THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

ADVANCED CRTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/2 **AGRICULTURE 2**

(For Both School and Private Candidates)

Time: 3 Hours. **ANSWER** **Year: 2020**

Instructions

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

1. Give a brief explanation on four cultural control methods that suppress pest population in integrated pest management.

One cultural control method is crop rotation. By changing the type of crop planted each season, the life cycle of pests that depend on a specific crop is interrupted. For example, rotating maize with legumes can reduce maize stem borer populations since the pest cannot find a suitable host in legumes.

Another method is timely planting. Sowing crops at the right time can help the crop escape the peak period of pest infestation. For instance, planting early can help the crop mature before the pests reach their destructive stage, thereby reducing yield losses.

Field sanitation is another important cultural method. By removing crop residues, weeds, and volunteer plants after harvest, the breeding grounds and hiding places for pests are eliminated. This lowers pest populations for the next cropping season.

Intercropping is also widely used. Growing two or more crops together can confuse pests or attract their natural enemies. For example, intercropping maize with beans can reduce stem borer attacks because the pests are distracted by the mixed plant environment.

2. (a) Explain to farmers on how to identify prevalence of viral disease in crop plants on the field by giving five points.

One way to identify viral disease is through leaf mosaic symptoms. Infected leaves often display irregular patches of green and yellow, giving them a mosaic-like appearance.

Another sign is leaf curling. Viral infection causes abnormal growth, making the leaves curl upward or downward, which weakens the plant.

Stunted growth is also a clear indication. Viral diseases interfere with plant metabolism, leading to reduced height and poor development compared to healthy plants.

Presence of vein clearing is another symptom. Infected plants show discoloration along leaf veins, making them appear transparent or yellow.

Reduced flowering and poor fruit set are also signs. Viruses weaken reproductive organs, leading to fewer flowers and malformed fruits, thus lowering crop yields.

(b) Briefly describe five agronomic practices that can be used to control disease infestation in plants.

One practice is the use of resistant crop varieties. Farmers should plant varieties that are naturally resistant to certain diseases, thereby reducing the spread and losses.

Crop rotation is another effective practice. Changing crops prevents the build-up of disease-causing pathogens in the soil, as most pathogens are host-specific.

Timely planting helps minimize disease infestation. By planting early, crops may escape periods when conditions are most favorable for disease outbreaks.

Proper spacing of crops reduces disease spread. Adequate spacing improves air circulation, lowering humidity levels that often favor the development of fungal and bacterial diseases.

Field sanitation is also essential. By removing infected plant materials, weeds, and debris, farmers destroy sources of inoculum that could re-infect healthy crops.

3. Briefly describe five ways to be taken in order to control Striga spp.

One way is crop rotation with non-host crops such as legumes. This starves Striga since it cannot parasitize non-hosts, thus reducing its population in the soil.

Another method is hand-pulling. Farmers can manually uproot Striga plants before they flower and produce seeds, preventing further spread.

Use of resistant crop varieties is effective. Plant breeders have developed maize and sorghum varieties that are resistant or tolerant to Striga infestation.

Application of organic manure is also useful. By enriching the soil, organic matter improves crop vigor and reduces the chances of Striga attachment to roots.

Seed treatment with herbicides such as imazapyr-coated maize seed is another strategy. The chemical kills Striga seedlings as they attempt to attach to the host crop.

4. (a) Justify the contention that 'plant disease are harmful' by giving four points.

Plant diseases reduce crop yields significantly. For example, maize streak virus can cause total crop failure, leading to food shortages.

They lower the quality of produce. Diseased fruits, vegetables, and grains may become unmarketable due to poor appearance, contamination, or reduced nutritional value.

Plant diseases increase production costs. Farmers must spend more on pesticides, resistant seeds, and labor to control and manage outbreaks.

They threaten food security. Severe epidemics can wipe out staple crops like cassava or maize, causing hunger and economic instability in farming communities.

(b) (i) Give three symptoms which might be observed to enable the farmer to identify Maize Streak Virus Disease.

One symptom is the presence of fine yellow streaks along the veins of the maize leaves, which later expand to cover the entire leaf.

Another symptom is stunted growth, as affected maize plants fail to develop normally, remaining short and weak.

Farmers may also observe poor ear formation, where the maize cobs are small, poorly filled, or completely absent due to the disease's effect on plant physiology.

(ii) Suggest six control measures of maize streak disease.

One measure is planting resistant maize varieties that can withstand the virus.

Farmers should also control insect vectors such as leafhoppers, which spread the virus, by using insecticides or cultural practices.

Early planting is recommended so that the crop establishes before vector populations peak.

Crop rotation with non-host crops reduces the build-up of the virus and its vectors in the field.

Field sanitation, including removal of volunteer maize plants and weeds, eliminates alternative hosts for the virus.

Community-wide control programs are also effective, where neighboring farmers coordinate planting and pest management to reduce disease spread.

5. Argue for and against the use of pure line selection in plant breeding by giving five points in each case.

For pure line selection, one argument is that it produces uniform crop varieties with similar growth characteristics, which makes management easier.

It enhances predictability of performance, since plants are genetically identical and respond uniformly to environmental conditions.

Pure line varieties often show high quality traits such as uniform seed size, taste, or fiber strength, making them preferred in markets.

It simplifies seed multiplication, as the same traits are preserved over generations without much variation.

Pure line selection helps in fixing desirable traits permanently, ensuring they are not lost through genetic mixing.

Against pure line selection, one point is that it reduces genetic diversity, making crops more vulnerable to pests, diseases, and climate stresses.

It can lead to reduced adaptability, as pure line crops may not perform well under varying environmental conditions.

Pure line varieties often have lower yields compared to hybrids, since hybrid vigor is absent.

Continuous use of pure lines may increase susceptibility to new pests and diseases that adapt to attack the uniform crop.

The process of developing pure lines takes longer and requires several generations of selfing, making it costly and time-consuming.

6. Describe the ways of collecting semen by using artificial vagina in a cattle by giving seven points.

The first step is to prepare the artificial vagina (AV) by warming it with water to match the body temperature of the cow, ensuring comfort for the bull.

The AV is lubricated internally to reduce friction and allow easy ejaculation.

A collection tube is attached securely at the end of the AV to receive the semen once the bull ejaculates.

The bull is then introduced to a teaser cow or a dummy to stimulate mounting behavior.

When the bull attempts to mount, the operator carefully guides the bull's penis into the AV instead of the cow's vagina.

As the bull ejaculates, the semen is collected in the attached tube, which is then sealed immediately to maintain viability.

Finally, the collected semen is transferred to a laboratory for evaluation, processing, and storage in liquid nitrogen for later use in artificial insemination.

7. Describe the function of the parts of the digestion system in poultry with the aid of an illustration.

The beak is the first part of the system. It is used for picking and swallowing food since poultry do not have teeth.

The crop is a sac-like structure that stores and softens food before it passes to the stomach.

The proventriculus is the glandular stomach where digestive enzymes and hydrochloric acid are secreted to start chemical digestion.

The gizzard, also known as the muscular stomach, grinds food with the help of swallowed grit, since poultry lack chewing teeth.

The small intestine is the site of nutrient absorption, where digested food is broken down and absorbed into the bloodstream.

The caeca are two small pouches that help in fermenting undigested food, especially fibrous material.

The large intestine absorbs water and forms feces, which are finally expelled through the cloaca.

8. (a) Briefly explain four limitations of natural pastures in livestock production in Tanzania.

One limitation of natural pastures in Tanzania is their low nutritive value. Many grasses and forbs in natural rangelands lack sufficient protein, minerals, and energy, which reduces livestock growth and productivity.

Another limitation is seasonality of production. Natural pastures grow vigorously during the rainy season but dry up during the dry season, leaving animals with insufficient feed. This seasonal variation causes weight loss and poor milk yield in livestock.

A further limitation is overgrazing. In areas with high livestock populations, natural pastures are grazed excessively, leading to land degradation, soil erosion, and reduced pasture regeneration capacity.

Lastly, natural pastures are prone to invasion by undesirable plant species and weeds. These invasive plants compete with useful pasture species and reduce both the quality and quantity of available forage.

(b) Give five points to educate livestock keeper in Tanzania on how to overcome limitations of natural pastures.

Livestock keepers can overcome pasture limitations by practicing pasture improvement techniques such as reseeding with high-quality grass and legume species to increase nutritional value and productivity.

They should also adopt controlled grazing methods like rotational grazing to prevent overgrazing and allow time for pastures to regenerate.

Supplementary feeding is another important measure, where farmers provide hay, silage, or crop residues during the dry season to ensure constant livestock nutrition.

Integration of legumes into pastures can also help overcome limitations. Legumes improve protein content and enrich soil fertility through nitrogen fixation, which benefits both crops and livestock.

Finally, proper weed control and pasture management should be emphasized to reduce the competition from undesirable species and ensure dominance of useful pasture grasses.

9. Briefly explain to what extent is genetic engineering important in agriculture by giving five points.

Genetic engineering is important in agriculture as it enables the development of crop varieties resistant to pests and diseases, reducing the need for chemical pesticides and lowering production costs.

It allows for the creation of drought-tolerant and climate-resilient crops, which are especially important in countries like Tanzania where rainfall is unpredictable.

Genetic engineering also helps improve the nutritional quality of food crops. For instance, biofortified crops such as Vitamin A-rich maize and rice can help address malnutrition in farming communities.

In livestock production, genetic engineering can be used to improve breeds for faster growth, better disease resistance, and higher productivity, leading to improved income for farmers.

Furthermore, genetic engineering plays a role in enhancing shelf life and marketability of agricultural products. Crops engineered to stay fresh longer can reduce post-harvest losses and increase food security.

10. (a) Identify other six symptoms expected from a chicken in which the faeces sample were taken.

The chicken may show loss of appetite, where it eats less or completely refuses to feed.

It may also exhibit diarrhea, with watery or bloody droppings being noticeable.

Another symptom is general weakness and lethargy, where the bird becomes less active and isolates itself.

Weight loss is another sign, as the chicken rapidly loses body condition due to nutrient malabsorption.

Ruffled feathers may also be observed, as the bird's body condition deteriorates.

In addition, the bird may show pale combs and wattles, which are indicators of anemia caused by internal parasites.

(b) Prescribe appropriate treatment for the infection of the chicken of which faeces were taken for laboratory examination.

The infection described is most likely coccidiosis, caused by protozoa of the genus Eimeria. Appropriate treatment includes administering anticoccidial drugs such as Amprolium or Sulfaquinoxaline in drinking water.

The use of ionophore-based anticoccidials like Monensin can also be effective, especially in flock-level management.

Supportive care should include providing adequate vitamins, particularly Vitamin A and K, to help the birds recover more quickly and regain resistance.

(c) Suggest six measures to be taken by farmers to control and prevent infection of the parasite of which oocysts were observed in the faeces.

Farmers should maintain strict hygiene in poultry houses by regularly cleaning and disinfecting floors, feeders, and drinkers to reduce oocyst buildup.

They should ensure proper litter management by keeping it dry, since moisture favors the survival of coccidia parasites.

Rotating or moving poultry to clean housing reduces exposure to contaminated environments and minimizes re-infection.

Providing anticoccidial feed additives as preventive measures is also important, especially in intensive production systems.

Farmers should avoid overcrowding in poultry houses to reduce stress and the spread of the parasite.

Finally, vaccination against coccidiosis can be adopted as a long-term preventive strategy, giving birds immunity and reducing dependency on drugs.