

2025 SUPER MOCK 1 – GENERAL AGRICULTURE 2 SOLUTION
PAPER 2

SECTION A

1. (a) Four factors that influence sustainable agriculture production in Ghana:

1. **Government Policies:** Policies related to subsidies (e.g., Planting for Food and Jobs), land tenure systems, and access to credit can either support or hinder sustainable practices.
2. **Climate and Weather Patterns:** Increasing climate variability, including erratic rainfall and prolonged droughts, directly impacts crop yields and the choice of sustainable farming methods like irrigation and drought-resistant crops.
3. **Soil Health and Management:** The fertility of the soil is crucial. Practices like crop rotation, use of organic manure, and cover cropping are essential for maintaining long-term soil health and productivity, but their adoption rates vary.
4. **Access to Technology and Knowledge:** The availability and adoption of modern farming techniques, improved seeds, pest management practices, and access to extension services significantly influence the ability of farmers to produce sustainably.

(b) Three routine maintenance carried out on a tractor:

1. **Checking and Changing Engine Oil:** Regularly check the oil level using the dipstick and top it up if necessary. The engine oil and filter should be changed at intervals recommended by the manufacturer to ensure proper lubrication and engine cooling.
2. **Cleaning the Air Filter:** The air filter prevents dust and debris from entering the engine. It should be regularly cleaned (by tapping out dust or using compressed air) or replaced if it is clogged, as a dirty filter can reduce engine power and increase fuel consumption.
3. **Checking Tyre Pressure and Condition:** Regularly inspect the tyres for correct inflation pressure, cuts, and wear. Proper tyre pressure is essential for traction, fuel efficiency, and stability.

(c) Three factors that accelerate agricultural development in Ghana:

1. **Investment in Research and Development:** The development and dissemination of high-yielding, disease-resistant crop varieties and improved animal breeds by institutions like the Council for Scientific and Industrial Research (CSIR) boost productivity.
2. **Infrastructure Development:** Improvements in rural roads, storage facilities (warehouses), and irrigation systems reduce post-harvest losses, improve access to markets, and enable year-round farming, thereby accelerating development.
3. **Value Addition and Agribusiness Growth:** Increased focus on processing raw agricultural produce into finished or semi-finished goods (e.g., fruit juices, packaged cassava flour) creates more value, generates employment, increases farmer incomes, and stimulates growth in the sector.

2. (a) Four factors to be considered in planning a farmstead:

1. **Proximity to Utilities and Roads:** The farmstead should be located near a reliable source of water for domestic and farm use, have access to electricity, and be close to a good road network for easy transportation of inputs and produce.
2. **Topography and Drainage:** The land should be well-drained and preferably on a gentle slope to prevent flooding and waterlogging around farm buildings. The main farmhouse is often sited at a higher elevation than other structures.

3. **Soil Type:** The soil should be suitable for the intended agricultural enterprises, whether for crop cultivation or for establishing pastures for livestock.
4. **Zoning and Orientation of Buildings:** Buildings should be grouped according to their function (e.g., residential area, livestock area, storage area). The farmhouse should be upwind from the livestock pens to avoid bad odors, and buildings should be oriented to take advantage of natural light and ventilation.

(b) Four problems associated with communal land ownership in Ghana:

1. **Lack of Security of Tenure:** Since farmers do not have individual titles to the land, they cannot use it as collateral to secure loans from financial institutions for farm expansion or improvement.
2. **Discourages Long-Term Investment:** Farmers are often hesitant to make long-term investments, such as planting tree crops, building irrigation systems, or undertaking significant soil conservation measures, because they are not guaranteed access to the same piece of land in the future.
3. **Land Disputes and Litigation:** Communal ownership can lead to frequent disputes over land boundaries, inheritance rights, and usage rights among family or community members, leading to costly and time-consuming litigation.
4. **Land Fragmentation:** As the community's population grows, the land is often subdivided into smaller, uneconomical plots for farming, making it difficult to practice mechanized agriculture and operate efficiently.

SECTION B

3. (a) Distinguish between the following terms:

(i) Micronutrients and Macronutrients:

- **Macronutrients** are essential plant nutrients that are required in relatively large quantities for plant growth and development. The primary macronutrients are Nitrogen (N), Phosphorus (P), and Potassium (K).
- **Micronutrients** (or trace elements) are essential plant nutrients that are required in very small or trace amounts. Despite being needed in small quantities, their absence can severely limit plant growth. Examples include Iron (Fe), Manganese (Mn), and Zinc (Zn).

(ii) Straight fertilizer and Compound fertilizer:

- **Straight fertilizer** is a type of fertilizer that supplies only one major nutrient. For example, Urea supplies only Nitrogen (N), and Muriate of Potash supplies only Potassium (K).
- **Compound fertilizer** (or mixed fertilizer) is a fertilizer that contains two or more major nutrients in combination. For example, NPK 15-15-15 is a compound fertilizer that supplies Nitrogen, Phosphorus, and Potassium.

(b) Five ways in which organic matter helps in maintaining soil productivity:

1. **Improves Soil Structure:** Organic matter acts as a binding agent, causing soil particles to form stable aggregates. This improves soil aeration, water infiltration, and root penetration.
2. **Increases Water Holding Capacity:** The humus in organic matter acts like a sponge, absorbing and retaining large amounts of water, which is then available for plant use, especially during dry periods.
3. **Supplies Plant Nutrients:** As organic matter decomposes, it slowly releases a wide range of essential nutrients (both macro and micro) that are vital for plant growth.

4. **Enhances Cation Exchange Capacity (CEC):** Organic matter has a high CEC, which means it can hold onto positively charged nutrients (cations) like potassium, calcium, and magnesium, preventing them from being leached away by rain and keeping them available for plants.
5. **Supports Soil Microorganisms:** It serves as a food source for beneficial soil organisms (like bacteria, fungi, and earthworms). The activities of these organisms help in nutrient cycling and improve overall soil health.

4. (a) Describe the following methods of land preparation:

- **(i) Slashing:** This is the initial step of clearing land, which involves cutting down weeds, grasses, shrubs, and small trees using tools like cutlasses or machetes. The slashed vegetation is often left to dry before being gathered or burned.
- **(ii) Stumping:** This is the process of removing tree stumps and their roots from the land after the trees have been felled. It is essential for preparing the land for ploughing and mechanization and can be done manually with tools like axes and hoes, or mechanically with bulldozers.
- **(iii) Mounding:** This involves gathering topsoil into heaps or mounds. Mounds are particularly useful for growing root and tuber crops like yam and cassava, as they provide a deep, loose soil medium for tuber development and improve drainage.
- **(iv) Ridging:** This is the process of making a series of linear, raised soil beds called ridges, separated by furrows. Ridging helps to control soil erosion, improves drainage in waterlogged areas, and is suitable for planting crops like maize, groundnuts, and vegetables.

(b) Four ways in which soil loses its fertility:

1. **Leaching:** This is the downward movement of dissolved plant nutrients (like nitrates) through the soil profile beyond the reach of plant roots. It is most common in sandy soils and areas with high rainfall.
2. **Soil Erosion:** The removal of the fertile topsoil by agents like wind and water. This is a major cause of fertility loss, as the topsoil contains the highest concentration of organic matter and nutrients.
3. **Crop Removal:** When crops are harvested and removed from the farm, the nutrients they absorbed from the soil are also removed. If these nutrients are not replenished through fertilizers or manure, the soil becomes depleted over time.
4. **Continuous Cropping:** Planting the same crop on the same piece of land year after year without practicing crop rotation or allowing the land to fallow. This depletes the specific nutrients required by that crop and can lead to a buildup of pests and diseases.

SECTION C

5. (a) Four agronomic factors that cause the death of transplanted seedlings:

1. **Transplant Shock:** The stress experienced by a seedling when it is moved from a controlled environment (like a nursery) to the open field can cause it to wilt and die if not managed properly through adequate watering and hardening off.
2. **Improper Planting Depth:** Planting seedlings too deep can cause the stem to rot, while planting too shallowly can expose the roots, causing them to dry out and die.
3. **Soil Moisture Stress:** Insufficient watering after transplanting or extremely dry soil conditions can lead to dehydration and death of the seedling. Conversely, waterlogged soil can suffocate the roots.
4. **Pest and Disease Attack:** Young, tender seedlings are highly vulnerable to attacks from soil-borne pests (like cutworms) and diseases (like damping-off) which can quickly kill them.

(b) Steps involved in calibrating a knapsack sprayer:

1. Fill the sprayer with a known quantity of clean water (e.g., 5 litres).
2. Mark out a trial area, for example, 10m x 10m (100 square meters).
3. Spray the trial area evenly, walking at a normal, steady pace and maintaining a constant pumping pressure.
4. After spraying the area, pour the remaining water from the sprayer into a measuring cylinder to determine the volume of water used.
5. Calculate the sprayer's discharge rate (e.g., if 2 litres were used for 100m², the rate is 2 litres/100m²).
6. Use this rate to calculate the amount of water and pesticide needed to spray the entire farm area. For example, for a 1-hectare (10,000m²) farm, you would need $(10,000 / 100) * 2$ litres = 200 litres of spray mixture.

(c) Three ways in which mulching improves crop yield:

1. **Moisture Conservation:** Mulch covers the soil surface, reducing water loss through evaporation. This keeps more moisture in the root zone available for the crop, which is crucial for growth and yield, especially in dry conditions.
2. **Weed Suppression:** A thick layer of mulch blocks sunlight from reaching the soil surface, which prevents weed seeds from germinating and growing. This reduces competition for water, nutrients, and light, allowing the crop to thrive.
3. **Temperature Regulation:** Mulch insulates the soil, keeping it cooler during the day and warmer at night. This protects plant roots from extreme temperature fluctuations, reducing stress on the crop and promoting healthy growth.

6. (a) Two causes of non-pathogenic diseases of crops:

1. **Nutrient Deficiencies or Toxicities:** A lack of essential nutrients (e.g., nitrogen deficiency causing yellowing) or an excess of certain elements (e.g., boron toxicity) can cause physiological disorders that resemble diseases.
2. **Extreme Environmental Conditions:** Unfavourable conditions such as extreme temperatures (heat or frost), poor drainage (waterlogging), drought, or improper soil pH can stress plants and cause non-pathogenic diseases.

(b) Four objectives of tillage:

1. **To prepare a suitable seedbed:** Tillage helps to create a fine, loose soil structure that allows for good seed-to-soil contact, which is essential for germination.
2. **To control weeds:** Tillage is a primary method of weed control, as it uproots weeds or buries them in the soil.
3. **To improve soil physical conditions:** It helps to improve soil aeration, water infiltration, and root penetration by breaking up compacted soil layers.
4. **To incorporate crop residues and fertilizers:** Tillage is used to mix crop residues, manures, and fertilizers into the soil, making them available for decomposition and nutrient release.

(c) Five problems affecting rice production in West Africa:

1. **Pest and Disease Infestation:** Rice is attacked by numerous pests, such as stem borers and armyworms, and diseases like rice blast and brown spot, which can cause significant yield losses. The African rice gall midge is a particularly devastating pest in the region.
2. **Inadequate Water Management:** Most rice is grown under rain-fed conditions, making it vulnerable to drought and erratic rainfall. In irrigated systems, there is often poor water management, leading to either water shortages or waterlogging.
3. **Low Soil Fertility:** Many rice-growing soils are inherently low in fertility, and continuous cultivation without adequate nutrient replenishment has led to a decline in yields.
4. **High Post-Harvest Losses:** Poor harvesting techniques, inadequate drying facilities, poor storage structures, and inefficient milling processes result in significant quantitative and qualitative losses of rice after harvest.
5. **Competition from Imported Rice:** Locally produced rice often struggles to compete with cheaper imported rice from Asia due to higher production costs and sometimes lower quality, which affects the profitability for local farmers.

SECTION D

7. (a) (i) Define the term cross-breeding as used in animal improvement: Cross-breeding is the practice of mating animals from two different established breeds. The goal is to produce offspring that combines the desirable traits of both parent breeds, a phenomenon known as heterosis or hybrid vigour.

(ii) Four advantages of cross-breeding in animal production:

1. **Hybrid Vigour (Heterosis):** The offspring (crossbreeds) often exhibit superior performance in traits like growth rate, fertility, and disease resistance compared to the average of their parents.
2. **Combines Desirable Traits:** It allows a breeder to combine the strengths of two different breeds. For example, mating a fast-growing exotic breed with a disease-resistant local breed can produce offspring that are both fast-growing and well-adapted.
3. **Improved Fertility and Survivability:** Crossbred animals often have higher conception rates, larger litter sizes, and lower mortality rates than purebred animals.
4. **Increased Production Efficiency:** The resulting improvements in growth rate and health can lead to more efficient production of meat, milk, or eggs, making the enterprise more profitable.

(b) Five ways in which fish farming is important to the economy of Ghana:

1. **Source of Protein and Food Security:** Fish farming increases the local supply of fish, a major source of affordable animal protein in the Ghanaian diet, thus contributing to national food and nutrition security.
2. **Employment Creation:** The aquaculture industry creates jobs for many people, including fish farmers, feed producers, equipment suppliers, processors, and marketers, especially in rural areas.
3. **Income Generation:** It provides a direct source of income for fish farmers and others involved in the value chain, helping to alleviate poverty and improve livelihoods.
4. **Reduction in Fish Imports:** By boosting domestic fish production, aquaculture helps to reduce the country's reliance on imported fish, which saves foreign exchange and reduces the national import bill.
5. **Economic Diversification:** Fish farming diversifies the agricultural sector and the overall economy, providing an alternative to traditional crop farming and fishing from natural water bodies, which are often overexploited.

8. (a) Two advantages of each of the following animal husbandry practices:

- **(i) Creep feeding:**
 1. **Heavier Weaning Weight:** It provides supplementary feed to young animals (like piglets or calves) while they are still suckling, leading to faster growth and a heavier weight at weaning.
 2. **Reduces Stress on the Dam:** It lessens the nutritional burden on the mother, allowing her to maintain better body condition and return to oestrus (heat) more quickly for re-breeding.
- **(ii) Debeaking:**
 1. **Prevents Cannibalism and Feather Pecking:** Removing the sharp tip of the beak in poultry prevents birds from injuring or killing each other, which is a common problem in crowded conditions.
 2. **Reduces Feed Wastage:** Birds with trimmed beaks are less able to scoop and flick feed out of troughs, leading to less feed wastage and improved feed conversion efficiency.

(b) Two bacterial diseases of farm animals:

1. Anthrax
2. Brucellosis (Contagious abortion)

(c) Five symptoms of ill-health in farm animals:

1. **Changes in Behaviour:** A sick animal may appear dull, listless, and isolated from the rest of the herd or flock. It may also show signs of restlessness or aggression.
2. **Loss of Appetite:** Refusal to eat or drink, or a significant reduction in feed and water intake, is a common early sign of illness.
3. **Abnormal Faeces and Urine:** Signs such as diarrhoea (scours), constipation, or changes in the colour or consistency of dung or urine (e.g., blood-stained) indicate a health problem.
4. **Poor Physical Appearance:** The animal's coat may appear rough and dull instead of smooth and shiny. There may also be a loss of body condition, drooping ears, or a hunched posture.
5. **Abnormal Discharges:** The presence of unusual discharges from the nose, eyes, mouth, or reproductive tract can be a symptom of various diseases.

SECTION E

9. (a) Four records that are kept on a farm:

1. **Production Records:** Details of yields (e.g., bags of maize harvested, litres of milk produced), births, and deaths.
2. **Financial Records:** Records of all income (sales) and expenses (purchases of inputs like feed, fertilizer, labour costs).
3. **Inventory Records:** A list of all farm assets, including land, buildings, machinery, tools, and livestock.
4. **Farm Operations/Diary Records:** A daily log of activities performed on the farm, such as planting dates, fertilizer application, pest control measures, and breeding dates.

(b) (i) Define the term value chain as used in agriculture: An agricultural value chain refers to the full range of activities and actors involved in bringing an agricultural product from input supply and production on the farm to final consumption. This includes stages like processing, packaging, storage, transportation, and marketing.

(ii) Two benefits of value chain development in agriculture production:

1. **Increased Farmer Income:** By connecting farmers more efficiently to processors and markets, and by creating opportunities for value addition, value chain development can lead to higher and more stable prices for their produce.
2. **Reduced Post-Harvest Losses:** A well-organized value chain improves coordination among actors, leading to better handling, storage, and transportation, which significantly reduces the amount of food that is lost or wasted after harvest.

(c) Three factors to be considered in the establishment of an agribusiness:

1. **Market Availability and Demand:** Before starting, it is crucial to research and identify a reliable market for the product. There must be sufficient demand to ensure that what is produced can be sold profitably.
2. **Access to Capital/Finance:** Establishing an agribusiness requires significant initial investment for land, equipment, inputs, and operational costs. A solid business plan is needed to secure funding from sources like banks, investors, or government grants.
3. **Technical Know-how and Management Skills:** The entrepreneur must have the necessary technical knowledge about the specific production process (e.g., crop cultivation, animal rearing) and strong business management skills in areas like finance, marketing, and human resources to run the enterprise successfully.

10. (a) Two advantages and two disadvantages of the individual extension teaching method:

- **Advantages:**
 1. **Effective for Teaching Complex Skills:** It allows for intensive, hands-on instruction and immediate feedback, making it very effective for teaching complex practices.
 2. **Builds Trust and Confidence:** The direct, personal contact between the extension agent and the farmer helps to build a strong relationship of trust and confidence.
- **Disadvantages:**
 1. **High Cost and Time-Consuming:** It is very expensive in terms of the agent's time and travel costs, as only one farmer is reached per visit.
 2. **Limited Coverage:** Due to the high cost and time involved, this method can only reach a very small number of farmers, limiting the overall impact of the extension service.

(b) Two reasons for carrying out each of the following marketing functions:

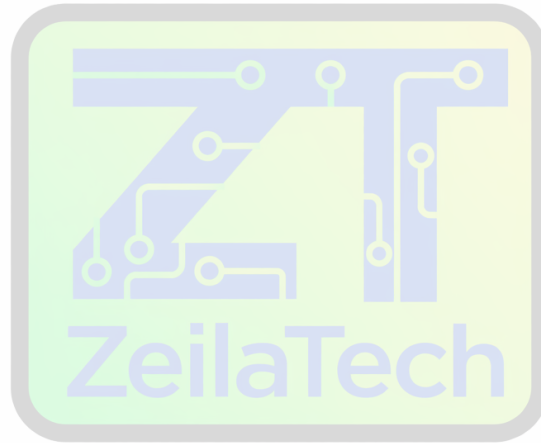
- **(i) Grading:**
 1. **To Facilitate Sale by Description:** Grading allows products to be sold based on a standard description (e.g., Grade 1 maize) without the buyer needing to physically inspect them.
 2. **To Ensure Fair Pricing:** It provides a basis for a fair pricing system where higher quality products fetch higher prices, rewarding farmers for producing better quality goods.
- **(ii) Advertising:**
 1. **To Create Awareness:** Advertising informs potential customers about the existence, features, and benefits of a product.
 2. **To Persuade Customers to Buy:** It aims to influence consumer choice and persuade them to purchase a specific product over its competitors.

- **(iii) Packaging:**

1. **To Protect the Product:** Packaging protects the product from damage, spoilage, and contamination during handling, storage, and transportation.
2. **To Provide Information and Convenience:** It provides essential information to the consumer (e.g., weight, ingredients, expiry date) and makes the product easier to handle and use.

(c) Three factors that determine the supply of land for agricultural production:

1. **Total Land Area of the Country:** The absolute physical size of a country sets the ultimate limit on the amount of land available for all purposes, including agriculture.
2. **Competition from Other Land Uses:** The demand for land for non-agricultural purposes such as housing, industrial development, infrastructure (roads, railways), and mining reduces the amount of land available for farming.
3. **Government Policies and Land Use Planning:** Government policies on land reclamation, conservation (e.g., creating forest reserves), and zoning regulations directly influence how much land is allocated and can be used for agricultural production.



Smart Learning Tools