

Agricultural Science

Year 1

SECTION

1

MEANING AND IMPORTANCE OF AGRICULTURAL SCIENCE



NEW DAWN IN AGRICULTURE

Misconceptions and Prospects in Agriculture and Farming

INTRODUCTION

You are welcome to Section 1 of the Agricultural Science learning material. In this section, you will learn about the meaning and importance of agriculture, then later explore some misconceptions about agriculture and how to address them. The significance of agriculture to Ghanaian households and the national economy cannot be overstated. You may have observed individuals in your community engaged in crop production, animal husbandry, and other agricultural activities. This section aims to provide an in-depth understanding of agriculture, enabling you to develop a more accurate and comprehensive perspective of the industry. Furthermore, the knowledge of Agricultural Science connects to interdisciplinary fields such as Environmental Science, Economics, and Sociology, offering valuable insights into how agricultural practices impact environmental sustainability, economic growth, and social structures. Note that these interdisciplinary fields are all factored into the content as the importance of agriculture to society.

At the end of this section, you should be able to:

- Explain the meaning and importance of agriculture.
- Identify and address misconceptions in agriculture and farming at the community and national levels.

Key Ideas

- **Farming** refers to the practice of growing crops and raising livestock for food or other products.
- **Agriculture** refers to the science or practice of farming, including the cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products for human consumption and industrial use.
- Agricultural science is the academic and scientific study of agriculture that involves researching and understanding the principles behind farming practices, developing new technologies and techniques to improve agricultural productivity, and addressing challenges such as pests, diseases, and environmental health.
- **Subsistence farming** is a type of farming that focuses on producing food to feed oneself and one's family with little or no surplus for sale.

- **Self-provision farming** is the type of farming that involves producing food primarily for one's consumption.
- **Commercial farming** is the type of farming that involves the production of crops or livestock for sale with the goal of profit maximisation.
- **Misconception** is a wrong belief or idea about something.
- **Prospects** refer to the possibility or likelihood of future success or advancement.
- **Climate resilience** refers to the capacity of farming systems and practices to withstand and adapt to the impacts of climate change.
- **Hybridisation** refers to a technique in breeding involving the crossing of two different species of animal, or two species of plant (genotypes) to achieve a desired trait or quality.

MEANING AND IMPORTANCE OF AGRICULTURE

Agriculture has long been a cornerstone of human civilisation, playing a crucial role in the development of societies around the world. Its importance is evident in the way it sustains populations by providing food, raw materials, and employment opportunities. In Ghana, agriculture remains a vital part of the economy, shaping the livelihoods of millions and contributing to the country's growth. Understanding the role and impact of agriculture offers valuable insight into how it has influenced cultural, economic, and social advancements over time.



Fig. 1.1: Traditional crop production



Fig. 1.2: Modern crop production



Fig. 1.3: Farm produce



Fig. 1.4: Some examples of farm animals raised in semi-intensive system

Meaning of Agriculture

Agriculture is the science or practice of farming, including the cultivation of the soil for growing crops and rearing animals to provide food, wool, and other products.

Agricultural science is the academic and scientific study of agriculture that involves researching and understanding the principles behind farming practices, developing new technologies and techniques to improve agricultural productivity, and addressing challenges such as pests, diseases, and environmental health. Invariably, agricultural science is the platform for developing the theories, tools, and equipment that are adopted and adapted for agricultural production.

Importance of Agriculture to Society

- 1. Food diversity and nutrition:** Agriculture contributes to the diversity of food available in Ghana. Traditional crops, fruits, vegetables, and livestock provide essential nutrients and contribute to a balanced diet. Promoting agricultural diversity enhances nutrition, improves dietary diversity, and helps combat malnutrition and related health issues.
- 2. Cultural heritage:** Agriculture is deeply connected with Ghana's cultural heritage. For instance, the cultivation of staple crops like maize, millet and yam is not only an economic activity but also a cultural practice, with deep-rooted significance in ceremonies such as festivals celebrations. In regions like the Northern and Volta areas, the cultivation of crops like shea and kente weaving from cotton, reflect centuries-old traditions that have shaped local identities and economies. These practices connect people to their ancestral heritage and continue to play an important role in both community life and Ghana's broader cultural landscape.
- 3. Provision of raw materials:** Agriculture is the source of raw materials for various industries such as textiles, pharmaceuticals, and biofuels. It supplies important resources or raw materials for manufacturing processes.
- 4. Food security:** Agriculture is the backbone of Ghana's food security. Most Ghanaians rely on agriculture for their daily sustenance, and the sector provides the country with a significant portion of its food supply.
- 5. Employment and livelihoods:** Agriculture provides jobs and a way of living for many people, especially in rural areas. Small farmers and workers in agriculture make up a large part of the workforce, helping to reduce poverty, create income, and support the economy.
- 6. Poverty alleviation:** Agriculture can help reduce poverty in Ghana. By improving agricultural productivity and promoting value-added activities, the sector can create income opportunities and reduce poverty levels, particularly in rural communities. The value-added activities in agriculture refer to processes which enhance the value of raw agricultural products through processing, packaging, branding, and marketing. For instance, turning raw milk into cheese, butter, or yoghurt. Similarly, processing fruits into juices, or jams.
- 7. National economic growth:** Agriculture plays an important role in Ghana's economy. It contributes to the country's gross domestic product (GDP) and export earnings.

The sector contributes to GDP in several ways among which include provision of employment for a large portion of the population and production of goods for domestic consumption and exports, especially through cocoa, cashew, and other cash crops. Additionally, the agricultural sector provides income opportunities for farmers, traders, processors, and other stakeholders along the agricultural value chain. Therefore, it stimulates economic growth, reduces rural-urban migration, and supports sustainable development.

8. **Trade and foreign exchange:** Ghana exports various agricultural products, such as cocoa, cashew nuts, timber, and fish, which generate foreign exchange earnings for the country. Agricultural exports contribute to Ghana's trade balance, enhance its international competitiveness, and promote economic stability.
9. **Provision of raw materials:** Agriculture is closely linked to rural development in Ghana. Investments in agricultural infrastructure, irrigation systems, rural roads, market access, and access to education can stimulate rural development and improve the living conditions of rural populations. It helps create sustainable livelihoods, improves social services, and reduces regional inequalities.
10. **Environmental Sustainability:** Sustainable agriculture practices are crucial for protecting Ghana's natural resources and environment. Implementing conservation agriculture, agroforestry, and organic farming practices can help maintain soil fertility, prevent land degradation, preserve biodiversity, and mitigate climate change impacts.
11. **Climate resilience:** Agriculture in Ghana is vulnerable to climate change impacts such as droughts, floods, and unpredictable rainfall patterns. Investing in climate-smart agricultural practices and technologies helps build resilience, enhances adaptive capacity, and ensures the sector's long-term sustainability.

Activity 1.1

Imagine you are a member of your community's agricultural council. Write down five (5) ways you think agriculture impacts your community and Ghana as a whole. Focus on areas like food production, employment, etc.

After listing your points, write an essay of 250 to 300 words explaining why agriculture is vital for national growth. Ensure that your essay connects agriculture to various societal benefits, highlighting how it contributes to improving living standards, creating job opportunities, and supporting economic stability.

Present your points to the class or friends by reading your essay. Listen to theirs and do further discussions.

Activity 1.2

1.
 - a. With a friend (s), conduct a survey within your community or school to gather opinions on the role of agriculture. Develop a set of simple questions about how agriculture affects daily life, such as its impact on food availability, job creation, or local businesses.
 - b. Distribute the survey to classmates, family members, or community members. Once you have collected the responses, analyse the data to identify common themes and significant findings.
 - c. Create a summary report of your findings, including graphs or charts to visualise the data. Present your report to the class, discussing how the survey results reflect the importance of agriculture in society.

MISCONCEPTIONS ABOUT AGRICULTURE AND FARMING IN GHANA AND HOW TO ADDRESS THEM

Agriculture in Ghana is shaped by rich cultural diversity across different communities, and people's perceptions of farming often vary based on their societal norms, beliefs and practices. Some cultures might view agriculture as an essential and prestigious activity, while others may have misconceptions, seeing it as a practice only for the poor or uneducated. These varying perceptions influence how agriculture is practiced and the extent to which it is embraced in different regions of the country. Societal forms affect people's view of farming. For instance, in some communities, farming is seen as a noble tradition passed down through generations, while to others, it may be viewed as less desirable compared to urban occupations.

Agriculture and farming in Ghana are fundamental to the nation's economy and way of life, yet there are several misconceptions that can cloud our understanding of their true significance. These misunderstandings often arise from outdated views or lack of knowledge about modern farming practices and their impact on society. Addressing these misconceptions is crucial for fostering a more accurate appreciation of agriculture's role in economic development, food security, and rural livelihoods. By exploring and correcting these false beliefs, we can enhance support for agricultural initiatives and promote more effective practices in the sector.

Misconceptions refer to wrong notions people have about agriculture due to lack of education, misinformation, cultural influences, and/or misinterpretation of information.

Some Misconceptions and How to Address Them

1. Those involved in agriculture are poor.

The majority of farmers do not own land and therefore need to raise capital to purchase or pay for leasing the land. Most farmers do not get access to loans and grants and thus are unable to acquire large parcels of land and the necessary machinery to produce on a large scale. These two factors tend to restrict many potential large-scale farmers to subsistence farming, leading to low levels of production and profit, with consequent poverty and poor livelihood. Many of you are wards of farmers and are aware of the financial and economic constraints most farmers face in Ghana. For example, at age 60 years and above, most Ghanaian farmers have no substantial property to bequeath to their wards, compared to other areas of work or employment. Hence, farmers' wards are not enthusiastic about farming.

However, some farmers in Ghana have achieved significant wealth and success. To discover more about them, take some time to search the internet for information on the wealthiest farmers and agricultural companies in Ghana for the year 2023 and previous years. Additionally, the Government of Ghana honours outstanding farmers across all branches of agriculture every first Friday in December, known as Farmers' Day. This special occasion recognises and celebrates exceptional contributions to the sector.

2. Agriculture is for males only.

In many parts of Ghana, agriculture is seen as “a man's job,” therefore deterring females from practising it. Female workers are mostly required at seed sowing, harvesting, conveyance stages, and initial processing, while the main farming activities such as land clearing, manual tilling, and tractor operation are reserved for males. To add, certain practices in the Ghanaian society have given rise to this notion. For instance, in the past, most cultures in Ghana did not give women access to, and ownership of, land. Hence, men eventually tended to own most of the lands and, thus, form the majority group in agriculture, especially major farming operations. Furthermore, women were referred to as the “weaker sex,” which has historically disallowed them from taking up certain tasks that had been tagged to be for men only. Today, these views are changing and women are entering the sector more - and becoming champions of it.

However, some females are successful crop, ornamental, and animal farmers in various communities in Ghana. Some notable females in agriculture in Ghana are:

- The 2023 National Best Farmer winner, Madam Charity Akortia.
- The 2023 National Most Enterprising Cocoa Farmer winner, Madam Faustina Asamoah.
- The 2023 National Best Coca Farmer winner, Madam Adwoa Sintim.
- The CEO of Agromart Solutions, Madam Hikimatu Kadiri. Her company provides plowing, harrowing, planting, and harvesting services to women across the northern region of Ghana.

- The Founder of Sungbo Women Empowerment Organization (SWEO), Portia Gban. This organisation empowers women in northern Ghana through supporting women farming and processing soybeans, maize, and shea butter.

3. Those in agriculture compel their wards to continue the farming traditions.

It is believed that most farmers practically force their children to continue the farming business and do not expose them to other job opportunities.

However, there are successful farmers whose children are not engaged in farming but are occupying top managerial positions in other sectors.

4. Farming is primitive and low-tech.

In Ghana, most farmers still use simple farm tools such as cutlasses, hoes, axes, shovels, pickaxes, and mattocks for tedious and strenuous farm operations such as ploughing, ridging, mounding, planting, and harvesting processes that discourage young people. Most school textbooks do not show farmers operating high-tech machinery that saves time and energy. Their artworks depict farmers doing everything by hand with the aid of simple farm tools. Korankye (2019) reported several reasons young people are not interested in agriculture. Paramount among the reasons were poor farming technology and the use of primitive tools.

However, contrary to assertions and beliefs, the world's scientific and technological advancements include farming. Tractors, ploughs, combine harvesters, planters, and other farming machinery are produced to increase efficiency, reduce resource use, and improve outcomes.

5. Farmers are generally uneducated.

Most Ghanaians think agriculture is just about land clearing or weeding, planting, and harvesting. However, issues about pest and disease control, hybridisation, genetically modified organisms (GMOs), storage, agro-processing, and distribution/marketing, for example, are integral parts of agriculture that require education and scientific approaches. Therefore, a higher education qualification is required to be successful in farming. Some of the very best farmers in Ghana are well educated, some with post-graduate degrees, and this includes females.

6. People who offer agriculture do not have good job prospects and have limited opportunities for further education.

Unfortunately, many young people feel that those who study agriculture at the secondary school or university level do not have good job prospects and have limited opportunities for further education.

But contrary to this misconception, the key advantage for school agricultural learners is self-employment. Most school leavers in other fields in Ghana face unemployment challenges, unlike those who study agriculture. Should you decide to proceed to further education, there are many programs for further studies. An agriculture student can become, for example, an animal or crop scientist, horticulturist, agricultural engineer, forensic scientist, biotechnologist, banker, agricultural economist, or nurse.

7. Farmers are uncultured rural folk.

Farming in Ghana is mostly practised in rural communities where farmers use primitive tools and are usually not well dressed; hence, they are seen as primitive and uncultured.

However, with modernisation, farming operations and farmers' appearance on the farm are changing rapidly. For example, commercial farmers and their workers dress in overalls and appropriate protective clothing on the farm.

8. Genetically modified organisms (GMOs) are evil and harmful and can alter the genes of consumers.

One common misconception is that genetically modified organisms (GMOs) are harmful and can alter the genes of consumers. In reality, GMOs undergo rigorous testing and regulation to ensure they are safe for consumption. They are designed to improve crop resilience, enhance nutritional value, and increase food security. Knowledge about genetically modified (GM) food and biotechnology is low among the Ghanaian public due to low levels of education and awareness of the topic. Thus, to address these misconceptions, experts must provide accurate information about the safety and benefits of GMOs. Educating the public through reliable sources and transparent research can help dispel myths and promote informed decisions about food.

Table : A List of Some Successful Farmers in Ghana

S/N	Name	Location	Farming Activities	Years of Practice	Award
1	Madam Charity Akortia	Agona West Municipality, Central Region	Mixed Farming (Includes crop cultivation and livestock rearing)	Over 20 years	2023 National Best Farmer
2	Theophilus Ezenrane Ackah	Nzulezo, Western Region	Large-Scale crop production and livestock farming	Over 15 Years	2023 first runner-up, National Best Farmer
3	Kwaku Yeboah Asumah	Kintampo South, Bono East Region	Crop farming, including maize and yam production	Over 15 Years	2023 Second runner-up, National Best Farmer

Activity 1.3

In pairs, read the scenario below and answer the follow-up questions. Present your answers to the class for further discussion.

Scenario:

In the small village of Dawa, there is a prevailing belief that female farmers cannot handle modern farming equipment, such as tractors and combine harvesters. This misconception has led to a lack of support for women in agriculture and limited their opportunities for advancing in their farming practices. Recently, the village has started a new initiative to improve farming productivity and technology. A local organisation has decided to conduct a series of workshops to address these misconceptions and encourage the participation of all community members, regardless of gender.

The workshops include practical training on operating modern machinery and discussions on successful female farmers who have excelled in using these equipment. The organisation has invited expert female farmers from different regions to share their experiences and demonstrate their skills.

Follow-Up Questions:

1. What is the main misconception about female farmers in the village of Dawa?
2. Why is this misconception problematic for the community and the farming industry?
3. How can research and real-life examples from the workshops address and debunk the misconception about female farmers?
4. What evidence from successful female farmers can be used to illustrate that women can effectively operate modern farming equipment?
5. How might addressing this misconception positively impact the farming practices and opportunities for women in Dawa?
6. What steps can be taken to further educate the community and change the perception of female farmers in agriculture?
7. How can you personally contribute to changing misconceptions about agriculture in your own community?
8. What role can education and technology play in overcoming such misconceptions and improving agricultural practices?

Activity 1.4

1.
 - a. Search online for information about common misconceptions in agriculture. Look for articles, videos, or research papers that address these myths and provide factual information.
 - b. Once you have gathered your information, write a short report (150-200 words) on how to address these misconceptions effectively. Your report should include a summary of the misconceptions, the correct information, and practical ways to educate others about these facts. If possible, include examples of successful campaigns or initiatives that have tackled these issues.
 - c. Share your report with your classmates through a digital presentation, a printed handout, or a hand-written report.

Activity 1.5

Research the stories of successful male and female farmers in Ghana who have pursued education and used their knowledge to improve their agricultural practices. Identify at least four (4) farmers (two males and two females) who have made significant contributions to the agricultural sector in the country.

Once you have gathered information about these farmers, write a report that includes:

1. Background Information:

- a. The educational background of each farmer.
- b. The type of farming they are involved in (e.g. crop farming, livestock, or agricultural operations).
- c. The region of Ghana where they operate.

2. Achievements:

- a. How has their education helped them succeed in farming?
- b. What innovative farming methods or technologies have they implemented to increase productivity?

3. Impact:

- a. How have these farmers contributed to their communities or the agricultural industry in Ghana?
- b. In what ways have they inspired others, particularly the youth, to take up farming as a career?

4. Reflection:

- a. Write a paragraph reflecting on what you have learned from these farmers' stories.
- b. How do you think education and farming can work together to transform the agricultural sector in Ghana?

After completing your report, create a short presentation summarising your findings, which can be shared with your classmates or friends.

EXTENDED READING

- <https://allianceforscience.org/blog/2020/05/misconceptions-about-gmos-in-ghana-due-to-weak-education-study-reveals/>
- Five top richest farmers in Ghana; Agro-learner.com <https://agrolearner.com/richest-farmers-in-ghana/>
- My Journey from Banking with Nothing and a Millionaire Farmer with 1,900 Acres of Farmland (<https://www.youtube.com/watch?v=wadzY4G0v6A>)
- Overview of Misconceptions of Youth About Agriculture: <https://agriculture.auburn.edu/hot-topics/5-misconceptions-about-agriculture-explained/>
- The Four Simple Steps to Start Vegetable Farming in Ghana: <https://www.demeterghana.com/article/top-10-essential-tips-for-launching-a-successful-farm-in-2024>

REVIEW QUESTIONS

1. How would you explain the term agriculture to a group of young people and make sure they understood how important it is to individuals and the country?
2. On a TV discussion program, a guest tried to convince parents in the audience not to allow their children to study agricultural science at secondary school because farmers were uneducated and poorly paid. How would you convince parents to allow their children to pursue a career in agriculture?
3. Agriculture has had a profound impact on society, shaping various aspects of human life, from economy and government to culture and health, social, environmental, technological, and industrial impact. Discuss these impacts of agriculture on society.
4. Imagine you are in a senior high school classroom. The teacher has just completed a unit on the study and practice of agriculture. To deepen your understanding, the teacher assigns a group activity where you need to outline some misconceptions about agriculture. In pairs, identify and outline at least three (3) common misconceptions about agriculture you have studied.
5. Identify and explain at least two (2) reasons to disprove the notion that agriculture is for males only.
6. Explain four (4) measures to address misconceptions young people have about agriculture.

ANSWERS TO REVIEW QUESTIONS

1. Agriculture is the science and practice of farming, including the cultivation of the soil for the growing of crops and the rearing of animals to provide food and other products for human consumption and industrial use.
2. Agricultural science should be studied in secondary schools in Ghana for the following reasons:
 - It helps students develop an understanding of the importance of agriculture to society as well as allowing some to progress to further and higher education.
 - It helps students understand the need for sustainable and efficient practices to address global food security challenges.
 - It helps students to contribute to environmental sustainability.
 - It helps students to appreciate new developments in agriculture.
 - It creates employment and ensures livelihoods for people.
 - It helps students gain a good understanding of the impact of climate change and how its effects can be minimised.
 - It provides students with knowledge of how to grow a range of farm crops and to raise livestock of a variety of kinds.
 - It provides students with opportunities to handle and use a range of farm tools, implements, and equipment.

3. Agriculture as a success story:

Significant improvements have been made in the types of crops grown and animals raised globally. Technology is now used more effectively to enhance how crops are cultivated and animals reared. Agricultural land has expanded, and increased use is made of freshwater and marine environments to exploit new resources. More research has been conducted on growing better crops and raising healthier livestock. Additionally, new chemicals have been developed to control pests and diseases, as well as to promote plant and animal growth.

As a result, in some parts of the world, there has been an overproduction of food, leading to people often eating too much and becoming overweight. In these areas, people tend to buy excessive amounts of food, leading to significant waste. Conversely, in other parts of the world, too little food is available, causing many people to go hungry, suffer from poor and unbalanced diets, or even die. The situation worsens in regions affected by wars or natural disasters, where food shortages are more severe. In such cases, food aid is often sent from regions with surplus supplies to those most in need.

Climate change is also expected to affect global food production, as natural disasters like floods, forest fires, and droughts will disrupt the natural food supply chains.

4. Outlining misconceptions about agriculture:

- People involved in agriculture are poor.
- Agriculture is only for males.
- Farming is primitive and low-tech.
- Genetically Modified Organisms (GMOs) are evil and harmful and can alter the genes of consumers.
- People pursuing careers in agriculture are often thought to have poor job prospects and limited opportunities for further education.
- Farmers are uncultured rural folk.

5. Reasons to disprove the notion that agriculture is for only males:

Evidence backs the historical and cultural contributions of women in agriculture.

Women have made substantial historical and cultural contributions to agriculture, actively involved in farming tasks such as planting, harvesting, livestock care, and managing household food production across diverse cultures, highlighting agriculture's inclusive nature across genders.

Support from modern advancements and educational opportunities.

With modern advancements and educational opportunities, women are now actively engaged in all aspects of agriculture, including fieldwork, agribusiness management, scientific research, and technological innovation, facilitated by inclusive agricultural education and training programs globally.

Also, support from economic empowerment and gender equality initiatives.

Various international and national organisations have launched initiatives promoting gender equality in agriculture, aiming to economically empower women by ensuring equal access to resources, training, and opportunities in the sector. For example, the United Nations' Food and Agriculture Organisation (FAO)

New initiatives from technological advancements and mechanization.

Technological advancements and farm automation have facilitated greater female participation in agriculture by reducing physical labour and opening new opportunities in research, management, and entrepreneurship.

6. Misconceptions about agriculture among young people can be addressed through:

Educational Campaigns and Workshops.

Organises workshops led by agricultural extension officers to educate them about modern agricultural practices and diverse career paths within the sector, showcasing success stories of young individuals thriving in agriculture to challenge misconceptions about its relevance and appeal.

Field trips and hands-on experiences.

Organise field trips to nearby farms or agricultural research facilities to provide them with firsthand exposure to farming practices and technologies, enhancing their understanding of modern agricultural innovations and opportunities.

Or

Collaborate with local agricultural organisations to arrange field trips and hands-on experiences where they can directly observe and participate in innovative farming techniques, meet diverse professionals in the agricultural sector, and gain firsthand knowledge that challenges misconceptions about agriculture as a limited or unappealing career choice.

Guest speakers and role models.

Invite accomplished young agricultural scientists as guest speakers to share their personal journeys, challenges, and successes with students, offering relatable and motivating examples of agriculture as a fulfilling and profitable career path.

Media and Technology Integration.

Integrate multimedia tools such as videos, podcasts, and social media platforms to deliver current insights and perspectives on agriculture, engaging students through documentaries on sustainable farming practices and interactive content from leading figures in agriculture, culminating in student-created multimedia presentations to share newfound knowledge with peers.

Incorporating Agriculture into the Curriculum.

Develop curriculum modules or projects that integrate interdisciplinary perspectives, such as the intersection of agriculture with environmental science, economics, and technology, providing students with a holistic understanding of agriculture's relevance and impact in various sectors of society.

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