Міністерство освіти і науки України
Національний університет водного господарства та природокористування

Кафедра іноземних мов

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МЕТОДИЧНІ ВКАЗІВКИ
та навчальні завдання
з розвитку
англомовного професійного спілкування
до практичних занять і самостійної роботи
для здобувачів вищої освіти першого (бакалаврського)
рівня за освітньо-професійною програмою «Агрономія»
спеціальності 201 «Агрономія»
галузі знань 20 «Аграрні науки та продовольство»
усіх форм навчання

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Методичні вказівки та навчальні завдання з розвитку англомовного професійного спілкування до практичних занять і самостійної роботи для здобувачів вищої освіти першого (бакалаврського) рівня за освітньо-професійною програмою «Агрономія» спеціальності 201 «Агрономія» галузі знань 20 «Аграрні науки та продовольство» усіх форм навчання. [Електронне видання] / Масло І. М. – Рівне : НУВГП, 2024. – 46 с.

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Зміст

Вступ

У сучасному світі, де відбувається активна інтеграція України у світове аграрне співтовариство, знання іноземної мови, зокрема англійської, є необхідною умовою для успішної професійної діяльності агронома. Володіння іноземною мовою дозволяє:

- *отримувати доступ до новітніх наукових досягнень та технологій у галузі сільського господарства;*
- *розширювати професійні контакти та співпрацювати з колегами з інших країн;*
- *представляти результати власних наукових досліджень на міжнародному рівні;*
- *брати участь у міжнародних проєктах та програмах обміну.*

Методичні вказівки та навчальні завдання з розвитку англомовного професійного спілкування для практичних занять і самостійної роботи для здобувачів першого (бакалаврського) рівня вищої освіти усіх форм навчання, які навчаються за освітньо-професійною програмою «Агрономія» спеціальності 201 «Агрономія» галузі знань 20 «Аграрні науки та продовольство» розроблені для *забезпечення ефективного опанування студентами англійської мови в контексті їхньої майбутньої професійної діяльності*.

Метою методичних вказівок та навчальних завдань є:

- *Сформувати* у студентів мовні навички (читання, аудіювання, говоріння, письмо), необхідні для успішного спілкування у міжнародному агрономічному середовищі.
- *Ознайомити* студентів зі спеціалізованою лексикою та термінологією у галузі агрономії, що дозволить їм розуміти наукову літературу, брати участь у професійних дискусіях та міжнародних конференціях.
- *Розвинути* у студентів комунікативні компетенції, необхідні для ефективного спілкування з колегами, партнерами та клієнтами з різних країн.
- *Сприяти* самостійному вивченню англійської мови та формуванню навичок самоорганізації навчального процесу.

Методичні вказівки та навчальні завдання складаються з *практичної частини (Unit)*, що включає тексти наукового й професійного характеру з вправами і завданнями до них, та *частини для самостійного опрацювання (Learn More)*, яка містить тексти, пов'язані з агрономією, завдання до них та посилання на додаткову інформацію.

Для досягнення цілей у методичних вказівках та навчальних завданнях використовуються такі методи навчання:

- *Комунікативний метод* націлений на розвиток усного та писемного мовлення в автентичних ситуаціях спілкування.
- *Аудіо-візуальні методи* передбачають використання аудіозаписів, відеоматеріалів та інших мультимедійних ресурсів для інтенсифікації навчального процесу.
- *Інтерактивні методи* спрямовані на активну участь студентів у навчальному процесі через виконання різноманітних завдань та проєктів.
- *Самостійна робота* передбачає виконання студентами індивідуальних завдань, що сприяє розвитку навичок самонавчання та самоконтролю.

У процесі опрацювання матеріалу та виконання комплексу вправ досягається розвиток умінь і навичок студентів, а саме:

- *Володіти* базовими граматичними конструкціями та лексичним запасом для спілкування на професійні теми.
- *Розуміти* зі слуху та *читати* тексти наукового і професійного характеру.
- *Складати* усні та письмові повідомлення на теми, пов'язані з агрономією.
- *Використовувати* англійську мову для спілкування у міжнародному агрономічному середовищі.

Методичні вказівки та навчальні завдання стануть важливим інструментом для успішного оволодіння англійською мовою й підготовки фахівців спеціальності «Агрономія».

SPEAKING

Agronomy is a branch of agricultural science that deals with the study and management of field crops, and the environment. It encompasses various aspects of crop production, including plant breeding, genetics, soil science, meteorology, and agricultural engineering. Agronomists work to develop sustainable and efficient agricultural practices that can increase crop yield and quality while protecting the environment.

1 **Answer the following questions based on the text.**

1. Why is it important to develop sustainable agricultural practices?
2. What are some challenges agronomists face in increasing crop yield and quality?
3. How can advancements in technology be used to improve agronomy practices?

2 **Are the statements *True* or *False*? Correct the false sentences.**

1. Agronomy only focuses on growing crops. __
2. Agronomists want to increase crop yield without considering the environment. __
3. Soil science is not important in agronomy. __

READING

WHAT IS AGRONOMY?

Agronomy is derived from the Greek words “agros”, meaning field, and “nomos”, meaning management. It is a multidisciplinary field that aims to optimize crop production and improve the quality of agricultural products while preserving natural resources and promoting environmental sustainability. Agronomists work to

develop and implement agricultural practices that are economically viable, socially acceptable, and environmentally responsible.

HISTORY OF AGRONOMY

Agronomy has a long and rich history that can be traced back to the beginnings of agriculture. Some of the earliest records of agronomic practices are found in ancient civilizations such as Egypt, Mesopotamia, China, and India. These civilizations developed various techniques for managing soil fertility, irrigation, and crop rotation.

In the 18th and 19th centuries, scientific advancements led to the development of modern agronomy. Key figures such as Justus von Liebig, a German chemist, and Sir John Lawes, an English entrepreneur, contributed to the understanding of plant nutrition and soil chemistry. Their work laid the foundation for the development of modern fertilizers and agricultural practices.

In the 20th century, agronomy continued to evolve with the development of new technologies and practices. The Green Revolution, which began in the 1960s, saw the introduction of high-yielding crop varieties, modern fertilizers, and improved agricultural practices. This revolution led to a significant increase in global food production and helped to alleviate and poverty in many parts of the world.

1 Answer the following questions and express your opinion.

1. In which era can we trace the beginnings of agronomy?
2. Give some examples of ancient civilizations that practiced early agronomy.
3. What scientific advancements in the 18th and 19th centuries contributed to modern agronomy?
4. Who were two key figures in the development of plant nutrition and soil chemistry?
5. What major development in the 1960s significantly increased global food production?
6. How did the Green Revolution help to address global issues?

VOCABULARY

PRINCIPLES OF AGRONOMY

Agronomy is the science of crop production and management. Several principles guide the practice of agronomy, including:

1. Soil Management. The soil is the foundation of all crop production. Agronomy emphasizes the importance of maintaining healthy soil through practices such as soil testing, nutrient management, and conversation tillage.

2. Crop Selection. Agronomists select crops based on factors such as climate, soil conditions, and market demand. They also consider the environmental impact of different crops and work to promote sustainable agriculture.

3. Crop Management. Agronomists develop and implement management practices that optimize crop growth, yield, and quality. This includes practices such as irrigation, fertilizer application, pest and disease control, and weed management.

4. Environmental Stewardship. Agronomy emphasizes the importance of protecting the environment through practices such as conservation tillage, crop rotation, and the use of cover crops. Agronomists also work to minimize the use of synthetic inputs and promote sustainable practice such as integrated pest management.

5. Research and Innovation. Agronomy is a constantly evolving field, and agronomists are always seeking new ways to improve crop production and management. This involves conducting research and testing new technologies and techniques.

Overall, the principles of agronomy are focused on promoting sustainable agriculture that balances the needs of crop production with environmental stewardship and social responsibility.

1 **Match the following agronomy terms with their definitions.**

1. Environmental Stewardship __ **2.** Crop Management __ **3.** Soil Management __ **4.** Research and Innovation __ **5.** Crop Selection __	***a)*** *The practice of selecting crops based on climate, soil conditions, and market demand.* ***b)*** *The foundation of all crop production, emphasizing maintaining healthy soil through practices like soil testing and nutrient management.* ***c)*** *Developing and implementing practices to optimize crop growth, yield, and quality, including irrigation, pest control, and weed management.* ***d)*** *Protecting the environment through practices like conservation tillage, crop rotation, and cover crops, minimizing synthetic inputs.* ***e)*** *The ongoing pursuit of new ways to improve crop production and management through research and testing of new technologies.*

2 **Complete the sentences with the correct word(s) in the box.**

• *conservation* • *innovative* • *integrated pest management* • • *sustainable* • *synthetic* •

1. Agronomists strive for _____ agricultural practices that balance productivity with environmental protection.
2. _____ tillage minimizes soil disturbance and erosion.
3. Farmers use _____ fertilizers to supplement natural soil nutrients.
4. _____ combines natural and biological methods to control pests.
5. Agronomists develop _____ technologies to improve crop production and management.

WRITING

3 **Imagine you're an agronomist in the year 2050. Climate change and population growth have created new challenges in agriculture. Design a sustainable farm of the future using principles of agronomy.**

Consider factors such as:

- What innovative technologies might be used for soil management and irrigation?
- How can you use crop selection and crop rotation to maximize yield and minimize environmental impact?
- What strategies might be used for pest and disease control, minimizing reliance on synthetic inputs?

4 **Design an infographic visually explaining the principles of agronomy. Use clear icons, diagrams, and concise text to illustrate each principle and its benefits for sustainable agriculture and "Free Professional Infographic Maker: Top Rated Templates"** https://piktochart.com/infographic-maker/

READING

IMPORTANCE OF AGRONOMY

Agronomy plays a critical role in addressing some of the most pressing global challenges, including food security, climate change, and environmental degradation. The world's population is projected to reach nearly 10 billion by 2050, which will place increasing pressure on the agricultural sector to produce more food with fewer resources. Agronomy contributes to food security by developing and promoting sustainable agricultural practices that can increase crop yield and quality while minimizing the use of natural resources and the impact on the environment.

Agronomy is also crucial in addressing climate change. Agriculture is both a significant contributor to greenhouse gas emissions and a sector that is highly vulnerable to the impacts of climate change. Agronomists work to develop climate smart agricultural practices that can both mitigate greenhouse gas emissions and enhance the resilience of agricultural systems to climate change.

Furthermore, agronomy plays an essential role in managing and conserving natural resources. Modern agriculture has led to

significant environmental challenges, including soil degradation, water pollution, and loss of biodiversity. Agronomists work to develop strategies and practices that can protect and restore soil health, conserve water resources, and maintain biodiversity in agricultural landscapes.

1 Answer the following questions and express your opinion.

1. How will the growing global population impact agriculture according to the passage?
2. In what way does agronomy contribute to food security?
3. How does agriculture play a dual role in climate change?
4. Explain the concept of "climate-smart agricultural practices" mentioned in the text.
5. Describe some environmental challenges caused by modern agriculture.
6. What role do agronomists play in managing and conserving natural resources?

2 Are the statements *True* or *False*? Correct the false sentences.

1. Agronomy plays a critical role in addressing global challenges. __
2. The world's population is decreasing by 2050. __
3. Agronomy promotes sustainable practices for food security. __
4. Agriculture has no impact on climate change. __
5. Agronomists develop practices to reduce greenhouse gas emissions. __
6. Modern agriculture improves soil health and biodiversity. __
7. Agronomy is essential for managing natural resources. __

VOCABULARY

KEY CONCEPTS IN AGRONOMY

Agronomy encompasses a range of scientific disciplines and concepts that are essential for understanding and managing crop production and the environment. Some key concepts in agronomy include:

Plant Genetics is the study of the inheritance of traits in plants, while ***Plant Breeding*** is the application of genetics to develop new plant varieties with desirable characteristics such as high yield, resistance to pests and diseases, and improved nutritional content. Advances in plant genetics and breeding have led to the development of modern crop varieties that have significantly increased food production and contributed to global food security.

Pedology or Soil Science is the study of the physical, chemical, and biological properties of soil and their influence on plant growth and the environment. Soil health is a critical component of sustainable agriculture, as healthy soils can support higher crop yields, enhance resistance to pests and diseases, and promote environmental sustainability. Agronomists work to understand the complex interactions between soil properties, management practices, and crop production to develop strategies for maintaining and improving soil health.

Plant Nutrition focuses on the essential nutrients required for plant growth and development and the mechanism by which plants acquire and utilize these nutrients. Understanding plant nutrition is crucial for developing fertilization strategies that can optimize crop yield and quality while minimizing nutrient losses and environmental impacts.

Pest and Disease Management is an essential aspect of agronomy that involves the study and control of organisms and pathogens that can harm crops and reduce agricultural productivity. Integrated pest management (IPM) is a key concept in agronomy that combines various control methods, such as biological, cultural, and

chemical control, to manage pests and diseases in an economically and environmentally sustainable manner.

Crop Physiology is the study of the physiological processes that occur within plants, including growth, development, and response to environmental factors. It is an essential component of agronomy, as it helps to understand the factors that influence crop yield and quality and develop strategies to optimize these factors.

Meteorology and Climate are critical aspects of agronomy, as they influence various factors that affect crop production, including temperature, precipitation, and solar radiation. Agronomists use meteorological data and climate models to understand the impacts of weather and climate on agricultural systems and develop strategies to mitigate these impacts and enhance the resilience of crops to climate change.

1 **Match the following agronomy concepts with their corresponding descriptions.**

1. Plant Genetics and Breeding __ **2.** Soil Science __ **3.** Plant Nutrition __ **4.** Pest and Disease Management __ **5.** Crop Physiology __ **6.** Meteorology and Climate __	***a)*** *The study of essential plant nutrients and how plants utilize them.* ***b)*** *The study of the inheritance of traits in plants and their improvement.* ***c)*** *The study of the physical, chemical, and biological properties of soil.* ***d)*** *The study of physiological processes within plants and their response to the environment.* ***e)*** *The study of weather and climate and their influence on crop production.* ***f)*** *The study and control of organisms that harm crops and reduce agricultural productivity.*

WRITING

2 **Complete the sentences with the correct word(s) in the box.**

• *climate* • *crop physiology* • *diseases* • *fertilization* •

• *integrated pest management* • *management* • *meteorology* • *pedology* •

• *pests* • *plant breeding* • *plant genetics* • *plant nutrition* • *quality* •

• *resilience* • *soil science* • *sustainable* • *understanding* • *yield* •

Agronomy is a scientific field concerned with the *1)*_____ and *2)*_____ of crop production and its impact on the environment. It involves understanding several key concepts.

*3)*_____ is the study of how traits are passed on from one plant generation to the next. This knowledge is applied in *4)*_____ to develop new plant varieties with desirable qualities such as high yield and disease resistance.

*5)*_____ or *6)*_____ is the science of soil, examining its physical, chemical, and biological characteristics. Healthy soil is crucial for *7)*_____ agriculture as it supports crop growth and environmental balance.

*8)*_____ focuses on the nutrients plants require for growth and how they absorb them. Effective *9)*_____ strategies are essential for maximizing crop yield while protecting the environment.

Managing *10)*_____ and *11)*_____ is vital in agronomy to safeguard crop health and productivity. *12)*_____ is an integrated approach that combines various control methods for sustainable pest management.

*13)*_____ explores the physiological processes within plants, including growth and response to environmental conditions. Understanding these processes aids in optimizing crop *14)*_____ and *15)*_____.

*16)*_____ and *17)*_____ significantly influence crop production. Agronomists use weather data and climate models to address the challenges posed by these factors and improve crop *18)*_____ to climate change.

3 **Develop an interactive infographic "The World of Agronomy" that explores the various fields within agronomy. Use a visually appealing layout with sections that reveal detailed information about each concept, including plant breeding techniques, soil testing methods, and integrated pest management strategies and "Free Professional Infographic Maker: Top Rated Templates"** https://piktochart.com/infographic-maker/

READING

AGRONOMIC KEY PRACTICES

Agronomic practices are the methods and techniques used to manage crops and the environment to optimize agricultural productivity and sustainability. Some key agronomic practices include:

Crop Rotation is the practice of growing different crops sequentially on the same piece of land. It is an essential agronomic practice that can improve soil health, reduce pest and disease pressure, and enhance crop yield and quality. Crop rotation can also help to maintain biodiversity in agricultural landscapes and reduce the reliance on synthetic fertilizers and pesticides.

Conservation Tillage is a set of tillage practices that aim to minimize soil disturbance and maintain soil cover, thereby reducing soil erosion, improving soil health, and conserving water resources. Examples of conservation tillage practices include no-till, reduced-till, and strip-till. These practices can also help to mitigate greenhouse gas emissions by enhancing soil carbon sequestration.

Integrated Nutrient Management involves the balanced and efficient use of both organic and inorganic sources of nutrients to optimize crop yield and quality while minimizing nutrient losses and environmental impacts. Agronomists work to develop and promote nutrient management practices that can enhance the efficiency of nutrient use and reduce the reliance on synthetic fertilizers.

Precision Agriculture is an agronomic practice that involves the use of advanced technologies, such as remote sensing, geographic information system (GIS), and global positioning systems (GPS), to monitor and manage crop production and the environment at a fine spatial scale. It can help to optimize the use of inputs, such as fertilizers and pesticides, and enhance the efficiency and sustainability of agricultural practices.

Cover Crops are plants grown between the main crops to provide various benefits, such as improving soil health, reducing soil erosion, enhancing water infiltration, and suppressing weeds. Cover crops can also help to maintain biodiversity in agricultural landscapes and provide habitat for beneficial organisms, such as pollinators and natural enemies of pests.

1 **Answer the following questions based on the text.**

1. What are the benefits of crop rotation?
2. How does conservation tillage contribute to sustainable agriculture?
3. What are the goals of integrated nutrient management?
4. How does precision agriculture help optimize crop production?
5. List some advantages of using cover crops.

2 **Are the statements *True* or *False*? Correct the false sentences.**

1. Crop rotation is the practice of growing different crops on the same land year after year. __
2. Conservation tillage is a set of practices that aim to minimize soil disturbance and maintain soil cover. __
3. Integrated nutrient management involves the balanced use of both organic and inorganic sources of nutrients. __
4. Precision agriculture is the use of advanced technologies to monitor and manage crop production at a fine spatial scale. __
5. Cover crops are plants grown between main crops to suppress weeds and improve soil health. __

VOCABULARY

3 **Match the words with their definitions.**

1. Crop Rotation __ **2.** Conservation Tillage __ **3.** Integrated Nutrient Management __ **4.** Precision Agriculture __ **5.** Cover Crops __ **6.** Nutrient __ **7.** Sustainable Agriculture __ **8.** Soil Health __ **9.** Biodiversity __ **10.** Ecosystem Services __	***a)*** *The chemical elements that plants require for growth and development.* ***b)*** *The ability of a soil to support the growth of plants and other organisms.* ***c)*** *The variety of life on Earth, including all plants, animals, and microorganisms.* ***d)*** *The benefits that humans derive from ecosystems, such as food, water, and clean air.* ***e)*** *The practice of managing agricultural resources to meet the needs of the present without compromising the ability of future generations to meet their own needs.* ***f)*** *The practice of growing different crops sequentially on the same piece of land.* ***g)*** *A set of tillage practices that aim to minimize soil disturbance and maintain soil cover.* ***h)*** *The balanced and efficient use of both organic and inorganic sources of nutrients.* ***i)*** *An agronomic practice that involves the use of advanced technologies to monitor and manage crop production and the environment at a fine spatial scale.* ***j)*** *Plants grown between the main crops to provide various benefits, such as improving soil health, reducing soil erosion, and enhancing water infiltration.*

4 **Complete the following sentences with the words from the text *"Agronomic Key Practices".***

1. _____ is the practice of growing different crops sequentially on the same piece of land.

2. _____ is a set of tillage practices that aim to minimize soil disturbance and maintain soil cover.

3. _____ involves the balanced and efficient use of both organic and inorganic sources of nutrients.
4. _____ is an agronomic practice that involves the use of advanced technologies to monitor and manage crop production and the environment at a fine spatial scale.
5. _____ are plants grown between the main crops to provide various benefits, such as improving soil health, reducing soil erosion, and enhancing water infiltration.

5 **Create a visually appealing infographic to illustrate the key principles and benefits of agronomic practices. Use clear and concise language, along with relevant graphics and diagrams to effectively convey the information to a broad audience. Use "Free Professional Infographic Maker: Top Rated Templates"** https://piktochart.com/infographic-maker/

6 **You are an agronomist advising a farmer on improving their corn-growing practices. Using your knowledge of agronomic practices, provide the farmer with several recommendations that will help them increase yields and conserve the environment.**

7 **Develop an interactive presentation to educate farmers and agricultural professionals about the benefits and best practices of adopting agronomic practices. Utilize interactive elements, such as videos, animations, and polls to enhance engagement and knowledge retention.**

READING

WHAT DOES AN AGRONOMIST DO?

An agronomist is a professional who specializes in the study of plants, soil, and their interactions with the environment. Agronomists typically work in agricultural settings, such as farms, ranches, or research institutions, where they use their expertise to improve crop yields, enhance soil quality, and optimize farming practices. Some of the specific tasks that agronomists might perform include:

- Conducting soil tests to determine nutrient levels and pH balance, and making recommendations for fertilization and soil amendments.
- Developing and implementing crop management plants that take into account factors such as weather patterns, pest and disease pressures, and soil conditions.
- Conducting research on new crop varieties and farming techniques, to improve yields and reduce environmental impacts.
- Advising farmers on best practices for irrigation, weed control, and other aspects of crop production.
- Monitoring and analyzing data on crop yields, soil quality, and other factors, and using this information to make recommendations for future improvements.

Overall, agronomists play a crucial role in ensuring that agricultural practices are sustainable, efficient, and environmentally responsible.

1 **Answer the following questions based on the text.**

1. What are the main areas of expertise for an agronomist?
2. Describe two specific tasks that an agronomist might perform.
3. Briefly explain how research conducted by agronomists can benefit the environment.
4. What information might an agronomist use to make recommendations for future improvements in agriculture?

2 **Are the statements *True* or *False*? Correct the false sentences.**

1. Agronomists primary work in laboratories. __
2. Agronomists recommend ways to improve soil quality. __
3. Agronomists develop new varieties of crops themselves. __
4. Agronomists advise farmers on how to control weeds. __
5. Agronomists are not concerned with the environmental impact of agriculture. __

VOCABULARY

3 **Match the terms with their definitions.**

1. Agronomist __ **2.** Soil Test __ **3.** Crop Management Plan __ **4.** Nutrient __ **5.** Pest __ **6.** Irrigation __	***a)*** *A chemical element that plants need for growth and development.* ***b)*** *An organism that damages crops.* ***c)*** *The process of supplying water to crops.* ***d)*** *An analysis of soil to determine its nutrient levels and pH balance.* ***e)*** *A plan that outlines how a crop will be grown, taking into account various factors.* ***f)*** *A professional who studies plants, soil, and their interactions with the environment.*

SPEAKING

4 **Imagine you are a farmer seeking advice from an agronomist. Describe a specific challenge you are facing with your crops (*e.g.* low yields, poor soil health) and explain how you think an agronomist could help you address it.**

VOCABULARY

WHAT ARE THE TOP SKILLS FOR AGRONOMIST?

Agronomists require a diverse set of skills to be effective in their work. Here are some of the top skills that are important for agronomists:

1. Plant and Soil Science. Agronomists need to have a strong understanding of plant and soil science, including plant physiology, soil fertility, and nutrient management.

2. Data Analysis. Agronomists often work with large amounts of data, including soil test results, crop yield data, and weather data. They need to be skilled in data analysis and be able to use statistical software to interpret and analyze data.

3. Communication. Agronomists need to be able to communicate complex scientific concepts to a variety of audience, including farmers, policymakers, and other stakeholders. They also need to be able to work effectively in teams and collaborate with other scientists and researchers.

4. Problem-Solving. Agronomists need to be able to identify and solve problems related to crop production, such as nutrient deficiencies, pest and disease pressures, and environmental concerns.

5. Technology Skills. Agronomists need to be comfortable working with a variety of technologies, including precision agriculture tools, GIS software, and remote sensing technology.

6. Adaptability. Agronomists need to be able to adapt to changing conditions, such as shifting weather patterns or new crop diseases. They also need to be able to stay up-to-date on the latest research and technology in their field.

7. Critical Thinking. Agronomists need to be able to think critically and analyze complex problems from multiple perspectives. This allows them to develop innovative solutions to the challenges facing agriculture today.

1 **Match the skills with their definitions.**

1. Plant and Soil Science __ 2. Data Analysis __ 3. Communication __ 4. Problem-Solving __ 5. Technology Skills __ 6. Adaptability __ 7. Critical Thinking __	***a)*** *The ability to identify and solve problems related to crop production.* ***b)*** *The ability to think logically and analyze information from different viewpoints.* ***c)*** *The knowledge of plant physiology, soil fertility, and nutrient management.* ***d)*** *The ability to use statistical software to interpret and analyze data.* ***e)*** *The ability to work with and utilize various agricultural technologies.* ***f)*** *The ability to communicate complex concepts to diverse audiences.* ***g)*** *The ability to adjust to changing conditions and stay up-to-date in the field.*

2 **Complete the sentences with the appropriate skills from the text.**

1. _____ is essential for agronomists to understand the needs of plants and soil.
2. Analyzing _____ helps agronomists identify trends and make informed decisions.
3. Effective _____ skills are crucial for explaining complex scientific information to farmers.
4. _____ allows agronomists to develop creative solutions to agricultural challenges.
5. Proficiency in _____ enables agronomists to utilize advanced technologies in their work.

3 **Rank the following skills (1 – being most important, 7 – being least important) based on their overall significance for an agronomist. Explain your reasoning for the ranking.**

- *Plant and soil science.*
- *Data analysis.*
- *Communication.*

- *Problem-solving.*
- *Technology skills.*
- *Adaptability.*
- *Critical thinking.*

4 **Imagine a debate on the topic *"Technology is the key to solving future agricultural challenges".* How would skills like data analysis, critical thinking, and communication be important for both sides of the argument?**

5 **Imagine the future of agriculture. What new skills or areas of knowledge might be important for agronomists in the years to come? Explain your reasoning.**

6 **Prepare for a job interview as an agronomist. Create a list of questions that demonstrate your understanding of the various skills required for the position.**

7 **Design a visually appealing infographic or presentation to showcase the diverse skills required for a successful career in agronomy. You can use "Free Professional Infographic Maker: Top Rated Templates"** https://piktochart.com/infographic-maker/

8 **Read a case study about a successful agronomist who implemented innovative practices on a farm. Identify the specific skills the agronomist used to achieve positive results.**

READING

CHALLENGES AND FUTURE OF AGRONOMY

Agronomy faces several challenges in the coming decades, including increasing food production to meet the growing global population, addressing climate change, and conserving natural resources. To overcome these challenges, agronomists must continue to develop innovative solutions and promote sustainable agricultural practices that can enhance the efficiency and resilience of agricultural systems.

One critical area of future research in agronomy is the development of climate-smart agricultural practices that can both mitigate greenhouse gas emissions and enhance the resilience of crops to climate change. This will involve the integration of advanced technologies, such as remote sensing, machine learning, and precision agriculture, to monitor and manage the impacts of climate change on agricultural systems.

Another area of focus will be the conservation and management of natural resources, such as soil, water, and biodiversity. Agronomists must continue to develop strategies and practices that can protect and restore soil health, conserve water resources, and maintain biodiversity in agricultural landscapes.

Finally, agronomy will play a crucial role in addressing global food security by developing and promoting agricultural practices that can increase crop yield and quality while minimizing the use of natural resources and their impact on the environment. This will require continued advancements in plant genetics and breeding, soil science, and other agronomic disciplines to develop high-yielding and resilient crop varieties and sustainable agricultural practices.

In conclusion. Agronomy is a vital field that addresses some of the most pressing global challenges, including food security, climate change, and environmental degradation. By developing and promoting sustainable agricultural practices, agronomists can contribute to a more secure and sustainable future for our planet.

1 Answer the questions based on the text.

1. What are three main challenges facing agronomy in the coming decades?
2. Briefly explain the concept of climate-smart agricultural practices.
3. How does agronomy contribute to the conservation and management of natural resources?
4. What is the ultimate goal of agronomists in terms of food security?

2 Are the statements *True* or *False*? Correct the false sentences.

1. Agronomy is not concerned with the environmental impacts of agriculture. __
2. Agronomists are developing ways to manage the effects of climate change on crops. __
3. Precision agriculture is a traditional farming practice. __
4. Agronomists aim to increase crop yields without using any natural resources. __
5. Agronomy plays a role in ensuring global food security. __

SPEAKING

3 Imagine you are an agronomist working in a region experiencing a water shortage. How would you apply your knowledge of agronomy to address this challenge?

4 Research and describe two emerging technologies (beyond those mentioned in the text) that have the potential to address some of the challenges faced by agronomy.

5 Create a catchy slogan that highlights the importance of agronomy in achieving a sustainable future.

1 WHAT IS AGRONOMY?

Every day, everyone is affected by agronomy. The food you eat, the coffee you drink, the ethanol-based gas in your car, the grass on the golf course, the natural fibers of the clothing you wear – all are products of agronomy and the work of agronomists.

Agronomy is a science and a practice that looks at agriculture from an integrated, holistic perspective. In agronomy, it's important to understand the properties of the soil and how the soil interacts with the growing crop; what nutrients (fertilizers) the crop needs and when and how to apply these nutrients; the ways that crops grow and develop; how climate and other environmental factors affect the crop at all stages; and how best to control weeds, insects, fungi, and other crop pests.

If that weren't enough, another huge consideration in agronomy is how to grow crops effectively and profitably while conserving natural resources and protecting the environment.

In short, growing crops requires collaborations among many, many fields, including the traditional soil, plant, and weed sciences, as well as related disciplines such as ecology, entomology, climatology, and economics. The best crop production methods are always grounded in scientific research. As a result, they are by nature continually evolving and improving.

Agronomy can also be grouped by the type of crop grown. Many agronomists specialize in one or more types of crops.

2 WHAT IS SUSTAINABLE AGRONOMY?

We define secure and sustainable food production as growing adequate nutritious and affordable food for the world's growing population while protecting the environment.

There are 7.5 billion people on our planet (2017). They need food production that ensures the safety of natural resources. These

resources may be air, water, soil, and more. The population is expected to be close to 10 billion by 2050. We need to find the practices and solutions that preserve resources and feed future generations.

Agronomists formed the backbone of the Green Revolution. They applied the latest scientific research in genetics and agriculture to develop new varieties of crops. These superior crops had desirable genetic traits that helped them resist diseases and adapt to a variety of growing conditions. They also benefited from improved agricultural techniques used by farmers in the United States and other nations.

3 BE AN AGRONOMIST!

Agronomists are plant and soil scientists who develop innovative farm practices and technologies that not only boost crop yields but also control pests and weeds and protect the environment. Agronomists are also professional practitioners, educators, and advisers who work directly with farmers, companies, and others in the ag community to implement the latest methods and tools for growing crops profitably and sustainably.

Agronomists play critical roles in issues of global concern, such as food security.

But the reach of agronomists and agronomy doesn't end on the farm. Agronomists also play critical roles in issues of global concern, including food and water security, air quality and climate change, soil loss and degradation, health and nutrition, and many others.

A future as an agronomist is exciting and promising! With the right education, training, and commitment to the profession, there are many good paying jobs and opportunities.

If you have a natural curiosity and enthusiasm for science to help solve some of the toughest problems facing humanity and want to be part of the efforts to increase the supply of high-quality food, feed, fiber, fuel and even pharmaceuticals while protecting and preserving the environment – agronomy may be the career for you!

DO YOU KNOW 1 ...

AGRONOMY FEEDS THE WORLD

TELLING THE STORY:

- Agronomy Overview
- Managing Water
- Healthy Soil
- Farm to Table

https://www.agronomy4me.org/what-is-agronomy/videos

LEARN MORE 2

1 CROPS – MORE THAN FOOD

If you have traveled along a highway, you probably passed miles and miles of corn. Who eats all that corn? Or its neighboring acres of soybean? Cattle and other livestock eat lots of it in animal feed. But that's not the whole story. Corn is a multi-tasker! It has many uses, which is true for soybean, sugarcane, cotton, and many of the world's major crops.

All crops – like all living things – are basically chemical factories. The carbohydrates in corn make them good fuel for cars as well as for us. The oils in soybean can be used to make inks and crayons as well as salad dressings. The fibers that surround cottonseeds can be spun into fabric, while the seeds themselves can be crushed into oil for frying or baking or processed into fuel.

Crops are definitely much more than food. You may be using one right now and not even know it.

DO YOU KNOW 2 ...

THE TOP TEN FOOD CROPS

TAKE THE QUIZ:

https://www.agronomy4me.org/quiz/

2 FOOD CROPS

Food crops, in agronomic terms, are different from feed crops (see below). They are the crops we are most used to seeing in produce sections, as well as vegetable- and grain-based processed foods (oils, starches, proteins, and flours). As you can see from the information below, wheat, soy and corn cover the most farmland in the world. However, most of the wheat you buy comes in the form of bread, pasta and other products made from wheat flour. The same goes for corn and soy.

Many people envision that vegetable crops are grown on small farms, for farmers markets. In reality, most vegetables are grown on large, specialized farms. They have many custom-designed pieces of machinery to help ease the labor. Many fields may cover hundreds of acres, and farms may be spread over several regions or states. This helps ensure a steady supply of fresh produce to the market.

Major vegetable crops include potato, lettuce, peppers, tomatoes, squash, sweet corn, green beans and watermelon (watermelon is included here as it is grown like a row crop, on the ground).

3 FEED CROPS

Feed refers to grains and other vegetable products (like soy) that are grown to meet the nutritional needs of livestock. Corn that is grown for cows and cattle is much different than the sweet corn you are used to picking up at farmer's markets or your grocery store. Feed crops include "small grains" such as wheat, oats, barley, and rice. They also include taller grain crops like corn and sorghum.

Alfalfa and other forage crops are grown for their stems, leaves, and other edible plant parts. Livestock either graze these crops in fields or eat stored forages.

4 FIBER CROPS

You might not think of your cotton jeans as coming from a crop – but cotton is big business! And, cotton growers benefit from the researchers and practitioners who work with them. Cotton needs water, nutrients, and all the other things that crops need to grow good yields. Hemp, which was banned from production in the United States in the 1960s (except by special permission), is also a fiber crop.

Beginning in the 1990s, the United States has been working toward more energy independence. Biofuels and biodiesel crops became of interest in many states. There are even incentive programs to grow these crops. They are grown to be processed into ethanol and biodiesel.

CHAPTER 1

CORN: YOUR PREFERENCE IS THE NEW VARIETY

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter1_Corn%3BYourPreference.pdf

CHAPTER 2

CROPS, WOULD YOU INVEST?

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter2_CropsWouldYouInvest.pdf

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LEARN MORE 3

1 PROBLEMS WITH PESTS

Look at a field of corn, and it appears to be just corn. But the corn shares the field with other living things – plants, animals, and

microbes. Crops are part of an ecosystem of living and non-living things.

Some of a crop's field mates don't affect the crop at all. Some can be beneficial, while others can be downright dangerous and even wipe out an entire crop. They are pests – weeds, damaging insects, and disease-causing microbes.

CHAPTER 3

PESTS: WHAT'S THE PROBLEM?
A PUBLIC SERVICE ANNOUCMENT

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter3_PestsWhatsTheProblem.pdf

2 WEEDS

There's no such thing as a weed in nature! However, we think of weeds as plants growing where we don't want them. As an example, a rose bush in a garden isn't a weed but if it was growing in the middle of a cornfield, it would be a weed! And, by their nature, weeds are survivors.

Weeds can outcompete crops because they have one or more of these qualities:

- *produce lots of seeds, which often can survive buried in soil for a long time and grow when conditions become favorable;*
- *have roots that spread quickly;*
- *adapt to sites that have been disturbed by people, such a plowed fields or vacant lots.*

They cause problems because they:

- *rob crops of light, water, and nutrients;*
- *grow faster than crops and crowd them out;*

- *can produce certain chemicals that are toxic to crops or grazing animals.*

But the same plant not in a garden or farm field can be beneficial. A "weed" can:

- *hold soil in place and enrich it with organic matter;*
- *provide habitat for wildlife;*
- *produce nectar for bees.*

DO YOU KNOW 3 ...

AGRONOMY WEEDS

TAKE THE QUIZ:
https://quizlet.com/143682204/agronomy-weeds-flash-cards/

3 INSECTS

Different pests can become problems at different times of the growing season, depending on the pest's – and the crop's – stage of growth. Examples are:

- *Seedcorn maggots spend the winter in the soil, ready to burrow into soybean seeds after spring planting. Soybean aphids are later, as they suck the juices out of soybean leaves.*
- *Japanese beetles can be found throughout the season chewing on leaves.*
- *Grasshoppers can be a big problem late in the season, especially in dry years. They feed on the soybean's leaves and pods.*

DO YOU KNOW 4 ...

AGRONOMY INSECTS

TAKE THE QUIZ:
https://quizlet.com/751554079/insects-agronomy-test-flash-cards/

4 DISEASE CAUSING MICROBES

Crop diseases can be very harmful to crops and yields. Examples of diseases include sudden death syndrome, stem rust, and blossom end rot. They can occur if all three of these factors are present:

- *A plant is susceptible to the disease-causing organism(s).*
- *There is a pathogen (organism) present to infect the host.*
- *There is a proper environment for the crop and pathogen to grow.*

5 CONTROLLING PESTS

Controlling pests is challenging. But agronomists love challenges, solving complex problems. To deal with pests, they map out a plan that begins with trying to prevent the pest in the first place. They use their knowledge of pest biology and habitats – where they live. When agronomists need to control a pest, they make decisions that will have the least effect on the farmer's budget, people, and the environment. In "agronomy-speak," that is called integrated pest management, or IPM for short.

DO YOU KNOW 5 ...

PESTS AND DISEASE CONTROL

https://www.youtube.com/watch?v=rXJCtftIJtY

LEARN MORE 4

1 BRINGING CROPS AND LIVESTOCK TO THE FARM ... TOGETHER

Remember the nursery rhyme and song, *'Old MacDonald Had a Farm'*? MacDonald raised a diversity of crops and animals. Why? He couldn't have operated his farm without either of them. For example, grains from MacDonald's crops fed his animals, which in turn produced manure to fertilize his crops and help them grow. Likewise, remains from crops after he harvested them helped sustain the animals that produced milk and meat for market and his family. Crops and livestock depended on each other to survive. They formed a system of connected parts – an ecosystem.

Today, however, most farmers specialize in livestock or crops. Crops are often grown in monocultures, many acres planted in a single type of crop. As a result, livestock and crops have become disconnected. And farm operations have become less diversified.

However, a growing number of agronomists and farmers are exploring ways to re-integrate livestock and crops. They see opportunities for farmers to be more efficient, more profitable – and provide more benefits for the environment.

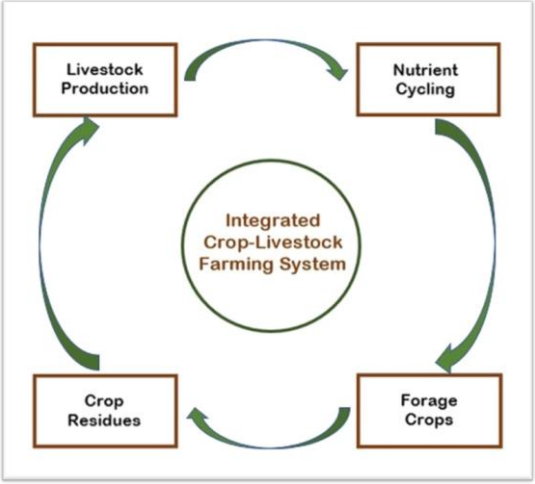
CHAPTER 4

AGRICULTURE A WINNING RELATIONSHIP

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter4_AgricultureWinningRelationship.pdf

NUTRIENTS AND ENERGY CYCLE THROUGH ALL ECOSYSTEMS:

- *Sun: supplies light energy*
- *Atmosphere and Precipitation: supplies water and nutrients*
- *Primary Producers: use light energy to produce plant material*
- *Primary Consumers: animals that eat plants*
- *Secondary Consumers: animals that eat animals that eat plants*



LEARN MORE 5

1 NUTRIENTS – VITAMINS FOR PLANTS!

Just as we need vitamins and minerals from our food to grow and thrive, plants need nutrients from the soil to grow. ***Phosphorus (P), Nitrogen (N), Potassium (K),*** and ***Calcium (Ca)*** are important nutrients for plant growth.

Soil passes nutrients on to us in the crops and the animals that become our food. As plant roots absorb water from the soil, they also take in nutrients that are dissolved in the water. How do nutrients get into the soil?

- *Soil bacteria decompose animal wastes and dead organisms and release nitrogen.*
- *Soil bacteria convert nitrogen from the atmosphere into compounds plants can use.*
- *Farmers add nutrients to the soil.*

Most soils have a large supply of nutrients. But when soils are continually used for growing food, nutrients are removed when the

crop is harvested. That's why farmers must add nutrients to their soils.

DO YOU KNOW 6 ...

PLANT NUTRIENTS

https://www.youtube.com/watch?v=Katy6SSf8FI

2 HOW TO IDENTIFY NUTRIENT DEFICIENCIES IN PLANTS?

For plants to grow and develop normally, several mineral components must be present in the soil or other growing medium. ***Magnesium (Mg), Phosphorus (P), Potassium (K), Sulfur (S), Calcium (Ca), and Nitrogen (N),*** include examples of major, or macronutrients because large amounts of them are required.

Zinc (Zn), Boron (B), Manganese (Mn), Iron (Fe), and Molybdenum (Mo) are examples of trace or micronutrients. Crops require all of them to complete their life cycle.

Because plants absorb and consume more significant elements, they must be replaced more frequently than minor elements. The development and growth of crop plants are jeopardized if any of these are present at levels below the minimum necessary and whenever plants can't adequately absorb them.

The majority of the symptoms and signs of plant nutrient deficiency can affect any plant organ, whether it is internal or external, and can occur in healthy and unhealthy plants alike.

DO YOU KNOW 7 ...

A BEGINNERS GUIDE: NUTRIENT DEFICIENCY

https://www.youtube.com/watch?v=9SotrCwqfHo

3 PUTTING TECHNOLOGY TO WORK IN THE FIELD

How do growers know how much nutrients need to be added to the soil? One way is using crop sensors. Crop sensors are computerized information-based technologies that are part of precision agriculture. For centuries, farmers have known that no two soils are the same. Some need more water. Some need more fertilizer. And parts of the same field can be different. And, if too little added, crops don't produce as well while if too much is added, excess nutrients can run off the fields or leach down through the soil into the groundwater.

However, with the help of technology, farmers can manage their fields as smaller, individual fields. This practice saves time, money, and the environment.

So, how do they work? The crop sensor is mounted on the tractor which moves across the field. The sensor emits a burst of light onto the crop's leaves and measures the amount of light reflected back. Dark green leaves reflect less light back than lighter ones. Lighter leaves indicate the plant needs nitrogen. Nitrogen is a major component of chlorophyll, the compound that gives plants their green color. The computer calculates the amount of nitrogen to apply to that part of the field as it goes along!

Nutrient management requires knowledge of the soil, nutrients, the plant, and the environment. Once the right nutrient rate is determined (through soil testing), the grower must then consider how the nutrient will be applied, the timing of the application, the placement, and which product will provide the best solution to the nutrient needs.

DO YOU KNOW 8 ...

SOIL SCHOOL: HOW NUTRIENTS MOVE

https://www.youtube.com/watch?v=IpeLfwJs0EU

1 WATER MATTERS

When looking at Earth from space, it appears that water is nearly everywhere. And it is. But only 3% of the Earth's water is freshwater – water that we can use to drink and grow crops. Demands for enough clean water are increasing, but supplies aren't. Water, like oil and gas, is a limited resource. But unlike them, there is no substitute for good old H_2O.

So what does that mean for agriculture? That's a critical question, especially as global population increases. Not only will agriculture need more water, so will other consumers like homeowners and industry. Competition for sufficient clean water is becoming fierce.

Right now, agriculture is the world's largest user of water. Also, agriculture impacts the quality of water that ends up in streams, rivers, and oceans. What will that mean for agriculture – and its ability to produce food? That's the challenge for agronomists today and the next generation of agronomists. How can farmers make every drop of water count while producing more and protecting the quality of water all of us depend on?

CHAPTER 5

WATER! HOW CAN YOU HELP?

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter5_WaterHowCanYouHelp.pdf

2 WATER CYCLE

Agronomists need to understand the Earth's water cycle so they can look for ways to use water wisely in agriculture. What is the Water Cycle? It's the way water moves on, in and above the earth's

surface – in all of its forms (liquid, gas, solid). Let's take a look at the Water Cycle …

Water is primarily stored in oceans, rivers, and lakes and evaporates into the atmosphere. Water also is stored in soil which evaporates and in plants and is removed through evapotranspiration (sort of like when we breathe and water vapor evaporates). It's also stores in ice, snow and glaciers and evaporates as well. All of that water vapor in the atmosphere creates condensation becomes liquid and forming clouds. These cloud particles fall out of the sky as rain, snow, and even hail. That precipitation runs off the soil back into the oceans, rivers and lakes. Much of it infiltrates into and through the soil and back into the cycle as groundwater.

So how can we help conserve water when growing crops?

- *Keep water in the soil through no-till and keeping the roots of the plants in the soil over the winter.*
- *Keep year-round vegetation to soak up water and un-used nutrients – preserving the quality of water for people living downstream.*
- *Grow water-saving crops.*
- *Put water only where it is needed using drip-irrigation.*
- *Fertilize only when needed.*
- *Irrigate only when needed.*

DO YOU KNOW 9 …

WATER CYCLE

TAKE THE QUIZ:
https://quizlet.com/493421058/water-cycle-quiz-2-flash-cards/

LEARN MORE 7

1

SOIL HEALTH
WE GOTTA HAVE IT, BUT WILL WE?

What do soil and oil have in common? Both are natural resources, materials produced by Earth. Oil is a non-renewable resource. But what about soil? Could we ever run out?

Not exactly. Ask most agronomists and soil scientists, and they will say: Soil isn't as renewable as we once thought. What they mean is that we can run out of "quality soil." That's soil that is healthy enough to produce an abundance of crops or livestock year after year.

Here's what's going on. During the past 50 years, quality soils have been lost – degraded – faster than nature can rebuild them. Most crops need at least four to five inches of healthy soil to grow well. But, one inch of soil can take 500 years to form. That's more than five lifetimes. So, on a human time scale, soil is a non-renewable resource.

At the same time that soil resources are declining, world population is growing. In less than 35 years, we'll need our soils to produce 70% more food, fiber, and sources of energy. And, we need to do so in a way that protects the environment for the future. That's a huge challenge for agronomists and soil scientists.

2 SO LET'S LEARN MORE ABOUT SOIL!

Soil covers about 30% of the Earth's surface. It's the building block for all the ecosystems that form on land. The thickest soils are only about 9 feet deep, while the depth of the Earth from its surface to its core is over 20,000,000 feet! Soil is a complex mixture of minerals, air, water, and organic matter – organisms and the decaying remains of once-living ones.

There are many soil properties that help us describe and manage soils. From how it forms, to its texture, structure, and color – these properties tell us about the soil.

BRITISH SOCIETY OF SOIL SCIENCE
https://soils.org.uk/

3 WHAT'S SO IMPORTANT ABOUT SOIL?

Soil performs many critical functions in almost any ecosystem (whether it's a farm, forest, prairie, marsh, or city) and to perform these functions, we need health soils!

Soils:

- *serve as a media for plants;*
- *help the atmosphere by absorbing gases and dust;*
- *provide a habitat for animals that live in the soil (such as groundhogs and mice) or organisms (such as bacteria and fungi);*
- *clean and capture water;*
- *process recycled nutrients for use over and over again;*
- *are the foundation for construction of houses, roads, dams, buildings;*
- *and so much more!*

CHAPTER 6

SOIL. WHAT'S THE DIFFERENCE?

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter6_SoilWhatsTheDifference.pdf

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LEARN MORE 8

1 COPING WITH CLIMATE CHANGE

Earth is warming, causing a change in our global climate and agriculture is at high risk.

Today, the average global temperature is higher than it has been for the past 10,000 years and perhaps longer. During our planet's 4.5-billion-year history, Earth has been warmer, and it has been colder. But this time is different. Why? First, warming is occurring

much more rapidly than in the past. Second, people – not natural causes – are the major drivers of change.

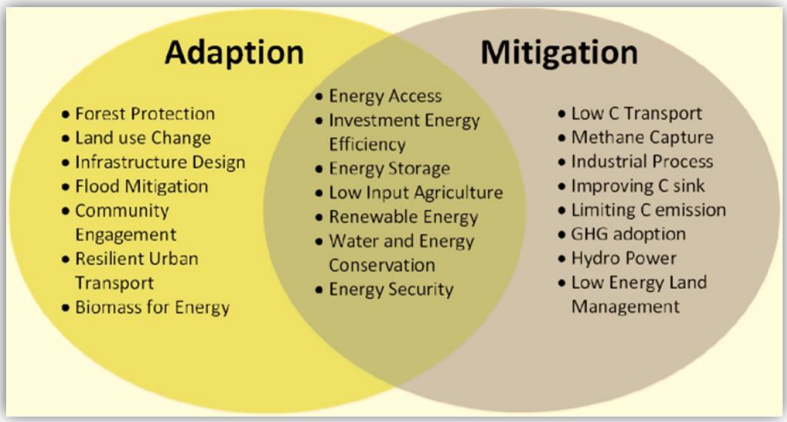
Over the last century, our activities – including agriculture – have added carbon dioxide and other greenhouse gases to the atmosphere. These heat-trapping gases have built up faster than they can escape into outer space. Our climate has warmed and continues to do so.

Agriculture is already suffering the effects of increasing heat, droughts, floods, and pests. And that puts food security at risk. For agronomists, "the heat is on." Agriculture has to be climate smart. That means adapting to a changing climate – changing how we raise our crops and livestock and treat our land. That's key to both reducing the effects of climate change on agriculture and the effects of agriculture on climate.

THE HEAT IS ON ... HERE COME THE AGRONOMISTS!

Agronomists use two major strategies to tackle climate change:

1. *Reduce its effects: Adaptation*
2. *Reduce its causes: Mitigation*



2 CLIMATE CHANGE: CAN WE BLAME NATURE?

Before humans, climate changes were caused entirely by natural factors that affect how much solar energy reaches earth. More solar energy increases temperatures. Less solar energy decreases temperatures.

Factors include:

- *Variations in Earth's orbit over the span of tens of hundreds of thousands of years. These changes probably caused past cycles of ice ages.*
- *Small ups and downs in the sun's intensity occur in cycles.*
- *Aerosols ejected by volcanic eruptions and meteor strikes can block sunlight, causing cooling.*
- *Variations in the levels of greenhouse gases in the atmosphere.*

Scientists have found no evidence that natural factors alone could have caused recent climate change.

DO YOU KNOW 10 ...

CLIMATE CHANGE

https://www.bbc.com/news/science-environment-24021772

CHAPTER 7

CLIMATE. WHAT'S YOUR PREDICTION?

https://www.agronomy4me.org/sites/default/files/inline-images/Chapter7_ClimatePrediction.pdf

3 WHAT IS THE GREENHOUSE EFFECT?

It is a layer of naturally occurring gases – *carbon dioxide* (CO_2),

methane (CH_4), *nitrous oxide* (N_2O) and *water vapor* (H_2O) – which helps trap some of the sun's heat. Otherwise our planet would freeze.

Here's how it works:

- *Incoming energy from the sun (solar radiation) penetrates the atmosphere. Earth's land, oceans, and lower atmosphere absorb most of the incoming energy. As a result, Earth's surface warms.*
- *In turn, the warmed surface releases heat back to the atmosphere in the form of infrared radiation.*
- *Greenhouse gases absorb some of the infrared radiation and send it back to Earth's surface. That causes temperatures to rise.*
- *Higher levels of greenhouse gases correspond to higher global temperatures.*

Sources of Greenhouse Gases from human activity are:

- *Energy Supply 26%*
- *Industry 19%*
- *Forestry 17%*
- *Agriculture 14%*
- *Transportation 13%*
- *Residential and Commercial Buildings 8%*
- *Waste and Wastewater 3%*

4 HOW DOES AGRICULTURE GENERATE GREENHOUSE GASES?

Agriculture removes CO_2 from the atmosphere, storing it in crops, pastures, and soil. That helps to reduce climate change. Agricultural activities also result in the emission of CO_2 and other greenhouse gases that contribute to the greenhouse effect.

DO YOU KNOW 11 ...

GREENHOUSE EFFECT & GREENHOUSE GASES

https://www.youtube.com/watch?v=XFCdxppTsu0

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