

Lesson Plan

Unit 2 – Better Living through Agriscience

Performance Objective

After the learner completes Unit 2 and participates in the suggested activities, the learner should be able to determine important elements of a desirable environment and explore efforts made to improve the environment.

Competencies

- Describe the conditions of desirable living spaces
- Discuss the influence of climate on the environment
- Compare the influences of humans, animals, and plants on the environment
- Examine the problems of an inadequate environment
- Identify significant world population trends
- Identify significant historical developments in agriscience
- State practices used to increase productivity in agriscience
- Identify important research achievements in agriscience
- Describe future research priorities in agriscience

Terms to Know

The following terms are used in this unit and defined in the text glossary. Spanish translations of the terms also appear in the glossary.

- **sewage system** — receives and treats human waste.
- **polluted** — containing harmful chemicals or organisms.
- **condominium** — apartment building or unit in which the apartments are individually owned.
- **townhouse** — one of a row of houses connected by common side walls.
- **famine** — widespread starvation.
- **contaminating** — adding material that will change the purity or usefulness of a substance.
- **parasite** — organism that lives in or on other organisms with no benefit to the hosts.
- **reaper** — machine that cuts grain.
- **combine** — machine that is used to cut and thresh seed crops such as grain.
- **moldboard plow** — plow with a curved bottom that will turn prairie soils.
- **cotton gin** — machine that removes cotton seed from cotton fiber.
- **corn picker** — machine that removes ears of corn from stalks.
- **milking machine** — machine that milks cows and goats.
- **tractor** — source of power for belt-driven machines as well as for pulling.
- **legume** — plant in which certain nitrogen-fixing bacteria utilize nitrogen gas from the air and convert it to nitrates that the plant can use as food.
- **tofu** — food made by boiling and crushing soybeans and letting it coagulate into curds.
- **Katahdin** — popular potato variety of the 1930s.
- **BelRus** — superior baking potato bred to grow well in the Northeast.
- **Russet** — potato grown in volcanic soils of Idaho and the Northwest; greater resistance to disease and insects results in greater yields.

- **Green Revolution** — process in which many countries became self-sufficient in food production.
- **feedstuff** — any edible material used for animal feed.
- **selective breeding** — selecting the strongest plants of each generation to parent the next generation.
- **genetic engineering** — physically putting certain genes into the cells of a plant or animal.
- **monoclonal antibodies** — natural substances in blood that fight diseases and infections.
- **hybrid** — plant or animal offspring from crossing two different species or varieties.
- **lasers** — devices used to determine wavelengths given off by plants.

Curriculum Standards Correlations

- National AFNR Performance Indicators: CS 01.03, CS 05.03, CS 06.01, CS 06.03, BS 01.01, BS 01.02, BS 01.03, BS 03.01
- CCTC Standards: AG 2, AG 3, AG 4, AG-ENV 4, AG-NR 2, ST 4, ST-SM 3
- Green Sustainability Knowledge and Skills Statements: Agriculture, Food, & Natural Resources Career Cluster™ 1, 3, 4, 7, and 8; STEM Career Cluster™ 2

Instructor Resources

- Computerized test bank in ExamView®
- Instructor slide presentations
- Correlation guides (National AFNR, CCTC, and Green Sustainability)
- Image Library
- CourseMate materials for Unit 2

Instructor Notes:

- Using Terms to Know from the beginning of the chapter, the teacher should make a handout of a word search puzzle by visiting www.puzzlemaker.discoveryeducation.com. Use the puzzle to introduce the lesson. Have the students write the meanings of selected words on the back of the handout.
- Visit the computer lab and let students look up their choice of a prominent American who was responsible for an agriscience invention. Have each student describe the events that led up to the invention that made its inventor famous.
- While in the computer lab, use the Excel program to make charts of Figure 2-21 describing labor and yield of wheat, corn, and cotton.
- Allow time to review Unit 2 and complete the self-evaluation.

Class Activities and Projects

1. Discuss ways that farm work has changed during the last 100 years. Identify several important tasks that must be done by farmers. Describe how each of those tasks was done 100 years ago. Describe how farmers perform each of those tasks today. What scientific discoveries have contributed to greater efficiency in doing farm work today?
2. Investigate ways that new and modern farming methods have contributed to opportunities in career fields other than agriculture. How have efficient farming methods benefited all the citizens of the United States?

3. Using library materials, the Internet, or other scientific sources, learn about climates in the latitudes of 90, 60, and 30 degrees. Using the information you have obtained about these regions, determine what kinds of crops might be raised at each of these latitudes.
4. Using the CourseMate resources, have students complete the matching exercise in Worksheet 02-01.
5. Suggest an FFA SAE (supervised agricultural experiences) project idea:
 - Study the effects of genetic selection in groups of animals over time (FFA SAE Ideas, Animal Systems 56).
 - Conduct a local water quality study (FFA SAE Ideas, Environmental Service Systems 24).
 - Research the effectiveness of genetically modified (GM) crops (FFA SAE Ideas, Plant Systems 42).

Essay Questions

1. Describe how genetically altered crops have changed pesticide use.
 - A significant and well-documented outcome derived from the adoption of genetically engineered plants is the declining use of pesticides. The USDA reported that pesticide use declined by 14% over an eight-year period. These findings should be no surprise considering that many genetic modifications have introduced pest resistance into some of our most widely used food plants. One such plant is the potato. This crop is highly vulnerable to the Colorado potato beetle, and an entire field can be destroyed by this pest in a very short period of time. The adult and immature forms of this beetle eat the stems and foliage and destroy the ability of the plant to engage in photosynthesis. The traditional treatment for these pests has been to apply pesticides to the crop. Potatoes that have been genetically modified to resist the beetles are able to produce a chemical that does not affect humans, but which poisons the beetles as they eat the foliage. The end result is that pesticides are no longer needed to control this pest in potato varieties that carry the resistant gene.
2. Describe a career in environmental management, including work settings and responsibilities.
 - Management of the environment requires the attention of consumers as well as professionals. However, specialists in air and water quality, soils, wildlife, fire control, automotive emissions, and factory emissions all help maintain a clean environment against tremendous population pressures in many localities. Helicopter, airplane, and satellite crews gather important data for scientific analysis to help monitor the quality of our environment. Individuals in environmental careers may work indoors or outdoors; in urban or rural settings; or in boats, planes, factories, laboratories, or parks. Careers range from laborer to professional. Environmental concerns are high on global agendas today as nations attempt to reduce global hunger and pollution.

3. Identify and discuss the importance of the contributions of Cyrus McCormick, Thomas Jefferson, John Deere, Eli Whitney, and Joseph Glidden.
 - In 1834, Cyrus McCormick invented the reaper, a machine to cut small grain. Later, a threshing device was added to the reaper, and the new machine was called a combine. The reaper cut and bundled the grain in the field. Today, grain is harvested with a machine called a combine, which cuts and threshes in a single operation.
 - Thomas Jefferson's invention of an iron plow to replace the wooden plow of the time was of great significance. Later, in 1837, a blacksmith named John Deere experienced the frustration of prairie soil sticking to the cast-iron plows of the time. It became apparent that Jefferson's invention would not work in the rich prairie soils of the Midwest. Through numerous attempts at shaping and polishing a piece of steel cut from a saw blade, the steel moldboard plow evolved. That plow permitted plowing of the rich, deep prairie soils for agricultural production and launched the beginning of the John Deere Company.
 - In 1793, Eli Whitney invented the cotton gin. The cotton gin separated the cotton seeds from cotton fiber. This paved the way for an expanded cotton and textile industry.
 - Joseph Glidden developed barbed wire, with sharp points to discourage livestock from touching fences. This effective fencing permitted establishment of ranches with definite boundaries.

Suggested Assessment/Homework Activities

You may choose to assign any or all of these items or provide some as additional review options or for extra credit. Depending on the length of your course, you may break the unit reading into segments or assign different items for homework each night. Note that the lab manual exercises are designed to be conducted in a group lab setting and require additional materials and preparation, and may be spread across units.

Textbook

- Complete Self-Evaluation for Unit 2
- Read Unit 3

CourseMate

- Review the Study Guide
- Complete the assignments for Unit 1 (02-01 and 02-02)
- Complete worksheets for Unit 1 (02-01)
- Study the Flashcards
- Explore the Web links
- Complete the pre-assessment quiz for Unit 3
- Complete the post-assessment quiz for Unit 2
- Review engagement tracker to track student progress and time spent on each activity.

Lab Manual

- Exercise 4: Don't Drink the Water: Insight into Water Safety

Online Resources:

- Investigate the state of the food supply worldwide by looking at the [Famine Early Warning System](#). Search for “Famine Early Warning System.”
- Explore various types of [Farm Machinery](#). Search for “University of Reading” and “ECIFM.”
- Learn about the [Ten Agricultural Inventions that Changed the Face of Farming in America](#). Search for “farm collector” and “ten agricultural inventions.”
- Examine [Tracking Down the Roots of Our Sanitary Sewers](#). Search for “sewer history.”
- Review the [Science and Technology of Agriculture](#). Search for “Iowa pathways” and “science” and “agriculture.”
- Search terms for additional resources: genetic engineering, pollution, recombinant DNA, and sanitary sewers.

Answers to Self-Evaluation

A. Multiple Choice

- | | | | | | | | | | |
|-----|---|-----|---|-----|---|-----|---|-----|---|
| 1. | c | 2. | c | 3. | a | 4. | a | 5. | d |
| 6. | a | 7. | b | 8. | a | 9. | c | 10. | d |
| 11. | d | 12. | d | 13. | b | 14. | b | | |

B. Matching (Group I)

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|----|---|----|---|----|---|----|---|----|---|
| 1. | d | 2. | f | 3. | g | 4. | e | 5. | h |
| 6. | c | 7. | i | 8. | b | 9. | a | | |

Matching (Group II)

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|-----|---|-----|---|-----|---|----|---|-----|---|
| 1. | b | 2. | e | 3. | d | 4. | g | 5. | f |
| 6. | a | 7. | c | 8. | j | 9. | l | 10. | m |
| 11. | i | 12. | k | 13. | h | | | | |