Agricultural Science and Careers

An Interactive Curriculum for Youth Educators

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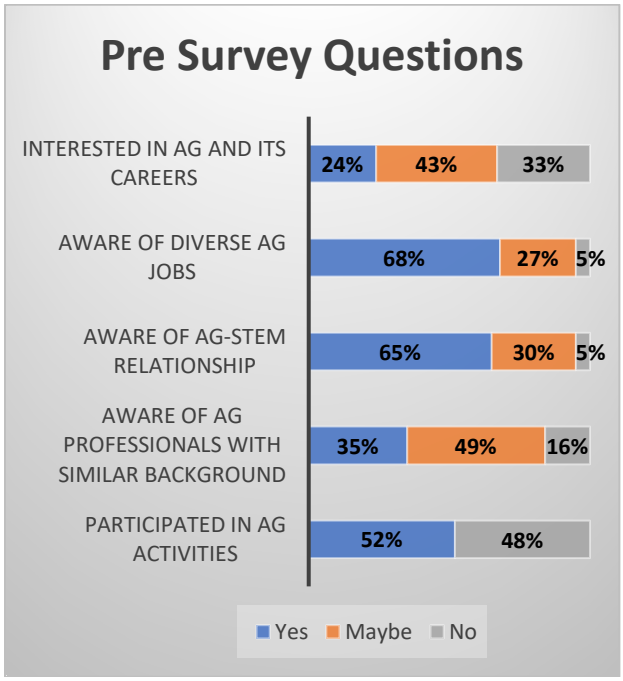
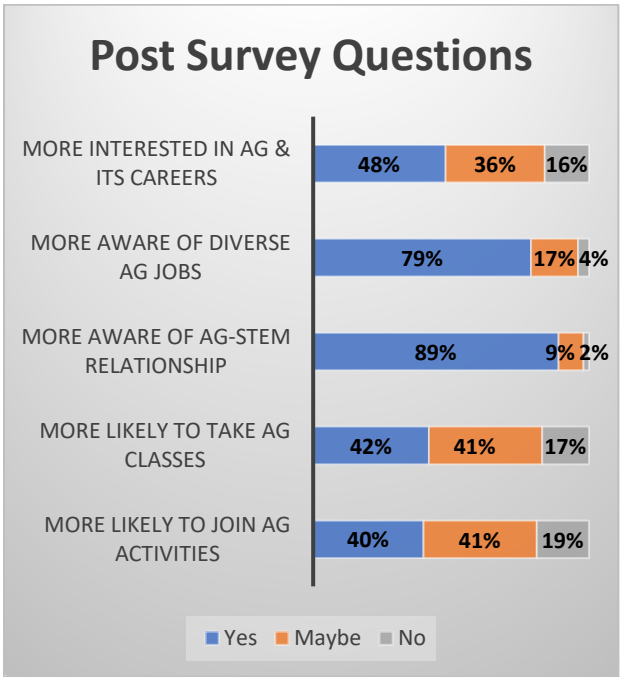
Introduction

This curriculum was developed because understanding of agriculture and interest in agricultural careers have been declining among youth. The agricultural sector is employing fewer workers, so youth are less likely to be closely connected with adults working in agriculture. At the same time, agricultural jobs are becoming more specialized and less visible to the public eye. Thus, today's youth—and even many parents and educators—are not aware of the breadth of agricultural career pathways. This lack of awareness may be especially prevalent among socially or economically disadvantaged youth, who tend to have less access to educational opportunities and less exposure to career options. However, people of all backgrounds and aptitudes are needed to be part of the solutions to the complex societal and environmental challenges associated with producing food, fuel, and fiber for the world. Intentional education is therefore essential for mobilizing diverse youth to pursue personally and financially rewarding careers in agriculture.

A team of professionals from four educational institutions—Mississippi State University, Alcorn State University, Mississippi Delta Community College, and Hinds Community College—received funding from the United States Department of Agriculture's Natural Resources Conservation Service (USDA-NRCS) to increase Mississippi youth interest in and entry to sustainable agriculture practices and careers. An output of this project is this curriculum designed to reach high school students. Between November 2021 and June 2024, this curriculum was used to teach approximately 4,500 students across the state. Results from pre-test (pg. 20) and post-test (pg. 21) surveys demonstrated the efficacy of the curriculum to increase students' knowledge and interest in agriculture (see figures below). Given these positive results, we hope other educators can use and adapt this curriculum to teach more students about agriculture and its careers. This curriculum is also available online at: https://extension.msstate.edu/publications/ag-sci-and-careers, while materials can be downloaded at https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php.





How to Use this Curriculum

This curriculum aims to guide educators through lessons that teach high school youth about agriculture and its careers using hands-on activities and follow-up discussions. These interactive elements promote student participation and encourage students to be co-leaders in the learning process. The curriculum is tailored to 9th - 10th grade students in classroom or extramural learning settings, but it can be suitable for use with 7th - 12th grade students. Educators are recommended to vary the level of detail and vocabulary used depending on the abilities of the target audience.

The curriculum is also intended to be flexible to student needs and to the availability of instructional time. With six standalone yet cohesive modules, the curriculum can be easily adapted to different schedules. For example, highlights from a few modules could be condensed into as little as one class period. The curriculum could be expanded as well, perhaps serving as the basis of a multi-week thematic unit on agricultural literacy.

Each module follows the same sequence of five segments.

- Surveying the Landscape refers to background information that supplies educators with the essential knowledge to teach the topic of the module.
- Scratching the Surface refers to introductory questions that assess students' initial understanding of the topic.
- Digging In refers to a hands-on classroom activity for students to learn by doing.
- Looking Closer refers to follow-up questions that direct students to reflect on the completed activity and discuss how the topic connects to their lives and experiences.
- Probing Deeper refers to advanced questions that steer students to search further on their own and to deepen their understanding of the topic and the world around them.

Feel free to use any of the question prompts provided and make up your own questions to help students explore what agriculture is, how it influences our lives, and what careers are available in the agricultural sector.

This curriculum is designed to be ready for implementation by any educator who wishes to cultivate curiosity, awareness, and reflection about agriculture and its careers. After thoroughly studying the information contained in the curriculum, even an educator with little prior familiarity with agriculture can become sufficiently equipped to deliver the lessons successfully. To achieve maximum effectiveness, however, educators will benefit from delving further into the topics through the wealth of resources available on the web. **Use websites that are reliable** to get the best and most accurate information, such as web pages from government agencies (URL's that ends in ".gov"), academic institutions like universities (URL's that ends in ".edu"), and scientific sources using the Google Scholar search engine. YouTube videos can be useful to help visualize complex concepts, but please ensure they are accurate and appropriate before sharing.

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Module 1: The Importance of Agriculture

Surveying the Landscape

This module aims to introduce students to the breadth of modern agriculture and the importance of agriculture to society and our daily lives.

What is agriculture?

Agriculture is the science of growing plants and rearing animals. More broadly, agriculture can further include the processing of those plants and animals into various forms to provide food, fuel, fiber, and other important products for our use. Agriculture involves the care and management of our natural resources, such as soil, water, forests, and air. Examples of agricultural products are:

- Food: fruits, vegetables, grains, meat, seafood
- Fuel: firewood, charcoal, bioethanol, biodiesel, bagasse
- Fiber: cotton, wool, bamboo, jute, lumber

Agriculture is very important because it produces the food we consume daily and the raw materials for manufacturing inedible items such as paper, clothing, shoes, tires, furniture, and buildings. Additionally, agriculture makes our environment more enjoyable with flowers, turfgrass, shade trees, and various ornamental plants. When done sustainably, agriculture can benefit the wellbeing of fish and wildlife, the functioning of ecosystems, and the quality of soil, water, and air.

Agriculture also creates jobs and helps build strong economies. According to the Mississippi Department of Agriculture and Commerce, agriculture employed about 17% of the workforce and contributed about $9 billion to the state's economy in 2023. The top agricultural commodities produced include poultry (chickens and eggs), soybeans, forestry (wood, paper), corn, cattle, cotton, and catfish. Because agriculture is increasingly mechanized and specialized, agricultural jobs are diverse and not limited to being farmers (see Module 6 on pg. 17-18).

While technological advancements have changed and will continue to change how agriculture is practiced, agriculture will likely remain as important as ever before. However, agriculture will likely become more challenging because of increasing human consumption and worsening environmental degradation. Educating youth about agriculture is one way to help prepare future generations for those challenges. Though the majority of today's youth may never work in the agricultural sector or serve as policymakers, most of them will still influence agriculture, whether intentionally or not, through their decisions as consumers and voters. Every time educators invest in students' agricultural awareness, educators are taking students one step further on a lifelong journey toward being more informed and more engaged about agriculture and its impact on society. This module and the rest of the curriculum strive to support such educational efforts.

Scratching the Surface

See "Surveying the Landscape" (pg. 1) for model answers.

- What is agriculture?
- What products do we get from agriculture?
- Is agriculture important to your everyday life? Why or why not?

Digging In

Estimated prep time: 5 minutes
Estimated activity time: 15 minutes
Materials:

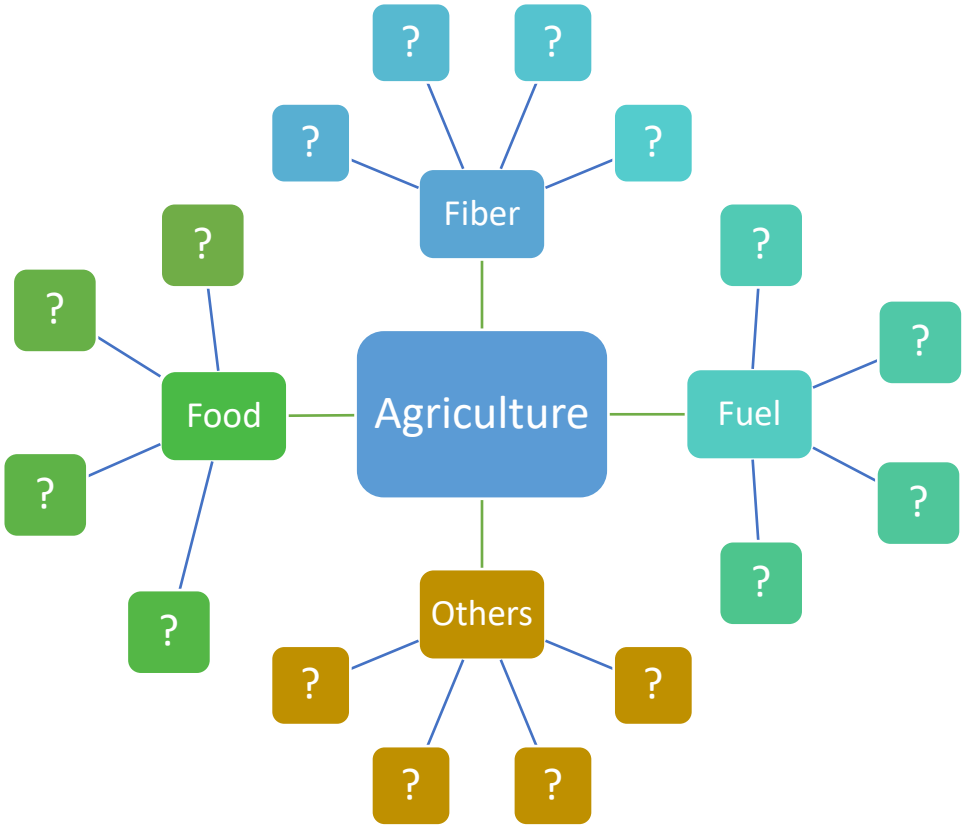
- PowerPoint presentation for Module 1 (pg. 22-23) and presentation equipment

Visit *https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php* to download materials.

- Cardboard or poster board, 1 sheet per student or group
- Colored pencils or markers, several per student or group

Activity:

1. Show the PowerPoint presentation for this module.
2. Individually or in groups, students will create an "agricultural web" (a concept map of agricultural products). The agricultural web will show at least four examples for each of the major agricultural product classifications of food, fuel, fiber, and others. An example is provided below.
3. To compile their examples of agricultural products, students may first need to consult books at a library or websites on a computer with internet access. Students can be assigned to perform this research during class or outside of class. In either case, the objective is to give students the opportunity to explore and learn more about the topic on their own.
4. Likewise, the actual creation of the agricultural web can be conducted during class or outside of class. Encourage student creativity to make the agricultural web as artistic and visually effective as they can. Besides writing the names of the agricultural products, students may want to draw these products or to paste printed images of these products. Also, digital design tools such as Canva (https://www.canva.com) may be an alternative to creating agricultural webs on paper.
5. Ask each student or group to give a brief presentation that explains their agricultural web to the class.
6. Utilize the information provided in "Surveying the Landscape" (pg. 1) and any supplementary resources to expand students' concept of agriculture.



A Template for the "Agricultural Web"

Looking Closer

See "Surveying the Landscape" (pg. 1) for a model answer to question 4. Answers to the other questions are subjective and may vary among students.

- Were there products you did not expect to originate from agriculture? What were they, and why were you surprised by this?
- What is your favorite agricultural product, and why is it important?
- How has this activity changed your view of agriculture?
- In the future, do you think that agriculture will become more or less important and challenging? Why or why not?
- In a few sentences, how would you share with a friend what you learned through this activity?

Probing Deeper

Have students make their best guesses to the items below before they gather information from the internet. Then, invite them to share their findings with the class visually and/or orally.

- For one item in each category (food, fuel, fiber, and other) of the agricultural web you created, where are the necessary plants and animals grown? Where and how do they go to be processed and eventually sold for human use? Illustrate these journeys using geographical maps.
- What are the most widely grown plants and animals in Mississippi agriculture? How are they grown?
- Pick one plant and one animal. What do they need to grow well, and how do humans help meet those needs through agricultural activities? What jobs might be involved in caring for this plant and this animal?

Module 2: Plants and Animals in Agriculture

Surveying the Landscape

In this module, students learn how many products they use in their daily life ultimately come from agricultural plants and animals.

Unlike plants, humans cannot obtain energy and nutrients for their bodies from sunlight and soil. Instead, we eat food that is derived from the plants and animals grown and produced from agriculture. Parts from these plants and animals may be eaten directly in raw or cooked form or processed further to make new types of foods. For example, tomatoes are fruits from tomato plants and are eaten raw in salads and sandwiches, cooked as fried green tomatoes, and processed as a part of various sauces.

Plants and animals grown by agriculture can also be transformed into various other products. For example, cotton is used for making clothes like jeans, soybean oil for cooking and baking, corn for making animal feed, the pulp of some trees for making paper, and a particular tree component—cellulose—for making products like toothpaste and shredded cheese! Other examples of plant and animal products include shoes, tires, furniture, building materials and even ingredients for medicine. The activity for this module helps students learn more about the diversity of products that originate from plants and animals.

Scratching the Surface

See "Surveying the Landscape" (pg. 4) for model answers.

- How and why are plants and animals used in society?
- How are plants and animals turned into food or other products for humans?
- Do plant and animal products play a role in human health and medicine? If so, how?

Digging In

Estimated prep time: 10 minutes
Estimated activity time: 20 minutes
Materials:

- PowerPoint presentation for Module 2 (pg. 24-25) and presentation equipment
- Plant Activity Cards, 1 set per student or group (pg. 26-27)
- Animal Activity Cards, 1 set per student or group (pg. 28-29)
- Plant Worksheet, 1 per student or group (pg. 30)
- Animal Worksheet, 1 per student or group (pg. 31)
- Pencils or pens, at least 1 per student or group
- Glue, 1 stick or bottle per student or group (optional)
- Cardboard or poster board at least 6" wide and 36" long, 1 sheet per student or group (optional)

Activity:

1. Show the PowerPoint presentation for this module.
2. With the cards and worksheets provided, students will match products to the plants and animals from which they are derived. Each of the 8 plants is to be matched with exactly 1 plant product, whereas each of the 8 animals is to be matched with exactly one animal product. Students may be instructed to work individually or in groups for a more interactive experience that fosters teamwork and discussion.
3. After introducing this matching activity and distributing the materials to each student or group, ask students to write their answers on the worksheets.

4. For a more hands-on alternative, cut up all the cards beforehand and hand out glue and cardboard or poster board. Ask students to divide their sheet of cardboard or poster board into two columns and label one column with “plant or animal” and the other column with “product”. To indicate their answers, students will glue onto this sheet each of the 16 plant and animal cards opposite the matching product card.
5. Once all the students are done, ask them to explain the reasoning behind their answers before revealing the correct matches (pg. 32-33).

Looking Closer

Answers are subjective and may vary among students.

- What elements of the plant and plant product matching activity surprised you? Why?
- What elements of the animal and animal product matching activity surprised you? Why?
- In what ways would your life be affected if all plants and animals disappeared from the planet?
- How has this activity changed your view of plants, animals, and the environment?
- In a few sentences, how would you share with a friend about what you learned through this activity?

Probing Deeper

Ask students to gather information from the internet. Then, invite them to share their findings with the class visually and/or orally.

- Look at the ingredient list of your favorite food (e.g., pizza), and then trace which ingredients are derived from which plants and animals.
- Pick one inedible plant or animal product from the matching activity and one from the list below. Find out how the two products are made from plants and animals.
  - *Bioplastics, Beeswax, Rayon, Linoleum floors, Soap, Perfume, Cardboard, and Gum*
- Choose any inedible product (e.g., cotton clothing) derived from plants or animals, and research alternatives (e.g., polyester clothing, nylon clothing) that are not derived from plants or animals. Then, find out the similarities and differences between the products (in terms of cost, functional characteristics, environmental impact, etc.).

Module 3: Soils and Agriculture

Surveying the Landscape

This module is designed to teach students about the important role of soil in agricultural systems. Students learn about the definition, composition, function, characteristics, and management of soils as it is related to agriculture.

According to the Soil Science Society of America, soil is "the surface mineral and/or organic layer of the Earth" that has been partially broken down by environmental processes. In agriculture, soil refers to the "dirt" in which plants grow.

Soil is actually composed of solids, liquids, gases, and organisms. The solid component of soil consists of mineral particles and organic matter. Among the mineral particles, the largest are sand, the smallest are clay, and the medium-sized are silt. Organic matter is made of decomposed remains of plants, animals, and microorganisms. The most important liquid in soil is water, while important gases in soil include nitrogen and oxygen. Soil organisms include animals we can see directly with our eyes (e.g. earthworms, ants) and microorganisms that we cannot directly see with our eyes (e.g. bacteria, microfungi, viruses).

Soil performs multiple essential functions for plants in agriculture. Soil provides stability for plants as roots anchor themselves in the soil. Also, soil holds and supplies water, nutrients, and oxygen that roots absorb to help plants grow.

The solid components of soil are arranged in clumps called aggregates. The stability of these aggregates is a key property of soil. If these aggregates are stable, the pores between the aggregates stay open and allow water, nutrients, and oxygen to move through the soil more quickly. If the aggregates are unstable, they will fall apart more easily when the soil is struck by wind and water or when the soil is disturbed by tillage. As the aggregates crumble into smaller pieces, the pores become narrower, so water enters the soil more slowly. The consequences are increased flooding and runoff, increased erosion (soil being washed or blown away), and increased risk of plants facing drought in the future. Therefore, greater aggregate stability is advantageous to plant growth and beneficial to agriculture, society, and the environment.

Aggregate stability is highly affected by how soil is managed. Ways to improve aggregate stability include growing dense and diverse plants for longer parts of the year, always covering the soil surface (with mulches or dead plant materials) and reducing tillage frequency.

Scratching the Surface

See "Surveying the Landscape" (pg. 6) for model answers.

- What is soil?
- What makes a soil suitable for plants?
- What does the soil provide for plants?

Digging In

Estimated prep time: 30 minutes
Estimated activity time: 20 minutes
Materials:

- PowerPoint presentation for Module 3 (pg. 34-35) and presentation equipment
- Spade (skinny, sharp shovel)
- 2 five-gallon buckets for transporting soil to classroom
- 2 aluminum 9" x 13" (or similar) pans to display soil for students

- 2 quart-sized (or similar) wide-mouth glass jars
- 2 pieces of wire mesh (e.g., chicken wire with ½" holes)
- 2 blocks of soil, each measuring approximately 6" x 6" x 6" and from a different area

Prepare:

To be done prior to the class activity

- Identify two areas on the landscape that are under different soil management, for example, a lawn versus a garden, a row-crop field versus a pasture, or a construction site versus a forest. The goal is to identify land areas that are likely to have differing soil characteristics.
- At each area, use the spade to excavate a block of soil that is about 6 inches long, 6 inches wide, and 6 inches deep. Place the two blocks of soil in separate 5-gallon buckets and transport to classroom.

Activity:

1. Show the PowerPoint presentation for this module.
2. This activity explains the importance of soil aggregate stability and demonstrates how stable (or not) soil aggregates are under the force of water. Set up 2 aluminum pans and place each block of soil in a separate pan for students to see.
3. Place 2 glass jars on the table. Fill them to the neckline with water. Place a wire mesh in the mouth of each jar so that it hangs like a small basket with the bottom of the basket about 3 inches into the jar. Refer to the picture that shows the glass jar of water with a soil clump suspended in a wire mesh basket.

4. For each block of soil, ask for a student volunteer to break off one small soil clump from a depth of 3-6 inches from the soil surface. The clump must fit into the small wire mesh basket, so a ping-pong ball size is suggested. Instruct the student to place the soil clump into the wire mesh so that the soil is submerged.
5. As the class observes what happens to each soil clump, ask them to share what they see.

6. If one soil clump is falling apart into small particles in the water faster than the other, ask the class why they think one soil clump might be falling apart faster than the other.
7. Ask the class about noticeable differences (color, murkiness, etc.) in the water in the jars.
8. Based on how much of the soil clump is intact after 5 to 15 minutes and how much soil appears in the water, can the class guess which soil has higher aggregate stability?
9. Use the information from "Surveying the Landscape" (pg. 6) to explain the importance of aggregate stability and the soil management strategies that improve it.

Looking Closer

See "Surveying the Landscape" (pg. 6) for model answers to questions 1 and 2. Answers to questions 3-5 are subjective and may vary among students.

1. Of the two soils from the experiment, which do you think plants would grow better? Why do you think this?
2. Of the two soils from the experiment, which do you think will have worse problems with erosion? Why do you think this?
3. When spending time outdoors, what soil characteristics have you ever noticed, and what differences between soils have you ever noticed? Might these characteristics or differences affect agriculture?
4. How has this activity changed your view of soil?
5. In a few sentences, how would you share with a friend about what you learned through this activity?

Probing Deeper

Ask students to gather information from the internet. Then, invite them to share their findings with the class visually and/or orally.

- How much do you know about the soil in your yard? Collect some soil from your yard and bring a sample of your yard soil to class in a quart-sized zip-top plastic bag and compare your observations about your soil sample with those of your classmates.
    - How wet or dry is it?
    - What color is it?
    - Can you squeeze it into a ball or a ribbon?
    - Does it feel gritty or smooth?
    - Does it contain gravel or rocks?
    - Are there many roots in it? How long and wide are the roots?
    - What other organisms did you find in it?
- For the list of major plant nutrients below, research the role of each nutrient in plants. Then, select a plant and find out how much of each kind of nutrient it needs.
    - Nitrogen, phosphorus, potassium, magnesium, sulfur, calcium
- Pick a soil management practice from the list below. Find out how this practice protects or enhances the soil and benefits agriculture, society, and the environment.
    - Animal waste application, buffer/filter strips, composting, cover crops, crop residue retention, green manuring, no-tillage, terrace farming

Module 4: Water Resources in Agriculture

Surveying the Landscape

In this module, students learn about water resources in agriculture and why it is important to conserve water.

Why is water important?

Water is essential for all living organisms. On an average day, each person must consume at least one quart of water to survive and at least two quarts of water to live healthily. Animals also need water; for example, a chicken needs to consume approximately one cup of water per day. On an average summer day, each square foot of dense plants consumes around a pint of water. While water covers roughly 70% of our planet's surface, less than 1% of Earth's water is freshwater available for consumption by humans, plants, and animals. The rest is mostly seawater, which is unsuitable for many purposes unless excess salt is removed using large amounts of energy. Therefore, we should use our freshwater resources wisely and protect them from pollution by harmful chemicals.

Why do we need water for agriculture?

In agriculture, water is very important for growing crops and rearing animals. Plants need water in the soil to access nutrients and to replace water lost through evaporation from leaves to the surrounding air for the purpose of photosynthesis (the process by which plants make their "food" using sunlight). Like humans, animals need water for maintaining bodily functions and indirectly for growing the food they eat. Additionally, aquaculture (the farming of aquatic animals such as catfish and crawfish) needs water to create a healthy environment for the species being raised. Water shortages reduce the quantity and quality of plant and animal products that provide food, clothing, fuel, and other materials for the world population.

What are the sources of water used by farmers?

In a humid region like Mississippi, rain is the primary source of freshwater. A portion of the rainwater soaks into the pore spaces of the soil for later use by plants and soil organisms. Another portion of rainwater becomes surface water, running off into ditches, creeks, rivers, ponds and reservoirs that can be used by wildlife or be redirected by farmers to their plants and animals. Yet another portion of the rainwater becomes groundwater, seeping below the ground and entering aquifers.

What is an aquifer?

An aquifer is an underground layer of sand, gravel, or rock whose many holes contain a usable supply of groundwater. This water can be pumped out of these holes by drilling and operating wells in the aquifer to provide water for irrigation, homes, power plants, factories, and other purposes. One major aquifer for agriculture in Mississippi and nearby states is the Mississippi River Valley Alluvial Aquifer. The water volume in this aquifer and in many aquifers across the world has been gradually decreasing because water is being pumped out faster than water is being replenished.

How can farmers conserve water?

- Raise plants and animals that require less water.
- Decrease evaporation by covering the soil with mulch.
- Build water harvesting/reuse systems and improve irrigation management.
- Store and apply farm chemicals and animal waste carefully to avoid polluting groundwater and surface water.

Scratching the Surface

See "Surveying the Landscape" (pg. 9) for model answers.

- What percentage of the Earth's surface is covered by water? Can all types of water on Earth be used for drinking and agriculture? Why not?
- Why is water necessary for agriculture? How is water used in agricultural activities?
- Most people are familiar with freshwater in rivers and lakes. Is there also freshwater below the ground? If so, how might we access it?

Digging In

Estimated prep time: 10 minutes
Estimated activity time: 25 minutes
Materials:

- PowerPoint presentation for Module 4 (pg. 36-39) and presentation equipment
- Clear plastic boxes approximately 6" long by 4" wide by 3" tall, 1 per student or group
- Pea gravel or aquarium stones, enough to fill each plastic box about 40% full
- Fine sand or play sand, enough to fill each plastic container about 20% full
- Spray bottles or water bottles with small holes drilled in the cap beforehand, 1 per student or group
- Water, enough to fill each plastic box about 50% full and poured into the bottles beforehand
- Water-soluble liquid (not gel) food coloring, 1 or 2 drops per bottle and mixed thoroughly with the water inside
- Spray nozzles or pump dispensers, 1 per student or group
- Coffee filter, 1 per student or group
- Rubber bands, 1 per student or group
- Disposable cups, 1 per student or group

Activity:

The images on page 11 show the activity materials and demonstrate how to create an aquifer model.

1. Show the PowerPoint presentation for this module.
2. Students may be instructed to work individually or in groups for this activity of creating an aquifer model. Distribute materials accordingly (see Image A).
3. Instruct the students to pile the aquarium stones or pea gravel on one end of the plastic container to form a slope toward the empty end (see Image B). The stones will represent an aquifer, while the empty end will represent a stream.
4. Instruct students to add a layer of fine sand on top of the stones and pack the sand down to create a smooth slope surface (see Image B). The sand will represent soil.
5. Instruct students to simulate rain by using the spray bottles or water bottles to sprinkle colored water over the sand. Ask the students to watch what happens to the rain as it falls onto the slope.
6. Some of the rain will run off the soil surface and flow downslope into the stream. The rest of the rain will soak into the soil, from which some of the water will then drain down into the aquifer. As the water level in the aquifer rises, some of the groundwater will also flow into the stream. Check the students' understanding of these concepts before proceeding further. Instruct students to continue simulating rain until the water level in the stream rises to roughly halfway up the slope (see Image C).
7. Explain to students that the groundwater inside an aquifer can be pumped out for agricultural and other purposes by first drilling wells into the aquifer down past its water level (also known as "water table") and then powering pumps to lift groundwater up through the wells. The spray nozzles or pump dispensers will represent groundwater wells. Instruct students to wrap the coffee filter around the inlet end of the straw and secure it with the rubber band. This helps prevent soil particles from getting sucked in and clogging the nozzle or dispenser.

8. Ask students to drill their wells in their model by inserting the wrapped end of the straw down into the water inside the layer of stones (see Image D). Instruct students to operate the spray nozzle or pump dispenser while holding the disposable cup over the outlet to catch the water that will squirt out. Ask students to continue simulating groundwater pumping while they watch what happens to the water level in the aquifer and in the stream.
9. Groundwater pumping not only removes water directly from the aquifer but also causes water to flow from the stream into the aquifer because gravity drives water to flow from higher elevation to lower elevation. Thus, the water level in both the aquifer and the stream will fall in response to groundwater pumping. Such connection and interaction between streams and aquifers are common in Mississippi and around the world. Consequently, surface water and groundwater should generally be managed jointly rather than be considered as two separate resources. Check the students' understanding of these concepts before proceeding further.

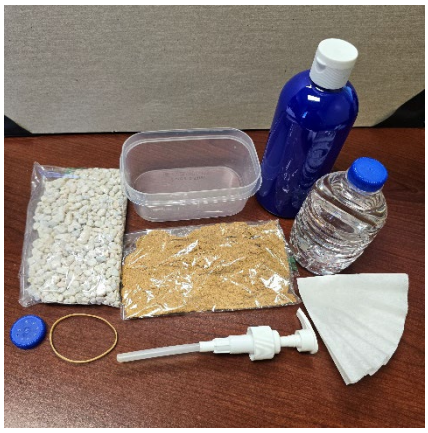


Image A

Image B

Image C

Image D

Creating an Aquifer Model

Adapted from the Science Learning Hub, The University of Waikato

https://www.sciencelearn.org.nz/resources/805-constructing-an-aquifer-model

Looking Closer

See "Surveying the Landscape" (pg. 9) and "Digging In" (pg. 10-11) for model answers to questions 1 and 2. If time permits, invite students to check their answers to these two questions by experimenting with the aquifer model. Answers to question 3-5 are subjective and may vary among students.

1. What happened to the stream when water was pumped out of the aquifer? What will happen to the aquifer if water is pumped out of the stream?
2. How is groundwater replenished? What happens to the aquifer if water is pumped out faster than it is replenished?
3. What will happen to agriculture if freshwater is no longer available? In what ways would your life be affected?
4. How has this activity changed your view of water resources?
5. How would you share with a friend about what you learned through this activity?

Probing Deeper

Ask students to gather information from the internet. Then, invite them to share their findings with the class visually and/or orally.

- We know that precipitation (rain and snow) falls from the sky, but how does this water get up there in the first place? Learn more about the water cycle.
- Find out about several different uses of water in both plant and animal agriculture. For each use, identify how much water is typically used and determine if the water eventually evaporates or eventually returns to lakes, rivers, and oceans.
- Pick a region within a country of the world. Find out the amount of precipitation (rain plus snow) this region receives each month in an average year. Then find out how water is obtained for agriculture in this region during months with low precipitation.

Module 5: Food Science and Agriculture

Surveying the Landscape

This module exposes students to the role of science in the food industry, an important segment of the agricultural sector.

How and why are food products made?

The food industry transforms what we harvest from plants (e.g., fruits, leaves) and animals (e.g., meat, milk) into what we actually eat. Such transformations encompass one or more steps of removing from, adding to, and altering the ingredient(s). For instance, popcorn is typically made by removing all harvested materials except kernels, adding fats (and whatever else for flavor), and raising the temperature until the kernels rupture and their contents puff out. The simplest transformations consist of just one step at one location (e.g., cutting up a watermelon in a kitchen), whereas complex transformations consist of many steps as the ingredients move through a web of processing and manufacturing facilities before becoming the final product (e.g., a frozen pizza). Some transformations are clearly beneficial because the resulting food products are safer, more nutritious, more convenient, and more resistant to spoilage than the original form of the ingredients. One example is making canned chicken from raw chicken. However, some other transformations prioritize the appeal of food products over their potential impact on the wellbeing of individuals and society. This type of food products often induces cravings for more but tends to contain high amounts of calories from sugars and fats relative to the low amounts of other nutrients. While enjoying this type of food products occasionally in moderation might not trigger any negative effects, eating this type of food products excessively or exclusively can significantly increase the risk of health problems.

What does science have to do with food products?

There is a lot of science that goes into making food products. The modern food industry relies on understanding and changing not only the physical, chemical, and biological properties of ingredients and resulting food products but also the consumers' sensing, perception, and intake of the food products. Thus, knowledge and inquiry in both the natural and social sciences are crucial for developing new food products as well as for continuing and improving existing food products. The food industry and the rest of the agricultural sector will keep progressing as scientists and other professionals work together toward a food system that is productive, sustainable, equitable, and healthy.

What makes some foods fluffy?

Breads and pancakes owe their fluffiness to ingredients that are leavening (rising) agents. In the case of pancake batter, buttermilk, which is an acid, mixes with baking soda, which is a base. This chemical reaction produces carbon dioxide (CO_2) gas, creating the bubbles that appear as the batter is mixed and as it is heated on a skillet. The increase in temperature not only cooks the pancakes, but it also speeds up the rate of the chemical reaction in the batter and leads to the formation of more CO_2 bubbles. The bubbles then expand with heat, which helps create air pockets that make the pancake rise and get fluffy. Both the formation of CO_2 bubbles and the creation of air pockets happen during bread production as well. However, the CO_2 gas in the dough is not produced by the chemical reaction between an acid and a base but by microorganisms called baker's yeast. As the yeast eat sugars in the dough, CO_2 gas is released as a by-product and makes the dough rise.

What do microorganisms have to do with food?

Microorganisms are living organisms that are too small for us to see without a microscope. While we might not notice them, microorganisms are almost everywhere in the environment, even on our skin and inside our bodies. Unlike humans, some microorganisms can thrive in low-oxygen conditions where they

eat sugars and release molecules such as acids, alcohols, and gases. This conversion process is called fermentation, and humans have harnessed the fermentation activities of microorganisms in food production for thousands of years. Because different microorganisms prefer different living environments and carry out different variations of the fermentation process, the most suitable strains of microorganisms are carefully chosen and managed to produce each fermented food. For example, strains of lactic acid bacteria are used for cheese, buttermilk, yogurt, sour cream, pepperoni, and pickled vegetables. Strains of acetic acid bacteria are used for vinegars, whereas strains of yeast are used for breads and alcoholic beverages. Meanwhile, all three types of microorganisms participate in the chain of fermentation processes for producing chocolate from the seeds of the cacao tree. Fermentation can improve the smell, taste, texture, and nutritional availability of foods. Additionally, fermentation by beneficial microorganisms can help suppress the growth of harmful microorganisms that are also present in foods. food spoilage and cause foodborne illnesses (sometimes called food poisoning). According to the Centers for Disease Control and Prevention, as much as 48 million cases of foodborne illnesses occur in the United States each year, with norovirus, *Salmonella* bacteria, and *Campylobacter* bacteria being some of the most common culprits. Although most cases are minor, foodborne illnesses can be very dangerous especially for young children, pregnant women, older adults, and people with weakened immune systems. Ways to reduce the likelihood of foodborne diseases include cleaning hands and surfaces adequately, separating raw animal products from other foods, cooking to sufficiently high temperatures, and storing spoil-prone foods at sufficiently low temperatures.

Scratching the Surface

See "Surveying the Landscape" (pg. 13-14) for model answers.

- Is science involved in producing food products? If so, how?
- What are microorganisms? Are microorganisms used or found in food? Are they good? Are they bad?
- What makes foods like bread and pancakes rise and become fluffy?

Digging In

The images on page 15 show the activity materials and illustrate key steps.

Estimated prep time: 10 minutes
Estimated activity time: 20 minutes
Materials (see Image A):

- PowerPoint presentation for Module 5 (pg. 39-41) and presentation equipment
- Baking soda, enough for 1 tablespoon per student or team
- Balloons, enough for 1 per student or team
- Vinegar, enough for ½ cup per student or team
- Small (e.g., 10 oz) plastic bottles with caps, enough for 1 per student or team
- Measuring cups and spoons
- Funnel

Prepare:

To be done prior to the class activity

- Measure out the baking soda and pour it into each balloon using a funnel.
- Measure out the vinegar and pour it into each plastic bottle.

Activity

1. Show the PowerPoint presentation for this module.
2. Students may be instructed to work individually or in groups for this activity of producing carbon dioxide gas from common food ingredients. Distribute materials accordingly (see Image B).

3. Ask students to take the cap off the plastic bottle containing the vinegar. Then, instruct students to fit the opening of the balloon containing baking soda securely over the mouth of the bottle without inverting the balloon (see Image C).
4. Ask students observe what happens as they empty the contents of the balloon into the bottle (see Image D).
5. The balloon will inflate because carbon dioxide gas is produced by a chemical reaction between an acid and a base. In this activity, the acid was vinegar while the base was baking soda. Check the students' understanding of these concepts before proceeding further.

Image A

Image B

Image C

Image D

Looking Closer

See "Surveying the Landscape" (pg. 13-14) for model answers to questions 1-3. Answers to questions 4 and 5 are subjective and may vary among students.

- Buttermilk and baking soda are often used to make biscuits and pancakes. As buttermilk is acidic, does a chemical reaction similar to the one in the activity occur when making biscuits and pancakes? Why do we want this reaction when making those foods? How would biscuits and pancakes taste different without this reaction?

- Thinking back to the activity, how would increasing the temperature affect the bubbling in the bottle and the expansion of the balloon?
- Temperature does not only affect the rate of chemical reaction and the volume of gases. What happens when milk is purchased from the refrigerated section of the grocery store and is then opened and left at room temperature for a week? Do you know anyone who was diagnosed with food poisoning or was feeling sick after eating something that had been improperly stored?
- How has this activity changed your view of food science?
- In a few sentences, how would you share with a friend about what you learned through this activity?

Probing Deeper

Ask students to gather information from the internet. Then, invite them to share their findings with the class visually and/or orally.

- From the list provided here, pick one food processing technique (for example, pasteurization, canning, dehydration, carbonation, milling, extrusion, centrifugation, homogenization) and find out how it works. Give examples of foods made with this process.
- Why are many foods cooked before we eat them? What are the purposes of heat in food preparation?
- How can harmful bacteria (such as botulism) and mold grow on food that has been kept inside containers? How did these harmful microorganisms even get in there? How can we minimize the threat of these harmful microorganisms?

Module 6: Agricultural Careers

Surveying the Landscape

In this module, students learn about the diversity of careers in the modern agricultural sector.

Contrary to popular misconceptions, the agricultural workforce is not comprised solely of older men driving tractors or of impoverished laborers using hand tools outdoors. Instead, the modern agricultural sector employs people from all backgrounds in a wide range of careers that vary greatly by necessary qualifications and skills, expected duties and tasks, working environment, and financial compensation. Given this diversity, at least one type of agricultural career might be a good fit for each person who is interested in entering the agricultural workforce.

The Career Cards for this module highlight 36 agricultural careers that are not "farmer". Some of these careers do not require formal education beyond high school, some others require nearly a decade of postsecondary education culminating in a terminal degree such as Doctor of Philosophy (PhD), and the rest require some level in between. Some of these careers involve the heavy use of science, technology, engineering, and mathematics (STEM), whereas some others would be rarely considered as STEM occupations. The multitude of modern agricultural careers can be classified into "pathways" or "focus areas" as proposed by the National FFA Organization (https://agexplorer.ffa.org). Despite the vast differences among agricultural careers, all these careers need to work together so that agriculture will thrive for the benefit of society, as illustrated by the activity for this module.

Scratching the Surface

See "Surveying the Landscape" (pg. 17) for model answers.

- What agricultural careers do you know about?
- What type of degree (or none at all) do you need to have an agricultural career?
- Do you think agricultural jobs are considered to be in STEM fields?

Digging In

Estimated prep time: 5 minutes
Estimated activity time: 30 minutes
Materials:

- PowerPoint presentation for Module 6 (pg. 42-46) and presentation equipment
- Career Cards (see download link), at least 1 set per student or student group
- Career Card worksheet (pg. 47), at least 1 per student or group
- Pencils or pens, at least 1 per student or group

Activity:

1. Show the PowerPoint presentation for this module from slide 27 to slide 31.
2. Students may be instructed to work individually or in groups for a more interactive experience that fosters teamwork and discussion. Distribute materials accordingly.
3. The Career Card worksheet describes six situations that can occur in the agricultural sector. From the 36 agricultural careers on the Career Cards, ask students to identify the careers that could help tackle each situation. The number of blanks that are provided under each situation description specifies the number of careers that should be listed for this situation. Although some of the 36 careers may fit more than one situation, each of the 36 careers should only be written in exactly one of the 36 blanks on the worksheet. Students will need to use their best judgment to assign each career to its most suitable situation given all the aforementioned considerations.

4. One way to conduct this activity is to give students enough time to complete the entire worksheet and then discuss all the answers (pg. 48) at the end. Another way is to give students just enough time to complete one situation, discuss the answers (pg. 48) for this situation, and repeat the process for each of the other situations.
5. Either way, the discussion can be more interesting and memorable if students are asked to offer their responses first. Whenever a student names a correct answer, use slide 32 to instruct the student to explain a) the general duties of this career, b) the role of this career in tackling the situation, and c) the required degree for this career. If time does not permit, the full answer key can be displayed using slides 33-34 so that students can check their responses against the key.
6. Conclude the activity using slides 35-36.

Looking Closer

Refer to the career cards for model answers to questions 1 and 2. Answers to questions 3-5 are subjective and may vary among students.

1. From the career cards, find two careers each that deal with a) numbers, b) machines, c) food, d) plants, and e) animals. Give examples of where they work or where you might find them.
2. Mention three careers you just learned from this activity that do not require bachelor or advanced degrees.
3. Share what careers you found most interesting or most surprising.
4. How has this activity changed your view of agricultural careers?
5. In a few sentences, how would you share with a friend about what you learned through this activity?

Probing Deeper

Ask students to gather information from the internet. Then, invite them to share their findings with the class visually and/or orally.

- Reflect on what you are looking for in a job. What tasks would you enjoy? What environment would you want to work in? How much more school do you wish to complete? Based on these characteristics, what are some agriculture-related careers that might fit you?
- Interview one professional from each of two different careers. Find out how they got there, what they do currently, their likes/dislikes, and salary/benefits/promotion?
- Pick a career/job in agriculture. Research related programs at three different colleges you might consider. Identify what high school subjects and extracurricular activities would prepare you well for those programs.

Appendix A

Survey Questions

Introduction
The following survey questions are to be administered to students before beginning the curriculum and at the end of all the modules. The pre-test is done to help determine students' prior knowledge about agriculture, while the post-test helps to evaluate students' grasp of the material and changed perspectives.

Estimated activity time: 10 minutes
Materials:

- Pre-test questionnaire, 1 per student
- Post-test questionnaire, 1 per student
- Pencil or pen, 1 per student

Pre-Test Questions

Name: _____

Check the box that best describes you!

1. Gender: ☐ Male ☐ Female ☐ I prefer not to answer

2. Race/Ethnicity: ☐ Asian ☐ Black/African American ☐ Hispanic/Latino
   ☐ Multiracial/Biracial ☐ White ☐ Other

3. Have you participated in or are you involved in any agriculture-related classes or activities (for example, gardening, FFA or 4-H, job at a farm store)?
   ☐ Never ☐ Yes, but only a little bit ☐ Yes, a lot

4. Is anyone in your family (for example, a parent or guardian, grandparent, brother/sister, aunt/uncle, cousin) involved in agriculture?
   ☐ No ☐ Yes, just one ☐ Yes, multiple

5.	Absolutely Yes!	Yes	Maybe	No	Absolutely No!
Do you think agriculture is related to STEM (science, technology, engineering, and math)?	☐	☐	☐	☐	☐
Do you have any interest in agriculture and its careers?	☐	☐	☐	☐	☐
Do you think people with a similar background as you are working in agriculture?	☐	☐	☐	☐	☐
Do you think there are diverse job opportunities in agriculture?	☐	☐	☐	☐	☐

6. What is groundwater?
   ☐ Water inside underground oceans ☐ Water inside underground pipes
   ☐ Water inside the holes of underground rocks ☐ Water above the ground

7. Which foods require the use of microorganisms (e.g., bacteria, yeast) to be produced? Pick all that apply.
   ☐ Bread ☐ Coke ☐ Yogurt ☐ Cheese

8. Which risks increase when soil aggregates (clumps) break down? Pick all that apply.
   ☐ Flooding ☐ Drought ☐ Leaching ☐ Erosion

9. What educational level do you need to have to start a career in agriculture?
   ☐ High School diploma ☐ Associate degree ☐ Graduate (Master's/PhD) degree
   ☐ Bachelor's degree ☐ All of these levels of education can lead to agricultural careers

Post-Test Questions

Name: _____

Give your best answer to the following questions!

1. What part(s) of the presentations or modules did you enjoy most?

   _____

2. Compared to before the presentations:	Absolutely Yes!	Yes	Maybe	No	Absolutely No!
I am more aware of how agriculture is related to STEM (science, technology, engineering, and math)	☐	☐	☐	☐	☐
I understand more about the importance of protecting our soil and water	☐	☐	☐	☐	☐
I am more aware of the diverse job opportunities in agriculture	☐	☐	☐	☐	☐
I am more interested in agriculture and its careers	☐	☐	☐	☐	☐
I am more likely to take classes related to agriculture	☐	☐	☐	☐	☐
I am more likely to join extracurricular activities related to agriculture	☐	☐	☐	☐	☐
I would tell others about what I learned from the presentations	☐	☐	☐	☐	☐

3. What is groundwater?
   ☐ Water inside underground oceans ☐ Water inside underground pipes
   ☐ Water inside the holes of underground rocks ☐ Water above the ground

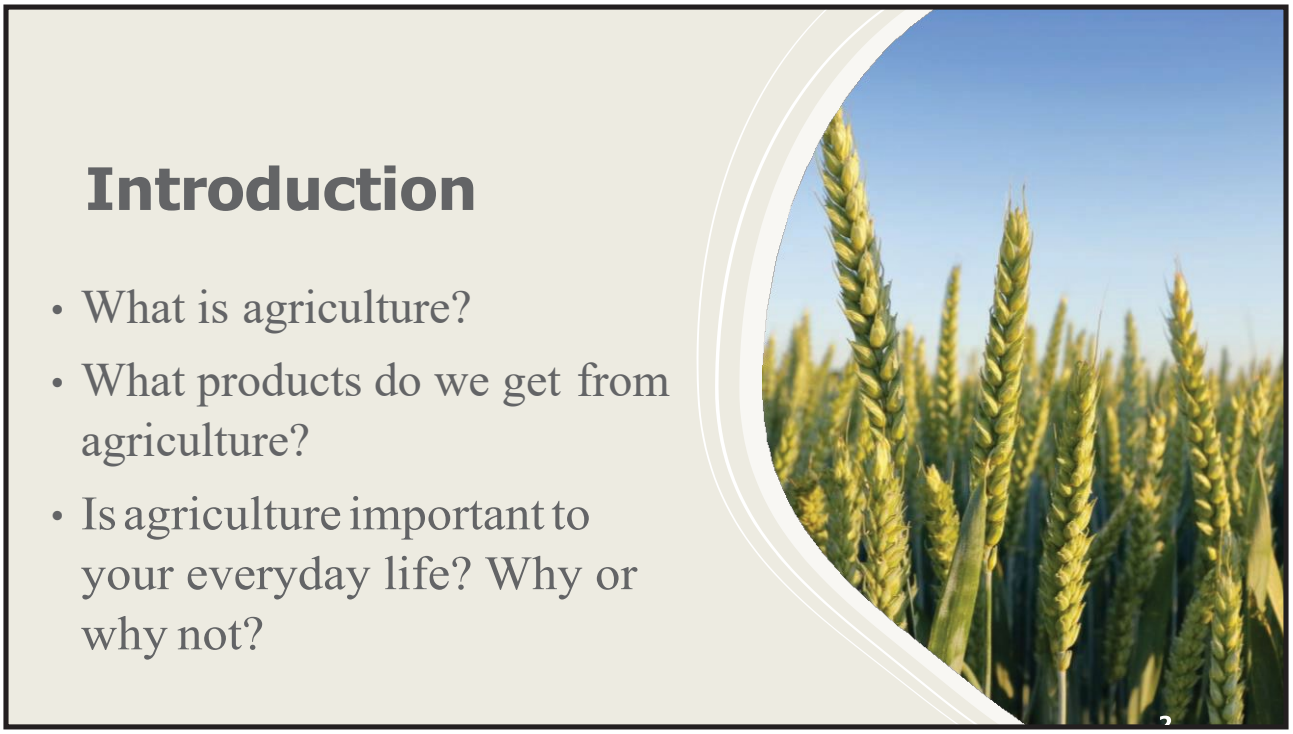
4. Which foods require the use of microorganisms (e.g., bacteria, yeast) to be produced? Pick all that apply.
   ☐ Bread ☐ Coke ☐ Yogurt ☐ Cheese

5. Which risks increase when soil aggregates (clumps) break down? Pick all that apply.
   ☐ Flooding ☐ Drought ☐ Leaching ☐ Erosion

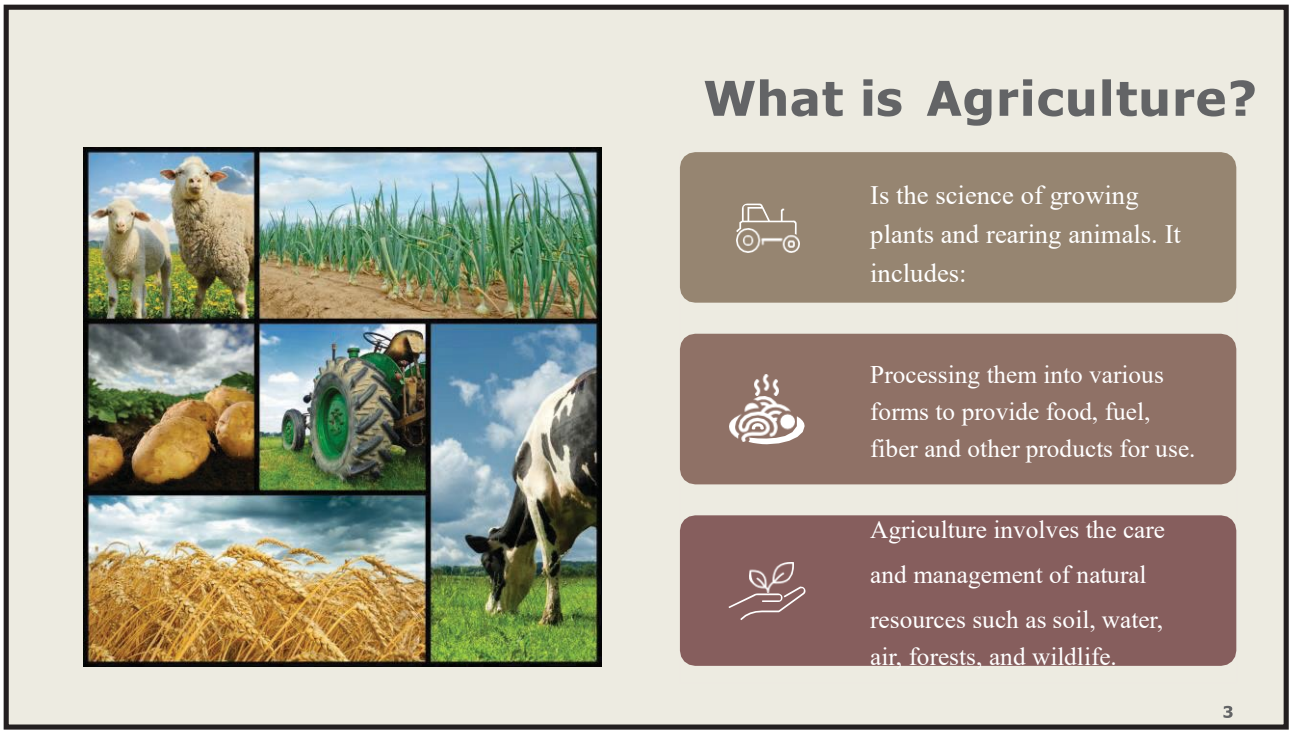
6. What educational level do you need to have to start a career in agriculture?
   ☐ High School diploma ☐ Associate degree ☐ Graduate (Master's/PhD) degree
   ☐ Bachelor's degree ☐ All of these educational levels can lead to agricultural careers

Appendix B

Slides from an instructional presentation to use with Module 1

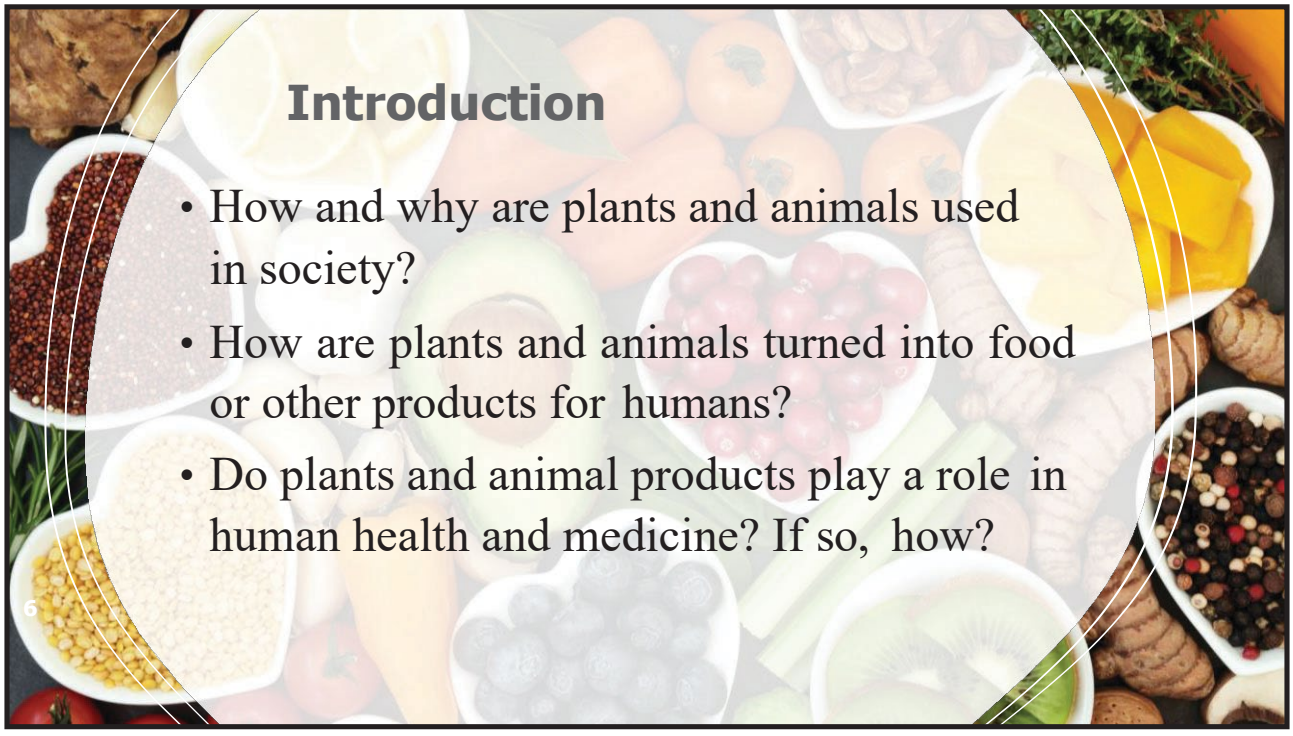


Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.



Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

Slides from an instructional presentation to use with Module 2



Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

Game

Match the following plants and animals with their corresponding products

7

Visit *https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php* to download materials.

Plant and Animal Cards

1

2

3

4

5

6

7

8

Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

A (PEANUT BUTTER)

B (ETHANOL FUEL)

C (FURNITURE)

D (JEANS)

E (PASTA)

F (VEGGIE PATTIES)

G (SUGAR)

H (TIRES)

Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

1

2

3

4

5

6

7

8

A (ICE CREAM)

B (CASHMERE)

C (BLOOD THINNERS)

D (ROASTED TURKEY)

E (LEATHER)

F (FLU VACCINES)

G (SILK)

H (BODY CARE PRODUCTS)

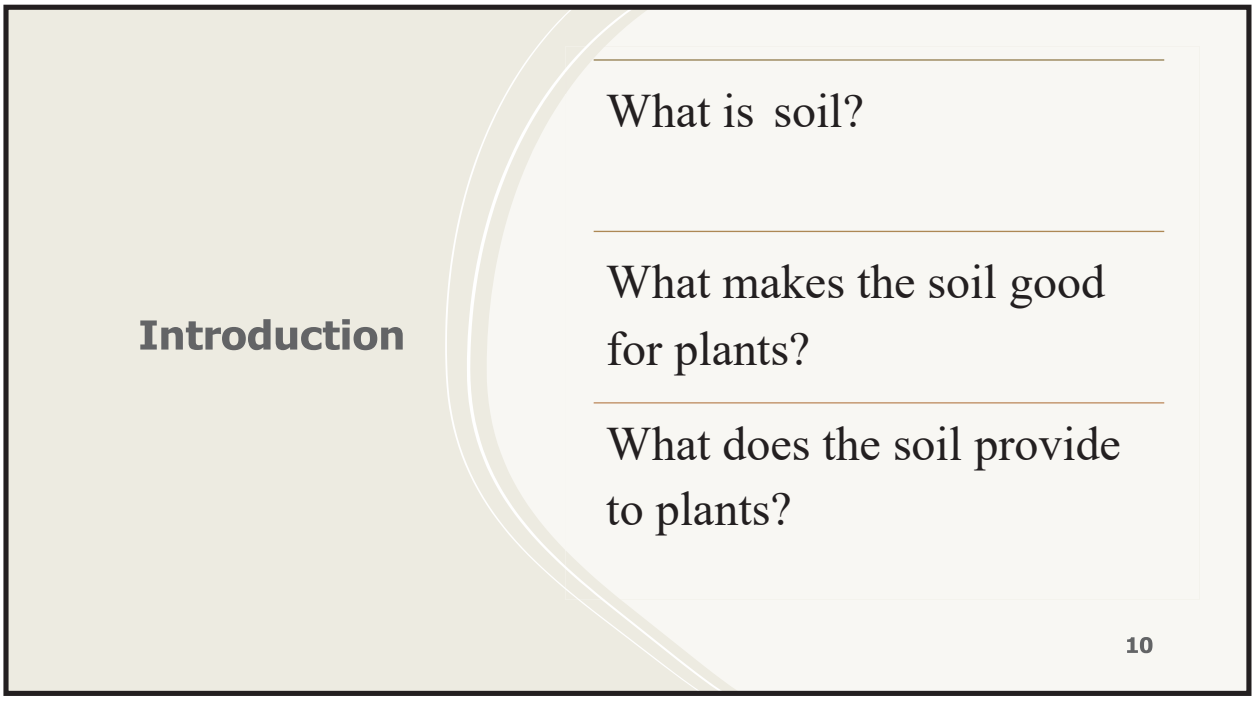
Worksheet Match the Product with the Plant	
Product:	**Plant Source for the Product:**
A. Peanut Butter	
B. Ethanol Fuel	
C. Furniture	
D. Jeans	
E. Pasta	
F. Veggie Patties	
G. Sugar	
H. Tires	

Worksheet Match the Product with the Animal	
Product:	**Animal Source for the Product:**
A. Ice Cream	
B. Cashmere	
C. Blood Thinners	
D. Roasted Turkey	
E. Leather	
F. Flu Vaccines	
G. Silk	
H. Body Care Products	

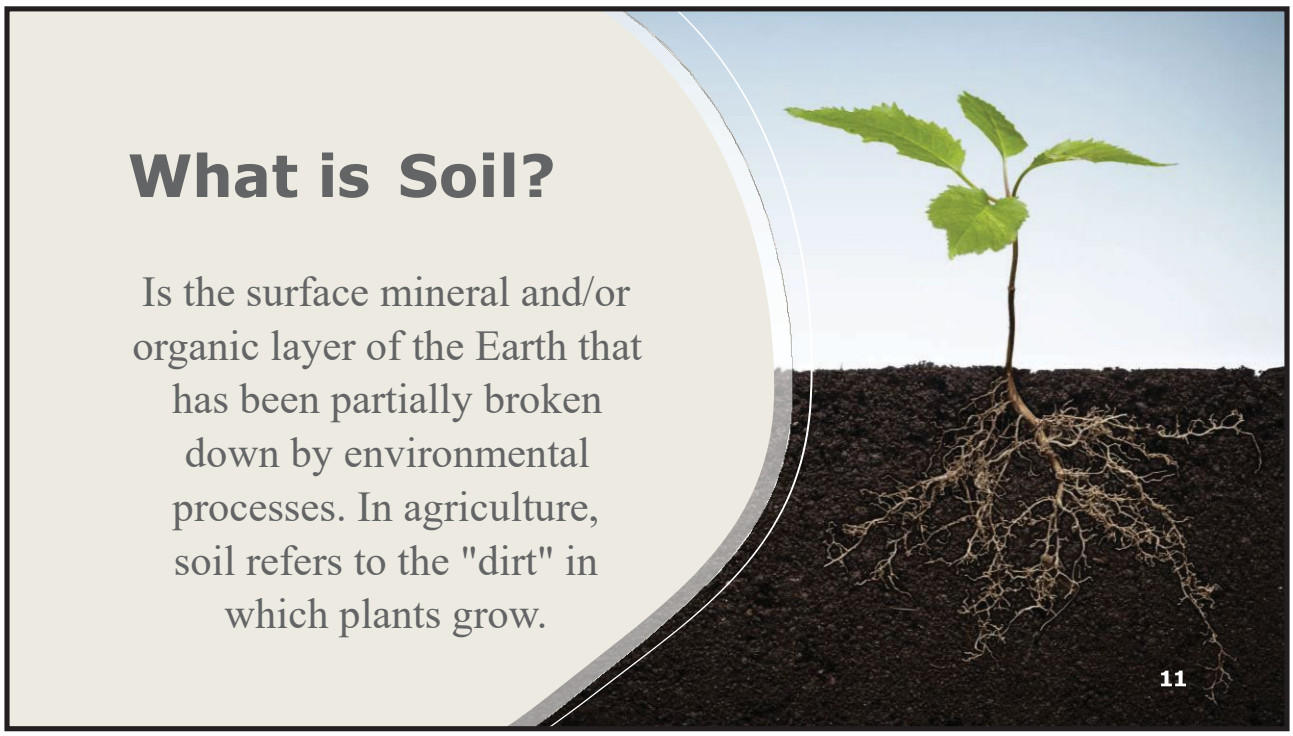
Worksheet Answer Key Match the Product with the Plant	
Product:	**Plant Source for the Product:**
A. Peanut Butter	*(Peanut)* **3**
B. Ethanol Fuel	*(Corn)* **5**
C. Furniture	*(Pine Tree)* 7
D. Jeans	*(Cotton)* **1**
E. Pasta	*(Wheat)* **8**
F. Veggie Patties	*(Soybean)* **2**
G. Sugar	*(Sugarcane)* **6**
H. Tires	*(Rubber Tree)* **4**

Worksheet Answer Key Match the Product with the Animal	
Product:	**Animal Source for the Product:**
A. Ice Cream	*(Dairy Cows)* **7**
B. Cashmere	*(Goats)* **8**
C. Blood Thinners	*(Pigs)* **3**
D. Roasted Turkey	*(Turkeys)* **6**
E. Leather	*(Cattle)* **2**
F. Flu Vaccine	*(Chickens)* **1**
G. Silk	*(Silkworms)* **5**
H. Body Care Products	*(Sheep)* **4**

Slides from an instructional presentation to use with Module 3

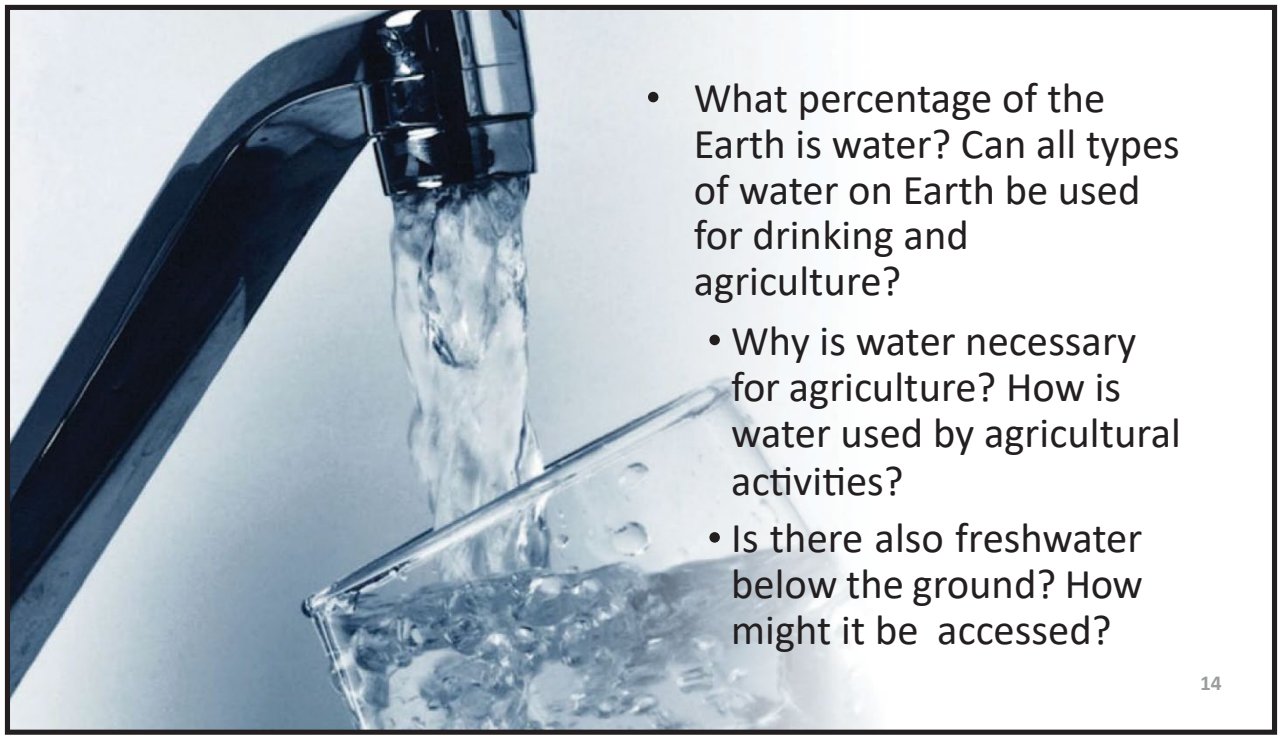


Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.



Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

Slides from an instructional presentation to use with Module 4

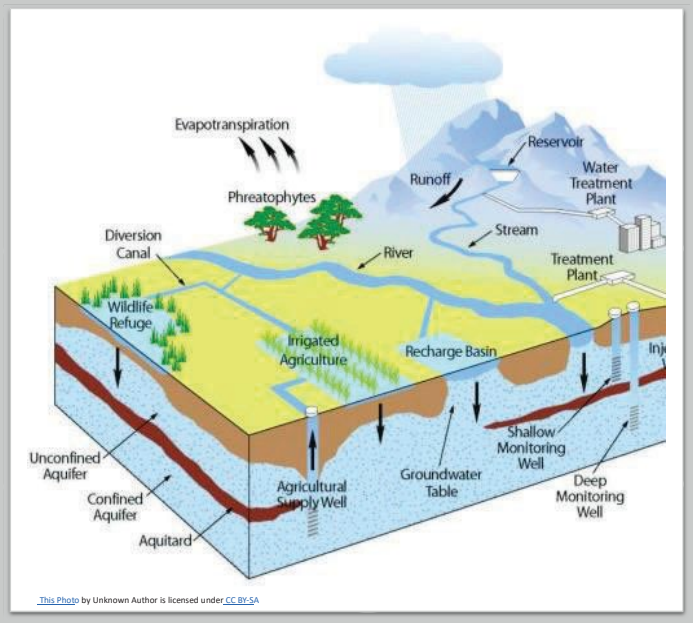


Visit *https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php* to download materials.

What is an Aquifer?

An underground layer of sand, gravel, or rock whose many holes contain a usable supply of groundwater.

They are accessed by drilling and operating wells that supply water for irrigation, homes, power plants and factories.



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Building an Aquifer

STEP 1

STEP 2

STEP 3

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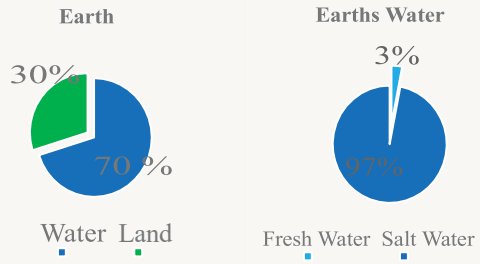
Visit *https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php* to download materials.

Why Should We Conserve Water?



Fresh Water (3%)

- Available water - 0.5 %
- Unavailable water - 2.5 %
  - Ice caps, glaciers - 68%
  - Ground water - 30%

17

How We Conserve Water in Agriculture

- Raise plants and animals that require less water
- Decrease evaporation by covering the soil with mulch
- Build water harvesting/reuse systems and improve irrigation management
- Store and apply farm chemicals and animal waste carefully to avoid polluting groundwater and surface water

18

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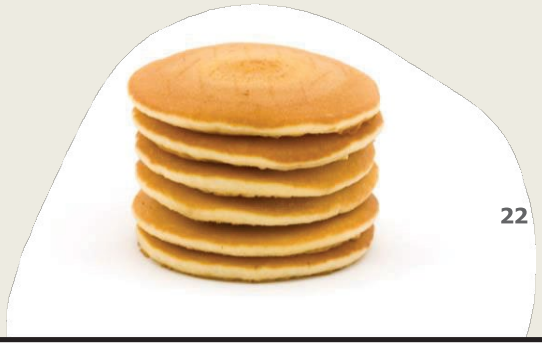
Slides from an instructional presentation to use with Module 5

Food

Introduction

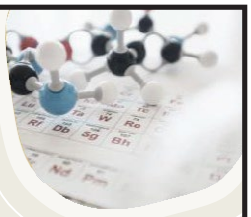
- Is science involved in producing and cooking food? If so, how?
- What are microorganisms? Are microorganisms used or found in food? Are they good? Are they bad?
- What makes foods like bread and pancakes rise and become fluffy?



22

Visit *https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php* to download materials.

Activity



STEP 1

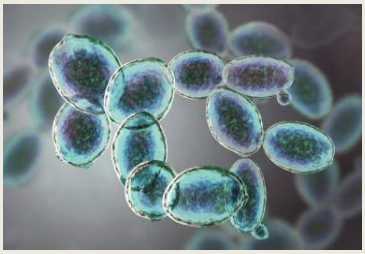
STEP 2

STEP 3

23

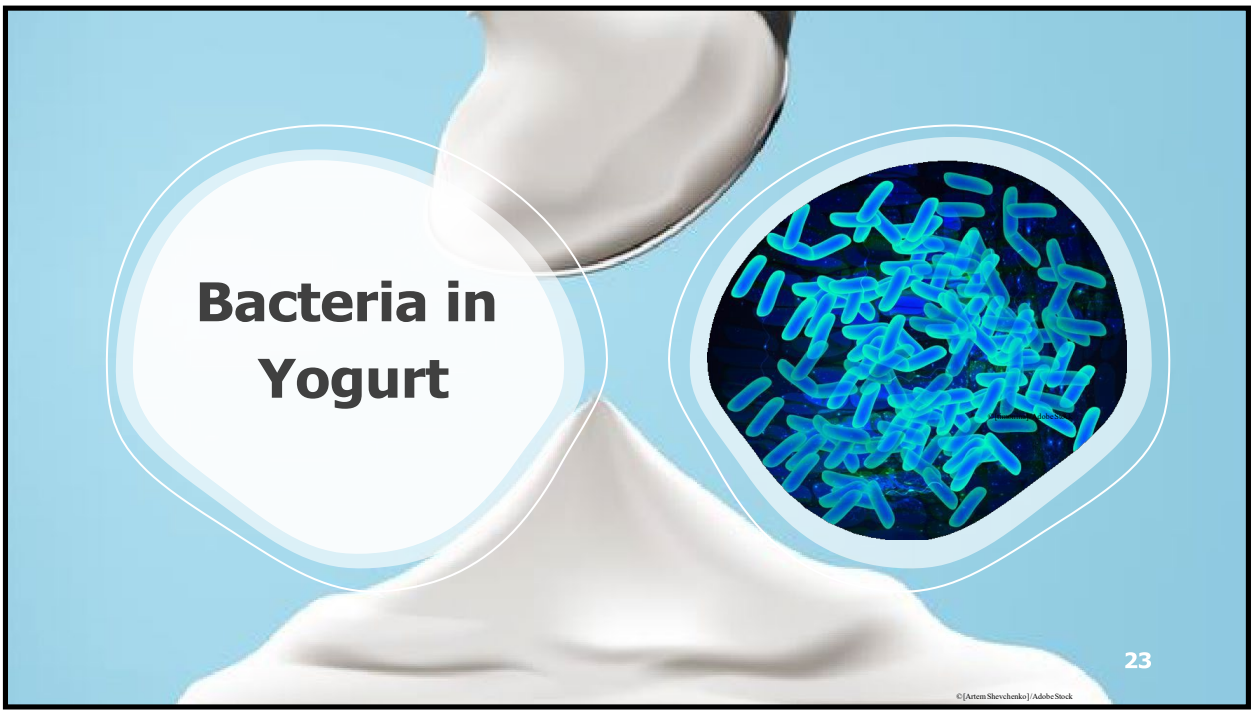
Microorganisms

- Yeast
  - Bread
  - Beer



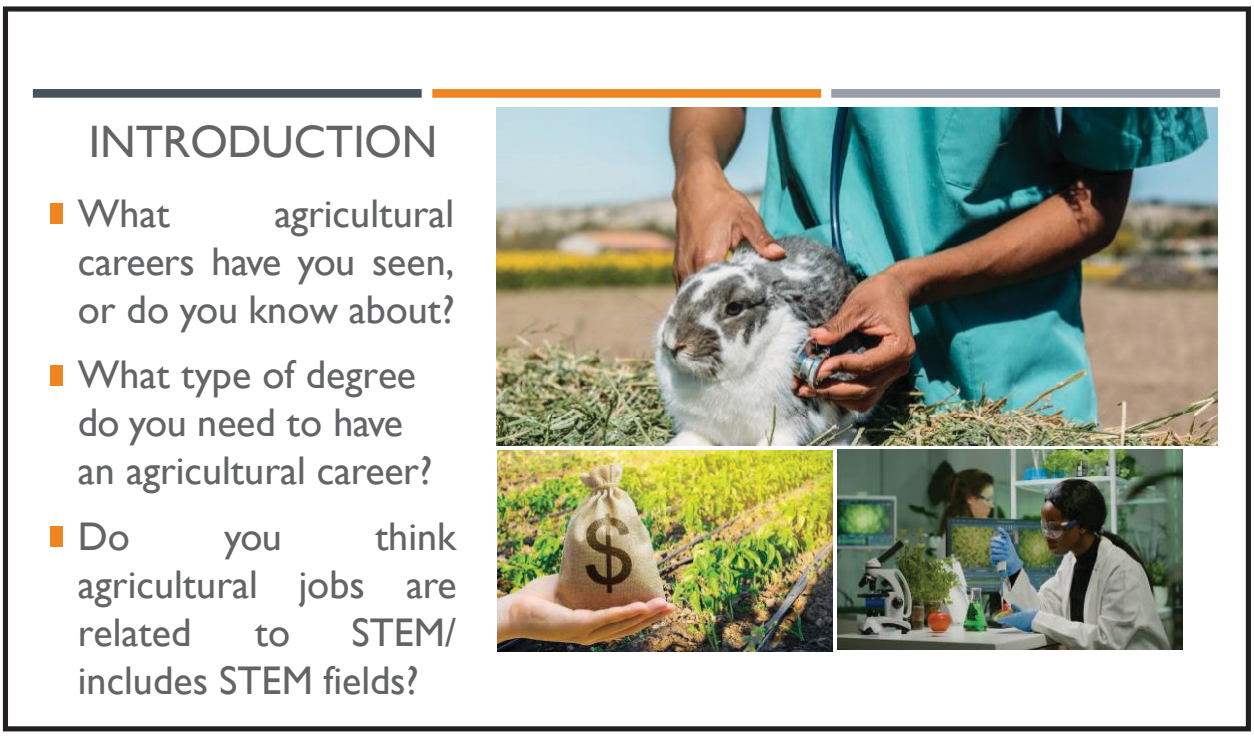
Yeast fungus under a microscope.

24


Bacteria in Yogurt
23
©[Artem Shevchenko]/AdobeStock


Bacteria for Cheese Production
26

Slides from an instructional presentation to use with Module 6



Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

CAREER PATHWAYS

Agribusines

Agricultural

Animal

Biotechnologica
l Systems

29

CAREER PATHWAYS

Environmental
and Natural
Resource

Food Products
and

Plant

Engineering

30

Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.


Activity
31


Correct!
• Summarize for this career:
• What does it do?
• How does it help in this situation?
• What degree does it need?
32

ACTIVITY

A

- Dietitian
- Sensory Scientist
- Packaging Designer
- ProcessingTechnician
- Agricultural Marketer
- Food Safety Specialist
- Product Development
- Procurement/Merchandising Agent

B

- Accountant
- Data Analyst
- Loan Officer
- Aquaculturist
- Agricultural Insurance Adjuster

C

- Welder
- Mechanic
- Machinist
- Electrician
- InformationTechnology (IT) Programmer/ Developer
- Agricultural Engineer

33

ACTIVITY

D

- Crop Adviser
- Extension Agent
- Agricultural Pilot
- Agricultural Researcher
- Agricultural

E

- Forester
- Geologist
- Hydrologist
- Veterinarian
- Wildlife Biologist/Ecologist
- Agricultural Journalist
- Agrotourism Educator

F

- Landscape Architect
- LandscapeTechnician
- Greenhouse Manager
- Agricultural

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AFTER HIGH SHOOL

College
Associate Degree/

6 months - 2 Years

University
Bachelor's Degree

4 Years

University
Graduate Degree (Master/PhD)

1 – 6 Years

35

RESOURCE

- Speak to your Counselors and Teachers
- Explore Courses at Career and Technical Center
- Research
  - College Websites

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Visit https://www.ncaar.msstate.edu/outreach/ag-sci-and-careers.php to download materials.

Career Card Questions

For each situation, which careers may be involved and how might they?

A. Your company is trying to create and sell a new chocolate bar.

1.	2.
3.	4.
5.	6.
7.	8.

B. Your catfish farm is trying to expand and make money after a natural disaster.

1.	2.
3.	4.
5.	

C. Your company invents, manufactures, and repairs agricultural robots.

1.	2.
3.	4.
5.	6.

D. Your cotton crop is looking unhealthy and growing poorly.

1.	2.
3.	4.
5.	

E. You are in charge of creating a new national park and increasing its number of visitors.

1.	2.
3.	4.
5.	6.
7.	8.

F. You are the principal of a high school, and you want to start a beautiful school garden full of herbs, vegetables and ornamental flowers.

1.	2.
3.	4.

Career Card Answers

For each situation, which careers may be involved, and how might they help?

A. Your company is trying to create and sell a new chocolate bar.

1. Product Development Technologist	2. Sensory Scientist
3. Food Processing Technician	4. Food Safety Specialist
5. Packaging Designer	6. Marketer
7. Procurement/Merchandising Agent	8. Dietitian

B. Your catfish farm wants to expand and make money after a natural disaster.

1. Accountant	2. Agricultural Loan Officer
3. Agricultural Insurance Adjuster	4. Data Analyst
5. Aquaculturists	

C. Your company invents, manufactures, and repairs agricultural robots.

1. Agricultural Engineer	2. Mechanic
3. Machinist	4. Welder
5. Electrician	6. Information Technology (IT) Programmer/Developer

D. Your cotton crop is looking unhealthy and growing poorly.

1. Agricultural Pilot	2. Agricultural Researcher
3. Cooperative Extension Agent	4. Crop Adviser
5. Agricultural Input Salesperson	

E. You are in charge of creating a new national park and maximizing its number of visitors.

1. Hydrologist	2. Geologist
3. Wildlife Biologist/Ecologist	4. Veterinarian
5. Forester	6. Environmental Technician
7. Agritourism Educator	8. Agricultural Journalist

F. You are the principal of a high school, and you want to start a beautiful school garden full of herbs, vegetables, and ornamental flowers.

1. Agricultural Instructor	2. Landscape Architect
3. Greenhouse Manager	4. Landscape Technician

Special Thanks to:

Agape Montessori School, Vicksburg, MS
Amanda Elzy High School, Greenwood, MS
Bogue Chitto High School, Bogue Chitto, MS
Canton High School, Canton, MS
Coahoma High School, Clarksdale, MS
Central Holmes Christian School, Lexington, MS
Charleston High School, Charleston, MS
Clarksdale High School, Clarksdale, MS
Cleveland Central High School, Cleveland, MS
Clinton Christian Academy, Clinton, MS
Clinton High School, Clinton, MS
Crystal Springs High School, Crystal Springs, MS
Deer Creek School, Arcola, MS
Discovery Christian School, Florence, MS
Enterprise High School, Enterprise, MS
Florence High School, Florence, MS
Gentry High School, Indianola, MS
Germantown High School, Madison, MS
Greenville Christian School, Greenville, MS
Greenville CTE Center, Greenville, MS
Greenville High School, Greenville, MS
Greenwood High School, Greenwood MS
Holmes County Central High School, Lexington, MS
J. Z. George High School, North Carrollton, MS
JPS Career Development Center, Jackson, MS
Lawrence County CTE, Monticello, MS
Leake County High School, Walnut Grove MS
Leflore County High School, Itta Bena, MS
Leland CTE Center, Leland, MS
Leland High School, Leland, MS
Lloyd Star High School, Brookhaven, MS
Madison S Palmer High School, Marks, MS
Magee High School, Magee, MS
Manchester Academy, Yazoo City, MS
McEvans High School, Shaw, MS
Northside High School, Shelby, MS
Northwest Rankin High School, Flowood, MS
O'Bannon High School, Greenville, MS
Pelahatchie High School, Pelahatchie, MS
Raleigh High School, Raleigh, MS
Raymond High School, Raymond, MS
Rebul Academy, Learned, MS
Riverside High School, Avon, MS
Simmons High School, Hollandale, MS
South Delta High School, Rolling Fork, MS
South Panola High School, Batesville, MS
Terry High School, Terry, MS
Thomas C. Randle CTE Center, Belzoni, MS
Thomas E. Edwards High School, Ruleville, MS
Union High School, Union, MS
Velma Jackson High School, Camden, MS
Vicksburg High School, Vicksburg, MS
Warren Central High School, Vicksburg, MS
Wesson High School, Wesson, MS
West Bolivar High School, Rosedale, MS
West Lincoln High School, Brookhaven, MS
West Tallahatchie High School, Webb, MS
Yazoo City High School, Yazoo City, MS
Yazoo County High School, Yazoo City, MS

Project Partners:

Project Sponsor:

Produced with support from Mississippi NRCS under award NR204423XXXXC116

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