GEORGIA MIDDLE SCHOOL Instructional Resources

CAREER, TECHNICAL, & AGRICULTURAL EDUCATION

AGRICULTURE

COURSE: Agriculture Education

UNIT 2: Propagating our Future through Horticulture

INTRODUCTION

Annotation:

In this unit students will be introduced to the Horticulture Industry. This includes plant propagation and requirements for growth. Students will also have access to FFA Floriculture identification.

Grade(s):

	6th
	7th
X	8th

Time:

Ten 50 minute class periods

Author:

Todd Dobson

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided appropriately. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation. Many students (both with and without disabilities) who struggle with reading may benefit from the use of text reading software or other technological aids to provide access to printed materials. Many of these are available at little or no cost on the internet.

FOCUS STANDARDS

GPS Focus Standards:

MSAGED8-6 **Students will define and explain the horticulture industry.**
a) Define horticulture.
b) Compare/contrast the horticulture and agriculture industry.
c) Research careers in the plant science/horticulture industry.

MSAGED8-7 **Students will identify plant parts and their functions.**
a) Identify vegetative parts of the plant (roots, stems, leaves) and their functions.
b) Identify and use terms that describe reproductive parts of the plant (flower and seed) and their functions.

MSAGED8-8 **Students will define methods of plant propagation either by sexual or asexual reproduction.**
a) Demonstrate sexual and asexual plant reproduction methods.
b) Compare and contrast sexual and asexual plant reproduction methods.

MSAGED8-9 **Students will identify plant growth requirements.**
a) Explain what nutrients plants need.
b) Describe the environmental conditions for plant growth (light, air, water, soil).
c) Explain the process of photosynthesis.

GPS Academic Standards:

M8A1 **Students will use algebra to represent, analyze, and solve problems.**

M8D2 **Students will determine the number of outcomes related to a given event.**

M8D4 **Students will organize, interpret, and make inferences from statistical data.**

M8P1 **Students will solve problems (using appropriate technology).**

M8P3 **Students will communicate mathematically.**

M8P4 **Students will make connections among mathematical ideas and to other disciplines.**

M8P5 **Students will represent mathematics in multiple ways.**

S7CS2 **Students will use standard safety practices for all classroom laboratory and field investigations.**

S7L1 **Students will investigate the diversity of living organisms and how they can be compared scientifically.**

S7L2 **Students will describe the structure and function of cells, tissues, organs, and organ systems.**

S7L3 **Students will recognize how biological traits are passed on to successive generations.**

S8CS1	**Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.**
S8CS4	**Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.**
S8CS6	**Students will communicate scientific ideas and activities clearly.**

UNDERSTANDING & GOALS

Enduring Understandings:

Horticulture is an important part of everyday society. Understanding the plants way of life enables us to ensure the best growing conditions needed to sustain plant life. We must stay on top of the latest trends and advances in horticulture to keep the American industry at the top.

Essential Questions:

- What are some examples of horticultural products?
- What are the components of the horticulture industry?
- What are the two major areas of horticulture?
- What are the functions of the different parts of a plant?
- What are the types of plant propagation?
- What is meant by "growing media?"
- What nutrients does a plant need?
- What environmental aspects help plants grow?

Knowledge from this Unit:

Students will be able to:

- Discuss the functions of plants and different parts of plant anatomy
- Describe the types of horticulture

Skills from this Unit:

Students will be able to:

- Identify the plant species that reproduce sexually and asexually
- Demonstrate various propagation techniques

ASSESSMENTS

Assessment Method Type:

____ Pre-test
X Objective assessment - multiple-choice, true- false, etc.
_X_ Quizzes/Tests
__ Unit test
X Group project
X Individual project
X Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
_X_ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
X Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
_X_ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
X Constructed Responses
__ Chart good reading/writing/listening/speaking habits
_X_ Application of skills to real-life situations/scenarios
X Post-test

Attachments for Assessment(s):

- **Hort Quiz 1**
- **Hort Quiz 2 Power Point**

• LESSON 1: INTRODUCTION TO HORTICULTURE

1. Identify the standards. Standards should be posted in the classroom for each lesson.

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2. Review the Essential Questions. Post Essential Questions in the classroom.

- What are some examples of horticultural products?
- What are the components of the horticulture industry?
- What are the two main areas of horticulture?

3. Identify and review the unit vocabulary.

Asexual	Humidity	Ornamental Turf Grass	Pomology	Transpiration
Bedding Plants	Layering	Perlite	Potassium	Vegetable Crops
Cuttings	Nitrogen	Phosphorus	Sexual	
Division	Olericulture	Photosynthesis	Shrubs	
Horticulture	Ornamental Horticulture	Pollination	Tissue Culture	

4. Introduction to Horticulture Discussion
    - Bring in different flowers, ornamental plants, fruits and vegetables to show students examples of horticultural products.
    - Review the types of horticultural products. Ask students to list some examples of each.
        - **Cut Flowers:** Flowers grown for blossoms
            - **Examples:** Roses, mums, orchids
        - **Bedding Plants**: Plants grown outside in flowerbeds
            - **Examples:** Petunias, begonias, zinnias
        - **Shrubs:** Small, woody plants grown around homes and buildings
            - **Examples:** Hollies, azaleas, rhododendrons
        - **Ornamental Turf Grasses**: Grasses used for lawns and golf courses
            - **Examples:** Bermuda grass, Kentucky fescue, zoysia grass
        - **Fruits and Vegetables**: Crops that provide nutritious foods
            - **Examples:** Lima beans, broccoli, apples
    - Ask students, "What is the horticulture industry?"
        - **Answer:** All things that support meeting the needs of consumers for horticulture products
    - What are the components that make up the horticulture industry?
        - **Examples:** Seed, fertilizer, lawn mowers, greenhouses, processors and distributors
    - What are the two major areas of horticulture?
        - **Answer:** Ornamental horticulture, including floriculture, landscaping, and interiorscaping, and food crop horticulture, including olericulture and pomology.

5. Language Arts Connection
    - Have students access local newspapers or magazines, either online or in print, and find a story about pertaining to some part of the horticulture industry.
    - Students should complete the **Hort 8-1 - Lang Arts Connections- Hort in the News** worksheet as they read their news story.
        - See attached supplementary files

6. Math Connection
    - Have students complete the **Hort 8-2 - Math Connections - Seed Word Problems** worksheet.
        - See attached supplementary files

7. Create a Garden Project
    - Find videos online that show different school garden projects.
    - Have students complete the **Hort 8-3 - Science Connections - Garden Plan** worksheet to plan a school garden.
        - See attached supplementary files
        - Students will need to research which vegetables grow well in the area and which ones would be in high demand.
    - If it is okay with the school officials, students can implement their garden plan in a school garden.
    - Have students create carnation bud vases to deliver to schoolteachers or to parents.

8. Have students complete **Hort Quiz 1.**
    - See attached supplementary files

• LESSON 2: FUNCTIONS OF PLANT SYSTEMS

1. Review Essential Questions. Post Essential Questions in the classroom.

    - What are the functions of the different parts of a plant?

2. Lead a brief discussion about plants.
    - Ask students, "What do you think the Earth would be like if there were no plants?"
    - Why are plants important?
    - Could life exist without plants?
    - What are some parts of plants?

3. Plant Parts Discussion
    - Ask students, "What are the functions of the leaves?"
        - **Answer:** Make food for the plant through the process of photosynthesis, where light and carbon dioxide are converted into oxygen
    - What are the functions of the stem?
        - **Answer:** Transports water and nutrients from the leaves
    - What are the functions of the roots?
        - **Answer:** Anchor the plant into the ground, provide structural support, absorb water and nutrients from the soil, and store food
    - What are the functions of flowers?
        - **Answer:** Attract insects for pollen, produce seeds and fruits, act as the site for plant reproduction

4. Plant Parts Experiments
    - Transpiration
        - Bring in leaves from several plants. Put each leaf in a small plastic baggie for several days, and observe how the leaf gives off water during transpiration.
    - Xy-High, Phlo-Low
        - Bring in stalks of celery and small cups with red-colored water in them.
        - Put the stalks in the cup overnight.
        - Observe how much water the xylem and phloem of the celery have absorbed.
    - Bring in samples of different roots and observe their differences.
    - Flower and Seeds Matching
        - Bring in several different flowers and their corresponding seeds or fruits.
        - Have students identify the types of plants they come from.
        - Introduce the seed and plant identification contest, as outlined in the Georgia FFA Awards Bulletin.
    - Using photos of different plants, have students identify the plant parts and review the roles of each.

5. Take-Home Activities
    - Students should take home the **Hort 8-5 Lang Arts Connections - Foods You've Eaten** worksheet.
        - See attached supplementary files
    - Have students keep a record of the food they eat during a one-week period.
        - They must identify all the foods on their list that come from plants, and identify the part of the plant that each food comes from.

6. Plant Identification PowerPoint
    - Give students a copy of the **Hort Quiz 2 Power Point** handout.
        - See attached supplementary files
    - Have students create their 10-slide PowerPoint presentation for a grade.

• LESSON 3: METHODS OF PLANT REPRODUCTION

1. Review Essential Questions. Post Essential Questions in the classroom.

    - What are the types of plant propagation?

2. Lead a discussion about plant propagation.
    - Ask students, "What is propagation?"
    - Why is plant reproduction important to agriscience research?
    - **Optional:** Find an online video clip, or a video that can be played in class, that discusses plant reproduction and demonstrates the proper method of taking a cutting from a plant.

3. Give each student a copy of the **Hort 8-9 - Math Connections - Propagation Methods** worksheet and review the different types of propagation as a class.
    - See attached supplementary files
    - **Sexual:** Flower parts of plants have the ability to form seeds
    - **Asexual:** Utilize a part or parts of one parent plant
    - **Cuttings:** A part is cut from the parent plant and then forms roots
    - **Layering:** A part of the plant forms new roots while still attached to the parent plant
    - **Division:** A plant is separated into smaller parts, including roots
    - **Tissue Culture:** A very small part of a plant, usually a single leaf, is used to grow a new plant in a sterile environment
        - Also known as micro propagation
        - All equipment used must be sterile, otherwise bacteria and fungi will grow in unclean culture tubes

4. Plant Propagation Activities
    - Research Project
        - Split the class into groups to complete the **Hort 8-7 - Science Connections - Propagation Methods** worksheet.
            - See attached supplementary files
        - Have each group research the types of plants that would be best for division and cutting types of propagation, and what types of environments are best for the plants.
        - Students should make note of the local plants that could be propagated in these methods.
    - Local Nursery Plants
        - Make a list of nursery plants on the board, and what type of propagation would be suitable for each. Some examples are listed below:

Local Plant	Propagation Method
Blueberries	Layering
Azaleas	Cutting
Dogwood Tree	Seeds
Daylilies	Division
Tulips	Bulbs
Carrots	Seeds
African Violets	Cuttings
Rhododendrons	Cuttings
Corn	Seeds
Tomatoes	Seeds

    - Have a local garden club member or greenhouse owner come speak to the class about different rooting techniques and propagation
    - Bulletin Board Project
        - Have students work in groups to create posters illustrating the different plant parts.
        - One group would draw the flower, another the stem, etc.
        - Place the posters on a bulletin board in the classroom so that one whole plant is created from the various projects.

5. Give each student a copy of **Hort 8-4 - Science Connections - Plant Parts** worksheet.
    - See attached supplementary files
    - Have students take turns reading the definitions aloud before completing the worksheet.

6. Math Activity
    - Have students complete the **Hort 8-8 - Math Connections - Percent Germination** worksheet.
        - See attached supplementary files

7. Take-Home Activity
    - Give each student a copy of the **Hort 8-6 - Lang Arts Connections - Propagation Methods** worksheet.
        - See attached supplementary files
    - Instruct students to research the different types of propagation and which plants are best for each.

• LESSON 4: REQUIREMENTS FOR PLANT GROWTH

1. Review the Essential Questions. Post Essential Questions in the classroom.

    - What is meant by "growing media?"
    - What nutrients does a plant need?
    - What environmental aspects help plants grow?

2. Survival Needs
    - Instruct students to make a list of basic requirements for survival.
    - Using things the students listed, make a master list of requirements on the board.
    - Ask students to pretend they are plants, and make a list of basic requirements for survival.
    - List these on the board on a separate master list, and compare the two.
    - Ask students, "What do plants need that we do not?"
    - What do humans need that plants do not?

3. Lead a discussion about plant nutrients.
    - Ask students, "What is meant by 'growing media?'"
        - **Answer:** Growing media is whatever material a plant grows in and gets nutrients from.
    - What are some examples of growing media?
        - **Examples:** Soil, water, perlite
    - What nutrients do plants need?
        - **Examples:** Vitamins, minerals, nitrogen, phosphorus, potassium
    - What role does water play in a plant's life?
        - **Answer:** Water provides proper plant development
    - How do plants get the water they need?
        - **Answer:** Directly (rain, irrigation), absorption through roots, absorbing water in the air (humidity)
    - How does air help plants?
        - **Answer:** Air gives plants carbon dioxide, which they convert to oxygen during photosynthesis
    - How does light help plants grow?
        - **Answer:** Light is required for photosynthesis to take place

4. Irrigation Math Connection
    - Have students complete the **Hort 8-10 - Math Connections - Irrigation** worksheet.
        - See attached supplementary files.

5. Growing Plants
    - Have students complete the **Hort 8-12 - Science - Average Temperature and Precipitation in Georgia** worksheet.
        - See attached supplementary files
        - Students should research plants in Georgia, but specifically plants that grow in the local community.
        - If the school garden was created in Lesson 1, students should choose a plant that is grown there to research.
    - Take students to the laboratory and have them complete the **Hort 8-13 - Plant Factors** worksheet.
        - See attached supplementary files
        - Students should further research the plant chosen for the 8-12 worksheet. They should use this worksheet to keep track of their chosen plant.
    - Using the same plant, students should complete the **Hort 8-11 - Lang Arts -What's it Like to be a Plant?** worksheet.

6. Terrarium Activity
    - Have each student bring in an empty two-liter soda bottle or a canning jar from home.
    - Provide students with appropriate growing media and seeds.
    - If using a two-liter bottle, draw a straight line around the bottle, six inches above the bottom. Cut around that line with scissors.
    - Have students choose a seed and plant it in the bottom part of the bottle.
    - Slide the top part of the bottle over the bottom part, creating an airtight seal over the plant. Taping the bottle parts together might help.
    - Place the terrariums in a lighted area.

CULMINATING PERFORMANCE TASK

Culminating Unit Performance Task Title:

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Attachments for Culminating Performance Task:

UNIT RESOURCES

Web Resources:

www.gaaged.org
www.youtube.com

Attachment(s):

Materials & Equipment:

- Worksheets attached
- pictures of various plants from magazines and catalogs
- local newspapers
- seeds
- house plants
- containers for new plants
- fertilizer
- plant labels
- soil/media
- pruners
- rooting hormone
- tissue culture kit
- TV/VCR
- supplies for constructing a terrarium:
    - 2-liter soda bottles
    - Scissors
    - 2-inch masking tape
    - potting soil
    - water
    - seeds

21st Century Technology Used:

X	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard	X	Calculator		Graphic Organizer
	Student Response System		Desktop Publishing		Image File(s)
	Web Design Software		Blog	X	Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		