Unit 4: Horticultural Science

Content Area: **CTE**
Course(s): **Horticulture I**
Time Period: **September**
Length: **Full Year**
Status: **Published**

Unit Overview

Horticultural is the science of cultivating plants for human use, whether for food production, beauty, conservation, landscaping or horticulture therapy.

To provide students with a foundational understanding of horticultural principles and practices, including plant anatomy, physiology, propagation, and cultivation.

Enduring Understanding

Horticulture is a segment of the agriculture industry. The term horticulture literally means the culture of a garden. However, the term has taken on a broader context. Horticulture includes the production and use of plants for food, comfort, and beautification. A direct relationship exists between horticulture and science. The area of science most closely associated with horticulture is botany. Botany is the study of plants and plant processes. The field of science that deals with the cultivation of horticultural plants is known as horticulture science. Science is applied across the horticulture industry. The application of science to horticulture is called horticulture technology. Successfully raising horticultural plants takes more than just daily watering. Time, patience, and an understanding of diverse scientific processes are needed to produce optimal plant growth.

Career Education Connection

AGRI.9-12.1	Food Products and Processing Systems Pathway
AGRI.9-12.4	Power, Structural, and Technical Systems
AGRI.9-12.9.4.12.A.(1).1	Examine and conduct food product development and research activities that demonstrate application of food science principles to enhance product quality and appeal.
AGRI.9-12.9.4.12.A.(2).1	Examine and apply knowledge of basic plant anatomy and physiology, using taxonomic and other classifications to build a working understanding of functional differences among plant structures.
AGRI.9-12.9.4.12.A.(2).2	Describe and implement the principles of plant production and management in both domesticated and natural environments, applying principles of anatomy and physiology to enhance plant production.
AGRI.9-12.9.4.12.A.(2).3	Evaluate and implement the fundamentals of production and harvesting when producing plants to demonstrate plant management and production techniques.
AGRI.9-12.9.4.12.A.(2).4	Exercise elements of design commonly used by professionals in plant systems careers by enhancing an environment (e.g., floral, forest, landscape, or farm) for a variety of purposes.

AGRI.9-12.9.4.12.A.(4).1	Examine structural requirements and estimate project costs in order to facilitate effective planning for projects within this pathway.
AGRI.9-12.9.4.12.A.(4).2	Plan design and construction support services to facilitate the development of agricultural machinery, equipment, buildings, structures, and technical systems.
AGRI.9-12.9.4.12.A.(4).4	Explain physical science principles and apply them to engineering applications involving mechanical equipment, structures, biological systems, land treatment, power utilization, and technology to facilitate work within this pathway.
AGRI.9-12.9.4.12.A.(5).1	Communicate about natural resources using effective public venues to heighten awareness regarding conservation and resource preservation.

Data and Analysis

Student completion of Labs in class

SAE evatulation

CDE Results

Assesement of FFA Manual

Essential Questions

1. What is the definition of horticulture?

2. What is the field of science that deals with the cultivation of horticultural plants?

3. How do the three main areas of horticulture differ?

4. What are the two major categories within ornamental horticulture?

5. What takes place in a nursery?

6. How important is Organic food production to the American Society?

Standards/Indicators/Student Learning Objectives (SLOs):

- 9.4.12. Career and Technical Education. All students who complete a career and technical education program will acquire academic and technical skills for careers in emerging and established professio
- 9.4.12.A. Agriculture, Food, & Natural Resources Career Cluster
- 9.4.12.A.34. Examine and summarize roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment to understand the nature and scope of this cluster and related organizations.

AGRI.9-12.PS.01.01.01.c	Analyze plant responses to varied light color, intensity and duration and recommend modifications to light for desired plant growth.
AGRI.9-12.PS.01.01.02.b	Determine the optimal air and temperature conditions for plant growth.
AGRI.9-12.PS.01.01.02.c	Design, implement and evaluate a plan to maintain optimal air and temperature conditions for plant growth.
AGRI.9-12.PS.01.01.03.a	Identify and summarize the effects of water quality on plant growth, (e.g., pH, dissolved solids, etc.).
AGRI.9-12.PS.01.01.03.b	Analyze and describe plant responses to water conditions.
AGRI.9-12.PS.01.01.03.c	Analyze plant responses to water conditions and recommend modifications to water for desired plant growth.
AGRI.9-12.PS.01.02	Prepare and manage growing media for use in plant systems.
AGRI.9-12.PS.01.03	Develop and implement a fertilization plan for specific plants or crops.
AGRI.9-12.PS.02	Apply principles of classification, plant anatomy, and plant physiology to plant production and management.
AGRI.9-12.PS.02.02	Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.
AGRI.9-12.PS.02.03	Apply knowledge of plant physiology and energy conversion to plant systems.
AGRI.9-12.PS.03	Propagate, culture and harvest plants and plant products based on current industry standards.
AGRI.9-12.PS.03.02	Develop and implement a management plan for plant production.
AGRI.9-12.PS.03.03	Develop and implement a plan for integrated pest management for plant production.
AGRI.9-12.PS.03.04	Apply principles and practices of sustainable agriculture to plant production.
AGRI.9-12.PS.03.05	Harvest, handle and store crops according to current industry standards.
AGRI.9-12.PS.04	Apply principles of design in plant systems to enhance an environment (e.g., floral, forest landscape, and farm).
AGRI.9-12.PS.04.02	Create designs using plants.

Lesson Titles:

Understanding Horticulture

Understanding the Effects of Light, Temperature, Air, and Water on Plant Growth

Determining the Importance of the Horticulture Industry

Exploring Career Oppurtunities in Horticulture

Identifying and Managing Plant Pests in the Greenhouse

Practicing Horticulture Safety

Propagating Plants by Cuttings

Supplying Nutrients to Floriculture Crops

Understanding Environmental Impacts of Horticulture

Understanding Integrated Pest Management

Understanding Plant Physiology

Career Readiness, Life Literacies, & Key Skills:

	Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
TECH.K-12.1.1.a	articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
TECH.K-12.1.1.b	build networks and customize their learning environments in ways that support the learning process.
TECH.K-12.1.1.c	use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
	Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.
TECH.K-12.1.2.a	cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
TECH.K-12.1.2.d	manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
TECH.K-12.1.5.a	formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
TECH.K-12.1.6	Creative Communicator
TECH.K-12.1.7.d	explore local and global issues and use collaborative technologies to work with others to investigate solutions.

Assessments

Summative Assessment:

- Career Development Events
- Marking Period Assessements
- Presentation
- Supervised Agricultural Experiences

Benchmark Assessments

Writing Prompt

Skills Based Assessment

Reading Response

Practical Lab

Alternative Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Reflective pieces

Concept maps

Case-based scenarios

Portfolios

Formative Assessment:

- Class discussion
- Edpuzzle
- Group work
- Oral response to questions
- peer evaluation
- Quizlet
- self evaluation and discussion with teacher

Inter-Disciplinary Connections:

	Language: System and structure, effective use, and vocabulary
	Reading: Text complexity and the growth of comprehension
	Writing: Text types, responding to reading, and research
SCI.K-2.K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
SCI.K-2.K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
SCI.K-2.K-2-ETS1-3.4.1	Analyze data from tests of an object or tool to determine if it works as intended.
FCSE.9-12.1.1.1	Summarize local and global policies, issues, and trends in workplace, community, and family dynamics that affect individuals and families.
FCSE.9-12.1.1.3	Analyze ways that individual career goals can affect the family's capacity to meet goals for all family members.

Diversity, Equity, and Inclusion

Amistad Mandate

- **Marie Clark Taylor:** A pioneering botanist, Taylor was the first African American woman to receive a doctorate in science from Fordham University. Her research focused on plant genetics and cytology.
- **Edmond Albius:** A Mauritian slave, Albius discovered the process of hand-pollinating vanilla orchids, revolutionizing the vanilla industry.
- **Abra Lee:** A passionate advocate for diversity in horticulture, Lee is a national speaker, writer, and historian who highlights the contributions of Black individuals to gardening and horticulture.
- **Wambui Ippolito:** Founder of the BIPOC Hort Group, Ippolito is dedicated to creating a more inclusive and equitable space for people of color in the horticulture industry.

- Contributions of African Americans to our Society
- Slavery in America
- Vestiges of Slavery in this Country

Holocaust Mandate

Topic:

Materials Used:

Addresses the Following Component of the Mandate:

- Bias
- Bigotry
- Bullying
- Holocaust Studies
- Prejudice

LGBTQ and Disabilities Mandate

Topic (Person and Contribution Addresses):

Materials Used:

Addresses the Following Component of the Mandate:

- Economic
- Political
- Social

Climate Change

Asian American Pacific Islander Mandate

Topic (Person and Contribution Addresses):

Materials Used:

Addresses the Following Component of the Mandate:

- Economic
- Political
- Social

Materials:

Core Instructional Materials

Mycaert: A Web-Based System Allowing Teachers to plan, document, deliver, and assess standards-based instruction.

National FFA Organization Teacher Resources toolbox.

FFA.org. Agricultural education prepares sutdents for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resource systems.

Supplemental Materials

Periodicals about Plant Science.

FFA Videos and resources.

Texts at Various Levels

Horticulture text book.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Conduct Official FFA meeting
- Cooperative Learning
- Delsea One Tutoring
- Drill and Practice
- Field Trips
- Guided Practice

- Individual Projects
- Internet Research
- Partner projects
- Presentations
- Problem Solving
- Recruitment
- Reflective Discussion
- Research Projects
- SAE Supervised Agricultural Experience

Modifications

MLL Modifications:

- Choice of test format (multiple-choice, essay, true-false)
- Continue practicing vocabulary
- Provide study guides prior to tests
- Read directions to the student
- Read test passages aloud (for comprehension assessment)
- Vary test formats

G&T Modifications:

- Alternate assignments/enrichment assignments
- Enrichment projects
- Extension activities
- Higher-level cooperative learning activities
- Pairing direct instruction with coaching to promote self-directed learning
- Provide higher-order questioning and discussion opportunities
- Provide texts at a higher reading level
- Tiered assignments
- Tiered centers

At Risk Modifications

The possible list of modifications/accommodations identified for Special Education students can be utilized for At-Risk students. Teachers should utilize ongoing methods to provide instruction, assess student needs, and utilize modifications specific to the needs of individual students. In addition, the following may be

considered:

- Additional time for assignments
- Adjusted assignment timelines
- Agenda book and checklists
- Answers to be dictated
- Assistance in maintaining uncluttered space
- Books on tape
- Concrete examples
- Extra visual and verbal cues and prompts
- Follow a routine/schedule
- Graphic organizers
- Have students restate information
- No penalty for spelling errors or sloppy handwriting
- Peer or scribe note-taking
- Personalized examples
- Preferential seating
- Provision of notes or outlines
- Reduction of distractions
- Review of directions
- Review sessions
- Space for movement or breaks
- Support auditory presentations with visuals
- Teach time management skills
- Use of a study carrel
- Use of mnemonics
- Varied reinforcement procedures
- Work in progress check

IEP & 504 Modifications:

*All teachers of students with special needs must review each student's IEP. Teachers must then select the appropriate modifications and/or accommodations necessary to enable the student to appropriately progress in the general curriculum.

Possible Modifications/Accommodations: (See listed items below):

- Allow for redos/retakes
- Assign fewer problems at one time (e.g., assign only odds or evens)
- Differentiated center-based small group instruction
- Extra time on assessments

- Highlight key directions
- If a manipulative is used during instruction, allow its use on a test
- Opportunities for cooperative partner work
- Provide reteach pages if necessary
- Provide several ways to solve a problem if possible
- Provide visual aids and anchor charts
- Test in alternative site
- Tiered lessons and assignments
- Use of a graphic organizer
- Use of concrete materials and objects (manipulatives)
- Use of word processor

Technology Materials and Standards

- Chromebooks
- FFA Manual
- FFA.org
- Mycaert.com
- THEART.com

TECH.K-12.1.1.a	articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
TECH.K-12.1.1.b	build networks and customize their learning environments in ways that support the learning process.
TECH.K-12.1.2.a	cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
TECH.K-12.1.3.b	evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.
TECH.K-12.1.3.c	curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
TECH.K-12.1.4.b	select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
TECH.K-12.1.4.d	exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
	Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
TECH.K-12.1.5.a	formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
TECH.K-12.1.5.d	understand how automation works and use algorithmic thinking to develop a sequence of

	steps to create and test automated solutions.
TECH.K-12.1.7	Global Collaborator
TECH.K-12.1.7.a	use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
TECH.K-12.1.7.b	use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.
TECH.K-12.1.7.c	contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
TECH.K-12.1.7.d	explore local and global issues and use collaborative technologies to work with others to investigate solutions.