Horticultural Science 2

Content Area: **Science**
Course(s): **Horticulture II**
Time Period: **September**
Length: **120**
Status: **Published**

Unit Overview

Horticulture is an exciting segment of agriculture that is growing ever more popular in the global economy. Horticultural Science uses all the tools of modern science to investigate the complex growth and developmental responses of horticultural crops and to develop solutions for problems confronting the horticulture industry.

Enduring Understandings

- A soil profile is a vertical cross-section of the soil. When exposed, various layers of soil should be apparent.
- Apical dominance is caused by auxin, which is produced in the apical meristem and flows down the stem, suppressing the lateral buds.
- Apical dominance is the dominance of a central branch or leader. It leads to a pyramidal shape for the plant.
- Compound leaves have more than one blade. Simple leaves have only one blade on each petiole.
- Flowers are the most obvious part of most plants. They are made of many intricate and important parts. Most flowers contain both male and female parts.
- Plants are essential for life as we know it on earth.
- Plants are named using a system called binomial nomenclature.
- Pollination occurs when the male pollen is transferred to the female part of the plant. Pollen may be transferred by wind, water, or animals to the ovary of the flower where the nuclei of the sperm and egg unite to form a seed that contains the embryo plant.
- Root functions involve the storage of food, absorption of water and minerals, and anchorage and/or support of the plant.
- Roots should be white. Roots should smell fresh. Roots should be evenly dispersed throughout soil.
- Self-pollination is the pollination of a flower on the same plant. Cross-pollination is the pollination of the flower on another plant.
- Sexual propagation involves the reproduction of plants with the use of seeds. Asexual propagation is the reproduction of new plants from the stems, leaves, or roots of a parent plant.
- Sexual reproduction gives the plant species the means to change with a changing environment. Every time sexual reproduction occurs there is a recombining of genetic material. Most genetic changes are beneficial because they enable plants to adapt to a changed environment and therefore survive.
- Soil texture is the fineness or coarseness of a soil. The inorganic material in soil is called mineral matter; it began as rock and was weathered into small particles.
- Stems have many important jobs in a plant. Stems are responsible for the size and shape of a plant. Some stems are made of wood, and some are herbaceous or soft.
- The genus is a group of plants that are very similar to each other.

- The species is a group of plants that are so similar that they usually mate freely with each other in the wild.
- The study of the form or shape of organisms or parts of an organism is called morphology.
- Water is necessary for seeds to germinate. At the same time, seeds need oxygen to germinate. Seeds need optimum temperatures.

Essential Questions

- How are plants classified and named?
- How are plants classified by life cycle?
- How do soils within a soil profile change over time?
- How does the ability to sexually produce seeds benefit a plant?
- How is sexual reproduction different from asexual reproduction and what is the advantage of sexual reproduction?
- What are five different factors that affect soil formation?
- What are some ways that we can put plants into groups?
- What are the different types of pesticide exposure?
- What are the functions of a plant's roots?
- What are the functions of a stem?
- What are the main parts of a leaf?
- What are the parts of a flower?
- What do plant growth regulators do?
- What is layering and how is it used to propagate plants?
- What is soil texture and why is it important?

Standards/Indicators/Student Learning Objectives (SLOs)

1 Define horticulture and describe its relationship to science and technology. less

2 Differentiate the three major segments of the horticulture industry.

3 Analyze activities included in the ornamental horticulture industry.

Plant science is the study of the structure, functions, growth, and protection of plants. Plant science can be divided into three major segments: agronomy, horticulture, and forestry. A. Agronomy is a specialized area of plant science that deals with field crops. Agronomy includes the relationship between plants and the soil. 1. Field crops include plants grown in large fields and are used for oil, fiber, grain, and similar products. 2. Field crops, such as corn and wheat, are often grown for their seeds, but other parts may also be used. B. Horticulture is the production and use of plants for food, comfort, and beauty. The two major areas of horticulture are ornamental and food crop production. 1. Ornamental horticulture involves growing and using plants for their beauty. Two main divisions of horticulture are floriculture and nursery/landscape. a. Floriculture is the production and use of plants for their flowers and foliage. Foliage refers to the stems and leaves of a plant. b. Nursery/landscape involves growing and using plants to make the outdoor environment more appealing. It includes shrubs, flowering plants, and lawn areas. 2. Food crop horticulture consists of growing plants for food. This can be divided into the two areas of olericulture and pomology. a. Olericulture is the science of producing vegetable crops. b. Pomology is the science of producing fruits and nuts. C. Forestry is the science of growing trees and producing wood products. 1. Tree farms are cultured forests that have been carefully planned, established, and maintained. 2. A great deal of labor and management goes into assuring high-quality timber.

LA.RH.11-12.6	Evaluate authors' differing perspectives on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.
LA.RH.11-12.8	Evaluate an author's claims, reasoning, and evidence by corroborating or challenging them with other sources.
9.3.12.AG.1	Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster.
9.3.12.AG.3	Examine and summarize the importance of health, safety and environmental management systems in AFNR businesses.
9.3.12.AG-ANI.3	Design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction and/or economic production.
9.3.12.AG-BIZ.1	Apply management planning principles in AFNR businesses.
9.3.12.AG-BIZ.4	Develop a business plan for an AFNR business.
9.3.12.AG-BIZ.5	Use sales and marketing principles to accomplish AFNR business objectives.
9.3.12.AG-ANI.1	Analyze historic and current trends impacting the animal systems industry.
9.3.12.AG-ANI.2	Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.
9.3.12.AG-BIZ.3	Manage cash budgets, credit budgets and credit for an AFNR business using generally accepted accounting principles.
PFL.9.1.12.A.5	Analyze how the economic, social, and political conditions of a time period can affect the labor market.
PFL.9.1.12.A.7	Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income.
PFL.9.1.12.A.8	Analyze different forms of currency and how currency is used to exchange goods and services.
SCI.MS	Growth, Development, and Reproduction of Organisms
SCI.MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
SCI.MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
CAEP.9.2.12.C	Career Preparation
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.4	Analyze how economic conditions and societal changes influence employment trends and future education.
CAEP.9.2.12.C.6	Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.
CAEP.9.2.12.C.7	Examine the professional, legal, and ethical responsibilities for both employers and employees in the global workplace.

Lesson Titles

- Classifying Ornamental Plants
- Examining Sexual Reproduction of Flowering Plants
- Explaining a Soil Profile

- Propagating Plants by Division, Separation, and Layering
- Propagating Plants Sexually
- Understanding Flower Anatomy
- Understanding Leaf Anatomy and Morphology
- Understanding Plant Growth Regulators
- Understanding Root Anatomy
- Understanding Soil Formation
- Understanding Soil Texture and Structure
- Understanding Stem Anatomy
- Using Pesticides Safely

Career Readiness, Life Literacies, & Key Skills

TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

Inter-Disciplinary Connections

- RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- RST.11-12.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
- RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms

LA.RH.11-12	Reading History
LA.RH.11-12.1	Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of primary and secondary sources, connecting insights gained from specific details to develop an understanding of the text as a whole.
LA.RH.11-12.6	Evaluate authors' differing perspectives on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.
LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
SOC.6.1.12	U.S. History: America in the World: All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.
SOC.6.1.12.B.1.a	Explain how geographic variations (e.g., climate, soil conditions, and other natural resources) impacted economic development in the New World.

SOC.6.1.12.B.2.a	Analyze how the United States has attempted to account for regional differences while also striving to create an American identity.
SOC.6.1.12.C.1	Economics, Innovation, and Technology
SOC.6.1.12.C.2.a	Assess the effectiveness of the new state and national governments attempts to respond to economic challenges including domestic (e.g., inflation, debt) and foreign trade policy issues.
9-12.HS-LS1-1.6.1	Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
9-12.HS-LS1-1.LS1.A	Structure and Function
9-12.HS-LS1-1.LS1.A.1	Systems of specialized cells within organisms help them perform the essential functions of life.
9-12.HS-LS1-1.LS1.A.2	All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.CS1	Understand and use technology systems.

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

- Philadelphia Flower Show
- NJ State Horticultural Expo
- Student Compete in (CDE)
- Greenhouse Aquaponic
- Greenhouse Hydroponics

- Breeding fish for Aquaponics and Sales
- Cooperative Learning
- Designing Residential and commercial Landscapes
- Designing with Prolandscape software
- Drill and Practice
- Field Trips
- Flower and leaf dissection
- Greenhouse routine Maintenance
- Guided Practice
- Individual project
- Internet Research
- Partner Project/Activity
- Presentations
- Problem solving
- Propagating plants
- Propagating plants

- Providing and scheduling Greenhouse tours
- Reflective Discussion
- Research Projects
- Scouting Greenhouse plants
- Scouting Greenhouse plants
- Teacher Lecture/Notes

Modifications

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ELL 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

504 and IEP Accommodations & Modifications

- 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

Gifted and Talented

- 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

- 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

Formative Assessment

- Projects
- Class Discussion
- Closure
- Group Work
- Guided Practice
- Oral Response/Random Questioning
- Performance Assessment
- Presentations
- Teacher Observations
- Warm up

Benchmark Assessments

Benchmark Assessments:
Skills-based assessment
Reading response
Writing prompt
Lab practical

Alternative Assessments

Alternative assessments:
Performance tasks
Project-based assignments
Problem-based assignments
Presentations
Reflective pieces
Concept maps
Case-based scenarios
Portfolios

Summative Assessment

- MPA
- Nocti
- Performance assessment
- Unit Assessment

Resources & Materials

- aged.org
- FFA.org
- Internet
- mycaert.com
- Smartboard
- Video Streaming

Technology

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.C.CS3	Develop cultural understanding and global awareness by engaging with learners of other cultures.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
TECH.8.2.12.A.CS2	The core concepts of technology.