



Unit 1:

Greenhouse Care and Maintenance

Lesson One: Materials and Equipment

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STUDENT LEARNING OBJECTIVES:

After completing these activities students will...

1. Identify plant materials and equipment that are commonly used in the greenhouse industry.
2. Examine common growing media and evaluate their use in plant production.
3. Discuss the importance of irrigation and the equipment associated with those systems.

TIME REQUIRED: 90 minutes

RESOURCES:

1. [Floriculture CDE Handbook](#)
2. Consider Rice Hulls as a Media Component, <http://www.greenhousemag.com/article/gmpro-1210-rice-hulls-media-component/>
3. Shry, C. L., & Reiley, H. E. (2011). *Introductory Horticulture* (8th ed.). Clifton Park, NY: Delmar Cengage Learning.

EQUIPMENT AND SUPPLIES NEEDED:

1. "Materials and Equipment" PowerPoint
2. Sheet of paper for the introduction activity and reflection activity (the same paper can be used for both)
3. If available, the items identified in the PowerPoint (optional)

PREVIOUS KNOWLEDGE RECOMMENDED FOR THIS LESSON:

- None

THESE ACTIVITIES ARE ALIGNED TO THE FOLLOWING STANDARDS:

AFNR Performance Element

- PS.01. Develop and implement crop management plan for a given production goal that accounts for environmental factors.

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.
- FFA.PL-C.Vision: Visualize the future and how to get there.
- FFA.PG-J.Mental Growth: Embrace cognitive and intellectual development relative to reasoning, thinking and coping.
- FFA.CS-N.Decision Making: Analyze a situation and execute an appropriate course of action.

Common Career Technical Core

- AG-PL1 Develop and implement crop management plan for a given production goal that accounts for environmental factors.

NASDCTEc

- AGPB01.01 Produce and manage plants in both domesticated and natural environments using application of principles of anatomy and physiology to enhance plant production.
- AGPB01.03 Examine and apply fundamentals of production and harvesting when producing plants to demonstrate plant management and production techniques.

Common Core- Reading: Informational Text

- CCSS.ELA-Literacy.RI.9-10.2 Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

Common Core- Science & Technical Subjects

- CCSS.ELA-Literacy.RST.9-10.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.

Common Core- Literacy in Science & Technical Subjects: Writing

- CCSS.ELA-Literacy.WHST.9-10.9 Draw evidence from informational texts to support analysis, reflection, and research.

Common Core- Math Practices

- CCSS.MP3: Construct viable arguments and critique the reasoning of others.

AFNR Career Ready Practices

- CRP.04. Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.
- CRP.05. Consider the environmental, social and economic impact of decisions. Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organizations and the environment.
- CRP.08. Utilize critical thinking to make sense of problems and persevere in solving them. Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem.

Partnership for 21st Century Skills

- Communication
- Critical Thinking and Problem Solving
- Information, Communications, and Technology Literacy
- Initiative and Self-direction

LESSON PLAN:

1. **Introduction** (suggested time 5-10 minutes): **Present slides 1 and 2 of the “Materials and Equipment” PowerPoint to present lesson objectives and complete the introduction activity.**

A big part of the floriculture industry is the production of plants and flowers in greenhouses. To be successful in this, certain materials and equipment must be used to run a profitable greenhouse and care for the plants inside. Let's take a moment to brainstorm some of these materials and equipment.

Allow students to share out some materials and equipment they think are needed in a greenhouse. It can be what an object does, is called or looks like. For the introduction activity, students will assume the role of a greenhouse manager. They have been tasked with creating a “shopping list” of material and equipment they think is necessary to run the operation. When instructed to begin, they will develop a list of materials and equipment. After the list is made, have them pair up and compare lists with a partner. Together, they can revise their list by combining or removing items. Once pairs have made their final lists, discuss findings with the class:

- Have one group share its combined list.
- Have one group's members identify items they had in common.
- Have one group's members identify items on which they differed.

It takes a lot of material and equipment to run a greenhouse, more than we may have originally thought. In this lesson, we will identify what those materials and equipment are and discuss their functions.

2. **Lecture** (suggested time 15-20 minutes per section): **Refer to slides 3-47 of the “Materials and Equipment” PowerPoint to show an overview of greenhouse production items.**

The items in this lecture have been divided into 3 sections (greenhouse production items, growing media and material, and watering and irrigation equipment). As you go through the PowerPoint, students will identify items found on the Floriculture Equipment and Supply Identification List (on page 17 of the handbook). On each slide, be sure to include the function or purpose of the item and distinguishing characteristics. If your program has access to any of the items identified in the lesson, have them available for students to view as they are mentioned in the PowerPoint.

Refer to slides 3-22 of the “Materials and Equipment” PowerPoint to discuss greenhouse production items.

In floriculture, we sometimes think solely of the finished product in a floral arrangement, but those beautiful blooms had to come from somewhere. Greenhouses allow us to produce plants and flowers used by florists year round. Let's start with identifying what we need to get a plant growing. Does anyone recognize any of the items listed?

Take a moment to see if students have any experience in the floriculture industry and allow them to discuss items, describe what it looks like and explain its use. After students have discussed, begin verbally identifying each item individually.

Refer to slides 23-32 of the “Materials and Equipment” PowerPoint to discuss growing media and materials.

Usually, when plants are grown in a greenhouse, we do not use the traditional top soil from the ground like we do in gardening and row crop farming. In fact, growing mediums like the ones listed are commonly used in the growing process in lieu of soil. What might be some benefits of using a soilless growing medium? What might be some possible disadvantages?

Analyze the potential pros and cons of using growing mediums versus soil. Students should consider factors such as

cost, availability, nutrient content, water-holding capability, drainage, etc. After students have discussed, begin identifying each item individually.

Refer to slides 33-47 of the "Materials and Equipment" PowerPoint to discuss watering and irrigation equipment.

We all know that water is necessary for a plant to grow. Since depending on rainfall can be risky and greenhouses are enclosed, how do plants and flowers grown in greenhouses get the water they need? Whether you water with a hose or run an elaborate irrigation system, water availability is a very important factor, but why?

Looking at the slide, students can see the equipment associated with watering (and that list only includes some items). Have students discuss the following questions:

- How much money goes into installing and maintaining a watering system?
- How will spending that money help the greenhouse?

Students should also discuss factors such as improved yields, overall product quality, less labor intensive, etc. After students have discussed, begin identifying each item individually.

3. **Reflection** (suggested 5-10 minutes): **Refer to slide 48 of the "Materials and Equipment" PowerPoint to present the reflection activity.** For the reflection activity, have students take out the paper they wrote their original "shopping list" on from the introduction activity.

Remember when you were the manager in charge of getting supplies for the greenhouse; do you think you could add a couple of things to that list now? Try recreating that list using items identified today in the class, but there is a catch: you can only choose 10. Along with your item, include a description of what it does and why you need it. Assume the greenhouse is built and fully functioning.

Students will have to use critical thinking to prioritize 10 objects for their shopping list. Assume the greenhouse is built and fully functioning, so certain materials are not necessary. For example, polyethylene film is not needed in a newly completed structure, but if they were buying polyethylene film they could write:
Polyethylene Film- A strong clear plastic that will be used to replace the walls and roof of the greenhouse when the current polyethylene film deteriorates.

Students can turn this in for a daily grade and/or a formative assessment. Be sure to check that they have the right description down for each item. If students are not clear on what an item does, review those items prior to moving on to Unit One, Lesson Two: Propagation Methods and Procedures.

4. **Leveling Up:** For students who finish early or want to practice the identification activity in the floriculture CDE.
- a. If you have internet access, have students use the identification cards on the [National FFA Quizlet](#) page to practice identifying items discussed in class.
 - b. If you do not have internet access, create a set of flash cards using the slides of this PowerPoint, so students can practice identifying items discussed in class.