

Lesson A4–1

Understanding Properties of Growing Media

Unit A. Horticultural Science

Problem Area 4. Growing Media, Nutrients, and Fertilizers

Lesson 1. Understanding Properties of Growing Media

New Mexico Content Standard:

Pathway Strand: Plant Systems

Standard: I: Apply principles of anatomy and physiology to produce and manage plants in both a domesticated and natural environment.

Benchmark: I-B: Test appropriate materials or examine data to evaluate and manage soil/media nutrients.

Performance Standard: 1. Collect and test soil/media and/or plant tissue. 2. Interpret tests of soil/media and/or plant tissue. 3. Identify soil slope, structure and type. 4. Evaluate soil/media permeability and water-holding capacity. 5. Determine the chemical properties of soil/media.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify the types of growing media.
2. Describe the functions of growing media.
3. Explain the relationship between growing media and plant growth.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Schroeder, Charles B., et al. *Introduction to Horticulture*, Third Edition. Danville, Illinois: Interstate Publishers, Inc., 2000.

Other Resources. The following resources will be useful to students and teachers:

Reiley, H. Edward and Carroll L. Shry, Jr. *Introductory Horticulture*, Sixth Edition. Albany, New York: Delmar Publishers, 2002.

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Samples of soil
Sample of soil amendments

Terms. The following terms are presented in this lesson (shown in bold italics):

Aeration
Growing medium
Hydroponics
Leach
Pore spaces
Soil
Soilless medium

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Collect samples of growing media. Some suggestions are: water, sand, peat moss, gravel, garden soil, potting mix, etc. Have the students vote on which growing medium would be most effective for growing plants. Then lead a discussion on what each sample contains that allows it to be used as a growing media.

Summary of Content and Teaching Strategies

Objective 1: Identify the types of growing media.

Anticipated Problem: What are the types of growing media used in floriculture production?

- I. When asked what plants need to grow, most people would respond with water, sunlight, and soil. In all actuality, soil is only one of the media that could be used to grow plants. There are a number of substances that would allow plants to grow.
 - A. **Soil** is the outer portion of the Earth's crust that supports plant growth.
 - B. A **soilless medium** (one that contains no topsoil) can be used to grow plants.
 - C. A relatively new method of growing plants is within a hydroponics unit. **Hydroponics** is a method of growing plants in a nutrient solution. The plants in a hydroponics unit could be supported in a sand or gravel substrate for support or the roots could be left bare. With bare roots, the plants' root system can float in the nutrient rich solution, or the nutrients could be sprayed directly onto the roots.

One way to help students master this objective is to have them experiment with growing plants in different media. The students can then lead a discussion on the effects of the medium on the health of the plants.

Objective 2: Describe the functions of the growing media.

Anticipated Problem: What are the functions of the growing media?

- II. No matter what choice of media is used, all **growing medium** (the material in which the roots of plants grow) has to achieve certain functions .
 - A. Growing medium needs to provide nutrients to the plants. The nutrients are needed by the plants for growth and flower and fruit production.
 - B. Growing media must also provide a place for the roots to anchor themselves. Plant roots are fragile and are crucial to a plant's successful growth. If the media helps hold the plants, the plant is less likely to fall over or move about, ripping the root system.
 - C. **Aeration** (the presence of oxygen) is another important characteristic of growing medium. Plants need oxygen in order to make their own food. Plant roots also need to be able to breathe. The oxygen in the media is located in the pore spaces between the particles of the of media. The **pore spaces** are the air holes between the particles.
 - D. Growing media must also be able to hold moisture for plant growth. Along the same lines, the media must also allow for drainage so the roots don't starve or rot.

One way to help students achieve this objective is to have them experiment with soils and other growing media. The students can then discuss their results and speculate on the success of each type of media.

Objective 3: Explain the relationship between the growing media and plant growth.

Anticipated Problem: What effect does growing media have on plant growth?

- III. Choosing the right growing media for floriculture crops is very important. The media can affect the amount of nutrients that are available for the plants, the presence of water, and the ease of growth plants.
- A. Plants need nutrients to grow. The nutrients needed by the plants can sometimes be present in the growing medium. Most often, with the use of artificial soil mixes and hydroponics, the nutrients must be added to the growing medium. The nutrients can sometimes be present in the growing medium but they are not available for the plants to take up into their roots because the pH level in the soil is not conducive to plant growth. Nutrients might also *leach*, run out of the medium, causing the grower to continually add the nutrients. Without the presence of nutrients in the growing media, the plant may grow poorly, showing stunted growth, unhealthy coloring of the leaves, and may be more prone to disease and insect problems.
- B. The ability of the growing media to drain water is very important for plant growth. Plant roots need oxygen to function properly and if the growing media is saturated with water, the plant roots will die due to lack of oxygen. The roots may also rot. Excess water in the growing media can also lead to insect problems.
- C. In the production of floriculture crops, it is important to use a growing medium that is uniform. With a uniform mix, watering, fertilizing, and transplanting schedules can be developed in order to insure even growth of the crop.

One way to help students achieve this objective is to have them review the experiments they performed at the end of objective one. Students can write a comparison paper on the effects of different media on plant growth. Students may also redesign the experiment to test one particular factor of plant growth (height, color, bloom time, etc.).

Review/Summary. Use the student learning objectives to summarize the lesson. Have the students name one type of growing media and explain why they would or would not use that media. Students may also try to develop their own growing media mix and test its results on plant growth.

Application. Application of this lesson can be achieved through the following ways:

Completing the experiments listed throughout the lesson

Reading related sections of *Introduction to Horticulture*

Evaluation. The evaluation of the student achievement of the objectives for the lesson will be in the successful completion of the experiments and the written test. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1=c, 2=a, 3=b, 4=d

Part Two: Completion

1. oxygen
2. pore spaces

Part Three: Short Answer

1. Provide nutrients, support or anchor the plant, provide oxygen to the plant roots.
2. Plants can be stunted, discolored and the roots can rot if the media does not drain well, provide nutrients, and support the plant.

Test

Lesson A4–1: Understanding Properties of Growing Media

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | |
|----------------|--------------------|
| a. soil | b. Soilless medium |
| c. hydroponics | d. growing medium |

- _____ 1. Method of growing plants in a nutrient solution.
- _____ 2. The outer portion of the Earth's crust that supports plant growth.
- _____ 3. A medium that contains no topsoil.
- _____ 4. The material in which the roots of plants grow.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. A well aerated soil has plenty of _____.
2. Oxygen is located in the _____ of soil.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. List 3 functions of a growing medium.

2. Describe how growing medium can affect plant growth.