



The Effects of Soil Quality on Animal Life

Middle School Food and Agricultural Literacy Curriculum

Precepts

- K. Emotional Growth
 - K1. Cope with life's trails
 - K6. Seek appropriate counsel

National Standards

- PS.02.02.01.b. Describe the physical characteristics of growing media and explain the influence they have on plant growth.
- NL-ENG.K-12.4 – Communication Skills
- NS.5-3.3 – Life Sciences

Student Learning Objectives

- As a result of this **unit** the students will...
- Explain the importance of maintaining soil quality.
- As a result of this **lesson** the students will ...
- Identify the major components of growing media.
- Describe how growing media supports plant growth.

Content Outline

Objective 1: Identify the major components of **growing media**.

- I. **What is growing media?**
 - A. Used in place of soil, **growing media** provides aeration, drainage, and water holding capacity for plants growing in a container.
 - B. Can be bought pre-mixed or by individual component
- II. **What components make up growing media?**
 - A. Peat moss, or the partial decomposition of plant material, provides good air and water holding capacity for plants as well as a good base for any **growing medium**.
 - B. Wood residues, such as bark or bark ash, provide large pore spaces to promote good aeration and drainage.
 - C. Vermiculite, or sterile lightweight mica, is able to store large amounts of water and air.

Time

Instruction time for this lesson: 45 minutes.

Resources

Growing Media Association (2006). What is a Growing Medium? Retrieved September 14, 2009, from Growing Media Association Web Site: http://www.growingmedia.co.uk/index.asp?c_idno=2313&m_idno=1019&s_idno= — National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success — Texas A&M University System, Texas Agricultural Extension Service. (2009). Media, Repotting, and Containers. Retrieved September 14, 2009, from Aggie Horticulture Web Site: <http://aggiehorticulture.tamu.edu/GREENHOUSE/NURSERY/GUIDES/ornamentals/media.html>

Tools, Equipment, and Supplies

- Overhead projector or writing surface
- LCD projector or SMART board (optional)
- Writing utensil
- Sandwich bag of potting soil
- Sandwich bag of perlite
- Sandwich bag of vermiculite
- Sandwich bag of peat moss
- Sandwich bag of wood residue
- Jar of plain tomato salsa
- MS.NR.4.3.TM.A – overhead or 1 copy per three students
- MS.NR.4.3.TM.B – one per teacher
- MS.NR.4.3.TM.C – one per teacher
- MS.NR.4.3.TM.D – one per teacher
- MS.NR.4.3.TM.E – overhead or one copy per three students
- MS.NR.4.3.TM.F – overhead or one copy per four students
- MS.NR.4.3.AS.A – one per student
- MS.NR.4.3.ASSESS.A – one per student

Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

Growing medium/media

- D. Perlite, sterile lightweight porous material, provides good aeration, but stores little water.

Objective 2: Describe how **growing media** supports plant growth.

- I. **How does growing media support plant growth?**
 - A. Provide good anchorage for plants
 - B. Provide adequate air space for root respirations
 - C. Able to hold sufficient amount of water and nutrients required for plant growth



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Interest Approach

Prior to beginning class, obtain a copy of **MS.NR.4.3.TM.A** to be shown either on an overhead or copied on paper, one per group of three students. As students arrive, welcome them to class and acknowledge them for being prepared today.

Who will tell what is in this picture?

Wait for student responses.

Great job! This is a house! When I say BUILD, everyone will have one minute to list all the materials needed in order to build this house. Think of all the supplies needed, writing down at least five tools, two pieces of equipment, five different building materials, like lumber or windows – everything it would take to build a house just like this? How many tools do you need to write down?

Wait for an answer.

Great. How many pieces of equipment do you need to write down?

Wait for an answer.

Awesome! One last thing – you will complete this activity in groups of three! What questions are there? BUILD.

As students prepare their lists in groups, prepare **MS.NR.4.3.TM.B** to record the data from their brainstorm. This can be done on either an overhead or a board. At the completion of one minute, refocus class's attention.

Great job working in groups! Who will be first to share one of the tools that is needed in the building of this house?

Allow several students to answer this. Record as many as you see necessary.

Who will share one of the pieces of equipment their group came up with?

Again, allow several students to answer this question and record as many as you see necessary.

And finally, who will tell what type of building materials will be needed in order to build this house?

Allow several students to answer. Record their ideas.

Wow. We can tell from this activity that a lot of things are needed in order to create this beautiful home. Well, let's just say for a minute that there has been a large shortage of windows in our area, so much so that we will not be able to get any to build our house. Would our home be just as beautiful and functional? Will we still want to live in our home?

Allow students to think out loud at this point and answer those questions of opinion.

There are so many things in our life, if we lost just that one thing, it could change the course or path of our future. Think of an experience in your life that was challenging. Think about one situation when you were able to lean on someone, whether it was a friend, teacher, parent, or someone you looked up to. Think about how much they helped you through that challenging time of your life. Now what if that piece was missing? What if you were unable to turn to that person? Would the outcome have been as successful?

We do not realize how much plants rely on pieces of a puzzle in order to grow and have productive lives. If one piece of the puzzle is missing, then growth could be compromised, or productivity could be reduced. Today get your shovels out and let's take a closer look at the major components of **growing media** and why each component plays an essential role in supporting plant growth. Prepare your mind and let's dig deeper!

Summary of Content and Teaching Strategies

Content outline can be found on **MS.NR.4.3.TM.C**, and **MS.NR.4.3.TM.D** can aid in instruction via an overhead or writing surface available to display information. Information can be written on a large poster board or piece of paper prior to class for easy access and instruction. If technology, similar to an LCD or a SMART board, is available, prepare the following information in presentation software prior to class meeting.



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This will be lengthy, so ensure enough time is allotted to transfer material. To expedite note taking, each student can be given **MS.NR.4.3.AS.A**, a copy of the content outline that has blanks. This will allow students to stay focused on the lesson and responsible for obtaining some information, but will not eat up as much time as writing down all the content.

Hold up the sandwich bag of potting soil for students to see.

Who will tell us what is in this bag?

Allow students to answer until you get "potting soil." If no students answer, lead them by talking about plants in containers, potting, etc.

That's right – this is what we often refer to as potting soil. Potting soil is often used in container planting for porches and patios. Potting soils is the common name for something called **growing media**.

Objective 1: Identify the major components of **growing media**.

I. What is **growing media**?

- A. Used in place of soil, growing media provides aeration, drainage, and water holding capacity for plants growing in a container.
- B. Can be bought pre-mixed or by individual component.

Reveal the definition for growing media on **MS.NR.4.3.TM.C**.

Growing media can be defined as the substance used in place of soil that provides aeration, drainage, and water holding capacity for plants grown in a container.

Advise students to fill in the appropriate words for this definition for future reference.

We often see **growing media** in stores during the spring planting season when people are putting together colorful arrangements for their porches.

Pass around the bag of potting soil. Advise students that it is not appropriate to open the bag for any reason and to just observe the soil through the bag.

How many different components can you identify in the bag of potting soil that is traveling around the room?

Depending on the soil you use, there may be several different things in there to talk about. Just have the students identify that there are several different things in the growing media, not just one specific thing.

There are a variety of different **growing mediums** that can be purchased depending on the specific need of the person using the soil. Each **growing medium** is made up a variety of different items that will aid in aeration, drainage, and water holding capacity. Let's take a close look at these components that are important for plant growth.

II. What components make up **growing media**?

- A. Peat moss, or the partial decomposition of plant material, provides good air and water holding capacity for plants as well as a good base for any **growing medium**.
- B. Wood residues, such as bark or bark ash, provide large pore spaces to promote good aeration and drainage.
- C. Vermiculite, or sterile lightweight mica, is able to store large amounts of water and air.
- D. Perlite, sterile lightweight porous material, provides good aeration, but stores little water.

Pass around the sandwich bag of peat moss. Reveal Roman numeral II.a. Peat Moss to the students.

In the first bag that is being passed around is a substance called peat moss. Peat moss, also known as partial decomposed plant material, provides good air and water holding capacity for plants.

Advise students to fill in the appropriate words for this definition for future reference.

Pass around the sandwich bag of wood residues. Reveal Roman numeral II.b. Wood Residues to the students.

The next bag that will be passed around contains wood residues. These items, such as bark or bark ash, provide large pore spaces to promote good aeration and drainage for the plant.

Advise students to fill in the appropriate words for this definition for future reference.

When plants are planted in containers, they do not get the natural drainage they would receive if in the ground.



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Wood residues allow for additional air space and aid in removing water when needed.

Pass around the sandwich bag of vermiculite. Reveal Roman numeral II.c. Vermiculite to the students.

In the next bag is a substance called vermiculite. This item, when heated, expands and allows for a large amount of water and air to be stored.

Advise students to fill in the appropriate words for this definition for future reference.

Pass around the sandwich bag of perlite. Reveal Roman number II.d. Perlite to the students.

In the last bag is perlite, a lightweight porous mineral that provides additional aeration to the soil. One difference between perlite and any other component is that perlite does not retain water but only aids in aeration of the **growing media**.

Advise students to fill in the appropriate words for this definition for future reference.

Each of these components plays an important role in making a plant productive. Depending on the plant, there can be a different mixture of these components to meet its need. Look at this salsa.

Show students salsa in a bottle.

What are the common components of salsa?

Allow students to answer. Make sure they talk about tomatoes, onions, and jalapenos.

What if we were to go get our chips and get ready to eat some yummy salsa and we notice there are no tomatoes? Would the salsa be what we were looking for? How would this salsa not be the same?

Allow students to discuss that the salsa would lack what we really want in a salsa, and that tomatoes are an important part of the dish.

The components we just discussed – peat moss, wood residues, vermiculite, and perlite – all play an important role in ensuring that plants can have a productive life. If a component were missing or if the **growing media** were not formulated to a particular plant's needs, then it could be very similar to our salsa, not a satisfying experience for the plant!

But why are these components so important to a plant's growth you might ask? Let's continue to dig and find out why we use **growing media** and how it is important in plant growth.

Objective 2: Describe how **growing media** supports plant growth.

Plants rely on soil and growing media to provide a good foundation. Growing media allows plants a good anchoring system to ensure that they stay stationary.

Show **MS.NR.4.3.TM.E** to class.

Look at this picture. Do you see how the roots of a plant either spread out or travel deep? The goal of growing media is to provide good anchorage for plants.

Advise students to fill in the appropriate words for this definition for future reference.

Not only is it important for the **growing media** to provide a good anchoring system, but the **growing media** allows the plant's roots adequate air space for respiration and holding sufficient amounts of water and nutrients.

Show the illustration on **MS.NR.4.3.TM.F**.

Growing media is important in ensuring that plants that live in containers get those important characteristics they need in order to live productive lives.

Advise students to fill in the appropriate words for this definition for future reference.

I. How does **growing media** support plant growth?

- A. Provide good anchorage for plants
- B. Provide adequate air space for root respirations
- C. Able to hold sufficient amount of water and nutrients

Growing media and its components are important in allowing plants in containers to have good aeration, drainage, and water holding capacity.



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Each component plays an important and very distinct role in ensuring these plants are supported through good anchorage, adequate air space, and holding sufficient amounts of water and nutrients.

Just like our salsa, if we are missing one of the key components, our dining experience will not be as good. Container plants need **growing media** in order to support healthy plant growth. Let's take a look back and review what we've learned today. Get ready to party!

Review/Summary

Utilize the *Party Host e-Moment*®

In order to prepare for this activity, it is a good idea to find a video clip of the Party Host segment of the show "Who's Line Is It Anyway?" so students understand the flow of the activity. Students will be participating in a "party" where the guests are only understood through their words and actions. The host does not know who will be in attendance. It may be necessary to send the "hosts" out of the class as you explain to the guests about their characters. Do not give the host any clues. Only if needed, allow the class to give clues when the host is stuck. Split the class up into groups of six students each.

Are we ready to party?

Show students the video clip stated above.

When I say PARTY, everyone will get a card that states the role you will play in the party today. Those of us labeled a guest will act out a unique character through words or actions that we discussed from today as the party host tries to figure out your identity.

If you are the host, greet your guests at the door, welcome them to the party, briefly interact with them, and greet the next guest at the door.

After the last guest arrives, the host and guests will interact in conversation until the party ends, where the host guesses the identity of each guest. If you are a guest who has selected a vocabulary word or process from your notes, how can you act out your identity?

Allow students to give an example through words or actions.

Correct. If you are the host, when do you get to identify your guests?

Allow students to answer at the end of the party.

Great job. Hosts, would you please leave the room for two minutes while the guests discuss the order in which they will arrive at the party and their characters? What questions do you have? Then the party will begin! PARTY!

After the two minutes, begin to let students present their "parties." This should be a very fun and entertaining way to review this material!

Great job partying! As you can see, **growing media** is very important to healthy plant growth in containers. Each component plays a different role and the correct mixture of components can aid in successful plant growth. In our next lesson we will collect soil and plant tissue samples for testing and learn how to interpret test results. Great job today understanding the importance of **growing media**!



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Application

Extended classroom activity:

Expand the list of growing media components to look at more specific types of peat moss, rice hulls, sand, or clays.

FFA activity:

FFA members could participate in a fundraiser for making homemade growing media. The chapter could obtain each separate component, combine, and sell in the spring along with plants at a plant sale.

SAE activity:

Students can conduct an Agriscience Fair Project to compare the productivity of different plants with a specific growing media.

Evaluation

MS.NR.4.3.ASSESS.A

Answers to Evaluation

Section 1: Matching

1. B
2. A
3. E
4. D
5. C

Section 2: Short Answer:

Answers should include two of the following three:

6. Provide good anchorage for plants
Provide adequate air space for root respirations
Able to hold sufficient amount of water and nutrients required for plant growth



How Can We Build This House?

[illegible]



What Are the Components of Growing Media?

Objective 1: Identify the major components of growing media.

I. What is growing media?

- A. Used in place of soil, growing media provides aeration, drainage, and water holding capacity for plants growing in a container.
- B. Can be bought pre-mixed or by individual component.

II. What components make up growing media?

- A. Peat moss, or the partial decomposition of plant material, provides good air and water holding capacity for plants as well as a good base for any growing medium.
- B. Wood residues, such as bark or bark ash, provide large pore spaces to promote good aeration and drainage.
- C. Vermiculite, or sterile lightweight mica, is able to store large amounts of water and air.
- D. Perlite, sterile lightweight porous material, provides good aeration, but stores little water.



How does Growing Media Support Plant Growth?

Objective 2: Describe how growing media supports plant growth.

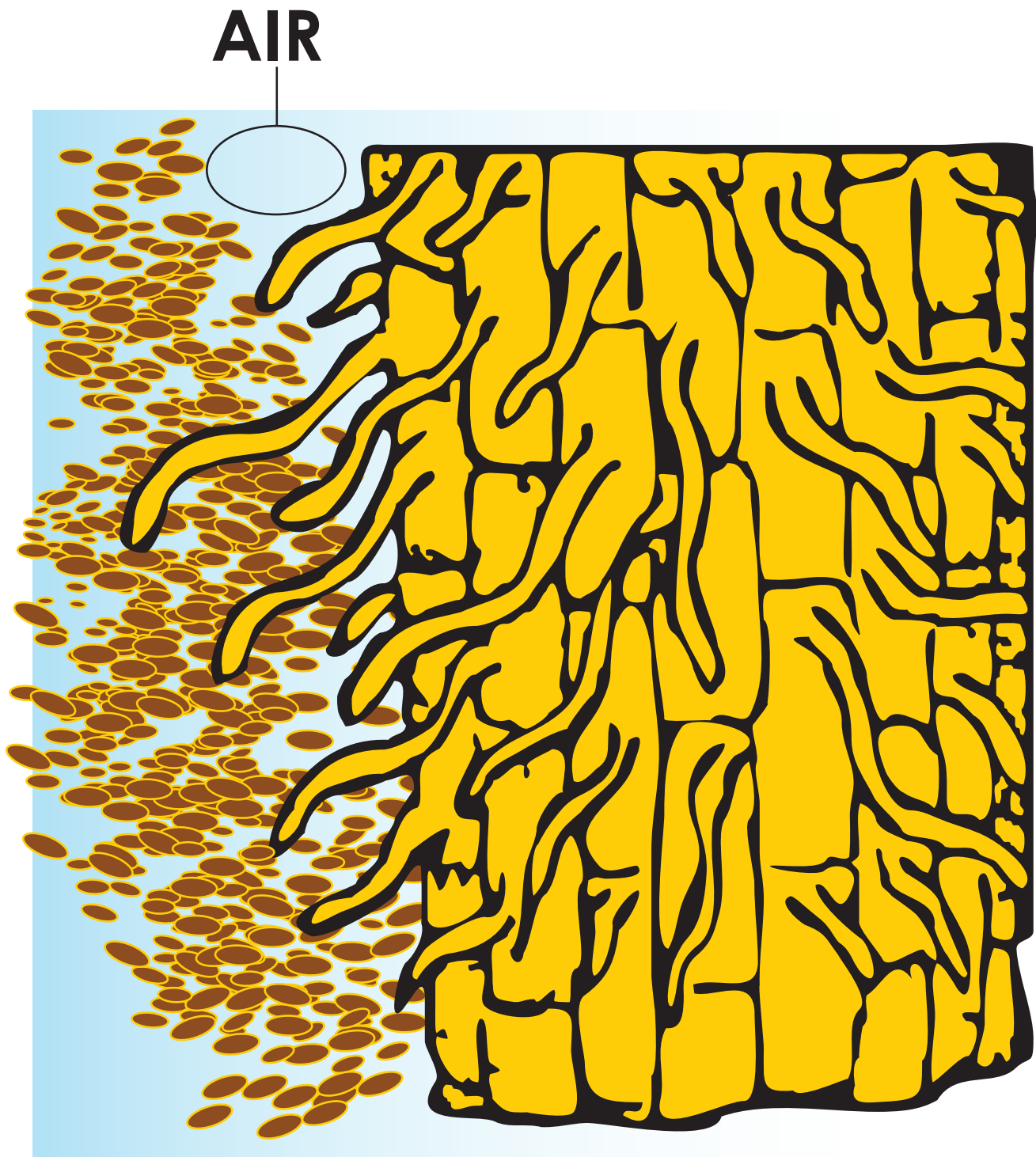
I. How does growing media support plant growth?

- A. Provide good anchorage for plants
- B. Provide adequate air space for root respirations
- C. Able to hold sufficient amount of water and nutrients required for plant growth

Plant Anchor System



Soil Aeration and Water Holding Abilities





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The following is an outline of today's notes. Listen carefully to make sure you fill in all the blanks!

Objective 1: Identify the major components of growing media

I. What is _____?

- A. Used in place of _____, growing media provides aeration, drainage, and _____ holding capacity for plants growing in a container.
- B. Can be bought pre-mixed or by individual component.

II. What components make up growing media?

- C. _____, or the partial decomposition of plant material, provides good air and water holding capacity for plants as well as a good base for any growing medium.
- D. _____, such as bark or bark ash, provide large pore spaces to promote good aeration and drainage.
- E. _____, or sterile lightweight mica, is able to store large amounts of water and air.
- F. _____, sterile lightweight porous material, provides good aeration, but stores little amounts of water.

Objective 2: Describe how growing media supports plant growth.

I. How does growing media support _____?

- D. Provide good _____ for plants
- E. Provide adequate _____ space for root respirations
- F. Able to hold sufficient amount of water and _____ required for plant growth



Growing Media Assessment

Name: _____

Section 1: Matching

Match the following letter with the correct definition.

- | | | |
|----------|---|------------------|
| 1. _____ | The component that is partially decomposed plant material that provides good air and water holding capacity for plants as well as a good base for any growing medium. | a. Growing Media |
| 2. _____ | Used in place of soil, growing media provides aeration, drainage, and water holding capacity for plants growing in a container. | b. Peat Moss |
| 3. _____ | The component that provides large pore spaces to promote good aeration and drainage. Examples are bark or bark ash. | c. Perlite |
| 4. _____ | The component that is sterile lightweight mica and is able to store large amounts of water and air. | d. Vermiculite |
| 5. _____ | The component that is sterile lightweight porous material, providing good aeration, but stores little water. | e. Wood Residues |

Section 2: Short Answer

Answer the following question.

6. Name two ways growing media supports plant growth.
