

6. Plant Makeovers

- Objective:** Demonstrate the symptoms of nutrient deficiencies in plants
- Time:** 45 minutes for construction of plants, 15 to 30 minutes for discussion
- Materials:** For each group of two to four students: Plant Makeover Card, construction paper, other miscellaneous craft supplies (tape, markers, scissors)

Ask the students if they have ever seen makeovers in magazines or on television in which a person is given a new haircut or new clothes, for example. Have them describe some of the dramatic changes shown in some of the “before” and “after” photos.

Tell the students that today they will be the ones doing the makeovers. The subject of the makeovers will be plants needing help. Explain that the class will “make over” sickly looking plants that have health problems, such as dead spots on the leaves and rotting of the ends of the fruit.

Clarify that a plant’s health problems can be caused by many different factors, including insects, diseases and environmental conditions. But the plants in today’s class are all lacking needed nutrients.

Divide the class into groups of two to four students each and give each group Plant Makeover Cards. Have the students read the cards to learn the symptoms that a plant would demonstrate if it lacked that specific soil nutrient. They could also use the resource links at www.jmgkids.us/thistle or other references to find examples of various symptoms.

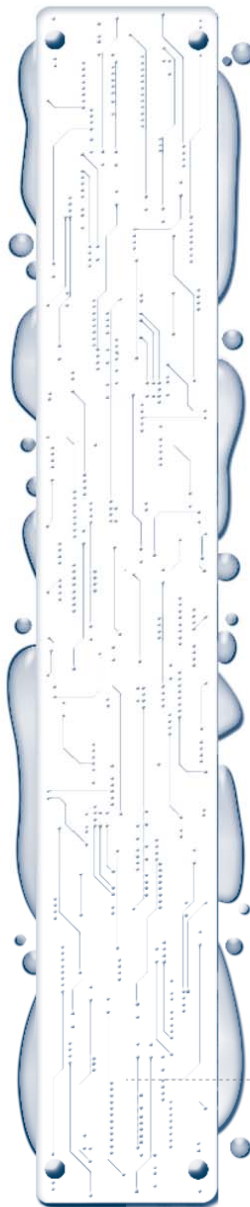
The groups will use construction paper and other craft supplies to create two models of the plant displaying the symptoms on their cards. The models could be paper sculptures, or the group could dress up students as the healthy and unhealthy plants.

Stress that the students should illustrate the symptoms listed on their cards. The groups should first create a “before” model of an unhealthy plant, then create an “after” plant with no deficiency and its health restored.

As an option, the groups could also act as announcers in a fashion show, detailing what the plant lacked, explaining the functions that the needed element serves, and describing the physical symptoms of the deficiency.

Allow time for each group to present the “before” and “after” illustrations. Then guide the group in the following discussion:

What caused the health problems for the plants they worked with today? *The plants could not get the nutrients they needed.*



Why wouldn’t a plant be able to get the nutrients it needs? *The nutrients may not be available in the soil. Or, the pH of the soil (how acidic or alkaline the soil is—see the Nailing Roots lesson) may be making the nutrients insoluble so they can’t be absorbed by the roots.*

How can we find out what would be causing the problem? *The soil can be tested (see the Nailing Roots lesson) to determine the soil pH or the nutrients that are lacking.*

How can the problem be solved? *If the pH level is good, the missing nutrients may simply be added to the soil. If the pH is too high or too low, the soil can be amended to adjust the pH. The materials, the amount and the method of application will vary depending on the garden’s size, location, soil type and the crops or plants to be grown. For specific details on using these materials, contact your county Extension office or nursery professional.*



Explain that only 16 elements are essential for plant growth. Three of these—carbon, hydrogen and oxygen—are readily available in the air and water for plants to absorb. The remaining 13 elements are absorbed through the soil.

Ask the students who demonstrated deficiencies in nitrogen, phosphorus and potassium to stand. Point out that these nutrients are unique because they are required in the largest amounts by the plants. They are called the *primary macronutrients*.

Primary macronutrients can easily be added through fertilizer. Every container of fertilizer lists a ratio of numbers such as 25-10-15. These numbers provide the percentages of those macronutrients in the container.

Ask the students demonstrating primary macronutrients to sit down and the students representing plants lacking calcium, magnesium and sulfur to stand. These are the *secondary macronutrients*. Usually, soils have enough of these nutrients for plants to stay healthy.

The students demonstrating secondary macronutrients should sit down. Ask the rest of the class to call out the names of the remaining nutrients: boron, chlorine, copper, manganese, molybdenum, iron and zinc. These are *micronutrients* and are needed only in very small amounts.

Although plants require different amounts of these nutrients, these elements are all essential for the health of a plant.

Close the lesson by applauding the students’ makeover efforts. Reiterate that a plant’s health can be affected by a deficiency of a needed nutrient. Macronutrients and micronutrients play vital roles in the health of a plant. Gardeners will be more successful if they understand the soil from which the plants are absorbing those essential elements.

Extension

Science: Ask the students to find and discuss the macronutrients and micronutrients on the periodic table of the elements. What do these elements have in common? How are they different?



Plant Makeover Cards

Macronutrients / Micronutrients

<h3>Nitrogen (N)</h3> <p>Symptoms of deficiency:</p> <ul style="list-style-type: none">• Reduced growth• Yellowing of leaves• Symptoms on oldest leaves first <p>N is important for foliage (leaf) growth in a plant.</p>	<h3>Phosphorus (P)</h3> <p>Symptoms of deficiency:</p> <ul style="list-style-type: none">• Reduced growth• Thin stems• Loss of lower leaves• Reduced flowering <p>P is important for root growth, especially for young plants and seedlings.</p>	<h3>Potassium (K)</h3> <p>Symptoms of deficiency:</p> <ul style="list-style-type: none">• Reduced growth• Burnt/brown leaf edges• Dead spots on leaves• Wilts easily <p>K is important for flower and fruit development and resistance to frost, drought and certain diseases in a plant.</p>
<h3>Magnesium (Mg)</h3> <p>Symptoms of deficiency:</p> <ul style="list-style-type: none">• Reduced growth• Yellowing of leaf edges• Reduced seed production• Cupped leaves <p>Mg occurs in chlorophyll; therefore, it is important to photosynthesis.</p>	<h3>Calcium (Ca)</h3> <p>Symptoms of deficiency:</p> <ul style="list-style-type: none">• Lack of bud growth• Dead root tips• Cupping of older leaves• Rot on ends of fruits• Pits on root vegetables <p>Ca is required for plant growth, cell division and enlargement.</p>	<h3>Sulfur (S)</h3> <p>Symptom of deficiency:</p> <ul style="list-style-type: none">• General yellowing of leaves or entire plant <p>S is important in the formation of protein within a plant.</p>

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