

Lesson II: Growing Plants Using Space Technology

Suggested Assessments

Outcome: Students will use similar decision-making and critical thinking skills used by farmers, determine how correct delivery of nutrients to a crop field is important to the farmer and the environment including all animals and people, explain how a practical application of space satellite technology is being used to solve problems on Earth, and study components of GPS and precision farming.

Objectives:

After completion of this module, students will be able to:

1. Explain why delivering plant nutrients to crops at the correct time and amount is important
2. List possible negative effects of improper nutrient delivery
3. Describe two problems that farmers are now able to solve by using Global Positioning System (GPS) space technology

Science Competencies/Standards:

NSES Content Standard A, B, D, E, G

Objective 1: Explain why delivering plant nutrients to crops at the correct time and amount is important

Suggested Assessment:

Have students write a short story indicating what, specifically, happens to plants when certain nutrients are missing or inadequately available; or

Using the attached worksheet, have students match the deficiency with the symptom.

Objective 2: List possible negative effects of improper nutrient delivery

Suggested Assessment:

Have students list (verbally or written) 5 problems consumers encounter when nutrients are improperly applied.

Key:

Lists should include: financial considerations (wastes money), can miss spots in the field, run-off from too much applied, plant and animal health hazards, dangerous to the water supply (ground and/or surface water)

Suggested Assessment:

Students will illustrate how GPS can help a farmer in his field.

Key:

Illustrations will include major components of GPS (i.e. satellite, tractor, field, etc.)

Objective 3: Describe two problems that farmers are now able to solve by using Global Positioning System (GPS) space technology

Suggested Assessment:

Using the illustration from Objective 2, have students further illustrate and label two of the following:

Where the soil is:

- a) Moist
- b) Eroded
- c) Lacking nutrients
- d) Limited plant growth
- e) Healthy plant growth

Students should create a legend to indicate each area on their illustration.

Name: _____

Plant Nutrient Challenge

Directions: In the space next to the symptoms, place the letter of the correct nutrient associated with that deficiency.

Nutrient	Symptom
a. Phosphorous (P)	___ Downward budding of leaf; leaves look wilted & tops of leaves can remain unfolded
b. Potassium (K)	___ Most common deficiency in plants; can cause increases in fungus diseases; shows up as yellowing of older leaves
c. Sulfur (S)	___ Blotchy ripening and black leaf
d. Magnesium (Mg)	___ Younger leaves are yellowish with a slight upward roll; stems become woody
e. Nitrogen (N)	___ Dark purple color on undersides of leaves & veins; roots are poorly developed; fruit will be small
f. Calcium (Ca)	___ Lower leaves become lighter in color & turn brittle; can show up as yellow stripes on leaves (i.e. grasses & corn)

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Directions: In the space next to the symptoms, place the letter of the correct nutrient associated with that deficiency.

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a. Phosphorous (P)	<u>f</u> Downward budding of leaf; leaves look wilted & tops of leaves can remain unfolded
b. Potassium (K)	<u>e</u> Most common deficiency in plants; can cause increases in fungus diseases; shows up as yellowing of older leaves
c. Sulfur (S)	<u>b</u> Blotchy ripening and black leaf
d. Magnesium (Mg)	<u>c</u> Younger leaves are yellowish with a slight upward roll; stems become woody
e. Nitrogen (N)	<u>a</u> Dark purple color on undersides of leaves & veins; roots are poorly developed; fruit will be small
f. Calcium (Ca)	<u>d</u> Lower leaves become lighter in color & turn brittle; can show up as yellow stripes on leaves (i.e. grasses & corn)