

Plant Nutrition



Student Learning Targets:

- » Students will be able to identify the 14 essential plant nutrients.
- » Students will be able to identify deficiencies of nitrogen, phosphorus, potassium, and sulfur in plants.
- » Students will be able to compile information on a plant nutrient into a fact sheet.
- » Students will be able to propose a plan for fertilizer application for a given crop and nutrient.

Standard Alignment:

- » MN.PS.01. Develop and implement a plant management plan for a given production goal based on current industry standards.
- » MN.PS.01.03. Develop and implement a fertilization plan for specific plants or crops.
- » English Language Arts 9.9.4.4 While respecting intellectual property, present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task (e.g., persuasion, argumentation, debate).

Supplies:

Quantity:	Item:
1 per student	Plant Nutrition Scenario Outline
1 per student	Computer with internet access (canva.com)
1	Projector

Introduction and Anticipatory Set:

- » Begin with a class discussion
 - What do plants need to grow? (Answers will likely include water, soil, sunlight, some students may bring up nutrients)
 - Ask students if they know what farmers apply to fields to support crop production. (Depending on the background of the students, answers may include herbicides, insecticides, fertilizers, etc.)
 - Direct discussion to fertilizers. Why are they necessary? What happens if crops don't get the nutrients they need? How do farmers know how much to apply?

Teaching and Main Activities:

» Plant Nutrition Slideshow

- Essential Nutrients
 - Discussion Question: what does it mean to be an “essential” nutrient?
 - Define essential nutrients
 - Macro vs micronutrients
 - Introduce the 14 essential nutrients
- Limiting Nutrients
 - Discussion Question: What nutrients are farmers usually concerned about?
 - Most limiting nutrient
- Nutrient Deficiency
 - Discussion Question: How can we tell when a plant is short on nutrients?
 - Deficiency symptoms
 - Plant tissue and soil tests
- *Discussion Question:* What impacts can a nutrient deficiency have on a crop?
- Activity: Crop macro/micronutrient fact sheet
 - Small groups of students (around 4 students per group) will act as part of the University of Minnesota Extension’s Nutrient Management team to create a fact sheet and presentation on a macronutrient (see *Plant Nutrition Scenario Outline*)
 - Macronutrients focused on will be nitrogen, phosphorus, potassium, and sulfur. If there are more groups than nutrients, also include magnesium, calcium, and zinc
 - Fact sheets should include an overview of the nutrient, deficiency symptoms, common fertilizers, best practices for application timing, considerations for efficient application, and considerations for environmentally sound application
 - Based on the fact sheet, the groups will then give a 5-7 minute presentation outlining a recommended fertilizer application plan to the rest of the class. One of the “audience” teams will be assigned a role (corn growers, soybean producers, sugarbeet farmers, wheat growers), and will ask questions of the presenting team. The presenting team should tailor their presentation to their assigned audience’s role.
 - After all presentations, the class will discuss the fact sheets, presentations, and Q&A sessions and vote on the best of each.

- See Extension Team Nutrient Report Rubric - note that this rubric covers a team's fact sheet, presentation, their response to questions, and their role as audience members asking questions.
- Allow groups at least 2-3 days to research, create their fact sheet, and prepare their presentation. (Tip - have groups assign roles to each member to ensure work is distributed evenly. Possible roles: researcher, artistic adviser, writer, lead presenter)
- Activity: Have students research human essential nutrients and answer this question - How do plant and human essential nutrients compare?