LEGUMES: NITROGEN FIXATION-COVER CROPPING

Garden

NEW! GRADE 6 | SCHOOL PARTNER LESSON PLAN

LESSON DESCRIPTION

This lesson introduces students to the concept of plants using soil nutrients and of interdependence of plants in companion planting pairs.

TOPICS

- The process of nitrogen fixation by legume crops.
- Cover cropping techniques to maintain microbial health of the soil, minimize weeds, and prevent evaporative water loss.
- Native American use of the 'Three (3) Sisters' planting technique (beans, corn, & squash) as a mutually beneficial codependence.

UNIT DAY/LESSON

Nitrogen Fixation/Cover Cropping for Soil and Plant Health

SUBJECT

Science: Soil, Elements, Ecosystems, Biodiversity

STATIONS

1. Discussion & Video: Biodiversity (plants, microorganisms)

2. Bean seed collection

3. Garden: clean bed, plant cover crop of legumes

4. PostQuiz/Assessment

ACADEMIC STANDARD CONNECTIONS

6th grade curriculum suitable for Louisiana Learning Standards:

6-MS-PS1-1 (Describe and model the atomic composition of simple molecules and extended structures)

6-MS-LS2-1 (Cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems)

6-MS-LS2-3 (Demonstrate how matter and energy is transferred between producers, consumers, and decomposers within an ecosystem)

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PROCEDURE

1. Class begins with a discussion period at the beginning of class. Introduction to material, new vocabulary, use of video of resource (Understanding Our Soil: The Nitrogen Cycle, Fixers, and Fertilizer).
2. Next, class engages in group discussion to review garden rules and procedures. Outline activity expectations and instruction of garden activity.
   - preparation of planting holes at ½–1 inch depth according to seeds size
   - planting bean seeds in a sunny location
   - applying water to stimulate growth hormone
3. Garden experience: class will perform steps discussed in step #2. garden maintenance and nitrogen fixation with use of legume cover crop.
4. Return to classroom or discussion circle for wrap up Post Assessment and review of lesson/new vocabulary.

MATERIALS

- Garden planting space (raised, in ground, or pots)
- Bean Seeds
- Garden gloves (optional)
- Trowels (optional)
- Watering buckets

VOCABULARY

- Cover crops
- Nitrogen
- Nitrogen Fixation
- Companion planting

DISCUSSION MATERIAL

The nitrogen cycle (article) | Ecology | Khan Academy

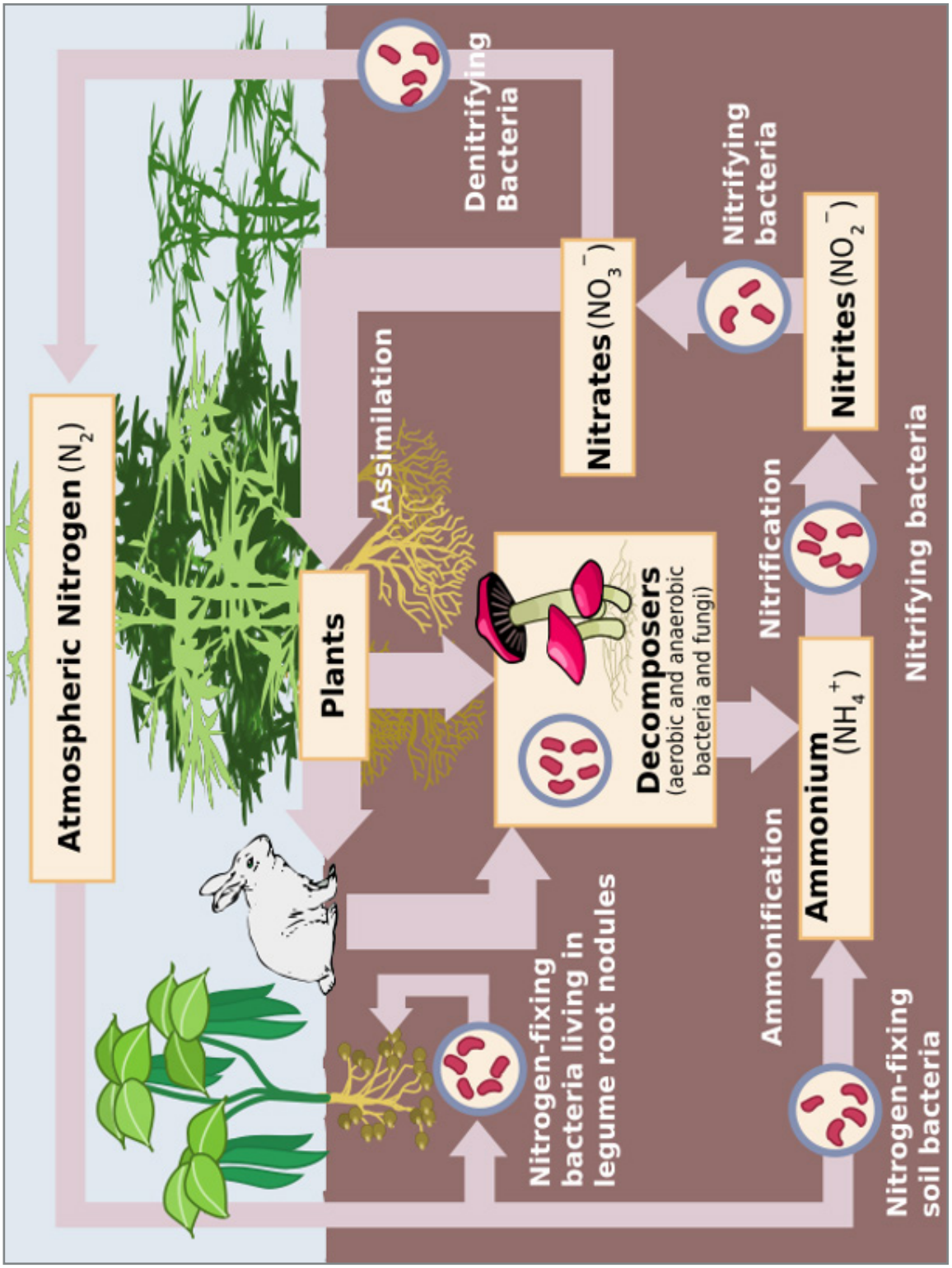
INTRODUCTION

Nitrogen is everywhere! In fact, N2N gas makes up about 78% of Earth's atmosphere by volume, far surpassing the O2 we often think of as "air". But having nitrogen around and being able to make use of it are two different things. Your body, and the bodies of other plants and animals, have no good way to convert N2 into a usable form. We animals—and our plant compatriots—just don't have the right enzymes to capture, or fix, atmospheric nitrogen. Still, your DNA and proteins contain quite a bit of nitrogen. Where does that nitrogen come from? In the natural world, it comes from bacteria!

Bacteria play a key role in the nitrogen cycle. Nitrogen enters the living world by way of bacteria and other single-celled prokaryotes, which convert atmospheric nitrogen—N2—into biologically usable forms in a process called nitrogen fixation. Some species of nitrogen-fixing bacteria are free-living in soil or water, while others are beneficial symbionts that live inside of plants.

Nitrogen-fixing microorganisms capture atmospheric nitrogen by converting it to ammonia—NH3—which can be taken up by plants and used to make organic molecules. The nitrogen-containing molecules are passed to animals when the plants are eaten. They may be incorporated into the animal's body or broken down and excreted as waste, such as the urea found in urine.

Source credit: The nitrogen cycle (article) | Ecology | Khan Academy



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