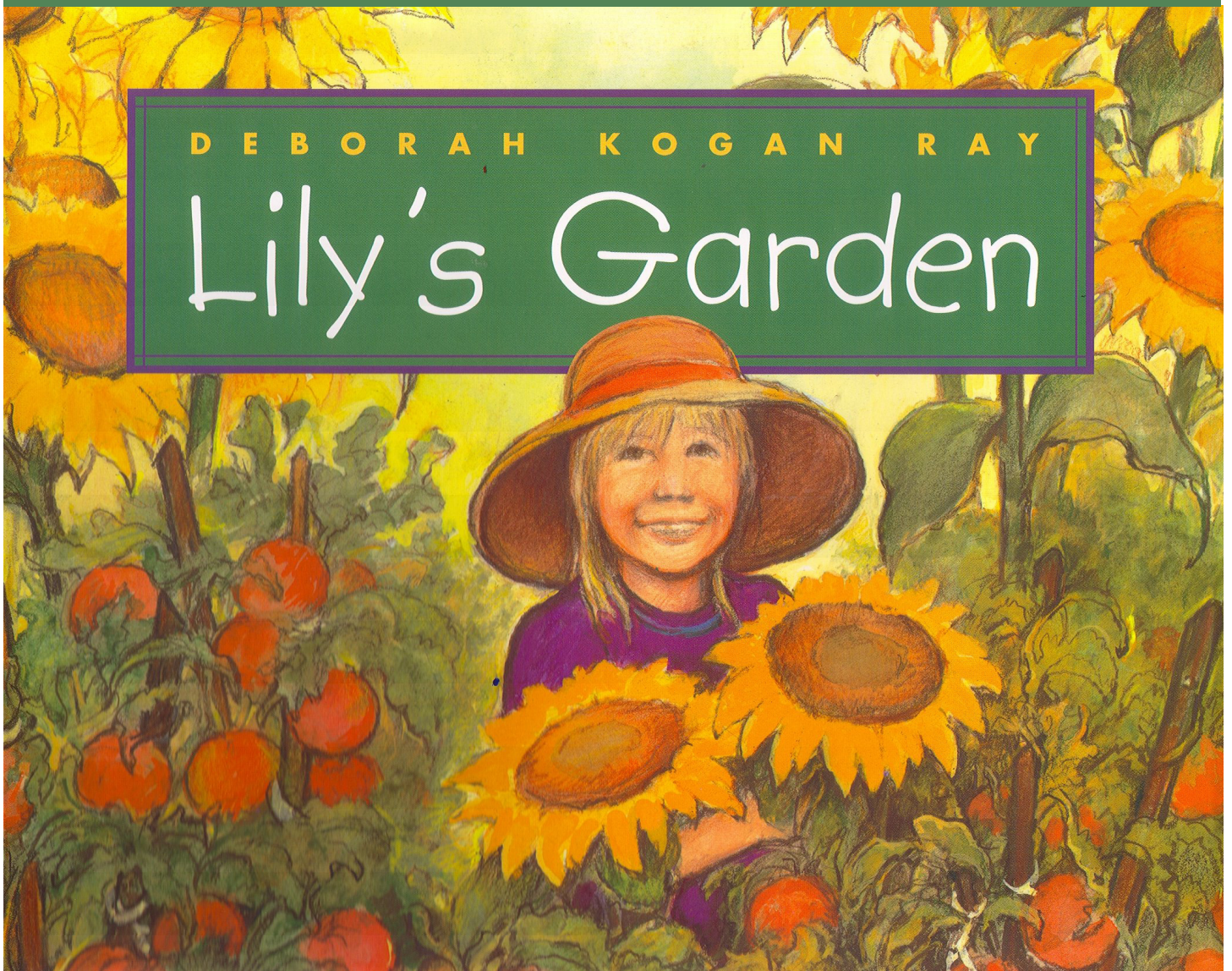


New York Agriculture in the Classroom

AG LITERACY DAY

D E B O R A H K O G A N R A Y

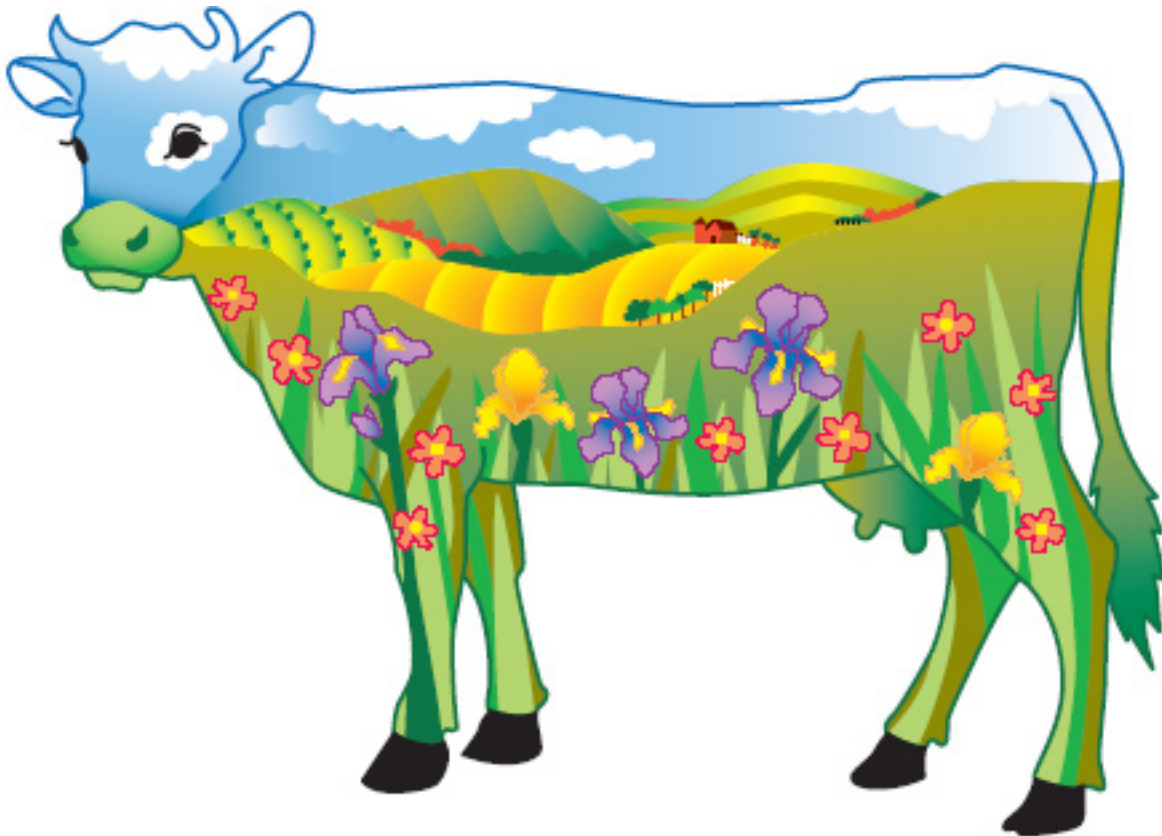
Lily's Garden



SOLE
Sciences of Life Explorations:
Through Agriculture



Suggested Month: March



Teacher Guide
Lesson: Planting Marigold Seeds
A Follow-up Activity for *Lily's Garden*

LESSON PLAN

LESSON TITLE Planting Marigold Seeds

MONTH March

GOAL

Students will understand how to plant **seeds** and care for young plants.

OBJECTIVES

Students will be able to:

1. Write observations of experiments in their journals, demonstrating an ability to explain data. (NYS Learning Standard 3a: Universal Foundation Skills, Elementary 1).
2. Take notes and categorize information using learned strategies. (NYS Learning Standard 1: Language for Information and Understanding, Elementary 1)
3. Demonstrate an ability to take turns speaking and responding to others' ideas in conversations about planting **seeds**. (NYS Learning Standard 4: Language for Social Interaction, Elementary 1)
4. Write and speak using simple **seed**-planting vocabulary in face-to-face conversation with peers and familiar adults. (NYS Learning Standard 1: Communication Skills, Checkpoint A Modern Languages)
5. Ask "why" questions in an attempt to seek greater understanding concerning objects and events they have observed and heard about. (NYS Learning Standard 1: Analysis, Inquiry, and Design, Elementary 1)
6. Demonstrate the ability to use simple measurement instruments to carry out plans for exploring phenomena through direct observation. (NYS Learning Standard 1: Analysis, Inquiry, and Design, Elementary 2)

TERMS

First Root - the new plant's root that grows before other roots grow

First Shoot - the new plant's first leaves

Seed - the part of a plant that, on its own, will grow into a new plant

Integrated Pest Management is a specialized form of environmental management wherein scientific research and real-world application work together to reduce pests such as insects, diseases or weeds.

1. Properly identify pests
2. Learn the pest/host biology
3. Sample the environment for pests
4. Determine an action threshold
5. Choose the best tactic
6. Evaluate results

SAFETY

This unit does not have any special tools with safety concerns. Use normal school classroom safety procedures.

Standards Matrix for this Lesson:

Standards:									
Month	Unit	Math/Science/ and Technology	English Language Arts	Social Studies	HEALTH	ARTS	Food & Fiber Literacy	CDOS	Other Languages
3	Planting Marigold Seeds	1:7 e1	1:3 e1						
		1:7 e2	1:6 A						
		3a:2 e1	4:5 e1						

Standards Matrix Key:

NYS Learning Standards arranged by Standard: Category, Level (e = elementary; i = intermediate)

Categories:

- | | |
|---|--------------------------------------|
| 1 Career Development | 11 Technology |
| 2 Universal Foundation Skills | 12 Interconnectedness: Common Themes |
| 3 Language for Information and Understanding | 13 Interdisciplinary Problem Solving |
| 4 Language for Literary Response and Expression | 14 History of the U.S. and New York |
| 5 Language for Social Interaction | 15 World History |
| 6 Communication Skills | 16 Geography |
| 7 Analysis, Inquiry, and Design | 17 Economics |
| 8 Information Systems | |
| 9 Mathematics | |
| 10 Science | |

ADDITIONAL RESOURCES

A Seed is a Promise, by Claire Merrill

SUPPLIES AND EQUIPMENT

Jiffy pots (provided)
Paper saucers
Watering can (and access to a watering source, or bottled water)
Ruler
Journals
Harris marigold **seeds** (provided)
Table
Lighting (natural or grow bulbs)

BACKGROUND FOR READERS

This lesson will refer to the March pages in *Lily's Garden*. Ask the students to explain what is happening in the illustrations. Using the lesson plan provided, the reader will guide class participants through a marigold **seed** planting activity. Students will discuss what a **seed** needs to grow: sun, soil, air, and water.

The sun provides the warmth and energy plants need to survive. Plants make their own food through photosynthesis, using the chlorophyll contained in their leaves and the sun's light. Not enough sun will slow a plant's growth and can even kill it. Too much sun can be a problem too. The soil can dry out too quickly and photosynthesis can slow down.

Soil provides a base for the roots to anchor themselves in and provides the plants with water and nutrients to help them grow (nitrogen, phosphorus, potassium, calcium, magnesium and sulfur). It is important that soil be loose and not packed down (compacted). It is harder for a plant to spread its roots in compacted soil. This limits their access to soil nutrients and weakens their hold in the ground.

Air is important because plants take in carbon dioxide to use during photosynthesis and give off oxygen as a by-product. Pollution in the air can block sunlight from getting to plants and the harmful chemicals can also impede plant growth. The wind is useful in carrying pollen and **seeds** of plants to spread them around as well.

Water comes from the sky as precipitation and flows on top of or through soil into lakes, rivers and streams. Water helps the plant move nutrients from the soil up through its stems and leaves. Water keeps the plant moist, flexible, and helps the plant make its own food. However, a plant's roots not only need room to spread out in the soil, they also need air. If the ground is oversaturated, it has too much water and not enough air. Some plants can die if the water is not drained away soon enough.

Through these experiments, students will gain a better understanding that plants do not grow independently and discover that different factors of nature and human action influence the growth of plants. They will have firsthand experience with **germination**.

Germination is the process of **seed** growth that occurs in response to warmth and water. Dormant **seeds** are very dry and require the absorption of water to initiate respiration and begin to digest their stored food, contained in the endosperm. Respiration requires oxygen, which must be sufficiently available in the soil for **germination** to proceed, so the soil must be wet but not so saturated as to make oxygen inaccessible. Temperatures must be above freezing, but not excessively hot (not more than about 45 degrees Celsius or 113 degrees Fahrenheit). If conditions are right, a root emerges from the **seed** coat, anchoring the **seed**; it then grows and puts out lateral roots. Eventually the seed produces its first leaves.

QUESTIONS FOR STUDENTS

How do you plant **seeds** so that they will grow?

What do plants need in order to grow?

Where should the **seeds** be placed so that they get everything they need?

SEED PLANTING ACTIVITY

Introduction

1. Open to the March pages of *Lily's Garden* and read them again for review.
2. Have students think about what is happening in the book-- they might guess what the activity will be.
3. Explain that the class will plant some flower **seeds** on their own.
4. Set the materials out on the table.
5. Talk to students about what a **seed** is.

Lesson Procedure

1. Each student will receive a Jiffy pot and two **seeds**.
2. Demonstrate on the table how the **seeds** should be planted, following the instructions on the **seed** packet. Emphasis should be placed on student inquiry questions (How do **seeds** grow?) to generate class involvement.
3. Students will:
 - a) Label their pot with their name, "Marigolds," and the date.
 - b) Have fun watching their Jiffy pots expand.
 - c) Plant marigold **seeds** in their Jiffy pot.
 - d) Water their **seeds** lightly with the watering can. Remind students to keep the pots moist, not soggy.
 - e) Place their pots on paper saucers on the window sill or under a grow light.
4. Suggest that students track the growth of their **seeds** by keeping a journal. Have them look for the **first root** of their new plants and suggest that they draw a picture that shows what's happening under the soil (the plant's **first root**).

Suggestions

1. Let plants grow until flowering.
2. In May, consider transplanting them into a school marigold garden and brainstorm possible locations for the flower bed.

Lesson 2

Teacher Guide

Unit: Experimenting with Seeds

Grade 2

UNIT PLAN

UNIT TITLE Experimenting with Seeds

MONTH March

GOAL

Students will learn about the balance of environmental factors that plants need in order to grow strong and healthy.

OBJECTIVES

Students will be able to:

1. Write observations of experiments in their journals, demonstrating an ability to explain data. (NYS Learning Standard 3a: Universal Foundation Skills, Elementary 1).
2. Take notes and categorize information using learned strategies. (NYS Learning Standard 1: Language for Information and Understanding, Elementary 1)
3. Demonstrate an ability to take turns speaking and responding to others' ideas in conversations about planting **seeds**. (NYS Learning Standard 4: Language for Social Interaction, Elementary 1)
4. Write and speak using language consisting of simple **seed**-planting vocabulary in face-to-face conversation with peers and familiar adults. (NYS Learning Standard 1: Communication Skills, Checkpoint A Modern Languages)
5. Ask "why" questions in an attempt to seek greater understanding concerning objects and events they have observed and heard about. (NYS Learning Standard 1: Analysis, Inquiry, and Design, Elementary 1)
6. Demonstrate the ability to use simple measurement instruments to carry out plans for exploring phenomena through direct observation. (NYS Learning Standard 1: Analysis, Inquiry, and Design, Elementary 2)
7. Describe organized observations and measurements, recognizing simple patterns and relationships in the data. (NYS Learning Standard 1: Analysis, Inquiry, and Design: Elementary 3)
8. Explain how to best test a proposed solutions and perform, record, and evaluate their tests under teacher supervision. (NYS Learning Standard 1: Analysis, Inquiry, and Design, Elementary 1)
9. Explain how measurement is approximate, never exact. (NYS Learning Standard 3: Mathematics, Elementary 5)
10. Record predictions related to experimental probabilities. (NYS Learning Standard 3: Mathematics, Elementary 6)
11. Present results of an extended, culminating, mathematics and science project, that requires students to gather and process information, generate and analyze ideas, and observe common themes to realize ideas. (NYS Learning Standard 7: Interdisciplinary Problem Solving, Elementary 2)
12. Explain how agriculture provides people's basic food. (Food and Fiber Literacy Standard I: Understanding: A, 2-3)

TERMS

First Root - the new plant's root that grows before other roots grow

First Shoot - the new plant's first leaves

Germination - the process in which a **seed** begins to grow into a new plant

Seed - the part of a plant that, on its own, will grow into a new plant

Seed Coat - protects the **seed**

Integrated Pest Management is a specialized form of environmental management wherein scientific research and real-world application work together to reduce pests such as insects, diseases or weeds.

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		7:13 e2							

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| 9 Mathematics | |
| 10 Science | |

ADDITIONAL RESOURCES

<http://www.theideabox.com/ib.php/web=idea&idea=7541>

SUPPLIES AND EQUIPMENT

Empty milk cartons
Potting soil
Watering can
Ruler
Journals
Seeds

BACKGROUND FOR TEACHERS

In the plant growth experiments that follow, students are making use of the scientific method-- observing and coming up with questions, predicting answers (hypothesizing), and setting out to prove whether their hypotheses are true or not through experimentation. The more input a student has, the more a project means to him or her, giving the student ownership. Experiments inspire student to learn more about a topic.

These experiments describe the important environmental factors that plants need for growth: sun, soil, air, and water. The sun provides warmth and energy for plants to survive. Plants make their own food through photosynthesis, using the chlorophyll contained in their leaves and the sun's light. Not enough sun will slow a plant's growth and can even kill it. Too much sun can be a problem too, if the plant and soil are drying out too quickly.

Soil provides a base for the roots to anchor themselves in and provides the plants with water and nutrients to help them grow (nitrogen, phosphorus, potassium, calcium, magnesium and sulfur). It is important that soil be loose and not packed down (compacted). It is harder for a plant to spread its roots in compacted soil. This limits their access to soil nutrients and weakens their hold in the ground.

Air is important because plants take in carbon dioxide to use during photosynthesis and give off oxygen as a result. Pollution in the air can block sunlight from getting to plants and harmful chemicals can also impede plant growth. The wind is useful in carrying pollen and **seeds** of plants to spread them around as well.

Water comes from the sky as rain or snow and flows on top of or through soil into lakes, rivers and streams. Water helps the plant move nutrients from the soil up through its stems and leaves. Water keeps the plant moist, flexible, and helps the plant make its own food. However, a plant's roots not only need room to spread out in the soil, they also need air. If the ground is oversaturated, it has too much water and not enough air. Some plants can die if the water is not drained away soon enough.

Through these experiments, students will gain a better understanding that plants do not grow independently and discover that different factors of nature and human action influence the growth of plants. They will have firsthand experience in learning about **germination**.

Germination is the process of **seed** growth that occurs in response to warmth and water. Dormant **seeds** are very dry and require the absorption of water to initiate respiration and begin to digest their stored food, contained in the endosperm. Respiration requires oxygen, which must be sufficiently available in the soil for **germination** to proceed, so the soil must be wet but not so waterlogged as to make oxygen inaccessible. Temperatures must be above freezing, but not excessively hot (not more than about 45 degrees Celsius). If conditions are right, a root emerges from the **seed** coat, anchoring the **seed**; it then grows and puts out lateral roots.

QUESTIONS FOR STUDENTS

What do plants need in order to grow?

What are the parts of a **seed**?

Engaging Easy-To-Do Seed Activities To Try With Your Learners

DISSECTING A **Seed**

Materials

Lima bean seeds	Water
Pan	Plastic knives
Magnifying glass	

Procedure

1. Soak lima bean **seeds** in water overnight.
2. Have students examine each **seed** with a magnifying glass.
3. Split the **seeds** open using their fingernails or a plastic knife.
4. Re-examine the **seeds**, looking at the different parts:
 - Seed coat** - protects the **seed**
 - Soft flesh - food for plant
 - First Root**
 - First Shoot/Leaves**
5. Teacher or students draw the **seed** on the chalkboard and label its parts.

Seed VIABILITY

Teacher Information

This activity involves a simple test to determine whether **seeds** will **germinate**. If you have any old **seeds**, your class might test them to see if they **germinate** in smaller percentages than fresher **seeds**. In the first week, the group puts the **seeds** in a moist environment. In the second week, the results are assessed. If the **seeds germinate** quickly, they are viable and will grow in the garden.

Materials

Paper towels	Rubber bands
Quart size zippered freezer bags	Labels
Seeds - If possible, each team will need 10 corn and 10 marigold seeds	

Procedure

1. Dampen paper towels, being sure to wring out excess water.
2. Lay out the towels on a table/counter.
3. Evenly place **seeds** 1/2" to 1" apart on paper towel, leaving a space of 2-3" from the bottom edge and 1-2" along each side edge. Corn and marigold **seeds** may be placed on the same paper towel.
4. Fold up the bottom edge of the paper towel to cover the **seeds**.
5. Roll up the towel like a carpet the rest of the way.
6. Twist each end and tie with a rubber band.
7. On the bag, place a label with type of **seeds** used and date.
8. Place **seeds** into bag and seal, punching a few small holes in the bag.
9. Store the bags in a dark place at room temperature.

Week Two:

1. Talk about what the students think the results will be. How many **seeds** do they think started to grow?
2. Take the paper towels out of the bags and carefully open them up.
3. On the chalkboard make a table showing the number of **seeds** beginning to **germinate**.
4. Discuss the results. How many **seeds germinate**? Did the age of the **seeds** affect the results? Was there a difference between the corn **seeds** and marigold **seeds**?

name _____

Student Lesson: Experiment with **Seeds**

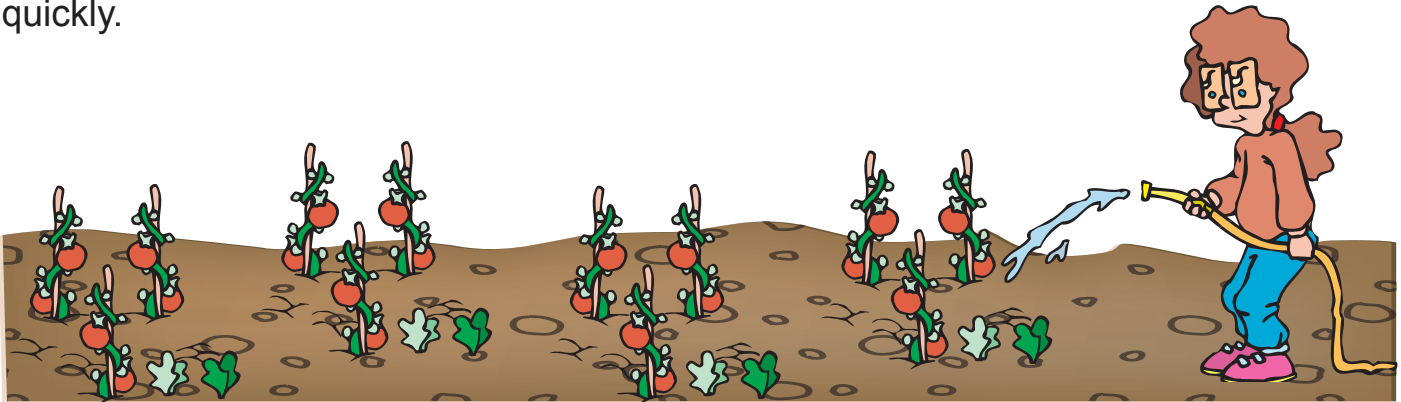
What do plants need to grow?

Sun and Soil



Sun

The sun provides warmth and energy for plants to survive. Plants use the sun's energy to make their own food energy in their leaves. Not enough sun will slow down a plant's growth and even kill it. Too much sun can be a problem too, if the plant and soil are drying out too quickly.



Soil

Soil provides a base which the roots hold on to as a plant grows bigger. It also provides plants with water and the nutrients they need to be healthy. In turn, some plants become healthy food for us.

Nutrients in the soil also help plants grow strong. Some nutrients plants need are nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur.

It is important for soil to be loose and not packed down. If the soil in a field is packed down (also known as being compacted), farmers plow it up before they plant their **seeds**.

Think of compacted soil as a snowball. When snow falls, it is fluffy. To make it into a snowball, you have to pack it tightly with your hands. It becomes heavier and firmer. That is what compacted soil is like.

Compacted soil makes it harder for plant roots to spread out. This limits their access to soil nutrients and weakens the plant's hold in the ground. The more room roots have, the more soil the plant can hold in place so it doesn't wash away during a rain storm.

name _____

Student Lesson: Experiments with **Seeds**

What do plants need to grow?

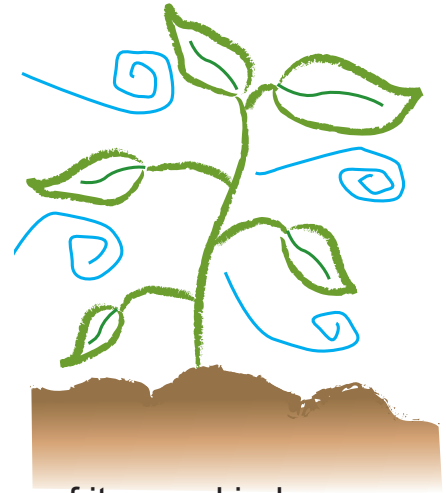
Air and Water

Air

Plants take in carbon dioxide from the air to use in the process of photosynthesis (making their own food energy) and give off oxygen, which we use.

Pollution in the air, from machines, fires, and other sources, can block sunlight from plants. Harmful chemicals in pollution can be bad for plant growth, too.

The wind also carries pollen and **seeds** of plants to help spread them around. This is the plant's way of making more of its own kind.



Water

It comes from the sky as rain or snow and it flows on top of or through soil into lakes, rivers, and streams. Water is very important to plant growth.

Water helps the plant move nutrients from the soil up through its stems and leaves. Water keeps the plant moist and flexible, and helps the plant make its own food.

When growing your own plants, pay attention to how often it rains and how long the ground takes to soak up the water. If it hasn't rained in a while and the soil feels dry, you may need to water your plants. You can do this with a hose, a sprinkler, or a watering can.

However, there is such a thing as over-watering your plants. A plant's roots not only need room to spread out in the soil, they also need air! If the ground has too much water, it doesn't have room for enough air. Some plants can die if the water is not drained away soon enough.

name _____

Student Lesson: Experiments with **Seeds**

Well...color me in! It looks like rain!

