

Cycles in the Garden

An integrated unit of study for first grade



Cycles in the Garden is a hands-on unit of study which builds scientific habits of mind and celebrates the cycles found in a garden community. The lessons integrate math, science, literacy, and social studies while students practice stewardship skills in a classroom Grow Lab and school yard garden habitat. Through experiments, ongoing observation, tasting, and planting, students develop an understanding of, appreciation for, and curiosity about the processes and cycles involved in the plants and animals making their home in the soil right outside their door.

Developed in collaboration with the teachers, students, and community partners at Lawrence Barnes Elementary School in Burlington, Vermont.

Lesson One: What is a Plant?

Explores plants, their parts, and needs through a dress up activity, scavenger hunt, and planting bean seeds to care for and monitor in the class grow lab. Students will be introduced to science notebooks, that are the foundation for practicing scientific drawing, informational text-style labeling, and scientific questioning throughout the unit.

Lesson Two: Seed Power

Students explore and compare wild and cultivated seeds, taste green beans, investigate the bean life cycle, and dissect a lima bean seed.

Lesson Three: Sprouts & Seedlings

Continuing along with the life cycle of a plant, students taste sprouts, compare a bean seedling to a marigold seedling, and plant seeds to grow their own sprout snack.

Lesson Four: I Wonder What Will Happen If...

Students collaboratively develop and begin conducting a simple experiment to discover what happens to a bean seedling when it is kept in the dark. Sets the stage for an ongoing comparison between a plant in the light and one in the dark.

Lesson Five: Get Into the Garden

Students broaden our thinking about plants, life cycles, and needs in the context of a diverse garden. Students dream up a garden of their own, tour existing school gardens, and plant seeds for food and flower gardens.

Lesson Six: Soil Field Trip

Dig into soil, compost, and worms at the Intervale Center. Students explore soil in terms of farms growing food, being a soil steward, and the lively world beneath our feet.

Lesson Seven: Plant Parts We Eat

Students taste and sort plant parts we eat while glimpsing the cycle of seeds to table.

Lesson Eight: Our Garden Community

Students collaboratively design, plant, and celebrate a class garden.



Cycles in the Garden

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Cycles in the Garden

Overview

Grade Level:	First Grade
Essential Questions:	What cycles can we find in our community? What cycles can we find in the garden? How does the garden change with the seasons? How do plants, animals, and people work together in the garden?
Potential Partners:	Farmers, cafeteria staff, local co-op member workers, community gardeners, composters, etc.
Objectives:	Students will: Plant seeds and care for plants in a grow lab. Record observations, practice scientific drawing and labeling in a science notebook. Taste sprouts and plant parts we commonly eat. Develop and conduct a simple experiment to explore how plants need light to grow. Explore soil on an Intervale field trip. Design, plant, and celebrate a class garden.
Big Ideas/Concepts:	interdependence cycles
Skills:	sorting, sequencing, comparing scientific questioning predicting and hypothesizing conducting experiments applying results observation stewardship scientific drawing and journaling

A note on using this unit: *Cycles in the Garden* is an eight lesson unit of study written for the first grade classroom by Shelburne Farms' Sustainable Schools Project in collaboration with the teachers, students, and community partners at Lawrence Barnes Elementary School in Burlington, Vermont. In each lesson you will find these components: objectives, focusing questions, materials list, literacy connections, procedural frame work and, where applicable, special notes and extensions. The lesson plans are followed by an appendix which contains materials and tools for use within the lessons and some extensions. Each lesson takes approximately one hour though most require ongoing work and follow up that is not written into the following lesson.

Spring 2007

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Connections to BSD Grade Expectations and VT Standards

Grade Expectations: Scientific Inquiry

Scientific Questioning

S1-2:1

Students demonstrate their understanding of SCIENTIFIC QUESTIONING by...

- ★ Posing observational questions that compare things in terms of number, shape, texture, size, weight, color, motion, etc. (e.g., How fast does a Lady Beetle move compared to a Bess Beetle?)
- ★ Investigating and completing questions to identify a variable that can be changed (e.g., What will happen if...? or I wonder if I change...?).
- ★ Generating new questions that could be explored at the end of an investigation.

Predicting and Hypothesizing

S1-2:2

Students demonstrate their understanding of PREDICTING AND HYPOTHESIZING by...

- ★ Predicting a logical outcome to a situation, using prior knowledge, experience and/or evidence.
- ★ Explaining reasons for that prediction.

Designing Experiments

S1-2:3

Students demonstrate their understanding of EXPERIMENTAL DESIGN by...

- ★ Writing a plan related to a question that includes:
 - a. What the experimenter will do.
 - b. What will be observed, measured, and/or compared.
- ★ Recording major steps sequentially.

Conducting Experiments

S1-2:4

Students demonstrate their ability to CONDUCT EXPERIMENTS by...

Referring to and following a simple plan for an investigation.

- ★ Describing observations using senses rather than feelings (e.g., The snail has a hard shell with wavy, brown lines, rather than the snail is awesome).
- ★ Recording observations of similarities and differences.
- ★ Drawing scientifically:
 - a. Recording relative proportion (e.g., Eyes are approximately the right size when compared to the head) including focus on finer details, and differentiating all parts observed.
 - b. Labeling significant aspects of a scientific drawing or diagram with words provided,
 - c. Creating a title for a scientific drawing or diagram.
- ★ Recording data (in a table provided by the teacher) generated from the use of simple science equipment , as well as nonstandard and standard measurement tools.

Representing Data and Analysis

S1-2:5

Students demonstrate their ability to REPRESENT DATA by...

- ★ Organizing a collection of data into a table or a graph template.
- ★ Creating a title for a table or graph.

Representing Data and Analysis

S1-2:6

Students demonstrate their ability to ANALYZE DATA by...

- ★ Sorting and classifying objects based upon observations, prior knowledge, or experience and justifying groupings.
- ★ Identifying and describing the pattern in diagrams and charts (e.g., model, bar graph, pictograph, diagram or chart).

S1-2:7

Students demonstrate their ability to EXPLAIN DATA by...

- ★ Developing a reasonable explanation based upon observations (e.g., I found out...)

Applying Results

S1-2:8

Students demonstrate their ability to APPLY RESULTS by...

- ★ Generating new questions related to discoveries during an investigation.
- ★ Relating current investigation to a similar investigation.

Grade Expectations: Life Science

Living Things

Enduring Understandings:

All living things are made of cells and maintain certain life processes that enable their survival.

Species depend on one another and the environment for survival. Energy is transferred through interdependent systems to support life.

Essential Questions:

- ★ How do organisms change over time?
- ★ In what ways do plants need animals and animals need plants in order to survive?

S1-2:31

Students demonstrate their understanding of Reproduction by...

- ★ Drawing and labeling the stages of development in the life of a familiar plant or animal.

Science Concept:

- All organisms undergo stages of development that include being born, developing into adulthood, reproducing and dying.
- Most organisms come from male and female parents.

Plants/Needs

Enduring Understanding:

Species depend on one another and the environment for survival. Energy is transferred through interdependent systems to support life.

Essential Questions:

- ★ In what ways do the parts of a plant contribute to its survival?
- ★ To what extent does a plant need light?
- ★ How do the changes in seasons affect plant life?

S1-2:34

Students demonstrate their understanding of Energy Flow in an Ecosystem by...

Experimenting with plant growth under different conditions, including light and no light.

Science Concept:

Plants need light (energy) to survive.

Objectives

Students will:

- Observe the five things that plants need.
- Discover the key parts of a plant that help it use the Fab 5.
- Plant bean seeds that will be continually studied throughout the unit.
- Be introduced to science notebooks.

Focusing Questions

What is a plant?

What do plants need to live?

What is a need?

What do I need to live?

How does each part of a plant help it get what it needs?

Literacy Connection

The Wind's Garden by Bethany Roberts and Melanie Hope Greenberg

Materials

Planting:

- Clear cups
- Bean seeds, 2 per student plus 10 extras
- Germinating soil mix
- Waterproof marker
- Labels or masking tape to label each cup
- Spray bottle filled with water

Dress Up a Bean costume:

- Leaves: Green cut outs that clip on to sleeves
- Stem: A long piece of green fabric, green sweater, and/or green knee socks
- Flower: fabric or laminated paper cut in the shape of flower petals that fit like a collar around the head/shoulders

Cycles in the Garden

Lesson 1: What is a plant?

Opening Circle

Begin with a group discussion on plants. What is a plant? What do we know about plants? What do we want to know about plants? Share photos of various plants.

Tell the students that one of the best ways to learn about plants is by becoming a plant! Dress up a student or another adult in the classroom with the “Dress Up a Bean” costume as students tell you what parts plants have. How do each of these parts help plants survive? Make a list of all the new plant vocabulary used.

Whole or Small Group Activity

Lead the students on a scavenger hunt of the “Fab 5: What Plants Need to Stay Alive” (see below and appendix). This acquaints the class with the needs of plants—sun, water, air, space, and soil. At each clue, students gather a colored bead that represents one of the Fab 5. These can be strung on a necklace or bracelet to remind the students what plants and other living things need.

Variations on the Fab 5:

Can be done in the school yard with illustrated signs posted for each Fab 5, the next clue and beads attached to the back. At the last stop each student gets a bean seed to plant.

Each clue can be found outside where a real world example of each is visible, i.e. hose for water, sunny spot for sun, etc.

Can be done inside, using the classroom resources such as the sink, a fan, etc., which is helpful if students are to take care of plants in a grow lab. Remember to discuss nature and people working together to care for our plant friends.

Fab 5 Clues:

In order for me to grow big and strong,
you're going to need to help me along.
Five things I need to stay alive—
We'll call them the fabulous five!

The first will surely help me wake,
It's cold in here for goodness sake!
I must warm up and feel the light—
Take me where it's warm and bright. (SUN)

I'm much warmer now, thanks a bunch
But I think it's getting time to munch
I make my own food whenever I'm hungry
But the problem is, I'm really thirsty! (WATER)
Look around—you need to think, and find something for the plants to drink.

- Bean: fabric or laminated paper cut in the shape of a bean
- Roots: twine or brown pipe cleaners that can attach to shoes

Fab 5 Scavenger Hunt:

- Clues for each
- Signs with illustrations (optional)
- Beads: brown (soil), blue (water), clear (air), green (space), yellow (sun)
- twine or string for bracelets

Extensions

Plant marigold seeds to grow seedlings as Mother’s Day gifts or a fundraiser. Students can transplant into hand painted clay pots. *These seedlings will be used in Lesson 3: Sprouts and Seedlings.*

Note

Always plant a few extra of each seed in the event they don’t germinate and also to prepare for experiments along the way (plant 5-10 extra bean seeds).

There is necessary follow up to each of these lessons that is generally not included in the next lesson.

You need me and I need you!

Soon you’ll learn a step or two

We eat and drink and need to share,

‘Cause both of us must breathe the...

Look around—think and observe. Can you see the wind pushing air in a swerve? (AIR—can use a pinwheel to see air moving)

Even though I’m little now

I’ll soon be big—somehow.

I’ll grow with others—it’s not a race

Just don’t plant me too close...I need my...

Look around—there’s a sign you’ll see—showing plants with room, growing happily. (SPACE—can also find a big open space to place the clue)

Sun, water, air and space—all things I need to live

But there’s one more, to me, you must give

It’s dark and brown, under your feet

Without it my life will be incomplete!

Look around—complete the Fab 5 and your plants will grow fine! (SOIL)

If activity is done outside, review the needs of plants and discuss how these needs will be met in the classroom.

Closing Circle

Introduce science notebooks. Discuss with students the role of this special notebook. Model to students that each entry will have a title, date, perhaps some labels, a scientific drawing, and words to describe the picture. Have students label their own notebook and make their first entry. This can be a simple map of where to find each Fab 5 in the school yard or classroom, a drawing of the bean seed surrounded by the Fab 5, etc.

Have each fill a clear planting container (could be a plastic or compostable cup, ideally with a hole or two poked in the bottom using a nail to let excess water drain) with soil gently patted down. Make two holes half the length of your pinky finger, ALONG OPPOSITE SIDES OF THE CUP (so as the plant grows students can observe the roots) and plant one bean seed in each hole. Cover with soil and spray with water.

As each student is passed the spray bottle ask them what their hopes and dreams (or prediction, something they wonder about the seed, etc.) for this bean seed is. Label each cup with the students’ name, type of seed and date planted.

Along the way

Have students care for their bean seed/plant and monitor it daily. Introduce students to the “Growth Graph” (see appendix). Discuss the graph, how to use it, and what we can learn from it. Begin plotting the height of the plant. You can start from the first day of growth above the soil or from the day the seed was planted and discuss more in depth germination. Students can also monitor the seed germination process and practice scientific drawing at various points throughout the week, between lessons.

Objectives

Students will:

- Use hand lenses to explore the inside of a seed.
- Compare a variety of seeds.
- Arrange sequence cards for a bean life cycle.
- Practice scientific drawing skills with particular focus on labeling and drawing to scale.

Focusing Questions

What is a seed?

What makes a seed a seed?

What do seeds need to grow?

How is a seed different than a plant?

Where do seeds come from?

What power do seeds have?

Do all seeds look alike?

Literacy Connection

The Tiny Seed by Eric Carle

I'm a Seed by Jean Marzollo

Seeds, Seeds, Seeds by Brian and Jillian Cutting

Seeds Like These by Paki Carter

Materials

Little Sprout

- Backpack
- Rain poncho
- High energy snack
- Water bottle with straw
- Green hat

Lima Bean Dissection:

- Pre-soaked lima beans, one per student
- Hand lenses
- Germinated maple seeds (optional)

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Lesson 2: Seed Power

Opening Circle

Revisit the Fab 5 and the progress of our bean seeds to date.

What is a seed? What makes a seed a seed? Compare seeds with other seed-like items—a rock, stick, etc. How does a seed grow into a plant? Where do seeds come from?

Unpack a seed backpack and discuss the parts inside a seed—seed power! Use Project Seasons' "Little Sprout" activity (see appendix).

Small Group Activity

Divide the students into three small groups to explore seeds at different adult facilitated stations. With each new scientific drawing, have students complete the following sentences in their science notebook: "I notice (or see, observe, discover, etc.)..." and "I wonder..."

Seed Explore:

Here students explore wild and cultivated seeds with hand lenses. Have them draw and label 2 or more seeds in their science notebooks, paying special attention to size, texture, color. Students should try to draw the seed either as it's actual size or larger than life but work to have all other details to scale. Students can also try to match seeds with a photo of its corresponding plant or fruit.

Bean Station:

Here students explore bean life cycle cards, working together to arrange the cards in a circle of bean seed to mature bean with more seeds inside. Students can also dissect fresh green beans and taste them. Find the seeds in the fresh green bean and compare them to the dried beans in the seed packet.

Lima Bean Dissection:

Students split open pre-soaked lima beans to discover the seed coat, tiny leaves, root and stored food. Students can draw the inside of the seed and label the parts after they have observed with hand lenses. If you can find maple seeds that are germinated in the school yard, gather enough for the class and add this common seed to the dissection. Try to do this in the spring, often they are buried under fallen leaves, but you can see the little root coming through and if you open the seed you will find bright green leaves that will unravel.



Cross section of sugar maple seed with leaves curled.



Bean Station:

- Fresh green beans, one per student
- Green bean seeds
- Bean life cycle cards

Seed Explore:

- Egg cartons or yogurt containers each compartment with a different kind of seed
- Photos of plants/fruits to match up with seeds
- Hand lenses

Science notebooks

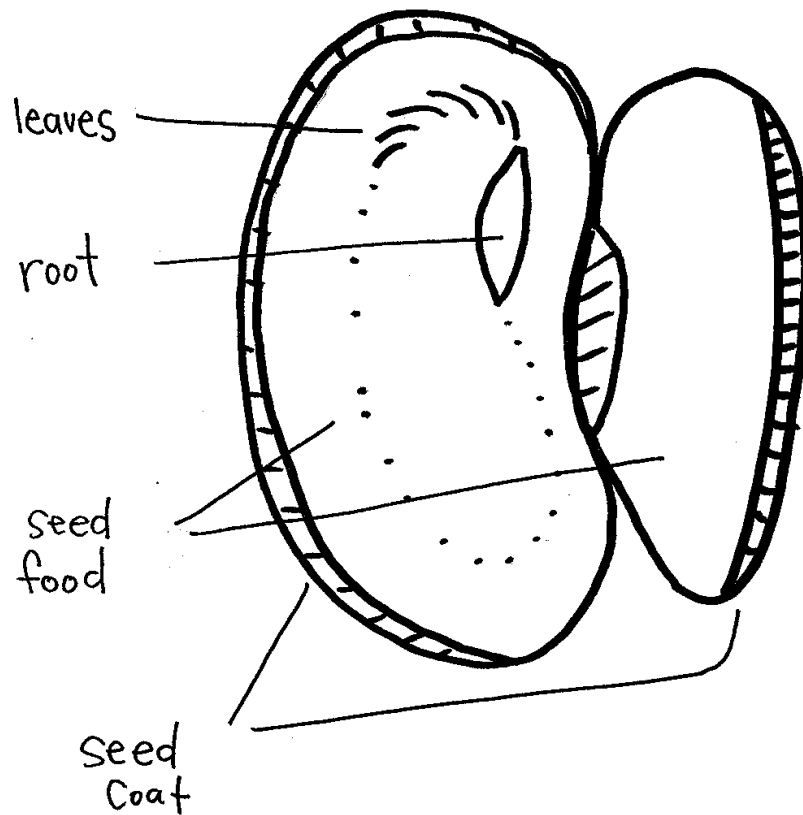
Colored pencils

Extensions

Using a variety of beans and other seeds, have students arrange a picture or special word and glue to card stock—a seed mosaic!

Host a seed tasting—sunflower seeds, pumpkin seeds, popcorn, nuts, etc. Students can compile a graph of favorites and/or match the seed with photos of its corresponding plant.

Cross section of lima bean seed with labels



Objectives

Students will:

- Compare a germinated seed to a non-germinated seed using a Venn diagram.
- Compare bean and marigold seedlings.
- Practice scientific drawing.
- Observe and taste a variety of sprouts.
- Plant seeds to grow their own sprouts.

Focusing Questions

What is a sprout or seedling?

How is a seedling like or different from a seed?

How is a seedling like or different from a full grown plant?

How does a marigold seedling compare to a bean seedling?

Literacy Connection

National Geographic Young Explorer: A Sunflower Grows

Materials

- Bean and marigold seedlings
- Hand lenses
- Color pencils or crayons
- Variety of sprouts to taste
- Sunflower seeds to taste
- Yogurt or milk containers for planting
- Sunflower or Oregon Giant snow pea seeds
- Labels
- Waterproof marker
- Science notebooks

Extensions

Play “Seed, Seedling, Plant” red light green light. Seed=red, curled up; Seedling=yellow, growing slowly; Plant=green, waving your leafy arms high, running

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Lesson 3: Sprouts & Seedlings

Opening Circle

Revisit seed power and the Fab 5. What happens in the time between a seed and the first new growth of a plant? Look at a germinated seed (photos or the real deal) and compare to a non-germinated seed. Fill in a Venn diagram to compare the two as a class. How does a seed germinate? It needs the right conditions and these can vary greatly from plant to plant. For example, some need darkness to germinate (buried in the soil) while others require light (seeds sprinkled on top of soil).

Discuss the plan for today—exploring sprouts and seedlings or “baby” plants in small groups, continuing to practice scientific drawing, using our senses to explore sprouts.

Small Group Activity

Working in small groups at desks or tables, have students explore their bean and marigold seedlings using observational questions such as “How many leaves does a marigold seedling have compared to a bean seedling?” and “How big is a marigold seedling compared to a bean seedling?” Continue developing questions with students to compare the plants in terms of numbers, size, shape, texture and color.

Next students will draw their seedlings side by side, paying close attention to proportion, finer details including color, labeling parts, title, and fill in the “I notice...” and “I wonder...” statements.

Divide students into two groups for tasting and planting.

Tasting Station:

Begin with hand washing. Students can observe sprouts using a hand lens. Discuss tasting protocol as a group (see *Sampling How To's* in appendix). Students may taste two or more sprouts—snow pea, sunflower, mung bean, alfalfa, microgreens. If you are tasting sunflower sprouts, you may also taste seeds to compare. Does a sunflower sprout taste the same as a sunflower seed? Do all sprouts taste the same?

Planting Station:

Students will fill a small yogurt or milk container, clean with a few holes poked in the bottom, with germinating mix soil. Easy and tasty sprouts to plant are sunflower or snow pea. Label each container with student name, plant type, and date. In a few weeks students can sample sprouts they planted themselves!

Closing Circle

What is next for your seedlings? How have you seen them change over the last few weeks? What do you think would happen if we changed how we took care of them? What if we stopped watering them? What if we took away the grow lab lights? Introduce the word “experiment” and share with students that we will conduct our own experiments next week.

Objectives

Students will:

- Develop a step by step plan to conduct an experiment on bean seedlings and light.
- Begin a series of drawings to compare a seedling kept in the dark and one in the light over time.

Focusing Questions

What is an experiment?

Why do we experiment?

How do we make a plan?

How does light affect plant growth?

Why do we think plants need light?

Literacy Connection

Materials

- Bean plants (use the extra seedlings that were planted the same day the students' own seedlings were planted) to put in the dark, one per small group of students
- colored pencils
- 11 x 17 paper, two per student

Extensions

Set up experiments to illustrate each of the Fab 5—plant a handful of seeds really close together, stop watering a plant, etc. Make observations and “I wonder...” or “I think...” statements and predictions along the way.

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Lesson 4: I Wonder What Will Happen If...

Opening Circle

Revisit the Fab 5. Discuss as a group what an experiment is—a test, trial, or set of observations set up to discover something new, or support an existing idea or principle. We've learned about the Fab 5 and have been taking care of plants to make sure they get all they need to grow and live. What happens if we take any one of the Fab 5 away? What does that look like? How does it affect the plant's life cycle?

When scientists set up an experiment, they make a plan. How do we make a plan? Write a plan as a group to test whether or not plants really do need light to grow. Begin with a question, “What will happen if I put a bean plant in the dark closet?” Turn that into a statement that we will test, “Bean seedlings need light to grow.” or “Bean plants do not need light to grow.” Next we need to make a plan, step by step in order to complete our experiment. What will we do to test our idea about plants and light? What will we watch for? If we are only changing the amount of light the plant gets, what else do we need to continue to do to care for the plant? This planning and experiment implementation can be done in small groups or as a whole class.

Small Group Activity

Have students draw the bean plant that will be put in the dark on the left side of a sheet of 11 x 17 paper that has 3 creases, creating space for 3 different drawings in a row on the same page. Students will continue to draw the same plant at two other intervals across the paper to compare how the plant looks over time in the dark. Label this drawing as “Dark”. Complete a similar drawing of their bean plant that will be kept in the grow lab. Label this sheet “Light”. It's important for students to draw fairly detailed plants so we can observe a variety of differences over time—color, height, number of leaves, etc.

Have students complete the sentence “I wonder...” or “I think...” about how they think their plant in the dark may change or not. Complete the same sentence for the plant in the light.

It is up to you when the other two drawings are done. Observe the plant in the dark to see when it is appropriate. Maybe you observe noticeable changes in the plant in a few days, perhaps it's a week or two. Ideally students will be able to easily observe that the plant in the dark is not growing and may even be dying while the other plant in the grow lab is growing taller and producing flowers then tiny beans.

Closing Circle

Why is light one of the Fab 5? Close with a discussion about energy and how animals (including us) get our energy from eating plants or animals that eat plants. Document the students' discussion in a diagram on large chart paper linking the sun to plants to animals and us. In a future lesson we will explore plants as food more in depth.

Objectives

Students will:

- Take a tour of the different school gardens.
- Draw their own theme garden and label.
- Explore a variety of texts related to gardens.
- Plant seeds for the food gardens.
- Plant seeds for the flower gardens.

Focusing Questions

What is a garden?

Who grows in a garden?

Who eats from a garden?

Are all gardens the same?

What kinds of gardens are there?

How do gardens make us feel?

Literacy Connection

How Groundhog's Garden Grew

by Lynne Cherry

The Ugly Vegetables by Grace

Lin

Materials

- Large chart paper
- Markers
- Science notebooks
- Seeds
- Germinating mix soil
- Containers for planting
- Labels
- Waterproof marker
- Variety of garden related books
- Hand trowels

Extensions

Grow extra seedlings for students to take home or to sell to parents and community members as a fundraiser for garden supplies.

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Lesson 5: Get Into the Garden

Opening Circle

Create a word bank or KWL (what do you Know, Want to know, how will we Learn about?) chart about gardens. What is a garden? Who has seen a garden? Who grows a garden? How can we use our classroom grow lab to prepare us to really get into the garden in spring and early summer?

Small Group Activity

While students draw their own theme garden, label, title, and write some words or sentences to describe their garden, take small groups of students on a school garden tour. While on the tour encourage students to notice what the gardens look like at this time of year. Look for colors, signs of animals and insects, sizes of plants, etc. Take a few small trowels to dig around looking for life below the soil surface.

As students finish their drawings and tour, invite them to plant several seeds to grow in the grow lab that, once they are big enough, can be transplanted to the school gardens. These can vary depending on curricular goals. Basil, tomatoes, marigolds, cucumbers, pumpkins, and nasturtiums all work well.

Make space for a relaxing garden book explore on the carpet or in other comfortable places around the classroom or outside, weather permitting.

Closing Circle

Ask students to share something they noticed or observed in the gardens and for an "I wonder..." statement about the future of the gardens.

Objectives

Students will:

- Explore soil at the Intervale Center in the context of growing food, compost, and worms.

Focusing Questions

What is soil?
How is soil made? Who helps make soil?
Who lives in soil?
How can we help care for soil?
What is compost?

Literacy Connection

Diary of a Worm by Doreen Cronin and Harry Bliss
An Earthworm's Life by John Himmelman
A Log's Life by Wendy Pfeffer and Robin Brickman

Materials

None

Extensions

Create a soil tunnel out of large cardboard boxes draped around a table. As students crawl through with a flashlight they can see soil dwelling animals and roots. Above ground you can add decomposing sticks and leaves, plant tops, etc.

Note

For information on scheduling a field trip contact Amy Chambers, achambers@shelburnefarms.org or 985-0345. See appendix for some of the field trip activities.
For information on classroom composting, worms, and waste reduction contact Jess Sankey at CSWD, jsankey@cswd.net or 872-8111.

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Lesson 6: Intervale Soil Field Trip

Opening Circle

This lesson takes place in the Intervale and is facilitated by Shelburne Farms in partnership with the Intervale Center, Chittenden Solid Waste District (CSWD), and Intervale Compost Products. To prepare students for the field trip, go over proper behavior on any field trip and special notes about being on a working farm and at a large compost facility. Introduce the focusing questions. Ask students why we would visit the Intervale to help us learn about cycles in the garden. Where is the Intervale?

Whole and Small Group Activity

Upon arrival at the Intervale, the class will be divided into two groups. One will visit Intervale Compost Products while the other will explore soil on the farm and worms. The groups will flip flop.

Closing Circle

Upon returning to school debrief the field trip. What did we see? What did we do? How did we help? What do we know about soil now? Have students make an entry in their science notebooks to reflect on the experience.



Objectives

Students will:

- Taste a variety of fruits and vegetables.
- Identify the parts of plants we eat.
- Sort fruits and vegetables based on their plant part.

Focusing Questions

What are plants we like to eat?

What part of the plant do we eat?

Literacy Connection

Tops and Bottoms by Janet Stevens

Materials

Tasting Station:

- A sample fruit or vegetable for each plant part, cut into bite size pieces enough for 1 or 2 per student
- Plates or bowls for each sample
- Photos of each plant sample still in the soil (i.e. a cutaway of a carrot under ground or being pulled out of the ground)

Sorting Station:

- Real, plastic or photos of fruits and vegetables to sort into plant parts
- Labels and pictures for each plant part
- Baskets for each plant part

Recording Station:

- “Plant Parts We Eat” worksheet

Extensions

Make a plant part soup.

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Lesson 7: Plant Parts We Eat

Opening Circle

Revisit the dress up a bean activity to remind students of the various parts of a plant. Discuss with the students how plants are food for people. What are some plants that we like to eat? Do all of these foods look alike? Do they taste the same? Are they all the same part of the plant?

Small Group Activity

Divide the students into three groups to explore the stations: tasting, sorting, and recording.

Tasting Station: Explore each edible on the table and discuss the part of the plant it is. Look at photos of each plant growing. Does it grow above or below the soil? Remind students of our tasting protocol then have them taste each plant part. Discuss how sometimes we eat more than one part of the same plant, i.e. beets and beet greens. What do we do with the plant parts we don't eat?

Sorting Station: Have students work together to sort real, plastic, or photos of plant parts we eat into the correct basket. Each basket should have a corresponding piece of paper or cardboard—one side is the name of the plant part such as “root” and the other side has pictures of examples of roots. This gives the activity multiple levels.

Recording Station: Students will use the “Plant Parts We Eat” worksheet to circle the part of each plant that we eat. They can also label plant parts and names of each plant if appropriate.

Examples of Plant Parts We Eat:

Roots: carrots, beets, radishes

Stems: celery, asparagus, onions, potatoes

Leaves: lettuce, spinach, herbs

Flowers: broccoli, cauliflower, artichoke, nasturtiums

Fruits: tomatoes, cucumbers, beans

Seeds: chick peas or garbanzo beans, peas, corn kernels

Closing Circle

How did these plants we eat get from a small seed to our table? Who are the people involved? What is the cycle of our food starting from seed and ending at our table? Create a class timeline illustrating one of these cycles.



Objectives

Students will:

- Collaboratively design, plan and plant a class garden.

*This will take more than one hour to complete.

Focusing Questions

How should a garden make us feel?

How will we plant our garden?

Who will visit or use our garden?

Literacy Connection

Jack's Garden by Henry Cole
A Harvest of Color: Growing a Vegetable Garden by Melanie Eclare

Materials

- Hand trowels
- Watering can or hose
- Seedlings for transplant
- Seeds to plant in the garden

Extensions

Create a display in the hallway to share the students' learning. This can include a map with drawings or photos and labels of plants in the garden, excerpts from science notebooks, the Fab 5, bean life cycle, hopes and dreams for the garden, photos of the students' engaged in gardening activities throughout the unit as a timeline, etc.

Paint or draw special cloth flags to hang around the garden. These can have students' drawings, words to represent hopes and dreams or key garden and plant vocabulary, students' names, etc.

Cycles in the Garden

Lesson 8: Our Garden Community

Opening Circle

Ask students what our class garden should look like. Be sure to bring the Fab 5, the seedlings in the grow lab, and the goals of a garden into the conversation. How should a garden make us feel? Who will visit the garden in addition to our class? How can we make it an inviting space for people, plants, animals and insects? Draw the shape of the garden on a large sheet of paper. Have photos to represent each seedling and seed we intend to plant in the garden that can be moved around to create the shape and design the students brainstorm.

Small Group Activity

In small groups take students out to the garden to dig around, looking for worms, mixing in compost and water to ready the garden for planting. Next, each student should have the opportunity to transplant (individually or collaboratively depending on space) a seedling or plant something from seed directly in the garden (peas, carrots, etc.). As students water their plant or seed in, ask them to think about their hopes and dreams for this garden. If they'd like to share be sure to record their responses.

Closing Circle

What cycles have we found in the garden? Ask a few students to describe a cycle or two we have discovered. Ask each student to draw one of these cycles in their science notebook, remembering to label, title, and write an "I notice..." and an "I wonder..." statement.

Have students follow through with the garden until school is out—continuing scientific drawings, reading in the garden, observing, and enjoying.

Celebrate the garden and the students' learning with a special meal, family potluck, art project or other fun event.



Cycles in the Garden

Resources for Students and Teachers

Resources for Students

GARDENS, CYCLES, SEASONS

Vegetable Garden by Douglas Florian

The Ugly Vegetables by

Good Morning, Garden by Barbara Brenner

Round the Garden by Omri Glaser

How Groundhog's Garden Grew by Lynne Cherry

A Harvest of Color: Growing a Vegetable Garden by Melanie Eclare

Planting a Rainbow by Lois Ehlert

Jack's Garden by Henry Cole

And the Good Brown Earth by Kathy Henderson

The Wind's Garden by Bethany Roberts and Melanie Hope Greenberg

SEEDS, PLANTS, CYCLES

The Reason for a Flower by Ruth Heller

Plants Seeds: A Book About How Living Things Grow by The Magic School Bus

A Handful of Sunshine: Growing a Sunflower by Melanie Eclare

Sunflower House by Eve Bunting

A Dandelion's Life by John Himmelman

Flowers, Fruits, Seeds by Jerome Wexler

From Seed to Plant by Gail Gibbons

Pumpkin Circle: The Story of a Garden by George Levenson

The Tiny Seed by Eric Carle

I'm a Seed by Jean Marzollo

Seeds, Seeds, Seeds by Brian and Jillian Cutting

Seeds Like These by Paki Carter

SOIL AND WORMS

Soil by Christin Ditchfield

Compost By Gosh! By Michelle Eva Portman

How Earthworms Live by Inge Plater

How Earthworms Grow by Inge Plater

Earthworms and Their Food by Inge Plater

Diary of a Worm by Doreen Cronin and Harry Bliss

Wiggling Worms at Work by Wendy Pfeffer

Wonderful Worms by Linda Glaser.

An Earthworm's Life by John Himmelman

Resources for Teachers

Project Seasons: Hands-On Activities for Discovering the Wonders of the World, Shelburne Farms

Digging Deeper: Integrating Youth Gardens Into Schools and Communities by Joseph Kiefer and Martin Kemple

GrowLab: A Complete Guide to Gardening in the Classroom, National Gardening Association

GrowLab: Activities for Growing Minds, National Gardening Association

Guide to Kids' Gardening, National Gardening Association

Dig In! Hands-On Soil Investigations, NSTA Press

The Growing Classroom: Garden-Based Science by Roberta Jaffe and Gary Appel

Healthy Foods From Healthy Soils: A Hands-On Resource for Educators by Elizabeth Patten and Kathy Lyons

In The Three Sisters Garden: Native American Stories and Seasonal Activities for the Curious Child by JoAnne Dennee

Pretend Soup and Other Real Recipes: A Cook Book for Preschoolers and Up by Mollie Katzen and Ann Henderson
Salad People and More Real Recipes by Mollie Katzen

Community Connections

Chittenden Solid Waste District, www.cswd.net

Intervale Compost Products, www.intervalecompost.org

Healthy City Youth Farm, The Intervale Center, www.intervale.org

UVM Extension Master Gardeners and Composters, www.uvm.edu/mastergardener/mastercomposter/

City Market/Onion River Co-op, www.citymarket.coop

Friends of Burlington Gardens and the Vermont Community Garden Network, www.burlingtongardens.org/

Cycles in the Garden

Appendix

Cycles in the Garden

Fab 5 Scavenger Hunt

In order for me to grow big and strong,
you're going to need to help me along.

Five things I need to stay alive—
We'll call them the fabulous five!

The first will surely help me wake,
It's cold in here for goodness sake!

I must warm up and feel the light—
Take me where it's warm and bright.

I'm much warmer now, thanks a bunch
But I think it's getting time to munch
I make my own food whenever I'm hungry
But the problem is, I'm really thirsty!

You need me and I need you!
Soon you'll learn a step or two
We eat and drink and need to share,
'Cause both of us must breathe the...

Look around—think and observe. Can you see the wind pushing air in a swerve?

Even though I'm little now
I'll soon be big—somehow.
I'll grow with others—it's not a race
Just don't plant me too close...I need my...

Look around—there's a sign you'll see—showing plants with room, growing happ-ily.

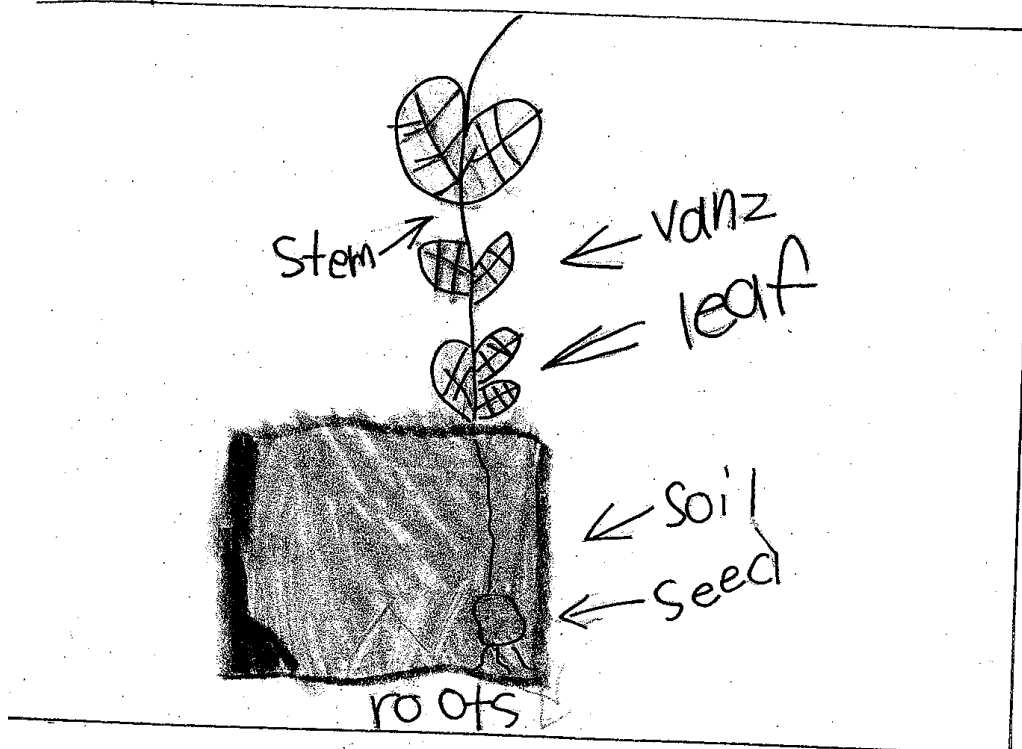
Sun, water, air and space—all things I need to live
But there's one more, to me, you must give
It's dark and brown, under your feet
Without it my life will be incomplete!

Look around—complete the Fab 5 and your plants will grow fine!

Cycles in the Garden

Science Notebook Sample Page

pea sprout 4/30/07



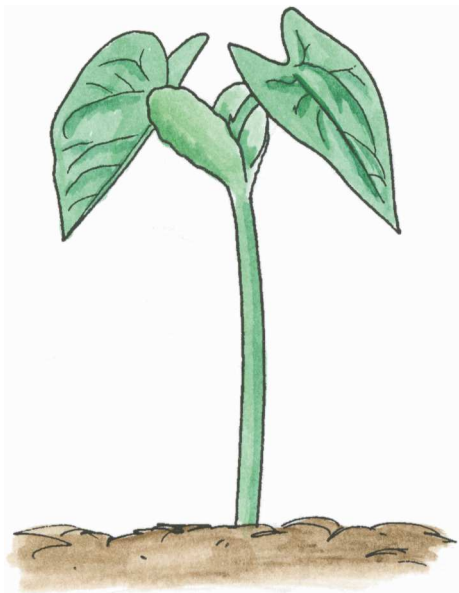
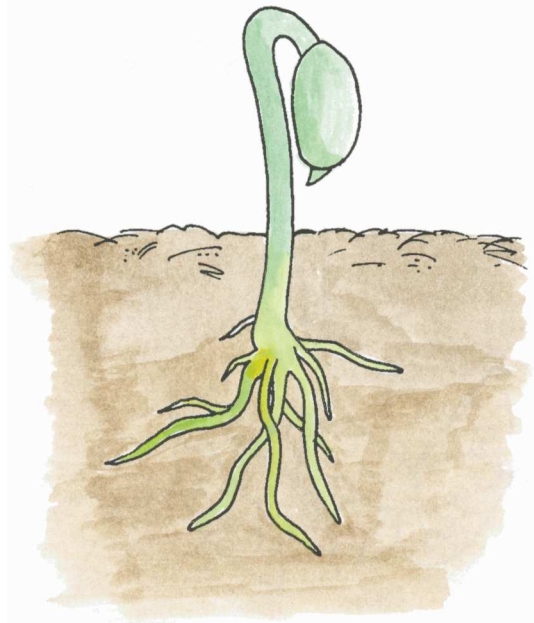
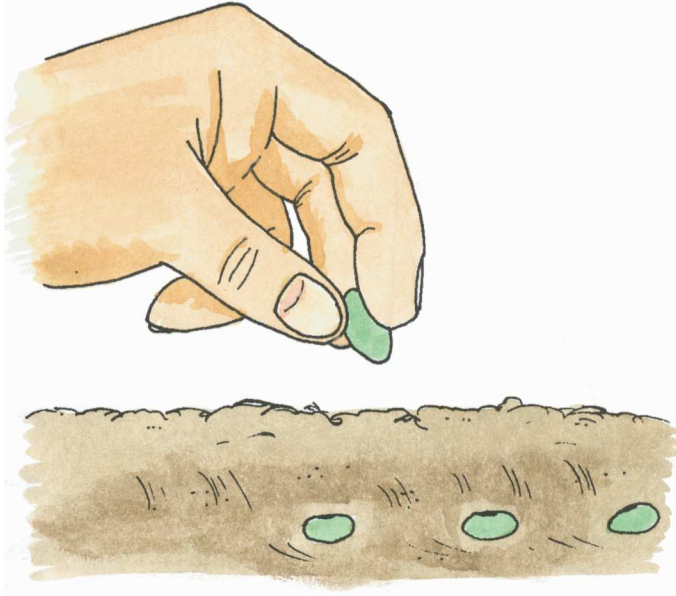
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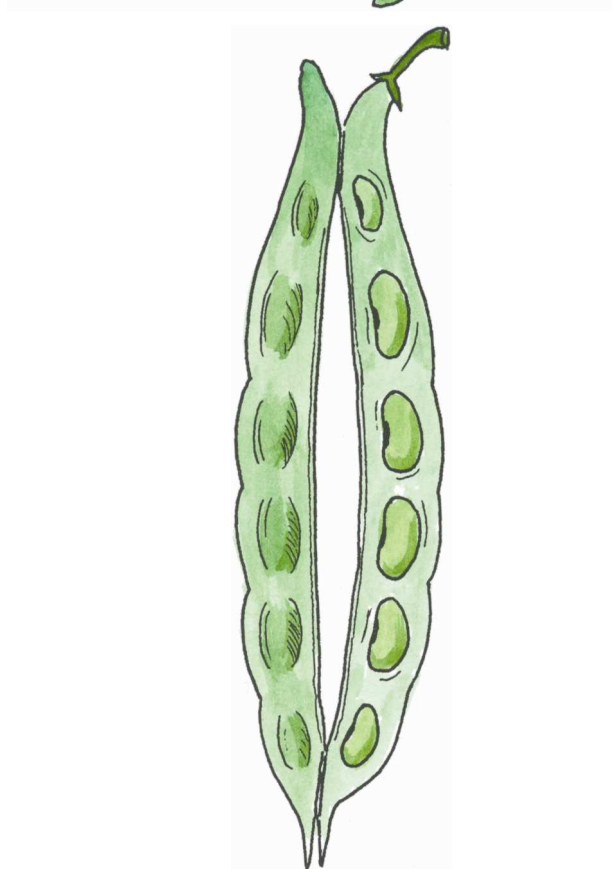
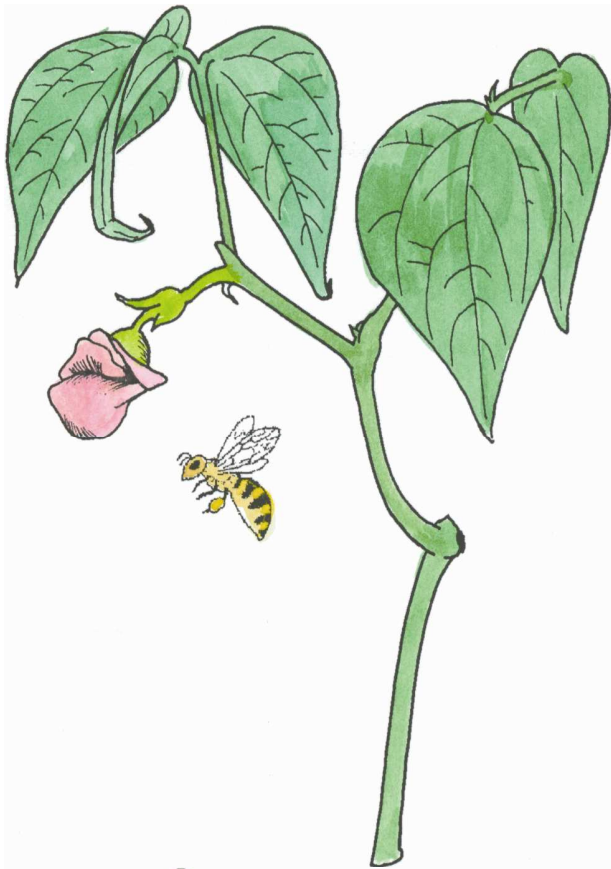
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sast like.

Cycles in the Garden

Bean Life Cycle Cards





Cycles in the Garden

Sampling How To's: Encouraging Children To Try New Foods

By Mandy Davis

Excerpted from *Food Foundations*

"I didn't like tomatoes while I was young, but when I grew older I tried it, and I liked it, so you just have to try!" – one Barnes Elementary School kindergartener to another

One of the central components of this unit is the introduction of healthy foods to students. Often, these foods are new and in order to encourage children to try new things, it is important to create an environment that supports exploration and experiential learning in the classroom. Children are often naturally picky eaters. In fact, all people, young and old, may have to try a new food up to seven times before being able to determine whether or not they like it. Remember how many times you had to try broccoli or mushrooms before they finally became delicious, or even tolerable, to you? As we adults know, a once hated food from childhood can become a favorite to us as long as we keep trying it. By creating an atmosphere in which students feel safe to try new foods, you can help them expand their palettes and their minds and become open to new experiences, culinary and otherwise. Here are a few tips on how to run successful food sampling exercises in your own classroom:

Make it fun. Trying new foods is one of life's pleasures. In this unit, we present food taste testing as part of a scientific exploration using one's taste buds. You can also decide as a class what to try based on a book you have read, the colors of the rainbow or a letter of the alphabet. Don't bribe or punish students who refuse to try something; instead, set a festive tone and offer the food in a kid-friendly way with no consequences for trying or not trying. Bite-sized or small portions with the option of seconds works well, since students are less intimidated by one bite than by a plateful of food. Furthermore, having students help prepare the food will give them ownership of the finished product, thus making them more likely to try it. People are also more likely to try new foods if they are not over-stimulated; in a calm, organized classroom, students will be less distracted and therefore braver in the face of new foods.

Keep offering new foods. No one can try something one time and make a definitive decision about whether or not that something tastes good. Offering the same foods multiple times and/or in a variety of preparations over several weeks or months often yields great results. For example, offer raw carrots, carrot bread, carrots with hummus dip, cooked carrots, oatmeal carrot cookies and carrot-raisin salad. Students will become familiar with a food over the course of several weeks and lessons. They will also become more willing to try new foods as sampling becomes a routine part of school life. You may also offer particularly exotic foods in combination with familiar ones, such as baba ghanouj with a familiar snack chip, or rice cakes with peanut butter.

Be a positive role model. Children's food choices and patterns are influenced by the people around them. By modeling healthy eating for your students, you set a positive example for them. By trying new foods with your students, you also demonstrate that all people, young and old, find it fun—and necessary—to try new foods. Be honest with them about foods you don't like or don't eat for dietary, religious or environmental reasons. Everyone likes different foods, and it is perfectly okay to like some foods and not like others. The learning is in the trying.

Don't force kids to try new foods. If a student is positive she does not like a food, do not force the student to try it. Drawing attention to students' hesitance or unwillingness will distract other students and disrupt the positive, fun tone you have set. Instead, simply tell this student that it's okay, that you'd really like for her to try the food, and that if she changes her mind, she should let you know. Often, a child who passes something up most adamantly the first time around will see other students—and you—enjoying the new food and change her mind.

Set a tone for food tasting and disposal that supports positive learning. An unwilling student who acts up can have a detrimental effect on other students' willingness to try new foods. For this reason, it is important to have your students develop a "politeness protocol" together before tasting any new foods that includes the procedure for disposing of food students do not like, as well as the reasons for being polite. By allowing students to develop rules themselves, you give them ownership of the rules and encourage them to police each other's behavior. Before every new test, have a student review the protocol to remind everyone of the process. A general protocol is something like, "If you don't like it, don't holler or say, 'Ew,' or, 'this is disgusting!' Just get up from the table, go over to the trash can and spit it out." And why? "Because someone might like the food, and if you make a big deal out of not liking it, you might make them feel bad." Perfect.

Don't get discouraged if most of the food goes into the compost or garbage. Success is measured by how many children taste a new food, not by how many children like it. Teaching them how fun it is to make adventurous food choices is an invaluable lesson that will broaden their horizons, support their health and sustain them throughout their lives.

References:

Bellows, Laura and Jennifer Anderson. May 2006. *Encouraging Preschoolers to Try New Foods*. Journal of the National Association for the Education of Young Children.

Also available online: <http://www.journal.naeyc.org/btj/200605/BellowsBTJ.asp>

"Tips to Expand Your Child's Taste for Exotic Food":

<http://www.hotelfun4kids.com/parenttravel/newfood.htm>

Young, L., J. Anderson, L. Beckstrom, L. Bellows, & S.L. Johnson. 2003. *Making New Foods Fun for Kids*. Journal of Nutrition Education and Behavior 35: 337-38.

Cycles in the Garden

Soil Field Trip Sample Activities

Worm Explore

Focusing Question: How do worms contribute to the health of soil?

Role play worms aerating soil by having the students pretend to be particles of soil clumped together. What is in between the soil particles? What about in the springtime when the snow melts? The students should stand as close as they can to one another. What would the difference be between the soil in a driveway vs. garden soil? You may choose to be the worm or chose a student or parent. As you burrow through the soil the students should take one step back. How do worms do this if they don't have any hands? Worms essentially eat their way through the soil to aerate it. What do worms eat? They then fertilize the soil with their castings.

Introduce the students to the worm bin. Can they find any of the worms aerating the soil? These worms are helping us by decomposing our kitchen waste, turning it into *vermicompost* to use on our houseplants and garden. Have the children work in pairs. Each pair of students will get a tray with a pile of wormy soil, magnifying lenses and scavenger hunt sheets. Explore the life cycle of a worm: laying eggs, hatching, eating apples and orange peels, growing into adults, laying eggs and dying, again becoming part of the soil. Allow the students to explore the pile of soil for eggs, babies, adults and decomposing food. What do they think of worms now? If time, share the Worm Rap from *Project Seasons* with your group.

Observations, Questions, Predictions

Focusing Questions: What is soil made of?

What are some words you would use to describe soil?

Pass a closed zip locked bag or container of soil around your group. Ask students to tell you something they know that soil is made of or ask a question about the contents of the bag. Record the questions and or predictions on a clipboard and take these around with your group to find the answers.

A bag complete with yogurt pots, magnifying lenses, thermometers, clipboards, pencils, soil augers, trowels, cans, sifters compaction sticks and bug boxes will be taken for the outside activities.

Collect soil samples from the driveway, garden and forest in yogurt containers. At each site have the soil scientists conduct the following experiments on the different soil types. Split your group into pairs and each pair can either rotate through experiments at one site or change jobs at each site.

Percolation:

Use a tin can with no bottom or top to push into the soil to a depth of 1 inch. Stand a ruler inside the can. Fill the can with water to the brim and time how long it takes for all the water to be absorbed into the soil. How long did it take for the water to seep into the earth? When comparing with the other sites, did the times change? Why would one site be faster than the other? Which would be best for planting and growing food?

Compaction:

Use a compaction stick to measure how deep you can press it into the soil. Use a ruler to measure the depth. Does the measurement change for each site? Why?

Sifting:

Using the sifters, shake the sediments out of the soil. Record, what do the sediments look like? How are they the same or different from the other sites?

Soil sample:

Using a trowel, collect a sample of the soil. Have these students perform the marble test. (see write up below) Record observations for sharing later.

Once you've visited the sites, gather around to discuss your findings. What do they tell you about soil, is it the same everywhere? How would these findings affect us and our everyday lives?

Soil Marble

Focusing Question: What are some words you would use to describe soil?

Allow the students to take a pinch of soil in their hand. Encourage them to make observations about texture, moistness, organic matter, composition. Can they mold their soil into a ball? *Our soil is mostly clay and this can usually be done very easily.* Have them dissect their soil marble to see if there is anything else that they may have missed in their first observation.

What are the ingredients in soil?

Soil is made of:

45% Solid Rocks and Minerals

5% Organic matter

25% Invisible air

25% Liquid water

Plant Parts We Eat

Name: _____

Circle and label the plant part to eat.

