

Grade 3 Spring School Garden Lessons to Meet Next Generation Science Standards

STC curriculum, Plant Growth and Development, teaches plant life cycle, plant parts, bee parts, and pollination.

Below is a table of suggested 3rd grade garden lessons to enhance current curriculum with expanded focus on other life cycles, inheritability of traits, and the effect of environment on traits and adaptation. It also provides real world experiments to test if plant growth is effected by planted seed density.

LL Science = Life Lab Science Curriculum; GC = Growing Classroom book (also by Life Lab); SGP = School Garden Project of Lane County lessons available on their website; NGSS 3= Next Generation Science Standards for third grade

3 rd Grade Lessons	Garden Lesson ideas to bolster STC Plant Growth and Development and meet NGSS – Spring 2015		
Lesson # and Date	Lessons	Source	NGSS 3-
1) Mid March- mason bees emerge early	A) Mason Bees vs Honey Bees –similarities and differences Honey bees are declining – Should we care?	Local 20 min full class	LS1-1 LS2-1
	B) Mason Bees vs Honey Bees – Help to build a Mason bee home	Local 15 min half class	LS4-4
	C) Room to Live Plant different densities of radishes	GC pg. 157 15 min half class	LS3-2
2) Late March	A) Is it a Seed – Seeds come in a diversity of sizes and shapes and are a baby plant – ½ class	LL Science 1.2.a	LS1-1
	B) Seed Ya Later – understand how seeds adapted for travel – inside as a class (seeds blow in the wind outside)	GC pg 66 4 th edition	LS4-2
	C) “What’s in a Name” - Plant 3 types of lettuce — there are many varieties of each vegetable – ½ class	GC pg 179	LS3-1 LS3-2 LS4-3
3) Mid April	A) Plant Needs Game Two versions depending on number of students	SGP	
	B) Students search the catalogues for different types of greens and students present about two characteristics (traits) of their selected green	Local Lesson	LS3-1
	C) Plant a diversity of greens – importance of eating a diversity	Local lesson	
4) Late April	A) Flowery Investigations lab sheet and review of flower parts	Local Lesson Modified local	LS 3-2
	B) Flower Power – pollinator game	GC – Pg 230	4-LS1-1 K-ESS3-1
	C) Observe and Record Radish Density experiment – Room to Live	GC pg. 157	LS3-2
5) May	A) Open to either do garden work, check the mason bee home, be a pollinator w q-tip cotton, observe flower/pollinator intractn		
	B) Observe and Record Lettuce variety traits – What’s in a Name	GC pg 179	LS3-1 LS3-2 LS4-3
	C) Plant or observe a diversity of brassicas starts – broccoli, kohl rabi, cabbage compare similarities/differences w the brassicas planted in class OR make the flower model and compare to taped	Local Lesson	LS1-1
6) Late May to early 12/13/2019 June	A) Salad making – pick and wash and tear leaves and stems and flowers	Local Lesson	
	B) Salad Making – pick/pull and wash and cut fruit and roots (strawberries and radishes)		
	C) create a vinaigrette and discuss the value of eating a diversity of color		

Standard Code	Performance Expectation or Standard Description
3-LS1-1	Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death
3-LS2-1	Construct an argument that some animals form groups that help members survive
3-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms
3-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment
3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
3-LS4-3	Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all
3-LS4-4	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
4.LS1.1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction
K.ESS3.1	Use a model to represent the relationship between the needs of different plants of animals (including humans) and the places they live

Grade 3 Spring Lessons

Visit # 1 – Early –mid March – 50 minutes – Start with the whole class for 20 minutes inside then two rotations each for 15 minutes

Station 1: Mason Bees vs Honey Bees - All Students – 20 minutes

Objectives:

- 1) Understand the similarities and differences in two life cycles
- 2) Realize that some animals form groups that help them survive – advantages to honey bee colony
- 3) Recognize the importance of pollination
- 4) Understand elements in a bee habitat and how students can impact the habitat

Preparation:

- Print and laminate copies of bee life cycle picture page
- Prepare by reading the background information about social and solitary bees; print and save the table describing the difference between the two bees and the discussion question regarding why honey bees evolved to live in a colony.
- Download the prepared power point with pictures of the different types of bees and their homes.
- Watch the video – link below in station 2.

Action: Direct a discussion about the fascinating world of bees. 80% of bees are solitary bees.

In discussing the differences between solitary and social bees, students can construct an argument that some animals form groups that help members survive. Being part of a group helps animals obtain food, defend themselves and cope with changes. Also in discussing the similarities between solitary and social bees, students can understand the diversity of life and that the bees have their life cycles in common.

Station 2: Building a Mason Bee Home – half students – 15 minutes

Objectives: Develop a plan to improve bee populations in the school yard. Students explain why this is a good plan and if it could be better.

Preparation:

Gather scrap 8.5x11" paper and cut it into quarters; 15-20 pencils; scotch tape; stapler; the outer bee house from Farm to School; one page laminated page of pictures of mason bee houses.

Action:

1. Lead a discussion: Honey Bee populations are decreasing due to mites, chemicals and loss of habitat. A decrease in natural habitat has also affected the population of native bees (solitary bees). This is a problem for our gardens because we depend on bees to pollinate our flowers. *Ask students how we can help solve this problem. What do all creatures need to live?* Providing shelter and flowers may help increase the native bees to help pollinate our flowers.
2. Show students the pictures of different Mason Bee Houses and discuss how we might use the materials to create a mason bee home.
3. Roll, tape and staple tubes according to this video at minutes 17:20-18:30 - any print on outside of tube. <http://www.growingagreenerworld.com/solitary-bees-pollinators/> and place tubes inside the house.

Station 3: Room to Live pg 157– Planting different densities of Radish seeds

Objectives: To discover the effects of crowding on the growth of plants

Preparation: Read the Lesson

- Prepare space in the garden for planting 2,4,8,16 and 32 radish seeds. One series per class
- 4 inch square empty seedling container to mark where to dig the holes
- Popsicle sticks and sharpie that will mark the 5 different holes
- A sign(s) that states experiment in progress – please do not disturb. Laminated paper on a popsicle stick
- Packet of radish seed – 62 seeds per class; watering can with water
- Whiteboard to capture predictions – lab sheet questions

Action:

1. Follow described class discussion in the lesson. Record Predictions for the class. Discuss setting up a fair test and ensure that the seeds germinating will vary only in space – not water, light, air or soil.
2. Mark where the 5 planting holes will be with a 4" seedling container. Have 5 students who describe themselves as very careful, dig the five holes 1" down and a hand or 5" apart. Place labels by each hole before planting. Or have this pre-dug and labeled before class starts. These holes will be filled by both groups. One set of holes/class.
3. Have remaining students who didn't dig, form a line. Describe the process. Each student will place some seeds in the labeled holes according to the # on the label. The group will count together.
4. Give each student two seeds. First student 2 seeds in the first hole. Next student 2 seeds in hole 2 and next student 2 seeds also in hole 2, next 4 student 2 seeds in hole 3. Have the lucky student who places the last seed cover the hole gently.

NGSS:

Students may be able to make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

In discussing the differences between solitary and social bees, students can construct an argument that some animals form groups that help members survive.

Students will begin an experiment which will allow them to use evidence to support the explanation that plants traits can be influenced by the environment. The environment affects the traits that an organism develops – differences in where they grow or in the food they consume may cause organisms that are related to end up looking or behaving differently.

Visit # 2 – Late March – 50-60 minutes – Seed ya later as a class inside & two outside rotations

Station 1 “Is it a Seed” LL Science Grade 1 module 2.a

Objective: Students sort objects according to whether or not they are seeds and share what they know about seeds and develop an understanding of the characteristics of various kinds of seeds. Students can answer the question “are seeds alive?” and consider the scientific definition of a fruit.

Preparation:

- Gather materials: 1 bean seed, 1 small eraser and a small cup filled with soil; 5-8 seeds of variety of shapes and sizes; 5-8 small round objects; 1 paper bag, two strings. Place the 5-8 seeds and small round objects in the bag.
- Read the full lesson including background information

Action:

1. Tell students you are going to plant two objects in your cup – one a bean seed and the other an eraser. Ask – what do you think will happen? Why? What kinds of things can you plant?
2. Place the string in two circles.
3. Have a student, one at a time, choose an object from the bag and list 3 words that describe what it looks and feels like. Discuss whether it is a seed.
4. Use the two circles to sort objects into seeds and non-seeds – Don’t correct the classifications and if unsure leave it outside the circles

Wrap up:

What senses did you use to sort these objects? Where do seeds come from? What does alive mean? One definition of alive –*is the ability to distort entropy--that is, to increase or maintain the organization of the living system at the expense of the environment.* Do you think seeds are alive? Can a lettuce seed make a bean plant? What would happen if we planted each of these items?

Station 2 “Seed ya Later” Pg 128 Growing Classroom 4th Edition – Can be done as a whole class inside on a windy day

Objectives: To understand how seed’s adaptations aid them in traveling away from their parent plants; to classify seeds based on dispersal mechanisms; to understand why it is important to travel away from the parent plant

Preparation:

- Read the Seed ya Later lesson

- Gather at least 6-8 seeds of 5 types of seed as described in the lesson. Place one of each type into 6-8 envelopes
- Gather plain paper to be labeled with categories of seeds by groups of 6-8 students or individuals
- Prepare a small container of water to test floatability

Action:

1. Ask students to share all the ways you can think of that people travel - Make a list on a paper or whiteboard
2. Why would seeds need to travel away from their parent plant?
3. Divide paper into 6 squares and label as described
4. If working with 1/3 the class - Give pairs of students an envelope of seeds and have them categorize; if working with the whole class – divide them into groups and provide each group with an envelope of seeds
5. Have them share how they categorized and why
6. I love to share the story of the man who invented Velcro after observing seed properties in his dog's fur; bio-mimicry

Wrap up:

What type of seeds do you think can travel the farthest? How do you think habitat impacts seed adaptations? (in areas with water more seeds develop to float, with high wind seeds adapt to have structures that soar on the wind)

Station 3 “What’s in a Name” - Plant 3 types of lettuce —

Objective: To discover that there are many varieties (diversity) of each vegetable crop

Preparation:

- Read the full lesson – a locally prepared lab sheet is used instead of the GC lab sheet.
- Determine if the teacher can help manage lab sheets by placing them in the student science notebook. If so, make enough copies for every student to have one. If not, make one copy per group – 9 copies for 3 classes.
- Prepare the garden bed for planting – create 3 furrows (per class if space allows) where you will plant the seeds.
- gather seeds for 3 types of lettuce; watering can w/ water
- Label popsicle sticks to mark the 3 types of lettuce growing and a sign stating experiment in progress – do not disturb. Use string or sticks to mark off the three different areas (one for each class).

Action:

1. Ask students to picture a lettuce plant. What does it look like? More than one picture should come to mind. Describe different kinds. These are called varieties. They are closely related, but different, just like two sisters
2. Do you think some varieties of lettuce might grow better here? Taste better? Let's find out.
3. Create 3 groups and assign them to a lettuce type – show them the package picture and ask them to decide why they are planting that type. “As team Burpee Bib Lettuce, decide why this lettuce is the one you want to grow”. Each team share one of their reasons. “They grow bigger, they are most nutritious, they taste best” – etc.
4. Demonstrate to plant with hands low to the ground, sprinkling not dumping, and in the correct furrow for your type of lettuce. Have each student team plant a few seeds according to their seeds and the areas labeled.
5. If time allows, read the information on the seed packets together and record predictions about which variety will grow the best
6. Discuss the importance of making sure all three types have the same space, air, water, soil and sun.

Visit #2 NGSS: Many characteristics of organism are inherited from their parents. Other characteristics result from individuals' interactions with the environment. Many characteristics involve both inheritance and environment.

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In this grouping of lessons students see seeds look different from one another which is a trait inherited from their parent plants. They also discuss how the environment might have an effect on the seed traits and over time plants may adapt to have seeds that are best suited for dispersal in their environment. Planting 3 types of one plant to see how minor variability in plants can be seen/tasted may help students understand that most characteristics are inherited and variability occurs.

Visit # 3 Mid April – 3 rotations of about 15 minutes each for 50 minute lesson

Station # 1 Plant Needs Game – two versions depending on the number of students

Objective: Play a game to reinforce what a plant needs to grow

Preparation:

- Read the Modified version of plant needs game, determine which version you would prefer and follow instructions
- Review the game with the teacher or volunteer who will be leading the station to ensure they understand how it works. Demonstrate the game w the teacher or volunteer.

Action:

1. Ask students for the 5 things plants need to grow – review which parts of the plant will acquire/need those 5 things
2. Describe the game and Have fun!

Station 2: Search catalogues for different types of greens

Objective: Students learn to observe similarities and differences between plants to begin to understand traits that define an organism.

Preparation:

- Create an info sheet for each green you are planting in station 3 or get seed catalogues with lots of photos
- Gather pencils and paper for students to write greens characteristics

Action:

1. Have students choose a green and read about it
2. Each student presents two characteristics about their green
3. Discuss differences and similarities.
4. Questions: Are all greens the same? What are the similarities between the different greens? How are they different? Why do you think they are different? (*they developed in different environments*) Or the same (*they are all leaves*)?

Station 3: Plant a diversity of greens

Objective: Students learn to plant seeds in the garden and notice that each seed looks different (a trait inherited from the parent plants). Students learn basic planting technique - Seeds are planted at different depths depending on size.

Preparation:

- Prepare garden for planting greens - pull weeds and turn soil, create 2 popsicle stick labels of each type of green, dig a furrow for each and place a label at each end of the furrow in alphabetical order.
- Gather seeds; watering can w/ water; catalogue of different greens that students can continue see the wide varieties. Territorial Seed Company is a great color catalogue with lots of greens.

Action:

1. Explain the process of planting to the students. Seeds should be planted 2x the depth as the size of the seed.
2. How large are these seeds? How deep should they be planted? Should we dig lots of small holes or dig a furrow?
3. Show students how to dig a furrow and have 3 students each dig one furrow to the correct depth depending on the seeds to be planted. – there won't be a big difference.
4. Show students how to plant the seeds by spreading them out in the furrow - why don't we drop them all in one clump? Have students demonstrate the technique for planting – low not high and sprinkled not dumped
5. Students can choose the seeds of the green that they spoke about in station 2 or are assigned a seed type
6. Give each student about 10 seeds of the green they choose and locate the correct furrow and plant.
7. Discuss with students why it is important to eat a variety of colors and plant parts – they all contain different nutrients that our bodies need.

Wrap Up: How are these greens different from one another? How are they the same? Do you think all of these types of greens come from the same origin? How did the greens become different from one another?

Visit #3 NGSS - Many characteristics of organism are inherited from their parents. Other characteristics result from individuals' interactions with the environment. Many characteristics involve both inheritance and environment.

Different organisms vary in how they look and function because they have different inherited information. In each kind of organism there is variation in the traits themselves, and different kinds of organisms may have different versions of the trait. The environment also affects the traits that an organism develops – differences in where they grow or in the food they consume may cause organisms that are related to end up looking or behaving differently.

Visit # 4 Late April- 3 station rotations of 13 minutes each and a class wrap up for 12 minutes

Station # 1 Flowery Investigation – a review of flower parts and completing a locally created lab sheet

Objective: Students investigate and observe flower parts to consider the role of flower parts in plant reproduction

Preparation:

- Read Life Lab's Flowery Investigations for great background information and the getting started discussion.
- Print one lab sheet for each student. – The modified sheet – not the booklet attached to the lesson
- Gather tweezers, magnifying glasses, pencils for writing labels, scotch tape – 1 or 2 rolls
- Identify the best flowers for students to pick (that best illustrate the various flower parts) or have them picked.
- Print out a flower illustration to label the flower parts or have chalk to draw a flower on the pavement

Action:

1. Give students 2 minutes to choose and pick the type of flower from the area you describe. Or hand a flower to each
2. Before they dissect the flower, have the students explore the flower with magnifying glasses, carefully inspecting the different parts of the flower and giving the parts their own names. 1 min.
3. As they dissect have students discuss what they think each part of the flower does. Have students look for nectar, pollen. As they remove a part, have them tape it to their lab page.
4. Have students label the different parts of the flower based on how it looks or what it is for.
5. Questions: What parts did you find in your flower? Did you find anything resembling eggs or seeds? Are all our flowers the same in certain ways? How are they different? What do flowers do for the plant? What is pollination? Which plant parts are involved in pollination? If a bee pollinates the plant, who benefits? The bee or the flower? Or both?

6. Ask teachers if students can hold onto their lab sheets and bring them back next visit OR don't put names on the sheets and gather them to hold and pass out to random students next visit.

Wrap Up:

After considering the parts of flowers and their properties ask students to label a flower parts picture and describe what that part does in plant reproduction or the creation of seeds.

Station # 2 Flower Power – pollinator game

Objective: To learn about pollinators and their relationship to flowers and to consider how plant flowers and pollinators developed together and help each other.

Preparation:

- Read the lesson
- Print and cut out the pollinator cards – pg 390-391 or collect from Farm to School Program
- Whiteboard, dry erase pens

Action:

1. Discuss pollination. What is it? Why is it important? But plants can't move from place to place. How does the pollen move from one flower to the next? A large variety of pollinators.
2. Write the pollinators and flowers preferred on the whiteboard as described in the lesson. Think about why these are matches. For instance why are plants that rely on wind lacking showy flowers?
3. Divide group into two (flowers and pollinators) ; hand each student a card
4. Have them mingle looking for their match.
5. If finished, look around the garden for real examples of a match to their card.

Wrap Up: When you look at insects near flowers now, what will you try to observe? Scientists believe that flowers and their pollinators coevolved. They changed over time to suit one another; they adapted to one another. How does this benefit the flower? How does it benefit the pollinator? How would more than one pollinator be a benefit to a flower?

Station # 3 Observe and Record Radish Density experiment – Room to Live from week #1 – can be done as a whole class

Objectives: To discover the effects of crowding on the growth of plants and to consider all variables in the experiment.

Preparation:

- Find the predictions recorded when the seeds were planted by this class.
- There will be 3 groups needing to observe the 5 plantings to compare growth.
- Gather 5 containers (old planters or lg yogurt containers) to hold the radishes that will be pulled from each group
- water and scrub brush to wash radish for tasting, cutting board and knife
- Piece of butcher paper with 5 boxes drawn – one for each planting density

Action:

1. Review the aspects of a fair experiment. Have students list all things a plant needs to grow. What were we testing? Consider if all of those variables. Are they the same for each planted group?
2. Review the predictions made when planting the radishes
3. What do they notice just by looking at the planting?
4. Have 1 student at a time start by pulling 3-4 plants from the most crowded area and place them into the container
5. Continue with each student until all the radishes are pulled and into the appropriate containers (keep separate)

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Wrap up:

- Get all 3 groups together and have them sit in a circle
- briefly discuss the wrap up of flowers and pollinators – 2 minutes
- In the center of the circle -spread out butcher paper and dump the radishes onto the appropriate box so that students can see the different sizes for each test
- Hold up the biggest radish from each box – or have a student hold up the biggest radish from each box.
- Compare the results with the predictions
- What did we test for?
- Did crowding affect radish growth? Why do some have longer stems? *To reach the light* Why do some have longer roots? *searching for space* Wider roots? Larger leaves *had space*?

Visit # 5 early to mid May – 3 rotations - 60 minutes

One station is flexible depending on what is happening in your garden

Station # 1 Flexibility station to do garden work or check the mason bee home or be a pollinator or read a book or construct a flower model or a combination of these.

Preparation:

- Make observations of your garden to see if there is some work that needs to be completed that students could help with in a 15 minute rotation
- Check to see if the mason bee house is active. If it is – would it be easy for students in small groups to sit and observe? If not, could students brainstorm on the needs of bees and if there is something else they could do to attract bees.
- Are there flowers that could be investigated and could students use q-tips to be a bee? This could be done in combination with reading “The Reason for a Flower”.
- Would students benefit from building a flower model and compare the model parts with the parts taped down during flowering investigations?

Station # 2 Observe and record results from “What’s in a Name?” – discovering varieties of lettuce from visit #2

Objective: To record the results of a field experiment testing 3 varieties of lettuce. Students choose the best lettuce of the three for taste, health and production.

Preparation:

- Gather a kitchen scale if you have one to help weigh a sample of each type of lettuce
- If there were shared copies of the lab sheet, gather those and pencils. Re-create the lab sheet questions on a whiteboard
- Pre-evaluate the lettuce to have in mind a number score for the various traits (health, leaf growth etc.)
- 3 rulers
- Gather plates and/or bowls to hold lettuce samples

Action:

1. Have student groups gather around the lettuce plot and remind them of the experiment (a fair test) and the 6 traits that you will be evaluating today – everyone will help. Each group will evaluate two of the traits and the whole class will analyze and interpret the data for all 6 traits during wrap up.
2. First group will evaluate plant health (germination rate and overall vigor) as well as number of leaves per plant for each type of lettuce.

3. Second Group will evaluate Pest damage and plant height and assign a number 1-5 for each type of lettuce. Have 3 students measure height of the largest plant– one student per lettuce type. Record the finding
4. Third group will evaluate plant weight and taste. 3 students clip ½” above the ground, the large lettuce plant of each type, and weigh it on the scale. Ask if someone in the group especially loves lettuce – the first to raise their hand will be the official taster. Remind them of the scale.
5. Have all students taste a piece of each lettuce and see if they agree with the taste scores.

Wrap Up: Which lettuce type did better than others? Check back on any student predictions about which one would grow the best, taste the best, be the tallest (plant traits). After observing the three lettuces, discuss which variety produced the most? Which grew the most? And which tasted the best? Then ask which factor is the most important? Is it better to have small sweet leaves or larger bland leaves? Vote on the best lettuce. Would this necessarily be the best to grow no matter where you lived? Would a different variety maybe do better elsewhere?

Station # 3 Plant a variety of brassica starts – Broccoli, Kohl rabi, cabbage, cauliflower

Objective: students compare these starts with the brassica plants they grew in class (Wisconsin Fast Plant) and learn how to plant starts into the garden.

Preparation:

- Gather starts from F2S; gather trowels, watering can with water.
- Prepare space in the garden with rich soil and where brassicas were not planted the previous year. Plant near an area with Borage flowers planted by 2nd grade to attract aphid eating insects.

Action:

There won't be enough seedlings for every student to plant, but there are 3-4 jobs per seedling planted.

Demonstrate how to remove a seedling from its container without damaging it. and how to place in the hole. Have groups of 3 or 4 plant one plant. Ask the small groups to decide which student is strong, which one is gentle and which one is accurate and detail oriented.

Student 1 – is strong and digs a hole that is just a tiny bit bigger than the soil of the seedling

Student 2 – is gentle and caring and can remove the plant from the container and gently pull out the roots

Student 3- is precise/accurate and can cover the roots while holding the plant stems straight up.

Make sure the plants have enough room to grow – about 1 foot between plants.

Ask students to think about the plants they are growing in the classroom. Has it flowered yet? How many petals does the flower have? All brassicas have 4 pedaled flowers that are edible. Can anyone name a brassica whose flower is commonly eaten? *Broccoli and Cauliflower* What about cabbage? It is also a brassica but we eat the leaves of that plant. What are some other characteristics or traits of this family? Look? Smell? Taste? Color? Feel?

Visit # 6 Salad Making Party – As described in lesson