



## Teaching in the Gardens and Growing the Future

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### Planting a Salad Grade Four

#### Lesson Summary

##### When to use this lesson

Use this lesson for your first early spring planting. We plant in mid-March, around St. Patrick's Day, to give the plants time to develop for a May harvest.

##### Objective

Students understand that plants have unique life cycles and conditions for seed germination that are linked to soil temperature.

##### Materials

- Flour in zip top bag
- Seeds
- Planting map
- Pre-labeled plant marker for each seed type
- Three buckets
- Bucket of empty cut water bottles
- Compost thermometer
- Worksheet to track temperature
- Lesson summary to send home with each student
- Optional: pre-soak some lima beans to show students some seed parts during your discussion

##### Estimated Duration

30 minutes

#### Ohio Academic Standards Connections

##### Life Science

- Earth Systems D4: Describe weather by measurable quantities such as temperature, wind direction, wind speed, precipitation, and barometric pressure.
- Earth Systems D5: Record local weather information on a calendar or map and describe changes over a period of time (e.g., barometric pressure, temperature, precipitation symbols, cloud conditions).

##### Life Science

Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful.

- Ecosystems can change gradually or dramatically. When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations. An

animal's patterns of behavior are related to the environment. This includes the kinds and numbers of other organisms present, the availability of food and resources, and the physical attributes of the environment.

### Planting Tips

- Pick up your seeds from the barn several days in advance.
- Along with the seeds, you'll find pre-labeled plant markers for each type of seed and seedling that will be planted in your beds. Please write the planting date on the markers.
- Ahead of time, review the seed planting instructions and map. You may need to adjust the maps a bit to fit your class size. The position of the seed placement on the maps takes into account companion planting when possible.
- In advance, prepare your beds to visually show planting areas in your beds. Use flour to line the sections. If your flour is in a zip top bag, cut a very small hole in one corner for pouring flour.
- If weather permits, place the seed packets and transplants in the locations you want students to plant according to the map.
- If weather does not permit advance placement of seeds in the bed, make a copy of the planting map for the teacher or another volunteer who will help you, and separate the seeds that go with that bed. Put the seeds in the order that they appear on the planting map. You can work one bed and the teacher or volunteer the second bed.
- In advance, fill three buckets with water for students to use to water their plantings. Collect some empty water bottles for students to share.

### Activity

- Consider soaking a few lima beans overnight to show students the inside of a seed. Distribute a few seeds to each table group. It is not important to spend a great deal of time naming or diagraming the parts. Do show the inside so students understand that seeds have a plant waiting to grow and a food source for that plant inside the seed.
- In the classroom, discuss background information about seeds.
  - Today students are planting ingredients to harvest a salad in May.
  - What is the name of the process for the start of seed growth? Germination
  - Seeds are dormant, meaning they are at rest, until they are exposed to right growing conditions for that seed. Seeds need the right amounts of water, oxygen, and sometimes light, and the right soil temperature (not air temperature) to grow.
  - Seeds have a protective outer layer called the seed coat. Inside every seed, there is food and a plant with a root and the plant's first leaves. The food source inside the seed provides energy for the plant to grow until the plant grows through the top of the soil. Then photosynthesis makes food for the plant. If you pre-soaked seeds, show examples of seed parts.
  - The seeds we are planting today were selected because they germinate in cool soils. Moreover, the plants of several of the seeds today, like lettuce, kohlrabi, peas, and spinach grow better in cooler air temperatures.
  - Other seeds and plants require warmer soil and air to grow and produce. Some of these are tomatoes, cucumbers, beans, and squash. We'll plant these later in spring.
  - Explain that we'll take the soil and air temperature each week to observe how temperature affects plants and animals.
  - How do these conditions affect germination and growth?
    - ✓ Too much water? Too much water reduces oxygen pockets around a seed, and drowns seeds that cannot handle all of the water coming through the seed coat.

- ✓ Too little water? Too little water means germination can't start, or once germination has started, that the plant may not be able to reach the surface because germination stops without moisture.
  - ✓ Planted too deep? Small seeds are planted closer to the surface because there is not enough food inside for the embryo to make it to the surface if it is planted too deep, and they may require more light.
  - ✓ Planted too close? Seeds need to be properly spaced apart to provide room for the roots and plant to grow.
- Why did we add compost to our beds last fall? We wanted to add nutrients to the soil that were depleted from the last growing season.
  - In many parts of the world, soil conditions are being degraded by poor farming techniques that lead to erosion.
    - Farm equipment is being redesigned to reduce compaction from the tires of large, heavy machinery. The tires compact soil. Compacted soil cannot absorb water well, which results in rain washing across the surface of soil and taking soil and its minerals and nutrients with it.
    - In other countries, trees were removed from land for farming without thought to wind and water erosion across their land.
    - What is the effect of poor soil? The quantity and quality of food is reduced. 99% of our food depends on soil. Eroded sediment can clog waterways, lead to flooding, and affect the numbers of aquatic life.
    - The challenge is to find ways to reduce erosion and catch water and soil run off. Farmers are adding plant barriers to trap soil in roots and to prevent wind erosion, adding cover crops to keep soil covered after harvesting, leaving some crop residue after harvest, not plowing fields, but instead using equipment to seed fields with little soil disturbance, putting in ponds that collect water and nutrients.
  - Discuss how to plant while you are in the classroom.
    - Explain that the bed is marked in a way for students to know where to plant. Students are planting seeds and a few seedlings. Students plant in the spot they find a packet of seeds or a seedling.
    - Wood chips or fingers can be used to make a shallow furrow for seed planting. Furrows are an easy way to plant small seeds that are planted  $\frac{1}{4}$  to  $\frac{1}{2}$  inch deep. Furrows also give students a better visual for spacing between seeds. Encourage students to use multiple furrows.
    - Fingers are excellent tools to estimate length. For the proper depth, model for the students how to use fingertips to estimate the proper planting depth. Check their fingers to find the finger to use to estimate one inch from the tip to a knuckle and another to measure  $\frac{1}{4}$  and  $\frac{1}{2}$  inch from the tip to the knuckle or the base of a fingernail. Often the pinky finger is the best to find these benchmarks. Use the width of fingers to estimate spacing. Check their fingers to find the combination of the index finger and the next two or three fingers side by side for 2 inches. Generally, two fingers are an inch – especially for the younger grades.
    - Show a seed packet and explain that the seed packets will have planting depth and spacing on the envelope. In the early spring garden, all but pea seeds and onion sets are planted not more than  $\frac{1}{2}$ -inch deep and 2 inches apart. Peas are planted 1 inch deep and 5 inches apart and onion sets 1 inch deep and 3 inches apart.
    - Emphasize the importance of getting depth and spacing right so the seeds have the right conditions to germinate and grow.
    - Instruct students to open their envelope and to pour all of the seeds into the hand they do not use to write. They pick up the seeds with the hand they use to write.
    - Remind students to pat the soil gently after covering the planted seeds to be sure the seeds and soil make contact.

- Explain the process to plant a seedling.
  - Dig a hole that is as deep as the pot of your plant.
  - Do not pull the plant out of the pot by the stem. This can result in breakage. Hold the container in the hand you do not use for writing. Use your writing hand to remove the plant by placing your index finger and middle finger on either side of the plant's stem. Your hand is now touching the top of the plant and covering the soil.
  - Tip the pot into your writing hand, put the pot down, and use both hands to put the plant in the hole.
  - Fill in the hole, and gently pat the plant in place. Do not compact the soil.
  - Remind the students that if there is a plant label in the pot, the label should be inserted into the soil near the plant.
  
- When you are outside:
  - Take a compost thermometer with you to take and record the temperature of the air and soil. We track temperature in fourth grade to make observations about plant and animal activity as soil and air temperature changes. In a future lesson, we'll graph air and soil temperature.
  - Discuss the condition of the soil. Is it ready for planting? Are any plants growing? Students should pull any weeds while they wait to receive their seeds. Remind students to hold the weed stem so their fingers touch the soil in order to remove the roots when they pull.
  - If weather prevented you from placing seed packets in the bed earlier, give each student a seed packet according to the planting map.
  - Wrap up: Do you think each kind of seed will grow at the same time since all of the seeds will get the same amount of water and sunlight? If not, will we see the larger or smaller seeds first? Why? How long do you think it will take for the first seeds to grow?
  - Please return unused seeds to the barn.

<b>Resources</b>
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- Mann, Charles C. "Our Good Earth." *National Geographic*. September 2008. 22 February 2013. <<http://ngm.nationalgeographic.com/2008/09/soil/mann-text/2>>.
- Dye, Felicia. "What are Farmers Doing to Prevent Erosion?" *eHow.com*. 22 February 2013. <[http://www.ehow.com/info\\_8176401\\_farmers-doing-prevent-erosion.html](http://www.ehow.com/info_8176401_farmers-doing-prevent-erosion.html)>.



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Today we started our spring garden season by planting seeds that will grow foods for a spring garden salad.

In science, we learn that plants have life cycles that depend on conditions in their environment and that environmental changes can be harmful to organisms.

Today, we learned that seeds have adaptations for germination that are linked to soil temperature. We only planted seeds that will germinate in cool soil temperatures.

We discussed the impact of soil erosion on our food system and how farmers are trying to improve soil quality.

Later in spring, classes discuss weather and tools to measure weather conditions. Today, we started our study by measuring the temperature of the air and soil. We'll make observations of plants and animals in the garden to learn more about the effect of air and soil temperature on plant and animal life cycles.

Ask your student what we planted in our gardens and what we noticed about plants and animals today.

Email [granny@grannysgardenschool.org](mailto:granny@grannysgardenschool.org) to join us for our next gardening experience!



## Planting Instructions

Seed	Envelopes Per Class	Plant Labels Per Class	Depth and Spacing	Germination	Notes
Arugula, Roquette	1	1	¼ in. deep 2 in. apart	5 to 7 days	Tangy, peppery flavored salad green.
Beets, Detroit Red	1	1	½ in. deep 2 in. apart	10 to 20 days	Each dried pod contains 2 to 6 seeds, so instruct students to plant one pod in a spot then space for the next pod, and so on. Deep red on the inside and outside. Beets are biennial.
Beets, Bull's Blood	1	1	½ in. deep 2 in. apart	10 to 20 days	Each dried pod contains 2 to 6 seeds, so instruct students to plant one pod in a spot then space for the next pod, and so on. Red on the outside and dark red and light red on the outside. Beets are biennial.
Carrots, Little Finger	4	2	¼ in. deep 2 in. apart	5 to 14 days	Carrots are biennial. If you left a carrot or two from the fall, watch for the development of flowers in this second season. Orange color.
Kohlrabi, Superschmelz	3	2	¼ in. deep 2 in. apart	5 to 17 days	Large forming green variety.
Lettuce, Bib Butterhead	1	1	¼ in. deep 2 in. apart	7 to 14 days	Small, green heads with buttery flavor.
Lettuce, Black Seeded Simpson	1	1	¼ in. deep 2 in. apart	7 to 14 days	Loose leaf green lettuce.
Lettuce, Mesclun Blend	3	2	¼ in. deep 2 in. apart	7 to 14 days	Mix of sweet and tangy lettuces and greens.
Lettuce, Super Red Romaine	2	2	¼ in. deep 2 in. apart	7 to 14 days	Starts green and turns red.

Onion sets	2	1	1 in. deep 3 in. apart		Onion sets are small bulbs planted with the round bulb end at the bottom and the pointed end pointing up.  Do not plant by the bunching or walking onions that overwintered in your beds so we can distinguish the types.
Peas, snow, Mammoth Melting	2	2	1 in. deep 5 to 6 in. apart	7 to 14 days	Plant about an inch from the picket fence in the middle of the bed. The fence will support the climbing vines. Monitor for early harvest opportunity.
Peas, snow, Oregon Giant	2	2	1 in. deep 5 to 6 in. apart	7 to 14 days	Plant about an inch from the picket fence in the middle of the bed. The fence will support the climbing vines. Monitor for early harvest opportunity.
Radish, Easter Egg	2	1	½ in. deep 2 in. apart	4 to 12 days	Mixture of white, red, purple, and pink radishes.
Radish, Watermelon	1	1	½ in. deep 2 in. apart	4 to 12 days	Larger sized radish with white outside and bright pink inside.
Spinach, Bloomsdale Long Standing	2	1	½ in. deep 2 in. apart	7 to 14 days	Monitor for early harvest opportunity.
Turnip, Purple Top White Globe	1	1	¼ in. deep 2 in. apart	2 to 5 days	Grow for the greens or grow for the roots.
totals	29	22			

Plant	Plants per Class	Plant Labels Per Class	Spacing	Notes
Cabbage, Red Express	2	2	1 plant per 18 inch section	Red variety.
Cabbage, Golden Acre	1	1	1 plant per 18 inch section	Green variety.
Celeriac, Giant Prague	4	2	2 plants 9 inches apart	Celeriac is a celery relative that does not need as much moisture as celery. Celeriac is grown for its underground swollen stem and not for the above ground stalks which are shorter than celery stalks and more bitter.

totals	7	5		
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**Planting plan for 20 students**

Garden bed is 10 x 2'

Each small square is 1'

Each large square is 10'

When to Plant

Each label to be planted by one student unless otherwise noted

(means that one student plants both crops)

In May planting, the grid shows planting by 20 students. The 20th student plants a cherry tomato plant in a spot outside the garden beds to save space in the beds.



