

Flowers, Fruits, & Seeds

Alaska Agriculture in the Classroom for Pre-K (Ages 3-5)

Lesson Goal

The goal of this lesson is to teach Pre-K students how to recognize flowers, fruits, and seeds, harvest them, and understand that they are useful for personal health.

Student Objective

The student will be able to understand why flowers, fruits, and seed are harvested, participate in a physical activity, participate in a group activity, recognize the images of flowers, fruits, and seeds, participate in making food



products, and to make healthy food choices.

Activities

- **Story Time:** Agriculture in Alaska and Children’s Books

- **Exploring:** Sunflower Lifecycles, Fruiting Vegetables, Ripening Tomatoes, Seed Dissection, Seed Strength, and Indoor Gardens–Peas & Beans
- **Creating:** Seed Mosaics and Garden Colors
- **On the Go:** Diffusion Confusion
- **MyPlate:** Making Healthy Food Choices, Stir Fry, Tomato Salsa, and Seedy Salad

Vocabulary

Vegetables, flower, fruit, pod, seed, edible, pollen, and pollinator.

Rubric

Alaska Early Learning Guideline Domains	Student Target	Facilitating Activities
1 – Physical Well-Being, Health, and Motor Development	The student participates in a physical activity, involving coordination and movement. The student recognizes and participates in making and eating nutritious foods.	<ul style="list-style-type: none"> • Diffusion Confusion • Stir Fry, Tomato Salsa, and Seedy Salad
2 – Social and Emotional Development	The student participates in a group activity, displays cooperative teamwork to accomplish a group goal, and recognizes individual contributions.	<ul style="list-style-type: none"> • Diffusion Confusion
3 – Approaches to Learning	The student sustains attention on a multi-task project with specified requirements.	<ul style="list-style-type: none"> • Seed Mosaics and Garden Colors
4 – Cognition and General Knowledge	The student communicates comprehension by recognizing plants and is able to show understanding of how to care for them. The student is able to choose healthy foods.	<ul style="list-style-type: none"> • Sunflower Lifecycles, Fruiting Vegetables, Ripening Tomatoes, Seed Dissection, Seed Strength, and Indoor Gardens – Peas & Beans • Making Healthy Food Choices
5 – Communication, Language, and Literacy	The student listens with attentiveness and curiosity. The student mimics sounds and/or actions.	<ul style="list-style-type: none"> • Agriculture in Alaska and Children’s Books

Story Time!

Agriculture in Alaska

Mathijs and the Peony Farm

Hi, I'm Mathijs. My grandparents have a peony farm just down the Farm Road. It's called North Pole Peonies. My grandparents and parents started peony farming before I was born. My sisters and I all work on the farm.

By the time I was two, I could help with planting. I would follow my oldest sister and she would let me mark holes she measured. I'd also stir compost and fertilizer into the holes my dad dug with a post-hole digger. Grandma and Mom would put the roots in the hole and my sisters and I would cover them.

It took many years to plant the 13,000 roots we have. There are lots of varieties in colors from white to darkest red. There are even a few corals and yellows.

Peonies need lots of care. Grandpa and Grandma fertilize and water them regularly. They grow fast and are big so they are really hungry. We also have to keep the weeds down. When I was 3 and 4 I used to like to find the tallest weeds and pull them to show Grandma how strong I was. Now that I'm 13, I really DO NOT like weeding.

Another task I don't really like is side-budding. When the stems have only been up three or four weeks, they get little buds next to many of the leaves. We only want the main bud so all those side buds have to be pinched off. It's not hard, but it is sticky work and you have to watch for bees because they like the sticky nectar too.

The peonies come up in late May and by late June my favorite farm activity happens - harvest. Yes, four or five weeks ago there was nothing coming out of the soil. Now there are buds everywhere ready to pick. They get ready to bloom fast and we have to hand-pick them as buds, so we are very busy! Picking starts early in the morning and can last until after midnight since it doesn't get dark here. I don't get to stay up that late though. We have lots of harvesters working in shifts. Fortunately harvest only lasts a couple weeks.

As soon as the stems are picked, the harvesters put them in crates. The crates are loaded onto a 4-wheeler and I drive them to the packhouse. They have to get to the cool packhouse quickly so they stay high quality. I usually bring 200-400 stems per trip. Sometimes three 4-wheelers are going at the same time.

In the packhouse my grandpa, grandma, and one of my sisters try to keep up. They have to remove lower leaves and check the quality of each stem and sort into bundles.



Now we will put on our warm gear and go into the chillers and pack boxes - sometimes just 25 stems in a small box, but often several boxes of 200 stems.

Once the boxes are packed, Grandpa loads them into a chilled trailer and takes them to the airport. The peonies will fly to the Lower 48, Canada, and even overseas!

You can see we all love our family peony farm. We all work hard but most of all, we LOVE the beautiful peonies. They bring smiles to faces around the world and to ours too. North Pole Peonies' wishes you smiles!



Children's Books Materials

- Children's book Sunflower House by Eve Bunting

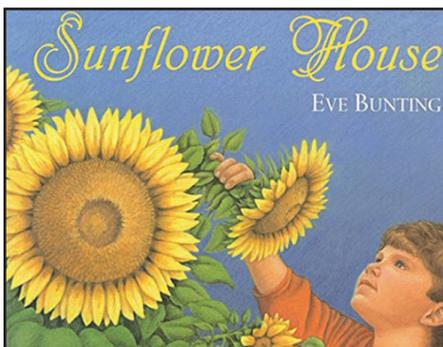
- Variety of edible plant parts

1. Read Sunflower House to the students. As you read, discuss the meaning of a life cycle. Point out the steps of the sunflower life cycle as you read the story.

2. After reading the book, discuss that sunflowers are grown by farmers for the seeds and oil they produce. The life cycle of a sunflower begins and ends with a seed.

3. Flowers of some plants are edible, such as broccoli, cauliflower, and artichokes. Broccoli and cauliflower flowers are called "heads" and eaten along with their stems. You can also eat zucchini squash, nasturtium, and dandelion flowers. Students should be warned that some flowers are poisonous, and they should only eat it if an adult says it's edible.

4. Show students the Sunflower Cycle pictures and discuss each step or use an actual sunflower head with the seeds inside if you can, but if not, use the pictures provided with this lesson. Go through each step of the cycle.



Exploring

Sunflower Lifecycle

Materials

- Sunflower Cycle Diagram
- Pictures of sunflowers
- Large craft sticks
- Sunflower seeds
- Green construction paper
- Glue
- Scissors
- Crayons
- Small paper plates

1. Farmers in the United States grow sunflowers. There are many varieties of sunflower. When farmers grow sunflowers, they grow them to harvest their seeds, birdseed, snacks, and cooking oil. Sunflowers have a deep root system that allow them to find water in the soil.

2. Their life cycle begins and ends with a seed. The seed is planted in soil, germinates, grows to maturity, and then flowers. The head of the flower contains many seeds and when fully ripe it becomes heavy and drops.

3. Hand out the paper plates and demonstrate how to glue the Seed to Seed Cycle in the middle of the paper plate. Demonstrate how to glue one sunflower seed at the bottom of the craft stick, like a seed in the ground.

4. Discuss the next step in the cycle, sprouting, as a seed will germinate and demonstrate by drawing roots below the seed



and a small stem above the seed.

5. Explain how to glue the craft stick on top of the small stem above the seed, like a stem that grows from the seed. Show how to cut out leaves from the green paper and glue them to the stick above the seed.

6. Demonstrate how to color the middle of the paper plate and to cut the plate edges to the center circle to create flower petals.

7. Discuss that flowers help create fruits, where the seeds form. Demonstrate how to glue sunflower seeds to the paper plate flower to create a fully ripe, sunflower seed head.



Ripening Tomatoes

Materials

- Safety goggles
- Several green tomatoes and ripe red tomatoes, on the vine, if possible
- Paper bags
- Cardboard box
- Newspaper
- Twine
- Plastic bags
- Jars
- Refrigerator

1. Place the red and green tomatoes on a table. Ask students to identify the ripe and unripe tomatoes. Ask them why they think the green are unripe and the red are ripe. Explain to the students that a chemical change happens in tomatoes, during which ethylene gas is given off and aids the ripening process.

2. Explain that the students will conduct an experiment with tomatoes to observe their ripening under a variety of conditions.

3. What is the difference between ripe and unripe fruit? Which tastes and looks better? What kind of experiment can we do to find a good way to ripen fruit off the plant? Discuss the movement of gas particles and how gas particles can move in and out of plants through diffusion by playing the Diffusion Game found in this lesson plan.

4. Set up several different ripening environments to test



such as placing tomatoes:

1) Alone in a paper bag with the top rolled shut. 2) With a ripening banana in a paper bag with the top rolled shut. 3) In a plastic bag tied closed. 4) On a sunny windowsill. 5) Hanging on the vine in the dark. 6) Hanging on the vine in the sun.

5. Allow several days for the tomatoes to ripen. Observe and record the condition of the tomatoes each day. Take photos of the daily change.

6. After 5-7 days, have students draw a conclusion about which methods worked best and were least effective.

7. Explain that ethylene gas, given off by the tomato, is involved in the ripening process. If the container is kept closed, the gas (ethylene) is kept near the fruit. If the container is open, the gas escapes into the room as it is produced. The exposed fruits have less gas near them and ripen more slowly.



Seed Dissection

Materials

- Variety of seeds
- Bean Seed Diagram
- Hand lenses
- Pinto beans soaked in water overnight

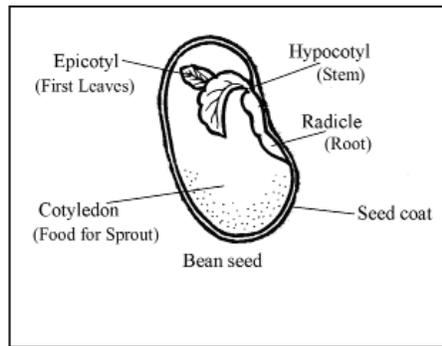
1. Ask students what seeds are used for. Explain that seeds are used to grow new plants and sometimes to eat. Allow students to observe a variety of different types of seeds. Explain that seeds come in different sizes and colors, but they are all used to grow new plants. Some seeds are even eaten by humans and other animals. Ask the students if they have ever eaten a seed. What kind of a seed was it?

2. Ask the students what is inside a seed. Show the Bean Seed diagram. Point out that inside a seed there is an embryo—what will become a new plant—and food for the embryo. On the outside of the seed is a seed coat. Its purpose is to protect the seed.

3. Tell the students that they are going to have the chance to look carefully at a bean seed that has been soaked overnight in water. They will observe the seed coat, embryo, and cotyledon of the seed.

4. Give each student one bean seed. Show them how to rub the seed between their fingers to remove the seed coat. Discuss why the seed coat is important to protect the seed.

5. Show the students how to split the seed in half. Give each student a hand lens to observe



the inside of the seed.

Explain that the embryo is the beginning of a new plant. When the seed receives warmth and moisture, it will begin to germinate, which means it becomes active and sprouts. The cotyledons provide food for the embryo until it grows leaves. The leaves will then use energy from sunlight to carry out photosynthesis, making food for the plant.



Seed Strength

Materials

- Plaster of Paris
- Water
- Plastic spoons
- Transparent plastic cups

1. Put 5 tablespoons of Plaster of Paris in the plastic cup. Add 2 tablespoons of water and mix with a plastic spoon. Continue to add drops of water until the mixture has the consistency of a very thick milkshake.

2. Push three soybeans into the plaster until they are covered and then smooth the surface. Ask students what they think will happen to the soybeans?

3. Add a tablespoon of water to the cup every day and make observations, until the seedlings emerge from the soil. Discuss that seeds require moisture and warmth to germinate.

4. Explain that the seeds absorbed moisture from the plaster mixture and increased in size, then applied pressure to the surrounding plaster. The seed's strength caused the plaster to crack and allowed the plant shoots to grow up through the plaster.

5. Discuss how the strength and ability to grow in adverse conditions allows plants to survive in difficult environments.



Indoor Gardens - Peas & Beans

Materials

- Seedling garden soil
- Vining Peas and Bush Bean seeds
- Seedling flats, shallow trays, plastic salad containers, or old baking pans
- Popsickle sticks for labels
- Spray bottles
- Counter space
- Grow lights
- Warm room

1. Explain that you will be planting seeds today. Show the seed packets, and have the students sort the seed packets into the different types of plants you might grow.

2. If the seedlings are to be transplanted into a garden or to a hydroponic setup, a commercial seed flat, or recycled produce container is sufficient. If your goal is long-term growing of plants (one semester), use a larger tub for a greater depth of soil.

3. Moisten the soil first, by placing all the soil in a large tub and adding water slowly, a small amount at a time and mix until the soil is uniformly damp but not soggy or dripping with water.

4. Demonstrate how to add soil to the planting containers, filling to within one-inch of the top. For seedling flats, fill about 1/2 inch below the top. For the large tubs, add soil to 4 inches deep.

5. Demonstrate how to smooth

the soil flat on top and to sow seeds according to seed packet directions for depth and spacing. Large seeds such as peas and beans can be planted 1-2 inch apart using a grid pattern.

6. Plant the seeds in a row or a grid, but do not cover seeds until you have planted the whole container. You can make rows by pushing a ruler down slightly into the soil.

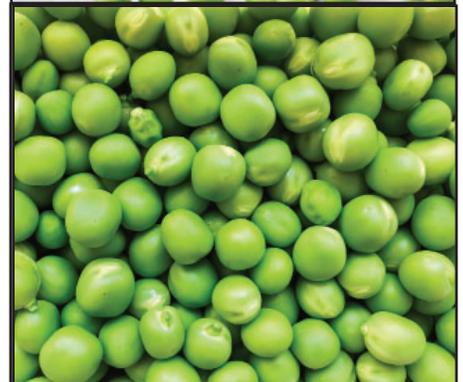
7. Demonstrate how to plant large seeds by making a hole with a pencil as deep as the sharpened end. Place two seeds of the same kind in the hole, and using the end of the pencil, gently fill the hole with soil.

8. Demonstrate how to lightly water the whole tray with the spray bottle and explain that it will assure good seed-to-soil contact, making it easier for the seeds to germinate.

9. When finished planting and watering, place the containers under the growing lights and cover with clear containers to keep moisture in and allow light to reach the soil until the seeds sprout.

10. Have students take turns watering the trays daily to keep moist, but not soaked. Light sources should be turned on and off manually to match the recommended daylight for the seeds you planted, or set on timers to mimic day and night requirements.

11. Uncover the trays after the seedlings have emerged and are growing, up to about 1-inch tall. Seedlings may mold if not given ventilation.



12. Continue growing until large enough to harvest as suggested by the seed packaging or transplant the seedlings into larger pots or the school garden. Students could also be allowed to take them home.

Option: If growing the plants in a garden, plan a day to harvest and share it using the recipes in this lesson or conduct a taste test.

Creating

Seed Mosaics

Materials

- Paper or sealable quart bags
- Access to an outdoor area with a variety of vegetation; garden, schoolyard, or park
- Paper plates
- Variety of large seeds
- Variety of soil types with different textures and colors
- Elmer's white glue
- Plastic spoons

1. Discuss the characteristics of living and nonliving things. Ask the students if soil is living or nonliving. Explain that a large part of the soil is made up of nonliving small pieces of rock, such as sand, silt, and clay particles. Soil as a whole is teeming with life including insects, fungi, and bacteria that are too small to see. Almost any handful of soil will contain both living organisms and nonliving elements.

2. Ask the students if they think seeds are living or nonliving. Explain that seeds are living, but they do not show the characteristics of living things until they germinate and begin to grow, which will not happen until the seed is in the right environment. Seeds need water in order to germinate. Without water they will not grow.

3. Plants are living things that provide food to people, animals, and other living things. Plants depend on nonliving things like soil and water to

grow and reproduce. When plants die, they decompose and become part of the soil. The once-living component of the soil is called organic matter.

4. Texture is an important component of art that can be both felt and seen. Define texture and explain that it is an important component of art that can be used to create different messages and emotions for the person viewing the artwork. Ask the students to identify the two senses we use to perceive texture (sight and touch).

5. Provide each student with a paper plate, glue, a variety of seeds, and soils. Have the seeds and soils handy in saucers or cups. Large seeds will work best for small hands and the soil can be sprinkled with teaspoons.

6. Instruct students to glue the large items on the mosaic first and add the seeds and dry soils next. It is best if glue is applied to the lines of the design, which have been traced onto the background, working with small areas at a time. Better results will be obtained if an area is left to dry before proceeding. Keep glue off of the surfaces where no seeds will be applied. Once the glue is dry, avoid flexing the paper plate.



Garden Colors

Materials

- Rolling pins
- Cotton muslin
- 1-12x12-inch piece per student
- Small rubber mallets
- Cardboard frames, 8.5x11 inches

1. People throughout history have crushed plants and used the natural pigments as paint and to dye fabric for clothing.

2. Cover the work area with newspaper. Demonstrate how to arrange the plant materials on the newspaper and cover with the 12x12-inch cloth. Make sure the items are not on top of one another all of them are under the cloth.

3. Demonstrate how to crush the materials with a rolling pin, to release pigments that stain the fabric. A rubber mallet may be used on more fibrous materials to obtain more color.

4. When all of the pigment is released, no more color will come out onto the cloth. Remove the newspaper and plant parts to view the artwork.

On the Go!

Diffusion Confusion!

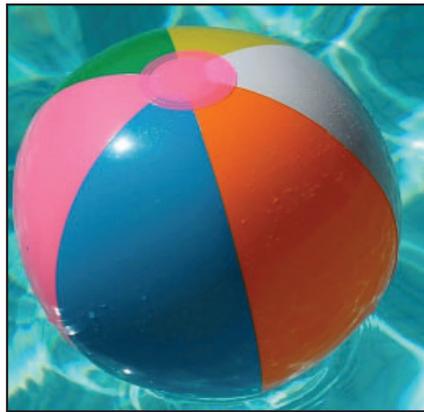
Materials

- Long rope
- 10 plastic beach balls or other soft balls
- Room to run

1. Place the rope in a large circle on the ground. Divide the students into two groups. Ask group of students to stand inside the circle. Ask the other group of students to stand outside of the circle—spread around the circle evenly.

2. Give all the balls to the group inside the circle and explain that the balls represent the molecules of ethylene gas in the tomato and the circle of rope represents the skin of the tomato.

3. Explain that the gas (balls) like to be away from each other, so they will try to move out of the circle. The students inside the circle will turn around in place inside the rope, with the balls, for 10 seconds and then toss the balls to students outside of the circle. This represents the energy and diffusion of the gas as it's molecules move away from each other and out of the tomato. The student's outside of the circle should run away with the balls for 10 seconds. This illustrates how the gas is diffused out of the tomato and away from the skin, slowing the ripening process of the tomato. Ask the students to switch



places and repeat the process and explanation.

4. Next, ask the students to take their original places and then explain that the students inside the tomato will once again turn around in place inside the rope, with the balls, for 10 seconds and then toss them to the students on the outside of the circle. This time the students outside of the circle will only be allowed to turn in circles next to the skin of the tomato (the rope). This illustrates how the gas is diffused out of the tomato, but is kept near the skin, which helps to ripen the tomato—much like keeping a tomato in an enclosed container. The tomato will ripen quicker if kept in an enclosed container. Ask the students to switch places and repeat the process and explanation.



MyPlate

Making Healthy Food Choices

Materials

- MyPlate Place Mats
- Variety of seeds
- Small paper cups

1. Hand out the MyPlate place mats and a small paper cup. Give the same kind of sample of nut or seed to all of the students by placing some in their cup.

2. Discuss which food groups each the nuts or seeds belong to on the place mat. Discuss why they fit where they do, reviewing the definitions of fruits and vegetables and what type of plant, the seeds they are eating come from. Discuss how making food choices that fill in each food group area for meals will help them grow healthy.

3. Repeat with each food sample, allowing the students to taste them as they are discussed.



Stir Fry

Materials

- Electric rice cooker
- Electric griddle with high sides or a stove top burner

Ingredients

- 1 cup uncooked white or brown rice
- 2 Tbsp. canola oil
- 3/4 cup low sodium soy sauce
- Variety of fresh vegetables, chopped
- Frozen peas, and fresh carrot sticks, to serve on the side
- 12 oz. extra-firm tofu, optional, drained and cut into 1-inch squares

1. Before beginning to stir fry, cook the rice in a rice cooker, according to the directions on the packet.

2. Add 1 Tbsp of oil to the griddle and preheat on medium-high heat. Add the tofu and 1/4 cup of soy sauce. Let the soy cook into the tofu and evaporate. Brown the tofu for about 5 minutes, flipping it while cooking. Remove it from the pan and set aside.

3. Add another 1 Tbsp of oil and reheat the pan on medium heat. Add the chopped vegetables and let cook a few minutes until soft. Add the frozen peas and the remaining 1/2 cup soy sauce. Stir and cook for a few minutes until broccoli is tender but still has a nice bite.

4. Add in the tofu and stir. Turn off the heat and serve with the rice, when slightly cooled.



Tomato Salsa

Materials

- Small paper plates
- Large salad bowl
- Chopping knife and board

Ingredients

- 2 cups red tomatoes, chopped
- 1/2 cup green bell peppers, chopped
- 1/2 cup sweet white onions, chopped
- Fresh cilantro, diced
- 2 tsp lime juice
- 1/2 tsp ground cumin
- Salt & black pepper, optional

1. Chop the vegetables and cilantro into small bite-size pieces. Place them all into a bowl and toss together. Add the lime juice, cumin, salt, and black pepper and mix together.

2. Serve with salt-free nacho chips.

Seedy Salad

Materials

- Medium-sized saucepan
- Spatula
- 2 mixing bowls
- Small paper bowls
- Plastic forks

Ingredients

- 1/2 cup of each of sunflower seeds, sesame seeds, and pine nuts, or other edible seeds
- Salad leaves, such as lettuce, spinach, and watercress
- Small cherry tomatoes, cut in half or quartered
- 2 tsp olive or vegetable oil
- 1 tsp balsamic vinegar

1. Place the salad leaves, cherry tomatoes and olives in a small bowl and set aside.

2. To toast the seeds, heat a medium-sized saucepan over medium heat. Different types of seeds cook at slightly different rates, so you may want to toast them separately.

3. Add the sesame seeds to the saucepan. Move the pan around as they toast and remove the pan from the burner when they start to brown. Dump them in a large bowl to cool and then add them to the salad. Repeat this with all the seeds types.

4. Pour on the oil and vinegar, if desired, and toss the salad gently by turning it over with a large fork or spoon. Serve in paper bowls with crackers.

References

The activities in this lesson have been, in part, adapted from the following references:

Rubric

- Alaska Early Learning Guidelines– <https://www.alaskaelg.org/goals-by-domain>

Agriculture in Alaska

- Story written by Marji Illingsworth of North Pole Peonies. <https://www.northpolepeonies.com/>

Children’s Books

- Sunflower House by Eve Bunting
- Companion Resource, National Agriculture in the Classroom (NAITC)– <https://www.agclassroom.org/matrix/resource/209/>

Sunflower Lifecycles

- Sunflower Life Cycle, NAITC– <https://www.agclassroom.org/matrix/lesson/175/>

Fruiting Vegetables

- Freshest Fruits, NAITC– <https://www.agclassroom.org/matrix/lesson/322/>

Ripening Tomatoes

- Ripening Tomatoes, [NBC Now](https://www.nbc.com)
- Seed Dissection
- How Does Your Garden Grow, NAITC– <https://www.agclassroom.org/matrix/lesson/364/>

Seed Strength

- Exploring Texture in the

Garden, NAITC– <https://www.agclassroom.org/matrix/lesson/480/>

Indoor Gardens–Peas & Beans

- Indoor Gardening With Soil, Alaska Agriculture in the Classroom - <https://www.fairbankssoilwater.org/akaginthelessonlessons.htm>

Seed Mosaics

- Exploring Texture in the Garden, NAITC– <https://www.agclassroom.org/matrix/lesson/480/>

Garden Colors

- Exploring Texture in the Garden, NAITC– <https://www.agclassroom.org/matrix/lesson/480/>

Diffusion Confusion

Written by Diane R. Hunt

Making Healthy Food Choices

- Grow It, Try It, Like It, U.S. Department of Agriculture– <https://www.fns.usda.gov/tn/grow-it>
- MyPlate Place Mat, U.S. Department of Agriculture– <https://www.myplate.gov/resources/graphics/myplate-graphics>

Your Resources:

Stir Fry

- Stir Fry, Gala Living– <http://galaliving.com/kids-favorite-quick-and-easy-veggie-stir-fry/>

Tomato Salsa

- Tomato Salsa, All Recipes– [AllRecipes.com](https://www.allrecipes.com) 2013

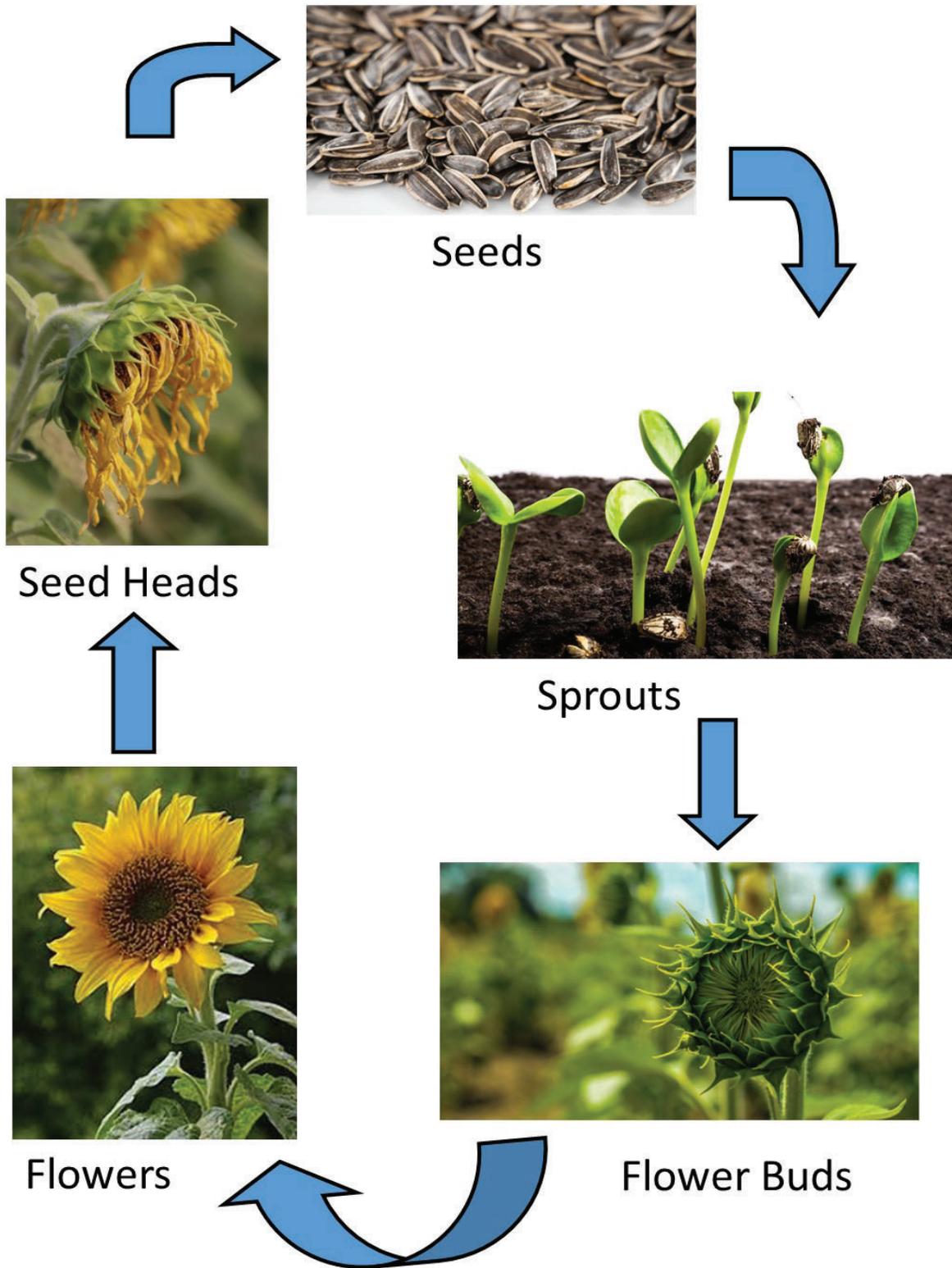
Seedy Salad

- Seedy Salad, Veggie Runners–<https://www.veggierunners.com/2012/07/20/super-seedy-salad/>

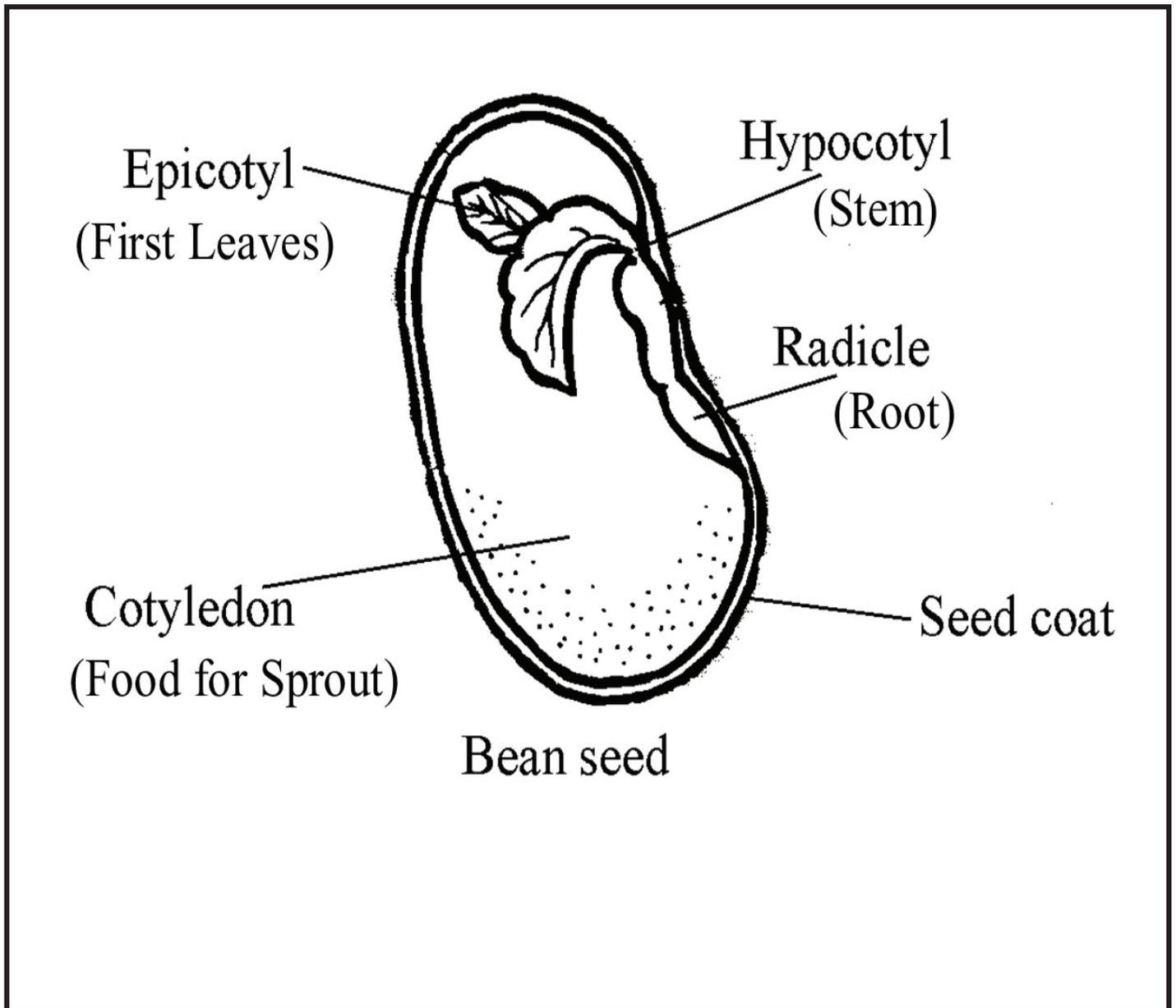
Resources

- Alaska Early Learning Guidelines– <https://www.alaskaelg.org/>
- MyPlate Poster and Place mat– <https://www.myplate.gov/resources/print-materials>
- MyPlate Tools, Graphics, Print Materials, and Videos– <https://www.myplate.gov/resources>
- Alaska Agriculture in the Classroom Lessons–<https://www.fairbankssoilwater.org/akaginthelessonlessons.htm>
- National Agriculture in the Classroom Lessons–<https://www.agclassroom.org/matrix>

Sunflower Life Cycle



Bean Seed Diagram



MyPlate Place Mat



Dairy

Grains

Protein

Fruits

Vegetables



What's **MyPlate** All About?

