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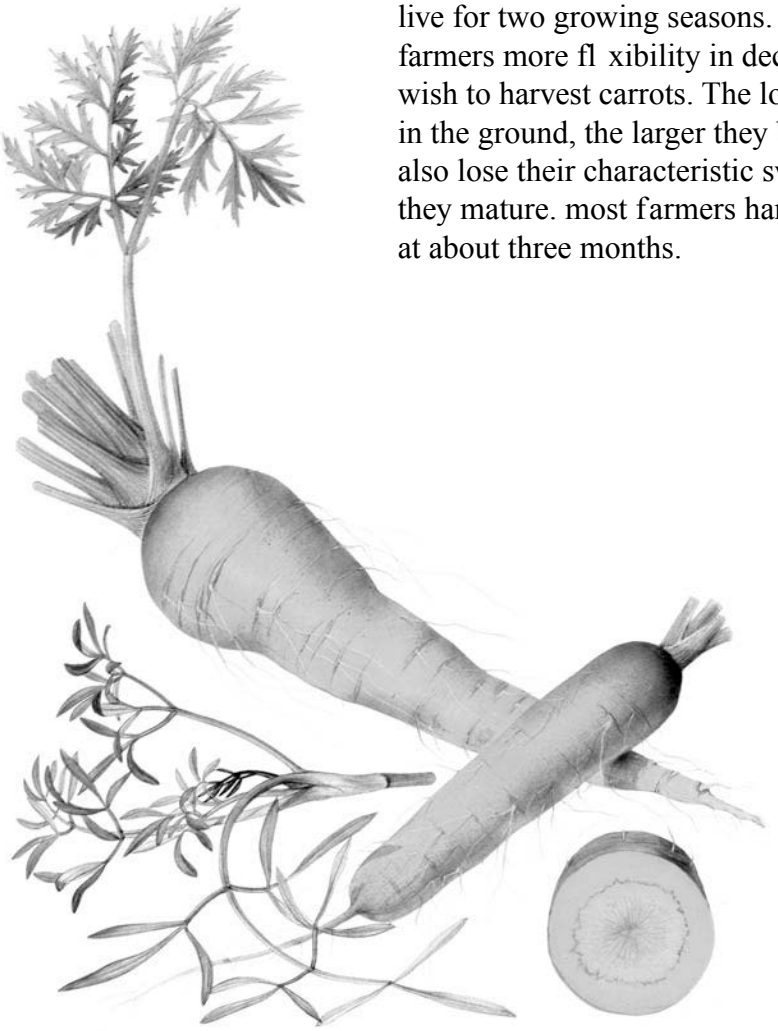
CHAPTER 10

Carrots

The well-known cultivated carrot originated in afghanistan some time before the tenth century . The first domesticated carrots were purple. during the ne xt several centuries, carrots were introduced throughout europe and asia. The modern varieties of carrots were bred in the Netherlands in the seventeenth century.

increasingly, there is a demand for heirloom varieties of carrots. These may range in color from maroon to white and have differing nuances in fl vor.



Wild carrots are white and fibrous and oody in texture. Wild forms of carrots are found all over the world. Carrots are members of the parsley family. Like wild mushrooms, wild carrots should never be picked; they closely resemble poison hemlock, one of the world's deadliest plants. death will result from eating a single leaf of poison hemlock, which is also a member of the parsley family.

Seasonality and Growing Conditions

Carrots are biennial plants, meaning that they live for two growing seasons. This fact allows farmers more fl xibility in deciding when they wish to harvest carrots. The longer carrots are in the ground, the larger they become, but they also lose their characteristic sweet fl vor as they mature. most farmers harvest their carrots at about three months.

Like many edible roots, carrots are sensitive to physical and nutritional changes in the soil in which they are grown. health y, long, straight carrots grow best in loose, well-worked soil that is rich in humus. The carrots are planted in raised beds so that rain will drain from the soil to eliminate flooding and decrease the chances of root rot. Carrots thrive best in temperatures between 50 and 60 degrees with abundant moisture. ho wever, carrots will tolerate higher or lower temperatures once they are established.

Carrot seeds are very finic y. They need temperatures that are neither too high nor too low and constant moisture to sprout (germinate). The carrot seedlings are thinned until they stand two inches apart, giving the roots adequate room to grow. Carrots split or become tough if they are not watered regularly. Too much nitrogen (from composted manure or other sources) causes the roots to fork. it is important for the soil to be loose and free from stones or clods, which cause the carrots to bifurcate or become bumpy.

Selection, Storage, and Nutrition Information

When choosing carrots at the market, look for roots that are not limp, damaged, or split. Carrots may be available with their green stems and leaves still attached, loose without stems or leaves, or prepackaged.

Carrots should be stored in the refrigerator or a cool, moist area as close to 32 degrees as possible. They can be stored for up to two weeks before they lose their crispness.

Carrots are high in vitamin a. The orange color in carrots indicates the presence of carotene, a fat-soluble pigment that becomes vitamin a in our bodies. Vitamin a is essential for both normal human growth and eyesight. Carrots are also a good source of fibe .

RECIPE

Carrot-Orange Salad

Preparation Time:	15 minutes
Cooking Time:	20 minutes
Total Lesson Time:	45 minutes
recipe Le vel:	easy

Background

Carrots brighten salads, appetizers, and main dishes, but rarely are they the central ingredient in those dishes. in this simple salad, the sweet taste of carrot is a central fl vor that contrasts well with the citrus fl vors of oranges and lemons. The chervil adds a licorice taste to the salad. if chervil does not appeal to you or if you cannot find it, substitute parsl y, cilantro, or tarragon. Carrots with their green tops are easy to find at the armers market and will help students visualize the whole plant. students can imagine carrots gro wing and being harvested for market.

To truly enjoy this salad, let it marinate for about 20 minutes while you read and discuss the farm profile with the class.

Objectives

Students will be able to:

identify the parts of the carrot plant: the root, the stem, and the leaf.
Understand the process of planting, growing, and harvesting carrots.

Ingredients

For a class of 20:

- 3 lbs carrots with green tops
- 2 large, juicy oranges
- 1½ lemons
- 6 tablespoons olive oil
- 6 tablespoons chopped fresh chervil, parsley, or cilantro
- 1 teaspoon salt

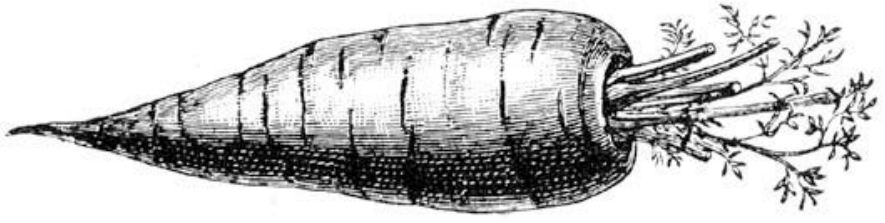
Materials

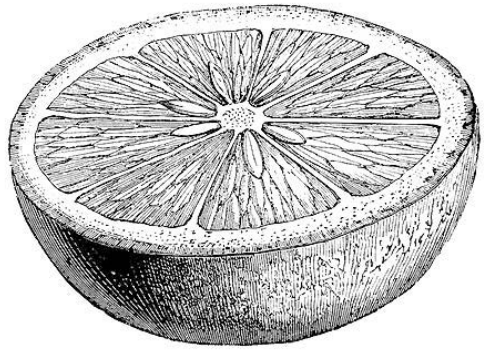
For the class:

- large mixing bowl
- colander
- strainer
- large spoon
- measuring spoons
- knife
- ston y Farms farm profil
- small bowl
- small grater
- cutting board
- vegetable peeler

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers or box graters
- 4 plates
- 4 napkins
- 4 forks
- journals





Preparation

1. ha ve students wash their hands. discuss proper methods of handling food.
2. Wash carrots thoroughly and separate them into fi e equal portions, one for each student group.

Safety Precautions

re view safety precautions for using knives and peelers.

Making the Recipe

1. Provide each group of students with a set of materials.
2. demonstrate ho w to trim the stems and leaves from the carrots and to use the peeler to peel carrots into short, thin slices. ha ve students make thin carrot peels and arrange them on the plates. alternati vely, use box graters to grate the carrots.
3. Collect the plates of carrots and set them aside on the demonstration table. ha ve students gather around the demonstration table. ask tw o students to place the carrots into the mixing bowl.
4. mak e the vinaigrette: ask a student to finely grate the peel from one orange. ask another student to cut the oranges and lemon in half. ask three other students to squeeze the oranges and lemons through strainers into the small bowl. ask tw o other students to measure and add salt and oil. mix ingredients thoroughly and add to the grated carrots.
5. Let the salad marinate while you read (or have students read) the ston y Farms farm profile. discuss the gr wing process of carrots.
6. after reading and discussing the f arm profile, ser e the salad on plates and garnish with chervil, parsley, or cilantro.
7. Clean up materials. if you have a school or classroom compost or worm bin, place the food scraps there.

RECIPE

Moroccan Carrot Dip

Preparation Time:	20 minutes
Cooking Time:	20 minutes
Total Lesson Time:	60 minutes
recipe Le vel:	adv anced

Background

as part of a midmorning snack, moroccan carrot dip allo ws students to taste a carrot's sweetness while they enjoy pita bread or crackers. This recipe also shows students what happens to carrots as they cook. students can observ e the changes in their consistency and fl vor.

y ou may use a food processor, if you have one, instead of the potato masher to give the dip a smoother consistency. For a decorative touch, sprinkle finely chopped parsl y (about ¼ bunch) over the dip before serving.

Objectives

Students will be able to:

observ e the transformation of the carrot's texture from hard to mushy.

Ingredients

For a class of 20:

- 4½ lbs carrots
- 6 cloves garlic
- 1½ onions
- 4 cups water
- 2 teaspoons salt
- 6 tablespoons olive oil
- 1½ teaspoons ground cumin
- ¾ teaspoon caraway seed
- 1 large lemon
- freshly ground black pepper
- 10 small pita breads
- 1 bunch parsley (optional)

Materials

For the class:

- hot plate
- 2-quart pot steamer
- colander
- large and small mixing bowls
- measuring spoons
- wooden spoon
- food mill or potato masher
- cutting board
- knife
- vegetable peeler

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 plates
- 4 napkins
- journals

Preparation

1. ha ve students wash their hands. discuss proper methods of handling food.
2. Wash carrots thoroughly and separate carrots, garlic, and onion into fi e equal portions, one for each student group.
3. Place water in the 2-quart pot and place it on the hot plate to boil.

Safety Precautions

re view safety precautions for using knives and the hot plate.

Making the Recipe

1. demonstrate ho w to cut carrots into ¼-inch "full moons." demonstrate ho w to peel and chop the onion finely and smash and mince the arlic. ha ve students prepare carrots and garlic first and arrange them on plates.
2. Bring water in the steamer to a boil.
3. Collect the plates. Place the carrots into the steamer and cook until very soft. meanwhile, have students prepare the onions and arrange them on plates. Collect those plates and put them on the demonstration table next to the large pot. ha ve students gather around the demonstration table.
4. remo ve the carrots from the steamer and set them aside in the large mixing bowl. ha ve a student measure and add oil to the large pot. ha ve two other students add the onions, cooking over medium heat until translucent (about 5 minutes). add the g arlic, spices, and salt and gently sauté another 3 minutes, stirring often. ha ve another student stir in the carrots for 1 minute to infuse the fl vors of all the ingredients.
5. remo ve the pot from the heat. ha ve two students pass the spiced carrots through the food mill or mash the mixture until it is a thick paste. Place the dip in the small mixing bowl and add 3 tablespoons lemon juice. add salt, lemon juice, and black pepper to taste.
6. Cut up the pita breads and serve with the dip.
7. Clean up materials. if you have a school or classroom compost or worm bin, place the food scraps there.

ACTIVITY

Pre-sprouting and so wing Carrots

Preparation Time: 20 minutes
Total Lesson Time: 30 minutes first da , and then
10 minutes a day for 10 days

Background

To get a head start on the growing season and to ensure that plantings are successful, farmers often pre-sprout the seeds. That means that they allow seeds to germinate, usually in greenhouses, before they are actually planted in the ground.

Pre-sprouting carrot seeds is especially useful because it reduces the long germination period for carrots. For germination to occur, there must be favorable conditions, including a moist and warm environment. sunlight is essential.

in this activity, students will pre-sprout carrot seeds and then transplant them into pots or the school garden. students will be interested to kno w that sweet-tasting carrots depend on a soil that has humus and loose soil. humus holds w ater and nutrients in the soil and keeps the soil light and flu fy. Loose soil is especially important for carrots because it allows the root to grow deeply and smoothly. Carrots also need soil with sufficient lime and potassium. Unli e many vegetables, however, carrots do not need a lot of nitrogen. in fact, too much nitrogen produces a less-than-sweet carrot and may cause the carrot to bifurcate.

Objectives

Students will be able to:
Pre-sprout carrot seeds.
Understand the conditions needed for germination (sprouting).
explain wh y farmers pre-sprout seeds.
describe the best soil conditions for optimal gro wth.

Materials

For the class:

- 2 quarts water
- 2 packets carrot seeds
- wax pencil
- school garden, or pots and potting soil
- journals
- rulers
- paper towels
- paper cups

Preparation

1. obtain se veral packets of carrot seeds.

2. Gather materials for student groups.

Doing the Activity

1. Tell the students that plants grow from seeds and discuss the process. relate the discussion to how and why farmers pre-sprout seeds in greenhouses at their farms.

2. explain to the students that carrots are hard to germinate and that the seeds do not li ve very long. Let students pre-sprout as many carrot seeds as possible, observe them daily, and record their observations. students may find the date of the seed on the back of the seed packet. if there are different years, students may want to record and observe any differences in sprouting. sho w the seeds to the students and let them examine the seeds and draw them in their journals.

3. Give each group four cups, four paper towels, and about 40 carrot seeds. demonstrate ho w to fold the paper towel into thirds and roll it into a tube. The diameter of the tube should be a bit smaller than the diameter of the plastic cup. Place the paper towel tube in the cup so that it rings the inside of the cup. Pour water into the bottom third of the cup. as the paper towel slowly absorbs the water, place about 10 seeds between the cup and towel.

4. ha ve students prepare their cups and seeds for pre-sprouting. ha ve students draw a picture of the cups and seeds and write their predictions of what will happen in 10 days.

5. Use a wax pencil to identify each cup with the student's name. Place the cups in the warmest part of the classroom.

6. For the next 10 days, provide time (about 10 minutes) for students to observe the seeds and record their observations. add sufficient ater to make sure paper towels stay moist. These observations may lead to discussions about the germination process. Common observations are that some seeds do not germinate, the seed cracks open, the root grows out of the seed before the shoots (stem), and the leaves unfurl from the stem. encourage students to mea- sure the growth of the roots and stems by using rulers. y ou may also want to take a couple of seeds from the cups and dissect them to investigate what is inside.

7. When leaves unfurl from the stems, help students transplant the largest plants into the school garden or pots. discuss what the carrot plants need for optimal gro wth. Continue to monitor the growth of the carrots until they are ready to harvest.

Stony Farms

Don and Shirley Ward bought Stony Farms in 1987 after Don had retired from his career as a businessman in Southern California. Don had always kept a small vegetable garden as a hobby, so when he retired, the Wards decided to pursue this hobby full time. After Shirley found the farm in Santa Rosa, north of San Francisco, the couple moved in and began a new life as farmers.

ston y Farms is relatively small—just eight acres, of which fi e are devoted to growing vegetables. despite this small size, in an a verage year don and shirle y grow 12,000 pounds of carrots.

The Wards' carrots are exceptionally sweet. What makes these carrots so good? shirle y admits with a laugh that even she is not sure. "it might be the stones—the same ones that give us the name ston y Farms," she claims.

it might also be the special variety of carrots the Wards plant, the name of which is top secret. "When we started, i asked my mother—who is from iowa—what we should plant. she told us what to do, what kinds of seeds to buy," says shirle y.

although the Wards will not reveal the name of their carrots, they are glad to tell you how they planted the carrots. First, don uses a tractor to rip up the soil, digging down one foot deep. Then he applies an organic fertilizer, such as compost, and tills the soil again. Next, he scatters or "broadcasts" the carrot seeds, throwing them over the prepared soil.

"We don't plant the carrots in rows," says shirle y, "That takes up too much space. That's how we can grow more."

after the seeds ha ve been broadcast, a layer of rich compost is laid over the top of the bed, and the planting is complete. When it comes

time to harvest, the Wards pull up all the carrots in the bed at the same time. This gives them a wide variety of sizes. shirley says she has found that customers like having choices, some preferring tiny baby carrots and others big, fat ones.

When they are harvesting, the Wards cut off the carrot tops right in the field. They then turn these back into the beds where they will decompose, adding rich nutrients to the soil.

after harvest, shirley says, "We wash, and we wash, and we wash the carrots. Then we count and weigh them before we go to market."

The carrots are planted and harvested between march and october . The last planting of the year (in october) stays under ground during the cold winter months while the rest of the farm shuts down and the Wards take their annual vacation. When the weather warms, the carrots start to grow; in march, they are ready to harvest.

While don takes care of the planting, shirley takes care of the business side of the farm. she sells the vegetables at the market and keeps careful records of how many pounds are grown and sold and how much money is made. But don and shirley also share many of the farm duties: shirley often drives the tractor while don is in the field, and don usually comes to the market to help shirley with the selling.

The Wards have a special working relationship with their friends, spencer and helene marshall. The marshalls sell honey at farmers markets and in stores throughout the san Francisco Bay area. Between 10 and 15 of the marshalls' beehives are at stony Farms. in exchange for housing the bees, the Wards not only get some of the honey but also benefit in another way. as they explain, "The bees do our pollination for us." Pollination is a necessary step in producing fruits and vegetables, so bees are essential for a healthy and productive farm.

Next to carrots, the Wards' most popular crops are tomatoes and cucumbers. But all told, they grow more than 80 varieties of vegetables and fruits—so there is always something fresh to eat at stony Farms.

CHAPTER 11

Potatoes

Potatoes are native to south america. They were first cult vated by the incas in the Peruvian highlands at least 2,000 and possibly up to 8,000 years ago. Now they are a dietary staple for cultures around the world.

The potato is a member of the nightshade family, along with tomatoes and peppers. Potatoes were introduced to europe in the sixteenth and seventeenth centuries. ho wever, potatoes did not become popular as a food for another century. People were suspicious of potatoes because many poisonous plants are in the nightshade family. Potatoes eventually became an important dietary staple. For example, the potato became such an important dietary staple in nineteenth-century ireland that when there was a serious potato blight in 1854 and 1846, widespread starvation occurred throughout the country, and many irish immigrated to the United states. irish potato crops were vulnerable to disease because there was only one variety of potato, called Lumpers.

Potatoes are tubers, meaning they are thick, fles y, underground stems. The buds (called *eyes* by farmers) are found all over the tuber. hundreds of v arieties of potatoes are grown worldwide, with most limited to Peru. ho wever, in the United states, se veral closely related varieties of russets are much more popular than others.

russet, or Burbank, potatoes are named after horticulturist Luther Burbank, who revolutionized the hybridization of thousands of fruits and vegetables. russets ha ve rough brown skin, numerous eyes, an elongated shape, and a high starch content that makes for mealy, flu fy flesh. They are the preferred potatoes for French fries and baking. Because their skin is so thick, russets store better than other v arieties of potatoes.

other kinds of potatoes are common as well. Long white potatoes have a thin, pale skin, small eyes, and an elongated shape. They are good for baking, broiling, and roasting. White rose is a common variety of the long white potato. round white and round red potatoes are medium-sized boiling potatoes with a waxy flesh. Because th y have a low starch content, their flesh is more moist

New potatoes are any variety of young potatoes in which the sugars have not fully converted to starch, so the flesh is crisp and axy. heirloom potatoes are v arieties of potatoes popular in the eighteenth, nineteenth, and early twentieth centuries. They are coming back in popularity today, especially yellow varieties (such as y ukon Gold and y ellow Finn), finge - ling varieties, and even blue varieties. most have thin skin and need not be peeled.

Seasonality and Growing Conditions

Potatoes grow well in many cool conditions, such as the coastal Northern California in summer and the high desert in spring or fall. They are available year-round, although spring and fall are peak seasons.

Potatoes require well-drained soil; without it they suffer from rot. Potatoes tolerate acidic soil better than do most crops. acidic soils are common in the northern regions, such as the states of idaho and North and south dak ota, so potatoes grow better in those places than do most other crops. The seed tubers are planted about four inches underground and about 10 to 12 inches apart. Potatoes should be planted in a different location each year, preferably following a legume crop, such as beans, peas, or vetch. Legume crops are valuable because they fix nitrogen in the soil, making it available for subsequent crops.

Potatoes should never be planted on a plot following a tomato crop as the two plants are subject to the same diseases.

one of the concepts of sustainable agriculture is to find the arieties that are best suited to a region. By growing diverse varieties, the farmer protects against an entire crop being lost due to susceptibility to various blights and fungi.

Selection, Storage, and Nutrition Information

Potatoes are harvested about three months after being sown. When choosing potatoes, look for firm, well-shaped specimens without green spots (the green is solanin, a substance toxic in large quantities). When stored in a cool, dry, dark, well-ventilated place, potatoes can last for up to two months. Potatoes are a good source of potassium, fibe , and vitamin C.

RECIPE

Roasted Potatoes with Herbs

Preparation Time:	15 minutes
Cooking Time:	30 minutes
Total Lesson Time:	60 minutes
recipe Le vel:	easy

Background

This recipe follows a format similar to the comparative tasting instructions found in the introduction of this guide. Unlike other fruits and vegetables that may be eaten raw during a comparative tasting, potatoes need to be cooked. (ra w potatoes contain a mildly poisonous substance that is destroyed by cooking.) This recipe allows students to compare many different types of potatoes. select se veral different varieties, such as y ukon Gold, y ellow Finn, reddale (or an y red-skinned potato), Burbank/russet, and all Blue (blue-fleshed). G ve students plenty of time to compare the different varieties before roasting the potatoes. Because the potatoes differ greatly in size, color, texture, and taste, students use all their senses in exploring these varieties.

The recipe may seem to call for a lot of potatoes, but potatoes cook down quite a bit as they roast. The rosemary in this recipe as well as herbs for other recipes in this book may be found in your school garden.

Objectives

Students will be able to:

Use their senses to observe different aspects of a variety of potatoes.
record observ ations and write comparisons in their journal.

Ingredients

For a class of 20:

- 4 or 5 each of 4 to 5 different types of potatoes, such as y ellow Finn, y ukon Gold, reddale, all Blue or blue-fleshed, n w potatoes, or fingerlings (20 to 25 potatoes total or about 4 lbs)
- 6 tablespoons olive oil
- 1 small bunch rosemary or thyme
- 1½ teaspoon salt
- 1 head garlic (optional)

Materials

For the class:

- large bowl
- colander
- oven
- 2 9-inch x 13-inch baking dishes, or larger
- spatula
- measuring spoons
- cutting board
- knife

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 sponges with rough green scrubbing side
- 4 plates
- 4 forks
- 4 napkins
- journals

Preparation

1. ha ve students wash their hands. discuss proper methods of handling food.
2. separate potatoes so that each student group recei ves one of each type of potato.
3. Preheat the oven to 450°F.

Safety Precautions

re view safety precautions for using knives and the oven.

Making the Recipe

1. Provide student groups with one of each type of potato and some rosemary or thyme. after students make and record observations in their journals about the potatoes, they can share their observations with the class. ha ve students remove rosemary or thyme leaves from their stems.
2. sho w your students how to wash the potatoes with the rough side of a scrub sponge, inspect the potatoes for greenish areas on the skin, and cut off any green area. The green areas contain solanin, a substance that is toxic in large quantities. The green indicates that the potato has been exposed to the sun.
3. demonstrate ho w to cut the potatoes into quarters. it is best to cut the potatoes in half and then put the flat side d wn while quartering. Cut potatoes in more pieces, if necessary, so that all pieces are roughly the size of a ping-pong ball.
4. ha ve students wash and prepare their potatoes for roasting and place the potatoes on a plate. While doing so, students can record further observations. a couple of students should separate the head of garlic (if using) into cloves.
5. in the large bowl toss together the cut potatoes with the herbs, oil, salt, and unpeeled garlic cloves. Put the seasoned potatoes into the two baking dishes. Place the potatoes in the oven for 30 to 40 minutes at 450ºF (or until done.)
6. While waiting for the potatoes to roast, students can share their observations and make predictions about which type they will like the best.
7. serv e the potatoes on plates, making sure that each student receives a piece of each type. While eating, students can discuss their observations with the class, focusing on appearance, texture, taste, and smell.
8. Clean up materials. if you have a school or classroom compost or worm bin, place the food scraps there.

RECIPE

Potato Salad

Preparation Time:	20 minutes
Cooking Time:	15 minutes
Total Lesson Time:	60 minutes
recipe Le vel:	adv anced

Background

The best potatoes for potato salad are waxy, yellow-fleshed arieties, such as y ellow Finn, y ukon Gold, fingerlings, or small red potatoes. Fingerlings get their name from their at, fingerli e shape. if you choose Burbank/russet or an y of the more starchy potatoes, be aware that they tend to lose their shape and fall apart in the salad.

y ou may also make this salad with an oil-based vinaigrette by eliminating the mayonnaise and adding instead an extra ¾ cup olive oil and an extra 3 tablespoons vinegar.

Objectives

Students will be able to:

Understand that a potato is a tuber or swollen stem that grows underground.
observ e whether the potato keeps its shape during cooking.

Ingredients

For a class of 20:

- 4½ lbs potatoes (use waxy boiling potatoes, not starchy baking potatoes)
- water
- 6 eggs
- 1 bunch chives
- 5 stalks celery
- 1 bunch green onions
- ½ cup plus 1 tablespoon apple cider vinegar
- ¾ cup olive oil
- 1 cup mayonnaise
- 2½ teaspoons salt
- ¼ to ½ teaspoon pepper

Materials

For the class:

- hot plate
- measuring spoons and cups
- colander
- slotted spoon
- 2 large mixing bowls
- 6- to 8-quart pot
- steamer insert
- small saucepan
- whisk

For each group of 4:

- 2 cutting boards
- 2 knives
- 4 napkins
- 4 plates
- 4 forks
- journals

Preparation

1. ha ve students wash their hands. discuss proper methods of handling food.
2. Cook the eggs in boiling water for 9 minutes. set up the steamer and start heating.

Safety Precautions

re view safety precautions for using knives and the hot plate. remind students to use caution around the steamer as steam can cause burns.

Making the Recipe

1. Provide each group of students with a set of materials and an equal amount of potatoes, green onions, and chives. ha ve students wash the potatoes, green onions, and chives.
2. demonstrate ho w to cut the raw potatoes into ½-inch cubes. it is best to cut potatoes in half and then chop the halves with the flat side on the cutting board. Collect the potatoes and add to the boiling steamer.
3. While the potatoes are steaming, demonstrate how to thinly slice the green onions and chop the chives. ha ve students prepare the ingredients and place them neatly on plates.
4. Collect the plates and set them aside on the demonstration table. Provide each group with an egg and let them peel and chop the egg into small pieces. ha ve the students place the egg neatly on a plate. Collect the egg plates and place them on the demonstration table. ha ve the students gather around the demonstration table.
5. Check the potatoes. When they are tender, move them from the steamer to a large bowl to cool. Let students volunteer to mix the vinaigrette. in a large mixing bowl, measure and whisk together the vinegar, oil, mayonnaise, salt, and pepper.
6. ha ve the students pour the dressing over the now warm potatoes. Point out how the dressing soaks in quickly because the potatoes are warm. ha ve the students add the chopped egg and herbs and mix gently. Taste and adjust seasoning.
7. serv e a small portion of the salad on plates for students to try. While the students eat, discuss the fl vors and textures of the salad.
8. Clean up materials. if you have a school or classroom compost or worm bin, place the food scraps there.

ACTIVITY

mulching for Water Conservation

Preparation Time: 20 minutes
Total Lesson Time: 30 minutes to set up experiment, then
5 minutes each day for three days to monitor,
and 15 minutes for closure on the last day

Background

mulch is a soil covering that farmers and gardeners place on top of the soil to save both water and soil. mulch may be made of a variety of materials, such as plastic sheeting, wood chips, compost, or straw.

in the summer, a nonmulched field must be atered more frequently than a mulched one. mulch also helps shade the soil surface, keeping it cooler and thus preventing further water evaporation.

mulch also helps hold the soil in place. rain can easily erode bare soil, taking important topsoil with it. in many parts of California, soil erosion is evident on hillsides.

in this activity, students will conduct an experiment to see the effect of mulch on the amount of water that evaporates from soil.

Objectives

Students will be able to:
Conduct an experiment to compare water evaporation with and without mulch.
describe the role of mulch in conserving w ater.

Materials

For the class:
- potting soil or garden soil
- garden mulch (if available)
- newspapers
- shredded newspaper or paper towels
- water
- waterproof pen for labeling
- balance scale, postal scale, or kitchen scale

For each group of 4:
- 2 copies of springhill F arm farm profil
- 2 clear plastic cups (9-oz. size)
- 2 1-cup measuring cups

Preparation

1. Gather materials. Groups may share the measuring cups.
2. Cover tables with newspaper.

Doing the Activity

1. Give each pair of students a copy of the springhill F arm farm profile and read it together as a class. ask students whether an ything surprised them about the reading. Lead the discussion toward the fact that Larry Peter dry-farms his potatoes. mak e a list of the conditions that dry farming requires: good soil, good mulch, and so on.
2. ask students what mulch is and ha ve them share their ideas about the purpose of mulch. explain that f armers and gardeners commonly use mulch to conserve water, to reduce the number of weeds, and to prevent soil from washing away. Tell the class that they will be conducting an experiment to see whether mulch affects the amount of water that evaporates from soil.
3. ha ve each group measure out ½ cup soil into each of their cups. ha ve them measure and pour ½ cup water into each cup.
4. ha ve each group place about one-half inch of shredded newspaper, paper toweling, or garden mulch on top of the soil in one cup. For comparison purposes, the other cup will have no mulch.
5. ha ve students weigh each cup and record its weight (the two cups will weigh about the same). ha ve them use a waterproof pen to label the two cups with the groups' names and the date.
6. Place all the cups on a countertop or windowsill.
7. once a day for the ne xt two or three days, give students time to weigh each cup and record the weights.
8. after the e xperiment, have students share their results with the class. discuss ho w the mulch affected the amount of moisture in the soil.

Springhill Farm

Some are big. Some are long and skinny. Still others are round and as small as marbles. They come in red, purple, yellow, white, and blue with names such as Russian Banana, German Butterball, White Rose, and Ruby Crescent. What are they? Potatoes!

many varieties of potatoes are grown by Larry Peter at his 320-acre farm in the rolling hills west of Petaluma in sonoma County. Larry grows at least 15 different types of potatoes each year and sells them as springhill potatoes. in addition, Larry keeps more than 300 cows that supply milk for his springhill dairy, where he produces many kinds of cheeses. These are called farm cheeses because they are made the old-fashioned way in small batches, which gives them lots of character.

you could say that being a potato farmer is in Larry's blood. his ancestors were potato farmers in ireland, and his parents raised their large family on an 18-acre farm outside santa rosa. "We all did garden chores, and i milked the cow," Larry remembers. he recalls that potatoes grew exceptionally well on his family's land and that they were part of most family meals.

on his own farm, Larry uses a technique called dry farming, which he learned from his parents. in dry farming, plants are not watered; they use the moisture already in the ground.

dry farming requires the soil to be specially prepared. in march, after the soil has dried out a bit from the usual winter rains, Larry begins his work. First, he digs down 15 inches and turns the soil over. he does this every week for three weeks in a row. This brings ground water (water already in the soil) up to the surface so there is enough moisture to keep the young potato plants alive. as this surface water begins to dry out, the growing plants will send their roots down deeper to seek out more water. if all goes well, the potatoes will be ready for harvest in 65 to 75 days.

harvesting potatoes is a little like digging for treasure. When the green part of the plant above the soil dies, the potatoes are ready to be taken from the ground. This can be done by a machine or by hand with a shovel. Larry uses both techniques.

Larry's parents, Virgil and Georgia, used to take his potatoes to their house and wash and sort them before they were sent to market. These days, his dad is his top salesman at the santa rosa farmers market, one of several farmers markets where springhill potatoes and cheeses are sold.

at the markets, Larry and his dad tell customers what the different types of potatoes taste like and suggest ways to cook them, since different potatoes are suited to specific dishes. some are great for baking but would not make a good potato salad. some are especially nice steamed with their skins on, and others make great mashed potatoes. Larry undoubtedly could tell you what kind of potato makes the best French fries. educating consumers is a role Larry clearly enjoys. "i need a break in the routine to get away from the cows and to see people," he grins.

CHAPTER 12

Pears

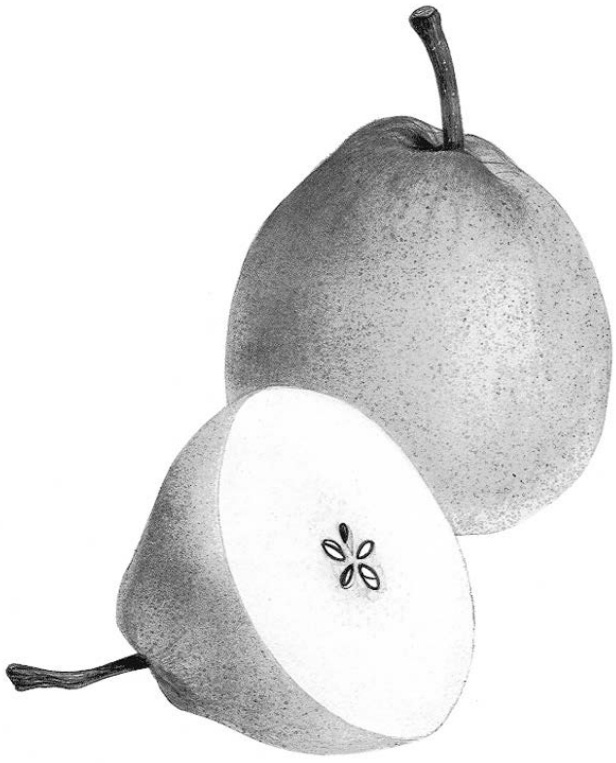
Pears originated around 4,000 years ago in central europe and northeast asia. They are one of the oldest known cultivated fruits. in early days of cultivation, the pear was prized among the wealthy and nobility. Today, there are at least 5,000 varieties of pears, the most common being the Bosc, Bartlett, anjou, and Comice, which is known as the "Queen of Pears" for its sweet, fl vorful flesh and luscious aroma. other varieties that are good for cooking and eating are the tiny seck el and the French Butter. all those varieties named are "european" pears. asian pears are pears too, b ut the word *Asian* is always specified because asian pears are a distinctly different species of pear.

Seasonality and Growing Conditions

Pears grow best in deep, well-drained loam soil with lots of water. in addition to full-size trees, pears are also grown in dwarf varieties, which are ideal for small gardens and *espalier* (a lattice on which trees are trained to grow in two dimensions). Nearly all pear varieties require cross-pollination.

Pear trees are planted as one-year old "whips" (young tree stocks), then severely pruned back. as the tree gro ws, the branches will continue to be heavily pruned to remove fireblight (a bacterial infection that enters the tree through the blossom in the springtime), to shape the tree, and to control the size of the crop (to prevent overbearing).

Unlike most other fruit, "european" pears do not ripen on the tree. For this reason, they are picked when they are still hard and green. Farmers generally use one of two methods to determine when pears are ready to be picked. The first method requires the armer to test the sugar content of the fruit on the tree. When the sugar content has reached its peak, the pear is picked to ensure that the fruit is at its sweetest as it ripens in storage.



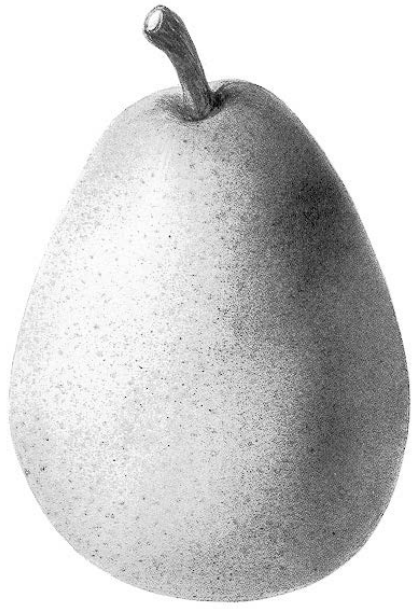
in the other method, the farmer tests the pressure of the pear. When the pear has reached its maximum pressure (when the fruit is at its hardest), it is picked so that it will soften as it ripens.

after being harv ested, pears are kept in a cool storage area for two weeks to two months before being shipped to market. Cold storage delays the natural ripening process.

Selection, Storage, and Nutrition Information

When purchasing pears, choose fruit that is still somewhat firm; pears should generally be ripened for a day or two at home in even temperature and out of direct sunlight. Pears are ripe when they give slightly to gentle pressure at the neck and stem, but be careful because they bruise easily. refrigerate ripe pears.

Pears tend to discolor quickly when the cut fruit is exposed to air, so you will need to add acid (such as lemon juice) to the cooking liquid or to cut fresh fruit to prevent it from turning brown. Pears are a good source of fiber and vitamin C



RECIPE

Pear, Celery, & Parmesan Salad

Preparation Time:	25 minutes
Cooking Time:	None
Total Lesson Time:	45 minutes
recipe Le vel:	easy

Background

This salad is refreshing and delicious. it does not have much seasoning, so it is important to use the freshest ingredients and ripe pears. Comice pears are a good variety to use because their sweetness really comes through in this salad. Texture in food is important, as this salad demonstrates. The soft pears contrast with the crunchy walnuts, the crisp celery, and the tangy dressing. you may also have students taste the pears, celery, walnuts, and cheese separately and then as part of the salad so that students taste how the fl vors enhance each other. you might want to provide a loaf of crusty bread and serve it in slices with the salad.

Objectives

Students will be able to:

Understand the importance of fresh food for fl vorful salads.

Compare the taste, smell, texture, and appearance of ingredients separately and in a salad.

Ingredients

For a class of 20:

- 6 large Comice pears
- 4 to 6 celery stalks
- 6 ounces Parmesan cheese (not grated)
- 1 cup walnuts, halves or coarsely chopped*
- 1 large lemon
- 6 tablespoons olive oil
- pepper
- ½ teaspoon salt

Materials

For the class:

- measuring spoons and cups
- colander
- wooden spoon
- small mixing bowl
- vegetable peeler/corer
- cutting board
- knife
- whisk
- juicer
- large platter

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- journals
- 4 plates
- 4 napkins
- 4 folks

*Check to make sure no students are allergic to walnuts.

Preparation

1. ha ve students wash their hands. discuss proper methods of handling food.

2. Before starting the class, wash the pears and celery.

Safety Precautions

re view safety precautions for using knives and peelers.

Making the Recipe

1. Provide each group of students with a set of materials and an equal amount of pears, celery, walnuts, and Parmesan cheese.

2. demonstrate ho w to peel pears, core them, and slice thinly. demonstrate ho w to remove the strings from the celery stalks and slice thinly in diagonals. mak e sure the celery slices are about 1⁄16-inch thick. if the celery pieces are much bigger, they overpower the pears. demonstrate ho w to cut walnuts into quarters and how to "peel" the cheese thinly with a vegetable peeler. ha ve students prepare ingredients and arrange them neatly on plates.

3. Collect the plates and set them aside on the demonstration table. ha ve students gather around the demonstration table. ha ve a student cut the lemon and juice it in a juicer to make 2 tablespoons juice. as you re view the recipe with students, discuss how each ingredient will influence the taste of the other ingredients

4. ask a student v olunteer to make the vinaigrette by measuring the oil, lemon juice, salt, and a little black pepper and whisking together in a small bowl. Taste and adjust seasoning.

5. ha ve students arrange the pears and celery on a large platter and scatter walnuts on the top. drizzle with the vinaigrette. Gently scatter the thin peels of cheese o ver the salad. serv e salad on plates.

6. While the students eat, discuss the differences between eating ingredients separately and in a salad. students can compare their predictions with the actual e xperience.

7. Clean up materials. if you have a school or classroom compost or worm bin, place the food scraps there.

RECIPE

Poached Pears

Preparation Time:	10 minutes
Cooking Time:	25 minutes
Total Lesson Time:	60 minutes
recipe Le vel:	adv anced

Background

Poached pears are a special treat. y our students may never have had poached pears, but once they do they will want them again and again. y ou can serve them as a snack by themselves or as a dessert with ice cream. y ou can also format this recipe to compare different varieties of pears. Bosc, Comice, Winter Nelis, and anjou are all suitable for poaching. as the class prepares the pears for poaching (simmering in liquid), lead a discussion about the similarities and differences among them.

Objectives

Students will be able to:

describe the cooking concept of poaching.

Compare the shape, color, skin texture, smell, and taste of different pear varieties.

discuss ho w the cinnamon, ginger, and lemon complement the fl vor of the pears.

Ingredients

For a class of 20:

- 6 cups water
- 2 cups sugar
- 10 ripe, but firm pears (a mixture of Bosc, Comice, Winter Nelis, and anjou, if possible)
- 2 cinnamon sticks
- 1 small knob fresh ginger
- 1 lemon

Materials

For the class:

- hot plate
- 6-quart pot with lid
- colander
- slotted spoon
- measuring cups
- vegetable peeler/corer
- knife
- cutting board
- wooden spoon

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- 4 napkins
- 4 plates
- 4 forks
- journals

Preparation

1. ha ve students wash their hands. discuss proper methods of handling food.
2. separate the ingredients into fi e equal portions, one for each student group.
3. While students are comparing pears, heat the water in a large pot at high heat. stir the sug ar into the water until it dissolves. When the water boils, turn it down to low heat so that it stays warm but does not continue to boil. Wash the lemon thoroughly.
4. While the sugar water heats, brainstorm how to record the different characteristics of the pears. allo w each student group to select its own method to record the shape, color, skin texture, smell, and taste of different varieties of pears. allo w students to share recording methods.

Safety Precautions

Take care when removing pears from the pan; they will be very hot. re view safety precautions for using knives, peelers, and the hot plate.

Making the Recipe

1. demonstrate ho w to peel, cut in half, and core the pears. While students prepare the pears, ask them to make observations in their journals about the pears. ha ve students place their pears on plates. Gather the plates and set them on the demonstration table. ask a couple of students to help cut the lemon and ginger into slices.
2. ha ve students gather around the demonstration table. heat the w ater until it boils. Place pears, cinnamon sticks, and lemon and ginger slices in the water, then turn down the heat so that the pears simmer for 20 minutes while the pot is covered.
3. While the pears simmer, allow students to share their journal entries with the class. Lead a class discussion about the different characteristics of pears. ask students to mak e predictions about how poached pears will taste.
4. When pears are translucent but still firm, rem ve them with a slotted spoon and place them on plates. allo w them to cool for a few minutes. serv e.
5. as students eat the poached pears, ask them to compare their predictions about the pears' taste with their actual experience.
6. Clean up materials. if you have a school or classroom compost or worm bin, place the food scraps there.

ACTIVITY

Washing Fruits and Vegetables

Preparation Time: None
Total Lesson Time: 40 to 50 minutes in two parts, if possible, with an hour in between to allow the insect spray to steep

Background

all f armers must contend with a variety of pests that can harm the crop. although f armers may use organic methods to control pests, a residue of any spray applied may still remain on the fruits and vegetables. in this activity, students apply an organic, garlic-based insect spray onto a fruit or vegetable and make observations. They also explore different types of fruit and vegetable skins: the tough impermeable skins we usually do not eat (such as orange, banana, and tangerine) and semipermeable skins that we often do eat (such as apple, pear, and peach). The term *permeable* refers to the skin's ability to absorb liquids and is an indication of the thickness and toughness of the skin.

students will also learn ho w to wash produce, before using it, to remove dirt or any residue from the farm. Fruits and vegetables should be washed just before using because storing wet or damp produce makes them spoil more easily.

Note: The all-purpose insect spray can be stored in a tightly covered jar in the refrigerator for up to one week.

Objectives

Students will be able to:
Compare semipermeable and impermeable fruit and vegetable skins.
Understand the importance of washing fruits and vegetables.

Materials

For the class:
- 1 garlic bulb
- 1 small onion
- 1 tablespoon cayenne pepper
- 1 quart water
- 1 tablespoon liquid soap detergent
- 1 blender
- 1 sponge or towel

For each group of 4:
- 1 1-quart spray bottle
- 1 banana or orange
- 1 pear or apple
- 1 leafy green (spinach, chard, or lettuce leaf)

Doing the Activity

1. read the Todd ranch f arm profile as a class and b gin a discussion of how farmers control pests. discuss ho w farmers sometimes use dormant oil sprays and other means to control pests on fruit trees and vegetables.

2. explain to students that the y will examine different fruit skins and discuss ways in which they are alike and different.

3. Provide each student group with samples of the two different skins so that they can compare the thickness, texture, pores, and fl xibility of the skins. ha ve students record their observations in their journals. ha ve students explain in their journals why we might eat some skins but not others. allo w students to share their ideas with the class.

4. Prepare the all-purpose insect spray by putting garlic, onion, and cayenne in a blender jar with some of the water. Blend, then add the remaining water. if possible, allow the insect spray to steep for an hour. add the liquid soap (the soap helps the spray cling to plants). Put the spray into spray bottles.

5. Give each group a spray bottle filled with the insect spray and demonstrate h w to lightly spray it onto the sample fruit or vegetable. allo w the produce to dry (5 to 10 minutes). ask students to mak e predictions about what they may find on the skins after drying.

6. When the produce is dry, have students make observations.

7. ask students whether the y would want to eat the fruit or vegetable after it has been sprayed. ask them wh y or why not. (in this case, it would leave a strong, undesirable taste.) ask them whether it mak es a difference whether the fruit or vegetable is eaten with or without the peel. Point out that it is important to wash all fruits and vegetables before cooking or eating them, especially those that are eaten with the peel.

8. demonstrate ho w to wash fruits and vegetables. Wash under cold running water while wiping the entire surface of the fruit or vegetable with a sponge or cloth towel. This process ensures that all residues will be removed.

9. Next time the class cooks a recipe, allow students to practice washing the produce.

Todd Ranch

The Todd Ranch pear farm is nestled against the hills surrounding Potter Valley in Northern California's Mendocino County. From his farm in the winter, Dan can see snow on the tops of the hills. Many creeks and streams run down toward the ocean, and a nearby canal brings water from the Eel River to help irrigate Dan's orchards.

on his 32-acre f arm, dan gro ws three types of pears: Bartlett, red sensation, and Bosc. The Bartletts, the oldest trees in the orchard, were planted in 1961. dan remembers helping to plant them. he w as fi e years old at the time. "i grew up on the farm, and i worked on the farm while i was growing up," dan recalls. "Then i went away to college for a few years, but i decided that what i really w anted to do was to be a farmer."

so dan came home and e ventually bought his father's pear farm, where he now lives with his wife, alice, and three children. his sons, andy and Luk e, are 16 and 14 years old, and his daughter, rebekah, is 11.

"The kids work on the farm. They help out at harvesttime. my oldest son dri ves the tractor," says dan. Just lik e their dad when he was young, dan' s children enjoy their life on the farm, and they love exploring in the hills near their home. "There's a lot of wildlife here," says dan, who often sees deer , skunks, and raccoons. "sometimes a black bear will

come down from the hills into the orchard," he reports. "We'll see footprints or maybe a half-eaten pear left on the tree, and we'll know that the bears have been there."

one of the things dan lik es most about farming is the constant challenge. "y ou have to think of ways to solve problems and be willing to experiment with new ideas," he says. "a f armer isn't just some guy in overalls who's sitting there and watching things grow."

With pears, there are many challenges. one of these is pests, such as the codling moth, whose larva eats the fruit of any pear tree. (see a discussion of the codling moth in Chapter 3, "apples. ") Because dan has decided to grow his fruit organically, he will not spray pesticides to kill the moths. instead, he has introduced beneficial insects, such as asps, which eat the larva. in a new experiment, he has built several bat houses to attract bats to live in his orchard. Bats eat large quantities of flying insects in their nightly forays, so th y are very helpful in keeping insect populations down.

dan' s decision to farm organically not only helps the environment but also has made his farm a financial success. his pears are sold at markets throughout the United states and are also used in organic baby food and juice. "my father always told me that you can't make any money being a farmer," dan says with a laugh. "But i've proven him wrong."

Locations of Farms Profiled in Winter

	FARM	CITY
1	Beck Grove	Fallbrook
2	Green Gulch Farm	Muir Beach
3	Coke Farm	Aromas
4	Stony Farms	Santa Rosa
5	Springhill Farm	Petaluma
6	Todd Ranch	Potter Valley