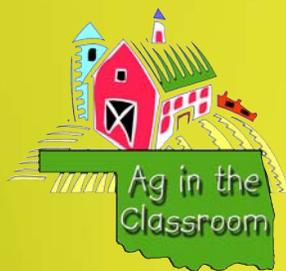
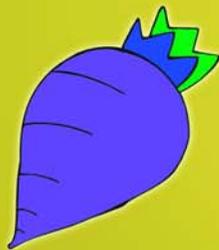


These Roots Run Deep



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P.A.S.S

Grade 1

Reading-1.2; 2.1; 4.4
Writing-2.5; 3.6
Math Process-1.1,2;
2.3; 3.3; 4.4; 5.1,2
Math Concept-2.2a,4;
3.1abd; 4.2c
Science Process-1.2;
2.1; 3.1,2; 4.3
Social Studies-1.1
Visual Arts-3.1,2
Music-3.3

Grade 2

Writing-2.5; 3.6
Math Process-1.1,2;
2.3; 3.3; 4.4; 5.1,2
Math Concept-3.1b
Science Process-1.2;
3.1,2; 4.3
Life Science 2.1
Social Studies 2.3; 4.2
Visual Arts-3.1,2
Music-3.3

Grade 3

Reading-4.1a
Writing-2.1,2,3,5; 3.6
Math Process-1.1,2;
2.3; 3.3; 4.4; 5.1,2
Math Concept-3.2b
Science Process-1.2;

2.1; 3.1,2; 4.3
Life Science-2.1,2
Visual Arts-3.1,2
Music-3.3
Grade 4
Reading-4.1b; 5.1a
Writing-2.1,2,4; 3.6
Math Process-1.1,2;
2.3; 3.3; 4.4; 5.1,2
Math Concept-3.2b;
5.1b
Science Process-4.1,2;
2.1; 3.1,3; 4.1

Life Science-3.1
Social Studies-2.2
Visual Arts-3.1,2
Music-3.3

Grade 5

Reading-4.1b; 5.1a
Writing-2.1; 3.6
Math Process-1.1,2;
2.3; 3.3; 4.4; 5.1,2
Math Concept-2.1d;
5.1a
Science Process-1.2;
2.1; 3.1,3; 4.1
Life Science-2.1,2
Visual Arts-3.1,2
Music-3.3

OKLAHOMA'S ROOTS — AND LEAFY GREENS

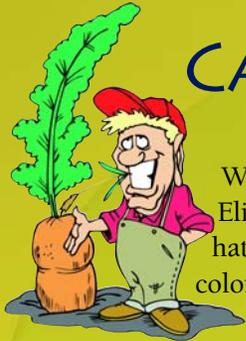
Some of our most nutritious foods come from the roots and leafy tops of certain plants. Carrots are a rich source of beta-carotene. Beet roots give us folic acid. Their leaves give us potassium and an important antioxidant. Spinach, along with greens like Swiss chard, mustard greens, kale and collard greens, provide Vitamins K, A, C and many other nutrients. Even the lowly dandelion, considered a weedy pest on Oklahoma lawns, is a valuable source of many nutrients.

The onion is considered a root vegetable, but it is a bulb, not a root. Onions provide dietary fiber, Vitamin C, Vitamin B6, potassium, and other key nutrients.

Most root vegetables and leafy greens grow best as cool season crops in the spring and fall of Oklahoma's long growing season.

Use the activities that follow to introduce your students to these valuable food sources. At left are some of the Oklahoma Priority Academic Student Skills covered in these activities.





CARROTS IN YOUR HAT.....

What vegetable has roots that are good for you and tops so pretty they have been used to decorate hats? The Elizabethans and early Stuarts in England used the flowers, fruit and leaves of carrots as fashion accessories for hats and dresses. Carrot tops were highly prized as a substitute for feathers, especially in the fall, when their colors were more vibrant.

The carrot is a member of the parsley family and is related to parsnip, celery and fennel. It probably originated in Afghanistan. In the wild, carrots' original color was white. The carrots we eat are orange because the Dutch bred them to be that color in the 17th century. Before that, most cultivated carrots were purple. They were grown that way in the Middle East and India as far back as the 10th century.

Orange carrots are an excellent source of the deep yellow carotenoids that produce Vitamin A. They are also a source of magnesium, potassium, Vitamins C and B complex. Steaming makes the betacarotene more readily available to the body, as heat breaks down the tough cellular walls that encase the nutrient.

**Acquire carrots with tops, and let students use them to decorate hats. Have a Carrot Top Parade.
Cut up the bottoms to eat.**

Make Carrot Necklaces: Wash a few carrots and cut them into 1/4-inch round slices. Before making the necklaces, use the disks for counting practice, to create addition and subtraction facts, to demonstrate multiplication and division or to demonstrate percentages before making the necklaces. Thread a heavy duty needle with dental floss. Use a thimble to push the needle through the carrot slices. Slip the slices onto the floss by pushing the needle through the core. Once you've strung enough carrot disks, tie the ends together to form a necklace. Lay it on paper in a dark, well-ventilated place, making sure the slices don't touch each other. As they dry, they turn into wrinkled beads. Drying takes a couple of weeks. Have students write or draw comparisons of the necklaces before and after drying.

GOOSEFOOT.....



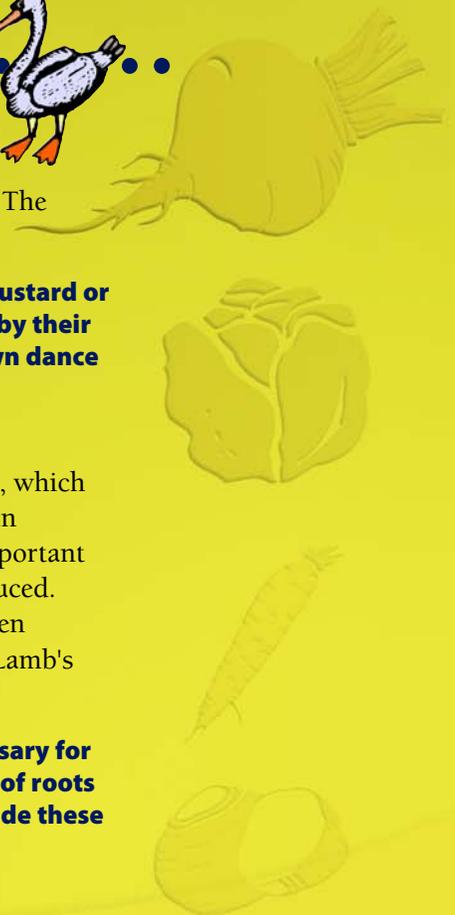
Beets, spinach, Swiss chard, sugar beets, wild lambs quarter and the South American grain quinoa are all members of the Goosefoot family (Chenopodium). The leaves of plants in this family resemble the foot of a goose.

Show students the leaves of several different plants (spinach, Swiss chard, lettuce, mustard or collard greens, kale, etc.) and see if they can identify those in the Goosefoot family by their similarity to the foot of a goose. Play lively music, and have students invent their own dance called “The Goosefoot.”

Wild Goosefoot

Lamb's-quarter, pigweed, goosefoot and wild spinach all are names for the same plant, which carries the botanical name *Chenopodium album*. This plant is a common garden weed in Oklahoma. Along with sunflowers and a wild form of squash, it was one of the most important foods gathered by ancient people in North America before maize agriculture was introduced. Lamb's quarter is best gathered early in spring when it is only a few inches high. It is then washed thoroughly and cooked in a small amount of boiling, salted water until tender. Lamb's quarter tastes like spinach.

Have students develop nutritional charts listing vitamins and other nutrients necessary for good health. As you share the information in this booklet about the health benefits of roots and leafy greens, have students mark their charts to indicate which vegetables provide these nutrients.



POPEYE'S FAVORITE.....

Spinach originally came from Persia (now Iran) where it was known as "aspanakh." By the 1300s, it had spread to Europe and Britain where it was popular in religious communities, particularly during Lent. It was being cultivated in North America by the early part of the 19th century.

Students may or may not be familiar with the cartoon character Popeye, whose superhuman strength was said to have come from eating spinach. In the 1930s, Popeye was so popular that the spinach industry credited Popeye with increasing spinach consumption by 33 percent. If possible, acquire some old Popeye cartoons to show, and discuss the likelihood that spinach or any other food would have the immediate results that spinach had for Popeye. Students should understand that the benefits of good nutrition come over time with consistent, good habits.

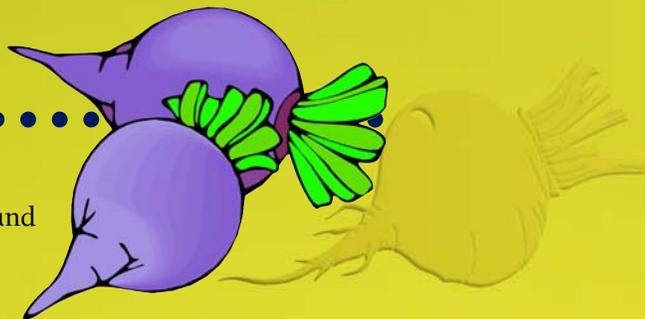
Spinach is delicious as a salad vegetable. Many children prefer raw spinach to lettuce and usually prefer raw spinach to cooked spinach. Provide raw spinach and other salad ingredients and let students build their own salads. Spinach is an excellent source of both Vitamin A and folacin. It is also a source of fiber, potassium and Vitamin C.



Spinach was used by medieval artists to produce a green pigment for illuminated manuscripts. It is one of the few non toxic natural green pigments, and is still used today as body paint.

Have students research and discuss illuminated manuscripts. Run drained, canned or frozen (whichever is cheapest) spinach through a blender to produce pigment for students to use for producing their own illuminated manuscripts, using their best handwriting. Cut holes in the sides of trash bags and split them up the middle on one side to make artist's smocks to protect students' clothing. Notify parents that students will be painting.

THE BEET GOES ON.....



Beets are natives of Europe and North Africa, and were originally found near the sea in southern Europe and around the coasts of the Mediterranean.

Beets are doubly valuable because we eat both the roots and the leafy green tops. The roots are an excellent source of fiber and phosphorous and are high in folic acid (iron). The leafy greens contain potassium, calcium and betacyanin (an antioxidant).

Beets have such stiff cell walls that it is hard for the human digestive system to extract the nutrients inside. Cooking will not soften the cellulose in the cell walls of the beet, but it will dissolve enough of the hemicellulose so that digestive juices are able to penetrate. Cooking also activates flavor molecules in beets, making them taste better.

Cook beets and use the water as a dye for eggs or for squares of unbleached muslin. Add vinegar or lemon juice for a more intense red.

Beets require thinning after germination because more than one plant comes up from each seed.

Have students plant beet seeds and place in a sunny location outdoors or in a sunny window.

Have students record the number of seeds planted, estimate how many plants they think will germinate and compare with the number that does germinate. Beets are ready to harvest 60 to 70 days after planting from seed. They are cool season plants and can be planted in a fall garden through August 15 or in February or March for harvest before school is out in the spring. Have students project when beets should be ready for harvest based on the date planted.

SWISS CHARD.....

Swiss chard is a tall, leafy green vegetable with a thick, crunchy stalk that comes in white, red or yellow with wide, fan-like green leaves. Many Oklahoma gardeners grow chard in their flower beds, just for its beautiful leaves, but they are missing out. Chard is delicious when chopped and added to scrambled eggs, soups or stir fry. Unlike spinach and other greens, it can tolerate the heat of Oklahoma's long summers.

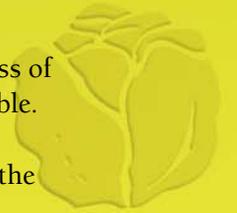
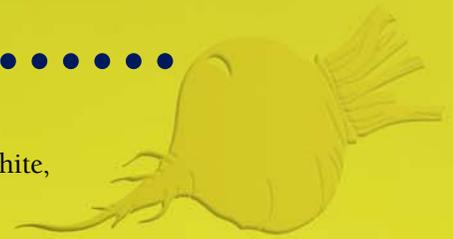
Chard belongs to the same family as beets and spinach and has a similar flavor. It has the bitterness of beet greens and the slightly salty flavor of spinach leaves. Both the leaves and stalks of chard are edible.

The homeland of chard is not in Switzerland, but the Mediterranean. It was named for the Swiss botanist who determined its scientific name. The Greek philosopher, Aristotle, wrote about chard in the 4th Century B.C. The ancient Greeks and Romans honored chard for its medicinal properties.

Swiss chard gets excellent marks for its concentrations of Vitamin K, Vitamin A, Vitamin C, magnesium, manganese, potassium, iron, Vitamin E and dietary fiber. Swiss chard is also a source of copper, calcium, Vitamin B2, Vitamin B6, protein, phosphorous, Vitamin B1, zinc, folate, biotin, niacin and pantothenic acid.

Fresh greens contain a large concentration of water, and students will be amazed at how much volume is lost when they are cooked. Bring a handful of Swiss chard or other fresh greens to class. Have students measure them before and after cooking. Serve with sliced, boiled eggs, and season with a splash of vinegar.

Have students make lists of vegetables and identify them as roots, leaves or other. Students may design charts to show how vegetables would be classified.



MUSTARD, TURNIPS AND RUTABAGAS.....

Turnips and rutabagas are members of the mustard family. As with beets, we eat both the roots and the leafy parts. The leaves of the mustard plant, called mustard greens, are also a valuable leafy green.

Turnips can vary in size and shape tremendously, with some reaching fifty pounds. Some, have reddish rings around the crown of the vegetable root. Others are purple. Turnips were the original jack-o-lanterns. The Irish brought the tradition to the United States but found that pumpkins were easier to carve and more plentiful.

Experts believe rutabagas may be the offspring of the wild cabbage and the turnip. They have a firm, yellow-orange flesh similar to that found in yellow-flesh potatoes. They are also more dense and sweeter than turnips and contain less moisture. Rutabagas, known also as “swedes,” can be purple, white or yellow in color, with white or yellow flesh.

Turnips and rutabagas are considered winter vegetables because they are available all through the winter. They are mashed or used to thicken stews and casseroles. Turnips are also great eaten raw, when peeled and sliced as chips or sticks; or shredded into a green salad or coleslaw.

Rutabaga

Bring a rutabaga and other tough-skinned vegetables to class. Have players sit in a circle and pass the rutabaga around as they count from left to right, starting with the number one. When the number five or any multiple of five comes up, the word “Rutabaga” is called out instead.

Match the other vegetables to different numbers, and play the game with different multiples.

Variation: Play the game with sevens. Whenever “Rutabaga” (or whatever) is called, the direction of the number-calling is reversed. If the game progresses into the 70s, the counting changes to “rutabaga 1, rutabaga 2,” etc. Whenever a player makes a mistake, he or she gets one penalty point and starts the game from the beginning.

10-MINUTE ROOT VEGETABLES.....

Serves 4 as a side dish

You can use just one of the vegetables or any combination

2 medium carrots, cut into 1/2-by-1/2-by-2-inch sticks (about 2 cups)

1 tablespoon unsalted butter

1 teaspoon sugar

1/2 teaspoon table salt

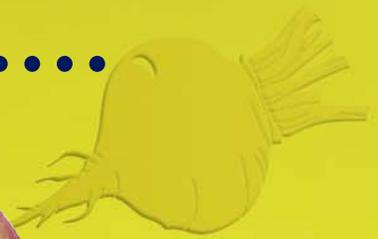
2 small parsnips, cut into 1/2-by-1/2-by-2-inch sticks (about 1 cup)

1 small turnip, cut into 1/2-by-1/2-by-2-inch sticks (about 1 cup)

Freshly ground black pepper

Bring the carrots, butter, sugar, salt and 1/2 cup water to a boil over high heat in a large skillet and cook for 2 minutes. Add the parsnips and cook an additional 2 minutes. Add the turnips and continue cooking, stirring about every minute, until all of the liquid is evaporated and the vegetables are tender, browned and shiny, about 6 minutes longer. Adjust the seasoning with salt and pepper to taste and serve immediately.

Write the names of all the vegetables used in the recipe above on slips of paper. Cut out pictures of the vegetables from magazines or grocery ads. Have students match the words with the pictures. Use the words and pictures to make a roots and leafy greens bulletin board.



KALE AND COLLARD GREENS



Kale and collard greens are ancient, "headless" members of the cabbage family. Kale is loaded with calcium, potassium, indoles (cancer-fighting substances), beta-carotenes and other antioxidants. Collards have the same nutrients, but in lesser concentration. One cup of kale provides more than the daily requirement of vitamins A and C. It is also a good source of calcium and fiber.

Kale is a very bitter green and is most palatable when combined with sweeter ingredients, like potatoes or onions. Collard greens have a much softer, sweeter taste than kale. When you combine the two greens in the same dish, the mild collard flavor mitigates the sharpness of the kale.

Like other greens, kale descends from wild cabbage that originated in Asia Minor. Kale was brought to the United States in the 17th century by English settlers. It is now a favorite in the southern United States where, like many cooking greens, it has been considered a poor man's food.

Like most cooking greens, kale can grow in colder temperatures and withstand frost - which actually helps produce even sweeter leaves. Kale can also grow well in the hot weather in the southern United States and in poor soil.

Have students brainstorm words that rhyme with kale and make up poems using as many of the words as possible.

Make potato-kale soup. Saute 1/4 cup chopped onions and 1 stalk celery in butter. Add 5 to 6 potatoes, peeled and cubed. Add 1 cup water. Cook potatoes until tender. Chop 1 cup kale and add to cooked potatoes along with 1 cup milk. Substitute collard greens or other greens for the kale, or use a combination.

ONIONS.....

Onions originated in the Fertile Crescent and have been cultivated for at least 7,000 years. They are part of the lily family. The name “onion” stems from the Latin word “unus,” meaning oneness or unity.

The Egyptians believed onions had strength-producing powers and fed them to the laborers who built the pyramids. The Romans ate onions for strength and courage, and Alexander the Great ordered his troops to eat onions to improve their vitality.

The ancients weren’t wrong about onions. They have many health benefits. Quercetin, an antioxidant compound in onions, helps fight cancer and prevent heart attacks. Onions also have anti-bacterial properties. Onions are a good source of Vitamin C, potassium, dietary fiber, Vitamin B6 and folic acid. They also contain calcium, iron, have a high protein quality, are low in sodium and contain no fat.

Why do onions make you cry?

I went to the garden and got it,
Came to the house and cried with it.
What is it?

The sulfuric compounds in onions are what make you cry. To chop, cut or slice an onion without crying, place onion in the freezer for a few minutes before cutting or cut them under water. Have students develop their own methods for cutting onions without tears.

Have students make up fables with the title “Why Onions Make Us Cry?”



Cut an onion in half crosswise. You will see the circles of leaves inside. Make prints with these onion halves by dipping the cut half in ink (Use an inkpad) or watercolor paint. Press the onion several times onto a piece of paper for a beautiful print.

Why did the Queen of Hearts want to behead the Seven-of-Spades in Alice's Adventures in Wonderland by Lewis Carroll?

He brought the cook tulip roots instead of onions.

How are tulip roots (bulbs) different from onions? How are they the same? Have students write paragraphs comparing and contrasting them.

WILD ONIONS

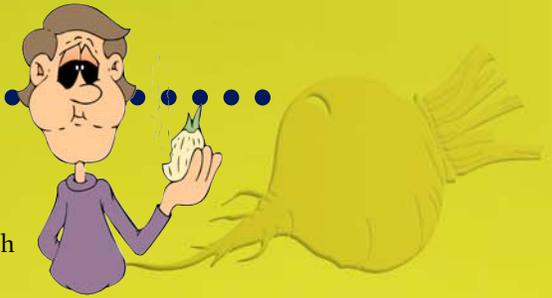
Onions are a powerhouse of nutritional benefits, but many children really dislike them. Try having a taste test with onions prepared in various ways - cooked, raw, chopped very fine, sliced, mixed with eggs or other foods, etc. Have students develop a chart to record what they like and dislike about the variations (flavor -sweet, bitter, etc.; texture - slimy, crunchy, etc.). Also, try different varieties of onions - red, white, green, wild, etc.

Onion skins very thin, Mild winter coming in.
Onion skins very tough, Coming winter very rough.
Ask students to discuss the meaning of this old English rhyme.

The first Pilgrims brought onions with them on the Mayflower. However, they found that strains of wild onions already grew throughout North America. Indians used wild onions in a variety of ways, eating them raw or cooked, as a seasoning or as a vegetable. Such onions were also used in syrups, as poultices, as an ingredient in dyes and even as toys. According to diaries of colonists, bulb onions were planted as soon as the Pilgrim fathers could clear the land in 1648.

The appearance of wild onions in the early spring signals a time of celebration for the Cherokees and other tribes in eastern Oklahoma. In the early spring, many Indian churches, stompgrounds, clubs and other groups hold wild onion dinners. Families and friends also often make an outing of gathering wild onions and/or eating them together. The wild onions are cleaned and added to scrambled eggs and are usually served with other Indian dishes such as fry bread and grape dumplings. Wild onions grow in a variety of conditions but are best gathered where a loose, moist soil promotes thick growth and easy digging.

Gather wild onions in spring and have students clean them for eating to demonstrate how much work went into the preparation of foods gathered from the wild for the relatively small yield. Have students write essays in which they discuss the difference in wild and cultivated foods and the importance of agriculture for meeting our food needs.



DANDELIONS AND OTHER WILD GREENS IN SPRING...

The name “dandelion” comes from an Old French phrase, dent-de-lion, which means "lion's tooth." Dandelions got their name from this phrase because of their sharply-lobed leaves that make them look like teeth.

Dandelions first came to the Midwestern United States from Europe to provide food for honeybees, also imported from Europe.

While the dandelion is considered a weed by many gardeners, the plant has several culinary and medicinal uses. Dandelions are actually grown commercially on a small scale as a leaf vegetable. The plant can be eaten cooked or raw in soup or salad. The young leaves and unopened buds can be eaten raw in salads. Older leaves have a slightly bitter taste and are usually cooked. Dandelion salad is often accompanied with hard boiled eggs. Caution: Never eat dandelions or other plants from areas that have been treated with pesticides.

According to the U.S. Department of Agriculture, a serving (one cup) of uncooked dandelion leaves contains 280 percent of an adult's daily requirement of beta carotene as well as more than half the requirement of Vitamin C. Dandelions are also rich in Vitamin A.



Gather dandelions in spring. Have students examine the leaves to see if they look like lion's teeth and notice the long roots which make them hard to eliminate from lawns. Find dandelions that have gone to seed and ask how their structure would help them spread quickly. Have students write detailed descriptions of dandelions.

VOCABULARY.....

antioxidant-a substance that opposes oxidation or prevents or makes difficult reactions made easier by oxygen. Research suggests that antioxidant-rich foods may slow down, prevent or even reverse certain diseases that result from cellular damage.

bulb-an underground vertical shoot that has modified leaves (or thickened leaf bases) that are used as food storage organs by a dormant plant. A bulb's leaf bases generally do not support leaves, but contain food reserves to enable the plant to survive adverse conditions. The leaf bases may overlap and surround the center of the bulb as with lilies, or may completely surround the inner regions of the bulb, as with the onion. A modified stem forms the base of the bulb, and plant growth occurs from this basal plate. Roots emerge from the underside of the base, and new stems and leaves from the upper side.

cultivate-to raise or assist the growth of by tilling or by labor and care; to improve or develop by careful attention

illuminated manuscript-a manuscript in which the text is supplemented by the addition of decoration or illustration, such as decorated initials, borders and miniatures.

nutrient-a substance that furnishes nourishment.

root-the leafless usually underground part of a plant that absorbs water and minerals, stores food and holds the plant in place

wild-growing or produced without human aid and care

The beet got its name from the shape of its seed pods. When they swell, they look like the Greek letter beta.

β

Acquire beet seeds and show them to students. Soak them overnight, and have students draw them. Do they look like the letter “B?”

WHERE DO THEY GROW?.....

Color in the counties having the most acreage of these crops:

Beets - Payne, Canadian, McIntosh, Oklahoma

Carrots - Canadian, Payne

Collards - Caddo, McLain, Tulsa

Mustard Greens - LeFlore, Logan, Tulsa

Onions - Pottawatomie, Cleveland, Grady, Seminole, Stephens

Spinach - Blaine, LeFlore, Muskogee

Turnips - Cleveland, LeFlore, Muskogee, Pottawatomie, Rogers

*Based on most recent U.S. Census in 2002



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