



WHAT'S GROWING ON IN VIRGINIA

Virginia Foundation for Agriculture in the Classroom
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Tower gardens are an alternative for schools where a traditional garden is not an option.

About the Newsletter

What's Growing On In Virginia? is a semiannual publication for Virginia educators and those who want to connect children with agriculture through education.

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THIS ISSUE

3 Salad in a Glove

4 Hydroponics

7 Literary Corner

WHAT'S GROWING ON

in Virginia

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Salads are healthy, easy to make and full of fresh vegetables.



The journey of a salad

“

Vibrant,” “crunchy,” “flavorful” and “crisp” are all words that can be used to describe salads, which are filling and full of fresh vegetables. Salads can include a variety of lettuces and other delicious vegetables, such

as tomatoes, carrots, red cabbage, peppers and cucumbers.

How do those vegetables get into your salad? Farmers grow crops that are best-suited for the climates in which they live. Ninety percent of the nation’s lettuce is grown in California and Arizona, but Virginia growers

also raise a variety of lettuces and salad greens, as well as large amounts of tomatoes. Many producers also grow cucumbers and other vegetables used in salads.

Lettuce

Lettuce is a cool-season vegetable and one of the easiest to grow. It also is one of the oldest known vegetables, dating back to 2500 B.C. and depicted in ancient Egyptian tomb drawings. The Egyptians believed lettuce aided in sleep.

Lettuce spread to the ancient Greeks and Romans, who gave it its name *lactuca*. Emperor Caesar Augustus built a statue praising lettuce because he believed eating lettuce had cured him of an illness. The crop was introduced to the Americas by Christopher Columbus during his second voyage in 1494, and many varieties were developed in Europe during the 16th through 18th centuries.

Cool weather is important in lettuce production. Lettuce grows best in moderate daytime temperatures and cool nighttime temperatures, in loose, fertile, sandy soils that are well-supplied with organic matter.

Lettuce varieties commonly grown in Virginia include crisphead, also known as iceberg lettuce; butterhead or bibb lettuce; romaine or cos; and leaf-type lettuce.



A variety of vegetables can make a delicious salad.



Did you know?

- Lettuce is one of the top three vegetables produced in the United States, along with tomatoes and potatoes.
- Iceberg lettuce makes up about half of the lettuce produced in the U.S., with the other half including romaine, butterhead and leaf lettuces.
- U.S.-grown lettuce is produced and marketed mainly by large-scale growers, with organic production gaining in popularity. Worldwide, the U.S. is the second-largest lettuce producer, behind China.

Tomatoes

Many tomatoes are grown on Virginia's Eastern Shore. The most recent Census of Agriculture found 893 acres of tomatoes were grown in Northampton County and 573 acres in Accomack County. Tomatoes also are grown on the Northern Neck, where the census noted 100 acres in production.



Hanover County is home to many producers who grow the famed Hanover tomatoes sold to grocery chains, wholesalers, and customers at farmers' markets and farm stands.

Tomatoes range in size from tiny cherry tomatoes to larger beefsteak varieties and medium-sized tomatoes with an oblong shape, such as the Roma tomato. They also have lots of colors and flavors. They grow on vines

that typically are trained to climb a stake to keep them off the ground.

Tomatoes are a summer crop and are planted in the spring after danger of frost is past and the soil has warmed. They are harvested July through September. Harvesting fresh-market tomatoes can be labor-intensive and requires multiple pickings by hand.

Cucumbers

The soil and climate of the eastern part of the state also are conducive to growing cucumbers.

Like tomatoes and lettuce, cucumbers come in a variety of sizes and types, including slicer or fresh salad cucumbers, smaller, pickle-type



cucumbers, seedless varieties and long, thinner English cucumbers.

Cucumbers need well-drained soil with moderate to high organic matter to grow well. Like tomatoes, they are planted after the danger of frost has passed and the soil has warmed. They also can be started indoors in peat pots three to four weeks prior to planting time.

Most varieties of cucumber vines spread from row to row. Training on a trellis or a fence along the edge of a garden plot will reduce the space needed and also lift the fruit off the soil.

Cucumbers are harvested by hand in June through October.

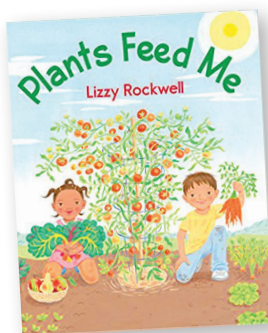
LITERARY CORNER

Plants Feed Me, Lizzy Rockwell, Holiday House, ISBN: 9780823425266

A True Book: Tomatoes, Elaine Landau, Scholastic Library Publishing, ISBN: 9780516210285

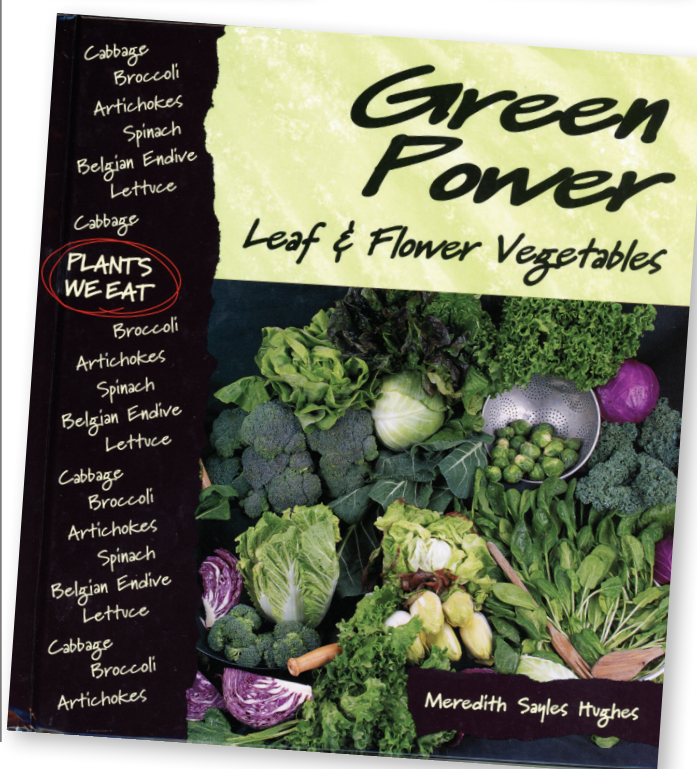
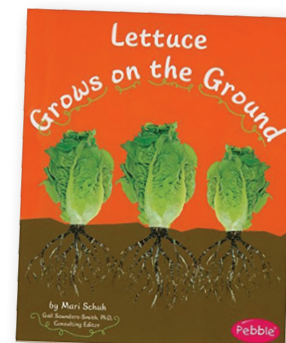
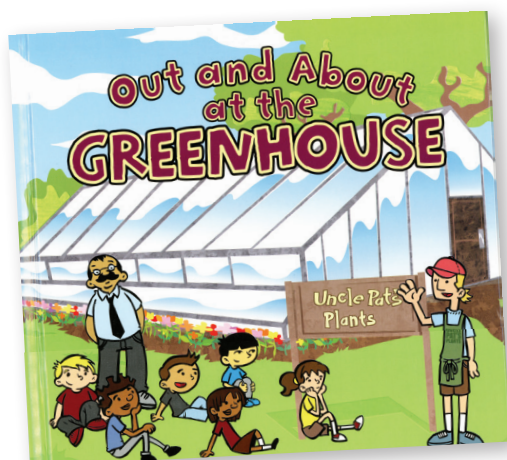
Lettuce Grows on the Ground, Mari Schuh, Capstone Press, ISBN: 9781429661881

Green Power: Leaf & Flower Vegetables, Meredith Sayles Hughes,



Lerner Publishing Group, ISBN: 9780822528395

Out and About at the Greenhouse, Bitsy Kemper, Capstone Press, ISBN: 9781404822795

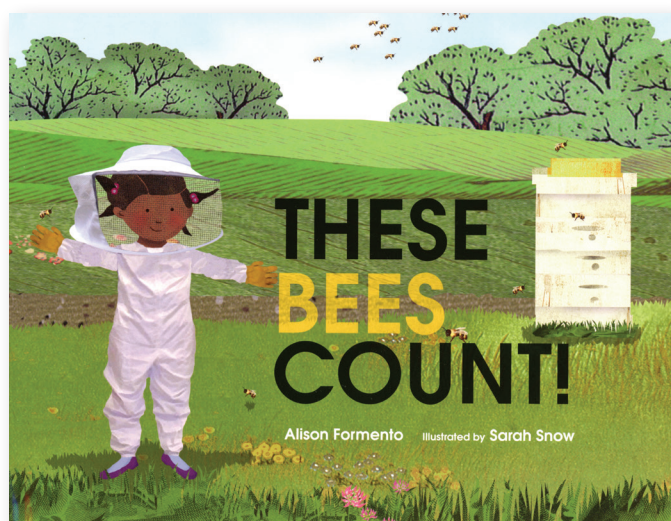


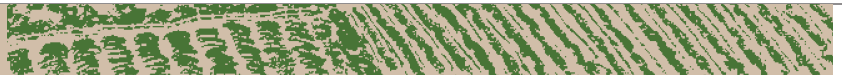
PROGRAM HIGHLIGHTS

Check out Agriculture in the Classroom's 2018 Book of the Year

Agriculture in the Classroom's 2018 Book of the Year is *These Bees Count!* by Alison Formento. Through this book students will learn about the important work of bees—from making honey to pollinating some of our favorite flowers, fruits and vegetables.

Readers will be able to count the ways that we depend on bees. Teachers can find a classroom curriculum companion for the book at alisonashleyformento.com/staging/wp-content/uploads/2013/05/awhitman_these_bees_count-tgl.pdf. It includes pre-reading activities, discussion questions, pollination activities and more. For more lessons and activities on the importance of bees, check out the pollination lesson collection at AgInTheClass.org.





BONUS ACTIVITY

What do plants need to grow?

Review with students what plants need in order to grow—water, air, nutrients and light.

Print off a blank grid and cards from naitc-api.usu.edu/media/uploads/2015/10/06/What_Do_Plants_Need_to_Grow.pdf, and have students cut out the plant growth cards.

Next, have them glue the cards into the correct column on the grid. As an extension activity, you also can print the third page and have students go on a “Plant Hunt” by circling all of the objects that come from plants.

What Do Plants Need to Grow? Cards

Row 1	Row 1	Row 1	Row 1
I am made of hydrogen and oxygen	I am made of carbon dioxide, nitrogen, water vapor and other gases	Plants absorb these through their roots	I am energy
Row 2	Row 2	Row 2	Row 2
I appear blue and cover most of the Earth's surface	You can rarely see me	We are the vitamins for plants	I am the opposite of dark
Row 3	Row 3	Row 3	Row 3
Plants absorb me through their roots	I may once have been in a person's lungs	We come from the decomposition of rocks, dead plants, and animals	Plants are special because they can capture me
Row 4	Row 4	Row 4	Row 4
Farmers irrigate their fields with me	Special openings in plant leaves allow me to enter	We are sometimes called fertilizers	I make plants green and help plants make their own food

What Do Plants Need to Grow? Grid

	Water	Air	Nutrients	Light
1				
2				
3				
4				



Students can grow a plethora of fruits and vegetables with a tower garden.

Tower gardens

School gardens can provide a treasure trove of learning experiences for children, but an outdoor garden is not feasible for all schools. Indoor gardens, using hydroponics or aeroponics, can be a perfect solution.

Virginia Agriculture in the Classroom's 2017 Teacher of the Year, Jessica Pittman, used aeroponics to grow and harvest lettuce in her first grade classroom utilizing a tower garden. When plants are grown using aeroponics, as opposed to traditional hydroponics, the plant's roots are misted with a nutrient rich water solution, rather than being submerged.

This system also allows more oxygen to get to the plant's roots. Pittman used an Agriculture in the Classroom grant to purchase the tower garden (towergarden.com) that allowed her class to grow and harvest lettuce inside the classroom throughout the school year.

In addition to growing the lettuce, her students also harvested and bagged it and sold it to their school, learning lessons in science, mathematics and economics along the way. They celebrated their hard work at the end of the year with a salad party.

Circle the objects that come from plants



Plant Hunt

CONTENT AREA

SOL: Science K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 2.7, 2.8, 3.1, 3.8, 4.1, 4.4

Objective: for students to:

- Identify what a seed needs in order to germinate.

Materials

- Clear plastic food service gloves
- Cotton balls
- Five different seeds such as lettuce, carrots, tomatoes, cucumbers and radishes or others
- Water
- Tape

LESSON PLAN

Salad in a Glove

Background Knowledge

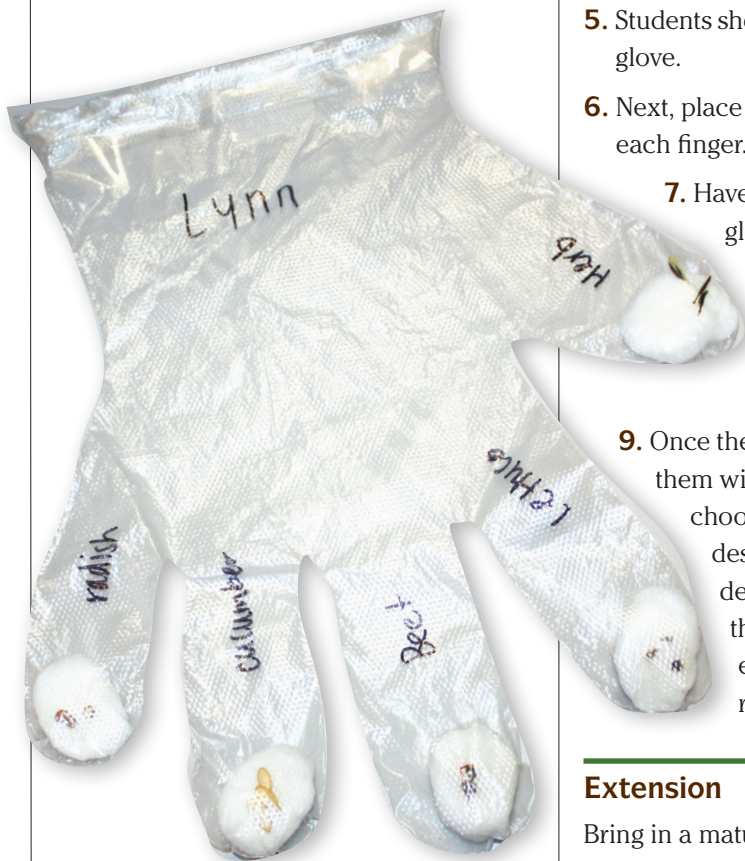
Most of the food that we eat begins as a seed. Germination is when the seed sprouts and begins to grow. To germinate, a seed needs warmth, moisture and air. By germinating the seeds in clear gloves, rather than in soil, students will be able to observe the plant right away as its life cycle begins.

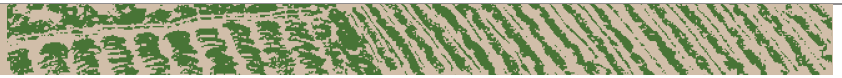
Procedure

1. As a class, generate a list of how plants are important to us. Example: They provide oxygen, serve as a source of food, provide useful products, help reduce soil erosion and provide shelter for animals.
2. Discuss how, like people, plants go through stages as they grow.
3. Inform students that they will have the opportunity to watch plants' progress through an entire growth cycle, starting with the germination of the seeds. They will be doing this with the seeds of various plants that are found in salads.
4. Provide each student with a clear plastic glove, and have them label the palm of the glove with their name, and the fingers of the glove with the names of the seeds. For younger students, you may choose to have pre-printed labels for them to affix to the gloves.
5. Students should wet five cotton balls and place one in each finger of the glove.
6. Next, place two to three seeds on each cotton ball. Use a different seed for each finger.
7. Have students puff some air into the glove, then fold the top of the glove over and tape it closed. You may then tape the completed gloves to a window (for warmth from the sun) or place them in a warm area of the room.
8. Observe the seeds for several days until germination is complete.
9. Once the seeds have germinated, transplant them into soil, and provide them with what they need to grow into mature plants. You also may choose to transplant them into a hydroponic growing environment as described in the companion lesson "Soda Bottle Hydroponics." If you decide to transplant the seeds, cut the bottom off of each finger of the glove and remove the cotton balls along with the sprouts. The entire cotton ball should be planted along with the seedling, as removing the cotton ball can damage the fragile roots.

Extension

Bring in a mature plant for each seed that was planted into the glove, and have a class salad party where students can sample the different vegetables.





Tomatoes, cucumbers, herbs, peppers and lettuce (shown here) are great hydroponic crops.

Hydroponics: Growing food without soil

Plants are usually grown in soil, but it is possible to grow plants without soil. This is particularly helpful in settings where soil is not available, such as urban areas where space for growing food is scarce, or areas where soil has been depleted of nutrients.

Hydroponics is a method of growing plants in water without soil. Common hydroponic crops include lettuce, tomatoes, cucumbers, herbs and peppers.

All plants need air, nutrients, water and light to grow. Nutrients are dissolved in water and taken up by the roots of the plant. The primary nutrients involved in plant growth are nitrogen, phosphorus and potassium.

Usually plants get these nutrients from the soil, but hydroponic plants are grown by floating their roots in nutrient-enhanced water. Another production method, aquaponics, blends aquaculture—feeding fish in tanks—with hydroponics. Aeroponics entails growing plants suspended in the air while their roots are misted with a nutrient-rich solution. With all three systems, water is recirculated.

All three forms of soilless gardening

conserve water and reduce the amount of space needed. Since the plants are grown inside, under lights, they can be grown year-round. Growing cycles are faster with certain crops. Plants can be planted closer together because root structures tend to grow down, not out, and the plants are not competing with one another for water and nutrients.

As most hydroponic systems are indoors rather than outside, light sources typically are artificial. This allows hydroponic crops to be grown and harvested year-round.

Plants in space

Finding an efficient way to grow plants in space is essential for long-term space travel or even colonization. Hydroponics provides a potential answer for this problem since the method uses no soil and requires less water and space than traditional growing methods.

Watch this short video clip from the University of Arizona to see how the recent movie *The Martian* addressed growing plants in outer space:

uanews.arizona.edu/videos/how-ua-delivers-martian-food.

Virginia hydroponics in action

Red Sun Farms has farms located in the United States, Canada and Mexico, including a farm, customer service center and distribution facility in Virginia, in Pulaski County. They utilize greenhouses to provide customers with produce all year long, including tomatoes, peppers, cucumbers and eggplants. Their high-tech greenhouses feature 100 percent recycling of water and nutrients that have not been consumed by the plants.

SmartBasil Farms in Suffolk uses a hydroponic greenhouse to grow basil for Whole Foods Market in Virginia Beach, and also for Baker's Crust in Norfolk. According to the farm, this system allows them to avoid using pesticides and herbicides needed in outdoor farming, and they are more easily able to offer a consistent product year-round.

CONTENT AREA

SOL: Science 1.4, 2.4, 4.4

Objective: for students to:

- Understand what plants need to grow
- Investigate the germination of seeds
- Define hydroponics and how it differs from traditional growing methods

Materials:

- Scissors
- 2-liter soda bottle
- Water
- Fertilizer, such as Floragro
- Cotton wicking material to make a wick, such as a rag cut into a strip 1 inch wide by 16 inches long
- Growing medium, such as vermiculite or perlite
- Seedlings (You also can use lettuce heads with roots, which may be available at the grocery store)



LESSON PLAN

Soda Bottle Hydroponics

Background Knowledge

All plants need water, light, nutrients, oxygen and space to grow to full maturity. Typically plants get the nutrients they need from the soil. The three most important nutrients for plant growth are nitrogen, potassium and phosphorous. It is possible, however, and sometimes even advantageous to grow plants without soil; this is called hydroponics. Hydroponics is particularly useful in places where they may not be enough quality soil or space. In addition to allowing growers to plant and harvest their crops in a smaller area, hydroponics actually uses less water than traditional growing methods, and because plants are grown inside they can be grown and harvested year-round. When a plant is grown using hydroponics its roots are submerged in nutrient-enhanced water. The addition of nutrients is important because plants normally would get these from the soil.

Procedure

1. Rinse out the soda bottle, and discard the cap. Cut the top of the bottle off just below where it begins to curve upward. Invert the top piece of the bottle into the bottom part.
2. Mix the fertilizer with water according to package directions, and add to the bottom part of the bottle. Fill until just before it reaches the spout of the top part.
3. Thread the wick through the bottle's opening so that it is submerged in the nutrient solution at the bottom.
4. Fill the top of the bottle with vermiculite or other growing medium.
5. Plant the seedling in the growing medium at the top of the bottle. The wick will provide it with a constant source of moisture and nutrients.
6. Refill the water-nutrient solution as needed while the plant grows.

Extension

In addition to the hydroponics, plant the same type of seedling in a pot with soil. Measure and record both plants' growth, and compare them.