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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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For additional information and activities, visit our website at AgInTheClass.org or call 804-290-1143

What's Growing On In Virginia?

AGRICULTURE IN THE CLASSROOM

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Corn converted into energy at biofuels plants

For the past three years, NASCAR drivers have fueled their cars with ethanol made in Virginia.

Biofuels have been around as long as cars have. At the start of the 20th century, Henry Ford planned to fuel his Model T's with ethanol, and early diesel engines were shown to run on peanut oil. But discoveries of huge petroleum deposits led to the use of affordable gasoline and diesel fuel.

However, with the recent rise in oil prices and concern about carbon dioxide emissions, biofuels have been regaining popularity.

Biofuels are energy sources made from living things or from the waste that living things produce. Supporters say biofuels could significantly reduce greenhouse gas emissions. Detractors claim that biofuel production poses a major threat to global food systems and the natural environment.

Types of biofuels

There are several types of biofuels. Biodiesel is a renewable fuel made from seed oils such as canola, sunflower or soybean, reclaimed vegetable or animal

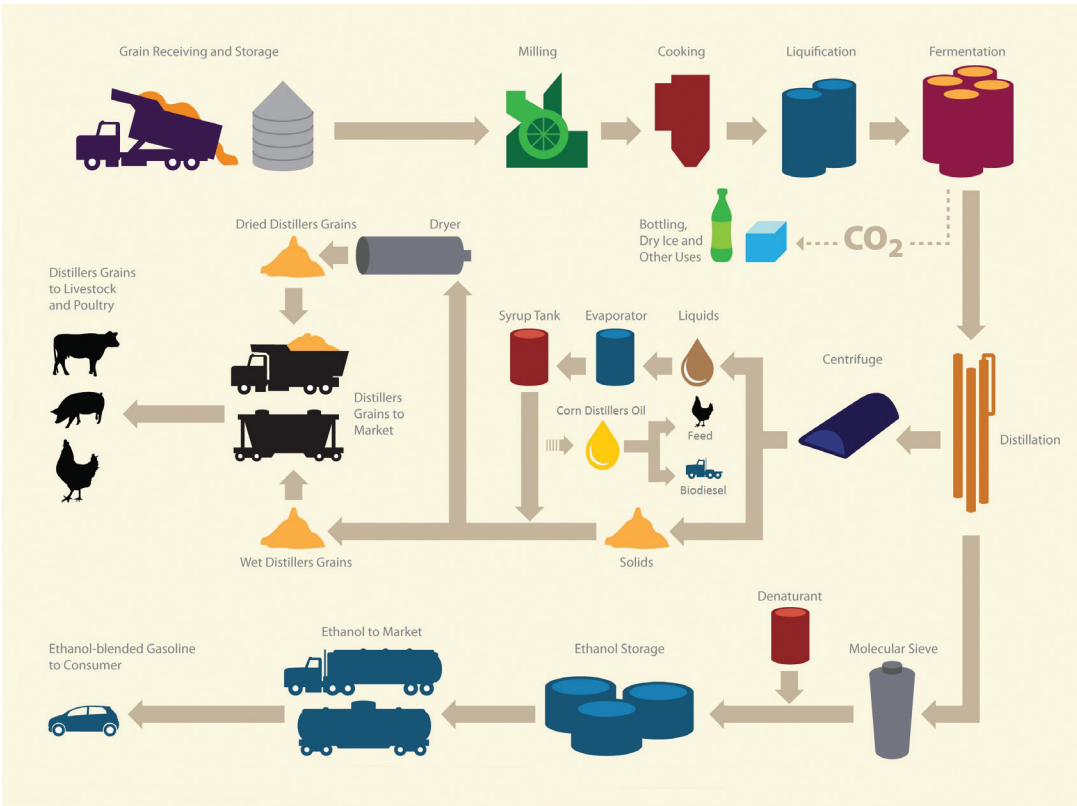


fats, or algae. Ethanol is an alcohol made from feed stocks like corn, sugar cane or cellulosic material. Ethanol generally is blended with

1. The former Vireol Bio Energy LLC in Hopewell is one example of a biofuels plant. 2. Feed trucks deliver grains to the plant. 3. Byproducts of corn processing. 4. Giant silos store the grains while they ferment. 5. Engineers monitor the processes. 6. Ethanol is loaded into tankers to take to fuel providers. 7. Consumers fuel up with ethanol-blend gasoline at the pump.

PHOTOS BY KATHY DIXON

DRY MILL ETHANOL PROCESS



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Bonus Activity

Yeast + sugar = ?

Ethanol is produced through a process called fermentation, in which yeast breaks down the sugars in corn. Try this activity to see what happens when yeast breaks down granulated sugar.

Step 1: Add 3 tablespoons of white granulated sugar and a packet of active dry yeast or dry quick-rise yeast (found in the baking aisle of a grocery store) to a 20-ounce plastic water bottle.

Step 2: Fill the bottle halfway with very warm tap water. Replace the cap, and shake to mix all of the contents.

Step 3: Remove the bottle cap, and place a balloon over the top of the bottle. Watch what happens as the yeast begins eating the sugar!



gasoline for use in automobile engines. Hard biofuels are made from low-density biomass, usually grass or wood byproducts that are pressed into combustible pellets. The pellets can be burned for electricity production or heating purposes.

Ethanol is essential component of gasoline

Ethanol plants around the country convert feed corn into fuel, corn oil and distiller's grains for livestock.

Ethanol is an essential component of the 134-billion-gallon-a-year U.S. gasoline market. When blended with gasoline, ethanol increases octane ratings, reduces production costs and provides compliance with emissions standards.

The majority of U.S. ethanol is made from corn, but it also can be produced from other feedstocks such as barley, sorghum, wheat and other small grains.

Feed corn used for ethanol

At biofuel plants, corn comes in, is cooked, separated and fermented. Ethanol is made, and the leftover mushy, polenta-like protein is dried and sold for livestock feed. The plant is capable

of extracting corn oil and capturing CO₂ as well. The corn that's sold to the plant is feed corn for animals, not corn that humans eat.

Grain buyers varied

Approximately 2.8 gallons of ethanol are produced from one bushel of corn. And because the corn is separated during the process, it makes nutritious feed ingredients (called distiller's dried grains with solubles, or DDGS) for livestock.

Grain buyers include small-scale farmers as well as large vertically integrated companies like Murphy Brown and Perdue. They purchase the distiller's grain from ethanol plants and add it to their feed mixtures.

Biofuels careers plentiful

There are plenty of job opportunities in the biofuels industry—for engineers, export specialists, grain elevator operators, farmers, plant inspectors, quality control technicians and truck drivers. The industry requires a large support network.

And with the growing population, there is a growing need for biofuels.

LESSON PLAN >> PRESCHOOL

Corn Prints

Background Knowledge

Called "maize" by Native Americans, corn was a completely new food for colonists since it was native to the Americas. In fact, in the early 1600s, Native Americans introduced settlers to this crop and taught them how to grow and prepare it. The colonists ate corn as a vegetable and ground it into a grain. Thus, corn was a very important crop and appeared in multiple ways on many Colonial tables. Benjamin Franklin even called it "one of the most agreeable and wholesome grains in the world."

Today, corn for grain or silage (a mixture of grains that is fed to animals) is raised in nearly every Virginia county. Virginia farmers harvest about 340,000 acres of corn for grain each year! This type of corn, called field or dent corn, is different from what you buy at the grocery store, which is sweet corn. Field corn is grown for animal feed and harvested with large combines. The corn is ground into feed that is fed to cows, chickens and other animals. Some field corn also is chopped up into silage for cows.

Sweet corn is grown for people. There is more sugar in this corn, which makes it tasty to eat. This is the type of corn grown in gardens and sold at vegetable stands and in the grocery store.

While we often think of corn kernels as being white or yellow, Native Americans grew several different types. Colors included red, white, blue and black. Discuss the types of corn children are familiar with.

Procedure

1. Trace students' hands (fingers closed) once on a piece of yellow construction paper and twice on a piece of green construction paper. Cut out.
2. Arrange the two green "leaves" at the base of the yellow corn to form the husk, and glue them together.
3. Add the "kernels" by dipping your fingers into the paint and stamping fingerprints onto the cob. You also may use Q-tips to dab and paint the kernels.

Extension

Glue real Indian corn seeds to the "corn cob." Create several large cornstalks on the bulletin board, and attach each child's ear of corn to form a display.



Bonus Activity

Fizz, fuel and feed

Step 1: Fill a glass jar one-third full of polenta, one-third with mineral oil and one-third water.

Step 2: Observe the layers, which represent three byproducts of corn fermentation.

Step 3: The polenta represents the distiller's grains for animal feed; the mineral oil represents the ethanol for biofuel; and the water represents CO₂, which is used in carbonated drinks.

Ethanol gives us Fizz, Feed & Fuel.

When field corn is used to make ethanol, **3** things are created.

1 FIZZ
CO₂ that puts the fizz in soda

2 FEED
Distillers grains to feed cows & pigs

3 FUEL
Ethanol to fuel cars & trucks

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LESSON PLAN >> ELEMENTARY SCHOOL

Super Seed Racers

Background Knowledge

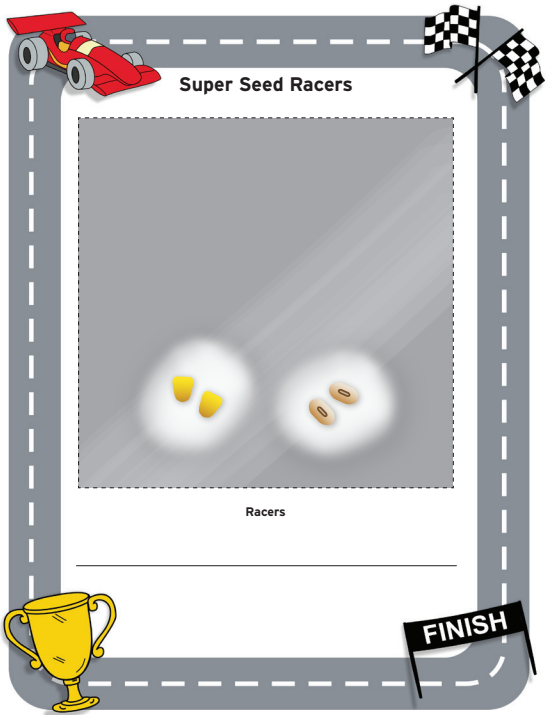
In this activity, students will “race” their seeds to see which germinate first and grow the tallest. Seeds play an important role with real race cars as well. Both NASCAR and Indy racing leagues use an ethanol-blend fuel in their cars. The NASCAR blend is made from 15 percent ethanol, a biofuel made from corn. In fact, ethanol produced in Hopewell at the Vireol Bio Energy LLC is used in NASCAR races. Ethanol biofuel is created in an efficient process that produces zero waste as the corn is turned into fuel.

Procedure

1. Define the term germination: “To sprout or begin to grow.”
2. Show the class a variety of seeds, and brainstorm what a seed needs in order to germinate. This list should be comprised of the childrens’ perceptions of what a seed needs to germinate, but guide them to include the following if they do not think of them on their own: water, air, warm temperatures.
3. Inform the children that they will be conducting a seed germination “race” using corn and soybean seeds.
4. Provide each student with a sandwich-size plastic bag.
5. Wet a cotton ball, and squeeze out the excess water.
6. Place the cotton ball inside the bag.
7. Place two seeds of the same type on the dampened cotton ball.
8. Repeat using a different type of seed so that there are at least 2 different types of seeds in the bag, with each type on its own cotton ball.
9. Seal the bag.
10. Cut along the dotted lines on the template. Tape the bag behind the window so that the seeds are visible.
11. Students also may color their templates.
12. Place in a safe place (preferably on a windowsill to demonstrate how seeds need warmth to germinate), and have students observe, measure and record the growth of their seeds.

Extension

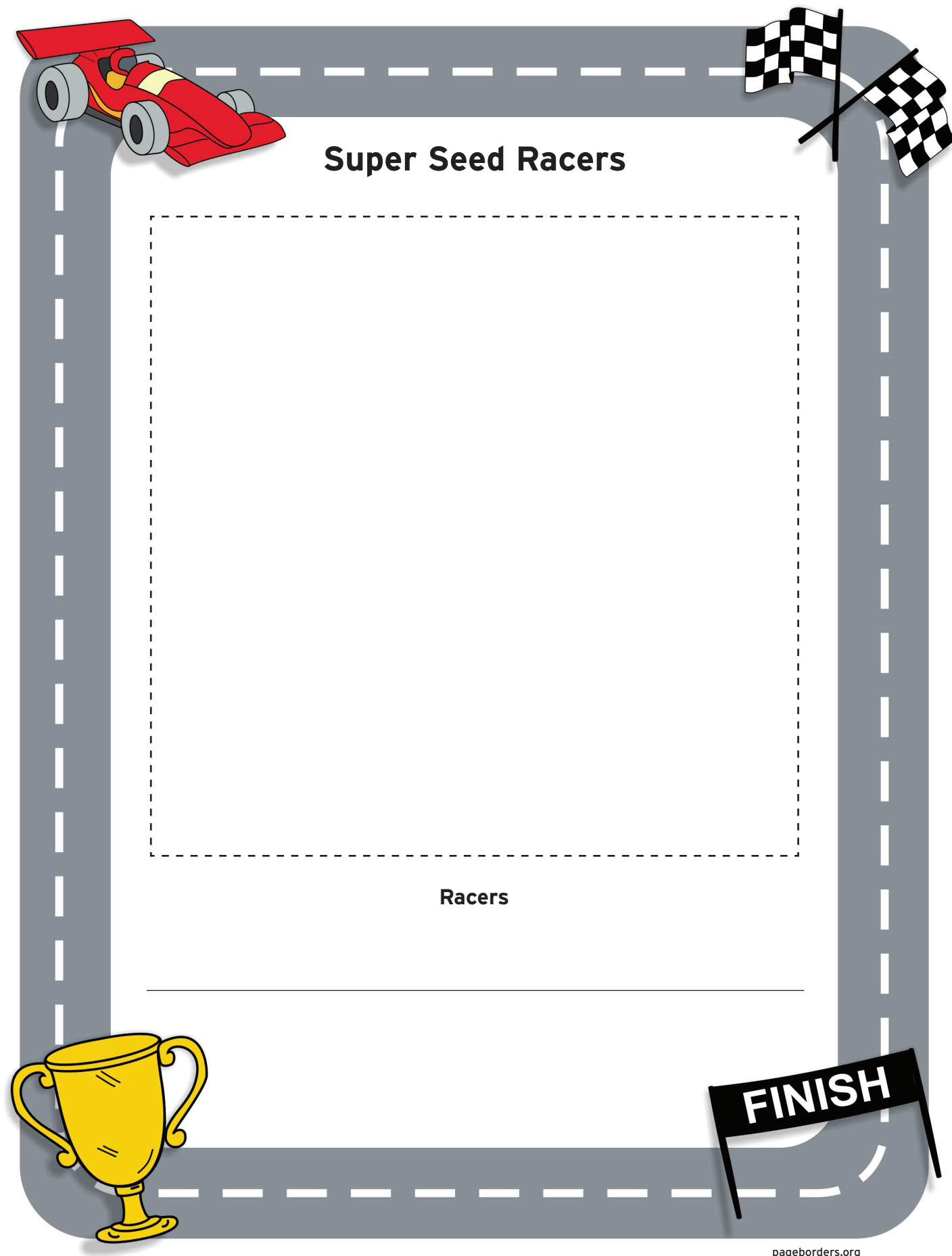
Once seeds have germinated, plant them in plastic cups or planters or outside for further observation.



- **SOL:** Science K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 2.8, 3.1, 3.8, 4.1, 4.4
- **Objective:**
for students to:
 - Investigate the germination of seeds
 - Investigate plant needs
- **Materials:**
 - 2 types of seeds (Corn and soybean seeds will be used in this lesson since these are the two types of plants typically used in biofuels. However, for germination purposes, any seeds will work.)
 - sandwich-size, zip-top plastic bag
 - cotton balls, two per student
 - template, attached
 - tape
 - scissors
 - markers or crayons
 - water



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LITERARY CORNER

Corn Aplenty, Dana Rau, Random House Books for Young Readers, ISBN: 0375855750

The Story of Corn, Mary Lindeen, Capstone Press, ISBN: 1429686413

Awesome Agriculture: Corn—An A-to-Z Book, Susan Anderson and JoAnne Buggy, Northwest Arm Press, ISBN: 1926781023

Corn, Gail Gibbons, Holiday House, ISBN: 0823422453

AITC Program Highlights

Teacher of the Year applications sought

Do you have an innovative way to incorporate agriculture into your classroom? Apply to be Virginia AITC's Teacher of the Year. The winner will receive a stipend as well as a trip to the National Agriculture in the Classroom Conference in Phoenix in June. Applications are available on the AITC website, AgInTheClass.org.

State Fair provides outdoor classroom

More than 10,000 Virginia students will visit the State Fair of Virginia this year and see the Virginia Standards of Learning come to life. Student groups who visit the fair explore Virginia agriculture, natural resources, history, technology and art through hands-on experiences and interactive learning. For more information or to register your class for a field trip, visit the fair website at: StateFairVa.org.

