Taste and Teach
December - Citrus

Five **Fun Facts** About Citrus!

- The navel orange got its name because the button end resembles a belly button.
- Eating just one orange provides 100% of the recommended daily intake of vitamin C.
- Moro or “blood” oranges are known for their burgundy color.
- Florida is the number one producer of citrus fruits, and the majority of their crop is made into processed juice products.
- California is the leading producer of fresh citrus fruits (sold fresh rather than made into juice)!

Four **Fun Teaching Ideas!**

- Watch this video on citrus from Sunkist: https://www.youtube.com/watch?v=WNNdMrBaYm4
- Create a comic strip about the Asian citrus psyllid and California citrus trees. See the Asian Citrus Psyllid Fact and Activity Sheet.
- Bees are needed for citrus fruit to grow! Try the *Busy Bees* WE Garden activity to illustrate the role bees play in a fun and artistic way.
- Have students create a Venn Diagram comparing two citrus fruits. Make it a fruity-Venn, and draw fruit shapes instead of circles!

Explore all the great citrus resources in this section!

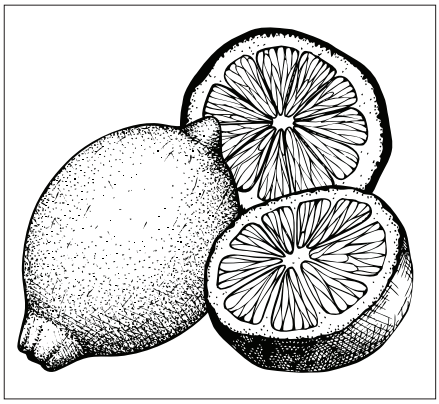
Learn About Ag®
California Foundation for Agriculture in the Classroom

Commodity Fact Sheet

Citrus Fruits

Information compiled by Sunkist Growers

How Produced – Citrus trees are propagated asexually through a procedure known as grafting which fuses two different varieties of plants. In the case of citrus trees, one variety, the rootstock, is selected for its hardiness and the other variety, the scion, is selected for its high-quality fruits. The rootstock, grown from a seed, is typically a two- to three-year-old seedling while the scion is a bud from a mature tree. Through grafting, the scion fuses to the rootstock and becomes a new tree. In approximately five years, the tree produces the same variety of fruit that was budded onto the rootstock. The successfully grafted trees are sold to citrus growers through wholesale nurseries and are certified disease-free. There are approximately 270,000 bearing acres of citrus trees in California.



History – Oranges and lemons can be traced back to the ancient Middle East. In Sanskrit, the oranges and lemons were called “Nagrunga” and “Nimbu” and their nectar was used both as a drink and as medicine. The Arabs called oranges “Naranji” while the Romans called them “Arancium.”

All navel oranges are related to each other and can be traced back to the Washington navel tree that still stands today in Riverside, California. Eliza Tibbets, a Riverside pioneer, is credited with planting California’s first two Washington navel trees in 1873. The resulting sweet seedless oranges helped launch Southern California’s modern citrus industry.

Varieties – Citrus fruits of one variety or another are available year-round from California, Arizona, Florida, and Texas. Navel oranges, a consumer favorite, are sweet, seedless and easy to peel. They are winter oranges, available November through June, and derive their name from their distinctive “blossom end.” Cara Caras are a type of Navel orange which is available December through May. They have a rich pink pulp, are naturally sweet, low in acid and seedless. Valencia oranges, which are excellent for juicing as well as for eating fresh, are summer oranges available February through November. California also produces Moro and Sanguinelli “Blood” oranges, named for their exterior blush and ruby interior flesh.

Traditional lemons, such as the Eureka and Lisbon varieties, are a California classic and available all year long. They have a tart flavor and a zesty peel. Traditional lemons are not typically eaten as a whole fruit but are wonderful flavor enhancers. Meyer lemons have a golden peel and, as a cross between a mandarin and a lemon, are less acidic than traditional lemons. Desert grapefruit are harvested October through March while summer grapefruit are available May through September. Specialty citrus includes Melo Golds and Oro Blancos, grapefruit varieties that are popular with those preferring a sweeter taste. Pummelos, or “Chinese” grapefruit, considered a delicacy among many Asian cultures, are the largest of all citrus fruits.

Almost a dozen different mandarin and tangerine varieties, such as Clementines, Gold Nuggets, and Pixies, are available November through May. Most are easy to peel and have a lively flavor. Minneola tangelos, available December through May, are a cross between a grapefruit and a mandarin. They are juiciest variety.

Commodity Value – California is the leading producer of fresh citrus varieties for consumption and second only to Florida in overall citrus production. Both oranges and lemons are among the top 20 commodities produced in the state as listed by the California Department of Food and Agriculture. Oranges and their products are also one of California’s leading agricultural exports. Canada is the top importer with Korea, Japan, Hong Kong, and China following closely. Other importers include Singapore, Malaysia, Australia, New Zealand, and Taiwan. Lemons are also a high value export crop. Japan is the largest importer of California lemons.

Top Producing Counties – Most of the nation’s fresh citrus products are produced in California and Arizona. The ideal climate in these areas permits the growth of fruit that is as pleasing to the eye as it is to the flavor. The leading counties in California citrus production include Tulare, Kern, Fresno, Ventura, Imperial, Riverside, and San Diego.

Nutritional Value – Citrus is well known for its high vitamin C content, a key nutrient that supports your immune system and health. Your body doesn’t store vitamin C, so it’s important to stay on top of your daily intake. Eating citrus is an easy way to meet your daily needs. Some citrus fruits, like oranges offer an excellent source of vitamin C. In fact, Cara Cara Navel oranges, also called The Power Orange, contain 100% of the daily recommended vitamin C intake as well as vitamin A, folate and fiber. Oranges, lemons, grapefruit, mandarin, tangelos and tangerines are great tasting, low calorie foods that are good sources of carbohydrates and fiber. They are also sodium-, cholesterol-, and fat-free.

For additional information:
Sunkist Growers
Website: www.sunkist.com

Sunkist

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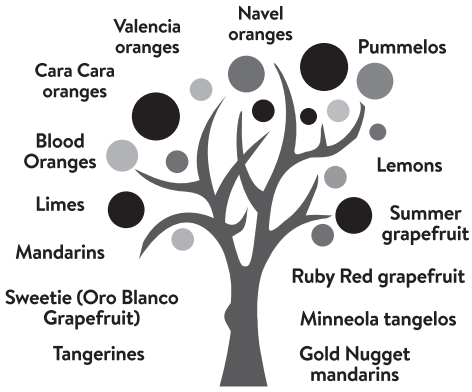
This is one in a series of fact sheets composed by the California Foundation for Agriculture in the Classroom (CFAITC). For additional educational materials: CFAITC, 2600 River Plaza Drive, Suite 220, Sacramento, CA 95833-3293 • (916) 561-5625 • (800) 700-AITC • Fax: (916) 561-5697
Email: info@learnaboutag.org • Website: LearnAboutAg.org

Citrus Fruit Activity Sheet



Citrus Varieties

Availability of Citrus Varieties by Month

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ORANGES												
NAVEL ORANGE	■	■	■	■	■	■					■	■
VALENCIA ORANGE		■	■	■	■	■	■	■	■	■		
CARA CARA ORANGE	■	■	■	■	■							
BLOOD ORANGE	■	■	■	■	■	■						
GRAPEFRUIT												
CALIFORNIA STAR RUBY				■	■	■	■					
SUMMER MARSH RUBY							■	■	■	■		
PUMMELO	■	■	■								■	■
SWEETIE (Oro Blanco)	■										■	■
MELO GOLD											■	■
TANGELOS												
MINNEOLA TANGELO	■	■	■	■								
MANDARINS												
CLEMENTINE										■	■	■
W. MURCOTT	■	■	■	■	■						■	■
GOLD NUGGET		■	■	■	■							
LEMONS	■	■	■	■	■	■	■	■	■	■	■	■

Lesson Ideas

- Test the pH of a citrus variety and two non-citrus fruits. Create a hypothesis and compare your findings.
- Experiment with the effect lemon or lime juice has on cut avocados or apples. Explain the significance of pH and enzymes in cut fruit preservation.
- Use the citric acid of a citrus fruit to create electricity.
- Make orange, lemon, or grapefruit juice popsicles.
- Make a bar graph comparing the vitamin C content of different fruits, including citrus fruits.
- Observe and practice various grafting techniques used in growing citrus trees.
- Perform experiments that show the effects of freezing on citrus fruits.
- Compare the climates of different citrus growing regions of the world.
- Determine the percentage of water in a citrus fruit.
- Measure and graph the peel to fruit weight ratios of several different citrus fruits.

Fantastic Facts

1. California and Arizona produce most of the United States' fresh citrus fruit.
2. Citrus fruit trees are reproduced by grafting.
3. Citrus has nutrients, like vitamin C, that support your immune system and health.
4. Cara Cara Navel oranges offer the most vitamin C with 100% of the daily recommended intake in just one orange. They are called The Power Orange because they also provide fiber, folate, potassium and vitamin A.
5. Navel oranges are named for the small, navel-like formation on their blossom end.
6. Cara Cara Navel oranges and grapefruit have a natural pink to ruby tint, which is due to the natural presence of the antioxidant lycopene.
7. You can reduce the amount of salt you use without sacrificing flavor by adding lemon zest and juice to your meals.
8. Blood oranges are known for their rich, ruby-colored flesh, which they get from high concentrations of anthocyanins – natural plant pigments that have antioxidant properties.

Lesson Plan: What's Inside?

Introduction: From Pummelos to Pixies, citrus fruits come in a wide range of sizes. They also differ in quantity of segments, presence of seeds, and volume of juice.

Objective: Students will examine a variety of citrus fruits. They will estimate and then measure the quantitative characteristics of the fruit.

California Standards: CC Math: 3-4.MD.2,4; 5.MD.2; 6.SP.4; HS.N-Q.1,2,3

Materials: A variety of whole citrus fruits (oranges, limes, grapefruit, lemons and tangerines), knife, paper towels, juicer (optional), string, ruler, balance, crayons.

Procedure:

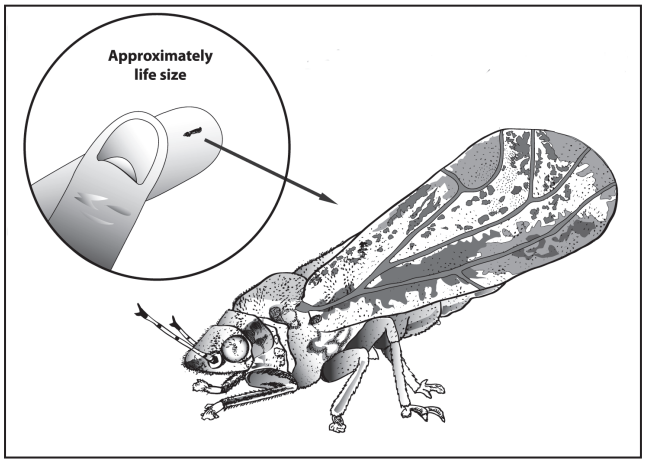
1. Have students predict how many segments and seeds they will see when the fruits are cut cross-wise. Plot the estimates on a graph. Use unit fractions as appropriate.
2. Weigh each fruit whole and record the results. Measure the circumference using a string and a ruler. Plot the results on a graph.
3. Cut the fruit cross-wise and count the number of segments and seeds. Record and chart the results and compare to the estimates.
4. If seeds are present, remove and dry for planting at a later date.
5. Use the juicer to remove the juice from the fruit. Reweigh the citrus halves to determine the juice content of the citrus fruit. Plot the fruit weight and juice weight on a graph.
6. Mix the juices to make a citrus drink for the class to enjoy.

07/20 Learn About Ag This Fact and Activity Sheet was developed by California Foundation for Agriculture in the Classroom in conjunction with California educators and meets the required education standards of the California Department of Education.

Invasive Species Fact Sheet

Asian Citrus Psyllid

Background – Invasive species are organisms that are moved by nature, people, or animals into an ecosystem where they have not been previously found. Some of these organisms are spread naturally or accidentally by people, while others are spread intentionally, without understanding the harm they might cause. Although most of the organisms brought into our state cause no harm, a few are able to thrive in California to the detriment of native ecosystems, recreation, agriculture, including specialty crops, infrastructure, and public or animal health. These invasive species include plants and animals, insects and other arthropods, and pathogens.



Description: A tiny bug called the Asian citrus psyllid is a big problem for citrus growers, home gardeners, and anyone who enjoys eating citrus. The Asian citrus psyllid threatens all citrus varieties and a few ornamental plants, because it can transfer a bacterium that causes huanglongbing [hwang-long-bing] (HLB) disease, also known as "citrus greening disease."

The Asian citrus psyllid adult is approximately the size of a sesame seed and has mottled brown wings. When the adult feeds it tilts its hind end at a 45-degree angle, making it look like a thorn on leaves and stems. Female Asian citrus psyllids lay hundreds of eggs in their lifetime, usually on new shoots and leaves. Asian citrus psyllid juveniles, or nymphs, are yellow in color and produce sugary 'honeydew' from the plant liquids they eat. Waxy, white tubules can be seen extending from their hind ends to move honeydew away from their bodies so they don't drown in it.

Habitat: The Asian citrus psyllid and HLB came from southern Asia and citrus psyllids were first discovered in North America, in Florida in 1998. The Asian citrus psyllid has since spread through parts of the United States and Mexico. HLB is also gradually spreading along with the psyllid. Psyllids feed on leaves and stems of all citrus varieties.

How Asian citrus psyllid and HLB are spread: The Asian citrus psyllid spreads by flying from citrus tree to citrus tree and HLB spreads when an Asian citrus psyllid picks up the bacteria by feeding on an infected plant, then flies to another plant and feeds again. Psyllids can travel long distances when people transport infested plants or plant debris from one area to another. This can lead to infestations in new regions or states.

Why it is a problem: The Asian citrus psyllid is dangerous because it can infect citrus trees with the bacterium that causes HLB, the worst citrus disease in the world. There is no cure for the disease and infected trees will eventually die. Homeowners and farmers must remove and destroy infected trees to prevent further spread of the disease.

HLB has killed many citrus trees in Asia, India, parts of the Middle East, South America, and Florida, and is now threatening citrus production in California, which is a $2.1 billion industry. California is the nation's primary source of fresh market oranges, producing 80 percent, and also supplies 87 percent of the nation's lemons.

How it affects California specialty crops: Many of the affected crops are California specialty crops. Specialty crops are fruits and vegetables, tree nuts, dried fruits, and horticulture and nursery crops (including floriculture). Many of the fruits, nuts, and vegetables eaten in the United States are grown right here in California. The Asian citrus psyllid could destroy these citrus crops including orange, lemon, lime, mandarin, kumquat, and grapefruit.

How you can help: Only purchase citrus trees from a good nursery close to your home and do not transport citrus trees to other areas. Anyone with citrus trees should inspect young leaves whenever watering or pruning. Always bag or dry out citrus prunings before disposing of them so psyllids don't hitch a ride to new places. Before transporting fruit, remove stems and leaves to make sure there are no psyllids. If an Asian citrus psyllid is found, report it to local agriculture authorities.

For Additional Information:
California Department of Food and Agriculture
1220 N Street
Sacramento, CA 95814
Pest Hotline: (800) 491-1899
www.cdfa.ca.gov/plant/acp
www.californiacitrusthreat.org

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Asian Citrus Psyllid Activity Sheet

Asian citrus psyllid nymphs can be identified by the waxy tubules that they secrete.

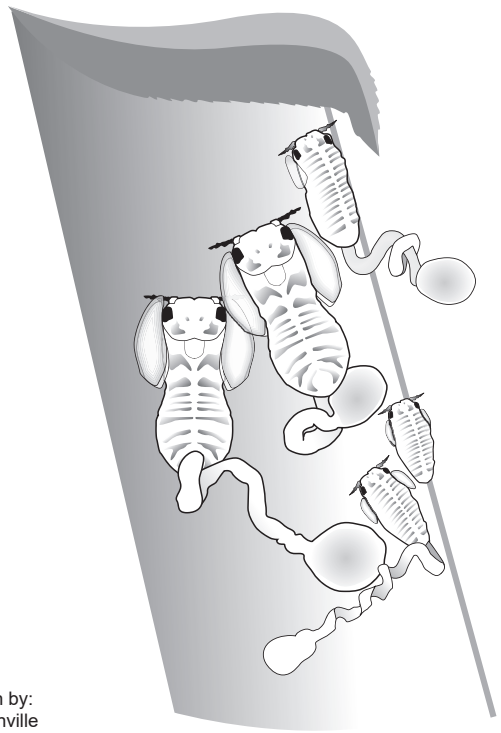

Illustration by:
Gwen Conville

Fantastic Facts

1. What is the Asian citrus psyllid?
2. What does the Asian citrus psyllid adult look like on leaves and stems?
3. How do you cure trees infected with huanglongbing disease?
4. What percentage of fresh oranges sold in the U.S. are grown in California?
5. Name two things you can do to help stop the spread of Asian citrus psyllid.

1) A tiny insect that threatens citrus 2) A thorn 3) No cure 4) 80% 5) Buy local plants, inspect citrus fruit and trees, wipe off fruit and remove leaves and stems, bag or dry out green waste

Lesson Ideas

- Create a comic strip featuring the Asian citrus psyllid and its destruction of citrus.
- Research the latest psyllid appearances and mark on a map how close the psyllid is to your home.
- Write a persuasive essay on the importance of keeping pests like the psyllid out of California.
- In groups, create a psyllid model out of recycled materials. Give each creation a creative name.

Lesson Plan: Stop the Psyllid

Introduction: To understand the economic impact of Asian citrus psyllid and huanglongbing disease, students will act as citrus growers managing a navel orange farm. ACP and HLB will be introduced into the orchard and students will calculate the point at which their orchard is no longer profitable.

Materials:
- You Tube Video: “Deadly Huanglongbing Disease Threatens California Citrus” www.goo.gl/vUczj6
- You Tube Video: “Detecting Asian Citrus Psyllid” www.goo.gl/sD3ccM
- Paper, colored pencils

Procedure:
1. Play both videos and discuss psyllid identification and damage caused by HLB disease.
2. Have students pair up to be “farmers” who own a 100-acre orange farm.
3. Project the template found at www.LearnAboutAg.org/resources/fact/asian_citrus_temp.pdf. Students should use this template to draw their own chart to show what’s happening in the citrus orchard at each stage of infestation. Chart boxes should be large enough for students to draw a picture of the orchard and write down the costs associated with ACP and HLB.
4. Students should use the following information to predict when the citrus farm is no longer profitable:
   - Trees take at least 5 years to start producing fruit.
   - HLB disease takes several years to start affecting fruit production. It can kill a tree in about five years. Diseased trees must be removed.
   - There are 100 trees per acre in the orchard
   - Profit per acre = $2,500 ($25/tree)
   - Annual cost of pesticides to control ACP = $500/acre applied every year after ACP has been detected
   - Tree replacement costs = $25/tree
   - At what point is it no longer profitable to farm citrus?
5. Why is it important to stop the spread of Asian citrus psyllid and HLB?

07/20

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Email: info@learnaboutag.org Website: www.LearnAboutAg.org

Citrus - Squeeze the Day!

There are over 3,000 growers farming 320,000 acres of citrus in California. Citrus trees are **propagated** through a procedure known as grafting, where two different plant parts are physically joined and grow together as one plant. One part, the **rootstock,** is selected for its hardiness and the other part, the **scion,** is selected for its fruit quality.

There are only three original species of citrus fruits—mandarin orange, pumelo, and citron. All other citrus fruits we see today are actually products of **crossbreeding** these original species. What varieties of citrus have you tried listed on this page? What seed varieties did they originate from? Answer below using the information on this page.

The acidity in lemons, along with metal conductors, create enough electricity to illuminate a small lightbulb.

Citron Tree

Growing Region: Coastal and desert regions of California.

Common Relatives:

- Eureka and Lisbon lemons are bitter-flavored lemons that can be used to flavor both sweet and savory dishes.
- Pink variegated lemons are known for their pink flesh and acidic flavor.
- Persian limes are traditional limes known for their tart flavor.

Nutritional Value: Along with supplying substantial amounts of vitamin C, the health benefits of these fruits also rest in their fiber and phytochemicals.

Come Clean with Citrus

Citrus concentrates are easy-to-make and effective cleaning solutions. Learn how to make an all-natural disinfectant, anti-adhesive, and air freshener. Visit sunkist.com/healthy-living to learn more.

Mandarin Tree

Growing Region: 75% of oranges are grown in the San Joaquin Valley.

Common Relatives:

- Valencia orange is commonly used to make the orange juice in your refrigerator.
- Navel orange is known for their belly button-like apex and sweet aroma.
- Blood orange is known for their crimson flesh and a flavor that is both sweet and tart.

Nutritional Value: All orange varieties are a good source of vitamin C, folate, fiber, and **antioxidants.**

Pummelo Tree

Growing Region: The desert regions of California.

Common Relatives:

- Pummelos look like a large grapefruit, but are less acidic.
- Red and pink grapefruits get their color from lycopene, a natural antioxidant.
- White grapefruits are actually yellow in color and available year round.

Nutritional Value: Pummelo varieties are an excellent source of vitamin C, and a source of many other nutrients such as fiber, folate, thiamin, vitamin A, and potassium.

Pummelos look like a large grapefruit, but are less acidic.

Red and pink grapefruits get their color from lycopene, a natural antioxidant.

Particularly Pesky Pests

Invasive species are **organisms** that are moved by nature, people, or animals into an ecosystem where they have not been previously found. Currently, California citrus is under the threat of attack by a tiny bug with a big impact. The bug is called the Asian Citrus Psyllid and it causes Huanglongbing disease. Although the pest is only the size of a sesame seed, it slowly kills the tree and stops it from producing fruit.

Research the latest Asian Citrus Psyllid sightings and plot them on a map (using digital or print sources). Which sighting is closest to your school? How far away is it? Learn more about Asian Citrus Psyllid from Ag in the Classroom's Fact and Activity Sheets LearnAboutAg.org/resources/fact.

Contact CDFA to report suspicious insects or disease symptoms in your citrus trees.

Standard: CA History Social Science 3.1

Orange you glad you read this page?

Orange peels sprinkled over garden soil can act as a natural slug repellent.

Size Up Your Citrus

Collect a variety of citrus fruits to conduct an analysis of size and shape. Measure the citrus fruits both in standard and metric units. Determine the diameter, circumference, weight, and volume of each citrus fruit. Use the provided scale to illustrate and label your citrus fruit according to size.

Standards: CC Math 3.MD.A.2, 5.MD.C.3, 8.G.C.9

very small | small | medium | large | very large

Harvest of the Month (harvestofthemonth.cdph.ca.gov)
National Geographic (nationalgeographic.com)
Sunkist (sunkist.com)
University of California Riverside Citrus Variety (citrusvariety.ucr.edu)

ORANGE you glad we have FARMLAND?

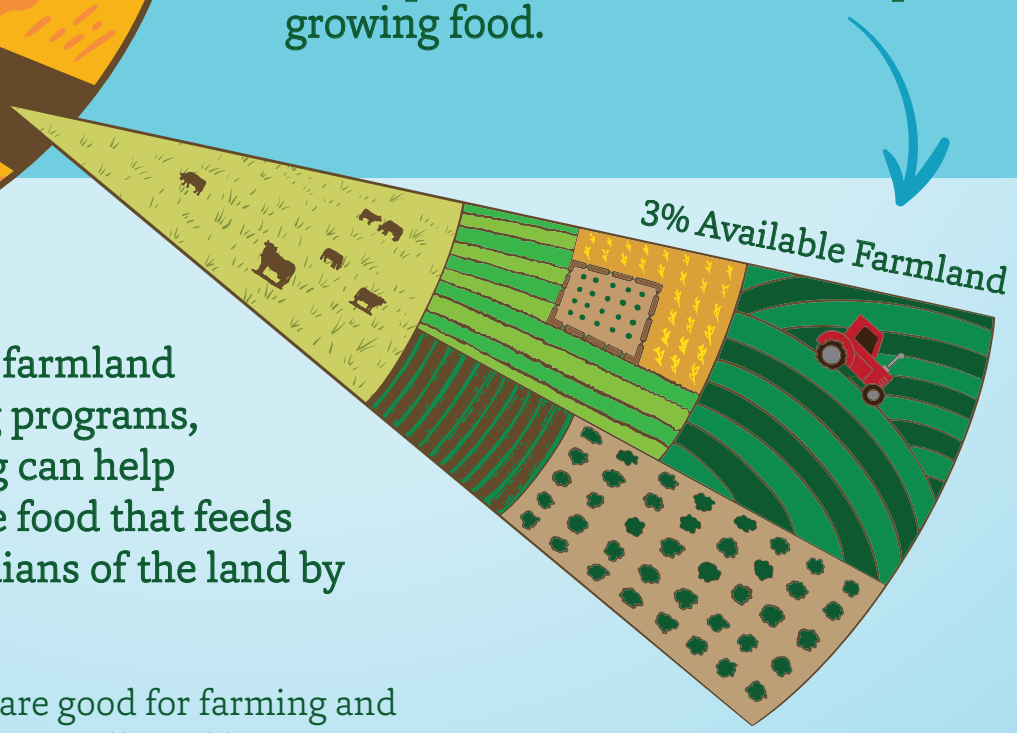
LEARNING WHERE OUR FOOD AND FIBER COMES FROM IS AN IMPORTANT LESSON IN LIFE.

Learn how much land is used to grow food for the world's population

What percentage of the land do you think it takes to grow all of the food that we need to feed the world?

IMAGINE THE EARTH AS AN ORANGE...

- Approximately 75% of the earth is covered in water.
- 22% of the earth is deserts, swamps, mountains, polar regions, or land that is too rocky, wet, or hot to grow food.
- This 3% of the earth is acceptable for farming and represents what humans depend on for growing food.



Knowing the importance of keeping farmland healthy by participating in recycling programs, water conservation, and not littering can help keep the land healthy to produce the food that feeds the world. We can all become custodians of the land by accepting the following challenges:

- Learn the difference between lands that are good for farming and the type of lands that are good for shopping malls and homes.
- Practice caring for the land by conserving water, not littering, and recycling.
- Support the land by eating California grown foods.
- Learn about conservation easements that allow landowners to protect their farmland forever. When farmland is protected, we all benefit by having food to eat and natural resources, like wildlife, that farmland provides.

HOW WILL WE CONTINUE TO GROW ENOUGH FOOD FOR THE GROWING POPULATION?

Visit California Farmland Trust's website
CAFARMTRUST.ORG

Raley's

CALIFORNIA FARMLAND TRUST

Learn About Ag®
California Foundation for Agriculture in the Classroom

ORANGE YOU GLAD WE HAVE FARMLAND?

GRADE 3–5

OBJECTIVE:

Learn the importance of protecting and keeping land healthy to produce our food and fiber for current and future generations.

ACTIVITY:

Look at the front of the poster. Make note that the orange represents the earth's entire surface area. Think about how much land is available to use for food and fiber production.

1. Collect an orange, a plastic knife, paper towels, and a cutting board or plate.

2. Slice the orange into four equal pieces. Set aside three of the four pieces. These three pieces represent the water covering the earth's surface. How many slices are remaining?
    a. If you are struggling with this concept – find four quarters. Four quarters equals one dollar. If we take three quarters away, how much change do you have left?

3. With the one remaining quarter slice of orange, slice it into four equal pieces. Set aside three of the four pieces. These three quarters represent deserts, swamps, mountains, polar regions, or land that is too rocky, wet, hot or that has soil conditions that cannot be used to grow food.

4. With the one remaining slice of orange, remove the peel off of the orange piece.

5. Calculate how much land is still available with the leftover orange piece. After calculating, check your answers with the percentages on the front of the poster. This small section of orange that is left is what land we currently grow our food on!

How can we use this available land to grow food for current and future populations? By becoming a good custodian of the land and accepting the four challenges listed on the front.

MATERIALS:

ENOUGH FOR EACH PARTICIPANT:

- Orange
- Plastic knife
- Cutting board or plate
- Paper towels

CALIFORNIA STANDARDS:

GRADE 3
NGSS: 3-LS4-4

GRADE 4
Math CC: 4.NF.3a 3b
NGSS: 4-ESS3-1

GRADE 5
Math CC: 5.NF.2
NGSS: 5-ESS3-1

DISCUSSION TOPICS:

- What is the key message about the amount of available land?
- What would a piece of land look like that is good for growing food?
- How can you be more like a farmer, and care for the land and keep it viable for the future?
- Learn about the benefits of adding a conservation easement to farmland by visiting: **cafarmtrust.org**

EXTENSION ACTIVITIES:

ENGLISH / LANGUAGE ARTS / HISTORY

- Journal about this farmland activity and the different ways you can take care of the land.
- Write a fiction or non-fiction story about conserving land to submit to California Foundation for Agriculture in the Classroom's *Imagine this…* Story Writing Contest
- Farmland provides a home for various types of wildlife such as hawks and rodents. Research the other positive benefits farmland provides. Research different farming methods and create a chart with pros and cons of each one. Share your findings with your peers.

VISUAL AND PERFORMING ARTS

- Create an orange peel garland. Collect the remaining orange peels from your activity, let orange peels dry in order to create a bright addition to your home.
- Use the activity as an example to produce a game, puzzle, poster, or other means of delivering a similar message of conserving farmland.
- Watch Featured Videos on **LearnAboutAg.org** to learn the Five F's of agriculture. Create your own visual illustrations of each industry represented.

MATHEMATICS

- Convert percentages of land to fractions of land.

GLOSSARY

Conservation: The act of protecting natural resources for current and future generations.

Conservation Easement: A voluntary legal agreement that permanently limits uses of the land in order to protect its conservation values.

Custodian: One that guards and protects or maintains.

Natural Resources: Something that is found in nature and can be used by people. Examples include light, air, water, plants, animals, soil, stones, minerals, and fossil fuels.

For more information on conservation easements visit:

CAFARMTRUST.ORG

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11 INVESTIGATING THE POLLINATION CYCLE

Busy Bees

Fruit trees must be pollinated to produce fruit. Pollen grains are transferred from the male flower part to the female flower part by wind, water, birds, bees and other insects. Bees are attracted to the nectar and pollen of fragrant flowers. The bee stops at a flower to suck the nectar, and the pollen grains get stuck to the bee's body. When the bee moves to another flower, the pollen grains are transferred to the second flower. More than 80 percent of crop pollination is accomplished by bees.

1. Write the following journal prompt on the board: "Do you think bees are helpful or harmful? Describe." After students brainstorm and write their answers down, ask them to share with the class.

2. Distribute green paper plates and craft supplies. Instruct students to illustrate and narrate the pollination cycle of bees on the paper plates. Use yellow pom-poms to depict the bee. Each quadrant of the plate should explain a different step of the pollination cycle:

   a. The bee is looking for food.
   b. The bee lands on the flower and sips the nectar. Pollen gets stuck on its body.
   c. The bee flies away, looking for more food.
   d. The bee lands on a new flower with pollen from the last flower. The pollen is transferred.

3. Use brown construction paper to create a tree trunk. Attach to the bottom of the plate with tape.

4. Ask each student to explain the pollination story to a partner using their completed visual aid.

Objective: Students will identify each step of the pollination cycle and understand the importance of bees in agriculture

California Standards

Kindergarten: ELA CC: SL.K.1,5
NGSS: K-LS1-1, K-ESS3-1

Grade 1: NGSS:1-LS1-1

Grade 2: ELA CC:SL.2.1,5
NGSS:2-LS2-2

Grade 3: ELA CC: SL.3.1,5
NGSS:3-LS1-1, 3-LS2-1

This lesson can be easily adapted to meet the educational standards for a variety of grade levels.

Materials:

- Green paper plates
- Circle template, divided into quadrants
- Brown construction paper
- Crayons, colored pencils or markers
- Tape
- Yellow pom-poms

Vocabulary:

Nectar: a sweet liquid for pollinators that is produced by flower glands called nectaries.

Pistil: the female part of the flower including the stigma, style and ovary.

Pollen: the fine, powder-like material produced by the anthers of flowering plants.

Pollen basket: a smooth, slightly concave surface of the outer hind leg of a bee that is fringed with long, curved hairs that hold the pollen.

Stamen: the male part of the flower consisting of the anther and filament.

This lesson has been adapted from Virginia Agriculture in the Classroom curriculum. For additional educational resources, visit *AgInTheClass.org*.