

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!

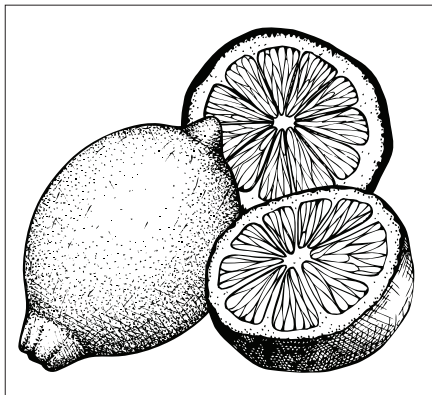
Explore all the great citrus resources in this section!



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.



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.

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.

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.

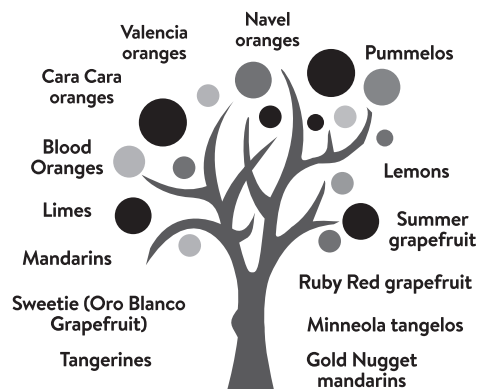
Top Producing Counties – Most of the nation’s fresh citrus products are produced in California and Arizona. The ideal climate in these areas permits the growth of fruit that is as pleasing to the eye as it is to the flavor. The leading counties in California citrus production include Tulare, Kern, Fresno,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

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.

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.

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
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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 CDEA 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.

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

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

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.



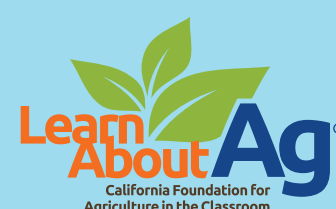
Knowing the importance of keeping farmland healthy by participating in recycling programs, water conservation, and not littering can help keep the land healthy to produce the food that feeds the world. We can all become custodians of the land by accepting the following challenges:

- 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



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.

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.

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



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

This is an educational poster 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 ©2020 California Foundation for Agriculture in the Classroom. All rights reserved.

Raley's



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:

- The bee is looking for food.
- The bee lands on the flower and sips the nectar. Pollen gets stuck on its body.
- The bee flies away, looking for more food.
- 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 2: ELA CC:SL.2.1,5
NGSS:2-LS2-2

Grade 1: NGSS:1-LS1-1

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.

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INVESTIGATING THE POLLINATION CYCLE

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.

Imagine This...

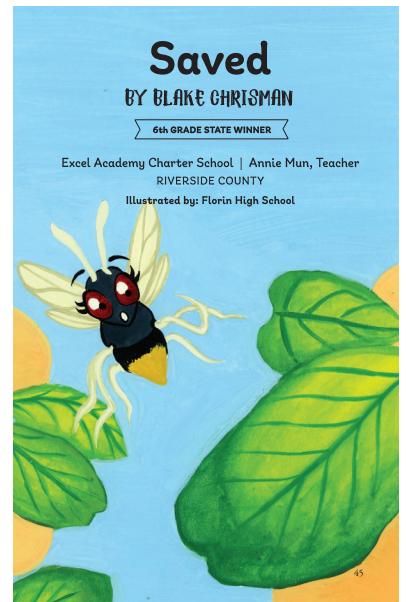
Saved

By Blake Chrisman

2022 *Imagine this...* Story Writing Contest Winner

6th Grade, Excel Academy Charter School

Annie Mun, Teacher, Riverside County



Some people believe I am a heroine, but maybe I am just an ordinary mother, California farmers depend on members of my family all the time to protect their crops. I am a teeny tiny wasp, *Tamarixia radiata*. This is a glimpse into my life as a humble parasitic wasp.

When I buzzed around the citrus tree on the school playground, I swear the kids swatted me away, even though I'm minuscule and they could never actually see me. Was this all the thanks I got for saving the oranges that they eat for lunch? Also, why can't they play somewhere else? There is a perfectly empty soccer field over there. Why do they have to do it in my nesting zone? I'm stingless, so I can't even protect myself! I zipped away as I dodged the swatting. I hummed around a house near the school as the owner of the house was talking to a pest control official. I knew the problem. A huge orange tree was starting to wither, and I noticed it was sick with the most devastating citrus killer in the world, Huanglongbing. Huanglongbing was a sign of my favorite nesting place, inside an Asian citrus psyllid. These plant-feeding insects spread the pathogenic bacterium that causes Huanglongbing disease. I darted over and skimmed around the leaves. Finally, I spotted the psyllids and got right to work. After laying a couple of eggs, one under each psyllid nymph, I decided to visit some other orange trees in the garden, knowing that my actions had prevented the psyllids from spreading Huanglongbing to the other trees in the garden and neighboring yards. The psyllids' bodies will become nutrients for my larvae. Once my newborns emerge, the psyllids won't be able to infect another citrus again.

While stopping to rest, I spied a mantis chowing down on a mosquito a few feet away. I also stared at some bees happily pollinating. A swallowtail fluttered gracefully through the garden, examining

the orange tree I just saved. My mind was starting to relax when I realized that I was being pursued by an army of ants. I jerked out of the way as the ants attacked and escaped just in the nick of time. I zigzagged around the mantis and zoomed over the garden fence. I hovered near another orange tree and dove out of the way of an interfering crow that swooped near me. The autumn leaves rustled by as I stationed myself on an evergreen near the tan house. I watched hummingbirds, butterflies, and carpenter bees travel from flower to flower as they produced a deep hum. As dusk started approaching, I flitted over to a crack under the rusty eaves of the ancient house. There, I held onto the rough wall as I shut my eyes and tried to drift off. One citrus psyllid jumped over the fence. Two psyllids jumped over the fence. Three psyllids jumped over the fence. Four psyllids jumped over the fence. Parasitic wasps like me just don't sleep.

Overnight, I thought of a plan to save more of California's prized citrus fruits. As soon as dawn broke, I flew as high as my little wings could take me. I finally spotted a truck with the words "Oranges, Grapefruits, Lemons, Pomelos" plastered on the tailgate. That was it! I shot over, assuming it was heading to a citrus orchard, and landed inside the bed of the pickup where I shuffled around until I saw rows of trees in the distance. The small oranges twinkled like diamonds in the sun's rays. As the truck rumbled close enough for me to fly over, I alighted, so I flew into the air and made out the slightest bit of yellow on a tree far away. I buzzed over to it and landed on the very tree I was looking at. Yes, this tree was infested with the psyllid, so I got to work right away! Another parasitic wasp flew over and started searching the other side of the tree. We worked together all afternoon. When our eggs were finally deposited under all the psyllid nymphs, I gave my teammate a high antenna since we had no hands. I waved goodbye as I found a hole in a tree adjacent to the one that we saved. As I climbed in, I thought about how I could save the world tomorrow.

**Learn more about the "Imagine this.. Story Writing Contest"
by visiting LearnAboutAg.org/imaginethis !**