What’s Growin’ On?
...Under the California Sun

A message for everyone...

Have you ever wondered what’s growing in the fields, orchards, or forests as you drive by in the car? California is a special place for agriculture. The microclimates and fertile soil found in our state are perfect for growing crops that don’t grow well in many other places. More than 400 different crops are grown right here in California and our state leads the nation in agriculture production. Nearly half the fruits, nuts, and vegetables consumed in the United States are produced by California farmers. Mild climate conditions in certain areas of California allow crops to be grown year-round. As a result, Californians are fortunate to always have a variety of fresh produce to choose from at the grocery store.

This year’s edition of What’s Growin’ On is inspired by California raisins and the farmers who grow them. Our state grows 100 percent of the raisins consumed in the United States! The Central Valley provides excellent growing conditions for seedless grapes, which are then dried in the sun to produce raisins. Raisins are a nutritious and all-natural food that has been around for centuries. This dried fruit is easy to pack for a snack and has provided energy for explorers on important expeditions to the North Pole and even to outer space!

This newspaper will introduce you to some of the important agricultural products produced in California and will inspire you to explore why California is such a great place for agriculture.

A message for teachers...

For the past 12 years, California Foundation for Agriculture in the Classroom has produced What’s Growin’ On? to help students discover the many ways agriculture impacts their daily lives.

Use the activities on the following pages to connect your students to the world of agriculture and its important role in California. Encourage students to share What’s Growin’ On? at home to help family members appreciate the process and people involved in producing food, clothing, and other necessities often taken for granted.

Each annual edition of What’s Growin’ On? is developed by educators and reviewed by agriculture experts to provide current and accurate information. The activities on the following pages are aligned to third through eighth grade Content Standards for California Public Schools including Common Core and Next Generation Science Standards.

An answer key and additional lesson ideas may be found in the Extra! Extra! extension lessons posted at www.LearnAboutAg.org/wgo.

Table of Contents

Introduction ................................................................. page 2
We Are Number One! .................................................. page 3
Sprouting the Bounty .................................................... page 4
Super Swine ................................................................. page 5
One Potato, Two Potato, Three Potato ................ page 6
Careers with Critters .................................................... page 7
Solar Powered Fruit ..................................................... pages 8 and 9
Movin’ in the Garden .................................................... page 10
Delicious Dairy Delights ............................................. page 11
The Invaders ................................................................. page 12
Where Would We Be Without Honey Bees?....page 13
The Vegetable With a Heart ....................................... page 14
Growing Strong Glossary ........................................... page 15
Acknowledgments ....................................................... page 16

© www.LearnAboutAg.org
On the California map, name the counties and list where the top 10 California agricultural products are produced. The California Grows map is helpful for this activity. www.LearnAboutAg.org/cagrows

People, plants, and animals love California for many of the same reasons. Location! Location! Location!

A microclimate is the climate in a small area, usually affected by local geographical features such as bodies of water, valleys, and mountains. California’s microclimates make our state a good place to grow many different kinds of crops. California has mild seasons in many areas of our state that make it possible to grow crops year-round.

For example, the coastal marine microclimate of the north coast of California experiences heavy rainfall during the winter with cool, foggy summers. This climate is ideal for growing coast redwood trees.

On a separate piece of paper, name and describe a microclimate in the area where you live. Name and describe one crop that is grown there.

Visit www.cfbf.com/counties and click on your county to see a list of the top agricultural products produced there.
Why are seeds important?

We need seeds to grow our future food supply. Some farmers hire seed companies to grow their seeds for them. Farmers want to make sure they get healthy seeds that have been selected for vigor and other traits such as disease- and drought-resistance.

Leon Etchepare, Emerald Farms

Where is your farm? Our headquarters are in Maxwell, CA and most of the land we farm is in Colusa and Glenn Counties.

What crops do you grow for seed?
We grow hundreds of species of plants. A few examples include arugula, beets, cucumbers, melons, zucchini, pumpkins, and tomatoes.

What are important points to know about growing crops for seed? In order to produce a seed crop, we must grow the vegetable crop beyond the actual edible stage. For example, if you plant lettuce you will notice that it sends up flowers and forms seeds near the end of the growing season. When this happens, the lettuce is no longer very good to eat and is usually bitter.

Who do you sell seeds to? We grow seeds for many different worldwide seed companies. You have probably seen some of these packages of seeds for sale at your local garden store.

Materials:
• Latex glove
• 5 cotton balls
• Variety of 5 seeds
• Water
• Tape

Procedure:
1. Moisten cotton balls.
2. Place a different seed inside each cotton ball.
3. Place one cotton ball in each finger tip of the glove.
4. Tape glove to a sunny window.
5. Keep cotton balls moist.
6. After seeds germinate, cut fingers off glove, remove cotton balls and plant seedling in a container or in the ground.
7. Observe seedlings over the next month. Use a notebook to record observations, growth measurements, and sketch seedlings as they grow into mature plants.

The seeds are released
After seeds mature, they drop to the ground or are collected for eating or planting.

The plant flowers
Flowers attract pollinators.

The plant grows
Depending on the variety, sunflower plants can reach 3 to 12 feet tall.

The seed germinates
When soil is warm enough, the seed cracks open and first roots and leaves emerge.

The plant dies
Seeds that dropped to the ground lie dormant until conditions are right for growth in the spring. The life cycle begins again.

Standards:
Science – Grade 3: 3a Grade 4: 6a,b, I Grade 6: 7h. NGSS – Grade 3, 6, 7, 8: LS1.B, LS3.A, LS3.B. English – Grade 3, 4, 5: RI 1, 7, W 7 Grade 6, 7, 8: RI 1, 7, W 7. History-Social Science – Grade 3, 4, 5: Chronological and Spatial Thinking 4 Grade 3: 3.1.1 Grade 6, 7, 8: Chronological and Spatial Thinking 3.
Super Swine!

History of Pork

Pork is the meat from swine, also known as pigs or hogs. Pigs were domesticated from wild boars in Europe thousands of years ago. They were not a native species of the Americas and were brought to America by Christopher Columbus in 1493. Pork was very important to colonists for meat, and lard which was used for baking, lamp oil, candle making and even soap. The population of pigs in the colonies grew quickly. Pigs can have about two litters of piglets a year, with 8-12 piglets per litter, depending upon the breed.

In an attempt to control large herds of roaming pigs, colonists built a long wall on the northern edge of Manhattan Island. This is the same area that is now Wall Street.

Today, more pork is consumed around the world than any other meat. Examples of pork include ham, pork chops, sausage, and bacon.

Swine Products

Every part of the hog is used. Besides meat, we also get many other products from hogs.

Insulin for regulation of diabetes, valves for human heart surgery, suede for clothing, and leather for footballs all come from swine. Gelatin, fertilizer, brushes, plastics, antifreeze, floor waxes, crayons, glue, rubber, and chalk all contain swine byproducts.

Swine Breeds

1. The Hampshire pig is black with a white belt and erect ears. Hampshires were originally bred in Scotland and Northern England and were introduced to the U.S. in 1825.

2. The Yorkshire pig is white with erect ears. Yorkshires were introduced to the U.S. in 1830 from England.

3. The Landrace is a white colored pig with a long body and droopy ears. Landrace pigs are known for their ability to have large litters. The breed originated in Denmark and came to the U.S in 1930.

4. The Duroc is a reddish colored pig with droopy ears. These hogs originated from breeders in New York and New Jersey in 1812.

Activity

Swine Breeds

Draw an arrow from each description to the correct photo.

- The Hampshire pig is black with a white belt and erect ears. Hampshires were originally bred in Scotland and Northern England and were introduced to the U.S. in 1825.
- The Yorkshire pig is white with erect ears. Yorkshires were introduced to the U.S. in 1830 from England.
- The Landrace is a white colored pig with a long body and droopy ears. Landrace pigs are known for their ability to have large litters. The breed originated in Denmark and came to the U.S in 1930.
- The Duroc is a reddish colored pig with droopy ears. These hogs originated from breeders in New York and New Jersey in 1812.

Activity

Math Activity

Determine the pounds of lean meat from a market hog weighing:

200 lbs = _______________
285 lbs = _______________
302 lbs = _______________

(Sources: US EPA, National Pork Beard, 4-H Swine Curriculum)

Activity

Pig Idioms

Interpret these common idioms:
- Going hog wild
- Bringing home the bacon
- When pigs fly
- Pig out

Activity

Make a timeline of when each swine breed came to the U.S.
Include one other historical fact about what was happening in the country at that time.

Standards: History-Social Studies – Grade 3, 4, 5: Chronological and Spatial Thinking 1; Grade 5: 5.4.1, Grade 6, 7, 8: Chronological and Spatial Thinking 1, 2; Math – Grade 3: MP 1, OA 1, Grade 5: 6, 7, 8: MP 1; English – Grade 3, 4, 5: RI 1, 3, 4, 7 W 4, 7 Grade 6, 7, 8: RI 1, 4 W 4, 7
Potatoes are one of the world’s staple food crops. They are tubers that develop from thickened, underground stems. Label the parts of the potato plant, then, discuss the job of each plant part. Use the glossary for assistance.

- Flower
- Leaf
- Stem
- Roots
- Potato
- Eye
- Young tuber or potato

**Spud-tastic Science Activities**

**Super Soaker**

- Fill two small bowls about $\frac{1}{2}$ full with water.
- Add 3 tablespoons of salt to one bowl and label it saltwater.
- Get help from an adult to slice one medium sized potato in half lengthwise. Examine the two potato halves and write down your observations on a separate piece of paper.
- Soak one half of the potato in the bowl of water and the other half of the potato in the bowl with saltwater overnight.
- How do you think the potato slices might change overnight? Write your predictions down.
- Remove the potato halves and examine the difference between the half that was soaked in water and the half that was soaked in salt water. Write down your observations.
- Explain the scientific process that you think is responsible for the change that happened to the potato halves that were soaked in water and in salt water.

**Trash Can Potatoes**

*You don’t need a big garden to grow potatoes!*

1. Drill holes in the bottom of a 30-35 gallon trash can and add a thin layer of gravel to the bottom to ensure proper drainage after watering.
2. Add a layer of potting soil that is about 18 inches deep.
3. Purchase three seed potatoes from a garden center and cut into chunks that each have at least two eyes (dimples). Allow cut edges to air dry overnight.
4. Plant potato pieces about 4 inches deep and evenly spaced in the potting mix.
5. Place the garbage can outdoors in an area that gets 4-6 hours of sunlight each day. Keep soil moist by watering as needed.
6. As potato plants grow, add a little more potting soil mix to cover stems, but make sure leaves remain exposed. Continue to “hill” or add soil around the stem throughout the growing season to allow potatoes more room to grow under the soil.
7. At the end of the growing season, dump your trash can onto a tarp and harvest your potatoes.

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Nutrition Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Size 1 potato (148g/5.3 oz)</td>
</tr>
<tr>
<td>Amount Per Serving</td>
</tr>
<tr>
<td>Calories 110</td>
</tr>
<tr>
<td>Total Fat 0g</td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
</tr>
<tr>
<td>Trans Fat 0g</td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
</tr>
<tr>
<td>Sodium 0mg</td>
</tr>
<tr>
<td>Potassium 620mg</td>
</tr>
<tr>
<td>Total Carbohydrate 26g</td>
</tr>
<tr>
<td>Dietary Fiber 2g</td>
</tr>
<tr>
<td>Sugars 1g</td>
</tr>
<tr>
<td>Protein 2g</td>
</tr>
<tr>
<td>Vitamin A 0%, Vitamin C 45%, Calcium 2%, Iron 6%</td>
</tr>
</tbody>
</table>

**Research and write a paragraph about the impact of the Irish Potato Famine on world history.**

**Activity**

**Standards:**
- NGSS – Grade 3: LS1.A, Grade 5: 6, 7, 8; ETS1.A, ETS1.B. Science – Grade 3: 3a, 5d, 6 Grade 4: 6a, 7 Grade 5: 5b, 6b, 7b, 8b Grade 6: 7a, 8a. History – Grade 3, 4, 5. Social Studies – Grade 3, 4, 5. Historical Interpretation 1, 3, 6. Grade 6, 7, 8. Historical and Spatial Thinking 2, Research, Evidence 1, Historical Interpretation 2. Math – Grade 3, 4. MPI, OA 1 Grade 5, 6, 7, 8. MPI, English – Grade 3, 4, 5. RI 1, 2, W 2, 5. Health – Grade 4, 5, 6. Grade 5: 3, 2, N. Grade 5: 3, 2, N.
Did you know?

Farm animals, like cattle, sheep, horses, and pigs, often require care from a veterinarian. Many farms have veterinarians perform regular checkups to make sure their animals are healthy. Most large animal vets make visits to their patients rather than have their patients come to an office. Their trucks are equipped with all the medical equipment they need to perform exams and even some surgeries at farms. Watch a video from America’s Heartland, “U.S. Veterinarian Shortage” to see a large animal veterinarian in action. goo.gl/CrnaTh

Daily Schedule of a Large Animal Veterinarian

Vet work changes from day to day. Here’s one example of a large animal vet’s day:

6:30 a.m. – drive to a dairy to do pregnancy check on cows.
10:00 a.m. – drive to a horse ranch to do regular vaccinations, suture a large cut, and perform lameness exams.
12:30 p.m. – lunch on the go
1:00 p.m. – drive to a client’s home to perform a dental exam on one horse and to castrate a young colt
6:00 p.m. – head home

Activity

Compare the digestive systems of a cow and a turkey using the Venn diagram. A cow is an herbivore, meaning they are plant eaters. Turkeys and chickens are omnivores, which means that they eat both plants and animals.

Compare a Vet’s Schedule to Yours

My Daily Schedule:

________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________

Explain why you think these two animals have different digestive systems?

________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________
________________________________________

Dr. Troy S. Ford DVM, Clovis California

What is the hardest part of your job? Trying to figure out what is wrong with my patient. Since they don’t talk, they can’t tell me what’s wrong or where they hurt. I have to rely upon the owner for information about the animal and symptoms they are having.

What is your favorite part of your job? Working with the animals and being able to help them when they are sick or injured. I also really enjoy doing surgeries and the challenge it brings.

Did you always want to be a veterinarian? I knew by the end of high school that I wanted to be a veterinarian.

Where did you go to school to become a veterinarian? I went to Cal Poly, San Luis Obispo then to UC Davis for vet school and completed my surgery residency at the University of Pennsylvania.

Standards: NGSS – Grade 6, 7, 8: LS1.A. Science – Grade 4: 2b Grade 5: 2a, c; English – Grade 3, 4, 5: RI 1, 7 W 1a, 7; Grade 6, 7, 8: RI 1 W 1a, 7.
2. Dried on the Vine. This method allows grapes to remain on the vine while they dry in the sun. Machines then harvest the dried grapes, cutting down on the amount of hand labor needed for harvest. These grapes dry in the sun for 3–4 weeks. After drying, the paper trays are rolled up and the raisins are put into bins that are shipped to the processing plant.

1. Paper Trays. Grape clusters are cut from the vine and laid on paper trays in rows between grape vines. Many workers are needed to pick the grapes and place them on the drying trays. The grapes dry in the sun for 3–4 weeks. After drying, the paper trays are rolled up and the raisins are put into bins that are shipped to the processing plant.

People have used the sun to dry and preserve food for centuries. Raisins were enjoyed by ancient Egyptians and were important for journeys where food had to be stored for long periods without spoiling. Raisins were among the food brought on famous expeditions to discover the new world, the North Pole and outer space.

Today, approximately 95 percent of the raisins in California are made from Thompson seedless grapes. Thompson grapes are grown for both raisins and as table grapes that you have probably seen in the grocery store. Thompson grapes make excellent raisins due to their thin skin, lack of seeds, and sweet flavor.

California raisins have one ingredient, dried California seedless grapes.

California raisins are all natural and are dried by the sun with no added sugar.

\[ \frac{1}{4} \text{ cup of raisins} = \text{one serving of fresh fruit.} \]

Raisins are:
- Fat and cholesterol free
- Low in sodium
- High in antioxidants
- A source of dietary fiber and potassium
- A good source of all-natural energy

California raisins contain naturally occurring sugars that are easily absorbed by the body and converted to energy. A pre-exercise snack of raisins and nuts provides a sustained source of energy.

(Spiller, Sphera Foundation & Health Research & Studies Center)

Compare and contrast these two different drying methods in the Venn diagram.

What do both methods have in common?
You need to follow a recipe to make a sweet spread for your breakfast toast. The recipe is in grams, but you only have a measuring device for ounces. Convert the recipe for ounces.

1 Gram = 0.035 Ounces

You will need:
- Sunshine and warm weather
- Seedless grapes
- Baking tray

**Directions:**
Pick at least 20 grapes off the stem, then wash and dry them. Evenly spread grapes on baking tray and place outside in full sun. Observe grapes each day until they are ready to eat. This will take a week or so depending upon the weather.

What do you predict will happen to your grapes in the sun?

Taste one of the grapes each day and describe how the taste changed as the grape transformed into a raisin.

What do you think made the taste change during the drying process?

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Grams</th>
<th>Ounces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raisin juice concentrate</td>
<td>5000</td>
<td></td>
</tr>
<tr>
<td>Cinnamon</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Raisin paste</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Cream cheese</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Vanilla extract</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

Science helps us learn how food works. Let’s use raisin bread as an example. Here are the common ingredients found in homemade raisin bread. Fill in the rest of the chart.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>What is it?</th>
<th>What does it do?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Dry Yeast</td>
<td>Single-celled fungi</td>
<td>Activates the yeast</td>
</tr>
<tr>
<td>Warm Water</td>
<td>H₂O</td>
<td></td>
</tr>
<tr>
<td>Flour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td>Provides food for the yeast</td>
</tr>
<tr>
<td>Salt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable Oil</td>
<td></td>
<td>Makes the bread soft</td>
</tr>
<tr>
<td>Raisins</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During WWII the demand for high energy foods and sugar substitutes resulted in the War Production Board ordering that California’s entire wine grape crop be made into raisins.

The process of osmosis happens when water molecules move across a semipermeable membrane from an area where water molecules are highly concentrated to an area where water molecules are less concentrated. This movement of water molecules continues until the concentration of water molecules on both sides of the membrane is equal.

What do you predict will happen if you place several raisins in a glass of water and let it stand overnight?

Carry out the experiment and write down your observations.

What is the semipermeable membrane in this experiment?

What happened to the raisins after soaking overnight in water?

Explain why this happened.

Did You Know?

It takes 4.5 pounds of fresh grapes to make 1 pound of raisins. How many pounds of grapes would you need to make 50 pounds of raisins? Write your equation below.

Sources: Sunmaid, CA Raisin Marketing Board, Britannica, California Bountiful: Jan/Feb 2010
Vitamin D is needed for strong bones. The body makes vitamin D when skin is exposed to sunlight. Just remember to wear sunscreen.

<table>
<thead>
<tr>
<th>Age</th>
<th>Not Active Girls</th>
<th>Not Active Boys</th>
<th>Somewhat Active Girls</th>
<th>Somewhat Active Boys</th>
<th>Very Active Girls</th>
<th>Very Active Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-8</td>
<td>1,200 – 1,400</td>
<td>1,200 – 1,400</td>
<td>1,400 – 1,600</td>
<td>1,600 – 1,800</td>
<td>1,600 – 2,000</td>
<td>1,600 – 2,000</td>
</tr>
<tr>
<td>9-13</td>
<td>1,400 – 1,600</td>
<td>1,600 – 2,000</td>
<td>1,600 – 2,000</td>
<td>1,800 – 2,200</td>
<td>2,000 – 2,400</td>
<td>2,000 – 2,600</td>
</tr>
<tr>
<td>14-18</td>
<td>1,800</td>
<td>2,000 – 2,400</td>
<td>2,000</td>
<td>2,400 – 2,800</td>
<td>2,400</td>
<td>2,800 – 3,200</td>
</tr>
</tbody>
</table>

Source: HHS/USDA Dietary Guidelines for Americans, 2010

Do these physical activities in an outside space using a little imagination.

Math Activity

Imagine that you wake up in the morning and your car is covered with a foot and a half of snow! You have to get to school and your mom has to get to work so you start shoveling. You finish after ½ hour of hard work. At school, your teacher starts the day with P.E. and you play basketball for an hour. Whew, that was a great workout! How many calories did you burn doing these activities? Show your work on a separate piece of paper.

The number of calories you need each day is based on your age, gender, and how much you exercise.

Very Active means you play sports or do an aerobic activity like running for more than 40 minutes a day.

Somewhat Active means you do a little bit of physical activity like fast walking for 30-40 minutes a day.

Not Active means you do very little physical activity and spend most of your time sitting or standing in place.

Calories burned per hour varies depending upon intensity of activity, age, and body weight.

Vitamin D is needed for strong bones. The body makes vitamin D when skin is exposed to sunlight. Just remember to wear sunscreen.

Standards: English – Grade 3, 4, 5; RI 1; Grade 6, 7, 8; RI 1. Math – Grade 3, 4; MP 1, OA 1, 2; Grade 5; MP 1, OA 2; Grade 6, 7, 8; MP 1. Health – Grade 4: 1.3 N, 6.2 N; Grade 5: 1.3 N, 6.2 N; Grade 7, 8: 1.6 N, 1.14 N, 7.3 N.

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Dairy is one of the five food groups. MyPlate recommends that girls and boys ages 9-18 eat 3 servings of dairy per day.

What is one serving of dairy =
1 cup of low fat or fat-free milk
1 cup of low fat or fat-free yogurt
1 ½ oz of hard cheese or 1 string cheese
1 cup of pudding made with milk

Nutritional Benefits of Dairy
Milk provides nine essential nutrients: calcium, potassium, protein, vitamin D, vitamin A, phosphorus, riboflavin, vitamin B12, and niacin. These nutrients are important for strong bones and teeth, building muscle, and healthy skin.

Breakfast is an important meal that provides the energy and nutrients we need to start the day. Build a healthy breakfast that includes at least three of the five food groups, including dairy.

Explain the health benefits of dairy to your family. Write them down.

Food Safety
Pasteurization is the process of heating milk to a specified temperature for a set amount of time before cooling it back down, packaging, and selling it to consumers. What role do you think this heating process plays in food safety?
**The Invaders!**

**Here’s the dirt…**

Invasive species are insects, plants, animals, and diseases that are moved by nature or people into an ecosystem where they have not been previously found. They often have no natural predators to control their numbers and as a result, they outcompete or kill native plants and animals.

**Why do we care?**

Invasive species can destroy agriculture crops, eliminate jobs, threaten food supplies, and damage our backyard gardens and wilderness areas. On average, a new pest is introduced into California every 60 days. Invasive species cost California’s agriculture industry about $3 billion per year in control methods and crop losses.

**WHO ARE THEY?**

- **Asian Citrus Psyllid**
  - Spreads huanglongbing disease that causes bitter fruit and kills citrus trees.
  - Photo credit: David Hall, USDA Agricultural Research Service, Bugwood.org

- **Japanese Beetle**
  - Feeds on leaves, fruit, and roots, damaging plants and destroying lawns.
  - Photo credit: Alex Wild www.alexanderwild.com

- **Red Imported Fire Ant**
  - Painful stings threaten people, livestock, pets, and wildlife.
  - Photo credit: Alex Wild www.alexanderwild.com

- **Asian Longhorned Beetle**
  - Tunnels through hardwood trees killing timber, nursery stock, and shade trees.
  - Photo credit: Karen Snover-Clift, Cornell University, Bugwood.org

- **Mediterranean Fruit Fly**
  - Maggots feed inside fruit and cause it to rot.
  - Photo credit: Scott Bauer, USDA Agricultural Research Service, Bugwood.org

- **Yellow Starthistle**
  - Invasive plant that crowds out native grasses and reduces forage for livestock and wildlife.
  - Photo credit: www.nrcs.usda.gov

- **Quagga and Zebra Mussels**
  - Clogs water systems and crowds out native species. One female can release up to 1 million eggs.
  - Photo: slocounty.ca.gov

- **European Grape Vine Moth**
  - Caterpillars feed on grapes and grape flowers, destroying the harvest.
  - Photo credit: Todd Gilligan, CSU, Bugwood.org

**How Can You Help?**

- **If you travel out of the area, don’t bring home food, plants, animals, firewood, or other material that might carry an invasive species.**
- **Do not release pets such as hamsters, gold fish, and reptiles into the wild.**
- **Plant only native plants in your yard.**

**Detective Dogs!**

Dogs, trained to detect agricultural products in shipments play an important role in preventing the spread of invasive species. These dogs work with their handlers in airports, shipping centers, ports, and state and country borders. When the dogs smell an agriculture product like fruit, vegetables, plants, soil, wood, or certain insects, they scratch at the container. The container is then opened and inspected by a biologist to check for invasive species. If any are found they are properly disposed of or shipped back to the person who sent the package. After the dogs work for a few hours, they have mandatory play or nap time!

Meet the detective dogs working in California by visiting www.cdfa.ca.gov/plant/dogteams

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**Standards:**

- **NGSS** – Grade 3: LS2.C, LS4.C Grade 6, 7, 8: LS2.C
- **Science** – Grade 3: 3c
- **Math** – Grade 3: MP 1, OA 1, 2, 8, Grade 4: MP1, OA 1, 2, 3 Grade 5, 6, 7, 8: MP 1
- **English** – Grade 3, 4, 5: RI 1, 3, 4, 7 W 2, 4, 7 Grade 6, 7, 8: RI 1, 3, 4 W 2, 4, 7

© www.LearnAboutAg.org
Honey bees are very important to people. They pollinate many of the food crops we eat. About \( \frac{1}{3} \) of our crops require pollination to produce fruits and seeds. Honey bees also make delicious honey.

In California, honey bees live in colonies of around 50,000 bees. There are three types of bees in a colony:
- **Drones** – males who mate with a young queen in flight.
- **Workers** – females who gather nectar to make honey, guard the hive, build honeycomb, and care for eggs and larvae. Most bees in the colony are workers.
- **Queen** – lays eggs which hatch into larva then pupate into adult bees. There’s only one queen in a colony.

**Activity**

On a separate piece of paper, draw the following steps to show how honey bees help pollinate a cherry tree.

1. Honey bee lands on cherry blossom to gather nectar.
2. Pollen from the blossom’s anthers rubs off and sticks to the honey bee’s fuzzy body.
3. Honey bee flies to another cherry blossom to collect more nectar.
4. As honey bee is gathering nectar, it accidentally brushes against the sticky stamen from a different variety of cherry blossom and leaves some pollen behind. This is called cross pollination.
5. The pollinated blossom develops into a cherry.

**Activity**

Build a honey bee model using materials such as empty toilet paper rolls, glue, yellow paint, electrical tape, pipe cleaners, construction paper, and other creative materials. Use the photo to identify and label the parts on your model. You may also add a stinger and a proboscis to your model. Only female worker bees have stingers. The proboscis is a long, straw-like tongue that the bee uses to collect nectar from flowers. Take your model home and explain what you have learned about honey bees to your family or friends.

**Activity**

Each person in the U.S. consumes an average of 1.1 pounds of honey each year. In order to produce one pound of honey, honey bees have to fly approximately 55,000 miles to gather nectar from flowers. How many miles do honey bees fly in order to make enough honey for all the people who live in your house?

**Activity**

On a separate piece of paper, write a paragraph that explains how honey bees are involved in making a delicious treat of strawberry ice cream.

**Did You Know?**

When worker bees find nectar, they fly back to the hive and do a type of bee dance to let the other bees know which direction to fly to find food.

If only 1% of the bees in a colony are drones, how many drones are in a colony of 53,402 bees?
**The Vegetable With a Heart**

**All Choked Up**

In 2013, Lt. Governor Gavin Newsom declared the artichoke as California’s official state vegetable. Artichokes are a member of the thistle family. The artichoke is actually a flower bud and the fleshy bottom portion of petals are edible. Inside the artichoke is a fuzzy center or “choke” that can be scraped away to find the “heart” of the artichoke which is considered to be a tasty treat by many artichoke lovers.

California farmers produce nearly 100% of the nation’s supply of artichokes. 75% of California’s artichoke crop is grown in Monterey County’s mild, coastal climate.

**Is an artichoke heart really a heart?**

Discuss the function of the labeled artichoke parts with a partner. See the glossary for help.

How tall in inches is the artichoke in the picture? _______ inches tall.

How tall is the artichoke in feet? _______ feet tall.

One inch is equal to 2.54 centimeters. Convert the artichoke’s height in inches to centimeters. The artichoke is _______ centimeters tall.

How tall are you in inches? _______ inches tall.

**Compare your height to the artichoke’s height and write as a fraction in the space below.**

__________________________

Express the fraction as a percent.____________________

**Activity**

Label the Parts of the artichoke using the word bank.

- Flower bud
- Roots
- Bud leaf petals
- Choke
- Stem
- Heart
- Plant leaves

**Artichoke Stamp Art**

Cut raw artichokes into vertical and horizontal halves and quarters. Paint cut sides of artichokes and stamp them onto paper to use as note cards.

Label the artichoke parts that are stamped on the paper.

**Sun Facts**

Artichokes grow well in Mediterranean coastal climates, found between 30 and 45 degrees latitude on the Western Side of continents. Use a map to find the degrees latitude of Monterey County, CA. What do you notice?

**Farmer Highlight**

Dale Huss

Vice President of Artichoke Production, Ocean Mist Farms

What growing conditions do artichokes require? Artichokes don’t like weather that is too hot or too cold, which is why they grow so well along the central coast of California.

What is the hardest thing about growing artichokes? Since artichokes are healthy for you, they are also healthy for other creatures like insects, voles, slugs, and snails. Protecting our crop from these artichoke pests is one of the hardest challenges we face.

Where are your harvested artichokes sold? All over the United States and Canada. However, our best markets are in California and on the West Coast.

**How many petals are on an artichoke?**

How many petals are on an artichoke? Ask your teacher to bring an artichoke to class for everyone to inspect. After carefully observing the artichoke, you and your classmates can each write down your guess of how many petals it has. Your teacher can then pull the petals off an artichoke while the class counts. My guess = _______.

Actual number of petals = _______.

What was the difference between your guess and the actual number of petals on the artichoke? _______.

Try the activity at home to find out if another artichoke has the same number of petals.
Choose two glossary words and use both in a complete sentence in the space provided.

Agriculture: The science, art, and business of growing crops and raising livestock.

Antioxidant: Vitamins and other nutrients that help protect cells in the body.

Bee hive box: used for housing a colony of bees.

By-product: Something that is produced as a result of the production of something else.

Calorie: Term used to describe the energy content of food.

Climate: The usual weather conditions in a region.

Colonist: Person who lived in the colonies that later became the first states in the U.S.

Commodity: Raw agricultural product that can be bought and sold.

Crop: Plant that is grown and harvested by farmers.

Drone: Male honeybee. They do not gather food, protect the hive, or sting.

Embryo: Early stage in development of plant or animal life.

Endosperm: Tissue found inside a seed that provides food for the embryo.

Flower: Reproductive structure of a plant.

Geographical: Natural features such as mountains and valleys in a particular region.

Honey: Sweet material produced by honey bees from the nectar of flowers.

Germination: Process when seeds begin to grow or sprout.

Idiom: Expression of speech that is not meant to be taken literally. For example, “sick as a dog” means a person is very ill.

Lactation: Secretion of milk from a female mammal to feed her young.

Lameness: Disabled, in that walking or running is difficult.

Leaf: Part of the plant that gathers sunlight and performs photosynthesis.

Litter: Offspring of animals that have multiple young at one birth. Examples: litter of puppies, piglets, or kittens.

Nutrition: Food necessary for health and well being.

Osmosis: Movement of water molecules across a membrane until the concentration of water molecules on both sides of the membrane is equal.


Pest: Organism that causes damage to people and/or the environment.

Pollen: Dust-like male reproductive cells of flowers. Also an important protein source for bees.

Pollinate: To deposit pollen on the female part of a flower to allow fertilization.

Proboscis: Mouthpart of a bee used to collect nectar from flowers.

Roots: Plant part that absorbs water and nutrients from the soil and anchors the plant in the soil.

Seed coat: Protective covering of a seed.

Semipermeable membrane: Membrane that allows some types of molecules to pass through but not others.

Stem: Main trunk of a plant that develops shoots, branches, and leaves.

Queen bee: Fully developed female responsible for laying eggs. There is only one queen per honeybee colony.

Udder: Mammary gland of female cattle, sheep, goats, and horses.

Worker bee: Female bee other than the queen that gathers nectar, pollen, and water to take care of other bees in the colony. Worker bees have a stinger to protect their colony.

Standards: English – Grade 3: Language 2g, 4d, 5b, 6 Grade 4: Language 2d, 4c, 6 Grade 5: Language 2e, 4c, 6 Grade 6-8: Language 4c, 4d, 6
California Foundation for Agriculture in the Classroom (CFAITC) is a 501(c)(3) not-for-profit organization that provides educators with free and low cost standards-based materials, training opportunities, and information to promote student understanding of California agriculture. The Foundation’s vision is an appreciation of agriculture by all. Contact CFAITC to request additional classroom resources, such as the Extra! Extra! Classroom Extensions that complement this newspaper.

Prizes include:
- E-reader
- Expense paid trip to Sacramento for you, your parents, and your teacher to attend awards ceremony
- Engraved plaque
- Agriculture-related book

Contest Deadline: November 1, annually

You could be a published author!

Write a creative story about your favorite agriculture topic and submit it to the Imagine this… Story Writing Contest for the chance to be selected as one of six state-winning authors! Stories will be illustrated by high school art students and published into a book that is used throughout the state to teach students about agriculture. Visit www.LearnAboutAg.org/imaginethis for more information.

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