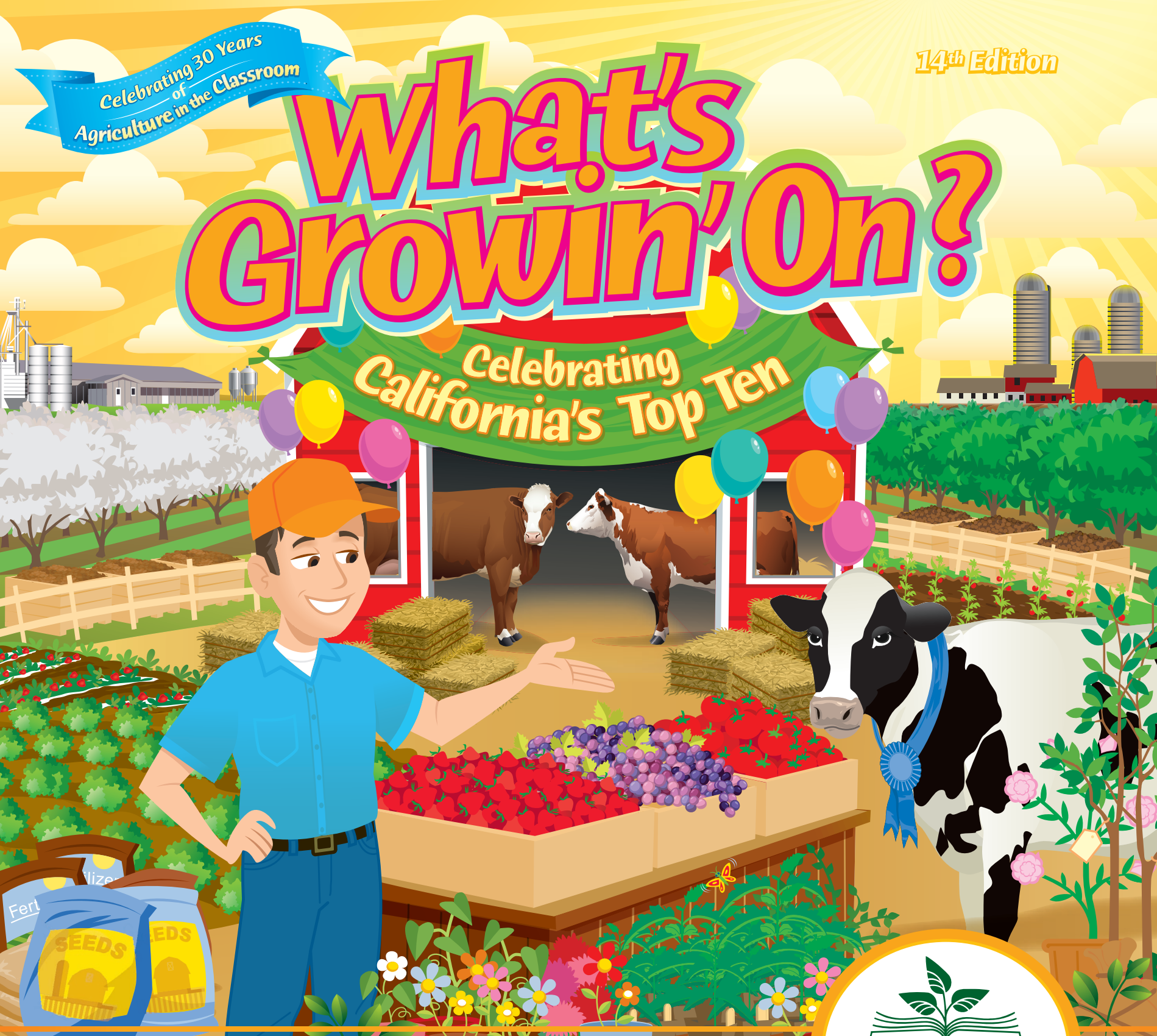


Celebrating 30 Years
of
Agriculture in the Classroom

14th Edition

What's Growin' On?

Celebrating
California's Top Ten



A NEWSPAPERS IN EDUCATION SUPPLEMENT

For Extra! Extra! Classroom Extensions, visit www.LearnAboutAg.org/wgo or call (800) 700-AITC.



California Foundation for
Agriculture in the Classroom

A message for everyone...

What role does Agriculture play in your life? Believe it or not, agriculture is in everything you do throughout the day. The cotton sheets on your bed, the scrambled eggs in your breakfast, the leather in your shoes, the paper in your notebook, your apple for lunch, the grass and trees outside, the milk with your snack, the lettuce in your salad, and the cookie for dessert...they all come from agricultural products.

California is the top agriculture producing state in the country. What does that mean? It means we grow more food, fiber, flowers, forest, and fuel than any other state. The Top-Ten commodities all fall into these five categories: the five "F's of Agriculture. Look around you, where ever you live, not too far away, are the ranches and farms that grow these commodities. Next time you're out and about, take a look and see if you can figure out *What's Growin' On?* around you!

This year's *What's Growin' On?* is inspired by the wealth of commodities that grow in our state. Over 400 different commodities grow in California. Read through each page of *What's Growin' On?* and you will find out more. There's information about each of the Top-Ten and you'll also find activities and challenges to get you thinking a little deeper about what goes into the commodities that are growin' around here!

A message for teachers...

This is California Foundation for Agriculture in the Classroom's 14th edition of *What's Growin' On?* With over a million readers each year, it is one of our most popular resources. Last year's edition, "Let's Look at Water," was especially timely with the current drought in our state. *What's Growin' On?* is a student friendly newspaper with activities and information that kids will love to do and read about. Featured this year is a STEM activity with each commodity as well as a career tie-in. We think you'll find *What's Growin' On?* an excellent supplement for your classroom reading time, enrichment activities, what to do if you're done early, or as the basis of a project-based learning idea, perhaps focusing on agriculture, gardens, or nutrition.

Each edition of *What's Growin' On?* is developed by educators and reviewed by a team of experts from the agricultural industry. We also align *What's Growin' On?* to current California Education Standards for grades three through eight. This year's STEM Activities feature an easy tie-in with Next Generation Science Standards and Common Core. For additional lessons, fun and challenging activities, go to www.LearnAboutAg.org to receive a classroom set of newspapers and a Teacher's edition of Extra! Extra! Classroom Extensions.

Happy Reading!

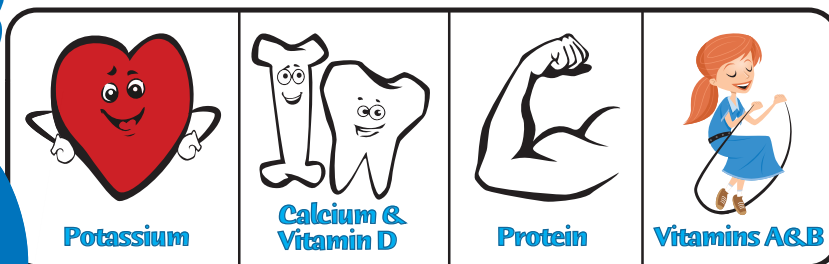
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MMM...Milk! Where does milk come from?

Milk is number one!
#1
 It is the top commodity in California!
 And our dairy farmers and processors produce that milk more efficiently than ever before.

Milk and dairy foods are rich in a wide range of nutrients that are enjoyed by children and adults. Most milk in the United States comes from cows, but goats, camels and sheep also produce milk. Beverages from plant sources like soy or almond are not true "milk."



Potassium

Calcium & Vitamin D

Protein

Vitamins A&B

What's in the Dairy Aisle?

Activity

Milk is a great beverage to have with meals and can also be made into other delicious products. Children and adults should include three servings of milk, cheese or yogurt each day. Use the following list to label the foods in the Dairy Aisle from the grocery store:

Milk, cheese, ice cream, yogurt, butter, and draw in another product you would find in the dairy aisle.



Dairy Aisle

Activity

Check your price!

Look in your local newspaper and find ads with dairy foods. Record the prices you find for the items listed. Compare prices from other stores or ads. **BONUS:** Find the price per serving.

Serving Sizes of Dairy Products

FOOD	SYMBOL	COMPARISON	SERVING SIZE
Milk + Milk Products			
Cheese (string cheese)		Pointer finger	1½ ounces
Milk and yogurt (glass of milk)		One fist	1 cup

Activity

Biotechnology

An early example of **biotechnology** was the use of **micro-organisms** to produce cheese, yogurt, and bread. Ancient Egyptians made cheese using biotechnology. In the 12th century, Genghis Khan fed his already **brawny** warriors yogurt for extra strength. Research how biotechnology and the use of micro-organisms help in the process of cheese and yogurt making. Compare "then and now" procedures. Students can work in groups and present their findings to the class.

STEM Activity

Enjoy delicious yogurt that you and your family can make at home. It's easy! www.healthyeating.org/Healthy-Eating/Meals-Recipes/Browse-Search-Recipes/rid/58472/homemade-yogurt.aspx or make cheese using the "Say Cheese" Ag-Bite from CFAITC. Go to www.learnaboutag.org/agbites/

CA Standards: ELA CCSS: RI.3-5.1, 7, RI.6-8.1, SL.3-5.4, SL.6-8.4, RST.6-8.2, 3, WHST.6-8.7 Math CCSS: 3.OA, 4.OA, 4.NF.7, 5.NBT.3b, 5, 6.NS.2, 3, 7.NS.3 NGSS: 5-PS1-1, 5-PS1-3, 5-PS1-4, 5-PS1.A, MS-PS1.B, MS-LS1.C **Source:** Dairy Council of California, www.healthyeating.org

Career Spotlight

Career: Animal Nutritionist

Calvin Willis, Animal Nutrition consultant, CMW Nutrition, Chino, CA



What do you do in your job? I visit dairies, look at cows, and formulate rations and supplements for them.

What is in a dairy cow's ration? A meal for a cow would include corn silage, alfalfa hay, cottonseed, rolled corn, almond hulls, and a protein source such as canola meal.

What is your education and background? I was raised on a farm in Arkansas, got my bachelor's degree in Animal Science, my master's degree in Dairy Science, and my PhD in **Ruminant** Nutrition. I've been doing my job for over 30 years.

Activity

Healthy Food Scramble

Unscramble the words to finish each sentence. Yidra _____ foods are an important part of a healthy diet.

Milk is a good source of lmccuia _____ which is important for strong bones.

Gtyuor _____ and eeshc _____ are examples of dairy foods.

Milk has rtpneoi _____ which is good for building muscle.

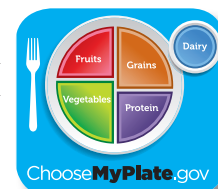
Children ages 9 and older as well as adults should eat erhte _____ servings of dairy foods each day.

MyPlate

MyPlate is an illustrated guide of what a balanced meal looks like. It should include: Grains, Protein, Vegetables, Fruits, and Dairy.

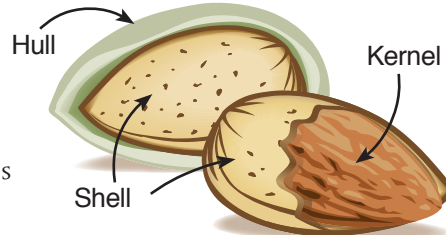
Activity: What should you put on your plate? Draw or write foods for your own MyPlate for lunch. Make sure you create a balanced meal!

See www.choosemyplate.gov/about for more details of what each food group contains as well as portions. Share your balanced meal with your classmates!



ALMONDS in a Nutshell

Almonds are a Top-Ten crop in California. All the almonds purchased in the United States come from California! And about 80% of almonds purchased in the world come from our great state!



Bee Activity:

Because of a problem called Colony Collapse Disorder or CCD, bees are disappearing across the country. Farmers have to 'rent' bees to pollinate their trees.

Almond farmers depend on bees, but there has been a shortage in the United States. Talk to your local Cooperative Extension or write a letter to your local beekeeper and find out how we can save the bee population. Research online about how to keep bee colonies healthy. Present your findings to your class.

STEM Activity

Design an Orchard

Orchards are planted in different patterns with different spacing. A common pattern is square with spacing of 22 feet x 22 feet. Plan out your own orchard with a scale drawing. Calculate how many trees you will plant per acre and then using graph paper, map out where your trees will be. Use one inch graph paper and show your calculations.

Steps

1. Make calculations:
1 acre – 43,560 square feet
Tree spacing – 22 ft x 22 ft = 484 square feet per tree
43,560 square feet / 484 square feet = 90 trees
2. Using 1 inch graph paper, scale your drawing to 1 inch = 22 feet
3. Map out where your trees will be, can you get 90 trees on your page? If not, you will need to show less than 1 acre.
4. Add your math calculations, scale, and any labeling.
5. Decorate your orchard, name your ranch, and color.
6. Challenge: Research other orchard planting patterns and spacing. Do another scale drawing.

CA Standards: ELA CCSS: W.3-5.4, 7, SL.3-5.4, W.6-8.4, 7, SL.6-8.4, RST.6-8.1, WHST.6-8.4, 7; Math CCSS: 3.OA, 3.MD, 4.OA, 4.MD, 5.G.2, 6.NS.2, 3, 6.G.1, 7.NS.2, 3, 7.EE.3, 7.G.1, 7.G.6; NGSS: 3-LS1.B, 4-LS1.A, 5-ESS3-1, MS-LS1.B, MS-LS2.A.

A Season of Almonds



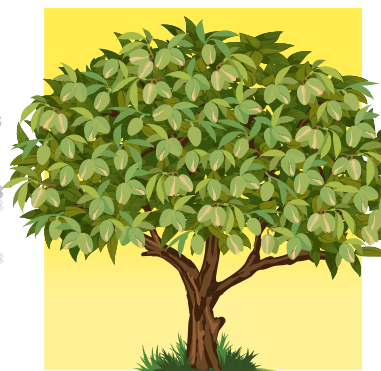
WINTER - Dormancy

- Trees are dormant or resting.
- All leaves have dropped.
- Trees are storing up nutrients.



SPRING - Pollination

- For almonds to grow, the trees need to be pollinated. About 1.6 million colonies of honey bees are required to pollinate almond orchards in California.
- In February, flowers bloom on the branches.



SUMMER - Growth

- Almonds continue to mature with the shell hardening and the kernel developing.
- Hulls begin to split, allowing the inner shell to begin to dry.
- When the almonds are ready to be harvested, the hull will begin to open. This is called the hullsplit.



FALL - Harvest

- The grower shakes the trees with a machine called a shaker. The almonds fall to the ground.
- After the almonds have dried for about a week, they are swept into rows by a machine called a sweeper.
- Almonds are picked up by a harvester and trucked to a processing plant to be packaged and shipped throughout the world!

Did You Know? That's Nuts!

• Almonds are used as a protein source for natural disaster victims.

• Almond extract is not made from almonds. It usually comes from apricot or peach pits.

• Almonds are related to apricots, peaches, and cherries.

• Bees can fly 22 miles per hour and fly five miles round trip

• Bees have five eyes.

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Activity

Have you tried this?

Take a class survey and find out how many students have tried the following:

Raw Almonds _____
Almond Butter _____
Almond Crackers _____
Marzipan _____
Roasted Almonds _____



Glenda & Shannon Wooten
Apiarist/Beekeeper

CAREER: Apiarist/Beekeeper

Shannon Wooten (pictured with his wife, Glenda), is an Apiarist/Beekeeper and Owner of Wooten Golden Queens, Palo Cedro, CA.

What is your job? I raise and sell queen bees; which is time consuming and technical, so most beekeepers don't do it

themselves. I also deliver colonies of bees to almond orchards. A colony is a box of bees with about 40,000 bees and 1 queen.

What is something interesting about your job? I handle my bees without a suit or gloves. If you handle the bees gently, they won't sting you. In

the spring time, you can get stung 50-100 times per day!

Anything else you'd like to share? As early as January, I have my bees ready to pollinate trees. I feed them protein and carbohydrates to get them strong and ready for **pollination**.

Source: Almond Board of California, www.almonds.com; University of California Cooperative Extension, fruitsandnuts.ucdavis.edu/datastore

California, a GRAPE State!

California
grows
more than
80 varieties
of grapes

produces 99% of
the nation's
table
grapes

3/4
of a
cup is
one serving
size, 24
grapes

I can be
eaten fresh,
frozen or in
liquid form

I
consist of
about 80%
water

We
can be
made into
raisins,
juice, or
wine!

We're
a fine
bunch!

Grapes are a Top-Ten commodity in California, bringing in \$5.6 billion dollars per year. Grapes have been an important part of agriculture for more than 300 years. Grapes are not only consumed as fresh table grapes, but also as raisins, and in wine. Read on to learn about how GREAT GRAPES are!

Career Spotlight

CAREER: Ranch Foreman

Luis Navarro, Ranch Foreman,
Wilson Farms, Clarksburg, CA



What is your training for the job? I've had over 30 years of on-the-job training.

What do you do in your job? I started working for Wilson Farms as an irrigator and quickly moved on to operating equipment. Eventually, I was put in charge of operating and organizing all of the labor for **irrigation**. I've operated everything from ground preparation equipment to planting and harvesting equipment. I've also run the service truck that fuels equipment, and I have done routine maintenance on all the equipment on the ranch.

Anything else you'd like to add? Over the years, I've been directly involved in every operation on the ranch from ground preparation, to irrigation, to the harvest of every crop. I currently organize all of the labor operations on the ranch. I direct and move people when and where they need to be through the day.

Wilson Farms' owners say, "When the ranch needs something to get done, Luis makes it happen."

STEM Activity

Grape Structures

Be an engineer using only grapes and toothpicks. Alone or in groups, create the tallest structure you can. Talk about which structures are strongest and tallest. What made them work so well? Try a new design with what you learned! Then, eat your creation!

Recipe

Try this Great Grape Smoothie!

1 cup seedless grapes

½ cup frozen strawberries and cherries

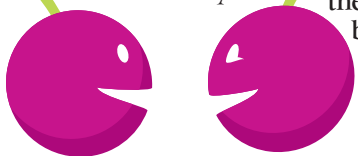
½ orange, peeled and sliced

½ banana, peeled and sliced

Combine all ingredients in a blender.
Pour into glasses. Enjoy!

Why are grapes
never lonely?

Because
they come in
bunches!



I	E	I	R	R	I	G	A	T	I	O	N	R	I	R
S	O	Y	U	T	X	W	Y	Q	X	Y	O	U	Y	E
V	M	D	Y	H	N	C	Q	H	E	E	L	B	A	T
N	C	Q	Q	Y	S	A	B	G	Y	Z	Z	W	P	S
Y	S	A	M	M	N	L	D	I	R	O	X	W	A	U
U	S	D	X	X	I	I	N	I	D	N	W	W	S	L
I	E	Y	T	Z	S	F	H	X	X	Q	Y	W	M	C
E	L	T	K	N	I	O	Z	N	Q	O	M	B	U	T
A	D	I	D	P	A	R	N	C	R	X	I	S	T	K
I	E	D	P	Z	R	N	I	B	M	F	P	T	S	Y
U	E	O	V	I	U	I	H	O	K	D	Q	M	N	T
Y	S	M	P	L	X	A	F	F	Q	U	Z	Y	X	A
R	D	M	A	V	I	N	E	Y	A	R	D	P	I	A
Z	E	O	G	P	H	A	R	V	E	S	T	U	R	R
M	G	C	T	Z	C	S	A	S	G	R	A	P	E	S

Activity Word Search

VINEYARD
IRRIGATION
GRAPES
SEEDLESS
COMMODITY
RAISINS

ANTIOXIDANT
CLUSTER
HARVEST
TABLE
CALIFORNIA

RED or GREEN

Take a classroom opinion survey of which are considered the best; red grapes or green grapes. Compare your chart with other classmates. Create a bar graph showing your results.

Grape	Tallies
Red	
Green	

CA Standards: Math CCSS: 3.OA, 3.MD.3, 4.OA, 5.NBT.5; NGSS: 3-5-ETS1-1, 2, 3, MS-ETS1-1, 2, 3, MS-ETS1.A, B, C
Source: www.californiaagriculture.ucanr.org,
www.grapesfromcalifornia.com
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Follow the Cattle Trail

Cattle and calf operations are another Top-Ten commodity in California agriculture. Follow the trail to learn more about beef!



Bull

A bull is a mature male that is able to reproduce.

Calf

A young male or female.

Cow

A mature female that has given birth or calved.

Heifer

A young female that has not given birth.

Herd of Cattle

A group of any combination of cows, steers, bulls, calves and heifers.

Steer

A steer is a male that cannot reproduce.

STEM Activity: Build It Better

Cattle are one of nature's hardiest animals, and are experts in finding and utilizing natural shelter against the elements. Design a place for your cattle herd. Take into consideration the following factors:

- Cattle are *herd* animals. This means they want to stay together with other cattle, not by themselves.
- Cattle need to have *food* and *water*. Cattle can graze on rangeland or on *pasture* if there is adequate grass. If there isn't, they will need to be fed *hay*.
- Cattle need healthcare. Your herd will need to be vaccinated, de-wormed and branded. If an animal is injured or giving birth, they may need additional help. This can happen out on the rangeland or in a *corral* with a *chute*. Either way, you will need to contain your cattle in order to handle them.
- Cattle need to be handled safely. This is

important to their well-being as well as the handler's. Full-grown cattle can weigh up to 1,500 pounds, so you wouldn't want to be stepped on or pushed around.

Activity Requirements:

Design a ranching operation for cattle on an 8 ½ x 11 paper, **bird's-eye** view. Show the pen or range where your herd lives. Show where your herd will get food and water. Include a space for storing hay out of the weather. Show a corral and chute where your cattle can be contained while they receive vaccinations, de-worming, branding or treatment for injury. It must be safe for the animal and the handler. Name your ranching operation. Show details in your drawing. Label all parts of your drawing; include all *italic* words. To learn more about safe structures for animals, view:

www.youtube.com/user/TempleGrandin

Cowboy Poetry

Cowboy poetry is as old as cowboys themselves! The tradition began on the long cattle drives of the 1880s. A cowboy poem is a narrative type of poetry with a western theme. It must be recited as well as written.



Use the information you've learned about beef and do your own research to write a cowboy poem that you memorize or read to your class. Alternate activity: research cowboy poetry, choose a poem, determine its message, memorize it, and retell it to your class or write about a famous cowboy poet.

"If you're ridin' ahead of the herd, take a look back every now and then, to make sure it's still there."

- Old West Proverb

Career Spotlight

CAREER: Cowgirl

Amanda Barrett, Cowgirl,
Rankin Ranch, Walker Basin, CA



What does your job involve? As a cowgirl, my primary responsibilities are to care for our cattle and the land on which they graze.

How did you become a cowgirl? I was born and raised on my family's ranch in Central California. I returned to the ranch after graduating college.

What training do you need? A lot of the training that you need comes from hands-on experience. You can learn a lot from animal science and business classes, but you learn even more when you put this knowledge to use.



CAREER: Cowboy

Jerry Spencer, Cowboy/Rancher,
Van Vleck Ranching & Resources, Inc.,
Rancho Murieta, CA

How did you become a cowboy? I was raised on my family's cattle ranch in Northern California. I went to Cal Poly, San Luis Obispo and majored in

Animal Science and Agricultural Business. That training along with on-the-job training is how I became a cowboy/rancher.

What does a typical day look like for you? I ride my horse quite a bit to check on cattle, doctoring them and moving them. Sometimes I use an ATV or a pickup to get from place to place. I also have to do office work, tracking finances and administrative work.

Strawberries Strategies

Californians love their berries. Strawberries grow especially well in our state because of the **temperate** climate from the coast. Here is a story of the many strategies people use to take extra care to grow scrumptious strawberries.



Photo by Neil Palmer (CIAT)

Breeding

Growing strawberries starts even before they are planted. Scientists look for ways to make healthy strawberry plants by making them more **resistant** to pests and diseases.



Growing

Strawberries grow in rows of raised beds, which makes them easier to harvest. The beds are covered in colored or clear plastic to help retain moisture, keep berries from the dirt, and maintain the shape of the bed for the long season. Drip irrigation is used to make sure each plant gets just the right amount of water.

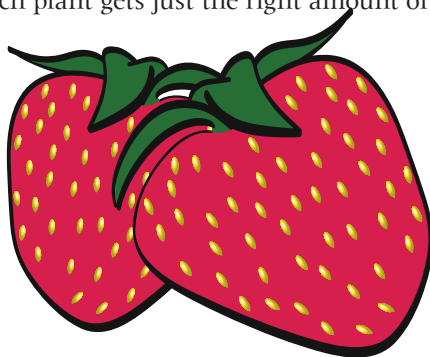


Photo courtesy Driscoll's

Planting

Virtually all strawberry plants in California start as runners trimmed from mother plants, grown at high-elevation nurseries in Northern California. Once strong and healthy, they are shipped to farms across the state, where they are planted by hand.



Photo by Holger Hubbs

Harvesting

All strawberries are picked by hand. Strawberry harvesting teams work hard to pick each berry and pack it inside a **clamshell** container. The containers are placed inside trays that are quickly transported to shipping facilities where they are cooled.



Photo by Rusty Clark

Selling and Shipping

Within 24 hours of being picked, the berries are loaded into refrigerated trucks and transported across the country and the world. 88% of the berries grown in the United States come from California. Berries are sold as fresh or frozen, or they are used as ingredients in other products.

CAREER: Plant Pathologist



Cecilia Wilson,
Plant Pathologist,
Bayer CropScience,
West Sacramento, CA

What do you do in your job? I run tests on plants to see how I can help them fight against pests and disease.

What training did you need for your job? I needed a bachelor's degree and lab experience. Much of my training was on the job.

What is an interesting thing that you've learned in your job? I've learned that plants can be plagued by multiple diseases at the same time.

Anything else you'd like to add? Everything looks so different at the microscopic level! I love that being a scientist can help farmers grow food to feed the world!

Activity

True/False

1. Strawberries have lots of Vitamin C. T/F
2. Strawberries each have about 50 seeds. T/F
3. California produces about 88% of our country's strawberries. T/F
4. Strawberries grow on trees. T/F
5. The country of Belgium has a strawberry museum. T/F

Class Connection

Go to a grocery store produce section. Check strawberry labels or ask where the strawberries were grown. Mark the location on a map. Compare locations with other students' findings.

STEM Activity: Strawberry DNA

Using common household items, you can separate and observe strawberry DNA. This experiment can be done in class, for a science fair, or even just for fun! Go to the website: www.genome.gov/Pages/Education/Modules/StrawberryExtractioninstructions.pdf

Or visit LearnAboutAg.org for another version in *Extra! Extra! Classroom Extensions*.

Answers: 1. True 2. False, strawberries have 200 seeds. 3. True, 4. False, strawberries grow on plants in fields. 5. True

CA Standards: ELA CC: RI.3-6.7, RI.3-5.8, SL.3-8.1; NGSS: MS-LS1-1, 2, 5-PS1-1, 4 **Sources:** California Strawberry Commission, www.californiastrawberries.com; National Human Genome Research Institute, www.genome.gov

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California is #1! It All Starts With the Sun

The Sun, the Soil, the Water, the Seeds, the Plants, the Animals,
all go together to produce the food YOU, ME and WE need to grow!

Activity

Think about how you use agricultural products. You know the Top-Ten now, but there are more than 400! If it's food, fiber, flowers, forest, or fuel...it's from Ag! Make a list of what products you use. Do you drink milk? Wear shoes? Drive to school? Make a list of everything you do during the day. If it were not for agriculture you wouldn't have most of the things you use every day. Cross off everything on your list that has something to do with agriculture. What is left? Think about it, what would you do without agriculture?

Activity

Find and identify the Top-Ten commodities and their by-products in the map. Color!

Top-Ten and By-Products Answers: Milk, cheese, yogurt, ice cream; Almonds, almond butter; Grapes, juice; Cattle, steak, purse, shoes; Strawberries, jam, smoothie; Walnuts, Walnut oil; Lettuce, sandwich, wraps; Hay, feed sack; Tomatoes, ketchup, sauce; Nursery- trees, shrubs, seeds
What else did you find? Did it come from agriculture?

It's pretty impressive! Not only does California produce over 400 agricultural products, it is the top producing agricultural state in the US! In the world, California is in the top 20, producing as much or more than most countries! Right here, in your backyard, is California Agriculture... growing dairy cows for milk, almonds, grapes, cattle and calves, strawberries, walnuts, lettuce, hay, tomatoes, and nursery plants. Look around and you'll see the important role they play in your life...

Then and Now

California Foundation for Agriculture in the Classroom began 30 years ago, in 1986. A Farm Day was organized in San Francisco in response to a request to teach students about where their food comes from. Since then, Ag in the Classroom has developed lesson plans, activities, and *What's Growin' On?* for students to learn about the important role agriculture plays in their lives. We hope you will take this information and share it with your family and friends. Most of all, we hope you will gain an awareness of where your food and fiber come from and an appreciation for the land, the people and the products that are so important to California agriculture.

Activity

What was going on in 1986? California Foundation for Agriculture in the Classroom was just starting out! Read the table below to see some agricultural comparisons between then and now. What do the changes mean? Does an increase in population but a decrease in farm acreage matter? What if the drought continues? Discuss with classmates to draw some conclusions. Research and write a report about the importance of and/or changes in California agriculture. What do we have now that we didn't back then? Fill in your findings and share with your class.

Statistic\Year	1986	2016
Population of California	27,052,000	38,802,500
Number of Farms	83,000	77,900
State acreage in farming	30,598,000	25,500,000
Average farm size in acres	368	327
Rank in Ag production, US	#1*	#1
Top 5 Crops	Milk, Grapes, Cotton, Cattle, Nursery products	Milk, Almonds, Grapes, Cattle, Strawberries
Rainfall	Above average	Drought
Ag in the Classroom	1 st year	30 th year
Other:		

Source: USDA Agriculture Fact Book, 1998, www.nass.usda.gov, dof.ca.gov, www.theaggie.org/2008, giannini.ucop.edu/CalAgBook/Chap1.pdf, www.agcensus.usda.gov/Publications/2012, aic.ucdavis.edu/publications/moca/MOCABrochure2013.pdf

California Standards: ELA CCSS: RI.3.7, W.3.1, 2, 7, SL.3.1, RI.4.7, W.4.1, 2, 7, SL.4.1, RI.5.5, W.5.1, 2, 7, SL.5.1, RI.6.7, W.6-8.2, 7, SL.6-8.1, SL.6-7.2, RST.6-8.2, WHST.6-8.2, 7

*California has been number one since 1948, source: <http://aic.ucdavis.edu/publications/moca/MOCABrochure2013.pdf>

Activity

Find the following in your local newspaper. Write down what you find and put a check mark in the box.

☐ An article on any commodity grown in California

☐ A headline that mentions agriculture

☐ A five-day weather forecast

☐ A national or world article related to agriculture

☐ A classified ad selling a farm product

☐ A photo of a plant or animal

☐ A comic strip with a plant or animal

☐ An article about water

☐ A job posting for a truck driver

☐ A grocery store ad for a California Top-Ten commodity

☐ What do all of these items have in common? Unscramble the yellow letters to find out!

Why Walnuts?

Walnuts are a Top-Ten crop. Why are they in the top ten? Geography, History, and Health...read on to learn more!!!

Geography

California geography plays a role in the success of walnuts in our state. The mild climate and fertile soils make ideal growing conditions for walnut production. Walnuts are primarily grown in the Central Valley from Redding to Bakersfield. California grows 99% of the walnuts grown in the United States...right here! And we produce 35% of the world's walnut crop. So Californians aren't the only ones eating walnuts; they are **exported** and enjoyed around the world.

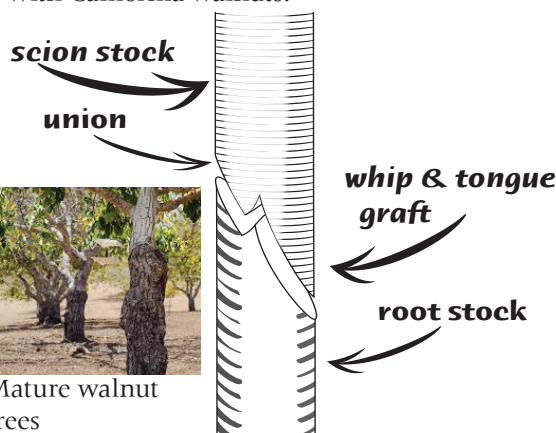


Let's Graft

Did you know you can spot a walnut tree by its base? Most California walnut trees are **grafted**, which means they are actually made of two types of walnut trees! Grafting is the process of putting two plants together so they become one. The point where the two come together is called a union.

Black walnuts are used for **rootstock** because they do not get root disease as easily as other varieties. They are more resistant to root disease.

So why don't we just grow Black walnuts? Black walnuts taste very strong and are smaller. This is why farmers graft a tastier variety such as English walnut onto the Black walnut rootstock. The tree grafted to the top is called the scion stock. A process called "Whip and Tongue" is the most common form of grafting with California walnuts.



Mature walnut trees

STEM Activity: Let's try it!

Materials: 2 different colored straws per student, clear tape, 1 pair of scissors per student

Process:

- Pick one straw. This is your rootstock. Make a sloping diagonal cut, about 1" long.
- On the same straw, make a second cut about 1/3 of the way down from the top of the first cut. This cut should be almost parallel to the first. The straw should now look like it has a tongue!
- Repeat the process on the second straw. This represents your scion stock.
- Line the two pieces up together and tape!

CA Standards: ELA CCSS: SL.3-8.1, 1a, NGSS: 3-LS1.B, 4-LS1-1, 1A, 5-LS2-1, 3-5-ETS1, MS-LS1-2, MS-ETS1.A

Source: <http://www.hort.cornell.edu/grafting>; California Walnut Board, www.walnuts.org; NASS, <http://www.nass.usda.gov/>; www.famousscscientist.org/luther-burbank

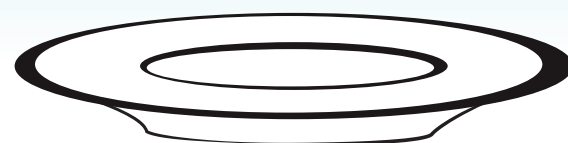
Health

The fact that walnuts are great for you is another reason for their popularity in California. Walnuts are packed with vitamins, minerals, and polyunsaturated fat (the "good" fat!) and contain fiber and protein. Walnuts are also used in foods around the world. In China, walnuts are used in mooncakes, popular during the mid-autumn festival. In Turkey, walnut baklava is a popular dessert, and in Germany, sweet strudel is made with walnuts.

Activity

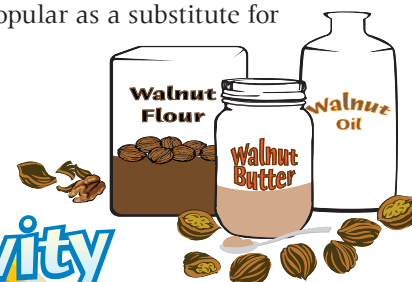
How would you use walnuts?

Draw a plate with your favorite meal using walnuts.



Many ways for Walnuts!

Walnuts used for snacking or baking are sold whole (in shell or shelled) or chopped. Walnut oil is used for salad dressings and to flavor fish and steaks. Walnut flour can be used for those with **gluten-free** diet requirements. Walnut butter is becoming popular as a substitute for peanut butter.



Activity

With a partner or small group, discuss the meanings of idioms. Then, as a group create your own.

- "Tough nut to crack" (meaning hard to understand or get to know)
- "Everything from soup to nuts" (meaning almost everything one can think of)
- "Go Nuts"
- "Nuts for You"
- "Drive someone nuts"

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Timeline

7000 BC: Walnuts can be traced back to Persia

1770 AD: First English walnuts brought to California by Mission Padres.

1867 AD: Joseph Sexton planted the first commercial walnut orchard near Goleta, CA.

1914 AD: Luther Burbank developed the Paradox rootstock variety.

2015 AD: Walnuts are a 1.8 billion dollar crop for California

CAREER: Plant Breeder

Luther Burbank, (1849-1926), Plant Breeder, Santa Rosa, CA



Luther Burbank was a pioneer in plant breeding. During his long 55 year career, he developed over 800 plant varieties including fruit, grains, flowers, and vegetables. One example of his work is the plumcot, a combination of a plum and apricot.

'Lettuce' Introduce You...

Lettuce, a leafy vegetable we use for salad, in sandwiches, and other dishes, is known to scientists by its scientific name of *Lactuca sativa*.

Lettuce has a long history in California. Lettuce began to be **cultivated** commercially in California in the 1930s. Today, lettuce is in California's Top-Ten most valuable agricultural commodities. California is the leading producer of lettuce in the United States, producing more than 73% of all lettuce grown in the United States. It grows year round in California. Monterey and Imperial counties are the top producers of lettuce.

There are three main kinds of lettuce: head, leaf, and romaine. Head lettuce is round and tight and shaped like a cabbage. Iceberg lettuce is a type of head lettuce. Leaf type is loose and leafy. Butter, Red and Green Leaf are types of leaf lettuce. Romaine is tall with slender leaves.



Identify each kind of lettuce; write your answer under each one.



Lettuce: How do you grow?

The lettuce you purchased at your local market is very fresh. There is a lot of planning and preparation before a lettuce crop is planted. First, the farmer prepares the field by using a laser to level the field, then **beds** are prepared to plant seeds. Sprinklers or drip irrigation are used to water the emerging plants and throughout their growing season. It is important to fertilize plants so that plants are healthy. **Integrated Pest Management (IPM)** is used to control pests and diseases that could harm plants. Lettuce is harvested carefully and quickly when it is ready to eat. Harvested lettuce is cooled and stored just above freezing to keep it fresh. Lettuce is then transported in a refrigerated truck to market.

'Lettuce' Keep you Healthy!

Lettuce may help maintain

- Vision
- Healthy immune system
- Cell growth

95% of lettuce is water!
Lettuce is high in Vitamin A



Circle key words in the paragraph above. Then draw a pictorial timeline of the eight steps of lettuce production. Write a caption for each picture using evidence from the paragraph above.

Today there are many options in purchasing lettuce. Lettuce can be purchased unwrapped or wrapped in cellophane, in bulk, or even in a bag as a prepared salad mix.



Create a salad recipe for two using California Lettuce. Use other "Top-Ten" California commodities as ingredients (walnuts, almonds, strawberries, tomatoes, grapes). Create and write your recipe. Be sure to record ingredients, measurements (in standard form like cups, teaspoons, etc) and instructions. Then, figure out the recipe for the entire class!

Salad for Two

Salad for the Class



What jobs are involved in producing lettuce? Choose a job related to lettuce production using evidence from the text or doing additional research. On a separate sheet of paper, draw a picture of yourself in a lettuce career spotlight, and write a paragraph about what you do.

STEM: How long do you grow?

Using a calendar, compute the answer:
When is Harvest? When lettuce is planted in the summer, it takes 65 to 80 days to grow. If it was planted on June 5, what would be the earliest day it could be harvested?
When to Plant? If lettuce is planted in late fall, it could take as long as 130 days to grow. If you want to harvest on January 12, when should you plant?

CA Standards: ELA CCSS: RI.3-4.1, 7, W.3-5.2, 7, SL.3-5.2, RI.6-8.1, W.6-8.2, 7, SL.6-7.2, RST.6-8.1, 7, WHST.6-8.7; Math CCSS: 3-4.MD.2, 5.MD.1, 6.NS.1, 7.NS.2; NGSS: 3-LS1-1, 4-LS1.A, 5-LS1-1, LS1.C, MS-LS1-1

Source: <http://learnaboutag.org/caspecialtycrops/agbites.pdf>, <http://anrcatalog.ucdavis.edu>, www.cdffa.ca.gov

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Say Hay!

Hay is a Top-Ten commodity in California. One example of hay is alfalfa, which has been around for more than 4,000 years. Alfalfa seeds came to California from South America around 1850. It is a **perennial** crop living from 5-12 years depending on variety and climate. Tractors and implements play a critical role in the production of hay.



Career Spotlight

CAREER: Agricultural Engineer
Alan Isaacson,
Agricultural Engineering Student,
Cal Poly, San Luis Obispo, CA

What area of Agricultural Engineering are you going into? I personally wish to pursue a job designing and building tractors and tractor implements.

How did you become interested in Ag Engineering? As a kid, I would pull anything apart just to see what was inside and how it worked. I became interested in agriculture through 4-H and FFA. As I grew older, I knew a career combining mechanics and engineering with agriculture was exactly what I wanted to pursue.

What's something else you'd like to share? I am the current Cal Poly Tractor Pull Club President. The team is responsible for the upkeep, transportation, and competitive running of two Modified Pull Tractors known as Mustang Fever and Poly Thunder.

Is it Hay or Straw?

Straw is an agricultural byproduct. It is the dried stem of the plant after the grain and **chaff** have been removed. It has many uses including livestock bedding. Hay is used as animal feed.

STEM Activity: Hay! You're an engineer!

Work in a group to develop and use a machine to stack a minimum of 10 "bales" which are scattered across your desk. Hay "bales" could be erasers, small note pads, dominoes, or any small bale shape that is stackable. Supplies for your "machine" could include yarn, string, paper clips, toothpicks, popsicle sticks, and pencils. Before building your machine, sketch a drawing of your idea. After you've completed your job of stacking at least 10 bales, share your thought processes that led to your machine design and explain why you think it worked or didn't work.

CA Standards: NGSS: 3-LS4.D, 5-LS2.A, 3-5-ETS-1, 2, 3, 3-5-ETS1.A, B, C, MS-LS2.A, MS-ETS1-1, 2, 3, MS-ETS1.A, B, C
Source: www.LearnAboutAg.org/resources/fact/alfalfa.pdf ©2016 California Foundation for Agriculture in the Classroom. All Rights Reserved.



Photo by W Oudenaarde

Seed Drill

A **sowing** device that precisely positions seeds in the soil and then covers them. Fun Fact: There are many varieties of hay grown in California, including alfalfa, timothy, bermuda grass, and oat hays.

Swather

Cuts and conditions the hay, which allows the hay to cure faster. It also puts the hay in windrows. Fun Fact: Silage is fermented high-moisture **fodder** fed to ruminants. It is usually made from grass crops or hay.



Photo courtesy Trego Center Dairy



Photo by Eli Duke

Hay Rake

Turns the windrow over to allow the other side to dry and can also put two windrows together. Fun Fact: Alfalfa is a drought-tolerant plant. Farmers will cut hay seven or more times per year, called "cuttings."

Hay Baler

Compresses cut and raked hay into bales that are easy to handle, transport, and store. Fun Fact: Bales can range in size from 100 to more than 1500 lbs!



Photo courtesy Kurt Hildebrand, The Gardenville Record-Courier

Harrowbed

Collects the bales from the field and puts them into stacks in the field. Fun Fact: The harrowbed was developed in the 1950s by Gordon Grey. It was spelled "Harobed" after his daughter's name (spelled backwards). What was her first name? _____

Hay Squeeze

Picks up the stacks from the field and loads them on a trailer for transport. Fun Fact: Hay can come in small, large, or round bales.



Photo by Dean Doctor



Photo courtesy Safety Driven

Truck and Trailers

Transport stacks of hay, usually about 30 to 40 tons per load, to storage or directly to the buyer. If one hay bale weighs 100 lbs., how many hay bales can you load on your truck? _____

Hay Barn

A Hay Squeeze unloads the trailer and stores the hay in a Hay Barn. Now, it's ready to be sold or fed to livestock. Fun Fact: Alfalfa provides key nutrients and roughage needed by cattle and horses for a healthy diet.



Photo by Jeffrey Beall



Career: Truck Driver

**Tomatoes
are good for you!**

13

From Sowing to Growing... Nursery Plants!

Nursery Plants rank in California's Top-Ten commodities. Nursery plants include trees, shrubs, sod, seeds and bedding plants. Read on to learn about sowing (planting) and growing plants in nurseries.

Nursery Production

Nurseries grow all sorts of landscaping products for your home, school, and neighborhood. Ornamental (decorative) shrubs and trees, fruit trees, vegetables, grasses and flowers all start at a nursery. Greenhouse photo shows *Diets bicolor*, a perennial plant.



Greenhouse photo shows *Diets bicolor*, a perennial plant.

Learn to identify trees! Use the following tree identification key to figure out different types of trees. Choose a leaf, make some observation notes about the tree and its leaves, including a sketch. Using that information, go to the website listed below, and identify what you find. Good luck!

www.arborday.org/trees/whattree



The Nursery Times

Create a class newspaper or newsletter, "The Nursery Times." Make it all about plants from California agriculture and your school. Review articles and information from this issue of *What's Growin' On?* and do interviews and research to write your newspaper. Create puzzles and include photos and cartoons.

STEM Activity: Propagation

Take a cutting from a house plant or shrub with at least 2 leaf nodes. Dip cut end in rooting hormone. Place in a small, well-drained pot of clean potting soil up to the second node. Leave a few inches of stem sticking out of the soil with a few leaves. Water soil and allow to drain excess water. Mist or keep moist like a wrung-out sponge. In a week or two, new growth should appear. Continue growing until plant is mature enough and danger of frost has passed. Keep a record or journal of your project. Include dates, notes, and drawings. Share your results with your class. Extension: Do some research to learn why plants are able to grow by propagation. Suggested plants are roses, philodendrons, hydrangeas, ivy, Christmas cactus, African violets, and snake plants.

Color the palm tree



FRUITS and VEGETABLES

Some nurseries grow and sell potted fruit and vegetable plants that can be used by families to get a head start in their gardens. Some popular plants to grow are carrots, cucumbers, and zucchini. If you are planning a garden, consider what time of year, or season, it is. Some plants are cool season, meaning they grow best through the winter, whereas some plants are warm season and grow best through the summer.

Facts: Carrots have many nutrients including Vitamin A, which is good for your eyes and skin. Cucumbers grow on vines and are low in calories. You can add a slice of cucumber to your water to make a great refreshing taste!



Career Spotlight

Career: Nursery Director

Luis Verdoza,
Director of Technical Services,
Village Nurseries Wholesale, LLC



What do you do in your job? My main focus is supporting our production growers in growing good quality plant material. This is done by taking soil and water tests and walking our production areas and fields looking for plant health issues.

What was your training for your job? There is a lot of science and math in growing plants. I did my studies at Cal Poly, Pomona and got my degree in Ornamental Horticulture.

Anything you'd like to share? What I like about my job is seeing our plants beautifying places like Disneyland, the San Diego Zoo, malls, neighborhoods, parks and other places. It makes me feel proud that I had some part in that.

CA Standards: ELA CC: RI.4-5.1, RI.3-5.7, RI.6-8.1, W.3-5.2, 6, 7, W.6-8.4, 5, 6, 7, SL.3-5.4, SL.6-8.5, RST.6-8.3, W.6-8.2, 7; NGSS: 3-LS1-1, LS1.B, 4-LS1-1, LS1.A, 5-LS1.1, LS1.C, 3-5-ETS1-1, MS-LS1-1, MS-LS1-2, LS1.A, LS1.B, MS-ETS1-7

california Commodities Glossary

- Administrative:** Relating to the management of a company.
- Antioxidants:** Prevents harmful reactions where oxygen is combined with other substances.
- Beds:** Area of soil for planting crops.
- Biotechnology:** The use of living cells, like bacteria, to make other products (e.g., yeast to make bread).
- Bird's-eye view:** View from a high angle, or what a bird might see.
- Brawny:** Strong, muscular, or powerful.
- Chaff:** Dry, small pieces of hay or grain.
- Chute:** Fenced passage for directing livestock.
- Clamshell:** Hinged-container that opens like a clam.
- Commodity:** Product of agriculture, includes plants and animals.
- Cultivate:** To grow crops or plants. To loosen or break up soil.
- Cure:** Age or dry out.
- Exported:** Ship to another country.
- Extract:** Used for flavoring.
- Fodder:** Food, or feed for livestock.
- Freight:** Goods that are carried by ship, train, truck, or airplane.
- Gluten-Free:** Usually referring to a diet without gluten, which is found in wheat, for example.
- Graft:** Join together.
- Grower:** A farmer.
- Hybrid:** Combination of two different types or varieties.
- Integrated Pest Management (IPM):** Using multiple resources to manage agricultural pests, such as natural predators, varying planting times, and planting a variety of plant that is resistant to pests.
- Irrigation:** Providing water to plants.
- Marzipan:** Confection consisting primarily of sugar or honey and almond meal, sometimes augmented with almond oil or extract.
- Micro-organisms:** Extremely small living things, only visible by microscope, e.g., bacteria.
- Perennial:** Grows for two or more years, includes plants and trees.
- Pollination:** Transfer of pollen from plant to plant to allow fertilization.
- Processed:** Change from one form to another (e.g., fresh tomatoes to ketchup).
- Propagation:** To reproduce.
- Resistant:** Not affected or harmed by something.
- Rootstock:** Root portion of a tree that another tree is grafted to.
- Ruminant:** Mammals that chew their cud. (e.g., cows, sheep, goats)
- Sowing:** Scattering seeds over the earth, planting.
- Temperate:** Mild or moderate.



Resources:

- Almond Board of California**
www.almonds.com
- California Alfalfa & Forage Association**
www.calhay.org
- California Beef Council**
www.calbeef.org
- California Department of Food and Agriculture**
www.cdfa.ca.gov
- California Foundation for Agriculture in the Classroom**
www.learnaboutag.org
- California Strawberry Commission**
www.californiastrawberries.com
- California Table Grape Commission**
www.grapesfromcalifornia.com
- California Tomato Growers Association**
www.ctga.org
- California Walnuts**
www.walnuts.org
- Choose MyPlate**
www.choosemyplate.gov
- Dairy Council of California**
www.healthyeating.org
- USDA – National Agricultural Statistics Service**
www.nass.usda.gov

Activity

Choose two glossary words and use both in a complete sentence. Write your sentence in the space provided.



Imagine this...

Story Writing Contest

Attention third through eighth grade students:

You could be a published author!

Write a creative story about your favorite agricultural topic and submit it to the *Imagine this...* Story Writing Contest. State-winning stories will be illustrated by high school art students and published into a book. Visit www.LearnAboutAg.org/imaginethis for more information. Common Core State Standards (W.3-8.2,3)



2016 Agriculture in the Classroom Conference:
September 22-24, Sacramento
www.LearnAboutAg.org/conference

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

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Contact CFAITC to request additional classroom resources, such as the *Extra! Extra! Classroom Extensions* that complement this newspaper.



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