



California Specialty Crop
Taste Test Grants

California Specialty Crop Resource Packet



CALIFORNIA FOUNDATION FOR
AGRICULTURE IN THE CLASSROOM

Everything you need to extend the learning
capacity of **Taste Tests** in your classroom.

California Specialty Crops

Welcome to your guide for teaching all about California specialty crops

Specialty crops are fruits and tree nuts, vegetables, herbs and spices, nursery, floriculture, and horticulture crops. They're the ones that are not considered staple foods. California produces more than 400 different commodities, many of which are specialty crops. They're all around us! In this guide, you will discover the many ways we use specialty crops and learn how to use them in the classroom to make a lasting connection between our everyday lives and the world of agriculture.

Nearly half of the fruits, nuts, and vegetables consumed in the United States are produced right here in our state. From the southern California deserts to the mountains in the north, California is home to a variety of soil and climate types that allow the state to produce a wide variety of specialty crops. California produces 99 percent or more of 14 commodities that are enjoyed throughout the United States, including artichokes, dates, kiwifruit, olives, pomegranates, and pistachios.

The information, activities, and resources featured in this guide will help your students understand the many ways we rely on agriculture each day. The guide also includes directions for incorporating taste tests into the classroom. As a teacher, you have the opportunity to introduce your students to the fascinating world around them—including agriculture!

All of CFAITC's resources are developed and reviewed by educators and agriculture industry experts to ensure accurate and factual information about each topic. The activities in this guide meet Content Standards for California Public Schools, Common Core State Standards, and Next Generation Science Standards for grades three through eight, while encouraging students to gain an appreciation for where their food and fiber comes from.

Specialty Crop Categories

Here are a few examples of specialty crops in each category:

Fruit and Tree Nuts

Almonds, blackberries, figs, grapes, lemons, oranges, pears, pecans, pistachios, walnuts.



Vegetables

Asparagus, broccoli, Brussels sprouts, carrots, celery, eggplant, garlic, lettuce, mushrooms, squash, tomatoes.



Culinary Herbs and Spices

Basil, cilantro, cloves, ginger, lavender, nutmeg, oregano, sage, thyme, vanilla.



Medicinal Herbs

Boldo, foxglove, marshmallow, passion flower, pennyroyal, pokeweed, senna, tansy, witch hazel, yarrow.



Nursery, Floriculture and Horticulture Crops

Christmas trees, ferns, holly, magnolia trees, marigolds, oak trees, pansies, poinsettias, roses, tulips.



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Taste Test Instructions

Taste testing in the classroom gives California students access to and new-found knowledge about fruits and vegetables that will help them make improved food choices. Below are instructions on how to conduct a taste test in your classroom.

Purchase California Specialty Crops

Here are four ways to conduct a taste test and purchase commodities for sampling. All are acceptable for your grant.

1. Purchase one commodity for your class to sample.
Example: Have the class sample artichokes.
2. Purchase a few different varieties of a commodity for your class to sample.
Example: Purchase three different types of apples.
3. Purchase one commodity and prepare it differently—fresh, cooked, dried, etc.—for your class to sample.
4. Purchase one commodity in different forms—fresh, canned, and frozen—for your class to sample.

Prepare the Taste Test

1. Before preparing the taste test samples, be sure to wash your hands, utensils, and fresh produce.
2. Prepare a sample for each student.
3. Have each wash their hands prior to tasting.

Discuss Taste Test Results

1. Discuss the nutritional value, appearance, taste, texture, and smell of the commodity.
2. Have the class explain what they liked about the commodity, which variety they liked best, or how they liked the commodity prepared.
3. Have students complete the Student Journal (download template from www.LearnAboutAg.org/tastetest/studentjournal).

California Specialty Crops

Fruits and Tree Nuts			
Almond	Cherry	Guava	Persimmon
Apple	Chestnut (for nuts)	Kiwifruit	Pineapple
Apricot	Coconut	Litchi	Pistachio
Avocado	Coffee	Macadamia	Plum (including prune)
Banana	Cranberry	Mango	Pomegranate
Blackberry	Currant	Nectarine	Quince
Blueberry	Date	Olive	Raspberry
Breadfruit	Feijou	Papaya	Strawberry
Cacao	Fig	Passion fruit	Suriname cherry
Cashew	Filbert (hazelnut)	Peach	Walnut
Citrus	Gooseberry	Pear	
Cherimoya	Grape (including raisin)	Pecan	

Vegetables			
Artichoke	Collards (including kale)	Mustard and other greens	Rutabaga
Asparagus	Cucumber	Okra	Salsify
Bean, Snap or Green, Lima, Dry, edible	Edamame	Pea	Spinach
Beet, table	Eggplant	Garden, English or edible pod	Squash (summer and winter)
Broccoli (including broccoli raab)	Endive	Onion	Sweet corn
Brussels sprouts	Garlic	Opuntia	Sweet potato
Cabbage (including Chinese)	Horseradish	Parsley	Swiss chard
Carrot	Kohlrabi	Parsnip	Taro
Cauliflower	Leek	Pepper	Tomato (including tomatillo)
Celeriac	Lettuce	Potato	Turnip
Celery	Melon (all types)	Pumpkin	Watermelon
Chive	Mushroom (cultivated)	Radish (all types)	
		Rhubarb	

Culinary Herbs and Spices			
Ajwain	Cassia	Filé (gumbo, cultivated)	Oregano
Allspice	Catnip	Fingerroot	Orris root
Angelica	Chervil	French sorrel	Paprika
Anise	Chicory	Galangal	Parsley
Annatto	Cicely	Ginger	Pepper
Artemisia (all types)	Cilantro	Hops	Rocket (arugula)
Asafetida	Cinnamon	Horehound	Rosemary
Basil (all types)	Clary	Hyssop	Rue
Bay (cultivated)	Cloves	Lavender	Saffron
Bladder wrack	Comfrey	Lemon balm	Sage (all types)
Bolivian coriander	Common rue	Lemon thyme	Savory (all types)
Borage	Coriander	Lovage	Tarragon
Calendula	Cress	Mace	Thyme
Chamomile	Cumin	Mahlab	Turmeric
Candle nut	Curry	Malabathrum	Vanilla
Caper	Dill	Marjoram	Wasabi
Caraway	Fennel	Mint (all types)	Water cress
Cardamom	Fenugreek	Nutmeg	

Medicinal Herbs			
Artemisia	Ginkgo biloba	Mullein	Stevia
Arum	Ginseng	Passion flower	Tansy
Astragalus	Goat's rue	Patchouli	Urtica
Boldo	Goldenseal	Pennyroyal	Witch hazel
Cananga	Gypsywort	Pokeweed	Wood betony
Comfrey	Horehound	St. John's wort	Wormwood
Coneflower	Horsetail	Senna	Yarrow
Fenugreek	Lavender	Skullcap	Yerba buena
Feverfew	Liquorice	Sonchus	
Foxglove	Marshmallow	Sorrel	

California Specialty Crops

Horticulture			
Honey Hops	Maple Syrup	Tea Leaves	Turfgrass
Annual Bedding Plants			
Begonia	Geranium	Pansy	Vegetable Transplants
Coleus	Impatiens	Petunia	
Dahlia	Marigold	Snapdragon	
Potted Flowering Plants			
African Violet	Azalea	Flowering Bulbs	Poinsettia
Potted Herbaceous Perennials			
Astilbe	Dianthus	Peony	Vinca
Columbine	Heuchera	Phlox	
Coreopsis	Hosta	Rudbeckia	
Daylily	Ornamental Grasses	Salvia	
Cut Flowers			
Carnation	Gladiolus	Lily	Rose
Chrysanthemum	Iris	Orchid	Tulip
Delphinium			
Cut Cultivated Greens			
Asparagus Fern	Eucalyptus	Leatherleaf Fern	Pittosporum
Coniferous Evergreens			
Foliage Plants			
Anthurium	Dieffenbachia	Ficus	Philodendron
Bromeliad	Dracaena	Ivy	Spathiphyllum
Cacti	Fern	Palm	
Christmas Trees			
Balsam Fir	Douglas Fir	Noble Fir	White Pine
Blue Spruce	Fraser Fir	Scots Pine	
Deciduous Flowering Trees			
Crabapple	Flowering Cherry	Hawthorn	Service Berry
Crepe Myrtle	Flowering Pear	Magnolia	
Dogwood	Flowering Plum	Redbud	
Broadleaf Evergreens			
Azalea	Cotoneaster	Holly	Rhododendron
Boxwood	Euonymus	Pieris	Viburnum
Deciduous Shade Trees			
Ash	Linden	Oak	Sweetgum
Elm	Maple	Poplar	Sycamore
Honey Locust			
Landscape Conifers			
Aborvitae	Hemlock	Pine	Yew
Chamaecyparis	Juniper	Spruce	
Deciduous Shrubs			
Barberry	Hibiscus	Rose	Viburnum
Bubbleia	Hydrangea	Spirea	Weigela

Source: www.ams.usda.gov/AMSV1.0/scbgrpdefinitions

Content Standards

Frequently Used in Taste Testing and Cooking

Third Grade

English Language Arts

SL.1.c, d: Engage effectively in a range of collaborative discussions, (one-on-one, in groups, and teacher-led) building on others ideas and expressing their own clearly.

W.1: Write opinion pieces on topics or texts, supporting a point of view with reasons.

W.8: Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Science

3.a: Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.

5.c: Use numerical data in describing and comparing objects, events, and measurements.

Health Education

7.1.G: Determine behaviors that promote healthy growth and development.

8.1.P: Support others in making healthy decisions.

Fourth Grade

English Language Arts

SL.4: Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

W.1: Write an opinion piece on topics or texts, supporting a point of view with reasons and information.

W.8: Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Science

6.e: Construct and interpret graphs from measurements.

Health Education

1.1.N: Identify and define key nutrients and their functions.

1.2.N: State the recommended number of servings and serving sizes for different food groups.

1.3.N: Describe the relationship between food intake, physical activity, and good health.

1.4.N: Identify how to keep food safe through proper food preparation and storage.

1.5.N: Explain how food can contain germs that cause illness.

3.1.N: Identify resources for valid information about safe and healthy foods.

3.2.N: Use food labels to determine nutrient and sugar content.

5.1.N: Describe how to use a decision-making process to select nutritious foods and beverages.

6.1.N: Make a plan to choose healthy foods and beverages.

7.1.N: Practice how to take personal responsibility for eating healthy foods.

7.3.N: Identify ways to establish and maintain healthy eating practices consistent with current research-based guidelines for a nutritionally balanced diet.

8.1.N: Support others in making positive food and physical activity choices.

Fifth Grade

English Language Arts

RL.4.a: Read on-level text with purpose and understanding.

SL.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

W.1: Write an opinion piece on topics or texts, supporting a point of view with reasons and information.

W.8: Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

Science

6.g: Record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data.

6.i: Write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions.

Next Generation Science Standards

5-LS2.C: Organization for matter and energy flow in organisms: Food provides animals with materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.

Health Education

- 1.1.N:** Describe the food groups, including recommended portions to eat from each food group.
- 1.2.N:** Identify key components of the “Nutrition Facts” labels.
- 1.5.N:** Describe safe food handling and preparation practices.
- 1.6.N:** Differentiate between more-nutritious and less-nutritious beverages and snacks.
- 1.8.N:** Describe the benefits of eating a nutritionally balanced diet consistent with current research-based dietary guidelines.
- 1.9.N:** Explain how good health is influenced by healthy eating and being physically active.
- 3.1.N:** Locate age-appropriate guidelines for eating and physical activity.
- 3.2.N:** Interpret information provided on food labels.
- 5.1.N:** Use a decision-making process to identify healthy foods for meals and snacks.
- 7.1.N:** Identify ways to choose healthy snacks based on current research-based guidelines.
- 7.2.N:** Demonstrate how to prepare a healthy meal or snack using sanitary food preparation and storage practices.
- 8.1.N:** Encourage and promote healthy eating and increased physical activity opportunities at school and in the community.

Middle School (6th through 8th grades)

English Language Arts

- W.1:** Write arguments to support claims with clear reasons and relevant evidence.
- W.2:** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- L.1:** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L.2:** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- L.3:** Use knowledge of language and its conventions when writing, speaking, reading, or listening.
- L.6:** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Next Generation Science Standards

MS-LS1.C: Organizations for matter and energy flow in organisms: Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth or to release energy.

Sixth Grade

Science

6.c: Students know the natural origin of the materials used to make common objects.

Seventh Grade

Mathematics

RP.2b: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

Seventh and Eighth Grades

Health Education

- 1.1.N:** Describe the short- and long-term impact of nutritional choices on health.
- 1.2.N:** Identify nutrients and their relationships to health.
- 1.4.N:** Describe how to keep food safe through proper food purchasing, preparation, and storage practices.
- 1.6.N:** Analyze the caloric and nutritional value of foods and beverages.
- 1.8.N:** Identify ways to prepare food that are consistent with current research-based guidelines for a nutritionally balanced diet.
- 3.1.N:** Distinguish between valid and invalid sources of nutrition information.
- 7.2.N:** Explain proper food handling safety when preparing meals and snacks.

Additional Resources

California Bountiful

California Bountiful promotes connections between farm and city, highlighting farmers, ranchers, chefs and others who bring us food and farm products. The magazine and TV show also features recipes that include California-grown products, gardening tips from experts, and more.

www.californiabountiful.com

California Department of Food and Agriculture

California's agricultural abundance includes more than 400 commodities. The state produces nearly half of U.S.-grown fruits, nuts, and vegetables. The California Agricultural Production Statistics provide information and an overview of California Agriculture.

www.cdфа.ca.gov/Statistics

California Education and the Environment Initiative

The Education and the Environment Initiative (EEI) Curriculum teaches to mastery select K-12 California academic content standards in science and history-social science, using the environment as a context for learning.

www.californiaeei.org

California Farm Bureau Federation

The California Farm Bureau Federation is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California.

www.cfbf.com

California Grown

"California Grown" reminds all of us how important it is to look for and purchase agricultural products grown and produced throughout the state. Visit this site to download classroom activities, learn about California's leading industries, discover the benefits of a healthy lifestyle, and meet the farmers and families behind the commodities we enjoy.

www.californiagrown.org

California Farm to School

Visit this site to learn more about farm to school, find schools and farmers in your area to connect with, and make farm to school a reality in your area.

www.cafarmtoschool.org

California School Garden Network

California School Garden Network is a collaboration of state agencies, private companies, educational institutions and non-profit organizations all dedicated to the mission of creating and sustaining gardens in every willing school in California. The Network serves as a central hub to distribute school garden resources and support throughout the state.

www.csgn.org

Dairy Council of California

Visit the Dairy Council of California website to learn about eating and to view recipes that incorporate fruits and vegetables into fun meals. The meal ideas and recipes are reviewed by a registered dietitian for nutrition and taste.

www.healthyeating.org

Harvest of the Month

Harvest of the Month provides materials and resources to support healthy food choices through increased access and consumption of fruits and vegetables, as well as encourage daily physical activity.

www.harvestofthemonth.cdph.ca.gov

Kids Growing Strong

Kids Growing Strong brings interactive exhibits and learning experiences that promote strong bodies, strong minds, and a healthy lifestyle through garden-based activities to kids and their families throughout the state. Visit their website to learn about activities that can be done in the garden and fun facts about fruits and vegetables.

www.kidsgrowingstrong.org

Network for a Healthy California

The Network represents a statewide movement of local, state and national partners collectively working toward improving the health status of Californians through increased fruit and vegetable consumption and daily physical activity.

www.cdph.ca.gov/programs/cpns/Pages/default.aspx

United State Department of Agriculture

Visit these sites to learn more specific information about what qualifies as a specialty crop, view a list of specialty crops, and to find specialty crop recipes and taste test resources.

www.ams.usda.gov/AMSv1.0/scbgpdefinitions

healthymeals.nal.usda.gov

Almond Board of California

www.almondboard.com

Apricot Producers of California

www.apricotproducers.com

California Apple Commission

www.calapple.org

California Artichoke Advisory Board

www.artichokes.org

California Asparagus Commission

www.calasparagus.com

California Avocado Commission

www.californiaavocado.com

California Blueberry Commission

www.calblueberry.org

California Canning Peach Association

www.calpeach.com

California Cherry Board

www.calcherry.com

California Cling Peach Board

www.calclingpeach.com

California Date Administrative Committee

www.datesaregreat.com

California Dried Plum Board
www.californiadriedplums.org

California Dry Bean Board
www.calbeans.org

California Fig Advisory Board
www.californiafigs.com

California Fuyu Growers Association
www.sdfarmbureau.org/fuyu

California Garlic and Onion Research Advisory Board
www.cagarlicandonion.com

California Kiwifruit Commission
www.kiwifruit.org

California Melon Research Board
www.cmrb.org

California Olive Committee
www.calolive.org

California Olive Oil Council
www.cooc.com

California Pear Advisory Board
www.calpear.com

California Pistachio Research Board
www.calpistachioresearch.org

California Raisin Marketing Board
www.calraisins.org

California Rare Fruit Growers
www.crfg.org

California Strawberry Commission
www.californiastrawberries.com

California Table Grape Commission
www.grapesfromcalifornia.com

California Tomato Growers Association
www.ctga.org

California Tomato Farmers
www.californiatomatofarmers.com

California Walnut Board
www.walnuts.org

Gold Crown Macadamia Association
www.macnuts.org

Grimmway Farms
www.grimmway.com

Fresh Express
www.freshexpress.com

Leafy Greens Council
www.leafy-greens.org

The Mushroom Council
www.mushroominfo.com

National Onion Association
www.onions-usa.org

National Watermelon Promotion Board
www.watermelon.org

Pear Bureau Northwest
www.usapears.org

Pomegranate Council
www.pomegranates.org

Sun-Maid Growers of California
www.sunmaid.com

Sunkist Growers
www.sunkist.com

Sweet Potato Council of California
www.cayam.com

United States Apple Commission
www.usapple.org

United States Potato Board
www.potatogoodness.com



What's Growin' On?

CA Crop Talk - Specialty Crops Edition



California Foundation for
Agriculture in the Classroom

A NEWSPAPERS IN EDUCATION SUPPLEMENT

For accompanying ^{extra!} Extensions, visit www.LearnAboutAg.org or call (800) 700-AITC.

California Specialty Crops

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Specialty Crop Categories

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Nursery, Floriculture and Horticulture Crops

Christmas trees, ferns, holly, magnolia trees, marigolds, oak trees, pansies, poinsettias, roses, tulips.



What makes specialty crops so special?

Specialty crops are fruits and tree nuts, vegetables, herbs and spices, nursery, floriculture, and horticulture crops.

They're the ones that are not considered **staple foods**. It's the almonds and carrots in your school lunch, the mushrooms on your pizza, the garlic and ginger that flavors your dinner, the cut flowers in the holiday centerpiece, the trees in the park, and the herbs in your medicine. California produces more than 400 different commodities, many of which are specialty crops. They're all around us!

Nearly half of the fruits, nuts, and vegetables consumed in the United States are produced right here in our state. From the southern California deserts to the mountains in the north, California is home to a variety of soil and climate types that allow the state to produce a wide variety of specialty crops. California produces 99 percent or more of 14 commodities that are enjoyed throughout the United States, including artichokes, dates, kiwifruit, olives, pomegranates, and pistachios.

Inside this newspaper, you will discover the many ways we use specialty crops and learn how agriculture impacts your life daily.

A message for teachers...

For the past ten years, the California Foundation for Agriculture in the Classroom (CFAITC) has produced **What's Growin' On?** to help students discover how agriculture regularly impacts their lives. This year's edition, focusing on California specialty crops, is inspired by the farmers and ranchers who provide these crops to our society on a daily basis. Specialty crops are crops that are grown and used by people for food, medicinal purposes, and/or aesthetic gratification. Many of these crops are grown in California.

The articles, activities, and Web resources featured in **What's Growin' On?** will help connect your classroom to the specialty crops of California in a unique way. As a teacher you have the opportunity to introduce your students to the fascinating world around them—including agriculture!

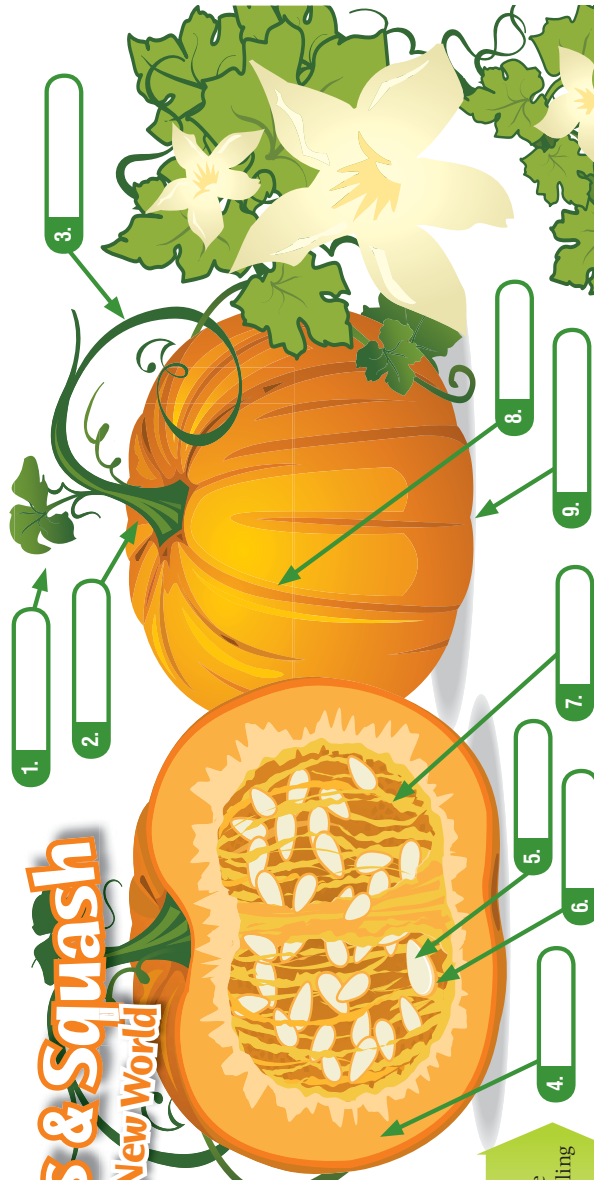
All of CFAITC's resources are developed and reviewed by educators and agriculture industry experts to ensure accurate and factual information about each topic. The activities on the following pages meet Content Standards for California Public Schools for grades three through eight, while encouraging students to gain an appreciation for where their food comes from and to connect them with the world of agriculture.

Pumpkins & Squash

Treasures of the New World

Pumpkins and Squash are members of the "Cucurbita" family. This family also includes cucumbers, gourds, and zucchini. These **annual** plants grow on vines and are native to the Americas. Pumpkins and squash can be used to make soups, breads, and pies. Pumpkins and gourds are also grown for **ornamental** purposes, and for feeding livestock.

Activity Using the word bank, identify the parts of the pumpkin by filling in the numbered blanks.



Blossom end – The scar at the bottom of the pumpkin that was once a flower that was pollinated and developed into fruit.

Brain – The slimy and mushy mass of string and seeds inside a pumpkin.

Leaves – Absorb light energy from the sun for **photosynthesis**.

Pulp – The edible inner layer of the skin, also called the "meat."

Ribs – Indented ridges running from top to bottom on the outside of the pumpkin.

Seed – The beginning of a new pumpkin that can be planted or roasted and eaten as a tasty snack.

Seed coat – The outer layer of the seed.

Shell – The skin and the pulp of the pumpkin.

Stem – Located on top of the pumpkin, the stem is attached to the vine to transport nutrients to grow the pumpkin.

Tendrils – Attached to the stem or vine, tendrils twist around objects to anchor and protect the plant.

What Will the Squash Look Like?

Solve the **Punnett square** to determine the genotypes and phenotypes for the color of the offspring when a female Onyx (dark green) squash and male Gold Rush (yellow) squash cross. Dark green is the dominant color. When two different varieties cross, their offspring are called **hybrids**.

How a person, animal, flower, plant, and/or fruit looks depends on the **genes** inherited from the parent. Each parent plant gives one gene to the offspring. Two genes determine the genotype (genetic makeup) and the phenotype (a **trait** or characteristic).

Onyx (dark green) = Bb Heterozygous

Gold Rush (yellow) = bb Recessive Homozygous

How many of the offspring are dark green?

What is the percentage of dark green offspring?

Convert the percentage into: Fractions: _____ Decimals: _____

How many of the offspring are yellow?

What is the percentage of yellow offspring?

Convert the percentage into: Fractions: _____ Decimals: _____

On a pumpkin plant, there are separate female and male flowers. The fertilized female flower becomes a pumpkin.

Sources: University of California Division of Agriculture and Natural Resources www.ucanr.org, Purdue University www.hort.purdue.edu

It is best to water pumpkin and squash plants at the roots rather than sprinkling from the top. Drip systems deliver water straight to the roots.



Pistachios are Nut-tastic

Did You Know?
It takes six years for a pistachio tree to produce its first fruit and 20 years to reach full production! If well-cared for, pistachio trees can produce nuts for more than a century.

California produces 98 percent of commercial pistachios in the United States.

Recipe Pistachio Butter

- 2 cups roasted pistachios
- 1/2 tsp salt
- 3 tbsp sugar
- Vegetable oil

Place nuts, salt, and sugar in a food processor and blend until you have a rough clump. Add 1 teaspoon of oil at a time and process until it reaches the creamy texture you want.

Activity

Taste Test

Roasted Pistachio Nuts vs. Pistachio Nut Butter

How do roasted pistachios, like you buy in the store, and pistachio butter taste different? Observe and taste a sample of roasted pistachio nuts. Make a list of adjectives to describe the taste. Repeat with a sample of pistachio butter. Compare and contrast the roasted pistachios to the pistachio butter. How can you use pistachio butter?

Standards: ELA – Grade 3: Writing 2.2; Written and Oral English Language Conventions (WOLC) 1.2; Grade 4: Writing 1.3; WOLC 1.1, 1.2; Grade 5: WOLC 1.1; Grade 6: WOLC 1.1, 1.4

Activity Nutrition

Convert the tally chart into a double bar graph using one color for fiber and another color for protein.

	Protein	Fiber
Almonds		
Pistachios		
Walnuts		

Standards: Mathematics – Grade 4: Statistics, Data and Probability 1.3, Mathematical Reasoning 2.3; Grade 5: Statistics, Data and Probability 1.2, Mathematical Reasoning 2.3; Grade 6: Statistics, Data and Probability 2.1, 2.2, Mathematical Reasoning 2.3

Sources: American Pistachio Growers www.thegreennut.org, Administrative Committee for Pistachios www.apistachios.org

Practical Pistachio Production

Pistachios are native to Afghanistan, Iran, and Turkey because of the low mountains and barren, dry foothills in the elevated deserts. To produce at maximum capacity, trees need long, hot, dry summers and moderately cold winters.

Imagine this...

Learn more about pistachios by reading the award-winning story "Peter's Journey" by Brook Jensen. Brook received statewide recognition for her short story about growing and harvesting the practically perfect protein. To learn more, visit www.LearnAboutAg.org/imaginethis/pistachio.

The California Delta is the largest estuary in North America. It supplies clean water to 25 million people and more than 3 million acres of farmland in California.

1929
William E. Whitehouse entered Persia (Iran) to obtain pistachio seeds.

1929-1930
Whitehouse explored Persia and collected 20 pounds of individually selected pistachio seeds, which he planted in Chico, CA.

1930-1950
3,000 trees grew from 20 pounds of seed. However, only one tree proved to be useful.

1950s
The successful pistachio tree seed was named Kerman for the famous carpet-making city near Rafsanjan in Iran.

Fancy Free, Floral-ly

Greenhouses, cut flowers, bedding plants, house plants, and **foliage** are all part of an agriculture industry in California called floriculture. More than 250 cut flower growers from San Diego to the Oregon border make California the top flower-producing state in the country! Careers in the floral industry include farming and growing, transporting, designing, and landscaping.

Egyptian Period (2800 – 28 B.C.) – In ancient Egypt, cut flowers were used for symbolic purposes. Egyptian floral designs were simple, orderly, and featured alternating patterns.



Greek and Roman Periods (600 B.C. – 325 A.D.) – Ancient Greeks and Romans used flowers and herbs for decoration, beautification, and to represent victory. Floral designs were garlands, wreaths, and flowers thrown on the ground.



Renaissance Period (1400 – 1600 A.D.) – Flower symbolism was important during this period. Flower arranging blossomed adding ribbons, fruit, and vegetables to the massive symmetrical arrangements.



Victorian Period (1837 – 1901 A.D.) – The first rules for arranging flowers were made during this era. Designs were made using ornate containers, overflowing with many different types of flowers using cool colors and an abundance of white.



Activity

Plot each significant event in the history of floriculture on a timeline. For each event plotted, add at least one additional important historical event from the same era.

Standards: -History-Social Sciences – **Grade 3:** 3.1; **Grade 6:** 6.2, 6.4; **Grade 7:** 7.8; **Grade 8:** 8.10 Sources: USDA National Agriculture Statistics Service www.nass.usda.gov, California Cut Flower Commission www.cffc.org

Greenhouse **climates** are controlled by fans and heaters, creating an environment that allows for year-round production of plants and flowers. Although the “season” is artificially produced, greenhouse plants are still considered in-season.

Some flower varieties grow better in open fields. These varieties, such as sunflowers, ranunculus, begonias, carnations and chrysanthemums, are grown in fields and prefer direct sunlight and low **humidity**. Hydrangeas are grown in **shade houses** which restrict light, allowing the plant to grow slowly, producing a more impressive bloom.

Try This Activity

Pressed Flowers

Pressed flowers can be used to decorate note cards, bookmarks, candles, and more. They can even be framed as natural art.

1. Pick your flowers when they still look fresh. Make sure they are free from moisture or dew.
2. Place flowers between two sheets of paper. Place the paper and flowers inside a heavy book.
3. Leave at least 25 pages between each pressing. Weigh the book down and wait 2-3 weeks.

Did You Know?

75 percent of cut flowers grown in the United States come from California.

TechCheck

Flowers for every occasion

Visit www.cffc.org to research different types of flowers and refer to the flower guide book. Select at least three different types of flowers to give to someone. Use the color wheel to select a color scheme that is attractive and pleasing to the eye. Draw or paint your arrangement.

Flowers: _____ Colors: _____

Standards: Visual Arts – **Grade 3:** Artistic Expression 1.3, 1.5; **Grade 7:** Artistic Expression 2.0

Mmmarvelous Melons

Melons are a summer favorite, but can be enjoyed throughout the year because they can be grown almost anywhere in California, due to the variety in climates. Thump the **rind** to check for ripeness and quality before slicing the melon open to see the beautiful colors inside.

Honeydew melons are a variety of muskmelon. Its botanical name is *Cucumis melo*. These melons have a waxy smooth rind that is creamy white to yellow in color. Inside, the flesh is green. The average honeydew melon weighs between four and eight pounds.

The scientific botanical name for cantaloupe is *Cucumis melo*. Cantaloupes were named after the Roman town of Cantalupo. Columbus brought cantaloupe seeds to the New World on his second voyage and reported their cultivation on his return. California produces approximately 75 percent of the nation's cantaloupes. The melon has a netted rind, which means it has a hard rind with deep grooves.

A ½ cup serving contains 50 calories and is high in vitamins A and C.

A ½ cup serving contains 64 calories and is high in vitamin C.

Watermelons, known botanically as *Citrullus lanatus*, are related to cucumbers, pumpkins, and squash, and are grown in more than 96 countries worldwide. The first watermelon originated in the Kalahari Desert of Africa. Seedless watermelons are a hybrid variety and were developed in the 1940s by a Japanese scientist. A field of watermelons can produce up to 40 tons per acre.

A ½ cup serving contains 23 calories and contains vitamins A, C, potassium, and B6.

Some melons, such as watermelons, are 90 percent water.

Activity

Look in your local newspaper for grocery advertisements.

How many varieties of melons can you find? List them.

Compare and contrast prices of honeydew melons, cantaloupe, watermelons, and others.

Standards: ELA – Grade 4: Reading 2.1, Grade 5: Reading 2.1; Grade 6: Reading 2.1; Mathematics – Grade 4: Number Sense (NS) 1.2, 2.1, Grade 5: NS 1.2, 2.2

Activity

Melon Haiku

Look at a melon of your choice and write down what you see.

Write a haiku describing the melon. A haiku is a 3-line poem consisting of 17 syllables.

Example:

A happy melon

Basking in the bright warm sun

Growing like a weed

Standards: ELA – Grade 3: Writing Applications 2.2; Grade 4: Written and Oral 1.2; Grade 5: Writing Strategies 1.2, Written and Oral 1.3

Recipe Corner

Watermelon Lemonade

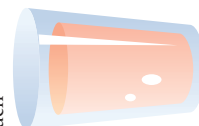
6 cups watermelon, cubed
1 cup water
⅓ cup sugar
½ cup lemon juice

Place watermelon and water in blender. Blend until smooth. Pour into a pitcher. Add lemon juice and sugar, stir until sugar is dissolved. Chill and serve over ice. Melon and water mixture may be strained.

Serves 8

Activity

- To serve your entire class, how much of each ingredient do you need?
- How many times will you need to repeat the recipe steps?
- Did you have any leftovers? How many servings remained?
- What nutrients are in your watermelon lemonade?



Standards: Mathematics – Grade 3: Number Sense 2.4, 3.2; Grade 5: Number Sense 2.2, 2.3, 2.4, 2.5; Grade 6: Number Sense 2.1, 2.2, 2.3 Health Education – Grade 5: 5.1.N
Sources: National Watermelon Promotion Board www.watermelon.org, Western Growers www.producepela.com, California Bountiful www.californiabountiful.com, University of California Division of Agriculture and Natural Resources www.ucanr.org

Colorful Fruits and Veggies

Many red fruits and vegetables contain important nutrients and **phytonutrients** that help to keep your heart healthy. Examples of red fruits and vegetables with high contents of vitamin C and/or fiber are listed.

Red bell peppers, guavas, radishes, papayas, raspberries, pomegranates, and tomatoes.

Some orange fruits and vegetables

are known for having beta carotene. Beta carotene is converted to vitamin A in your body, which is important for your vision, immune system, and skin. These listed are sources of beta carotene.

Pumpkins, apricots, carrots, oranges, cantaloupes, sweet potatoes, and mangoes.

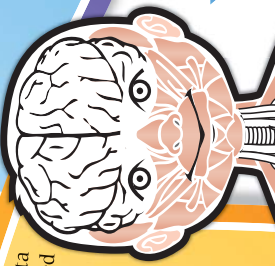
Several green vegetables and fruits can be

a good source of potassium, fiber and/or calcium. Potassium helps your heart beat correctly and assists your muscles in contracting. Fiber helps with digestion and calcium helps build strong bones.

Broccoli, kale, artichokes, collard greens, spinach, pears, and kiwifruit.

Many blue and purple fruits and vegetables contain phytonutrients that protect against cancer. These fruits and vegetables can improve memory, and keep your heart healthy. These fruits and vegetables are a good source for vitamin C.

Blackberries, plums, purple asparagus, purple onions, and blueberries.



Activity

Our bodies benefit from eating colorful fruits and vegetables! Use the information located in the colorful stars and the body at right to illustrate each of these benefits. For example, if you were to eat carrots, color the eyes orange because carrots contain vitamin A which supports healthy eyes and vision. Research other fruits and vegetables to find out what nutrients they contain – notice there are a variety of colors that can also be a good source of vitamin A.

Standards: Science – Grade 3: 3a; Nutrition and Physical Activity – Grade 4: 1.1.N; Grade 5: 1.8.N, 1.9.N; Grade 7 and 8: 1.2.N, 1.7.N
Sources: MyPlate www.myplate.gov, Fruits and Veggies More Matters www.fruitsandveggiesmorematters.org



Choose **MyPlate.gov**

Design Your Meal Activity

- Materials:**
- Newspaper ads
 - Paper plate
 - Magazine
 - Scissors
 - Glue

The MyPlate food icon shows us how to create a healthy meal, including specific proportions of the five food groups: fruits, vegetables, protein, grain, and dairy. Fill half your plate with a colorful rainbow of fruits and vegetables. Using a grocery store ad, cut out healthy foods you like from each of the food groups. Glue the food onto the plate in the appropriate place to create YourPlate!

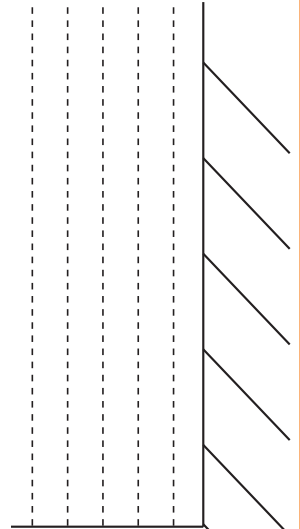
Dig Deeper: Calculate the total cost of your meal using the advertised price. Visit www.foodapedia.gov to calculate the nutritional value of the meal.

Standards: Health Education – Grade 4: 1.2.N, 7.3.N; Grade 5: 1.1.N, 5.1.N

Activity Class Survey

Survey your class to determine food preferences. First, select one of the five food groups: fruits, vegetables, protein, dairy, grains. The food group you select will determine the theme for your survey. Next, think of at least five different foods that are in your selected food group. For example, if you chose fruits you might list peach, cherry, mango, grapes, and kiwifruit. Survey your classmates, asking which of these five foods they prefer. Create a bar graph in the space provided to illustrate your results.

Survey _____
(Write in the food group you selected.)



Standards: Mathematics – Grade 4: Statistics, Data and Probability 1.3; Mathematical Reasoning 2.3; Grade 5: Statistics, Data and Probability 1.2, Mathematical Reasoning 2.3; Grade 6: Statistics, Data and Probability 2.1, 2.2, Mathematical Reasoning 2.3

California Grows...

Top 3 Commodities

Specialty crops are bold

Alameda Winegrapes, Woody Ornamentals, Cattle & Calves

Alpine Cattle & Calves, Pasture & Range

Amador Winegrapes, Cattle & Calves, Pasture & Range

Butte Rice, Walnuts, Almonds
Calaveras Cattle & Calves, Poultry, Pasture & Range

Colusa Rice, Almonds, Vegetable Seeds

Contra Costa Cattle & Calves, Sweet Corn, Vegetable Crops

Del Norte Cows, Milk, Lily Bulbs

El Dorado Apples, Cattle & Calves, Winegrapes

California is the leading agricultural state in the nation producing more than 400 commodities, with a value of more than \$37 billion. Many of the crops grown are fruits and tree nuts, vegetables, herbs and spices, flowers, and horticulture crops which are recognized as specialty crops by the United States Department of Agriculture (USDA). Specialty crops make up a majority of the commodities grown in California – \$23 billion worth! You can say that California is pretty special!

Fresno Almonds, Poultry, Raisin Grapes

Glenn Rice, Almonds, Walnuts

Humboldt Timber, Nursery Products, Milk

Imperial Steers & Heifers, Leaf Lettuce, Alfalfa Hay

Inyo Steers, Heifers, Alfalfa Hay

Kern Almonds, Table Grapes, Pistachios

Kings Milk, Cotton, Processing Tomatoes

Lake Winegrapes, Bartlett Pears, Nursery Products

Lassen Hay, Alfalfa Hay, Strawberry Plants

Los Angeles Woody Ornamentals, Bedding Plants, Vegetable Crops

Madera Almonds, Pistachios, Milk

Marin Milk, Cattle & Calves, Poultry

Mariposa Cattle & Calves, Pasture & Range, Livestock Products

Mendocino Winegrapes, Timber, Bartlett Pears

Merced Milk, Almonds, Broiler Chickens

Modoc Alfalfa Hay, Cattle & Calves, Potatoes

Mono Alfalfa Hay, Stockers & Feeders, Steers

Monterey Strawberries, Head Lettuce, Romaine Lettuce

Napa Winegrapes, Cattle & Calves, Nursery Products

Nevada Cattle, Pasture, Pasture & Range

Orange Woody Ornamentals, Strawberries, Vegetable Crops

Placer Rice, Cattle & Calves, Nursery Products

Plumas Stockers & Feeders, Timber, Pasture

Riverside Milk, Woody Ornamentals, Table Grapes

Sacramento Winegrapes, Milk, Bartlett Pears

San Benito Vegetable Crops, Salad Lettuce, Bell Peppers

San Bernardino Milk, Eggs, Milk Cows

San Diego Woody Ornamentals, Foliage Plants, Bedding Plants

San Francisco Cut Flowers, Alfalfa & Bean Sprouts

San Joaquin Milk, Winegrapes, Walnuts

San Luis Obispo Winegrapes, Strawberries, Broccoli

San Mateo Potted Plants, Nursery Products, Brussels Sprouts

Santa Barbara Strawberries, Broccoli, Vegetable Crops

Santa Clara Mushrooms, Bedding Plants, Nursery Products

Santa Cruz Strawberries, Raspberries, Cut Flowers

Shasta Forest Products, Timber, Hay

Sierra Stockers & Feeders, Timber, Pasture

Siskiyou Strawberry Plants, Alfalfa Hay, Timber

Solano Processing Tomatoes, Walnuts, Vegetable Crops

Sonoma Winegrapes, Milk, Poultry

Stanislaus Milk, Almonds, Chickens

Sutter Rice, Walnuts, Dried Plums

Tehama Walnuts, Almonds, Olives

Trinity Firewood, Timber, Cattle & Calves

Tulare Milk, Navel Oranges, Cattle & Calves

Tuolumne Livestock, Cattle & Calves, Pasture & Range

Ventura Strawberries, Celery, Lemons

Yolo Processing Tomatoes, Rice, Winegrapes

Yuba Rice, Walnuts, Dried Plums



Activity

On the map, locate and label major lakes, rivers, mountains, and deserts. Identify the four climate regions (Mountain, Central Valley, Pacific, Desert). Include a map legend and compass. Identify the top four crops grown in each region and write them in the chart.

Hint: Count how many times a commodity is listed in that region. Some counties span multiple regions and the commodity will be counted more than once.

Climate region: _____

The top four crops grown:

1. _____ 2. _____

3. _____ 4. _____

Climate region: _____

The top four crops grown:

1. _____ 2. _____

3. _____ 4. _____

Climate region: _____

The top four crops grown:

1. _____ 2. _____

3. _____ 4. _____

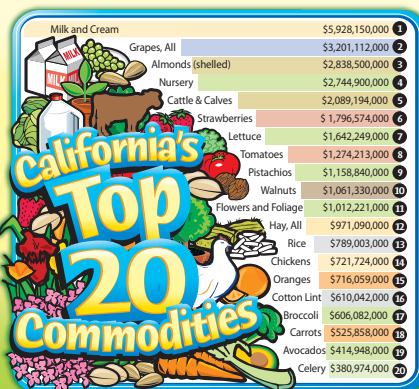
Climate region: _____

The top four crops grown:

1. _____ 2. _____

3. _____ 4. _____

Standards: History-Social Science – Grade 3: 3.1.1; Grade 4: 4.1.3, 4.1.4, 4.1.5; Science – Grade 4: 2 a, 2 b



Which of California's top 20 commodities are specialty crops? Circle those that are specialty crops. What is their combined value? What percent of the top 20 are specialty crops?

Standards: Mathematics – Grade 5: Number Sense 1.1, 1.2; Grade 6: Number Sense 2.1, 2.3; Grade 7: Mathematical Reasoning 2.1

What makes California able to produce so many different commodities? One reason is the climate: California has a Mediterranean climate with mild winters and warm summers that provide optimal conditions to grow specialty crops. California also has many micro-climates that allow farmers to grow specific crops in certain areas.



In the local newspaper, check the weather section. On a chart, record the daily temperature for a week. From the chart calculate the mean, mode, and median. Make a graph of the daily temperatures.

Standards: Mathematics – Grade 4: Statistics 1.1; Grade 5: Statistics & Probability 1.2

Most rainfall and water is in Northern California. It is transported to the Central Valley and Southern California by the California Aqueduct.



Source: National Agricultural Statistics Service www.nass.usda.gov



Water Wise Plants

A native plant is one that occurs naturally in a region or habitat without human intervention. Gardening with native and water wise plants from around the world, can bring beauty into your own landscape while also receiving numerous benefits.

Landscaping with native and water wise plants provides numerous benefits including requiring little-to-no fertilizer or pesticides, less water usage, and less pruning. These plants can provide a low-maintenance and budget-friendly landscape.

Activity

Use an agriculture publication, such as Ag Alert® (www.agalert.com) or your local newspaper, to find articles about water wise plants or local water issues. Use a separate sheet of paper and write a summary paragraph explaining how to conserve water and why it's important.

Standards: ELA – Grade 3: Writing 1.0, Reading 1.0; Grade 4: Writing 1.0, 2.4, Reading 2.0; Grade 5: Writing 1.0, Reading 2.0; Grade 6: Reading 2.0; Grade 7: Writing 2.5, Reading 2.0



Irreplaceable Irrigation

Every living thing needs water to survive. Since water is a natural resource, it is limited, and everyone must do their part to conserve it.

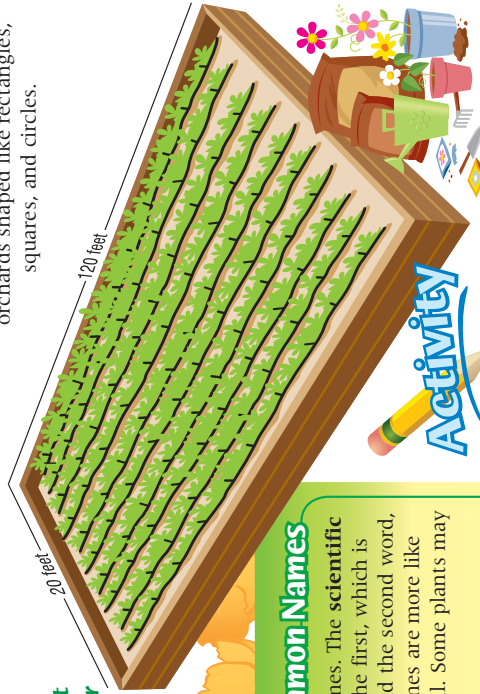
Farmers are careful to conserve water when irrigating plants and crops. They want to make sure the plants get enough water to thrive and produce crops without being wasteful.

Drip irrigation – Water is delivered to plants through small tubes. Each tube has many pin-sized holes which direct the water close to the roots. This method uses less water than

overhead sprinklers and less evaporation occurs. **Sub-irrigation** – Used in commercial greenhouses, this method of irrigation is used for potted plants. Water is delivered from below the plant and absorbed upwards. The excess water can be recycled.

Hand watering – Water travels through a hose and is sprayed from a nozzle in rain-size droplets.

Sprinkler – Large sprinklers spray water from overhead. This method covers a large area and works best in fields and orchards shaped like rectangles, squares, and circles.



Activity

You decide to conserve water by installing drip **irrigation** in your garden. Your garden measures 20 feet by 120 feet. You plant 10 rows of plants that run the entire length of the garden. You will use one piece of irrigation tubing for each row.

- Determine the square area ($A = l \times w$) of your garden. _____
- How many feet of irrigation tubing will you need to irrigate all 10 rows? _____
- What will the total cost be if the irrigation tubing costs \$0.05 per foot? _____

Standards: Mathematics – Grade 3: Measurement and Geometry 1.2; Grade 4: Measurement and Geometry 1.1; Grade 5: Measurement and Geometry 1.1

Scientific Names versus Common Names

Plants have scientific and common names. The **scientific name** is Latin and consists of two parts: the first, which is always capitalized, indicates the **genus** and the second word, in lowercase, is the **species**. Common names are more like nicknames, and can be one word or several. Some plants may have multiple common names.

Draw a line to match the scientific name to the common name. Hint: Often a variation of the common name can be found within the scientific name.

Scientific Name	Common Name
1. <i>Juniperus chinensis</i> 'Aurea'	a. Flowering Pear
2. <i>Myrsine africana</i>	b. Chinese (Tropical) Hibiscus
3. <i>Pyrus calleryana</i>	c. Canary Island Pine
4. <i>Pinus canariensis</i>	d. Gold Coast Juniper
5. <i>Hibiscus rosa-sinensis</i>	e. African Boxwood

Standards: Science – Grade 5: 6a, Grade 7: 3a, 5a

Sources – Arbor Day Foundation www.arborday.org, USDA Natural Resources Conservation Service plants.usda.gov



Have a Berry Special Day

Mixed berries are popular **super foods**. What makes them so super? They are packed with vital nutrients, such as **antioxidants**, that are important for good health. Examples of berries include blueberries, blackberries, raspberries, and strawberries.

Blueberries are **perennial, deciduous** shrubs. They are commonly grown as free standing shrubs. When the berry is a deep

blue color they are carefully hand-picked and rushed to nearby packing houses and then delivered fresh to the grocery store.

Blueberries are an excellent source of antioxidants!

Blackberry and **raspberry** plants start flowering in the spring and berries ripen in the summer. Some varieties are vine-like and are grown on trellises. When ready for harvest the blackberry will have a solid center while the raspberry is hollow.

Commercially, **strawberries** grow on plastic covered beds, close to the ground. On average, it takes 30 days for the fruit to ripen before being picked. When the strawberries are ready to be harvested they are hand-picked, placed in **clamshells** or other packaging, transported to a cooler, and delivered to stores or restaurants.



Activity

Match the berries below to how they are grown and what they look like.

How they are grown	Type of Berry	What it looks like
	Strawberry	
	Blueberry	
	Blackberry	
	Raspberry	

Standards: ELA: Grade 3: Reading 2.1, 2.3, 2.6; Grade 4: Reading 2.2, Grade 5: Reading 2.1; Grade 6: Reading 2.1

A bramble is a plant belonging to the genus **Rubus**, and includes raspberries, blackberries, and hybrids such as boysenberries.

Did You Know?

The strawberry got its name in the 19th century when children strung the berries onto straw and offered them for sale. Hence the name straw-berry.

Activity

You and your family visit a local U-pick farm to pick fresh berries. They have three varieties in season: raspberries, blueberries, and strawberries. The raspberries and blueberries are \$3.25 per pound and strawberries are \$2.99 per pound. Calculate the cost of purchasing $\frac{1}{2}$ a pound of raspberries, $\frac{1}{4}$ pound of blueberries, and $1\frac{1}{4}$ pounds of strawberries. Round to the nearest cent.

Standards: Mathematics – Grade 3: Number Sense (NS) 3.3, 3.4, Algebra and Functions 2.1, Mathematical Reasoning (MR) 1.0; Grade 4: NS 1.3, 1.5, MR 1.2; Grade 5: NS 2.4, 2.5, MR 1.0; Grade 6: NS 2.3, 2.4, MR 1.0; Grade 7: NS 1.2, MR 1.0

Sources: Highbush Berry Council www.blueberry.org, California Strawberry Commission www.calstrawberry.org, Network for a Healthy California Harvest of the Month www.harvestofthemonth.com

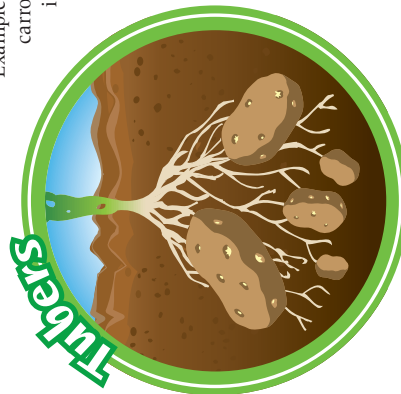
Underground Edibles

Roots, tubers, and bulbs are three examples of specialty crops that are grown underground. Each underground edible acts as a storage unit that provides the plant with the nutrients it needs to grow and bloom.

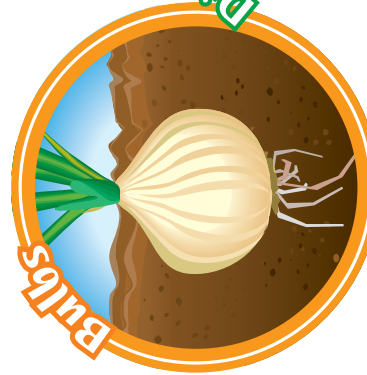
Roots: There are two different types of root systems: fibrous and tap. Fibrous roots are those that have many branches of the same size. Tap roots have a single large root. The tap root is the most common part of the plant that we eat.

Examples include carrots, beets, radishes, and turnips.

Tubers are underground plant structures that are enlarged to store plant nutrients. They are used by plants to survive the winter or dry months and provide energy and nutrients for re-growth during the growing season. Tubers have leathery skin and growing points where new plants can develop. Potatoes, yams, sweet potatoes, and Jerusalem artichokes are tubers.



Bulbs are planted in the ground and act as an underground storehouse. In the center of the bulb is a bud, ready to sprout when the environment is right. If you were to dissect the bulb, the bud inside looks like a miniature flower! The bud is surrounded by scales that contain nutrients the bulb will need to flower. Examples of bulbs are onions, garlic, green onions, and fennel.



Underground Fun Facts:

In California, we grow more sweet potatoes than russet, red, white, and gold potatoes.

The majority of garlic grown in the United States comes from California.

Sulfuric compounds are what irritate your eyes and cause you to cry when cutting onions.

It grows in soil, but can I eat it? There are many underground edibles that are a part of our diets! Rearrange the circled letters in the facts below to learn more about underground edibles.

Activity

The first food ever grown in outer space.

Used in the 1700s to provide feed for cattle during the winter.

Since the 1700s, it has been used as a natural dye.

Originally purple in color, this vegetable originated in central Asia.

Nutritional Values:

These specialty crops are high in:

Carrots	Beta carotene and fiber
Garlic	Vitamins B6 and C
Radishes	Vitamin C and calcium
Beets	Vitamin A, vitamin C, calcium, and iron

Square Roots

If you have a garden space of 4.5 ft. x 4.5 ft., how many onion seeds can you plant? Determine the perimeter and area for the garden space. Space requirements: Allow 2 inches between each seed and 18 inches between rows.

Standards: Mathematics – Grade 3: Measurement and Geometry 1.2, 3.1, 3.2; Grade 4: Measurement and Geometry 1.1, 1.4

Did You Know?

Baby carrots are regular carrots cut into two inch pieces.

In the know about H₂O

An aquifer is an underground bed or layer of permeable rock saturated with water that farmers can use.

Activity

Can you grow a carrot using only the top 1/4 inch of a carrot root? Form a hypothesis and develop an experiment. Take measurements and record your observations over time.

Standards: Science – Grade 3: 3a, 3d, 5a, 5c, 5d, 5e; Grade 4: 3b, 6b, 6c; Grade 5: 2a, 6c, 6f; Grade 6: 7a, 7b; Grade 7: 5a, 7c; Grade 8: 9a

Food Safety is a Team Effort

Food safety practices are important in every stage of food production, preparation, and consumption. Good agricultural practices have been developed by agriculture, and government agencies, and each step in the process is inspected or monitored. It takes teamwork to ensure the safe and abundant food supply we enjoy!

FOOD SAFETY TEAM
What's Grown On?

PRODUCTION

At the farm, soil and water are tested for **pathogens** and monitored to prevent **contaminants**.

FOOD SAFETY TEAM
What's Grown On?

TRANSPORTATION

En route, and at all stages, produce is kept at its ideal temperature. If refrigerated, the cold chain cannot be broken at any point.

FOOD SAFETY TEAM
What's Grown On?

PROCESSING

Sanitary conditions continue with equipment sterilization, and maintained during washing, pasteurization, cooking, freezing, and/or packaging.

FOOD SAFETY TEAM
What's Grown On?

DISTRIBUTION

Employees at grocery stores and restaurants follow rules and procedures during food handling and preparation.



Activity

Career Presentation

Research a career in agriculture and present it to your class or family. Include a description of the career, required education, and projected income. Visit agriculture.purdue.edu/USDA/careers for ideas.

Standards ELA — Grade 3: Writing 2.2; Listening & Speaking (LS) 1.5; Grade 4-5: Writing 2.3; LS 2.2; Grade 7: Writing 1.2, 1.4; LS 2.3; Grade 8: Writing 1.4, 2.3; LS 2.3

Tracking with Technology

Sophisticated data collection is available to track specific products from the field where they were grown to your local market. Produce in more than 35 million clamshells have been tracked with codes since 2007! Scan the following containers to find out where the produce came from or enter the codes at kids.learnaboutag.org/wgo10/foodsafety.



Activity

Use facts from this page, and the word bank, to complete the crossword.

ACROSS:

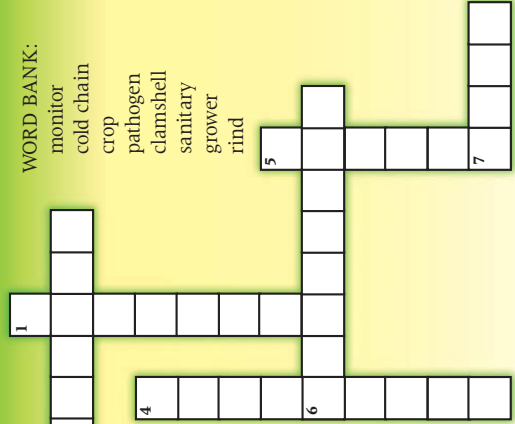
- Harvests kept cold continuously
- To continuously check
- Free from contaminants
- Thick outer skin

DOWN:

- An organism that causes harm
- Produce grown by a farmer
- Plastic hinged container
- One who produces plants

WORD BANK:

monitor
cold chain
crop
pathogen
clamshell
sanitary
grower
rind



Source: www.learnaboutag.org/foodsafety **Standards:** ELA — Grade 4: Reading 2.0; Grade 5: Reading 2.0; Grade 6: Reading 2.0; Science — Grade 4: 3c; Grade 6: 6c

Superb Herbs

Am Herb by Any Other Name

Herbs: The Spice of Life

A herb is a plant or plant part used for its scent, flavor, or therapeutic properties. Herbs can be used to enhance the taste of food and as a source of phytochemicals for health benefits. Herbs, spices, botanicals, and medicinals are a special part of California agriculture.

Activity

How do herbs affect the smell and taste of food? Compare culinary herbs from your family's kitchen. Select an herb and record its name, how it smells, and what dishes it could be used in.

Herb/Spice	What does it smell like?	What do you use it in?

Bonus Activity

Find your favorite recipe in a cookbook from the library or on the Internet (www.californiaaboutful.com/recipes). Do the ingredients include herbs? How do you imagine it would taste without the herbs? Try making a new dish each week for a month to find new flavors that you like.

Standards: ELA – Grade 3: Reading 2.7; Written and Oral English Language Conventions (WOLC) 1.2; Grade 4: Reading 2.7; Science – Grade 3: Investigation & Experimentation 5a; Grade 4: Investigation & Experimentation 6a; Grade 5: Investigation & Experimentation 6b, 6c

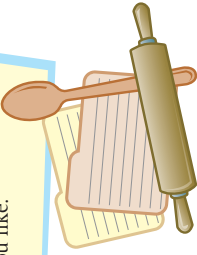
Medicinal Herbs Word Search



- Fenugreek
- Foxglove
- Ginkgo biloba
- Ginseng
- Witch hazel
- Horsetail
- Wormwood
- Lavender
- Yarrow
- Licorice

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

Herbs can either be used fresh cut, straight from the garden or farm, or dried. A general guideline when using fresh herbs in a recipe is to use three times as much as you would use of a dried herb.



Activity

A recipe you're using calls for the following dried herbs. Convert the ingredients from tablespoons to cups to represent the amount of fresh herbs needed. One cup equals 16 tablespoons. Express your answer using cup equivalents.

- 4 tablespoons dried oregano = ____ cup fresh oregano
- 1 1/2 tablespoons dried thyme = ____ cup fresh thyme
- 8 tablespoons dried basil = ____ cups fresh basil

Standards: Mathematics – Grade 3: Number Sense 3.1; Algebra and Functions 1.1, 1.2, 1.4; Grade 4: Number Sense 1.5; Algebra and Functions 1.4; Grade 5: Number Sense 2.5; Grade 6: Algebra and Functions 2.1; Grade 7: Measurement and Geometry 1.1

Did You Know?

Both the leaves (cilantro) and seeds (coriander) are from the *Coriandrum sativum* plant.



Sources: UC Davis Small Farms Program <http://smallfarms.ucdavis.edu>; <http://www.nlm.nih.gov/medlineplus/herbalmedicine.html>; USDA AMS – Specialty Crops www.ams.usda.gov

Specialty Words

Annual: A plant that flowers, produces seed, and completes its life cycle in one growing season.

Antioxidant: A substance that reduces damage by preventing oxidation.

Aqueduct: A pipe or channel designed to transport water from a remote source, usually by gravity.

Bedding plants: A plant suitable for planting in a flower bed for one season's display.

Botanical: Relating to plants, especially to the scientific study of plants.

Clamshell: A container with two hinges that holds produce for consumers to buy.

Climate: The general atmospheric conditions for a location; including rainfall, temperature, and humidity.

Contaminants: Foreign matter that makes something impure, unclean, or polluted.

Deciduous: Trees and bushes that shed their leaves in the fall.

Family: A taxonomic category of related organisms, ranking below an order and above a genus.

Foliage: A cluster of leaves.

Gene: A segment of a chromosome. Some genes direct the syntheses of proteins, while others have regulatory functions.



Activity

In complete sentences and in your own words, use what you learned in this newspaper tab to define specialty crops. List three examples.

Phytonutrients: Naturally occurring compounds found in plants that function as antioxidants, promote immunity, increase communication with cells in the body, and help repair damage to DNA. Also known as phytochemicals.

Punnett Square: A diagram that is used to predict an outcome of a particular cross or breeding experiment. Used by biologists to determine the probability of an offspring's having a particular genotype.

Rind: A thin, shiny outer layer of the produce, also known as the skin. This is a protective layer to keep disease and insects out of the fruit.

Scientific Name: The recognized Latin name given to an organism, consisting of a genus and species.

Shade House: A building used to help plants that do better in shady conditions grow, or to help those that were started in a greenhouse adjust to the outdoor environment.

Species: A group of organisms with common characteristics.

Staple Foods: Food regularly consumed and in such quantities that it constitutes a dominant portion of a diet. Examples include wheat, fish, peanuts, and rice.

Super Foods: Foods that are rich in vitamins, minerals, and other nutrients.

Therapeutic: An item used to maintain or improve health.

Trait: A genetically determined characteristic or condition.



For a fast-paced, entertaining introduction to the farmers who grow specialty crops and the people who help bring those crops to you, watch the California Bountiful television program. Find the broadcast schedule for your area. www.californiabountiful.com.



Resources

American Pistachio Growers
www.thegreennut.org

Arbor Day Foundation
www.arborday.org

California Cut Flower Commission
www.ccfca.org

California Department of Food and Agriculture
www.cdffa.ca.gov

California Strawberry Commission
www.calstrawberry.org

Fruits and Veggies More Matters
www.fruitsandveggiesmorematters.org

Highbush Berry Council
www.blueberry.org

Iowa State University Cooperative Extension
www.extension.iastate.edu

MyPlate
www.myplate.gov

National Watermelon Promotion Board
www.watermelon.org

Network for a Healthy California
www.harvestofthemonth.com

Purdue University
www.hort.purdue.edu

UC Division of Agriculture and Natural Resources
www.ucanr.org

United States Department of Agriculture
www.usda.gov

Water Education Foundation
www.watereducation.org

To request a free **What's Growin' On?** extra extra Extensions to enhance the use of this newspaper, or for answer key, visit www.LearnAboutAg.org/wgo or call (800) 700-AITC(2482).

Fun Facts!

There are more than 7,000 varieties of apples grown in the world, and about 2,500 varieties are grown in the United States.



In the first week, a Christmas tree displayed in your home will consume as much as a quart of water each day.

Oranges do not ripen after they are picked

...but lemons do.

An apiary is a place where hives of honey bees are kept. Honey is considered a specialty crop. Besides giving us honey, research gives us other ways that bees help farmers and ranchers.



Acknowledgements

California Foundation for Agriculture in the Classroom (CFAITC) is a 501(c)(3) not-for-profit organization dedicated to increasing the awareness of and appreciation for the safe, fresh and abundant agricultural products we are fortunate to enjoy in California. The Foundation provides free and low cost standards-based resources, training opportunities and K-12 classroom materials that enhance regular classroom instruction.

Contact CFAITC or visit www.LearnAboutAg.org for:

- Kids' Corner (kids.LearnAboutAg.org)
- Resources and lesson plans
- What's Growin' On? Teacher's Supplement
- Story-writing contest
- Upcoming conferences
- Cream of the Crop monthly e-newsletters

Editors: CFAITC Staff
Executive Director: **Judy Culbertson**
Design: **Erik Davison, The Fresno Bee**
NIE Manager: **Jim Fotes, The Fresno Bee**
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What's Growin' On?

CA Crop Talk - Specialty Crops Edition



**Extra!
Extra! Classroom Extensions**



California Foundation for
Agriculture in the Classroom

2300 River Plaza Drive
Sacramento, CA 95833-3293
www.LearnAboutAg.org

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Introduction

Welcome! Thank you for your interest in the California Foundation for Agriculture in the Classroom's (CFAITC) student activity newspaper, *What's Growin' On? CA Crop Talk—Specialty Crops Edition*. Developed by educators like you, *What's Growin' On?* offers fun and engaging ways to teach and practice core academic skills while demonstrating the importance of our food and fiber system.

The *Extra! Extra! Classroom Extensions* guide contains ideas and opportunities for extending the content presented in the student activity newspaper. Depending on the needs of your specific classroom, this teacher's guide includes inquiry-based lab ideas, related literature, and methods for incorporating technology into each learning experience. CFAITC encourages teachers to continue sharing life-long lessons outside the pages of the student newspaper, and have provided a list of field trip and guest speaker ideas that may strengthen student learning and comprehension. Finally, recognizing that each student in your classroom has uniquely different learning styles and educational needs, we have provided GATE and ELL adaptations that can help tailor each topic to the diverse abilities of your students. We hope you are able to deepen your student's learning through these lesson ideas.

The agriculture-themed examples and activities found in *What's Growin' On?* are designed to motivate and inspire your students, connecting classroom lessons to real-life experiences and circumstances. This is accomplished by weaving **agriculture** into teaching so students can better relate to food they eat, clothes they wear, homes they live in, and open spaces they enjoy. Additionally, using the **newspaper** as an instructional tool allows young people to discover the relevance of their classroom studies by reading news stories, acquiring new knowledge, forming opinions, and broadening their understanding of the world they live in.



California Foundation for Agriculture in the Classroom is dedicated to increasing the awareness and understanding of agriculture among California's educators and students. CFAITC provides educators with resources and programs that enhance agricultural literacy. To request a free teacher resource packet or a classroom set of the current edition of *What's Growin' On?* contact CFAITC via e-mail (info@LearnAboutAg.org) or phone (800-700-2482).

Contributors

Julie Bottoms, Teacher, Agnes M. Baptist Elementary School, Modesto
Ellen Nelson, Retired Teacher, El Portal Middle School, Escalon

Editor

Mandi Bottoms, Curriculum and Evaluation Specialist, CFAITC

Layout and Design

Erik Davison, Graphic Designer, The Fresno Bee
Renee Hyatt, Website Coordinator, CFAITC

Pumpkins & Squash: Treasures of the New World

Extension Ideas

1. **Be a Botanist.** Using the pumpkin diagram on page three of *What's Growin' On? CA Crop Talk—Specialty Crop Edition*, students work in groups to dissect a pumpkin. Instruct students to separate and label the pumpkin parts. Dissect other members of the Cucurbita family to identify similar (and different) anatomical structures.
2. **Game Time.** After students have read and discussed the material, use a Jeopardy-style game format to reinforce pumpkin parts, origins, and growth patterns. Categories could include "Before the Carve" (outer appearance), "Digging In" (what's inside), "Edible Delights" (nutrition facts), and "Veggie Tales" (other Cucurbits and their uses).
3. **Balm Like an Egyptian.** How would you like to preserve your carved pumpkin to make it last longer? Using techniques to sterilize and seal surfaces in order to kill the growth of fungi, mold, bacteria, and insects, students can "embalm" pumpkins the same way the ancient Egyptians embalmed mummies. For more detail about the experiment, visit www.pumpkinpatchesandmore.org/carvedpumpkins.
4. **Giant Pumpkins.** Many communities in California have joined the giant pumpkin craze, hosting everything from fair competitions to citywide festivals to show off their prodigious pumpkins. Investigate the origin of "biggest produce" contests, typical contest rules and guidelines, growing tips, and state and world records. Students may even want to grow a giant pumpkin of their own!



Guest Speaker Idea

Find a local professional pumpkin carver (or artist) and invite them to do a demonstration for your class. Before your guest arrives, brainstorm a list of questions students would like to ask.

Field Trip Idea

This website provides a detailed list of California's pumpkin patches, corn mazes, hay rides, and other agriculture-based Halloween experiences! The list includes everything from local growers to elaborate farm stands with mountains of pumpkins and world record-breaking corn mazes. All sites have plenty of pumpkins to choose from. To create an educational experience your students will never forget, look for sites that have extra activities, like a corn maze, spook house, or hayride. There is usually a small fee for the mazes and hay rides. To find a pumpkin patch near you, visit

www.pumpkinpatchesandmore.org/list/geography/United%20States/California.

Technology Opportunity

Brainstorm ways to use technology to carve a pumpkin. Some carvers have found success using power tools, such as a Dremel rotary tool. Watch a video online (www.youtube.com/watch?v=w6pN0QdLGWU) or give a live demonstration.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about seed germination. First, encourage students to research the ideal environment for seed germination. Next, have students create a hypothesis around the question "how long does it take for a pumpkin seed to germinate?" Have students predict and write down how many days it will take. Distribute a clear plastic cup to each student. Have students dampen a paper towel, wad it up, and place it in the bottom of their cup.



Nestle the seed on a side of the cup, between the cup wall and the paper towel. Keep track of the progress of the seeds each day with your students, making a note of when seeds sprout and sketching each day's progress. Don't forget to revisit their original hypothesis, identify variables, compare observations, and illustrate findings with a graph.

GATE Adaptation

Explore the buoyancy of pumpkins using the scientific method. Have student predict whether a variety of pumpkins will sink or float. Provide a large bucket of water and different varieties and sizes of pumpkins. Students should make a tri-fold display to show the entire process when finished: problem, hypothesis, materials, results, and conclusion.

Books About Pumpkins and Squash

Ayres, Katherine. **Up, Down, and Around**. Candlewick Press, 2007. When two children help plant a garden, they learn that peppers grow up, potatoes grow down, and pumpkin vines twine around and around. ISBN 978-0-7636-4017-0

Bauer, Joan. **Squashed**. Putnam Juvenile, 2001. Ellie Morgan's life would be almost perfect if she could get her potentially prizewinning pumpkin to put on about 200 pounds before the Rock River Pumpkin Weigh-In. ISBN 978-0-14-240426-3

Berger, Melvin. **Growing Pumpkins**. Newbridge Educational Publishing, 2007. This early science reader shows pumpkins from seed to fully grown, ready to be taken home. ISBN 978-1-4007-6175-3

Burckhardt, de Ann L. **Calabazas**. Capstone Press, 1999. This book, with Spanish text, shows the growing and harvesting of pumpkins. ISBN 978-1-56065-786-6

Evangelista, Gloria. **In Search of the Perfect Pumpkin**. Fulcrum Publishing, 2001. Share the adventures of the Pucci family as they search for the perfect pumpkin only to find it in their backyard. ISBN 978-1-55591-994-8

Farmer, Jacqueline. **Pumpkins**. Charlesbridge, 2004. This book introduces the pumpkin plant, including its anatomy, growth cycle, and historical importance. ISBN 978-1-57091-557-4

Fridell, Ron and Patricia Walsh. ***Life Cycle of a Pumpkin***. Heinemann Library, 2001. Learn how leaves protect pumpkins, how large they can grow, and look inside of them. ISBN 978-0-431-08460-2

Gibbons, Gail. ***The Pumpkin Book***. Holiday House, 2000. The life cycle of the pumpkin is clearly depicted in this picture book. How pumpkins are used at Thanksgiving and Halloween is also discussed. ISBN 978-0-8234-1636-3

Harris, Calvin. ***Pumpkin Harvest/La Cosecha de Calabazas***. Capstone Press, 2009. This book describes and illustrates the fall pumpkin harvest in both English and Spanish. 978-1-4296-3262-1

Keeler, Renee. ***Our Pumpkin***. Creative Teaching Press, 1995. A book about how to use math with a pumpkin. ISBN 978-1-57471-002-1

Koontz, Robin. ***Pick a Perfect Pumpkin***. Picture Window Books, 2011. Learn where pumpkins come from and how to harvest them. ISBN 978-1-4048-6011-7

Kroll, Steven. ***The Biggest Pumpkin Ever***. Cartwheel Books, 1993. Two mice raise and harvest a very large pumpkin. ISBN 978-0-590-46463-5

Krudwig, Vickie Leigh. ***Cucumber Soup***. Fulcrum Publishing, 1998. This counting picture book, full of whimsical insects, introduces students to many garden critters. ISBN 978-1-55591-380-9

Ray, Mary Lyn. ***Pumpkins: A Story for a Field***. Harcourt, 1996. In this fictional story, a field and pumpkins make one think about what is important in life. ISBN 978-0-15-201358-5

Rockwell, Anne. ***Pumpkin Day, Pumpkin Night***. Walker & Company, 2001. Jeffrey finds a perfect pumpkin that is not too big and not too small. ISBN 978-0-8027-7614-3

Rustad, Martha E. ***Pumpkin Harvest***. Capstone Press, 2008. In fall, pumpkins turn orange and are picked from patches. Check out pumpkins during and after the harvest. ISBN 978-1-4296-0026-2

Sloat, Teri. ***Patty's Pumpkin Patch***. G. P. Putnam's Sons, 1999. Patty's pumpkin patch is busy all year from plowing to planting to weeding to picking. This book shows in alphabetical fashion the creepy-crawly and feathered friends that live there. ISBN 978-0-399-23010-3

Titherington, Jeanne. ***Pumpkin Pumpkin***. Mulberry, 1986. A young boy plants a pumpkin seed and, after watching it grow, carves it and saves some seeds to plant in the spring. ISBN 978-0-688-09930-5

White, Linda. ***Too Many Pumpkins***. Live Oak Media, 2004. Rebecca Estelle finds a creative way to share her pumpkins when she accidentally plants and produces too many. ISBN 978-1-59112-831-1

CFAITC Resource

Check out CFAITC's resource, ***Fruits and Vegetables for Health***, a fourth through sixth grade unit, that contains five lessons designed to teach students about the production, distribution, and nutritional value of California-grown produce. Students will gain knowledge in geography, language arts, science, nutrition, and math as they learn about the process through which fruits and vegetables are transported from California farms to kitchen tables. Healthy eating is emphasized throughout. www.LearnAboutAg.org/lessonplans

Pistachios are Nut-tastic

Extension Ideas

1. **Culinary Creations.** Challenge students to create menu items featuring that little green snack—pistachios. Appetizers, salads, breads, main dishes, and desserts can be considered. Plan a “pistachio potluck” as a festive way to celebrate St. Patrick’s Day (and green foods). For recipe ideas, visit www.food.com/recipe-finder/all/pistachio.
2. **Meet Pete Pistachio.** Create a storyboard that illustrates the steps required to produce the perfect pistachio. Create characters of interest, intriguing destinations, challenges, and triumphs. Students can tell their stories of “Pete Pistachio” to one another, the whole class, or they can develop the story in written form with greater detail. Follow “Pete” from seed to package and meet the people who help him become most desirable. Submit the best stories to the *Imagine this...* Story Writing Contest (www.LearnAboutAg.org/imaginethis).
3. **Who’s the Heavyweight?** Give each student a cup of pistachios to crack and separate the shells from the meat. Students can take turns weighing the shells and the meat separately. Have a class discussion on their findings. What percentage of an in-shell pistachio is waste? What are some creative ways farmers can recycle the shells? What is the cost of shelled or in-shell nuts? Is one a better deal? Why might farmers prefer to sell pistachios in-shell or shelled?



Guest Speaker Idea

Invite a representative from a local nut company or fruit stand to share information about popular flavors, consumer packaging, and product shelf life.

Field Trip Idea

Show students firsthand how pistachios and other nuts are grown. Schedule your field trip during pistachio harvest, which usually begins in early September and continues for four to six weeks. Observe California pistachios as they are mechanically shaken from the tree (in under a minute) and visit the processing plant to see how machines remove the hull, or outer shell. The following farms grow pistachios in the San Joaquin and Sacramento Valley: Braga Organic Farms (Madera), Fiddymment Farms (Lincoln), Setton Farms (Terra Bella), and Yurosek Farms (Bakersfield).

Technology Opportunity

Producing pistachios starts the moment a seed is planted. Take a look into the process of planting, harvesting, drying, roasting, and packaging pistachios. Visit www.settonfarms.com to view a 12-minute video that illustrates the process. Have students record the many uses of technology they observe, including water delivery methods, in a graphic organizer.

Inquiry Opportunity

Pistachios are full of all kinds of goodness beneath their shells. But did you ever wonder how they compare to other nuts? Create an infographic to visually represent information, data, and knowledge about the nutritional value of pistachios. Students may wish to compare the nutrient value of pistachios to different nuts.

GATE

Help students discover the practicality of pistachio production by visiting www.nationmaster.com. Search geography, climate, and agriculture statistics by country. Instruct students to determine which countries are best suited to grow pistachios based on a variety of factors. Students will then draw and label a world map to show their findings. Later, students may write a summary of their findings and share conclusions about emerging patterns or themes.

CFAITC Resource

Check out CFAITC's resource, Agricultural Fact and Activity Sheets. These fact sheets include one page of current facts about agricultural commodities or natural resources including information on their history, production, top producing regions, varieties, and economic value. The second page features ideas for teachers. A pistachio fact sheet is available. www.LearnAboutAg.org/factsheets

Fancy Free, Floral-ly

Extension Ideas

1. **Draw a Still Life.** Cut flowers have a limited shelf life, and after a few days most flowers are not fresh enough to use in florist-quality arrangements. Contact a local flower shop and ask for a donation of soon-to-be wilted flowers. Use donated flora to practice flower arrangements in the classroom. Divide the flowers evenly and instruct students to think of symmetry in their arrangement as well as complementary colors. Once the arrangement is complete, students can draw a still life. If possible, use watercolor pencils. Donate arrangements to a local elder care center.



2. **A Rose By Any Other Name.** Flower names for girls (such as Iris, Lily, and Daisy) are really blooming! Bring in a baby name book and research the history of specific flower names. Discuss origin, popularity, and similarities with the actual flower.
3. **Build a Greenhouse.** Students can use a plastic bottle to create a miniature greenhouse. Cut about a third off the top of a 2- or 3-liter plastic soft drink bottle with a pair of scissors. Then, smooth out the edges by lightly rubbing sandpaper over the top. Students fill the container with 4-6 inches of soil and plant flower seeds of their choice. Place the greenhouse near a window that gets a lot of sun and water regularly. Inverting the top of the bottle and placing it back on the container will help collect dew and water the seeds. Check the temperature and humidity regularly to insure proper growth of established plants. For older students, use the model to illustrate and learn about the greenhouse effect.

Guest Speaker Idea

Invite a floral designer to your classroom to demonstrate the use of flowers in arrangements. The designer can introduce students to different flower varieties, assist the class with pruning techniques, explain the use of color and shape, and reinforce the importance of academic skills students are learning now.

Field Trip Idea

The California Cut Flower Commission (www.cffc.org) lists local growers on their website, under the "Industry" tab. Visit a grower near you and become informed about seasonal availability of flowers, varieties, and transportation.

Technology Opportunity

Use video to illustrate the greenhouse effect. Brainpop (www.brainpop.com) hosts several videos related to the greenhouse effect. Watch “Greenhouse Effect” (subscription required) or “Global Warming” (no subscription required) to learn more. Instruct students to fill out a Venn diagram during the video to keep track of similarities and differences between real greenhouses and the greenhouse effect.

Inquiry Opportunity

Create a research opportunity that encourages students’ curiosity about flower preservation. First, encourage students to research why cut flowers deteriorate over time. What biological processes are evident? Challenge students to determine the best treatment for cut flower preservation. Treatments may include lime or lemon juice, lemon-lime soda, pennies, bleach, chlorine, aspirin, and more.

Brainstorm with the class potential treatments and why they think they will or will not effectively preserve flowers. Students should identify variables, establish a control, and select three different treatments for their flower. Students work in groups to determine the effectiveness of each treatment based on a set criterion. These criteria might include color, wilt factor, smell, and more.

GATE Adaptation

Instruct students to design a small flower plot for their backyard, using flowers suitable for their region. Students can research the characteristics of the flowers they plan to plant and keep in mind the following design tips:

- Flowers that grow taller should be placed in back.
- Different textures add interest to the viewers.
- Choose colors that complement each other.
- Annuals or perennials can be mixed together.
- Thematic flower beds feature plants with a similar feature, such as honeybee gardens, native plants, butterfly gardens, and tolerant plants.

Students may wish to illustrate their plan using colored pencils. Allow the class to select their favorite design and then create a replica in a large container.

Books About Flowers

Godwin, Sam. ***A Seed in Need***. Picture Window Books, 2001. Follow the life cycle of a sunflower seed in this colorful book. ISBN 978-1-4048-0920-8

Guillain, Charlotte. ***Spot the Difference: Flowers***. Heinemann Library, 2008. This book introduces children to the parts of a flower using intriguing photos of a variety of plants to provide child-friendly examples. ISBN 978-1-4329-0952-9

Gunderson, Jessica. ***The Sunflower Farmer***. Picture Window Books, 2008. Troy’s dream is to be a farmer like his grandfather, so his mother helps him plant sunflowers but a disaster strikes. Does the flower survive? ISBN 978-1-4048-2293-1

Heller, Ruth. ***The Reason for a Flower***. Putnam Publishing Group, 1999. Brief text and lavish illustrations explain plant reproduction and the purpose of a flower. Uses unique flowering plants as examples. ISBN 978-0-698-11559-0

Hibbert, Clare. ***The Life of a Sunflower***. Raintree, 2004. Describes the life cycle of a sunflower, from seed to flower. ISBN 978-1-84443-312-4

James, Felix. ***From Field to Florist***. National Geographic, 2001. This nonfiction primary reader shows how flowers get from the field to the florist shop. ISBN 978-0-7922-8736-0

Lovejoy, Sharon. ***Sunflower Houses***. Workman Publishing, 2001. Garden discoveries, tips for growing plants, folklore, and crafts for children of all ages. ISBN 978-0-7611-2386-6

Royston, Angela. ***Flowers, Fruits and Seeds***. Heinemann Library, 1999. Discover why plants have flowers, how some animals help make new plants, and what pollen is. ISBN 978-1-58810-449-6

Royston, Angela. ***Strange Plants***. Heinemann Library, 1999. Discover what flower grows 10 feet tall, which plants eat insects, and what spores are. ISBN 978-0-431-00184-5

Spilsbury, Louise and Richard Spilsbury. ***Where Do Plants Grow?*** Heinemann Library, 2006. Explains how plants survive in a desert, why some flowers have furry petals, and which trees do not lose their leaves in fall. ISBN 978-1-4034-7367-7

Spilsbury, Louise and Richard Spilsbury. ***Why Do Plants Have Flowers?*** Heinemann Library, 2006. Explains what pollen is, why some flowers are so colorful, and why plants make fruit. ISBN 978-1-4034-7368-4

Wellington, Monica. ***Zinnia's Flower Garden***. Puffin Books, 2005. Young readers will see how Zinnia's garden grows from seeds to flowers. ISBN 978-0-14-240787-5

Lovejoy, Sharon. ***Roots, Shoots, Buckets & Boots***. Workman Publishing, 1999. Twelve easy-to-implement ideas for theme gardens that parents, teachers, and kids can grow together are described in this book, including moon gardens and sunflower houses. ISBN 978-0-7611-1765-0

Parker, Steve. ***Sunflowers, Magnolia Trees and Other Flowering Plants***. Compass Point Books, 2010. This book explores the history of flowering plants and examines how they reproduce and obtain energy. Readers learn how flowering plants are used in agriculture. ISBN 978-0-7565-4222-1

Whitehouse, Patricia. ***Flowers***. Heinemann Library, 2002. This book introduces the physical characteristics, life cycle, and role of flowers in the world of plants. ISBN 978-1-58810-729-9

Worth, Bonnie. ***Oh Say Can You Seed?*** Random House Books, 2001. Learn all about flowering plants with the Cat in the Hat. ISBN 978-0-375-81095-4

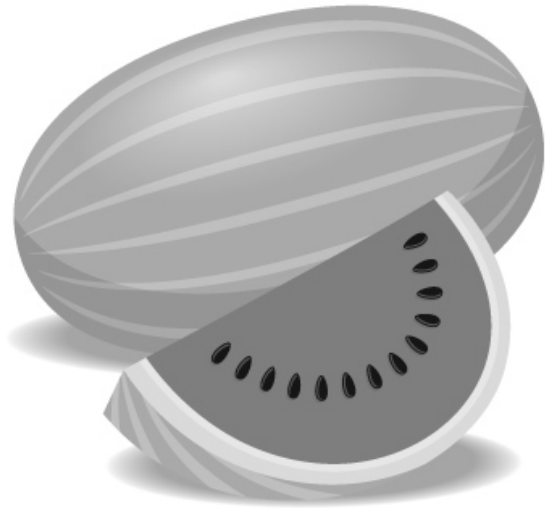
CFAITC Resource

Check out CFAITC's resource, ***Agricultural Fact and Activity Sheets***. These fact sheets include one page of current facts about agricultural commodities or natural resources including information on their history, production, top producing regions, varieties, and economic value. The second page features ideas for teachers. A cut flower fact sheet is available.
www.LearnAboutAg.org/factsheets

Mmmarvelous Melons

Extension Ideas

1. **Measure Up.** Instruct students to compare the size (circumference and length) and weight of various melons in both standard and metric measurements. Display the results in inequalities and have students discuss their findings. Practice academic vocabulary such as: less than, greater than, circumference, pounds, ounces, grams, kilograms, millimeters, centimeters, inches, feet, customary units, metric units, etc.
2. **Rebus Word Puzzle.** Honeydew, watermelon, cantaloupe, and other melons can be easily represented by a rebus. A rebus is an allusional device that uses pictures or symbols to represent words or parts of words. It was a favorite form of heraldic expression used in the Middle Ages to denote surnames. For example, an image of two gates with a head would be a rebus for “Gateshead.” Have the class brainstorm a list of melon varieties and create rebuses to represent them. Students can quiz each other by taking turns showing their rebus and guessing its meaning.
3. **Making Math.** An important aspect of nutrition is understanding the concept of energy balance. Our bodies need energy to move, work, and play. The foods we eat contain the energy we need (in the form of calories) to be active. If we consume too many calories or are not active enough to balance the calories we take in, we gain weight. When students become aware of serving sizes and the caloric value of a serving, they can make better choices for themselves. Using the nutrition facts labels for a variety of melons (www.harvestofthemonth.cdph.ca.gov/EdCorner/nutrition-labels.asp) instruct students to create word problems. Focus on serving sizes and calorie, vitamin A, vitamin C, and fiber content. Pair students up to solve each other’s word problems, and then have them choose between the two to share with the class.



Guest Speaker Idea

Invite a local certified farmers market coordinator to visit your class to discuss the variety of melons produced locally. Ask the expert for tips in selecting a melon that is in-season and at peak ripeness.

Field Trip Idea

Take a trip to a local nursery that sells melon transplants. How are different varieties similar or different at this stage? Compare color, leaf size, blossom appearance, size, and stems. Discuss proper fertilizing and watering practices, pest control, and the best time to plant.

Technology Opportunity

A Web quest is an inquiry-oriented lesson in which most or all of the information that students explore and evaluate comes from the Web. This Web quest uses the book *Watermelon Day* by Kathy Appelt to teach interesting facts about watermelons and help students decide if a watermelon is a fruit or a vegetable.

www.westalleggheny.k12.pa.us/mckee/reading_activities/grade%202/WebQuest.htm

Inquiry Opportunity

Many fruits and vegetables are harvested by hand. Modern technology, such as pick-up machines and conveyors, help farmers harvest melons. Cantaloupes are harvested with "sack" crews who empty the melons into bulk trailers. Crenshaw melon and other specialty melons are easily damaged and require special care in handling and transport to the packing area. Design a device which could protect the fruit from damage during harvest. Discuss the benefits of harvesting at different times of the day. For additional information, visit

vric.ucdavis.edu/postharvest/fruitveg.htm.

GATE Adaptations

Agritourism involves any agriculturally-based operation or activity that brings visitors to a farm or ranch. Create an agritourism plan that takes visitors on a melon tour. Research the California regions that are best suited for melon growth and design a route to visit several melon farms. What areas would be designated for the different varieties? What activities could you come up with for visitors to do that would incorporate learning about melon production, distribution, and retail? Students can submit a brochure advertising their tour as a final project.

Books About Melons

Appelt, Kathi. ***Watermelon Day***. Henry Holt and Company, 1996. A young girl watches a watermelon's growth all summer, waiting for it to ripen. ISBN 978-0-8050-2304-6

Hickman, Pamela and Heather Collins. ***A Seed Grows***. Kids Can Press, 1997. This book, with fold-out pages, describes a watermelon plant's life cycle from seed to harvest. ISBN 978-1-55074-200-8

Moser, Lisa. ***Watermelon Wishes***. Clarion Books, 2006. When Charlie spends the summer growing watermelons with Grandpap, his secret wish is to do it all over again the next year. ISBN 978-0-618-56433-0

Perkins, Lynne Rae. ***Home Lovely***. Greenwillow Books, 1995. A lonely young girl living in an isolated trailer makes new friends and gains knowledge by growing flowers and melons. Along the way, she beautifies her home. ISBN 978-0-688-13687-1

Salas, Laura Purdie. ***Lettuce Introduce You: Poems About Food***. Capstone Press, 2009. Poems in various forms celebrate everything from watermelon to Brussels sprouts. ISBN 978-1-4296-1703-1

CFAITC Resource

Check out CFAITC's resource, ***A Garden Plot The Tale of Peter Rabbit***. This unit uses *The Tale of Peter Rabbit* and other stories by Beatrix Potter as a vehicle to teach reading, writing, and science concepts. This unit encourages students to think about where their food comes from, distinguish between fact and fiction, observe roots and soil, and write about personal experiences they have while caring for the personal gardens they create.

www.LearnAboutAg.org/lessonplans

Agricultural Fact and Activity Sheets include one page of current facts about agricultural commodities or natural resources including information on their history, production, top producing regions, varieties, and economic value. The second page features ideas for teachers. A cantaloupe fact sheet is available. www.LearnAboutAg.org/factsheets

California Grows...

Extension Ideas

1. **County Close-up.** Have students locate their county on the map of California featured on pages eight and nine of *What's Growin' On? CA Crop Talk—Specialty Crop Edition*. Students may list the top commodities produced in their county, identify why their county is best suited to produce certain commodities, and discuss how history, immigration, location, soil, climate, and water resources may affect the local agriculture industry.
2. **Digging Deeper.** Have students identify the counties surrounding their community. Instruct students to create a graphic organizer that organizes the county name, similar commodities, and different commodities. Record average temperature, rainfall and soil type. Identify any themes that emerge. To wrap up the lesson, assign teams of students different counties to represent on a discussion panel. Panelist will introduce their county and explain why they are best suited to grow specific commodities.
3. **Graphing California Grows.** Using pages eight and nine of *What's Growin' On? CA Crop Talk—Specialty Crop Edition*, create a bar graph to illustrate the number of counties that produce the top 20 commodities. For example, how many counties have milk and cream included in their top three commodities? Are there any unusual findings? Have students describe why a commodity might be included in the "California's Top 20 Commodities" but not in the county list.



Guest Speaker Idea

Invite an economist into your classroom to discuss the importance of California's agriculture industry. Ask about the potentially negative consequences of a natural disaster, drought, or invasive species infestation on California's economy. How long would it take to recover? Would other states or countries be impacted? How would our lives personally be impacted? Students should chart the causes and effects as they are discussed.

Field Trip Idea

Today there are more than 400 different commodities grown in California! In fact, if California were a country, its agricultural value would rank between fifth and ninth among countries in the world. Take advantage of California's unique climate and diverse production by visiting a farm in your own backyard. Help students plan questions to ask the farmer about the commodities they produce and where their product is sold.

Technology Opportunity

Study Stack is an online tool used to create virtual flashcards for studying any subject. On this site, students can create their own flashcards or use the California commodity cards already developed (www.studystack.com/flashcard-312862). Students may pair up and practice their agricultural knowledge, or connect to a classroom projector to quiz the whole class.

Inquiry Opportunity

Water is an essential resource for growing crops. Create a research opportunity that encourages students' curiosity about how water moves through soil. Students can design a water permeability test using 2-liter bottles with the bottoms cut off, colored water, and natural earth materials such as sand, gravel, ash, silt, and clay. Each group of students should invert their bottle, and fill a third of it with their choice of layered earth material. Each group will determine the appropriate method for testing water permeability (time, color of soil, etc.). Challenge students to answer the following questions: 1) How does water filter into the ground? 2) What are some of the things that control water filtration? 3) How can agriculturalists conserve water?

GATE Adaptation

How do other countries get crops that are grown exclusively in California? For a complete listing, visit www.agclassroom.org/kids/stats/california.pdf. Help students investigate the import/export process for commodities that are only grown in California. They should include transportation methods, costs, and destination countries. Create a classroom bulletin board that features a large map. Students can add trade routes (string) and import/export locations (push pins).

Books About California's Top 20 Commodities

Milk and Cream

Gibbons, Gail. **The Milk Makers**. Aladdin, 1987. Text and pictures explain how cows produce milk and how it is processed before being delivered to stores. ISBN 978-0-689-71116-9

Leeper, Angela. **Dairy Plant**. Heinemann Library, 2004. Take a field trip to a dairy plant and learn how milk is processed into butter, cheese, and ice cream. ISBN 978-1-4034-5166-8

Peterson, Cris. **Clarabelle: Making Milk and So Much More**. Boyds Mills Press, 2007. This book is about how cows produce much more than just milk. ISBN 978-1-59078-310-8

Grapes

Adler, Karen. **California Grapes**. Karen Adler Books, 2004. This children's book helps students understand how grapes came to California and the process involved in getting them from the vineyard to their tables. ISBN 978-0-9679772-4-9

Perez, L. King. **First Day in Grapes**. Lee & Low Books Inc., 2002. Learn how Chico and his family move up and down the state of California picking fruits and vegetables and about Chico's successes and challenges in school. ISBN 978-1-58430-045-8

Cattle

Urbigkit, Cat. ***Cattle Kids***. Boyds Mills Press, 2007. Cowboys and cowgirls take part in many aspects of livestock operations. ISBN 978-1-59078-508-9

Wallace, Bill and Carol. ***That Doggone Calf***. Holiday House, 2009. Cookie, a calf, thinks he is going to be in charge of the cattle, but Hoss, the dog, is not about to give up his job. ISBN 978-0-8234-2228-9

Strawberries

Gibbons, Gail. ***The Berry Book***. Holiday House, 2002. This nonfiction book introduces students to different types of berries, and explains how varieties are cultivated and harvested. Includes recipes for blackberry jam, blueberry pie, and raspberry ice cream. ISBN 978-0-8234-1697-4

Tomatoes

Graham, Pamela. ***Big Red Tomatoes***. National Geographic, 2001. Learn the unique life cycle of the tomato in this early science reader. ISBN 978-0-7922-9221-0

Landau, Elaine. ***Tomatoes***. Children's Press, 2000. In this true-to-life book, learn how tomatoes grow and the history of them. ISBN 978-0-516-26773-9

Walnuts

Hauck, Phillip E. ***A Timeless Journey Told by Mr. Walnut***. Dab Publishing Company, 2000. The walnut has made a special place for itself within the cultures of the world. In this book, students discover the folklore and history of the walnut, while learning about botany, horticulture, and production agriculture. ISBN 978-0-9662228-7-6

Flowers and Foliage

James, Felix. ***From Field to Florist***. National Geographic, 2001. This nonfiction primary reader shows how flowers get from the field to the florist shop. ISBN 978-0-7922-8736-0

Saunders-Smith, Gail. ***Flowers***. Capstone Press, 1998. Learn the anatomy and function of flowers through colorful photographs and primary text. ISBN 978-1-56065-769-9

Hay

Paulsen, Gary. ***The Haymeadow***. Yearling, 1994. John Barron is asked to spend the summer taking care of six sheep and is not quite sure how he will survive. ISBN 978-0-440-40923-6

Rice

Spilsbury, Louise. ***Rice***. Heinemann, 2001. Find out where rice is grown and what happens to it on the way from the farm to your table. ISBN 978-1-4034-4050-1

Dooley, Norah. ***Everybody Cooks Rice***. Carolrhoda Books, 1992. A girl's adventure at dinnertime introduces her to a variety of cultures and the ways that rice is used in the evening meal. ISBN 978-0-87614-591-3

Chickens

Hibbert, Clare. ***The Life of a Chicken***. Raintree, 2004. Describes the life cycle of a chicken, from egg to broiler or laying hen. ISBN 978-1-84443-308-7

Ray, Hannah. ***Chickens***. Crabtree Publishing, 2008. In this book, learn about chicken anatomy, life cycle, different breeds, and uses. ISBN 978-0-7787-4050-6

Oranges

Keller, Kristin Thoennes. ***From Oranges to Orange Juice***. Capstone Press, 2004. Follow along as oranges from an orange grove are taken to a factory and made into orange juice. ISBN 978-0-7368-2636-5

Spilsbury, Louise. ***Oranges***. Heinemann, 2002. Find out how oranges are grown and how they get from the farm to your table. ISBN 978-1-4034-4048-8

Trumbauer, Lisa. ***The Story of Orange Juice***. Yellow Umbrella Books, 2006. From pollination to processing plant, this narrative follows the transformation of fruit on the tree into juice in your glass. ISBN 978-0-7368-5838-0

Cotton

Nelson, Robin. ***From Cotton to T-Shirt***. Lerner Publications Company, 2003. Discover how a cotton T-shirt is created from start to finish in this simply-written, emerging reader book with colorful photographs. ISBN 978-0-8225-4661-0

Yu, Norman. ***Cotton Comes from Plants***. National Geographic, 2003. Learn how cotton is grown and made into the clothes we wear. ISBN 978-0-7922-4331-1

Carrots

Saunders-Smith, Gail. ***Carrots***. Capstone Press, 1997. This primary reader describes carrots from growing to processing to eating. ISBN 978-1-56065-488-9

CFAITC Resource

Check out CFAITC's resource, ***Edible Numbers***. This unit, for grades three through six, introduces students to the numerous commodities California farmers produce. Through a series of activities, students analyze, using mathematical and scientific processes, the food they buy at the grocery store and understand that it ultimately comes from plants or animals. This lesson also includes grocery ad scavenger hunts.

Agricultural Fact and Activity Sheets include one page of current facts about agricultural commodities or natural resources including information on their history, production, top producing regions, varieties, and economic value. The second page features ideas for teachers. More than 30 different commodity facts sheets are available. www.LearnAboutAg.org/factsheets

Have a Berry Special Day

Extension Ideas

1. **Taste Test.** Bring in samples of fresh, frozen, and dried berries for the class. Have students use all their senses by comparing appearance (color, shape and size), taste, aroma, firmness of fruit, and texture of the berries. Students should record their findings in a graphic organizer. Later students can collect data from their classmates and create a wordle to graphically represent the class's aggregate observations. To create a wordle online, visit www.wordle.net.
2. **Design a Berry Advertisement.** In small groups or individually, have students choose a berry and design a commercial or poster, advertising a "Berry Beauty." The advertisements should promote the berries' attractiveness, nutritional value, versatility, and availability. Students who chose to design a commercial will then act it out for the class; students who designed a poster will do a brief oral presentation. For information on the nutritional value of berries, visit nutrition.about.com/od/healthyfood1/a/berries.htm.
3. **Berry Beautiful Paint.** Make a berry-based paint. For instructions on how to make paint from berry juice, visit the website www.ehow.com/how_4884547_make-paint-berries.html. Instruct students to use a pencil to create a large sketch of the berry they would like to paint. Use the berry-based paint to fill-in the sketch. Once the paint is dry, have students outline their berries with black marker, which will create a more finished product. Note: Berry juice may stain clothing and countertops. Protect clothing and surfaces and have tools on hand to clean up any messes.



Guest Speaker Idea

A grocery store produce manager must handle all berry shipments with care. Invite a produce manager to your class to explain shipping, cold storage requirements, and the frequency of product turnover. Before the manager comes to class, make a class KWL chart (which tracks what students know (K), want to know (W), and have learned (L) about the topic) to pique interest and focus the discussion. After the speaker has finished, be sure to fill in what the class learned.

Field Trip Idea

Visit a local nursery that sells berry plants. Compare and contrast the plant growth patterns (height, spacing) and environmental requirements (sun, water, soil) for each type of berry. Identify the varieties of blueberries, strawberries, blackberries, and raspberries best for your region. Did you know that raspberries can vary in color—including red, yellow, purple, and black? For more information, visit www.raspberries.us/varieties.htm.

Technology Opportunity

Food safety practices are important in every stage of food production, preparation, and consumption. Best management practices have been developed by agriculture and government agencies, and each step in the process is inspected or monitored. View a video on how one California company makes food safety a priority during the planting, harvesting, inspection, storage, and shipment of strawberries. To view, visit calgiant.com/foodsafety.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about acids and bases. Students can create their own litmus paper using white construction paper and a handful of blackberries. Visit www.stevespanglerscience.com/experiment/berry-ph-paper-sick-science for step-by-step instructions. Have students research the science behind using berries as a pH indicator. Challenge learners to test their litmus paper on a variety of liquids, including juice, milk, and soda. Students should create a hypothesis before testing each liquid, record their results, and compare their findings with others. Each group must conclude whether the homemade litmus paper is or is not an accurate way to measure pH.

ELL Adaptation

Smoothies have become a popular way to consume fruit. Split the class into five groups, and instruct each group to create their own version of a berry smoothie using the same five ingredients (berries, milk, yogurt, juice, and ice). Pour small sample cups and distribute to the class. After each group has tasted a smoothie, practice sentence building to promote vocabulary and use of adjectives. Each member of the group adds on to the description of a simple sentence that was started by the first person to describe their smoothie. For example, person #1 says, "The smoothie was **cold**." Person #2 says, "The **tart** smoothie was **sweet** and cold." Person #3 says, "I **enjoyed** the tart smoothie that was sweet and cold **like ice cream**." Person #4 says "I enjoyed the tart, **refreshing**, smoothie that was sweet, **fresh** and cold like ice cream." Capture each group's sentence on the board and compare the adjectives used to describe the smoothie.

Books About Berries

Gardella, Tricia. **Blackberry Booties**. Scholastic Books, 2000. Mikki Jo wants to give her new baby cousin the perfect gift but doesn't know how to make anything. What she does know is how to pick blackberries. But babies don't eat blackberries, so Mikki figures out how to make the perfect gift. ISBN 978-0-531-30184-5

Gibbons, Gail. **The Berry Book**. Holiday House, 2002. This nonfiction book introduces students to different types of berries, and explains how varieties are cultivated and harvested. Includes recipes for blackberry jam, blueberry pie, and raspberry ice cream. ISBN 978-0-8234-1697-4

Giesecke, Ernestine. **Wetland Plants**. Heinemann Library, 1999. Discover how many kinds of wetlands exist, why Venus flytraps eat insects and spiders, and where cranberries grow. ISBN 978-1-4034-0529-6

Sloat, Teri and Betty Huffman. **Berry Magic**. Alaska Northwest Books, 2004. An Alaskan folk story about Anana, a young girl who spreads different types of berries in her village's fields. ISBN 978-0-88240-575-9

Trapani, Iza. ***Here We Go Round the Mulberry Bush***. Charlesbridge Publishing, 2006. The traditional nursery rhyme is expanded into a lively story when pesky insects and animals invade the garden. ISBN 978-1-57091-663-2

CFAITC Resources

Agricultural Fact and Activity Sheets include one page of current facts about agricultural commodities or natural resources including information on their history, production, top producing regions, varieties, and economic value. The second page features ideas for teachers. A strawberry fact sheet is available. www.LearnAboutAg.org/factsheets

Fruits and Vegetables for Health, a fourth through sixth grade unit, contains five lessons designed to teach students about the production, distribution, and nutritional value of California-grown produce. Students will gain knowledge in geography, language arts, science, nutrition, and math as they learn about the process through which fruits and vegetables are transported from California farms to kitchen tables. Healthy eating is emphasized throughout. www.LearnAboutAg.org/lessonplans

Underground Edibles

Extension Ideas

1. **Above Ground Observations.** Gather examples of root vegetables, such as carrots, beets, radishes, rutabagas, kohlrabi, and turnips from a farmers' market. Make sure these examples still have their green tops attached and smaller secondary roots. Have students note the similarities and differences in appearance, taste, texture, and fragrance. Cut each vegetable longitudinally and instruct students to identify and record the vegetable's anatomical parts.
2. **Potato Stamps.** For this art activity, students will create stamps out of potatoes. First, cut the potato in half. Have students use cookie cutters to imprint an image or draw their own design on the flesh. Help students cut around their design, leaving about $\frac{1}{4}$ inch raised. Instruct students to use alternating stamps to create a pattern. Teachers may use this activity to reinforce concepts of color (i.e., create a pattern using "cool" colors, mimic the color sequence found in a rainbow), stamp on different colored backgrounds to show positive and negative space, or let the students explore on their own. For more information, visit www.msfb.com/Programs/AITC/potato.pdf.
3. **Literary Connection.** Read the book, *Tops and Bottoms*, by Janet Stevens to the class (even upper grades enjoy picture books every now and then). Stop half way through and have students predict the ending. Finish the book and instruct students to create their own story that teaches readers about roots, tubers, and bulbs.



Guest Speaker Idea

Invite a chef to visit your class and demonstrate how to cook their favorite "underground edibles" dish. Ask the chef to emphasize the nutritional value of eating fresh vegetables and share a "kid-friendly" recipe with the students as well.

Field Trip Idea

There are more than 100 Community Supported Agriculture (CSA) programs in California. CSAs grow a variety of products, including many roots, tubers, and bulbs. Find a CSA near your community (www.localharvest.org/csa) and schedule a visit to their farm to find out how they are helping Californians buy local agriculture products. If possible, subscribe your classroom to the farm's CSA, so your class can try new produce, including underground edibles, on a regular basis.

Technology Opportunity

A Web quest is an inquiry-oriented lesson in which most or all of the information that students explore and evaluate comes from the Web. In this Web quest, students learn about the phytochemicals found in fruits and vegetables (including carrots and onions), and the benefits of eating these foods as part of a balanced diet.

glencoe.mcgraw-hill.com/sites/007877800x/student_view0/unit2/webquest.html

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about onions. Challenge students to research why cutting onions makes people cry, and develop a method for cutting onions that does not cause one's eyes to water. Students should create a hypothesis, summarize their research, and record their steps. Buy fresh onions and have students demonstrate their strategies for reducing tears. Time how long it takes for the "subjects" eyes to react. Rate each strategy based on its effectiveness. As a class, discuss the chemical and biological processes involved.

ELL Adaptations

Practice using vocabulary about underground edibles by playing the "I Am, They Are" game. Create cards that highlight facts about tap roots, fibrous roots, tubers, and bulbs. The card should read:

"I am a (tap root/fibrous root/tuber/bulb), but they
are (description of a different type of underground edible)."

Distribute the cards to each student or pair of students. Start the game by reading your card, "I am a tap root, but they are planted in the ground and act as an underground storehouse." The students with "bulb" cards should stand as they realize their definition. The first student standing says their card next, "I am a bulb, but they have leathery skin and have growing points where new plants can develop." Again, "tubers" would stand. The game continues until each card has been read. Since there will be multiples of each type of underground edible, there are many different outcomes to the game and no right order.

Books About Roots, Tubers and Bulbs

Bodach, Vijaya Khisty. **Roots**. Capstone Press, 2007. Describes different types of roots, how they help the plant get food, and some that we eat. ISBN 978-0-7368-6345-2

Coy, John. **Two Old Potatoes**. Alfred A. Knopf, 2003. A father and daughter plant two old potatoes they found in a cupboard and learn how this vegetable grows. ISBN 978-0-375-92180-3

Davis, Aubrey. **The Enormous Potato**. Kids Can Press, 1997. See what happens when a farmer plants a potato eye. Who can pull it out of the ground? ISBN 978-1-55074-386-9

de Las Casas, Dianne. **The Gigantic Sweet Potato**. Pelican Publishing, 2010. Join Ma Farmer in growing a sweet potato from the market to needing help picking, so she can make her sweet potato pie. ISBN 978-1-58980-755-6

Hester, Denia. ***Grandma Lena's Big 'Ol Turnip***. Albert Whitman & Company, 2005. Grandma Lena grows a turnip so big that she needs help pulling it out of the ground and eating it. ISBN 978-0-8075-3027-6

Monroe, Judy. ***George Washington Carver: Scientist and Inventor***. Capstone Press, 2006. Learn how George Washington Carver found hundreds of uses for peanuts and sweet potatoes. ISBN 978-0-7368-4345-4

Peck, Jan. ***The Giant Carrot***. Dial Books for Young Readers, 1998. Little Isabelle's family decides to plant a carrot seed, and each will do their part to make it grow. ISBN 978-0-8037-1823-4

Saunders-Smith, Gail. ***Carrots***. Capstone Press, 1997. This primary reader describes carrots from growing to processing to eating. ISBN 978-1-56065-488-9

Tagliaferro, Linda. ***The Life Cycle of a Carrot***. Capstone Press, 2007. Simple text and photos illustrate the transformation from seed to carrot. ISBN 978-0-7368-6713-9

Tolstoy, Aleksei and Niamh Sharkey. ***The Gigantic Turnip***. Barefoot Books, 2005. This nineteenth century Russian story shows how a farmer and his wife pull a gigantic turnip out of the ground with the help of their friends. ISBN 978-1-905236-72-5

Zuckerman, Larry. ***Potato: How the Humble Spud Rescued the Western World***. North Point Press, 1999. Tells the story of how this vegetable, once regarded as trash food, had a revolutionary impact on Western history. ISBN 978-0-86547-578-6

CFAITC Resources

Agricultural Fact and Activity Sheets include one page of current facts about agricultural commodities or natural resources including information on their history, production, top producing regions, varieties, and economic value. The second page features ideas for teachers. A carrot fact sheet is available. www.LearnAboutAg.org/factsheets

Fruits and Vegetables for Health, a fourth through sixth grade unit, contains five lessons designed to teach students about the production, distribution, and nutritional value of California-grown produce. Students will gain knowledge in geography, language arts, science, nutrition, and math as they learn about the process through which fruits and vegetables are transported from California farms to kitchen tables. Healthy eating is emphasized throughout. www.LearnAboutAg.org/lessonplans

Superb Herbs

Extension Ideas

1. **Be a Botanist.** Grocery and produce markets carry a variety of fresh herbs. Collect various culinary herbs for students to sketch and label. Students should note appearance, scent, touch, and taste in a pictorial journal. Older students should also identify the leaf type and scientific classification. After the study, create an herb identification quiz. Students will match the name of each herb to the correct specimen.
2. **Plant an Herb Garden.** Search for “herb garden” on Lowe’s Creative Ideas website (www.lowescreativeideas.com) to find an idea that works for your class. Ideas include themed pots (pizza garden, Mexican herbs), large container gardens, and indoor gardens. Before deciding on what herbs to plant, have students interview a family member to find out what fresh herbs they would use the most. Discuss how cultures use different herbs and spices to create a distinct flavor.
3. **Helpful Herbs.** Using the “Medicinal Herbs Word Search” on page fourteen of *What’s Growin’ On? CA Crop Talk—Specialty Crop Edition*, research how each herb can be used for medicinal purposes. Identify potential dangers and toxicity levels. Remind the class to never use a medicinal herb without consulting with a doctor. Consultants at health food stores can also guide you to safe medicinal herbs. The National Institute of Health has a helpful handout: ntp.niehs.nih.gov/files/herbalfacts06.pdf.
4. **Harvesting Herbs.** Learn how to harvest herbs by watching an instructional video. Students can practice what they learn by harvesting herbs from a garden or the school landscape. Check out this informative video: video.about.com/herbgardens/How-To-Pick-Herbs.htm.



Guest Speaker Idea

Invite a farmer to your classroom to explain the day-to-day responsibilities of managing an herb farm. Be sure to ask the farmer how the herbs are grown, harvested, and transported to consumers. As a thank you, create and share a snack that features one of the herbs the farmer produces.

Field Trip Idea

Show students firsthand how herbs are grown. Lavender farms are popular attractions in many areas. Growers can introduce different varieties of lavender (English, French, and Spanish), culinary and medicinal uses, and demonstrate craft ideas. The following farms are just a sampling of the many lavender farms located in California: Lavender Hollow Farm (Escalon), The Lavender Farms in Lincoln (Lincoln), Clairmont Farms (Los Olivos), Keys Creek Lavender Farm (Valley Center), Green Acres Lavender Farm (Atascadero), and Cache Creek Lavender (Rumsey). Search online for a farm near you.

Technology Opportunity

Instruct students to create an electronic spreadsheet to organize information about herbs. Students can research and record the herb's name, available form (fresh, dry, frozen, whole seeds, ground) and what foods they complement. This information can be made readily available to the household chef. Advanced students can record the cost per ounce of each form and create an appropriate graph to illustrate their findings.

Inquiry Opportunity

Create a research opportunity that encourages students' curiosity about plant physiology. Collect various culinary herbs. Challenge the student to determine what percent of the fresh herb is water. Students can test their hypothesis by developing a scientific process to dry the herbs and measure the water loss. Instruct students to present an oral summary of their findings. They should include information about the role of water in plant physiology and theorize why dry herbs have a higher concentration of flavor.

ELL Adaptations

The word "herb" has a silent "h" at the beginning of the word—at least in the American English pronunciation. As a class, brainstorm other words that begin with a silent "h" and instruct students to use all the words in a sensible paragraph. For example:

The *heir* took ownership of the property and business after the tragic death of the father. He was heard speaking to his mother, "I am *honored* that dad thought so highly of me as to entrust me with this great responsibility." The mother told him it was because of his ability to be *honest* and fair with customers, that he was chosen. To pay *homage* to his father, the son built a memorial at the father's favorite place to sit in the town's public park. At any *hour* of the day, people can be seen sitting on the bench and enjoying the beauty of the park.

Books About Herbs

Bass, Jules. ***Herb, the Vegetarian Dragon***. Barefoot Books, 2005.

In this light-hearted book, readers see that people with various eating preferences can learn to co-exist in the same community. ISBN 978-1-902283-36-4

Biggs, Matthew et. al. ***Vegetables, Herbs & Fruit***. Laurel Glen, 2002. This illustrated encyclopedia features detailed information, tips, and advice on edible plants and gardening. ISBN 978-1-55407-126-5

Pallotta, Jerry. ***The Spice Alphabet Book***. Charlesbridge, 1994. Information on the history, sources, and uses of herbs, spices, and other natural flavors. ISBN 978-0-88106-898-6

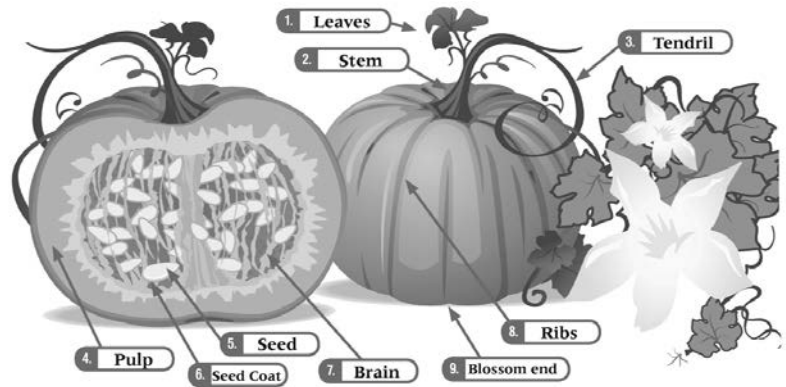
Turner, Jack. ***Spice: A History of Temptation***. Alfred A. Knopf, 2005. An original history of the spice trade and the appetites that fueled it, including discussions on spice myths, archeology, and literature. ISBN 978-0-375-70705-6

What's Growin' On? Activities Answer Key

Page 3: Pumpkins & Squash

Identify the parts of the pumpkin.

1. Leaves
2. Stem
3. Tendril
4. Pulp
5. Seed
6. Seed Coat
7. Brain
8. Ribs
9. Blossom End



Solve the Punnett square.

How many of the offspring are dark green? **2**

What is the percentage of dark green offspring? **50%**

Convert the percentage into: Fractions: $\frac{1}{2}$ Decimals: **.50**

How many of the offspring are yellow? **2**

What is the percentage of yellow offspring? **50%**

Convert the percentage into: Fractions: $\frac{1}{2}$ Decimals: **.50**

	B	b
b	Bb	bb
b	Bb	bb

Page 8–9: California Grows...

Identify climate regions and top crops grown in each (answers may vary).

Mountain Region: Cattle & Calves, Almonds, Hay, Rice

Pacific Region: Grapes, Woody Ornamentals, Strawberries, Milk

Central Valley Region: Milk, Rice, Almonds, Cattle & Calves

Desert Region: Milk, Cattle & Calves, Woody Ornamentals, Hay

Page 10: The Garden Center

Match the scientific name to the common name.

1. d
2. e
3. a
4. c
5. b

- | | |
|--------------------------------|--------------------------------|
| 1. Juniperus chinensis 'Aurea' | a. Flowering Pear |
| 2. Myrsine africana | b. Chinese (Tropical) Hibiscus |
| 3. Pyrus calleryana | c. Canary Island Pine |
| 4. Pinus canariensis | d. Gold Coast Juniper |
| 5. Hibiscus rosa-sinensis | e. African Boxwood |








Drip irrigation in the garden.

1. Determine the square area ($A = l \times w$) of your garden. **2,400 sq. ft.**
2. How many feet of irrigation tubing will you need to irrigate all 10 rows? **1,200 ft.**
3. What will the total cost be if the irrigation tubing costs \$0.05 per foot? **\$60**

Page 11: Have a Berry Special Day

Match the berries.

Activity Match the berries below to how they are grown and what they look like.

How they are grown	Type of Berry	What it looks like
	Strawberry	
	Blueberry	
	Blackberry	
	Raspberry	

Calculate the costs of purchasing berries at the U-Pick farm.

- ½ a pound of raspberries: **\$1.63**
 ¼ pound of blueberries: **\$.82**
 1¾ pounds of strawberries: **\$5.23**

Page 12: Underground Edibles

Rearrange the circled letters.

1. Potato
2. Turnip
3. Beet
4. Carrot

Square Roots

How many onion seeds can you plant? **81**

Perimeter: **18 ft.**

Area: **20.25 ft²**

Activity It grows in soil, but can I eat it? There are many underground edibles that are a part of our diets! Rearrange the circled letters in the facts below to learn more about underground edibles.

The first fo@d ever gr@wn in outer sp@ce.

Used in the 1700s to p@rovide feed for ca@tle d@ring the w@nter.

Since the 1700s, it has b@een us@d as a na@tural dy@.

@riginally purple in @olor, this vege@table o@riginated in cent@al @sia.

Page 13: Food Safety is a Team Effort

Crossword

Across

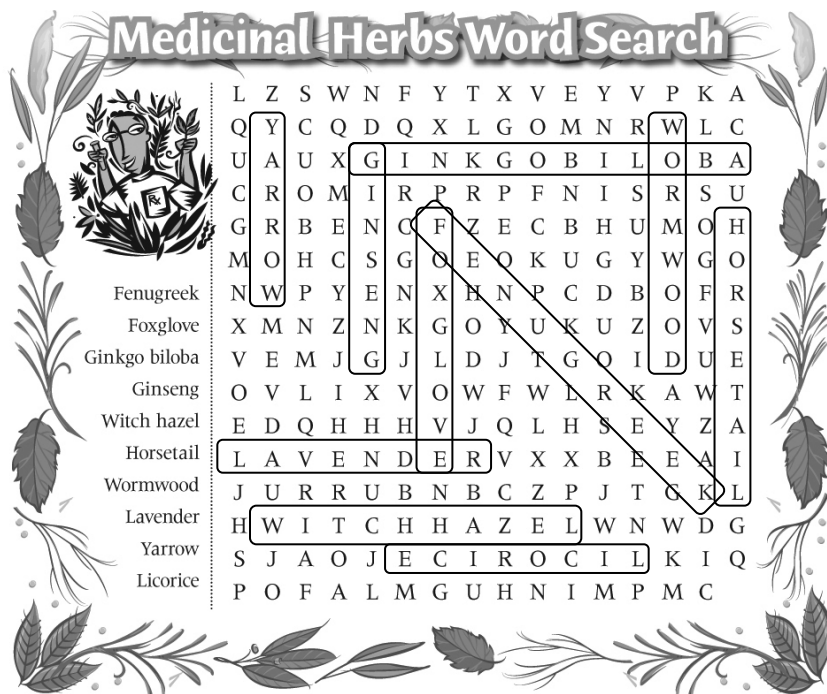
2. Coldchain
3. Monitor
6. Sanitary
7. Rind

Down

1. Pathogen
2. Crop
4. Clamshell
5. Grower

Page 14: Superb Herbs

Word Search



Convert the ingredients.

- 4 tablespoons dried oregano = $\frac{1}{4}$ cup fresh oregano
- 1 $\frac{1}{3}$ tablespoons dried thyme = $\frac{1}{12}$ cup fresh thyme
- 8 tablespoons dried basil = $\frac{1}{2}$ cups fresh basil

Recipe

Peachsicles

1 28 oz can California cling peaches, sliced

4 tbsp honey

4 tsp lemon juice

1/2 tsp vanilla

1/4 tsp ginger

1/2 cup vanilla yogurt

8 small paper cups and wooden sticks

Drain peaches, then place in a food processor or blender with honey, lemon juice, vanilla, and ginger. Puree. Add yogurt and blend until smooth. Pour into cups and freeze for 45 minutes. Add wooden sticks and freeze until firm.

Recipe courtesy of California Cling Peach Board



Recipe

Baked Apples

4 baking apples

1 1/2 tbsp margarine

1/3 cup brown sugar

3 tbsp chopped walnuts

1/4 cup apple juice or water

3 tbsp raisins

Core apples. Combine margarine and sugar, add raisins and nuts and stuff into cavity of apples. Place apples in baking dish. Pour 1 tablespoon apple juice over each apple. Cover with wax paper. Cook for 8 minutes or until tender.

Recipe courtesy of California Apple Commission

Recipe

Pear Mango Salsa

2 medium pears, peeled, cored, and cut into small chunks

1/2 mango, peeled, seeded, and cut into small chunks

1/3 cup of each yellow bell pepper, red bell pepper, and red onion, finely chopped

1 small jalapeño pepper, seeded, and finely chopped

3 tbsp fresh cilantro, finely chopped

2 tbsp vegetable oil

Lime juice and salt to taste

Mix all ingredients in a bowl and refrigerate in a covered container for at least 30 minutes before serving.

Recipe courtesy of California Pear Advisory Board



California Specialty Crop
Taste Test Grants



Recipe

Sweet 'N Crunchy Trail Mix

- 1 cup whole natural almonds
 - 2/3 cup dried apricots, diced
 - 2/3 cup raisins or dried cherries
 - 1/2 cup dried banana or apple chips
 - 1/2 cup semi-sweet chocolate chips
 - 1/2 cup vanilla yogurt
 - 1/3 cup roasted sunflower seeds
- Spread almonds in a single layer in a shallow pan.
Place in cold oven; toast at 350° for 8-12 minutes, stirring occasionally, until lightly toasted. Remove from pan to cool.
Toss with remaining ingredients until well mixed.

Recipe Courtesy of Almond Board of California

Recipe

Vegetable Quesadillas

- 1/2 cup each green bell pepper and tomatoes, chopped
 - 1/2 cup frozen corn, thawed
 - 1/2 cup sliced green onion
 - 2 tbsp fresh cilantro, chopped
 - 4 6-inch flour tortillas
 - 1/2 cup reduced fat Cheddar cheese, shredded
- Saute bell pepper and corn over medium heat until softened. Add green onion and tomato. Cook until heated through. Stir in cilantro. Heat tortillas in large skillet over high heat. Place equal amounts of vegetable and cheese on each tortilla. Fold in half and cook until cheese is melted.

Recipe courtesy of Network for a Healthy California



Recipe

Pick Up Sticks

- 12 long, thin pretzel sticks (about 4 inches long)
 - 1/4 ripe California avocado, seeded, peeled, and cubed
 - 2 slices nonfat American cheese, cut into 1-inch squares
 - 1/2 red apple, cored and cubed
 - 12 red grapes
- Using pretzel sticks as a skewer, thread on grape, cheese square, apple cube, and avocado cube. Repeat process making, 12 "Pick Up Sticks."

Recipe courtesy of California Avocado Commission




**California Specialty Crop
Taste Test Grants**

Agricultural Fact and Activity Sheets

Information compiled by California Foundation for Agriculture in the Classroom

These California-specific fact sheets include information about natural resources or commodity production, history, nutrition, top producing counties, and economic values. The activity sheets provide specific lesson ideas and fun facts for each topic.

- 
- Almonds
 - Artichokes
 - Asparagus
 - Avocados
 - Cantaloupes
 - Cherries
 - Citrus Fruits
 - Cling Peaches
 - Cut Flowers
 - Dried Plums
 - Dry Beans
 - Forest Resources
 - Fresh Carrots
 - Invasive Species
 - Mushroom
 - Pears
 - Pistachios
 - Processing Tomato
 - Spinach
 - Strawberries
 - Table Grapes
 - Walnuts

Top 10 Ways to Use Agricultural Fact and Activity Sheets

1. **Ag Literacy Events**
Information and fun activities for young students who are just starting to learn about agriculture.
2. **Bulletin Board Ideas**
Assign each student a different commodity or natural resource. Students design a weekly bulletin board and engage their peers in a related activity.
3. **World Geography Connection**
Where did these California commodities originate? Students create a world map, illustrating country of origins.
4. **History Connection**
Highlight the dates mentioned on each commodity sheet. Create a timeline that goes all around the classroom, using words and images to record these significant moments in agriculture.
5. **Math Connection**
Students use numbers found within the facts sheets to create an appropriate graph of their choice. For example, create a pie chart representing the percentage of clingstone peaches that are used for fruit cocktail, are canned and are eaten fresh.
6. **Agricultural Marketing**
Students use the information on fact sheets to develop jingles, billboards, and commercials. Discuss the importance of a strong and positive marketing campaign for agriculture.
7. **Agriscience Project Ideas**
Fact sheets are a wellspring of ideas for researching and experimenting about different agricultural commodities and natural resources.
8. **Language Arts/English Connection**
Students read the front of the fact sheet and demonstrate their reading comprehension by how well they answer the “fantastic facts” questions. Students select an agricultural topic and write a research paper using proper grammar and citing of references.
9. **Nutrition Connection**
Students analyze the nutritional values of various agricultural commodities and explain the human body's use of specific vitamins. Students identify where the commodities fit in the different food groups.
10. **Add some spice to your lessons!**
Find a new method for teaching everything from alfalfa to water.

Commodity Fact Sheet

Almonds

Information compiled by the Almond Board of California

How Produced – Following the winter dormant season, early spring weather coaxes the first almond blossoms from their buds. Because the trees are not self-pollinating, at least two varieties of almond trees are planted in alternate rows in each orchard. Almonds grow best when the weather from February onward is frost-free, has mild temperatures, and minimal rain so blossoms can flourish and bees can cross-pollinate the blossoms. After the petals have dropped and the trees have leafed out, the first signs of the fuzzy gray-green fruit appear. The hulls that cover the growing almonds continue to harden and mature. In July, the hulls begin to split open. Between mid-August and late October, the splits widen, exposing the shells, which allow the almond kernels to dry. The whole nuts eventually separate from their stems and the hulls open completely.



Varieties – Almond growers have sought to produce delicious varieties that would be hearty in the fields and work well as a cooking ingredient. Research in the 1870s resulted in some of today's varieties including Mission, Price, Carmel, and today's most popular, the Nonpareil. Since then, more than 40 varieties have been developed and grown commercially. Most research today focuses on developing varieties that are more resistant to crop damaging insects. Almonds are related to the peach and rose families. In fact, most almond trees are grafted to peach rootstock, which is more resistant to pests.

Commodity Value – California produces the largest supply of almonds in the world. With more than 6,000 growers and 100 almond processors, California produces approximately 80 percent of the

world's almonds and 100 percent of the United States commercial supply. The United States is the largest consumer of almonds. China is the largest importer of California almonds, importing more than 168 million pounds in 2010/2011. More than 90 countries import California almonds, including China, Germany, India, United Arab Emirates, Japan, Canada, Turkey, the Netherlands, and Italy.

Before harvest, orchard floors are swept and cleared. Mechanical tree shakers knock the almonds to the ground, where they are allowed to dry before they are swept into rows and picked up by machine. They are transported to carts and towed to the huller, where the hull is removed.

The almonds are packaged raw, roasted, or flavored. Some varieties are prepared into various forms including sliced, diced, slivered, ground (almond flour), blanched, as pastes, and as butters.

History – Almonds are mentioned far back in history, even in the Bible. They were a prized ingredient in breads served to Egyptian pharaohs. The ancestry of the almond is unknown, but almonds are thought to have originated in the Mediterranean area of Europe. Explorers ate almonds while traveling the Silk Road between the Mediterranean, Central Asia, and Eastern Asia. Before long, almond trees were being enjoyed by many different cultures, from China to India and beyond.

The almond tree was brought to California from Spain in the mid-1700s by Franciscan Padres. However, the moist, cool weather of the coastal missions did not provide optimum growing conditions. It was not until the following century that trees were successfully planted inland. By the 1870s, research and cross-breeding had developed several prominent almond varieties. By the turn of the twentieth century, almonds were firmly established in the Sacramento and San Joaquin areas of California's Central Valley.

Top Producing Counties – The largest almond-growing region of the world is California's Central Valley, an area stretching nearly 500 miles. Its hot, dry summers and cool, wet winters make it an ideal location for growing almonds. Top producing counties include Kern, Fresno, Stanislaus, Merced, and Madera.

Nutritional Value – Almonds are an excellent source of vitamin E and magnesium. Studies have shown that almonds can actually lower cholesterol levels. A handful (one ounce, about 23 almonds) has the same amount of calcium as one quarter cup of milk and the same amount of fiber as an apple or orange. Almonds are also a good source of protein and are listed in the "meat, eggs, poultry, fish, dry beans, and nuts" category of MyPlate which recommends that most nine to 18-year-olds should eat five to six ounce equivalents from this category each day.

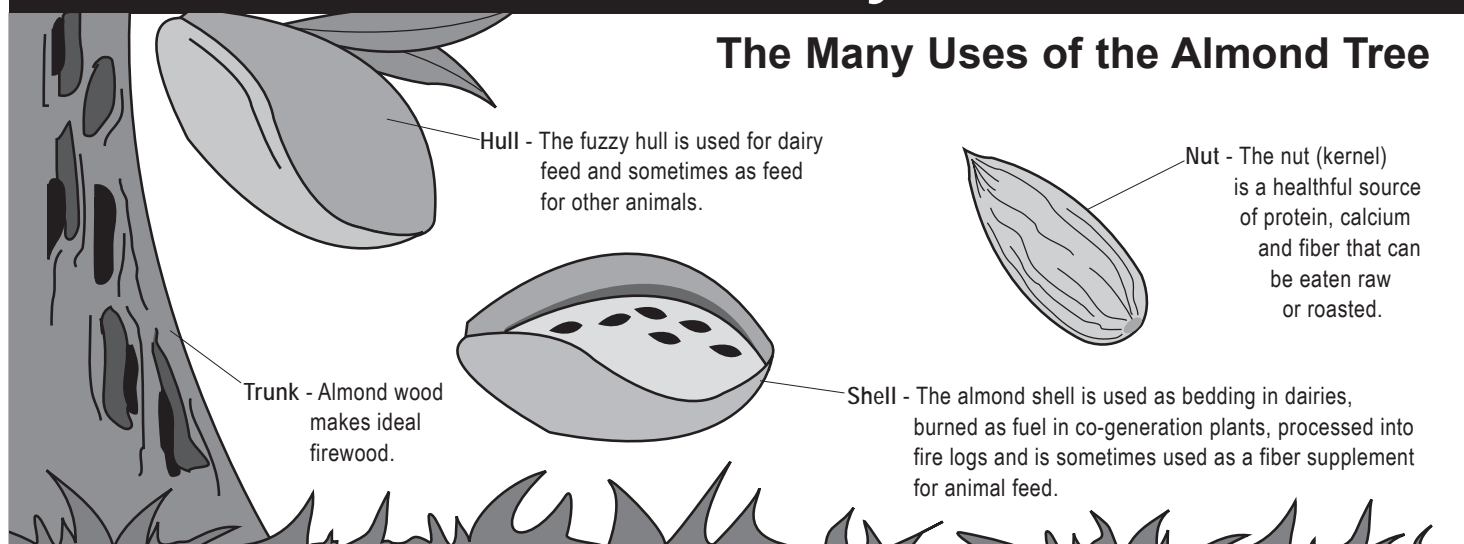
For additional information:

Almond Board of California
1150 Ninth Street, Suite 1500
Modesto, CA 95354
(209) 549-8262
Fax: (209) 549-8267
Website: www.almondboard.com



Almond Activity Sheet

The Many Uses of the Almond Tree



Lesson Ideas

- Visit your local market and see how many different almond products you can find.
- Examine the nutritional labels for almonds and milk. Create a graph comparing the nutritional value of the two. Remember to use equivalent serving sizes.
- Investigate which countries import California almonds. Identify the locations on a map and illustrate the flow of goods.
- Taste test a variety of almonds including raw, roasted unsalted, and roasted with salt or other flavors.
- Study the process of cross-pollination and learn how it is used in the almond industry.
- Create a mural or book about the life cycle of an almond tree.
- Create recipes using almonds. Make a class "Almond Cookbook."
- Study the scientific processes involved in the blanching (removing the skin) of almonds.

Fantastic Facts

1. Name one plant that is related to the almond.
2. Name one use of the fuzzy almond fruit.
3. Why didn't almond trees become a staple tree at California missions?
4. How are almonds removed from trees?
5. Why are at least two varieties of almond trees planted in almond orchards?
6. What is the most popular variety of California almond?
7. Name one nutrient almonds have that is important for strong bones and teeth.
8. What percentage of United States almonds does California produce?

1) Peach, rose 2) Dairy feed 3) The coastal climate in which missions were located was too mild for optimum production 4) With mechanical shakers 5) Almonds must cross-pollinate 6) Nonpareil 7) Calcium 8) 100 percent

Lesson Plan: A Look at the Nutrients of an Almond

Introduction: Almonds contain five of the six classes of required nutrients—carbohydrates, fats, protein, fiber, vitamins and minerals. Your students will examine the nutrition information of whole-shelled almonds and learn about the nutrients they provide to the human body.

Materials: One pound package of whole uncooked almonds with nutrition label, one almond in shell for each student, construction paper, markers, nutrition reference books or encyclopedias.

Procedure:

1. Distribute one almond with a shell and one almond without a shell to each student. Have students make observations of the shell and discuss its uses. Have students compare their two almonds. Are they the same varieties or do they appear different? Discuss the varieties of almonds, their uses and the cross-pollination needed to produce almonds.

2. Have each student observe the nutrition label for one serving of almonds.
3. Assign pairs of students one of the nutrients contained in an almond and research the human body's need for that particular nutrient.
4. Create a class book showing how these nutrients assist the human body to grow, repair, furnish energy and regulate body processes. Incorporate artistic techniques, word processing, use of the Internet, library research and group problem solving.

Artichokes

Information compiled by the California Artichoke Advisory Board

How Produced – The artichoke is a perennial plant in the thistle group of the sunflower (Compositae) family. The vegetable we eat is the plant's flower bud.

The historical method for propagation is vegetative, where plant root sections attached to basal stem pieces called "stumps" are planted into the ground. More recently, some growers are planting from seed on an annual basis. Generally, perennial artichoke plants are maintained for five to 10 years. Each cropping cycle is initiated by "cutting back" the plant tops several inches below the soil surface to stimulate new shoot growth. The fern-like plants commonly grow to be four feet high and six feet wide.

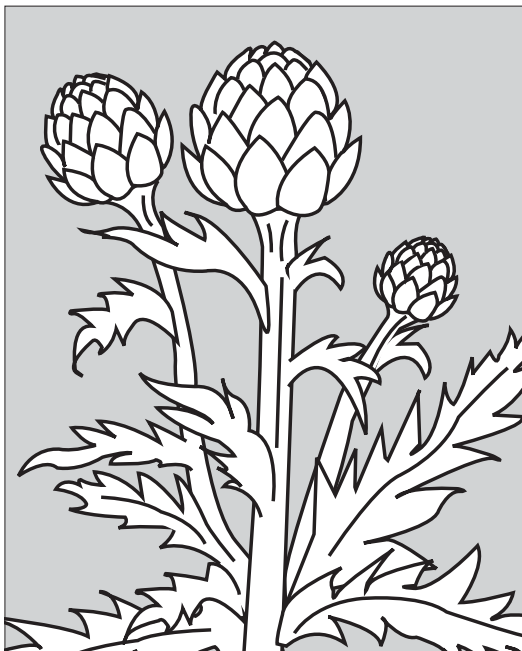
Artichokes are an extremely labor intensive crop with labor representing 40 to 60 percent of the growing costs. Artichokes are harvested entirely by hand. Because artichokes on the same plant mature at different times, the same field will be harvested every seven days and even more often during the peak season of March through May. Artichokes are sorted and packed in the field, by hand, into waxed cartons and immediately trucked to cooling facilities where they are refrigerated to 34 degrees Fahrenheit.

Varieties – The thorny *Green Globe*® is the predominant variety grown on California's central coast from south of San Francisco to Monterey. Other varieties such as *Imperial Star*, *Big Heart*®, *Desert Globe*®, and other proprietary varieties grow in the Central Valley, the desert areas in the state, and along the coast. They are characterized as "thornless" and "semi-thornless."

Although it is not an entirely different variety, California winter frosts can yield "frost kissed" artichokes that are available in stores for a limited time. Frost causes the outer layer of the artichoke to turn brown, flake and peel, much like we do after being sunburned. Artichokes are "frost kissed" when the temperature drops below 32 degrees. Following a freeze, artichoke plants take two to three weeks to start producing "frost free" artichokes again. Many believe frost enhances the flavor of the artichoke resulting in a nutty taste.

Commodity Value – California produces virtually 100 percent of the nation's supply of fresh artichokes. The artichoke

industry provides hundreds of jobs and annually contributes more than \$150 million to the state's economy. The 2011-2012 crop year produced more than 3,826,002 cartons of artichokes, averaging 22 pounds each, on 6,671 acres statewide.



Top Producing Counties – The artichoke is the official vegetable of Monterey County where approximately 75 percent of the state's artichokes are grown. In 2008, artichokes ranked 14th in crop value for this agriculturally rich area. Other top producing counties include San Luis Obispo, Ventura, San Mateo, and Santa Cruz.

History – Artichokes are one of the oldest known foods. They were cultivated in the Mediterranean basin thousands of years ago. Theophrastus, an Ancient Greek philosopher and naturalist (317 B.C. – 287 B.C.), wrote of them being grown in Italy and Sicily.

During the late nineteenth century, California's first commercial artichoke fields were planted by Italian immigrants south of San Francisco near Half Moon Bay. The modern artichoke industry started during the 1920s in Castroville, California. Today, Castroville is the self-proclaimed "Artichoke Center of the World."

Nutritional Value – Artichokes are fun to eat and good for you. One 12-ounce artichoke contains 25 calories, is low in sodium, and contains no fat or cholesterol. One medium artichoke is an excellent source of fiber and vitamin C, and a good source of folate and magnesium. Artichokes also contain phytochemicals, antioxidants in the flavonoid family, which are beneficial in the prevention of certain cancers and boosting the body's immunity. Recent research shows cooked artichokes as the best antioxidant source among all fresh vegetables. Health professionals recommend a low-fat diet with at least five servings of fruits and vegetables each day to reduce the risk of heart disease, diabetes, and obesity.

For additional information:

California Artichoke Advisory Board
Post Office Box 747
Castroville, CA 95012
(831) 633-4411
Fax: (831) 633-0215
Website: www.artichokes.org



Artichoke Activity Sheet



< #1

Growers plant root cuttings into the ground, cover them with soil and water them.



< #2

After about one year, artichoke flower buds are ready for harvest. The largest buds form close to the tops of the stalks.



< #3

Artichokes, harvested by hand using small knives, are tossed into packs on the backs of the field workers.

#4 >

When the packs are full, the artichokes are transferred to bins or directly to field packing machines.



#5 >

Artichokes are sorted and packed by hand into waxed cartons and refrigerated immediately.



#6 >

Artichokes are purchased by consumers and can be a nutritious low-fat component of daily meals.



Lesson Ideas

- Using the data provided under "Commodity Value," calculate the total weight of artichokes produced annually and determine the yield (in pounds) per acre.
- By contributing millions of dollars to the state's economy, the artichoke industry provides many jobs in California. Brainstorm a list of careers related to this industry.
- Create a picture book showing the cultivation and harvest methods of artichokes.
- Cook and serve artichokes as a snack. Serve with low-fat dips your students create.
- Find out why vitamin C, magnesium and folate are important in one's diet.
- Research the climate in your county and determine what variety of artichoke, if any, would best grow in your community.
- Dissect an artichoke and label its parts.
- Research the vegetative propagation methods of artichokes. Find out what other plants are propagated in this way.
- Analyze the geometric arrangement of artichoke leaves on the flower.

Fantastic Facts

1. What state produces virtually 100 percent of the nation's commercial artichoke crop?
2. How long do artichoke plants generally stay in the field?
3. List one reason artichokes can be a part of a healthy diet.
4. How are artichokes harvested?
5. What is the most expensive part of growing artichokes?
6. What California county proclaims the artichoke as its official vegetable?
7. Who began the commercial production of artichokes in California?
8. Name one reason artichoke production is so labor intensive.

1) California 2) Five to 10 years 3) Low in fat and cholesterol; contain fiber, vitamin C and other minerals; contains phytochemicals 4) By hand 5) The labor 6) Monterey 7) Italian immigrants 8) Hand labor requirements including hand picking and hand packing.

Lesson Plan: Let's Advertise!

Introduction: Many methods are used to promote and advertise products to consumers. This activity encourages students to explore the various persuasion techniques used by advertisers as they develop a commercial for artichokes, artichoke dips or artichoke utensils.

Materials: Resource materials on various advertising techniques, butcher paper, markers and other supplies needed to create student-designed props, video camera with tripod.

Procedure:

1. Discuss various methods of advertising used to persuade a consumer to purchase a product. Classify the commercials according to type (TV, internet, print, radio, etc).
2. Brainstorm a list of various food commercials that students feel are successful in their advertising. Discuss why the commercials are successful.

3. Divide students into groups; have each group decide what they will advertise: artichokes, an artichoke dip or an artichoke utensil.
4. Have each group create a 15 to 20 second commercial, which will promote their item. They must determine what type of commercial they are producing, create a script, design a slogan and/or logo and prepare any props they will need for the commercial.
5. Assign a filming date and time for each group—30 minutes filming time for each group is appropriate. After taping, share the video-taped commercials with the class. Determine the type of commercial each group created and vote on which commercial would be most effective.

Asparagus

Information compiled by the California Asparagus Commission

How Produced – Asparagus is the growing shoot of a perennial plant raised in furrowed fields. Commercial plantings take two or more years to grow from seed to crowns. As the crowns grow, they develop buds that push up as asparagus spears every spring. The number of buds on a crown increases each year of production. A typical commercial crown is harvested for 10 to 15 years.

Individual spears with compact, tight heads, and vivid green color are harvested when they are about nine inches long. Each day, workers walk the furrows selecting choice spears and cut them by hand. An individual crown produces different sized spears. Earlier in the season, the plants produce thicker spears, which are the most tender.

While the harvest season lasts only 60 to 90 days in each production area, California's wide range of microclimates allows for fresh asparagus to be available from January through May with a small amount in September and October.

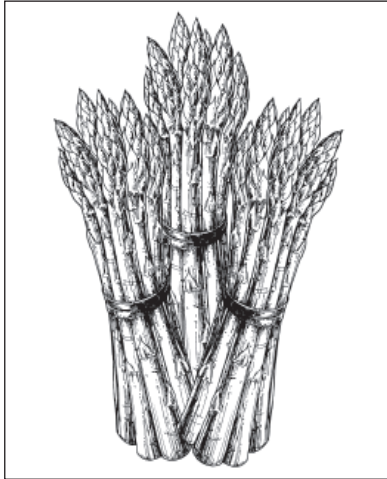
The asparagus is graded and packed in sheds located near the fields to assure maximum freshness. Spears are typically bundled into one-pound bunches, containing 10 to 12 spears, and placed into 30 pound crates specially designed for safe transport. A moist, absorbent fiber pad is placed at the bottom of the crates to prevent drying. Space is left at the top to allow for elongation of spears, which continue to grow. The boxed asparagus is rapidly cooled to a temperature of 34°F to 37°F. Careful handling at every stage of transit is the key to retaining superior flavor, texture, and nutritional content.

History – Asparagus is a member of the lily family (Liliaceae). Its name comes from the Greek language meaning "sprout" or "shoot." Cultivation began more than 2,000 years ago in the eastern Mediterranean. Ancient Greeks and Romans prized asparagus for its unique flavor, texture, and medicinal qualities. It was eaten fresh when in season and dried for winter use.

In the sixteenth century, asparagus gained popularity in France and England. From there, the early colonists brought it to America. Asparagus was first planted in California during the 1850s in the San Joaquin Delta. In addition to the Delta, today's production is centered in the Central Coast, Southern California desert, and Central Valley.

Varieties – Asparagus is available in a variety of sizes; however, size has no bearing on flavor, texture or tenderness.

Today, 98 percent of California's asparagus production is marketed as a fresh green product with the remaining two percent used for processing.



The most common variety is University of California 157 (UC157), which is adapted for warm temperatures and moist soils. Other green-colored varieties include Brock and Ida Lea. The University of California has developed a new variety, UC115, which will soon be in commercial production. It has a longer green stock and tighter tip than current, commercial varieties. Asparagus is also available in white and purple. White asparagus, which grows from the same crown as green asparagus, is shielded from the sun by straw or dirt to prevent the plant from developing chlorophyll, a photosynthetic green substance. Purple Passion produces purple spears which turn green when cooked.

Commodity Value – California produces approximately 70 percent of the nation's supply of fresh asparagus. The value of this California crop has declined because of increased foreign competition. The annual value of California's asparagus crop is now close to \$75 million, half the crop's value in 2000. California currently produces about 40 million pounds of asparagus yearly on 12,500 acres. Growers export 17 percent of their production to countries including Canada, Japan and Switzerland.

Top Producing Counties – San Joaquin County produces approximately 40 percent of the state's asparagus. Other producing counties include Imperial, Monterey, Fresno, Contra Costa, Kern, Sutter, Kings, Merced, and Sacramento.

Nutritional Value – Asparagus is low in calories, contains no sodium or fat, and is an excellent source of potassium, folic acid, and dietary fiber. One five-spear serving contains 20 calories and two grams of protein. Asparagus contains antioxidants which are beneficial in the prevention of certain cancers and is a significant source of vitamin C, vitamin B₆, and thiamin.

For additional information:

California Asparagus Commission
1432 McCabe Cove
El Centro, CA 92243
(760) 356-4906
Fax: (760) 353-1801
Email: ccwatte@calasparagus.com
Website: www.calasparagus.com



Asparagus Activity Sheet

History of California Asparagus Production



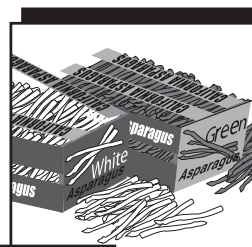
◀ #1

1850s-Migrant families started growing asparagus in the Stockton/Sacramento Delta. Harvested by hand, farmers also used horse and plow to work the fields.



◀ #2

1930s-Asparagus was taken to the docks by truck and then loaded on to ferries where they found their way to San Francisco or Sacramento—the product was then loaded on to railcars and shipped by rail all over the U.S.



◀ #3

1950s-Farmers began producing more green than white asparagus because consumers liked it more. Both were usually processed in cans.



◀ #4

1970s- Another change in consumer preferences led the industry to produce and ship fresh asparagus to grocery stores rather than a canned or frozen product. This change resulted in the need for faster transport to the marketplace. Farmers began to use semi-trucks and airplanes to get their product to market. 1980s- Asparagus was first shipped in refrigerated containers aboard airplanes to destinations all over the world.



◀ #5

Today-Fresh asparagus is still harvested and packed all by hand—just as it was 150 years ago. But, today's asparagus farmer uses tractors rather than horses and ships fresh green asparagus to consumers all over the world.

Lesson Ideas

- Asparagus is measured one inch above the bottom of the stem. Using various sizes of asparagus, determine the circumference, radius and diameter at this point.
- Bring in a unique asparagus recipe to share. Convert the ingredient measurements in order to provide enough servings to feed the whole class.
- Place cut asparagus spears, tulips and daffodils in a glass of water. Calculate any growth that occurs.
- Calculate the number of standard crates needed by a grocer who wants to stock 200 lbs. of asparagus.
- How many spears of asparagus are in an average crate?
- On a map, locate California's primary asparagus production regions.

Fantastic Facts

1. What flower is related to asparagus?
2. Name two nutrients asparagus contains.
3. How many spears are in a typical one-pound bunch of asparagus?
4. True or false? White asparagus is green asparagus that has not been exposed to the sun.
5. How is asparagus harvested?
6. What percentage of the growing costs can be attributed to labor?
7. True or false? Asparagus can continue to grow after it is cut.

1) Lily 2) Protein, potassium, fiber, vitamin C, vitamin B₆ and antioxidants. 3) 10 to 12 4) True 5) By hand 6) 75 percent 7) True

Lesson Plan: Asparagus! It's All About Teamwork!

Introduction: It is important to understand that both cooperation and competition are valuable yet challenging components of the business world. This is especially true in asparagus production. More than 75 percent of asparagus production costs are associated with labor including planting, harvesting, packaging and shipping. Additionally, in recent years the value of California asparagus production has declined due to international competition in places where labor costs are lower.

Materials: Green construction paper, scissors, shoe boxes, rubber bands.

Purpose: The purpose of this activity is to reinforce the concepts of cooperation and competition by having teams cut and package asparagus.

Procedure:

1. Divide the students into teams of five or six students.
2. Designate one area "the field" where you place 10 sheets of green construction paper and two pairs of scissors for each group.

3. Designate another area, at least 25 feet away, as "the end of the field row." Place 20 rubber bands and a shoe box at this end for each group.
4. Explain that the green construction paper represents asparagus growing in a field. They are to cut 1-inch strips of paper, get it to the end of the row, bundle it into bunches of 10 with a rubber band, and then neatly place it in a packing crate (the shoe box). The first team to do this is the winner.
5. Model the activity and then have the students perform the activity several times, making changes as needed to become more efficient.
6. After clean-up, discuss how cooperation and competition were involved in the activity. Was competition a useful tool? How about cooperation? How did competition and cooperation affect quality?
7. Relate this information to California agriculture.

Commodity Fact Sheet

Avocados

Information compiled by the California Avocado Commission

How Produced – California’s coastal microclimates are ideal for growing avocados. California avocados are grown by nearly 6,000 farmers on approximately 59,000 acres. One California Avocado tree can produce up to 500 avocados (or 200 pounds of fruit) a year although they average about 150 avocados or 60 pounds of fruit. Avocados are harvested from each tree by hand using special avocado shears called “clippers.” On tall trees, ladders up to 30 feet high and poles up to 14 feet long are used to reach the fruit.

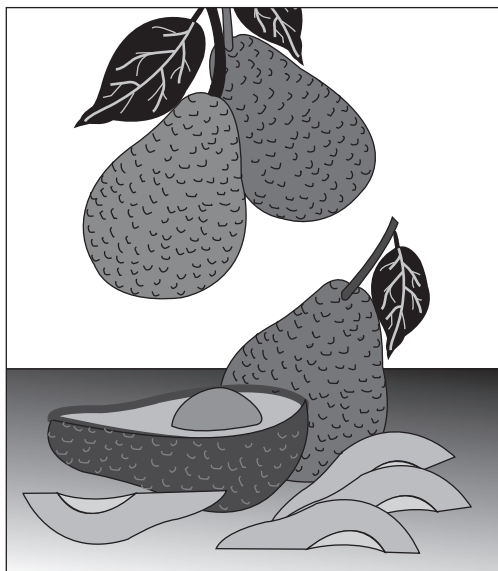
The fruit is then carefully placed into large picking bins, which hold 900 pounds of fruit, and transferred to a main road where large “boom” trucks pick up the fruit and haul it to a local packing house. Upon arrival, the avocados are immediately put into a large cold storage room for 24 hours to remove field heat and preserve quality. The fruit is then placed onto conveyor belts for grading and sorting. The avocados are washed, inspected for quality, and placed into single-layered cartons called flats or double-layered cartons called lugs. Lugs have a consistent weight of 25 pounds. Avocados are sized based on how many can fit in one lug. The fruit is shipped in refrigerated trucks to markets nationwide.

Varieties – Hass avocados account for nearly 95 percent of California’s avocado crop volume. They have thick pebbly skin that generally turns purplish-black during ripening. They are available in peak volume from March through September. A relative newcomer, the Lamb Hass, is a Hass-like variety that is generally available July through October. Other commercially produced varieties include Fuerte, Zutano, Bacon, Pinkerton, Reed, and Gwen varieties. These “greenskin” varieties yield to gentle pressure when ripe and are available at different times throughout the year.

Commodity Value – California produces nearly 90 percent of the nation’s crop, generally growing approximately 300-400 million pounds each year. Crop value has averaged about \$300 million with recent years topping \$400. The majority of the crop is sold in the United States. Most California avocados are sold fresh.

Top-Producing Counties – Avocados mostly grow on the coastal strip between San Luis Obispo and the Mexican border. These areas are ideal due to the rich soils and mild

climates. More than 37 percent of California avocados are grown in San Diego County.



History – The avocado is a Native American plant with a long, distinguished history. Today, the most popular variety is the Hass. The mother tree of all Hass avocados was born in a backyard in La Habra Heights, California.

The avocado (*Persea americana*) originated in south-central Mexico, sometime between 7000 and 5000 B.C. But it was several millennia before this wild variety was cultivated. Archaeologists in Peru have found domesticated avocado seeds buried with Incan mummies dating back to 750 B.C. and there is evidence that avocados were cultivated in Mexico as early as 500 B.C. Spanish conquistadors loved the fruit but couldn’t pronounce it and changed the Aztec word to a more manageable

aguacate, which eventually became avocado in English. The first English-language mention of avocado was by Sir Henry Sloane in 1696.

In 1871, Judge R.B. Ord of Santa Barbara successfully introduced avocados to the U.S. with trees from Mexico. By the early 1900s, growers were seeing the avocado’s commercial potential and ever since growers, enthusiasts and researchers have been hunting for improved varieties. By the 1950s around 25 different varieties of avocados were being commercially packed and shipped in California, with Fuerte accounting for more than two-thirds of the production. Even though Hass was discovered in the early 1930s and patented by Rudolph Hass in 1935, it was not until large-scale industry expansion occurred in the late 1970s that Hass replaced Fuerte as the leading California variety.

Nutritional Value – One-fifth of a medium avocado (1 oz.) has 50 calories and contributes nearly 20 essential vitamins and nutrients. Avocados are sodium and cholesterol-free and provide three grams of mono and half a gram of polyunsaturated fat per one ounce serving.

For additional information:

California Avocado Commission

12 Mauchly, Suite L

Irvine, CA 92618

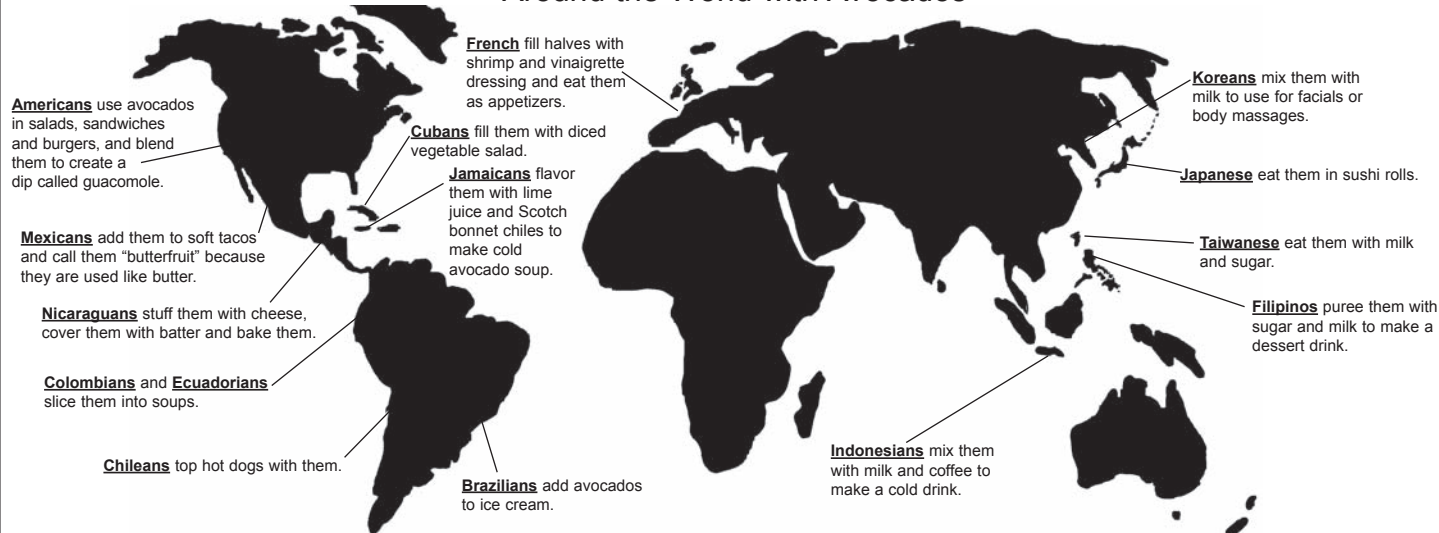
(949) 341-1955

Fax: (949) 341-1970

Website: www.CaliforniaAvocado.com

Avocado Activity Sheet

Around the World with Avocados



Lesson Ideas

- Use craft materials to create individual packaging for safe avocado transport. Test your invention by transporting your avocado (via backpack) for several days. Compare your results with others.
- Research which beauty products contain avocados and develop an infomercial to promote an avocado-based product.
- On a California county map, shade in the counties which produce avocados.
- Make a picture book illustrating the harvesting of avocados.
- Cut open an avocado seed. Identify the embryo, cotyledons and seed coat. Draw a cross-sectional view.
- Record and graph the weekly/monthly prices of avocados.
- Sprout an avocado plant from a seed.
- Examine various avocado skins using a hand lens or microscope.
- Cut an avocado in half and remove the fruit and seed. Weigh the skin, meat and seed in grams. What percent of the avocado is edible?
- If a lug of size 48 avocados weighs 25 pounds, how much does one average avocado of this size weigh? Convert to ounces.

Fantastic Facts

1. Are avocados a fruit or a vegetable?
2. Which variety of avocado accounts for 95 percent of California's crop?
3. What percentage of the nation's avocado crop does California produce?
4. Which California county produces more avocados than any other county?
5. Name one variety of avocado that has a green skin.
6. How are avocados harvested?
7. Are avocados sodium and cholesterol free?
8. How did the Hass avocado get its name?

1) Fruit 2) Hass 3) Approximately 90 percent 4) San Diego County 5) Fuerte, Zutano, Bacon, Pinkerton, Reed or Gwen 6) By hand using special shears called clippers 7) Yes 8) It was discovered by Rudolf Hass

Lesson Plan: Ripening an Avocado

Introduction: Avocados are increasingly shipped ripe and ready-to-eat to retailers and foodservice operators. Some are shipped "firm" and arrive at the point-of-purchase unripened. This experiment illustrates ways to speed the ripening process of avocados. Ethylene is a natural hormone emitted from fruit such as avocados, bananas and apples that causes the unripe fruit to ripen.

Materials: At least two avocados per group, bananas, apples, paper bags, plastic bags and other supplies determined by the students, knife.

Procedure:

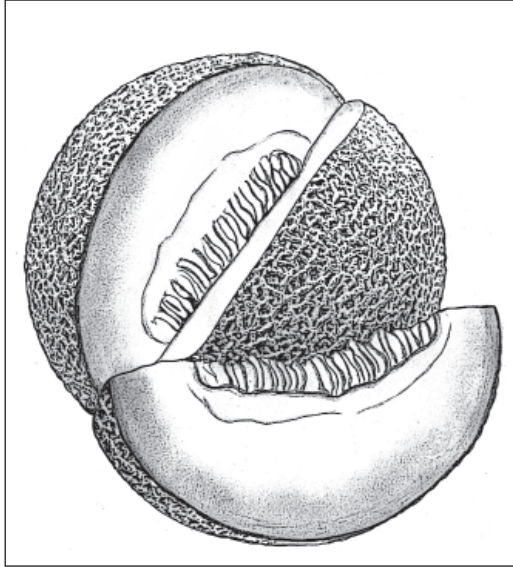
1. Explain to the students why many fruits, including avocados, are shipped unripe.

2. Divide the students into groups and have them design an experiment that would expedite the ripening process of avocados. Show them various supplies such as bananas, apples, paper bags, plastic bags and other items you have available.
3. Have each group obtain your approval of their experimental design, conduct the experiment and complete a formal laboratory report.
4. At the completion of all of the experiments, have the students share their results with the class. This can be done while the class eats an avocado snack.
5. Discuss the various methods that are used to commercially ripen fruit such as avocados.

Cantaloupe

Information compiled by the California Cantaloupe Advisory Board

How Produced – California cantaloupes are grown in two main regions—the Southern Desert Area, and on a 200-mile long stretch on the west side of the San Joaquin Valley from Bakersfield to Tracy. The latter area is where 70 percent of California's crop is harvested each year between June and October. Because of climatic conditions, planting times vary depending on the region in which they are produced. In the San Joaquin Valley, "Westside" cantaloupes are planted in early to mid-April and through mid-summer. These cantaloupes prefer loam or clay-loam soils and are planted on beds that are raised so when irrigation water is applied, only the plant roots get the water and the surface of the bed remains dry. This keeps the cantaloupes from contact with moist soil, which can result in cosmetic blemishes. It also protects against molds and other microorganisms.



Cantaloupes are generally harvested, packed, inspected and graded in the field and then transported to a cold storage facility, where they are cooled to 36°F to 40°F prior to shipment. Some melons are harvested into field bins and brought directly to packing houses where they are placed into shipping boxes.

All cantaloupes packed in central California are subject to continuous government inspection, and only cantaloupes that meet the inspection criteria receive a stamped certification and may be shipped. Like all fresh fruits and vegetables, melons should be washed under running tap water before cutting. Store sliced melon with seeds still intact in the refrigerator until it is ready to be eaten.

History – Egyptians wrote about cantaloupes as far back as 2400 B.C. In later times, the Romans described the cultivation of cantaloupes. Gradually their popularity moved west, reaching France in the 1490s, and continued to spread into central and northern Europe. Columbus brought seeds to the New World on his second voyage and reported their cultivation there upon his return. Since the eastern soils and climate of North America weren't well suited for cantaloupes, commercial production eventually moved into the western states. Today, most of the cantaloupes produced in the U.S. are grown in Arizona and California.

Varieties – There are many types of cantaloupes. The type generally grown in California is called the "western shipping type," of which there are many varieties. Seed companies

supply the variety best suited to a region's particular soil type and weather conditions. The average consumer cannot tell the difference between the varieties since they are all nearly round, have a prominent "netting" on their skin and differ only slightly from each other in general appearance.

Commodity Value – California typically produces about 75 percent of the nation's domestic supply of cantaloupes. Cantaloupes are generally packed in 40-pound cartons. Production varies greatly, ranging from 500 to 900 cartons per acre. This is equivalent to 20,000 to 36,000 pounds per acre. Over the past five years, the average cantaloupe crop was valued at \$194 million annually.

The cantaloupe retail price, which is the cost at the grocery store, ranges from 69¢ to 99¢ per pound in California. The cost of getting the melons

from the field to the retailer is approximately 15¢ to 20¢ per pound. This includes the cost of growing, picking, packing, cooling, and transporting the cantaloupes. From that amount, the grower receives 2¢-4¢ per pound.

Top Producing Counties – Fresno County grows more cantaloupes than any other California county, but cantaloupes are a major crop in several other San Joaquin Valley counties including Merced, Kern, Stanislaus, and Kings. In addition, cantaloupes are grown in Riverside and Imperial counties.

Nutritional Value – Cantaloupes are an excellent source of both vitamin A and vitamin C. A six-ounce serving, or roughly a quarter of a melon, provides 100 percent of the U.S. recommended daily allowance of each vitamin. Cantaloupes are also high in dietary fiber as well as folacin, a nutrient needed for growth and the development of hemoglobin. All of the nutrition in cantaloupes comes with minimal calories. There are 50 calories in a six-ounce serving of cantaloupe. Cantaloupes contain no fat or cholesterol.

For Additional Information:

California Cantaloupe Advisory Board
531-D North Alta Avenue
Dinuba, CA 93618
(559) 591-5715
Fax: (559) 591-5744

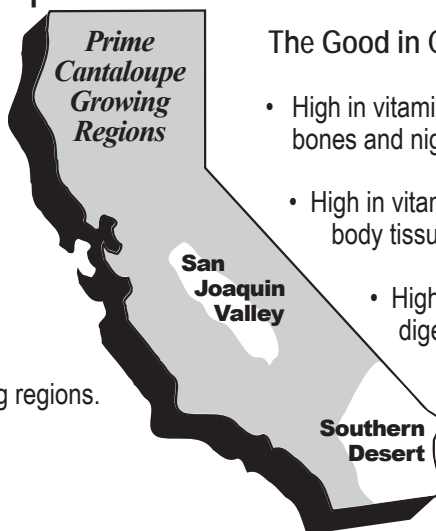


Cantaloupe Activity Sheet

Cantaloupes for Californians and the World

What it Takes to Grow a Cantaloupe

- Loam or clay-loam soils.
- Raised beds so roots get the water but the melons do not.
- Plentiful water.
- Sunny, hot days.
- Seed variety selection for specific growing regions.
- Minimal rain and low humidity.
- Control of white flies and other pests.



The Good in Cantaloupe

- High in vitamin A essential for healthy body tissue, growing bones and night vision.
- High in vitamin C essential for strong gums and healthy body tissues.
- High in dietary fiber essential for maintaining a healthy digestive tract.
- High in folacin essential for cell growth and reproduction.
- Low in calories.

Lesson Ideas

- Cantaloupes were named after the Roman town of Cantalupo where they were grown in abundance. Research the history and culture of Cantalupo, Italy and share five interesting facts with the class.
- Create a poster illustrating the nutritional benefits of cantaloupe. Ask the produce manager at a grocery store to display the informative posters.
- Cantaloupes are members of the gourd family. Find criteria that define the gourd family and make a list of other commodities classified as gourds.
- Create a limerick about cantaloupes. Include facts found on this fact sheet.
- Collect a variety of soil samples. Have students determine which sample would be best for growing cantaloupes and why.
- Estimate the circumference, surface area and volume of various melons. Verify your results and then enjoy a melon fruit salad.

Fantastic Facts

1. What state leads the nation in cantaloupe production?
 2. What California county leads the nation in cantaloupe production?
 3. How many bee visits are needed, on average, for proper pollination and large melons?
 4. What is another name for cantaloupe?
 5. What is the most common color of the fleshy portion of a cantaloupe?
 6. What do cantaloupes grow on?
 7. True or false? There is evidence that the ancient Egyptians and Romans grew cantaloupes.
- 1) California 2) Fresno 3) 10-15 4) Muskmelon 5) Orange 6) A vine 7) True

Lesson Plan: Melodious Melon Poetry

Introduction: Poetry is often used to express feelings and experiences. In this activity, students will experience the sights and tastes of cantaloupes and will then write about them poetically.

Materials: One cantaloupe for every six people, knife, paper towels, writing paper, pencils.

Procedure:

1. Give each group of students a cantaloupe. Have them write down single words that describe its external appearance.
2. Next, cut the cantaloupe in half. Have students brainstorm a list of adjectives that describe its internal structure.
3. Continue cutting the melons, providing each student with a slice. Have them smell, touch and taste the melon and then write down words that describe their experience.

4. A cinquain is a five line verse with a particular structure. Have your students write a cinquain describing their melon-tasting experience.

A one word title, a noun that tells what your poem is about

Two adjectives that describe the title

Three action verbs that describe the title

Four-word phrase that tells more about the title

A synonym for the title

Commodity Fact Sheet

Cherries

Information compiled by the California Cherry Board

How Produced – Cherry trees are grafted to rootstock and planted 20-25 feet apart in straight rows. Farmers can typically grow 100 trees per acre. Trees grow best in deep, well-drained, gravelly to sandy loam soils. Pollination is absolutely essential for production. Because the trees are not self-pollinating, at least two varieties of cherry trees are planted every third tree in every third row, or a ratio of approximately 9 to 1. Honey bees are the main pollinator.

After an orchard is planted, it takes approximately six years until it produces its first major crop. Constant attention is given to each tree every step of the way to ensure a healthy orchard. California cherry harvest lasts May through June.

Traditionally, color change is used to signal maturity. However, “fruit removal force” has been used more recently, and is more reliable. This is based on the progressive ease of removing the fruit from the pedicel, or stem, starting about two weeks before maturity. Growers use a special pull gauge, which pulls the fruit from the pedicel and registers the force required to remove the fruit.

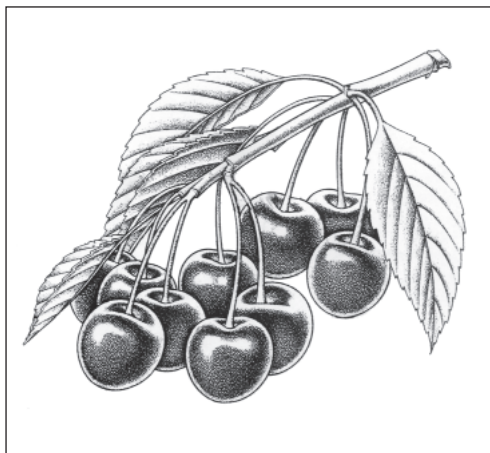
Sweet cherries for fresh consumption are harvested by hand, usually leaving the pedicels intact. They are harvested at firm-mature stage to reduce bruising. Sweets intended for processing are hand harvested also, but without pedicels.

Sweet cherries have extremely short shelf lives, and must be handled gently to reduce bruising and oxidation. Cherries are cooled directly using chilled water—a process called hydro-cooling—then sorted based on color and size, and packed in shallow flats. The shelf life of fresh cherries is only a few days at room temperature and about 2 weeks when refrigerated.

History – The sweet cherry originated in Asia Minor, in the fertile area between the Black and Caspian Seas, and was probably carried to Europe by birds. Cultivation began with Greeks, and was increased and expanded by Romans. Trees were planted along roadsides and were valued for their timber as well as their fruit.

Sweet cherries came to the U.S. with English colonists in 1629, and later were introduced to California by Spanish missionaries. In the 1800s, sweet cherries were moved west by pioneers and fur traders to their major sites of production in Washington, Oregon, and California. Cultivars selected at that time still form the base of the industry today.

Varieties – Cherries are members of the Rosaceae family, subfamily Prunoideae, and are distant cousins to peaches, plums, apricots, and almonds. California sweet cherry varieties include Bing and Rainier. The Bing variety has red or mahogany-colored skin and flesh. The stone is relatively small, while the fruit itself is crisp, firm, and juicy. Consumers enjoy its sweet, rich flavor, which is the reason that it's the dominant variety. The Rainier variety is recognizable by its golden and pink blushed skin color. It's a finely textured variety with firm, clear flesh, and colorless juice. The Rainier offers consumers a sweet, delicate flavor.



Commodity Value – The U.S. is the second-largest producer of cherries in the world, accounting for more than 10 percent of world production. Turkey is

the leading cherry producer. Washington leads the nation in sweet cherry production followed by California. Sweet cherries rank 25th among all California commodities. With approximately 650 growers farming more than 40,000 acres, California's sweet cherry crop was valued at \$200 million in 2011.

Top Producing Counties – Cherry orchards in the San Joaquin Valley receive the perfect combination of nutrient-rich soil, abundant sunshine, and mild temperatures needed to produce high-quality fruit. In 2007, San Joaquin County produced nearly 62 percent of the state's total production. Other top producing counties include Fresno, Stanislaus, Tulare, Kern, Kings, San Benito, Santa Clara, and Sacramento.

Nutritional Value – In addition to being a good source of vitamin C, cherries are also high in iron, potassium, dietary fiber, and antioxidants. Anthocyanins found in cherries block inflammatory enzymes, reducing pain. In fact, 20 cherries are 10 times as potent as aspirin and have positive effects on gout and arthritis pain. All in a delicious package that's low in calories and contains no fat or sodium. Sweet cherries are also considered to be excellent sources of boron. Boron consumption, coupled with calcium and magnesium, has been linked to increased bone health.

For additional information:

California Cherry Board
1521 I Street
Sacramento, CA 95814
(916) 441-1063
Fax: (916) 446-1063
Website: calcherry.com



Cherry Activity Sheet

Sweet Cherry Pie Recipe

Pastry for a 9" Two Crust Pie

2 cups flour
 ½ cup plus 1 tablespoon butter
 ½ cup plus 1 tablespoon shortening
 1 teaspoon salt
 4-5 tablespoons cold water

Preheat oven to 425 degrees. Place flour and salt into a medium mixing bowl or into the food processor. Cut in shortening and butter and work with a fork or pastry cutter until mixture is like coarse corn meal. If using a food processor, use the "S" blade, sprinkle in cold water, one tablespoon at a time, mixing until all flour is moistened and forms a ball. Chill until ready to roll out for pie crust.

Filling

¾ to 1¼ cups sugar, to taste
 ¼ teaspoon almond extract
 8 cups pitted Bing cherries (about 3½ pounds)
 ½ cup flour
 2 tablespoons butter



In a large mixing bowl, stir together sugar and flour. Mix well with cherries. Roll pastry out on lightly floured board. Place bottom crust in 9" pie plate. Add cherry mixture. Sprinkle with almond extract and dot with butter. Cover pie with top crust, crimping edges, and adding slits to allow for steam to escape. Cut a piece of aluminum foil about three inches wide and cover the edge of the pie to prevent excessive browning. (Remove foil during the last 15 minutes of baking.) Bake 35-45 minutes or until crust is brown and juices are bubbling.

Lesson Ideas

- Investigate health benefits of cherries. How do cherries help prevent heart disease?
- Visit a grocery store and identify the different varieties available (fresh, frozen, dried, and canned). Determine where each variety is grown.
- Design an informative and attractive cherry display for consumers. Include information about shelf life, handling tips and recipes. Share your display with a local grocery store.
- Calculate how many cherry trees can be planted on one acre if each tree is spaced 20-25 feet apart.
- Compare and contrast the harvesting techniques for sweet and tart cherries intended for processing or fresh consumption.
- Using a map of California, locate the geographical areas where cherries are grown. Study the climate, seasons and weather patterns of these areas for similarities.
- Determine the chemistry involved in processing maraschino cherries.

Fantastic Facts

1. True or false? Cherries are a good source of vitamin C.
2. Which county leads the state in cherry production?
3. What percent of the nation's total production is in San Joaquin county?
4. Name two cherry varieties grown in California.
5. Of all California commodities, where do sweet cherries rank?
6. How many Bing cherry growers call California home?
7. How can you differentiate California Bing cherries from other varieties?
8. What insect is essential for cherry blossom pollination?
9. Who introduced cherries to California?

1) True 2) San Joaquin 3) 62 percent 4) Bing and Rainier 5) 25th
 6) 600 7) Red/mahogany-colored skin and flesh, small stone, sweet flavor, and a crisp, firm and juicy flesh. 8) Honey bees 9) Spanish missionaries

Lesson Plan: An American Legend

Introduction: Cherries have an interesting place in our nation's folklore. One of the most enduring legends about George Washington involves his chopping down his father's cherry tree and, when asked about it, using the famous line "I cannot tell a lie, I did it with my little hatchet." Mason Locke Weems has been identified as the storyteller responsible for this legend. In this lesson plan, students will investigate the origin of legend, read common American legends and write their own legend about cherries.

Materials: Internet access, encyclopedia, reference books, paper, pencil.

Procedure:

1. The Brothers Grimm defined legend as "folktale historically grounded." In cooperative learning groups, students may use previous knowledge and experiences to brainstorm characteristics common to legends.
2. As a class, have students share and compare their brain-

stormed ideas, and research the actual etymology and origin of legends.

3. Assign each group an American legend to read and examine. Examples of American legends include the story of Johnny Appleseed, Davy Crockett and Paul Bunyan.
4. Once students read the legend, challenge them to decipher fact from fiction. Each group may report their findings by summarizing their legend for the class.
5. Instruct groups to write their own legend featuring a historical figure, a character trait and cherries. Students will need to research their historical figure and determine which traits they are renowned for. Encourage students to use creative writing skills to develop this information into a legend.
6. Have writers share their legend in front of the class. As a group, provide feedback for each story and determine how it exemplifies the traits of a great legend.

Commodity Fact Sheet

Citrus Fruits

Information compiled by Sunkist Growers

How Produced – Citrus trees are propagated asexually through a procedure known as grafting which fuses two different varieties of plants. In the case of citrus trees, one variety, the rootstock, is selected for its hardiness and the other variety, the scion, is selected for its high-quality fruits. The rootstock, grown from a seed, is typically a two- to three-year-old seedling while the scion is a bud from a mature tree. Through grafting, the scion fuses to the rootstock and becomes a new tree. In approximately five years, the tree produces the same variety of fruit that was budded onto the rootstock. The successfully grafted trees are sold to citrus growers through wholesale nurseries and are certified disease-free. There are approximately 271,000 bearing acres of citrus trees in California.

History – Oranges and lemons can be traced back to the ancient Middle East. In Sanskrit, the orange and lemon 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, and Florida. Navel oranges, a consumer favorite, are sweet, seedless and easy to peel. They are winter oranges, available November through May, and derive their name from their distinctive “button end.” Cara Caras are a type of Navel orangewhich is available December through April. 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 or “Blood” oranges, named for their burgundy flesh.

Traditional lemons, such as the Eureka variety, are a California classic and available all year long. They have a tart juice and a zesty peel. Traditional lemons are not typically eaten as a whole fruit but are wonderful flavor enhancers. Meyer lemons are sweeter than traditional lemons and provide abundant fruit nearly year-round.

Desert grapefruit are harvested October through March while summer grapefruit are available May through September.

Specialty citrus include 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 tangerine varieties, such as Clementines, Gold Nuggets, and Pixies, are available November through May. Most are easy to peel and have a lively flavor.

Commodity Value – While Florida is the number one producer of citrus fruits, the majority of their crop is made into processed juice products. California

ranks second in the nation in total citrus production and is the leading producer of fresh citrus fruits. 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, China, and Japan following closely. Lemons are also a high value export crop. Japan is the largest importer of California lemons with China a fast growing second.

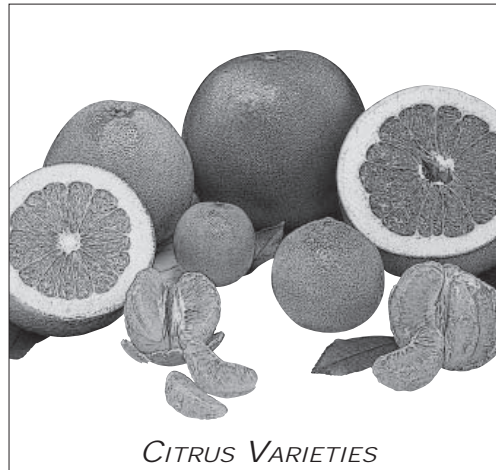
Top Producing Counties – Most of the nation’s fresh citrus products are produced in California and Arizona. The ideal climate in these areas permits the growth of fruit that is as pleasing to the eye as it is to the taste. The leading counties in California citrus production include Tulare, Kern, Fresno,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

Nutritional Value – From the smallest tangerine to the largest grapefruit, citrus is well known for its high vitamin C content. In fact, just one orange supplies a full day’s requirement. Vitamin C, also known as ascorbic acid, is required for strong gums and healthy body tissues and for preventing a disease called scurvy. Oranges, lemons, grapefruit, and tangerines are great tasting, low calorie foods which are good sources of carbohydrates and fiber, and are low in sodium, cholesterol, and fat. Cara Cara “Power Oranges” are packed with vitamin C, A, fiber, and are a natural source of lycopene.

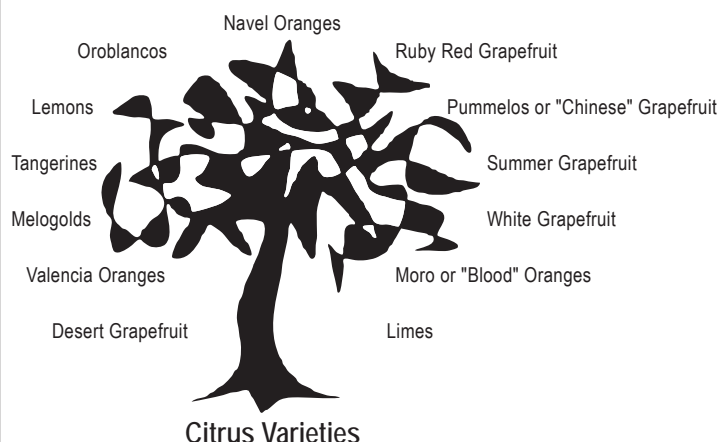
For additional information:

Sunkist Growers

Website: www.sunkist.com



Citrus Fruits Activity Sheet



Varietal Calendar

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ORANGES												
NAVEL ORANGE												
VALENCIA ORANGE												
CARA CARA ORANGE												
MORO ORANGE												
GRAPEFRUIT												
WESTERN GRAPEFRUIT												
PUMMELO												
ORO BLANCO												
SWEETIE												
MELO GOLD												
TANGERINES												
DANDY TANGERINE												
FAIRCHILD TANGERINE												
MINNEOLA TANGELO												
CLEMENTINE MANDARIN												
ROYAL MANDARIN												

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 or popsicles.
- Make a bar graph comparing the vitamin C content of various fruits, including citrus fruits.
- Observe and practice various grafting techniques used in growing citrus trees.
- Research how snails and slugs are controlled in citrus groves.
- 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. How are citrus fruit trees reproduced?
 2. Which variety of lemons is known for its sweet taste and availability nearly year round?
 3. What vitamin do all citrus fruits have in high quantities?
 4. How did the navel orange get its name?
 5. Name two western states that produce most of the United States' fresh citrus fruit.
 6. Which state produces the most citrus fruit?
 7. How many oranges must one eat to get 100 percent of the recommended daily intake of vitamin C
 8. Which variety of oranges is known for its burgundy colored flesh?
- 1) By grafting 2) Meyer lemons 3) Vitamin C 4) The button end resembles a belly button 5) California and Arizona 6) Florida 7) One 8) Moro or "Blood" oranges

Lesson Plan: What's Inside?

Introduction: This activity encourages students to use estimating and predicting skills before examining a variety of citrus fruits. Measuring, charting and graphing skills, as well as the scientific method, are emphasized throughout the lesson.

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.
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.

Cling Peaches

Information compiled by the California Cling Peach Board

How Produced – Cling peach trees are grown by nurseries and sold to growers for planting during dormancy in the winter months. To encourage early fruit production, trees are planted with a minimum density of 121 trees per acre. The first peaches are seen when the trees are one year old, in “second leaf.” At five years, they are in full production, yielding an average of 18 tons of fruit per acre. The orchards require the constant attention and care of the growers. Pruning is generally done during the winter months. Thinning is done in the spring to achieve optimum sized fruit at harvest.

Harvest begins at the end of June in the southern San Joaquin Valley, and concludes soon after Labor Day in the northern Sacramento Valley. Cling peaches are picked when fully ripe. An average picker harvests three tons of peaches each day. Quality peaches at optimum maturity are placed in bins that hold 1,000 pounds of fruit. The fruit is then delivered to canneries that operate seven days a week during peak season.

At the processing plant, peaches are unloaded on a conveyor belt where they are sized and sent into the appropriate pitting machine. Following pitting, cling peaches are peeled and sliced. All peaches are packed in natural syrup to preserve quality and taste. Finally, the cans are sealed, cooked, and cooled. The fresh fruit is generally processed into one of its many products within 24 hours. Quick processing allows the fruit to maintain its nutritional value and quality.

History – Chinese writings more than 3,000 years old give reference to peaches. In California, Spanish padres found that cling peaches thrived along the mission trail. In the late 1700s, President George Washington enjoyed the peaches he grew in his garden at Mount Vernon. The fruit became well established during California’s gold rush when settlers began growing and preserving them for commercial sale to miners. During World War I peach pits were gathered, ground, and used as filters in gas masks.

Varieties – The 16 most common California peach varieties, which account for 92 percent of all acreage, and are separated into four main groups identified by harvest time—from extra early (late June) to extra late (September). The term “cling peaches” was given to these varieties because the flesh of the fruit “clings” to the pit. Today, by-products from peach processing are used in animal feed and compost.

Commodity Value – Cling peaches have a value of \$153 million at harvest and increase to more than \$550 million after processing. Cling peaches are primarily processed into two major products: canned cling peaches which are diced, sliced or halved, or diced as an ingredient in fruit cocktail. Other products include frozen cling peaches, baby food, and peach concentrates.



Top Producing Counties – Cling peaches are grown on approximately 23,000 acres in the San Joaquin and Sacramento Valleys by more than 550 growers. Five companies are responsible for processing the harvest, around 400,000 tons per year.

Although peaches are grown in 41 states, California accounts for nearly 100 percent of the commercial production of cling peaches in the United States. Butte, Fresno, Kings, Madera, Merced,

San Joaquin, Stanislaus, Sutter, Tulare, and Yuba counties produce most of the state’s cling peaches. These areas are ideal because the dormant season provides sufficient “chilling hours” to set the following year’s crop. Later in the season, warm summer days combined with rich soil, and adequate water provide strong fruit growth.

Nutritional Value – California cling peaches are picked at the optimum nutrient level and the canning process locks in nutrients until you open the can and take a bite. Cling peaches are naturally fat-free and contain high levels of vitamin A and vitamin C. They also contain carotene and lycopene, antioxidants that improve skin condition and strengthen eyesight. In 2008, scientists discovered that carotene and lycopene increase during the canning process, supporting the claim that cling peaches are a great source of these nutrients.

For additional information:
California Cling Peach Board
Department AG
531-D North Alta Avenue
Dinuba, CA 93618
(559) 595-1425
Fax: (559) 591-5744
Website: www.calclingpeach.com



Cling Peach Activity Sheet



< #1

Small bareroot peach trees are planted in the winter. Growers extend the harvest season by planting varieties that mature at various times.



< #2

Winter and spring pruning is done by hand.



< #3

Pickers use both hands to pick several peaches at a time. Their day begins at dawn.

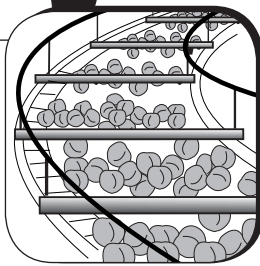
#4 >

Peaches are sorted at the orchards and then placed into big bins.



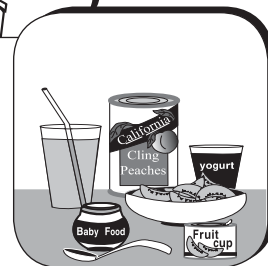
#5 >

At the cannery, peaches are sorted on conveyor belts, cut into different sizes and processed.



#6 >

Cling peach products including canned peaches, fruit cups, juice and babyfood are available to consumers worldwide!



Lesson Ideas

- Research the characteristics of cling and freestone peaches. Hypothesize the benefits of each and why both are important to the agriculture industry.
- Analyze the nutritional labels on various canned cling peach products. Which cling peach product would you choose for its nutritional benefits? Defend your choice.
- Research how cling peach growers/farmers increase their production and lower labor costs.
- Using the figures on the fact sheet, calculate the average number of cling peach trees in California.
- On a map of California, identify the major counties where cling peaches are grown. What geographic characteristics do these counties have in common and how do these help with cling peach production?
- Create a recipe that includes cling peaches. Have the students practice their arithmetic by halving, doubling and tripling their recipes.
- Develop a flow chart showing the innovative and technical processes used to get peaches to homes throughout the county.

Fantastic Facts

1. How many years does it take for a cling peach tree to be in full production?
2. Who were the first people to commercially farm cling peaches in California?
3. How many tons per day does an average cling peach picker pick? How many pounds?
4. Are most cling peaches sold frozen, fresh or canned?
5. How many times per year are cling peach trees pruned?
6. Name one vitamin cling peaches contain.
7. What percentage of United States' commercial production of cling peaches does California produce?
8. Name one way cling peaches are processed.
9. Why did people collect peach pits during World War I?
10. Who was the first president that grew peaches?

- 1) Five 2) The gold miners 3) Four tons; 8,000 pounds 4) Canned
5) Twice 6) Vitamin A, vitamin C 7) Nearly 100 percent 8) Canned
9) Used as filters in gas masks 10) George Washington

Lesson Plan: Cling Peaches – A Convenient Fruit

Introduction: Cling peaches are processed in a variety of ways to provide nutritious, convenient fruit to people throughout the world. In this activity, students will analyze cling peach packaging techniques and the value added to the peaches in processing.

Materials: A variety of cling peach products including canned peaches in different mediums and cuts, baby food products, flip-top individual servings, juice concentrates and frozen cling peaches with the cost of each item, paper, markers and pencils.

Procedure:

1. Ask the students why people may eat processed fruit products such as cling peaches rather than fresh fruit. Write the variety of answers on the board. Answers may include taste, convenience, food safety, nutrition and year-round availability.
2. Have the students create a list of processed cling peach

products and, in labeled columns, record the price and weight of each item.

3. Divide the students into small groups. In additional columns on their papers, have students determine the price per ounce of the food products and then rank the food items from most expensive to least expensive.
4. Students discuss and then write ideas why some of these products were more expensive than others. Possible answers may include processing requirements, packaging costs and the popularity of the product. As a class, discuss each group's comments and the term "value added."
5. Have the students taste the cling peach products. Create a class graph that depicts the levels of their popularity.

Cut Flowers

Information compiled by the California Cut Flower Commission

How Produced – California dominates the domestic cut flower industry because of its favorable Mediterranean climate, which allows for year-round production of an enormous variety of flowers.

Cut flowers are grown in covered greenhouses and outside in open fields. The floriculture industry, which includes the production of bedding and potted plants, shrubbery and fruit stock, as well as cut flowers, and foliage, is extremely labor intensive, requiring as many as 12 workers per acre. Flowers are harvested by hand and then pre-cooled and boxed to prevent heat buildup and premature decay. United States cut flower growers ship approximately two-thirds of their product by truck and the other one-third by air. Transit time from the grower/shipper to retail outlets varies widely, but can take as little

as 24 hours—even to the East Coast. Most flowers are purchased during four key holiday months: February, April, May, and December. Besides holiday sales, flowers are typically purchased for two reasons: to express an emotion or to send “get well” wishes.

Varieties – Color and scent are distinguishing features of cut flowers, however they are generally categorized as one of four types used in floral design; line flowers, mass flowers, filler flowers, and foliage. Line flowers are tall, and give the bouquet height, width and a balanced look. Examples of line flowers are gladiolus, snapdragons and curly willows. Mass or “face” flowers give bouquets weight, or mass and are generally round and full faced. They are usually the focal point of color and interest in a bouquet. Most mass flowers come with only one flower on the end of the stem. Examples include roses, carnations, gerberas, sunflowers, lilies, daffodils, tulips, iris, freesia, zinnias, alstroemeria, protea, and chrysanthemums. Filler flowers, stems with a lot of little flowers and foliage, round out the bouquet and give it a soft, full look. Casual, fresh-from-the garden, bouquets use an abundance of filler flowers to visually connect mass and line flowers. Examples of filler flowers are baby’s breath, Queen Anne’s lace, heather, and aster. The last type of plant used in floral design is foliage. Foliage refers to the leaves and greenery used to complement floral arrangements. Foliage can also conceal the “mechanics” of an arrangement, such as floral foam. Fern, eucalyptus, salal, and myrtle are all examples of foliage.

Like most California crops, some flower varieties are available year-round while others are not. Many flowers are only available during certain times of the year based on seasonality. For the highest quality and most inexpensive California flowers, consumers can select flower varieties that are “in season.”



Commodity Value – California leads the nation in cut flower value of production, accounting for 77 percent of the nation’s total production. California producers market cut flowers and foliage, valued at more than \$278 million (wholesale value) annually, to the nation’s 40,000 florists and 24,000 supermarket floral departments, as well as to numerous kiosks and outlets. California retail florists alone employ approximately 11,000 people.

Top Producing Counties – The leading county is Santa Barbara. Other major producing counties include San Diego, Monterey, San Luis Obispo, Santa Cruz, Humboldt, and Ventura.

History – California is considered the originator of America’s commercial cut flower industry, which began in the late 1870s when a Ventura housewife, Theodosia Shepard, was inspired to sell the flowers she raised in her garden. Soon, other women were following suit and bringing their backyard beauty to the local market, and the retail florist profession was born. This period marked a time when French Impressionists began depicting flowers in their paintings and women’s magazines began counseling homemakers on flower care and display.

At the turn of the century the state’s cut flower industry expanded even further as many immigrant families turned their love of beauty and their botanical talents to flower production. The Chinese, Japanese, Italians, and Dutch revolutionized the floriculture industry in California and make up much of the industry to this day.

For additional information:

California Cut Flower Commission
Post Office Box 90225
Santa Barbara, CA 93190-0225
(916) 441-1701
Fax: (925) 905-4489
Email: ccfc@ccfc.org
Website: www.ccfc.org

Cut Flowers Activity Sheet

Line Flowers

gladiolus, liatris, snapdragon, delphinium, veronica, curly willow

Filler Flowers

baby's breath, Queen Anne's lace, statice, aster

Mass Flowers

rose, carnation, sunflower, lily, iris, zinnia

Foliage

ferns, eucalyptus, salal, myrtle, ruscus



Beautiful Bouquet

Lesson Ideas

- Invite a floral designer to visit your classroom to teach about floral arranging and discuss the wide variety of career opportunities in the floral industry.
- Press flowers in waxed paper. Use the flowers to create a botany book, labeling each flower with its common and scientific name
- Create a manual illustrating the steps of cut flower pollination, fertilization and reproduction.
- Did you know that patterns often appear in nature? Research the Fibonacci sequence and determine how the sequence relates to cut flowers.
- Look at a variety of flowers. Categorize them as line, mass or filler flowers. Sort by color, smell and shape.
- Grow flowers from bulbs or seeds.
- Color a white carnation using food color in water to learn about capillary action.
- Dissect a flower and identify its parts.
- Experiment with different liquids to determine their effect on flower freshness.
- Research varieties of flowers that are edible and those that are poisonous.
- Plant a flower garden at your school with an assortment of varieties that will bloom during each season.
- Visit a commercial greenhouse or nursery to learn how cut flowers are produced.

Fantastic Facts

1. What are the four categories of flowers typically used in a bouquet?
2. What four months result in the most flower sales?
3. How are cut flowers shipped to floral retailers and wholesalers?
4. Besides holidays, why are flowers typically purchased?
5. What is the main expense in cut flower production?
6. Cut flower production is just one part of which agricultural industry?
7. Who is considered the founder of the cut flower industry in both California and the United States?

1) Mass, line, foliage and filler flowers 2) February, April, May and December because Valentines Day, Easter, Mothers Day and Christmas fall in these months 3) One-third by air and two-thirds by truck 4) To express emotion or to send "get well" wishes 5) Labor costs—it requires up to 12 workers per acre 6) The floriculture industry 7) Theodosia Shepard, a Ventura housewife

Lesson Plan: Make Your Own Potpourri

Introduction:

Making potpourri allows students to compare a variety of flowers based on texture, color and scent. Several mathematics and art concepts can be incorporated into this activity.

Materials:

Fresh flower petals and herbs, citrus peels, large cardboard sheet, paper towels, large bowl, large jar with lid, cinnamon (sticks or powder), a variety of scented oils.

Procedure:

1. Cover cardboard with paper towels.

2. Spread flower petals and citrus peels on the cardboard and let dry for 2-3 weeks, fluffing the mixture occasionally.
3. In large bowl, mix dried petals with all other ingredients except scented oil. Put a layer of mixture in the jar. Add 3-4 drops of scented oil. Continue to layer the mixture with the oil until the jar is full.
4. Put lid on the jar and leave 1-2 weeks, shaking daily to mix.
5. Finished potpourri can be used in gift baskets or to make sachets.

Dried Plums

Information compiled by the California Dried Plum Board

How Produced – A tree starts to bear fruit four to six years after planting and reaches its full production capacity (150 to 300 pounds of raw fruit per year) sometime between its eighth and twelfth year in the ground. The tree will continue to bear quality fruit on a commercial basis for about 30 years.

By mid-August, the orchards are ready for harvesting, which generally takes about 30 days. Harvest time is determined by fruit ripeness, since plums are one of the few fruits allowed to fully tree ripen before they are picked.

Today, the majority of California's dried plums are machine harvested. The fruit is shaken off the tree and transferred via conveyor belt into bins which then go to the dehydrator. The orchard ripe fruit is washed, placed on wooden trays, and dehydrated—three pounds of fresh fruit then become one pound of dried plums.

From the dehydrator, the dried plums go to packing plants where they are graded for size, inspected, and stored to await final processing and packaging. Unlike the majority of processed fruits, most dried plums are packed to order. With each order, plums are re-hydrated, sterilized, put through a final inspection and packaged for shipping.

History – Louis Pellier, a Frenchman, introduced dried plums to the United States in 1856 after an unsuccessful gold mining venture in California. He established an orchard in Santa Clara Valley which became a great success. As the seasons turned, Pellier's patient work began to bear fruit, and the California dried plum industry was born. The development of the transcontinental railroad in 1869 increased the market for dried plums across the nation.

In 1905, California dried plum grower Martin Seely tried to remedy a labor shortage by bringing 500 monkeys to the Santa Clara Valley from Panama to pick dried plums. Seely organized them into crews of 50 (with a human supervisor overseeing each crew) and set them to work in the fields. While the monkeys were reliable at picking the fruit, they also ate every plum they picked.

In 1941, America's involvement in World War II provoked the heaviest buying of dried fruit in history. However, the war

years were challenging for farmers—farm labor shortages, limited inventories of supplies and farm equipment, and rising costs all took their toll.



Varieties – Not all plum varieties can be dried. The high sugar content of the California variety allows it to be dried without fermentation occurring around the pit. The California variety is an off shoot of La Petite d'Agen, a plum native of Southwest France. Today's California dried plum accounts for 99 percent of the United States dried plum production because it has ideal characteristics for drying.

Commodity Value – California supplies more than 47 percent of the world's supply of dried plums from more than 55,000 bearing acres. Approximately 50,000 tons of dried plums are exported annually to more than 60 different countries. In 2010, California produced 117,500 tons of dried plums, valued at \$175 million.

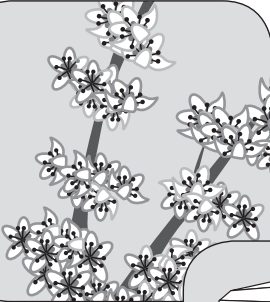
Top Producing Counties – Most dried plums are grown in the Sacramento and San Joaquin valleys where the rich soil and the long, warm and clear growing season provides ideal growing conditions. The leading counties are Sutter, Butte, Yuba, Tehama, Glenn, and Tulare.

Nutritional Value – California dried plums are a high-energy snack that provides antioxidants, potassium, and fiber. These nutrients may help reduce the risk of some chronic diseases. Dried plums have a unique combination of high levels of pectin, sorbitol, and malic acid which makes dried plum puree an ideal fat substitute in baking. The antioxidants in dried plums eliminate the "warmed-over" flavor in precooked meats, and fiber and sorbitol help retain moisture in leaner cuts of red meat and poultry.


For additional information:

California Dried Plum Board
3840 Rosin Court, Suite 170
Sacramento, CA 95834
(916) 565-6232
Fax: (916) 565-6237
Website: www.californiadriedplums.org


Dried Plum Activity Sheet



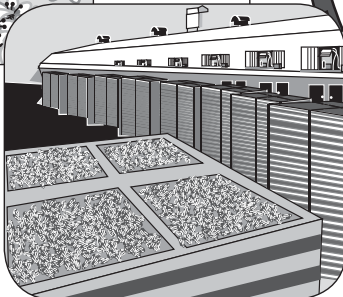
#1
In early spring, bees pollinate the white, fragrant blossoms and plum development begins.



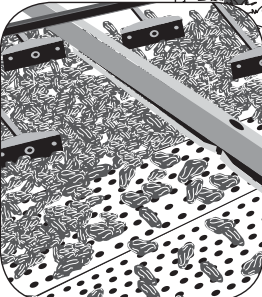
#2
The orchards are irrigated and nutrients are added to the soil. As the plums ripen they turn from green to purple.




#3
Mechanical harvesters grab the trunks and shake off the fruit which fall onto fabric catching frames and are then transported by conveyor belt into bins.



#4
After weighing and washing, the plums are stacked onto rays and rolled into large tunnels where they are dehydrated.



#5
During processing the dried plums are sorted, steamed, pitted and packaged.



#6
Consumers enjoy healthful dried plums as bite-sized snacks and juice or as an ingredient in baked goods, cereals and energy bars.

Lesson Ideas

Keep a daily journal tracking the food you eat throughout the week. Compare your daily servings of fruits and vegetables to those recommended by USDA's MyPyramid. Set an attainable goal to increase your fruit and vegetable consumption. Use MyPyramid to investigate the nutritional value of fresh vs. dried fruits. Determine if there is enough fruit in your daily diet. Create short myths explaining how dried plums get their wrinkles.

Devise an advertisement which promotes the eating of dried plums.

Create an advertising jingle promoting dried plums.

Find out how dried plums are associated with the Gold Rush of the 1800s.

Research the science of dehydration and learn its benefits as a food preservation method.

Invite a dried plum producer or grower into your classroom to discuss his or her profession.

Fantastic Facts

- How are dried plums harvested?
- In what California valley was the first dried plum orchard established?
- What animal did a dried plum grower try to use as a picker in his orchards during a labor shortage in 1905?
- True or false? Dried plums are fully ripened on the trees before harvest.
- What characteristic allows d'Agen plums to dry without fermenting around the pit?
- How many pounds of fresh fruit make one pound of dried plums?
- True or false? Water is added to dehydrated dried plums right before they are packed for consumers.
- For about how many years are commercial plum trees productive?

1) By mechanical shakers 2) Santa Clara 3) Monkey 4) True 5) High sugar content 6) Three pounds 7) True 8) 30 years

Lesson Plan: A Low-Fat Cookbook

Introduction: Over the last decade, people have realized the health benefits of having a low fat diet that includes a minimum of five servings of fruits and vegetables each day. In this activity, the students will analyze some of their favorite recipes and see how they can make their favorite dessert a healthier snack.

Materials: 1½ cups (8 ounces) pitted dried plums, water, mixer, one packaged brownie mix with required ingredients, one favorite baked snack recipe from each student, blank paper, markers, construction paper.

Procedure:

Make a puree by pureeing 1½ cups of pitted dried plums and six tablespoons of hot water in a food processor or blender. This makes one cup of dried plum puree. Use one half the

butter or oil called for in the recipe. Replace the amount of butter eliminated with one-half measure of dried plum puree. If a recipe calls for 1 cup butter, use ½ cup butter and ¼ cup dried plum puree.

- Have the students taste the brownies and comment on their flavor. Explain what you did to make them lower in fat.
- Have the students bring in one or two of their favorite brownie, cake or cookie recipes and rewrite the recipe using dried plum puree (see step 1). Encourage the students to try their new recipes at home. Works best with dark colored baked goods.
- Create a class cookbook of the low-fat recipes. It may include a recipe from each child with illustrations, quotes from students and parents who tried their new recipes, as well as scientific statistics on the need for a healthy diet.

Dry Beans

Information compiled by the California Dry Bean Advisory Board

How Produced – Dry beans are an annual crop; most varieties are planted in the spring or early summer and harvested in the fall. They are often rotated with other crops because they, as with all legumes, have unique root systems which provide natural nitrogen to the soil. When the beans are mature, the plants are cut off at the root and raked into windrows to dry for seven to ten days. Bean harvesters pick up the plants, pods and beans, threshing out everything except the bean seeds which are escalated into a truck. The straw goes out the rear of the harvesters where it is scattered over the soil to provide organic matter for future crops.

At the warehouse, the beans are cleaned and placed in 100-pound sacks. They are then shipped to packaging and canning companies for further preparation for the consumer.

History – Dry beans have been produced for thousands of years. Most common varieties originated in Africa, Asia and the Middle East. Beans placed in the tombs of ancient Egyptian pharaohs have been found to be viable after centuries of storage. It is thought that the first beans were brought to America by nomadic tribes crossing the Bering Strait into Alaska. Large and baby lima beans originated in Peru, thus the name “lima.” They were brought to California on a merchant ship around 1900 and have been grown in the state since then.

Varieties – California producers generally grow “specialty beans,” including baby limas, garbanzos, pinks, blackeyes, large limas, and dark and light red kidney beans. Each variety has at least one unique characteristic that makes it useful for particular dishes. California’s dry summer climate allows producers to grow disease-free seed beans of more than 50 varieties for planting in other areas of the country.

Commodity Value – Bean prices to the grower vary from \$25 to \$75 per 100-pound sack, with production varying from 12 to 45 sacks per acre depending on the weather, the variety and the grower. In a good year, the California average crop of 1.2 million 100-pound sacks will average \$48 per sack for a total value of approximately \$57.6 million.

Top Producing Counties – The type of bean grown in a certain area is dependent on the bean’s specific growing needs. Blackeyes, which like heat, are grown mainly in

Fresno, Kern, Kings, Madera, and Tulare counties. Large limas, which benefit from cool nights, grow in the coastal valleys of Monterey, Santa Barbara, and Ventura counties and in Stanislaus County where the cool evening breeze comes inward from the Bay Area. Kidney beans are grown in Colusa and San Joaquin counties, while other beans are grown in Sacramento, Solano, and Yolo counties. Baby limas are grown in Colusa, Fresno, Madera, San Joaquin, Stanislaus, and Sutter counties. Garbanzo beans, sometimes called chick peas because of their shape, are grown in Fresno, Kings, San Luis Obispo, and Santa Barbara counties.

Nutritional Value – Dry beans, known mostly for their high protein value, are also high in fiber and many vitamins and minerals. When combined with small supplements

of grain, such as rice or corn, beans can supply all essential amino acids, the building blocks of proteins. Beans are low in fat and sodium and contain no cholesterol or sugar. With their high carbohydrate content, they digest slowly, satisfying hunger and energy needs for long periods of time. Most beans, especially blackeyes, contain high levels of folate, the B vitamin that can help prevent certain birth defects and heart diseases.

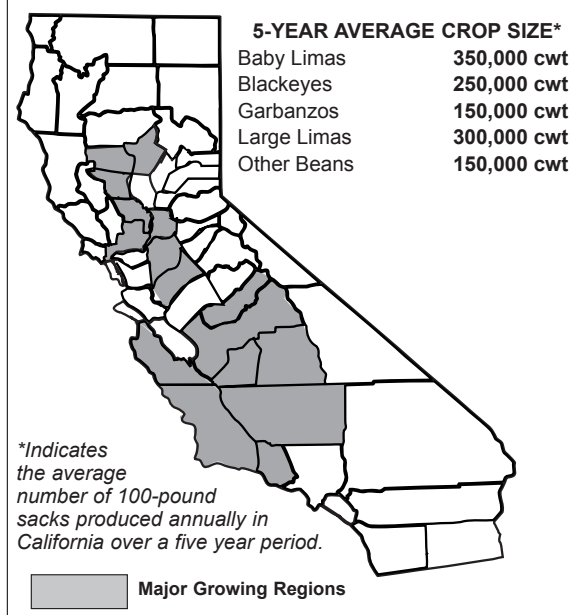
A cup of cooked or canned beans provides almost half the amount of iron recommended daily for men, and one-fourth of that recommended for women. Iron is important for building red blood cells to carry oxygen from the lungs to all parts of the body.

For additional information:

Dry Bean Advisory Board
531-D North Alta Avenue
Dinuba, CA 93618
(559) 591-4866
Fax: (559) 591-5744
Website: www.calbeans.org

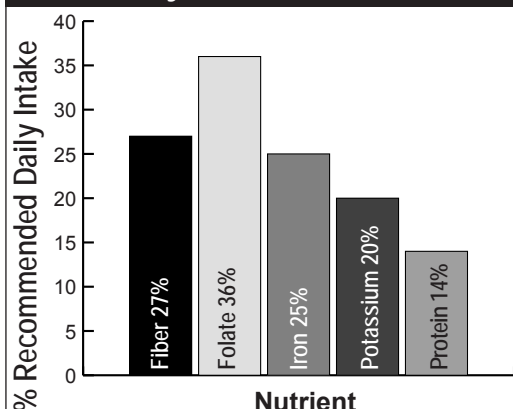


Major Growing Regions and Yields of California Dry Beans



Dry Beans Activity Sheet

Dry Bean Nutrients*



*Based on 1/2 cup serving cooked beans



Dry beans are used in many ways:

- Some eat blackeyes on New Year's Day to bring good luck.
- Japanese make a confectionary paste called *anko* from baby limas.
- Large limas, often called butter beans, are popular in the southeastern part of the United States, and are served with pork.
- Garbanzos and dark red kidneys are a healthy and colorful protein source in salad bars.
- Pink beans and light red kidneys are favorites in chili recipes.

Lesson Ideas

- Hold a class or school-wide chili bean cook-off.
- Discuss the importance of folate in one's diet and how beans can provide this nutrient.
- Create mosaics using a variety of dry beans.
- Use Biuret reagent to compare the amount of protein in various beans and other foods.
- Estimate and count the number of beans in a jar.
- Use beans as game pieces, counters or in sorting activities.
- Research the symbiotic relationship between rhizobia and bean plant roots.
- Research why beans produce gas and learn what can be done to reduce the amount of gas in bean dishes.
- Talk about traditions associated with beans.
- Soak beans and dissect them to learn their parts and functions.
- Plant different varieties of beans and note their characteristics.

Fantastic Facts

1. What is it called when the bean seed is removed from the rest of the plant during harvest?
2. Beans are an annual crop. What does that mean?
3. Which variety of bean is grown the most in California?
4. For what reason, other than consumption, are dry beans grown in California?
5. Name one or two foods that can be eaten with beans to produce all of the essential amino acids required for protein synthesis.
6. True or false? Specialty beans, such as blackeyes and garbanzos, are grown in California.
7. True or false? A variety of climates is one reason more than 50 varieties of beans are grown in California.

1) Threshing 2) They must be planted each year to produce
3) Large Limas 4) They are grown for seed beans, beans that are planted to grow bean plants 5) Corn and/or rice 6) True 7) True

Lesson Plan: Dry Bean Math Magic

Introduction: Beans provide protein, fiber, and a variety of other nutrients. In this activity, students will practice arithmetic skills using beans as the topic.

Materials: A copy of the following table, MyPyramid poster or handouts, calculators (optional), chart paper, markers.

1 lb. dry beans = 5 cups cooked beans
15 oz. can of beans = $1\frac{2}{3}$ cups cooked beans
$\frac{1}{2}$ cup cooked or canned beans = 1 serving
1 serving cooked beans = 115 calories
1 serving cooked beans = 8.5 grams protein

Procedure:

1. Review the MyPyramid recommendations with your students. Discuss the need for protein in one's diet.
2. Distribute the chart above or copy it on the chalkboard.
3. Divide the students into small groups and have them solve

the math problems below. Have each group show their work in a creative way on their chart paper and then explain their solutions to the class. As a class, discuss that there are variety of ways to solve a particular math problem.

Sample Math Problems

- How many people will a one pound bag of dry beans serve if each person were to get one serving of beans? (10 people)
- About how many people will one 15 oz. can of beans serve? (3 people)
- How much of a one pound bag of dry beans would you cook to feed each member of a five-member family one serving of beans? ($\frac{1}{2}$ bag)
- Your daily protein requirement is 0.4 grams of protein for each pound you weigh. How many grams of protein would a 100 pound person need to eat daily? How many servings of beans would this person need to eat if the entire protein source for the day came from beans?
- Assume one lb. of beans costs \$.80. What is the price per serving?

Forest Resources

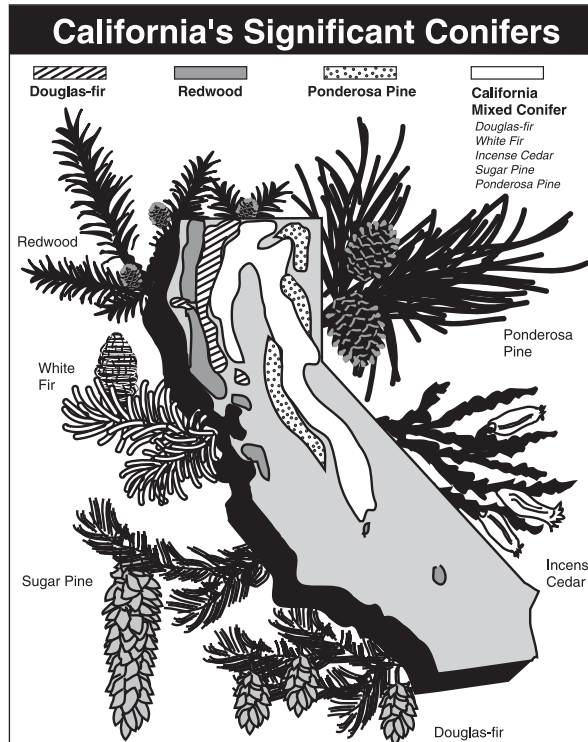
Information compiled by the Forest Foundation

Sources – Approximately one-third of California's 100 million acres is forests. More than half of California's Forestland is under public ownership by the federal or state government. Approximately 11 percent of California's forestland is privately owned and managed for timber production. California is home to 52 native species of conifer trees. Conifer trees produce cones, have leaves that are needle-like and are evergreen. Needles are like solar panels for the tree, capturing energy from the sun through photosynthesis and converting carbon dioxide and water into sugars used for growth and reproduction. The roots absorb water and nutrients from the soil, transporting them through the trunk to the rest of the tree. The trunk protects the tree and provides support. In spring, a tree grows wood in a ring of large, light cells. In summer, it grows more slowly, forming a ring of darker, smaller cells. Dark rings are counted to tell the age of the tree.

Coastal redwood, Douglas-fir, white fir, sugar pine, ponderosa pine and incense-cedar form the mainstay of California's forest products industry. California utilizes the equivalent of one 100 foot tall tree per person per year in forest products. Trees are a renewable resource. In addition to natural regeneration, foresters replant an average of 30 million seedlings annually—about one for each person in the state.

Uses – California's forests provide more than just forest products. They provide beauty, sources of recreation, and homes to many Californians and to nearly 650 species of fish and wildlife. Forests protect against erosion, purify the air through photosynthesis, and filter water. Nearly 100 percent of each tree is used to produce more than 5,000 products. Lumber, furniture, and paper are easily identified wood products. Other items are less obvious. Rayon is cellulose acetate, a by-product of tree fibers. Lignin, which holds tree cells together, is often used as a thickener in baby foods, pet foods and cosmetics. Baked goods sometimes contain torula yeast, derived from sugars in wood pulp. Flavorings and fragrances from tree oils are often used in foods, beverages, cosmetics, and medicines. Wood is 50 percent carbon. When trees are made into wood products, the carbon

is stored for the life of the product. Wood waste from the milling process is often used to produce electricity. This provides a renewable source of power, which is an environmentally friendly alternative to burning fossil fuels.



History – Long before the arrival of Europeans, Native Americans lived in and around forests. They burned and opened up parts of the forest to provide wood for daily needs, build villages, plant crops, make hunting easier, and to protect against enemies. The process helped maintain forest health. Arriving in the 1600s, European settlers respected the forests which gave them building materials and plenty of game. In colonial days, towns often had a liberty tree, under which important decisions were made. A tree was stamped on America's first coins and trees were sewn on the flags of the first colonies. During the settlement of the West in the mid-1800s, wood was used without much thought of the future.

The Gold Rush town of San Francisco was built almost entirely of redwood—even its curbs. Today, California foresters practice sustainable forestry—more trees are grown than harvested. The amount of U.S. forestland has increased in the last 20 years.

Economic Value – California has more forestland than any state, except Alaska. Our state is among the top five producers of wood products in the nation. California's lumber, wood products, paper, and allied industries provide an annual payroll of more than \$4 billion to employees annually. Approximately three percent of California's lumber is exported outside the U.S.

For additional information:

The Forest Foundation
(866) 241-TREE
Email: lindseyn@calforestfoundation.org
Website: www.calfoundation.org



The Forest Foundation

Forest Resources Activity Sheet



◀ #1

Seedlings are often damaged or destroyed by animals, insects, drought, and plant competition. Modern forestry techniques allow 80 percent of seedlings to reach cone-bearing age.



◀ #2

Saplings grow vigorously, cleaning the air of greenhouse gases and releasing oxygen.



◀ #3

Light filtering through adolescent forests stimulates growth of understory plants, providing ideal foraging for animals, who then become prey to others.

#4 ➤

In established forests, foresters control disease and insects. They build trails and roads to provide access to firefighters.



#5 ➤

The mature forest provides recreation, watershed for urban and rural communities, animal habitats, and a host of wood products for our everyday lives.



Lesson Ideas

- List the variety of products in your kitchen that come from trees.
- Visit a lumber mill or a paper processing plant.
- Help plan and cook a breakfast; list the ingredients you used that come from trees.
- Make a collage of everyday items made from trees that do not look like wood.
- Make a trail mix made from tree products. Include fruits, nuts, and sweeteners.
- Make a sand table forest scene. Show how Native Americans made openings in the forest through fire and harvesting to provide for their needs.
- Contact a forester to find out the kinds of tools used to measure and work with trees.
- Visit a cogeneration plant to find out how electrical energy is produced from forest by-products.
- Find the height of a tree at your school using a clinometer and triangulation, a method of geometry.
- Count the dark rings of a wafer of wood to determine its age.

Fantastic Facts

1. Approximately how much of California is covered in forests?
2. Where does California rank in United States production of lumber?
3. How much of California's lumber is exported outside the United States?
4. Name a fabric made from tree fibers.
5. List one reason Native Americans used controlled burns in the forest.
6. How many species of fish and wildlife inhabit California's forests?
7. About how many forest products come from trees?
8. Name three of the six main types of conifers used for California wood products.

1) One-third 2) Ranked among the top 5 producers 3) Three percent
4) Rayon 5) Building villages, planting crops, hunting, or protecting themselves from attack 6) Approximately 650 7) 5,000 8) Coastal redwood, Douglas-fir, white fir, sugar pine, ponderosa pine or incense cedar

Lesson Plan: Making Recycled Paper

Introduction: The word paper comes from the Latin word "papyrus," named after the Egyptian reed from which paper was first made. In this activity, students will create recycled paper—a forest product.

Materials: Large square pan about three inches deep, large bowl, 3 cups of water, a large section of newspaper, rolling pin.

Procedure:

1. Tear one or two pages of newspaper into small pieces of one inch or less.
2. Put the paper chips into a large bowl and add three cups water to it. Keep adding paper, tearing it and squeezing it, until the mixture looks like thick oatmeal.
3. With the pan turned upside down, place about 1 cup of the

blended pulp over the bottom of the pan. Spread it with your fingers evenly across the entire area.

4. Lay several sheets of newspaper over the pulp, then carefully turn the pan over. Remove the pan. Your pulp "square" is now sitting on the newspaper.
5. Close the newspaper over the pulp. Using the rolling pin, roll over the newspaper to blot out the extra water.
6. Uncover and let the new "paper" dry completely. When it is thoroughly dry, peel your new "recycled paper" away from the newspaper. It can now be cut to any size and used to make a variety of things.
7. Have students make a greeting card out of their recycled paper. They can draw designs or use glitter and glue to write a message.

Fresh Carrots

Information compiled by the California Fresh Carrot Advisory Board

How Produced – Carrots, an annual root crop, must be planted in soil that is free of disease and organisms that might affect their color, shape, or texture. This sometimes requires fumigation of the soil. The tiny carrot seeds, 2-3 millimeters in length, are planted in raised beds so the carrots are in position for mechanized harvesting. The growing season ranges from 110 to 180 days, depending upon the time of year, growing conditions and desired size.

After loosening the earth under the mature carrots, large, self-propelled harvesters lift the carrots by their tops, remove the tops, and load the carrots into a truck and trailer which travel alongside the harvester. The carrots are rushed to packing plants, cooled to 34°F, sorted, cleaned, and packaged within 24 hours of harvest.

History – Carrots, originally cultivated in Central Asia and the Near East, were introduced to the American colonies in the seventeenth century.

They were not originally yellow-orange, but a range of purple colors. It is thought that the yellow root evolved from a mutant variety which lacked the purple pigment. Ancient Greeks and Romans used both the purple and yellow varieties for medicinal purposes.

Carrots were first used for food by Europeans during the Middle Ages. In the nineteenth century, carrots were identified as a rich source of beta-carotene. During World War II, British aviators were fed a specially developed English carrot, high in beta-carotene, to overcome night blindness. Plant geneticists continue to develop carrots with higher beta-carotene content, as well as strains that are sweeter and more tender.

Varieties – While there are many varieties of carrots, most consumers are unable to tell one from another since there are only slight differences in taste, shape, or size. Varieties are bred for particular growing regions or specific uses. Normally, carrots grown for the supermarket produce shelf are found in cello bags and are purposely cultivated to be larger than carrots for the baby-cut market. Baby-cut carrots are not necessarily small carrots, but are made from full-grown, small diameter carrots by peeling and cutting them to the desired length. Farmers plant carrots intended for the baby-cut market closer together so the roots stay slim and there is less

waste when the carrots are cut to size. Conveniently packaged to be ready-to-eat, baby-cut carrots keep in the refrigerator in their original bag for up to three weeks.



Commodity Value – There were production increases of approximately 30 percent during the late 1990s because of the rather sudden popularity of baby-cut carrots. The market for fresh carrots has leveled off since the turn of the century. California now produces approximately 70,000 acres annually, with the value of the crop ranging from \$275 to \$325 million. Baby-cut carrots account for 70 percent of the acreage. Besides fresh carrots still being available in the familiar cello package as well as the very popular baby-cut carrots, consumers are now also able to find fresh carrots in other convenient shapes such as sticks, coins and chips, as well as shredded carrots for salads.

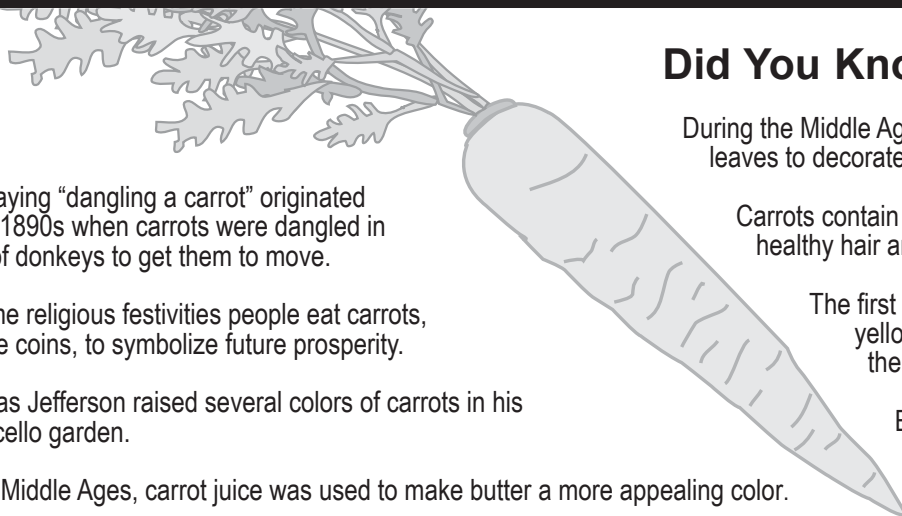
Top Producing Counties – Approximately 80 percent of the nation's fresh carrots are grown year-round in California. Most are grown in and shipped from Kern County. Other growing regions include Imperial County, Salinas Valley in Monterey County, the Lancaster area of Los Angeles County, Cuyama Valley in Santa Barbara and San Luis Obispo counties, Fresno County, and Owens Valley in Mono County.

Nutritional Value – Carrots are an excellent source of beta-carotene and a good source of fiber. Beta-carotene, the plant pigment that gives carrots their vivid orange color, is converted by the human body to vitamin A. Surplus amounts of beta-carotene are stored in the body's fat cells. One medium carrot provides four times the Daily Value of vitamin A which helps maintain the health of eyes and skin and reduces the risk of certain cancers. Carrots are fat-free and contain other essential elements in low amounts including vitamin C, potassium, calcium, phosphorus, and magnesium.

For additional information:

California Fresh Carrot Advisory Board
531-D North Alta Avenue
Dinuba, CA 93618
(559) 591-5675
Fax: (559) 591-5744

Fresh Carrots Activity Sheet



Did You Know?

During the Middle Ages, French women used carrot leaves to decorate hair and hats.

Carrots contain beta-carotene, which helps build healthy hair and nails and keeps eyes healthy.

The first carrots were white, purple, and yellow. In the 1600s, the Dutch developed the orange carrot we eat today.

Early American colonists grew carrots between rows of tobacco to repel beetles.

The saying “dangling a carrot” originated in the 1890s when carrots were dangled in front of donkeys to get them to move.

In some religious festivities people eat carrots, cut like coins, to symbolize future prosperity.

Thomas Jefferson raised several colors of carrots in his Monticello garden.

In the Middle Ages, carrot juice was used to make butter a more appealing color.

Lesson Ideas

- Read “The Carrot Seed” by Ruth Kraus.
- Make a list of edible roots.
- Find in your garden and research examples of taproots and fibrous roots.
- Make a carrot-shaped book showing the history of the carrot and interesting carrot facts.
- Visit the cafeteria to see ways carrots are prepared.
- Ask a professional chef to discuss and demonstrate the many uses of fresh carrots.
- Place a freshly cut carrot top in a shallow dish of water and watch it grow.
- Estimate, then count, the number of baby carrots in a bag.
- Visit a grocery store and make a list of the ways fresh carrots are available to consumers.
- Inside a large drawing of a carrot, write the many nutrients carrots have and the functions these nutrients have in the human body.
- Research and discuss how scientists determine the amount of beta-carotene in a carrot.

Fantastic Facts

1. In what county are most of the nation’s fresh carrots grown?
2. What nutrient that carrots contain is known to assist with night vision?
3. What is the main reason for the increase in carrot production over the past several years?
4. True or false? Carrot tops are plowed back into the soil to provide nutrients for the next crop grown there.
5. How are commercial carrots harvested?
6. True or false? Baby-cut carrots are long small-diameter carrots peeled and cut into pieces.
7. Name one way carrots were used before they were considered a staple food source.

1) Kern County 2) Beta-carotene 3) The popularity and increase in demand of baby-cut carrots 4) True 5) By self-propelled harvesters 6) True 7) Decorations in hats and clothing, medicine, food coloring, and symbols of good luck

Lesson Plan: Growing Carrots on the Mayflower

Introduction: Grow boxes are used where the soil is in poor condition or where weather is such that it is difficult to grow crops. Pilgrims used grow boxes on the Mayflower. The class will grow carrots in grow boxes, keeping a journal of the growth, changes, and challenges that occur.

Materials: Redwood boards at least 12 inches wide, an area to build and place a garden box, nails, hammer, saw, soil mixed with nitrogen-based fertilizer, carrot seeds, water, journals for each student, resource materials about the Mayflower, Pilgrims and early colonists.

Procedure:

1. Explain what a garden box is and brainstorm why and where people use them. Discuss the food conditions and challenges Pilgrims encountered during their voyage to America and the building of their settlement. Why did they use grow boxes?
2. As a class or with a select group of students, build a grow

box that is at least 12 inches deep. Fill the box with soil and moisten.

3. Make rows 4 to 5 inches apart. Make a shallow furrow in each row and sprinkle seeds in the furrow. Cover the seeds with a dusting of soil.
4. As the carrots grow, thin the crop when the carrots are as thick around as an index finger, allowing four inches between plants.
5. Keep garden well watered and weeded. Enjoy eating your carrots in 2 to 3 months.

NOTE: Throughout the growth of the carrots, have the students perform various assignments in their journals—observations, poems, find or create recipes, make invitations to a Carrot Fest where carrot dishes will be served, measure root length and stem length, find out what to do with the carrot tops and peelings, etc.

Invasive Species

Information compiled by the Invasive Species Council of California

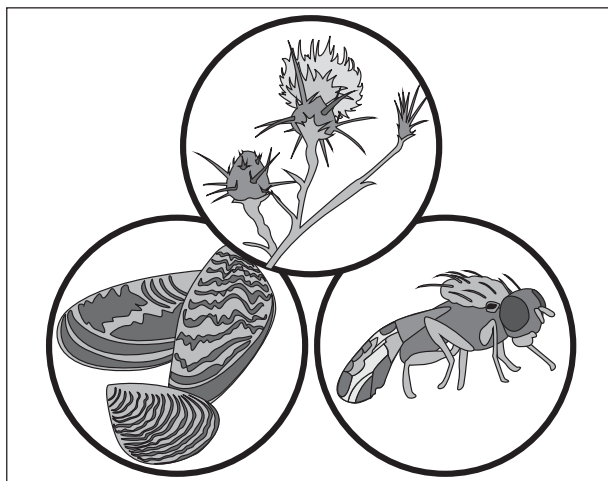
Background – Invasive species are organisms that are moved by nature, people, or animals into an ecosystem where they have not been previously found. Some of these organisms are introduced naturally or accidentally by people, while others are introduced intentionally, without understanding the harm they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

Plants – California is home to 4,200 native plant species; approximately 1,800 non-native plants also grow wild in the state. A relatively small number of these non-native plants, approximately 200, are considered invasive. Invasive plants damage ecosystems by displacing native plants, changing the structure of the plant community, and reducing the value of habitat for wildlife and other animals. Medusahead, an annual grass found in California, is an example of an invasive plant that crowds out native grass species, reducing forage for livestock. Water hyacinth is a floating aquatic plant that has invaded the Sacramento Delta and can quickly cover the surface of open water.

Animals – Invasive animals can be divided into two major groups—vertebrates, or those animals with backbones, like mammals, and invertebrates, or those without backbones, like snails. They may cause a decrease of native animals by out-competing them for resources such as food and habitat, by preying on them, or by introducing new diseases. The Norway rat is an example of an invasive vertebrate. These rodents can spread diseases affecting humans and other animals. The quagga mussel is an example of an invasive invertebrate that clogs water systems, crowding out native wildlife and damaging water supply infrastructure.

Insects and Other Arthropods – Insect and other arthropod introductions into the U.S. have increased rapidly over the past century, largely because of increased trade and travel. Invasive insects or arthropods such as mites and spiders, often sneak onto airplanes and into shipping containers. When the containers arrive and the cargo is unloaded, pests can enter our environment unnoticed, despite government inspectors monitoring shipments. Pests can also cross state lines,

“hitchhiking” as unintended passengers on produce, firewood, and other items packed in cars or planes. For example, the Mediterranean fruit fly, or Medfly, is constantly entering the state through fruit smuggling, package shipments, and tourists’ carry-on luggage. The Medfly can infest a wide range of commercial and garden fruits, nuts and vegetables, and is considered the most damaging agricultural pest in the world. In California, when Medfly is found, regulators impose quarantines on the movement of fresh fruits and vegetables, and this may cause economic hardship for those producing and selling the produce.



Diseases – Viruses, bacteria, fungi, and other pathogens can cause invasive diseases which typically

enter the U.S. in infected imported plants, soil, equipment, or firewood. Invasive diseases sometimes need a carrier, or vector, to further the spread of disease in an area or to a new location. For example, the Asian citrus psyllid is a newly arrived insect pest that acts as a vector spreading the bacteria thought to cause huanglongbing, a devastating disease of citrus trees. This bacterial disease is transmitted to healthy trees by the psyllid after it has fed on infected plant tissue.

Prevention and Control – Preventing the introduction of invasive species is preferred since eradication is not always successful. Travelers play an essential role in invasive species prevention. Not transporting food, animals, plants, firewood, or other materials that might harbor an invasive species will help protect our agriculture, forests, and natural and urban areas.

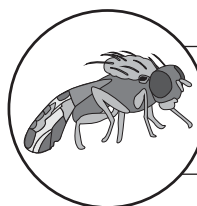
Economic Impact – Invasive species present a significant risk to California’s agricultural economy, valued at \$36 billion. Natural resources also face ecological, economic, and aesthetic impacts. Nationally, the damage resulting from invasive species is estimated at more than \$100 billion annually.

For additional information:

Invasive Species Council of California
1220 N Street, Suite 221
Sacramento, CA 95814
(888) 922-4722
Fax: (916) 651-2900
Email: info@iscc.ca.gov
Website: www.iscc.ca.gov

Invasive Species Activity Sheet

Draw a line connecting the invasive species to its region of origin.



The Mediterranean fruit fly or Medfly is native to Africa and is a major threat to California agriculture. It has been recorded to infest more than 300 cultivated and wild fruits.

Yellow starthistle is native to Eurasia and is an invasive plant that crowds out native California plants and is toxic to horses.



The quagga mussel is native to Eastern Europe and is an invasive invertebrate that clogs water systems, crowding out native wildlife and damaging water supply infrastructure.

Lesson Ideas

- Plan and build traps to detect invasive insects. Place the traps and monitor insect populations. Display data in graph form.
- Examine firewood in a natural area for signs of beetle activity. Discuss how moving firewood increases the risk of spreading invasive species.
- Create a public service announcement that will encourage Californians to protect our agricultural supply from invasive species. Share the PSAs online via podcasts.
- Select an agricultural commodity that is sold and shipped around the world. Investigate potential pests that may "hitchhike" with the commodity.
- Take a field trip to a California port or airport. Have a state or federal regulator explain inspection procedures.
- Research native plants and plant a native garden. Label each plant appropriately.
- Draw a cartoon that teaches other students how to report invasive species to the proper authorities.
- Canines have an important role in detecting invasive species. Follow Hawkeye, a parcel inspection dog, via his blog at hawkeye.detection-dog.com.

Fantastic Facts

1. What is the total cost of invasive species damage nationwide?
2. Which invasive insect is thought to spread the disease huanglongbing?
3. Which invasive pest is considered the most damaging agricultural pest in the world?
4. What is the name of a mussel that clogs waterways and crowds out native wildlife?
5. What are the two subcategories of invasive animals?
6. How many native plant species can be found in California?
7. What is an invasive aquatic plant that has invaded the Sacramento Delta?
8. What is the best way to combat the introduction of invasive species?

1) \$100 billion 2) Asian citrus psyllid 3) Mediterranean fruit fly 4) Quagga mussel 5) Vertebrates & invertebrates 6) 4,200 7) Water hyacinth 8) Prevention

Lesson Plan: Invasive Weed Seed Walk

Introduction: The best way to protect natural and agricultural areas from invasive species is to prevent the spread of new invasive species to those areas. Students can help prevent the spread. Invasive weed seeds can be spread through movement of soil. When we walk or hike through muddy areas, we often carry soil with us, moving debris, which may include invasive weed seeds, to new locations. In this lesson, students will examine the material that may attach to their shoes, and identify methods that reduce the risk of spreading invasive weed species.

Materials: Newspaper, magnifying glass, tweezers, shoes that can get dirty

Procedures:

1. Introduce students to a variety of invasive weeds, and what their seeds look like. Have students recognize different ways the seeds can be transported. Explain that some invasive

weed seeds are transported by unsuspecting hikers, as they move through natural environments.

2. Take students on a walk around campus. Lead them through various areas, some dry and some wet, on pavement and on grassy areas.
3. Have students remove their shoes over a sheet of newspaper. Using tweezers and a hand lens, instruct students to identify, categorize, and analyze the plant material and soil that has adhered to the soles of their shoes.
4. Lead a class discussion to highlight their findings. Discuss how wet soil (mud), like glue, causes plant material to stick as students move through different environments. Remind students that invasive species can also be part of the plant material. Have students retrace their steps and predict how an invasive weed seed could have been moved.
5. Have students create a brochure to advise hikers, bikers, or off-road motorists on best practices to prevent the spread of invasive weed species.

Mushroom

Information compiled by the Mushroom Council

How Produced – The life of mushrooms begins in a laboratory as tiny grains, but they will eventually grow into flavorful mushrooms in just five steps.

Step 1 – Composting: At the farm, the grower prepares a growing medium called compost. The compost is often made from wetted straw, hay and/or crushed corncobs. The grower mixes the ingredients and waits for them to decompose. Once the material is broken down, they bring the compost inside to pasteurize it. Pasteurizing kills any insects or pests and removes ammonia, which formed during decomposition. This step is important because the compost provides nutrients for the mushrooms.

Step 2 – Spawning: The mushroom compost must be inoculated with mushroom spawn for mushrooms to grow.

Growers start the process by sterilizing a mixture often composed of rye grain, water, and chalk. The grower spreads this mixture across the compost and the spawn will begin to appear as a white to blue-white mass throughout the compost. The compost will fully grow with spawn in 14 to 21 days.

Step 3 – Casing: The pasteurized compost is placed in stacked, wooden trays. A top-dressing, called casing, is layered onto the compost. This is where the mushrooms will eventually form.

Step 4 – Pinning: This is the growth stage where the shape of the mushroom forms, appearing like pins. From this point, it takes about a month to produce the first mushrooms for harvest.

Step 5 – Cropping: Mushrooms develop at varying rates, so harvest can take six to 10 weeks. Once all of the mushrooms are picked, the trays are emptied and the growing area is pasteurized with steam before a new crop is started. Mushroom farms today are highly technical operations with computerized systems to monitor each point in production.

History – Ancient Egyptians believed mushrooms were the plant of immortality, according to the hieroglyphics of 4,600 years ago. The delicious flavor of mushrooms intrigued the pharaohs so much that they thought mushrooms were food for royalty and no commoner could touch them. In other civilizations throughout the world, including Russia, China, Greece, Mexico and Latin America, communities practiced mushroom rituals. Many believed that mushrooms had properties that could produce super-human strength, help find lost objects, and lead the soul to the gods.

France was the leader in the formal cultivation of mushrooms and some say that Louis XIV was the first mushroom grower. In the seventeenth century, mushrooms were grown in

special caves near Paris set aside for this unique form of agriculture.



Varieties – The most popular mushroom is the white button, representing approximately 90 percent of mushrooms consumed in the United States. Crimini mushrooms, also known as baby ‘bellas or browns, are similar in appearance to the white button, but have a light-tan to rich-brown cap and a firmer texture. Portabella mushrooms are another popular variety. Known as the “vegetarian meat,” they have a meat-like texture and flavor. Specialty mushroom varieties include shiitake, maitake, enoki,

oyster, beech, and blue trumpet.

Commodity Value – Today, mushrooms are commercially produced in almost every state. As the top mushroom producing state, Pennsylvania accounts for approximately 60 percent of the total U.S. production. California is the second largest mushroom producing state, accounting for 20 percent of total U.S. mushroom production.

Top Producing Counties – In California, mushrooms are primarily grown on the coastal strip between San Mateo and San Diego. The leading mushroom growing counties include Monterey, Santa Clara, Ventura, San Diego, and San Mateo. As the top producing county, Monterey County alone accounts for nearly 40 percent of California’s total production.

Nutritional Value – Mushrooms are a produce powerhouse of nutrients. Few foods naturally contain vitamin D, but mushrooms are unique for being the only source in the produce aisle and one of the few non-fortified food sources. Mushrooms are low in calories, fat-free, cholesterol-free, and low in sodium. Mushrooms provide selenium, potassium, B vitamins, and ergothioneine, a naturally occurring antioxidant that helps protect the body’s cells.

For additional information:

The Mushroom Council
2880 Zanker Road, Suite 203
San Jose, CA 95134
(408) 432-7210

Email: info@mushroominfo.com

Website: www.mushroominfo.com

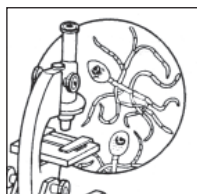


Mushroom Activity Sheet

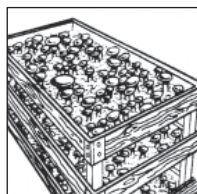
Mushrooms to Market



1. Compost production



2. Spawn production



3. Mushroom growing



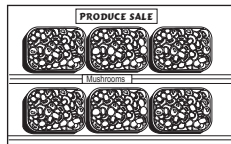
4. Mushroom harvesting



5. Mushroom packaging



6. Mushroom transporting



7. Mushroom sales



8. Mushroom cooking



9. Enjoyment

Lesson Ideas

- Persuade the class that your chosen mushroom variety is the best. Create a convincing, fact-based advertisement and develop a supporting sales presentation.
- Determine the current market price (per pound) for different mushroom varieties. Weigh the mushrooms, convert data from dollars per pound to dollars per gram and compare the price.
- Egyptians believed mushrooms were the plant of immortality. Research specific mushroom rituals for ancient civilizations. Create a work of art that communicates the traditions and myths of selected cultures.
- Compare the energy flow of autotrophic plants and heterotrophic fungi. Create a Venn diagram showing the similarities and differences.
- Identify nutrients found in mushrooms and their effects on human health. Develop a tri-fold brochure to illustrate the health benefits.
- Research each mushroom variety. Create a fictional, multi-paragraph story that features one of the mushroom varieties as the main character. Follow the mushroom's experience from spawn to supper.

Fantastic Facts

1. Which county produces the most mushrooms in California?
 2. What is the most popular variety of mushroom?
 3. What mushroom variety is known as the "Vegetarian Meat?"
 4. Which ancient civilization believed mushrooms were the plant of immortality?
 5. Name three nutrients that are found in mushrooms.
 6. How long does a typical mushroom harvest last?
 7. True or false? Light, high humidity and warm temperature are required for mushroom growth.
 8. Which process kills insects or pests and removes ammonia from the compost?
 9. True or false? It is safe to eat mushrooms found outdoors.
 10. Which country was the leader in the formal cultivation of mushrooms?
 11. Which mushroom variety is known as baby 'bellas or browns?
- 1) Monterey 2) White Button 3) Portabella 4) Egyptians 5) Potassium, copper, vitamin D, phosphorus and ergothioneine 6) Six to 10 weeks 7) False. Mushroom growth does not require light. 8) Pasteurization 9) False. Only eat mushrooms bought at a market. 10) France 11) Crimini

Lesson Plan: Mushroom Dissection

Introduction:

Mushrooms are natural wonders. Very different from plants, these fungi have cell walls made of chitin and do not go through the process of photosynthesis. This activity allows students to identify and dissect several varieties of mushrooms.

Materials:

Scalpels, tweezers, microscopes, microscope slides and cover slips, magnifying glasses, paper, tape.

Procedure:

1. Review mushroom anatomy with the class. Discuss varieties of mushrooms and make observations about visual differences and structural similarities. Discuss the important role mushrooms and all fungi serve in the ecosystem.
2. Distribute three different varieties of store-bought mushrooms to the class. Each student/group should have one mushroom.

3. Instruct students to identify and record their given mushroom variety. Have students carefully bisect the mushroom to reveal the internal components. Students may either draw their mushroom specimen or tape their specimen to a piece of paper. Guide students in labeling the following parts: hyphae, fruiting body, mycelium, cap, gills, stipe (stalk), ring, pores and scales.
4. Demonstrate use of the scalpel to take a small sample of mushroom tissue for microscopic observation. Students place their mushroom sample on a slide, view and record observations. Challenge students to also draw their magnified tissue sample and label cell wall, cross wall, nuclei and cytoplasm.
5. Students compare findings and submit completed lab reports.
6. Conclude the experiment by reviewing the unique qualities of mushrooms and their exceptional nutritional value.

Commodity Fact Sheet

Pears

Information compiled by the California Pear Advisory Board

How Produced – Rich soil, plenty of water, warm days and cool nights are the best conditions for pear growth. Pear trees are in production for an average of 50 to 75 years, although some pear trees still produce after 100 years.

In winter, trees are pruned and replacement trees are planted. It takes five to seven years for a tree to produce fruit. Pear trees are unique since they are self-pollinating. They do not need bees for this process. The California pear harvest begins in late June and continues through September. Pears do not ripen properly on the tree, so growers pick the fruit when it is mature, but green. Pears are harvested by hand, placed into bins and transported to a packing house. The pears are graded for quality, sorted by size, and packed for the fresh market or sent to a processing facility.

Next, pears are cooled to slow down the ripening process. To initiate ripening, pears are brought to room temperature.

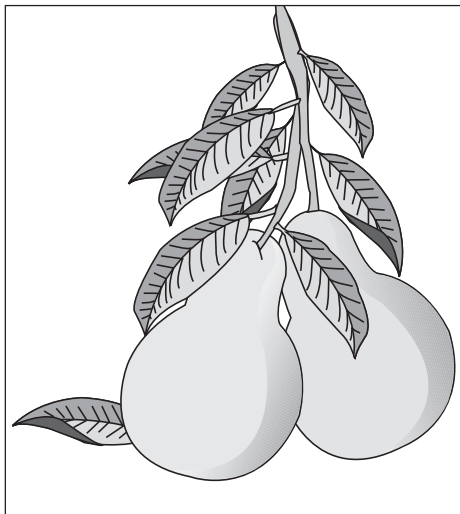
Pears are processed into canned pears, fruit cocktail, juice concentrate, and baby food products, and are often dried. They can be found in such items as fruit juices, baked goods, and snack foods like fruit roll-ups.

History – In eighth century B.C., pears captured the praise of the Greek poet Homer, who referred to them as a “gift of the gods.” The Romans proceeded to use grafting techniques to develop more than 50 varieties and introduced cultivated pears into other parts of Europe.

The Bartlett pear was developed in England in the seventeenth century by a schoolmaster named John Stair. He sold some cuttings to a horticulturist named Williams, who further developed the variety and renamed it after himself. Early Americans brought pear seedlings across the Atlantic to the Massachusetts Bay Colony. In 1812, nurseryman Enoch Bartlett discovered the pear variety and, unaware of the pear’s true name, distributed it as a “Bartlett.” However, it is still known as the “Williams” pear around the world. Bartlett cuttings eventually came west when the forty-niners headed for the great California Gold Rush and continue to grow in California today.

Varieties – The pear, scientifically known as *Pyrus communis*, is a member of the rose family. The Bartlett comprises 75 percent of California’s pear acreage and 90 percent of its tonnage. The Bartlett has a teardrop shape with thin skin that

turns from green to yellow when it ripens. When California Bartletts are golden yellow, they are ready to eat. Remember to handle gently to avoid bruising.



Other California varieties include Bosc, Seckel, Comice, Red Pear, and Forelle. Each has its own distinct shape, color and flavor. The Red Sensation variety was discovered as a “bud sport” on a Bartlett tree. A bud sport is a tree limb that naturally transforms and develops a different fruit variety from that of the original.

Commodity Value – California produces 25 percent of all pears grown in the United States, ranking number two in the nation. California produces approximately 200,000 tons each year and adds \$80 million to its economy. California exports more than 20 percent of its fresh

crop. Canada and Mexico receive more than 80 percent of California’s exports.

Top Producing Counties – Pears are grown in two primary growing regions of Northern California on approximately 10,000 acres. The regions are divided into “early” and “late” districts based on the timing of the harvest. The early district, called “River Pears,” spans the Upper Sacramento Valley of Sutter and Yuba counties and along the Sacramento River Delta in the counties of Sacramento, San Joaquin, Yolo, Solano, and Contra Costa. The early district produces about two-thirds of California’s annual pear crop. The late district, called “Mountain Pears,” spans Mendocino, Lake and El Dorado counties. This area produces approximately one-third of California’s pears annually.

Nutritional Value – One medium pear provides 16 percent (four grams) of the daily requirement for dietary fiber, 10 percent of the daily requirement of vitamin C, and a healthful source of potassium. One pear has approximately 100 calories and contains no cholesterol, sodium, or saturated fat.

For additional information:

California Pear Advisory Board
1521 “I” Street
Sacramento, CA 95814
(916) 441-0432
Fax: (916) 446-1063
Website: www.calpear.com



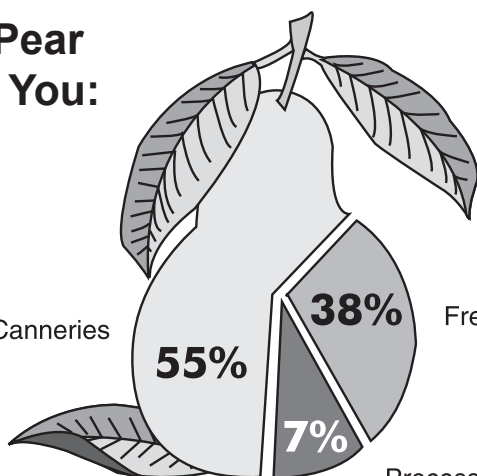
CALIFORNIA
PEARS

Pear Activity Sheet

From Pear Tree to You:



Canneries



Fresh market



Processed into dried fruit, baby food, and juice products.

How Are Pears Consumed?

Lesson Ideas

- Slice a pear in half. Find the stem, core, shoulder, flesh, seeds, skin and calyx.
- On a map of California, identify the River and Mountain districts.
- Dehydrate pears and calculate the percent water loss.
- Compare the color, taste and texture of various pear varieties. Graph or chart your results.
- Examine pear fruit cells under a microscope. Observe the sclerenchyma cells, which give pears their unique texture.
- Dip the tips of your thumb and little finger on an inkpad and make pear prints.
- Write a song or poem about pears highlighting their unique characteristics.
- Cut a firm pear in half, dip in paint and use it to make prints.
- Create a collage of food products that contain pears.

Fantastic Facts

1. How long does it take for a pear tree to produce fruit?
 2. Why are pears picked fully grown but still green?
 3. How can consumers initiate ripening in pears?
 4. How did the Greek poet Homer refer to pears?
 5. Why is the Bartlett pear sometimes called the Williams pear?
 6. What is the most common variety of pear grown in California?
 7. What is a bud sport?
 8. How much of the daily requirement for dietary fiber does one medium pear provide?
- 1) Five to seven years 2) Pears do not ripen properly on the tree 3) Store pears at room temperature 4) As a "gift of the gods" 5) A horticulturist named Williams originally developed the variety 6) Bartlett 7) A tree limb that naturally transforms and develops a different fruit variety from that of the original 8) 16 percent

Lesson Plan: Ripe for the Taking

Introduction: Since pears do not ripen properly on trees, growers pick pears while they are still green, but mature. Seventy percent of consumers want to buy Bartletts that are just starting to "break color" from green to yellow, yet only 47 percent of grocery chains ripen Bartletts in the backroom. A considerable amount of time and money has gone into informing grocers how to properly ripen pears as well as increase their shelf life. This activity allows students to compare the ripening rates of pears under various conditions. Pears are considered ripe when they are slightly soft when gently pressed on the stem end of the fruit.

Materials: Unripe pears for each variety you are testing, thermometers, resealable plastic bags, supplies determined by students.

Procedure:

1. Explain to the students that pears ripen best after they have been picked. Have the students think of variables that may affect the ripening rate of pears and brainstorm a list of variables that can be explored in a classroom setting.

2. Have the students create and perform an experiment that will test one aspect of fruit ripening. One such experiment is described below.

Make two sets of three pears each in a resealable plastic bag. Place one bag in the refrigerator and one on a counter top. Record temperatures. Over the next few days, record temperatures, and changes in fruit color and firmness. Compare the ripeness of the two sets of fruit.

3. Have the students discuss the results of each of the performed experiments.
4. Individually or as a class, have the students write a memo or cardboard box cover that explains to the grocer how to store and ripen pears. Or, have students design an ad that explains to consumers how to ripen pears at home.

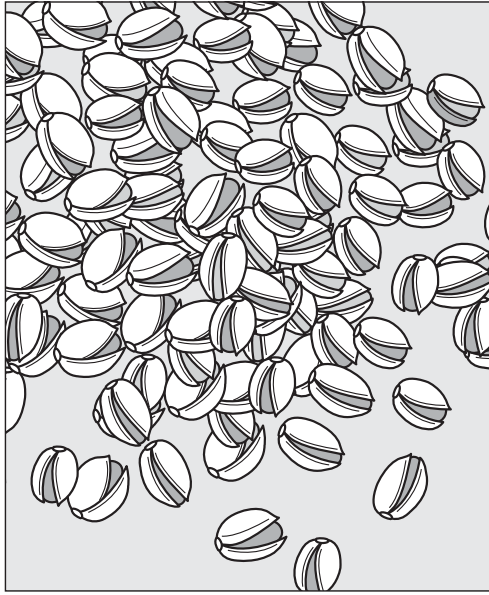
Commodity Fact Sheet

Pistachios

Information compiled by the California Pistachio Commission

How Produced – Pistachio trees begin in the nursery where rootstock is planted, germinated, and grown in pots for 15 months. The rootstock is then planted in an orchard to help the tree adapt to soil, climate, and other environmental conditions, before being budded with an edible cultivar (variety). It takes approximately six years after the tree is planted in the orchard before the first harvest. Pistachio trees are either male or female and the pollen is distributed throughout the orchard by the wind. Trees need long, hot, dry summers, and moderately cold winters for optimum yield.

Like other nut trees, the pistachio is alternate bearing—producing a heavy crop one year and a lighter crop the next. Trees reach maturity and peak production after approximately 15 years. In the Middle East, pistachio trees have been known to produce for more than 100 years.



Pistachio nuts grow in grape-like clusters and an outer skin, called the hull, encases each nut. When ripe, the hull turns rosy and the inside shell splits naturally, indicating the nut is ready to be harvested. Harvest usually begins in early September and continues for four to six weeks. California pistachios are mechanically shaken from the tree (in under a minute) and fall directly onto a catching frame. At the processing plant, workers use machines to remove the hull and dry the nut within 24 hours after harvest, ensuring the highest quality standards. Technological advances continue to improve sorting and grading techniques. For example, electric eyes detect any dark-stained shells and blow them away in a jet of air. Further processing may include roasting, salting, and dyeing the nut red to meet consumer demand. More than 90 percent of the pistachios sold are roasted and salted.

History – Pistachios are native to the low mountains and barren, dry foothills in the elevated deserts of Afghanistan, Iran, and Turkey. Historically, they were considered a rare delicacy and a favorite of the Queen of Sheba.

Pistachios were imported to America in the 1880s but did not become popular as a snack food until 50 years later. These nuts were dyed red to draw consumer attention and to cover stains from now obsolete harvesting techniques. The California pistachio industry can be traced back to 1930 with experimental plantings by American plant scientist William E. Whitehouse, who returned from a six-month trip to Persia (modern

day Iran) with 20 pounds of the most distinctive seed he could find. The first commercial crop in California was not harvested until 1976, producing 1.5 million pounds of pistachios.

Varieties – California pistachios are of the Kerman cultivar, which originated from seed found in the Kerman region of Iran. Since the state's first plantings, scientists have strengthened the Kerman cultivar by budding it to healthier rootstocks. Several new varieties have been released and are being evaluated.

Commodity Value – In California, more than 175,000 bearing acres produce in excess of 98 percent of the United States pistachio crop. The 2010 harvest of more than 520 million pounds provided returns to California farmers of more than \$1 billion. It is estimated that 65 percent of the California crop is exported, primarily to Europe, Canada and Japan.

Top Producing Counties – Kern County leads the state in pistachio production with more than 50 percent of the total crop. Other top producing counties include Madera, Kings, Tulare, and Fresno. Pistachios are grown as far north as Tehama County and as far south as San Bernardino County.

Nutritional Value – California pistachios provide high-energy nutrients. Each one-ounce serving of shelled pistachios (49 kernels) offers 300 milligrams of potassium, six grams of protein, nine grams of total carbohydrates, and three grams of dietary fiber. Pistachios are relatively high in monounsaturated fats (seven grams per serving), which scientists say assist in maintaining good (HDL) cholesterol, while reducing the bad (LDL) cholesterol levels and polyunsaturated fats (four grams per serving). Pistachios have just 1.5 grams of saturated fat per serving, no trans fat, and like all nuts, pistachios contain no cholesterol.

For additional information:

Administrative Committee for Pistachios
4938 E. Yale Avenue, Suite 102
Fresno, CA 93727
(559) 255-6480
Fax: (559) 255-6485
Email: Bobk@acpistachios.org
Website: www.acpistachios.org

Pistachio Activity Sheet

The Historical Development of the California Pistachio

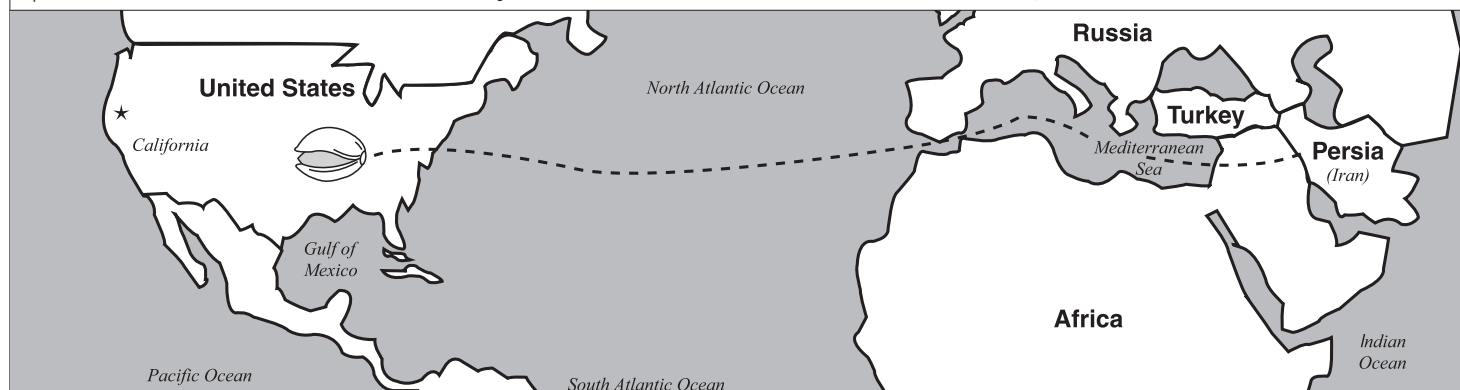
1929 - William E. Whitehouse, as instructed by Knowles Ryerson, entered Persia (Iran) to obtain pistachio seeds.

1929-1930 - Whitehouse explored Persia and collected 20 pounds of individually selected pistachio seeds, which he took to Washington, D.C.

1930-1950 - 3,000 trees grew from 20 pounds of seed. However, only one tree proved to be useful.

1950s - The successful pistachio tree seeds were named Kerman for the famous carpet-making city near Rafsanjan in Iran.

2007 - More than 415 million pounds of California pistachios were marketed for a value of more than \$557 million.



Lesson Ideas

- Create a timeline showing when pistachios were introduced in California and the events that occurred before commercial production began.
- Create a map of California highlighting the major counties where pistachios are grown. Compare and contrast the growing conditions in these counties to the Kerman region of Iran.
- Explore how other countries use pistachios.
- Make pistachio butter. Have a taste test with other homemade nut butter (peanut, walnut, almond).
- Make pistachio creatures. Write a story about your creature.
- Create a flow chart of the life cycle of pistachios.
- Create and prepare a recipe using pistachios.
- Compare the buoyancy of closed and opened pistachios. Discuss how this principle is used in sorting nuts.

Fantastic Facts

1. Name two climatic conditions required for pistachio production.
2. How long does it take to hull and dry pistachios?
3. What percentage of the United States' pistachio crop is grown in California?
4. California produces what percentage of the world's pistachios?
5. Why are pistachios sometimes dyed red?
6. How many years does it take for a pistachio tree to reach peak production?
7. What fruit do pistachios resemble while growing on a tree?
8. Approximately what percentage of California pistachios are exported?

1) Long, hot summers, winters that chill plant roots, breezy spring
 2) Within 12-24 hours 3) More than 98 percent 4) About 30-35% 5) To draw the consumer's attention, previously to cover stains from now obsolete harvesting techniques 6) 20 7) Grapes 8) Nearly 50 percent

Lesson Plan: Let's Compare!

Introduction: The agricultural production and economic impact of commodities varies from state to state and country to country. In this activity, students will compare the production, nutritional philosophy and economic impact of the pistachio in the Mediterranean to that of the United States.

Materials: World map, access to reference books, encyclopedias and the Internet, chart paper, markers.

Procedure:

1. Gather various resources students can use in the lesson described below.
2. Discuss with the students that different cultures throughout the world have different eating habits and varying agricultural practices due, in part, to climate, technological advances and economics. Locate the Mediterranean region on the map.
3. Divide the students into three groups. Each group will compare

and contrast the United States to the Mediterranean in one of the following areas:

- Pistachio production, processing and harvesting techniques.
 - Economic impact of pistachios, including importing and exporting policies and procedures.
 - USDA MyPyramid and Mediterranean Diet Pyramid, which vary in the quantities of recommended daily consumption within the various food groups.
4. After the students have gathered information related to their topic, have them create a visual aid which cleverly describes what they have learned. They should use chart paper and markers to make a visual, which can be displayed for others to learn from.
 5. Have students share their projects with the class. Take this opportunity to discuss that there are many ways to complete a task or look at subjects such as nutrition.

Processing Tomatoes

Information compiled by the California Tomato Growers Association, Inc.

How Produced – Tomato plants are planted in the field as seeds or as young plants, called seedlings. If sowing seeds directly into the ground, the producer sows seeds in late January or early February. If planting by seedling, plants are grown in greenhouses until they are hardy enough to be planted outside in the spring.

Tomatoes are ready for harvest between early July and mid-October. To avoid the daytime heat, tomatoes growers often harvest the crop after sunset. Mechanical harvesters move through the fields picking the entire tomato plant and shaking the tomatoes off the vine. Specially designed electronic sensors on the harvesters sort the ripe, red tomatoes from the vine and transfer them into a gondola pulled by a tractor following alongside. The tomatoes are immediately transported from the fields by trucks, which can hold approximately 50,000 pounds of tomatoes. Trucks haul the crop to a nearby state-controlled grading station to be graded, then on to a tomato processing plant where they are peeled, sliced, diced, or sauced into the familiar canned tomato products seen on store shelves.

History – The first tomatoes can be traced to the South American Andes Mountains where they grew wild as cherry-sized berries. Padres following the Spanish conquistadors most likely sent the first seeds to Spain in the early 1500s. The fruit gained little attention in Spain, but soon traveled to Italy—a country that embraced tomatoes with great passion and developed numerous recipes which are still popular today. By the mid-sixteenth century, tomatoes made their return to America via English colonists. They did not become an important part of the American diet, however, until after World War I. Today, tomatoes are grown in every state except Alaska.

Varieties – There are more than 2,750 genetic varieties of fresh market and processing tomatoes at the Tomato Genetics Stock Center at the University of California, Davis. These varieties have been developed to suit the various growing conditions around the state, taking into account soil type, climate, and disease. Processing tomatoes have been selectively bred for more than 50 years to differ from fresh market tomatoes. The varieties designated for processing have a thicker skin and firmer consistency than fresh market tomatoes. These qualities enable the mechanical harvester to pick the fruit when it is ripe without damaging the fruit and ensure

tomatoes can survive transportation. The processors prefer the “meatier” character of the processing tomatoes because it provides consumers with more of the tomatoes’ essence.



Commodity Value – California is the nation’s leading producer of processing tomatoes. In 2011, California’s processing tomato growers grew approximately 12 million tons on 258,000 acres throughout the state. California farmers produce more than 95 percent of the nation’s processed tomatoes and nearly one-third of the world’s total processed tomato tonnage. The state’s crop value reached \$816 million last year.

Top Producing Counties – Fresno County leads production followed by Kings, Yolo, San Joaquin, Merced, and Kern counties. However, nearly the entire state is involved in producing processing tomatoes, with some being grown as far south as Kern County and

as far north as Colusa County.

Nutritional Value – Processing tomatoes are considered a “Super Food” because they are nutrient dense. One, four-ounce tomato supplies about one-third of the recommended daily allowance for vitamin C, plus contains beta-carotene, potassium, folic acid, and other B vitamins, iron, and fiber. Tomatoes are a naturally low-calorie food.

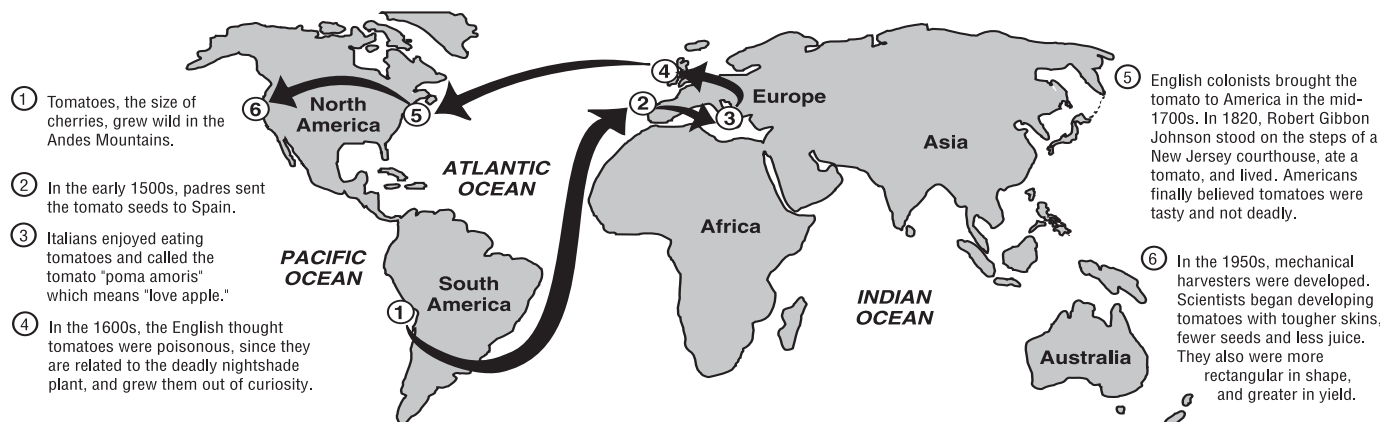
Studies show processing tomatoes are the leading source of lycopene in the American diet. Lycopene, the ingredient that makes tomatoes red, is an antioxidant that blocks cellular damage and is highly effective in preventing cancers. Tomatoes do not lose their health benefits as they are processed and cooked. In fact, lycopene in cooked and processed tomatoes (sauce, paste, salsa, canned tomatoes) is more easily absorbed than fresh tomatoes. This fact, along with their popularity, makes tomatoes a leading nutritional source in the American diet.

For additional information:

California Tomato Growers Association, Inc.
2300 River Plaza Drive, Suite 100
Sacramento, CA 95833
(209) 478-1761
Fax: (209) 478-9460
Website: www.ctga.org

Processing Tomatoes Activity Sheet

The Tomato's Journey to North America



Lesson Ideas

- Label and color the top seven counties in California for processing tomato production.
- Make a collage made from labels of various processed tomato products.
- Make a Venn diagram which compares processing tomatoes to fresh market tomatoes.
- Find out why a tomato is scientifically a fruit but is also known as a vegetable.
- Create a class cookbook which includes favorite student recipes using a tomato product.
- Research nightshade. What crops are related to this family of plants?
- Research the Spanish exploration movement of the 1500s. What other "treasures" came from the New World?
- Locate your nearest tomato processor. Where do the tomatoes they process come from?

Fantastic Facts

1. Which state leads the nation in processing tomato production?
2. How are processing tomatoes harvested?
3. Why do processing tomatoes have thicker skins than fresh market tomatoes?
4. How many different varieties of tomatoes are there?
5. True or false? Tomatoes were once thought to be poisonous.
6. Name one vitamin or mineral processing tomatoes are rich in.
7. The first tomatoes originated in the South American Andes and were berries the size of _____.

1) California 2) By machines 3) So they can be mechanically harvested and successfully transported 4) 2,750 5) True 6) Vitamin A, vitamin C, potassium, folic acid, beta-carotene, iron, B vitamins, fiber 7) Cherries

Lesson Plan: pH Perfection

Introduction: When food is preserved, the microorganisms causing food spoilage are destroyed or slowed down. This is done by using extreme temperatures, changing the moisture level, or altering the acidity of the foods. The temperature of canning is extremely important for safety reasons. Foods with a pH higher than 4.6 must be canned at 240°F or greater. Foods that are more acidic, having pH measurements less than 4.6, may be preserved at 212°F. This difference in temperature can affect food taste and cost. In this experiment, students will determine at which temperature tomatoes should be canned.

Materials: Lemon, pear, carrot and tomato juice, litmus paper which shows varying pHs, six paper cups or test tubes, forceps.

Procedure:

1. Discuss reasons and ways people preserve food. Talk about the importance of acidity and heat in canning. Explain what pH is and how scientists determine the pH of a substance. Talk about the indicator litmus and how it will be used.

2. Pour an equal amount of each substance to be tested into a cup or test tube.
3. Using the forceps, have the students dip one piece of litmus into one substance and record its pH. Repeat this procedure for each juice.
4. Discuss which foods could be preserved at the lower temperature and which need to be canned at the higher temperature. Where do tomatoes fall in this test?
5. What could be done to the foods to change their pHs? When do you think scientists should check the pH of the item to be canned?



This is one in a series of fact sheets composed by the California Foundation for Agriculture in the Classroom (CAITC). For additional educational

Commodity Fact Sheet

Spinach

Information compiled by Fresh Express

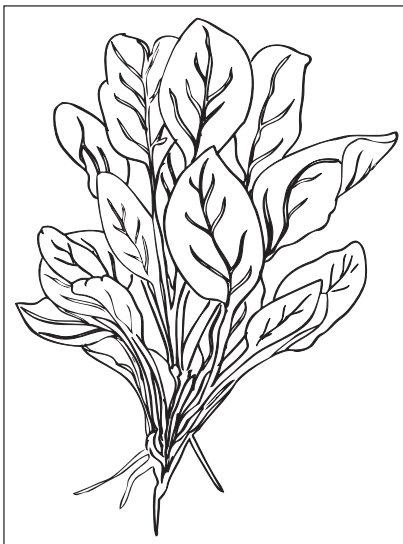
How Produced – Before the grower plants, the farmer will till and prepare the soil. Spinach can be grown on a variety of soil types but the best crops come from sandy loam soil, which is usually found along rivers. The sandy ground makes harvesting easier after rainfall because of good drainage. Drainage quality also affects the irrigation cycle. Since spinach is not a deep-rooted crop, it relies on frequent irrigations to maintain the proper soil moisture levels for ideal growth.

Approximately 90 percent of U.S. spinach is grown in California and Arizona. Spinach grows best during cool periods of the year. Almost 50 percent of spinach produced in California is grown in the Salinas Valley in Monterey County, where spinach is produced from February through November. Spinach is a quick-growing, cool-season vegetable that grows best at temperatures from 45 °F to 75 °F. The foggy and cool summers of the California central coast and the clear and cool winters of the Arizona desert provide ideal growing conditions for spinach.

Spinach is planted relatively shallow at about ½ to ¾ inch depth and at high seed densities of 21 to 48 seed lines per 80-inch beds. These high seed densities result in about 3.5 million plants per acre. Spinach can be harvested in the Salinas Valley 21 to 50 days after planting. Spinach is grown for fresh market (bunched or packaged) and for the processing (frozen) industry. Most of the spinach is mechanically harvested using a machine with a front cutter bar. After harvesting, spinach is typically cooled to 34 °F at centralized cooling facilities before being transported to the processing plant. Spinach has a very high respiration rate and is therefore quite perishable. If kept at low temperatures, spinach can be stored for 14 to 18 days.

History – Spinach has been consumed for thousands of years. It is believed that spinach made its way into Indian and Asian cooking through Arab traders who carried it to Asia from the Middle East. In the 11th and 12th centuries, spinach became a popular vegetable in Spain, and from there it diffused to Germany, Italy, England, and France. It has been used in salads, soups, in baked dishes with cheese, yogurt, and in tortellini. In the early 19th century, American colonists introduced spinach to North America. At least three varieties were grown by 1806. With the development of canning and freezing, the popularity of spinach increased world-wide. The increase in spinach consumption in the U.S. has been due to the sale of freshly packaged teen and baby spinach.

Varieties – Types of spinach are classified as smooth leaf, savoy, and red veined. California grows all three. Smooth leaf varieties have a mature leaf length of about six inches. Savoy spinach is very crinkly and has the same sized leaf as the smooth leaf variety. Red veined spinach has a smaller leaf, similar to the all-green baby leaf types, but adding attractive color and nutrients associated with the red color in the leaf veins. There are many varieties in each type of spinach. Popular varieties in California include Avenger, Bolero, Bosanova, Dolphin, Emilia, Falcon, Lazio, Palco, Unipak, and Whale. Varieties are constantly being developed and may replace these currently popular ones.



Commodity Value – The acreage of fresh market spinach in California has continuously increased by 30% over the last decade from 15,000 acres in 2001 to 19,600

acres in 2011, while the acreage of processing spinach remained constant at 7,300 acres. In 2011, the total crop volume for spinach (fresh market and processed) was 606 million pounds, showing an increase of 59% from 2001. California accounts for 58% of the nation's total spinach production. Spinach ranks number 41 among all commodities grown in California.

Top Producing Counties – The top counties for spinach production in California are Monterey (66%), San Benito (9%), Imperial (8%), Ventura (6%), and Santa Barbara (4%).

Nutritional Value – Fresh spinach is a good source of antioxidant vitamins like A and C and phenolic antioxidants like lutein, zeaxanthin, and beta-carotene. These compounds are scavengers against free radicals and play a healing role in aging and different diseases, including cancer, and promote normal eye-sight. Spinach is an excellent source of vitamin K, which is important for strengthening the bone mass. It also contains vitamin B6 and folates.

For additional information:

Chiquita Brands/Fresh Express
607 Brunken Ave.
Salinas, CA 93901
(831) 772-6057
Fax: (831) 775-1227
Email: sklose@chiquita.com
Website: www.freshexpress.com

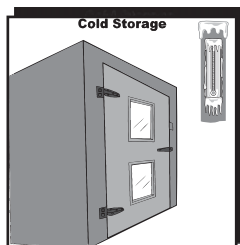


Spinach Activity Sheet



◀ #1

Food safety specialists carefully examine field conditions, monitoring crop quality and food safety compliance prior to planting, and during production and harvest.



◀ #2

Cold temperatures are critical to freshness. Growers cool down spinach within hours of harvesting and keep it chilled from the field to the store.

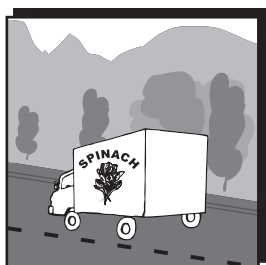


◀ #3

From the field, spinach is transported to packaging facilities where it is thoroughly washed, rinsed and gently dried. Often spinach is packaged in a breathable bag for long-lasting freshness.

#4 ➤

After packaging, spinach is transported swiftly and safely to retail locations across the country. Maintaining consistent cold temperatures is important so every refrigerated truck is monitored throughout its journey to ensure spinach stays cool, fresh, and delicious.



#5 ➤

Consumers enjoy eating spinach. Everyone knows that fresh spinach makes a delicious side dish, but it also makes a nutritious meal on its own.



Lesson Ideas

- Traceability systems inform consumers about where their food comes from and plays a significant role in minimizing food safety risks. Visit www.freshexpress.com/yoursaladstory to track the origins of fresh, packaged spinach.
- Locate on a Western U.S. map where spinach is predominantly grown. What are the climatic differences or similarities?
- Based on the total pounds of spinach produced in California in 2011, how many pounds would have been grown in Monterey County? How many tons is this?
- Illustrate the process of photosynthesis and explain the role chlorophyll plays in spinach growth.
- Compare and contrast the nutritional value of spinach to other leafy greens such as mizuna, iceberg lettuce, and arugula.
- Create a delicious recipe using spinach and provide a cooking demonstration for the class. Explain safe food preparation and give everyone in the audience a sample.
- Use age, gender, and activity level to determine how many fruits and vegetables you should consume daily. Design a week-long menu plan which includes eating spinach at least once a day.

Fantastic Facts

1. Name the types of spinach varieties and describe their physical attributes.
2. How long does it take for a spinach plant to mature?
3. After harvest, spinach is typically cooled to what temperature?
4. Spinach is a significant source of which nutrients?
5. The best spinach crops come from which type of soil? Why?
6. Which valley in California produces the most spinach?
7. What percent of the nation's total spinach production is grown in California?
8. Where are the earliest origins of spinach as a food crop?

1) Smooth Leaf (smooth, six inches in length), Savoy (crinkly leaves) and Red Veined (small leaves with red color) 2) 21-50 days 3) 34 °F 4) Vitamin A, vitamin C, vitamin B6, vitamin K, folate, beta-caroten, lutein, and zeaxanthin 5) Sandy loam, good drainage and easy harvesting 6) Salinas Valley 7) 58% 8) The Middle East

Lesson Plan: Steamed or Raw?

Introduction: Spinach is packed with nutrients, easy to prepare and tasty too! In fact, spinach can be prepared many different ways. In this activity, students will examine the visual appearance, taste, texture and smell of spinach prepared two different ways—steamed and fresh. This activity will encourage students to add spinach to their diets.

Materials: Raw and steamed spinach (prepared before or during class), paper plates, forks, napkins, observation journals, pencils.

Procedures:

1. After students wash their hands, instruct them to use all their senses to observe the raw spinach. Keep in mind color, texture, smell, sound and taste. Students may record observations in their journals.
2. Repeat the observation activity above with steamed spinach.

3. Research and compare the nutritional value of raw and steamed spinach. Discuss why the nutritional values differ and investigate the chemical processes involved in cooking spinach.
4. Determine the differences in serving size for raw and steamed spinach.
one cup raw = ___ cup steamed
5. Ask students to explain which type of spinach they liked best and why. Discuss the balance between choosing the most nutritious product and personal taste preference.
6. Optional: Give students the opportunity to compare the qualities and nutritional value of canned and frozen spinach too.

Strawberries

Information compiled by the California Strawberry Commission

How Produced – Strawberries thrive along California's coast because western ocean exposure and Pacific winds insulate the fields from extreme temperatures and weather, providing the ideal conditions for growing strawberries almost year-round. Strawberry plants are grown in stock nurseries and then transplanted into fields where they grow for another three months before they begin producing fruit. Strawberries are grown all year long in California, with the peak strawberry season occurring in April, May, and June when volume rises from about a million trays per week to seven million trays. That is about 60 million pounds per week.

All strawberries are picked, sorted and packed in the field by hand. Trays of strawberries are then rushed to shipping facilities where they are cooled to 32°F. Within 24 hours of harvest, fresh market strawberries are loaded on refrigerated trucks for delivery across the country. This unique and sophisticated distribution system ensures this highly perishable fruit reaches consumers in fresh-from-the-field condition.

History – This luscious fruit can be traced back as far as the Romans, and perhaps even the Greeks. Medieval stonemasons carved strawberry designs on alters and around the tops of pillars in churches and cathedrals, symbolizing perfection and righteousness. During the same time period, strawberries were served at important state occasions and festivals to ensure peace and prosperity.

The most common explanation for how the strawberry got its name is that children in the nineteenth century threaded the berries into straw and offered them for sale. Fresh strawberries began to flourish in California in the 1950s due to improved cultural technologies. California strawberry farmers were also one of the first agricultural groups to adopt innovative drip irrigation technology for water conservation.

Varieties – Different varieties are suited to particular climates and growing regions. Southern California varieties are adapted for warmer temperatures and shorter daylight hours for early fruit production. Northern varieties have been selected for a longer production cycle, which extends through the fall. For more than 40 years, commercial varieties have been developed by pomologists at the University of California. Successes include the development of new commercial strawberry vari-

eties now grown throughout the world and precedent-setting solutions to disease and pest control. Many strawberry farmers have implemented Integrated Pest Management (IPM) programs on their farms to help control pests using fewer pesticides.



Commodity Value – Strawberries are among the top five most frequently consumed fruits, and strawberry consumption is steadily increasing. In fact, one in five families report eating more strawberries in the past year than previous years.

In 2011, strawberries produced in California accounted for 88 percent of the U.S. strawberry production. More than 38,000 acres are devoted to strawberry production in California. Canada, Mexico,

and Japan are primary export markets for fresh and frozen California strawberries. Today, strawberries represent a \$2.3 billion industry in California.

Top Producing Counties – California produces 88 percent of the nation's fresh and frozen strawberries, harvesting more than two billion pounds of fruit annually. The leading counties in strawberry production include Santa Barbara, Orange, Ventura, San Diego, Monterey, Santa Cruz, Fresno, and San Luis Obispo.

Nutritional Value – California strawberries are called a nutritional super food because they are an excellent source of antioxidants including vitamin C, and are a source of potassium, folate and fiber. One serving of California strawberries has only 45 calories and 140 percent of the recommended daily allowance of vitamin C. Additionally, strawberries are naturally low in sugar, making them a naturally sweet super fruit for every day. The latest nutrition research has found that eating eight California strawberries a day may improve memory, and reduce the risk of heart disease and some cancers.

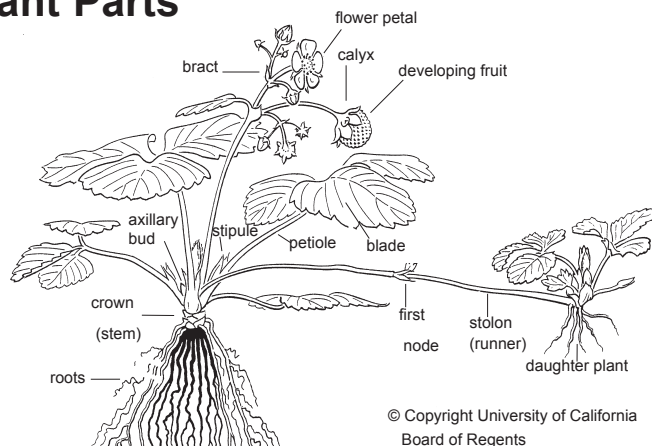
For additional information:

California Strawberry Commission
Post Office Box 269
Watsonville, CA 95077
(831) 724-1301
Fax: (831) 724-5973
Website: www.californiastrawberries.com

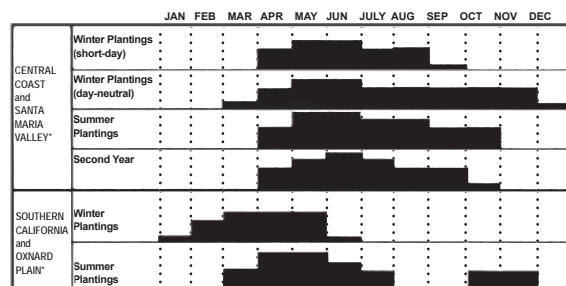


Strawberry Activity Sheet

Plant Parts



Growing Season and Peak Production



* Strawberries are also grown in the San Joaquin and Central Valleys

Lesson Ideas

- Create a map of California highlighting the major counties where strawberries are grown.
- Estimate the number of seeds on a strawberry and devise a simple method for determining the number of seeds.
- Calculate the surface area and volume of a strawberry.
- Discuss different pests that affect strawberry production and methods for controlling these pests.
- Devise a method of estimating the quantity of strawberries produced on an acre of land.
- Write a paper entitled, "California—The Strawberry Capitol of the United States." Use www.calstrawberry.com for your research.
- Discuss the advantages and disadvantages of hand and machine harvesting. Invent a machine to harvest strawberries.
- Analyze the economic impact export markets have on the California strawberry industry.

Fantastic Facts

1. How many seeds are on the average strawberry?
2. Are strawberries harvested by machine or by hand?
3. How are strawberries typically propagated?
4. What percent of the recommended daily allowance for vitamin C does one serving of strawberries contain?
5. Do strawberries ripen after picking?
6. How many U.S. states have a town named Strawberry?
7. How many pounds of strawberries can be picked in California in one week during peak production?
8. How many tons of strawberries can an average acre of California farmland produce?
9. Are strawberries annual or perennial plants?
10. What percentage of the strawberries produced in the U.S. are grown in California?

1) 200 2) By hand 3) Vegetative reproduction 4) 140 percent for one serving of eight medium-sized strawberries 5) No 6) 3: Arkansas, Arizona and California 7) 50 million pounds 8) 21-27 tons 9) They are perennials, but are often planted annually 10) 87 percent

Lesson Plan: Make Your Own Strawberry Leather

Introduction: Strawberries can be used to make several tasty and nutritious snack foods. This lesson uses strawberries to teach students measuring, shaping, food processing and food safety skills.

Materials: Strawberries (1½ cups per group of 4 students), light corn syrup, lemon juice, jelly roll pan, blender or food processor, plastic wrap.

Procedure:

1. Place 1½ cups of clean strawberries in a blender or food processor and process until smooth.
2. Stir in ½ teaspoon lemon juice and 1½ teaspoons light corn syrup.

3. Line a jelly roll pan with heavy-duty plastic wrap, taping the plastic wrap to the corners of the pan with masking tape.
4. Pour the strawberry mixture into the pan, spreading evenly. **Leave at least a one-inch margin on each side.**
5. Dry in an oven at 150°F for seven to eight hours or until the surface is dry and no longer sticky.
6. Remove the leather and plastic wrap from the pan while still warm (hands must be clean and dry) and roll up in a jelly roll fashion. Cut into logs and store in plastic wrap for a maximum of five days. Have the students take their strawberry leather home or enjoy it as a class snack.

Table Grapes

Information compiled by the California Table Grape Commission

How Produced – Growing fresh market grapes is a year round job. Growers vigorously prune the vines in the winter. In the spring, buds appear, flowers bloom, and shoots emerge next to the flower clusters. The flowers bloom when daytime temperatures reach about 68°F. As the flowers die, tiny green berries appear. These will eventually grow and ripen into clusters of grapes. In late spring, the farmers girdle the vines of many varieties, stripping a small ring of bark from the shoots, canes, or trunks. This forces nutrients from the vines and roots into the fruit, resulting in larger berries.

When grape berries achieve the correct size, sugar content, and color, they are harvested by hand with special clippers. Harvest usually occurs in late spring to mid-July in the warm desert area of the Coachella Valley. In the San Joaquin Valley, harvest begins in early July and continues until late fall.

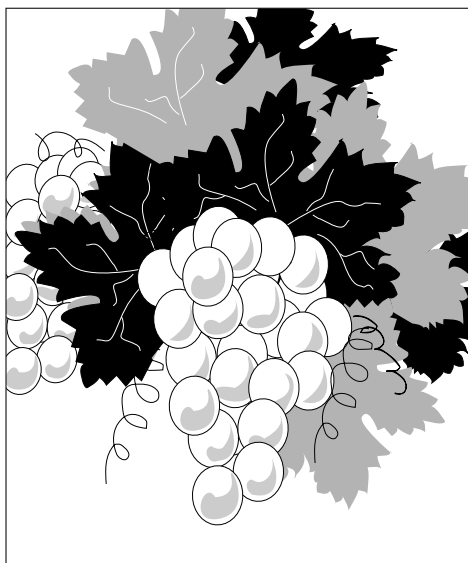
At harvest, the bunches are trimmed and inspected, packed into shipping containers, and transported to a cold storage facility to quickly cool the grapes. Grapes that are not immediately shipped to market are maintained in a controlled climate storage facility between 30°F to 32°F with 90 to 95 percent relative humidity. This storage process allows consumers to enjoy California table grapes through January.

History – Viticulture, or the science, production and study of grapes, first began in California in the late 1700s when Spanish friars arrived to establish Catholic missions. Because the native grapes were sour and made poor wine, the Friars brought over grapes from Europe and planted their own vineyards to make sacramental wine.

In the mid-1800s, prospectors poured into California. They came looking for gold until some discovered that there might be more money in grapes. Shortly after the Gold Rush, California's fledgling agricultural society declared, "Capital put into vineyards would bring greater rewards than... fluming rivers for golden treasures." Their instincts were good. California's warm, dry climate turned out to be ideal for growing grapes. Today, more than 700,000 acres across California are planted with fresh grape, wine and raisin vineyards.

Varieties – California produces more than 1.8 billion pounds of table grapes each year. To give an idea of the total annual crop size, if one season of California table grapes were lined

up, end to end, in standard sized boxes, they would wrap around Earth about 1.5 times.



More than 70 varieties of table grapes are grouped into three color classifications: green, black, and red. The numerous varieties enable consumers to have fresh California table grapes from May through January.

Commodity Value – The total annual crop value of fresh grapes from California is more than one billion dollars. Approximately 40 percent of California's table grapes are exported to countries around the world. The top five export markets include Canada, Mexico, China, Indonesia, and the Central America Region.

Top Producing Counties – California produces 99 percent of the nation's commercially grown table grapes. California's table grapes are produced in the Coachella and San Joaquin Valleys, which include Fresno, Kern, Kings, Madera, Riverside, and Tulare counties.

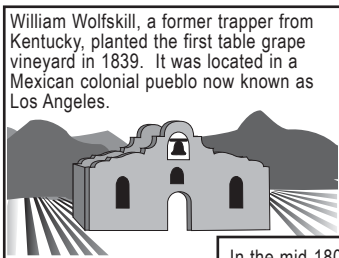
Nutritional Value – Grapes of all colors make a healthy snack. A serving of grapes ($\frac{3}{4}$ cup) is just 90 calories, has no fat or cholesterol and virtually no sodium. Grapes are a source of potassium, calcium, and vitamin C. Fresh grapes are also a natural source of beneficial antioxidants. Research suggests that an important group of natural grape components—called polyphenols—helps maintain a healthy heart. It is recommended that people consume a "rainbow" of naturally colorful, whole fruits and vegetables; eating a variety of fresh grapes helps achieve this goal and is a great start to a healthy lifestyle. Eat them fresh by the bunch, tossed into salads and in yogurt. Frozen grapes also make a refreshing snack on a hot day.

For additional information:

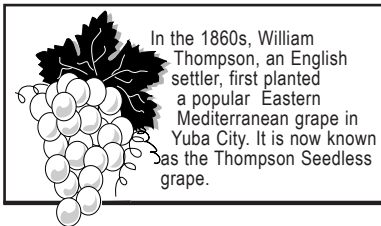
California Table Grape Commission
392 W. Fallbrook, Suite 101
Fresno, CA 93711-6150
(559) 447-8350
Fax: (559) 447-9184
Email: info@grapesfromcalifornia.com
Website: www.grapesfromcalifornia.com

Table Grapes Activity Sheet

A Little Bit of History



William Wolfskill, a former trapper from Kentucky, planted the first table grape vineyard in 1839. It was located in a Mexican colonial pueblo now known as Los Angeles.

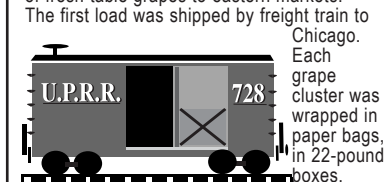


In the 1860s, William Thompson, an English settler, first planted a popular Eastern Mediterranean grape in Yuba City. It is now known as the Thompson Seedless grape.

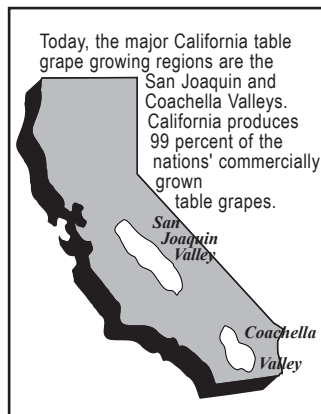
In the mid-1800s, Colonel Agoston Haraszthy personally brought 100,000 table grape cuttings to California and planted them to provide fruit to the miners of the California Gold Rush.



In 1869, R.B. Blowers pioneered the transport of fresh table grapes to eastern markets. The first load was shipped by freight train to Chicago.



Each grape cluster was wrapped in paper bags, in 22-pound boxes.



Today, the major California table grape growing regions are the San Joaquin and Coachella Valleys. California produces 99 percent of the nation's commercially grown table grapes.

Lesson Ideas

- Make a mural depicting the lifecycle of a grapevine.
- Research the role of phloem, xylem, and cambium in plants and relate it to the girdling process done on grapevines.
- Use a world map to trace the distribution of grapes over time.
- Compare the latitudes and longitudes of major grape-growing countries and grape-importing countries.
- Compare and sort various grape varieties by color, shape, or size.
- Use thumbprints to make pictures of grapes and grape bunches.
- Research the Phoenicians and their importance in the ancient world.
- Use frozen grapes as ice cubes in a favorite drink.
- Compare the etymology of the French word "grape" and the English word "grapple."

Fantastic Facts

1. True or false? Growers harvest grapes when they are fully ripe.
2. Name one of two California valleys which produce the most fresh market grapes.
3. Who brought the first grapes to California?
4. California produces _____ percent of the nation's commercially grown table grapes.
5. Where were the first California grape vineyards planted?
6. True or false? Upon harvest, grapes are quickly cooled to preserve freshness.

1) True 2) Coachella or San Joaquin Valleys 3) The Spanish friars who established the missions 4) 99 5) In present-day Los Angeles 6) True

Lesson Plan: To Market! To Market!

Introduction: Since 1970, the United States per capita consumption of table grapes has grown from two pounds to eight pounds per year. Many factors contributed to this rise, including improved marketing techniques. Developing new marketing techniques relies heavily on research such as surveys and taste tests. In this activity, your students will conduct a survey, analyze the results, and produce a magazine advertisement to sell table grapes.

Materials: *Table Grape Fact Sheet*, supermarket advertisements for grapes, magazine food advertisements, and red, green and black grapes.

Procedure:

1. Discuss how advertising and product presentation affect the sale of foods. Have students bring in samples of food advertisements from magazine and grocery ads.
2. Discuss the various marketing strategies used to persuade a consumer to purchase a product. Examples may include low

prices, convenience, healthy eating, or appealing to the senses. Have the students analyze what strategies are used in the ads brought to class.

3. Have students gather information on grapes by examining and tasting fresh grapes, writing down words that describe the grapes, looking at the cash register receipt from the grape purchase, and reading the *Table Grape Fact Sheet* and other literature you have on grapes.
4. Have the students develop and administer a survey designed to find out what consumers are looking for when buying fresh fruit, in particular, fresh grapes. Possible questions may include: "Who eats grapes in your home?," "Does price matter in your fruit choice?" and "What color of grapes do you prefer?"
5. After conducting their survey and analyzing results, have students write magazine or grocery ads to promote their products.

Walnuts

Information compiled by the California Walnut Board

How Produced – After an orchard is planted, it takes approximately four years until it produces its first major crop. Constant attention is given to each tree every step of the way—from pruning, spraying, and fertilizing to irrigation—to ensure a healthy orchard. Once a walnut tree has been planted and stabilized, it will continue to bear fruit for as long as a century.

Harvest begins in September when the protective outer covering, called a hull, splits, signaling that the nuts are ready to be removed from the trees. Nuts are often harvested by a mechanical shaker. After walnuts have been shaken to the ground, they are blown into a row to allow mechanical harvesters to pick them up for cleaning and hulling. The harvest season usually continues into early November.

After hulling and washing, the nuts are transferred from the mechanical harvester into a hopper where they are mechanically dehydrated (air-dried). This protects the nut during transport and storage. Mechanical dehydration is quick, thorough, and scientifically controlled—a major improvement over the sun-drying method formerly used. Walnuts with desirable traits such as big beautiful shells are selected for the inshell market. Other walnuts are shelled and processed into walnut halves and pieces, and chopped walnuts to be sold in supermarkets across the country.

History – Walnuts are recognized as the oldest known tree food, dating back to 7000 B.C. In fact, walnuts are one of only a handful of trees and plants that can be found growing naturally in both eastern and western hemispheres—strong evidence that the trees existed before the continents split apart. Records indicate Persian nuts (English walnuts) were known during the reign of Tiberius. Remains of this nut have also been unearthed in ancient Rome where walnuts were considered food for the gods and called "Juglans Regia" in honor of Jupiter.

The term "English" applied to the Persian nut is a misnomer. The name "English walnut" refers to the English merchant marines whose ships transported the product for trade around the world. It is thought that the first English walnuts were brought to California by Mission Fathers around 1770. Joseph Sexton planted the first commercial walnut orchard

in California in 1867, near Goleta in Santa Barbara County.

Varieties – In recent years, Chandler has been the most popular variety used for shelled walnuts. However, there are more than 30 varieties of commercially produced walnuts, hybrids of the English (Persian) walnut. The varieties were developed to have specific characteristics such as early or late harvest times, thin or thick shells, high percentages of walnut meat, or specific pest tolerances. Four varieties account for more than 80% of production: Chandler, Howard, Hartley and Tulare.



Commodity Value – In California, nearly 245,000 acres, primarily from Redding to Bakersfield, produce three-quarters of

the world's trade in walnuts. California's crop generates more than \$1 billion in farm gate revenue. Approximately 60 percent of the crop is exported. China, Turkey, Spain, Germany, and Korea are some of the largest export markets.

Walnut shells can be burned to generate power and heat, or ground and used as pet litter and in sandblasting. In Japan, the shells are used in snow tires to aid traction. Walnut oil is used in gourmet cooking and cosmetics.

Top Producing Counties – San Joaquin County leads production. Other top counties include Butte, Tulare, Stanislaus, and Sutter.

Nutritional Value – In March 2004, the United States Food and Drug Administration affirmed that eating 1.5 ounces per day of walnuts as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease. A one-ounce handful of walnuts (12-14 halves) contains good polyunsaturated fats (PUFAs) and is an excellent source of the plant-based essential omega-3 fatty acids ALA (2.5 grams). Walnuts contain many antioxidants and are naturally cholesterol and sodium free. They also have four grams of protein and two grams of fiber per serving.

For additional information:

California Walnut Board
101 Parkshore Drive, Suite 250
Folsom, CA 95630
(916) 932-7070
Fax: (916) 932-7071
Website: www.walnuts.org

Walnut Activity Sheet

Year 1

Seedling grafted to ➤
Paradox or Black
Walnut rootstocks.

Harvest

Orchard floors cleaned to
remove vegetative growth.

↓
Shaker shakes nuts from
trees; walnuts swept into wind-
rows by a sweeper, picked up
by harvester and delivered
to a hauler.

↓
Large wire brushes remove
remaining husks from walnuts;
walnuts dried to moisture
content of 8 percent.

↓
Walnuts packaged for market
or sent to processors.

Year 2

Orchard leveled, irrigation ➤
system installed, trees
planted.



Years 2-6

Trees pruned, irrigated and ➤
fertilized; weeds and insects
controlled by biological
chemical and/or mechanical,
methods; limited nut
production.



Years 7-100

Trees produce full crops
averaging 2.14 tons/acre.

Annual Practices

September-October

Early harvest begins.

April-August

Fertilizaion, irrigation
and pest management
strategies implemented.

November

Late harvest completed;
orchard floors cleaned;
pruning begins.

December-March

Pruning continues; dormant
sprays control mites and oth-
er insect pests.

Lesson Ideas

- Make a list of different uses for walnuts and walnut by-products.
- Go to the school cafeteria and interview the cook.
- How are walnuts used at your school?
- Share your favorite walnut recipe with your class. Have a walnut tasting party.
- Use walnut shells in math and art activities.
- Discuss the importance of polyunsaturated fats. Walnuts are an excellent source of omega-3 fatty acids, which are necessary because they cannot be produced by the body.
- Bring products made from walnuts or walnut by-products to class.
- California exports walnuts to more than 100 countries around the world. Discuss how walnuts can be used as a communication tool between countries.

Fantastic Facts

1. What is the oldest known tree food?
2. How much cholesterol is contained in a walnut?
3. Eating walnuts helps reduce the level of _____ in the blood.
4. How much of the world's trade of walnuts is produced in California?
5. How many years can a healthy walnut tree produce a productive crop?
6. Name three by-products of walnuts.
7. After a walnut orchard is planted, how long does it take to produce the first crop?
8. What is one of the best non-fish sources of omega-3? (Omega-3 helps with the prevention of heart disease.)
9. What are the physical attributes of walnuts used for the inshell market?

1) Walnuts 2) None 3) Cholesterol 4) Three-Quarters 5) Approximately 100 years 6) Cosmetics, oil, sand blasting materials, snow tires, pet litter 7) Four years 8) Walnuts 9) Big beautiful shells

Lesson Plan: Walnut Shell Dye

Introduction: Walnuts are a delicious and healthful snack, and provide valuable by-products for a variety of purposes. Walnut shells can be burned to generate power and heat or ground up to be used as pet litter, sand paper and snow tires. Processes walnut shells can be used for dyeing fabrics and other textiles, as well as staining wood. Students can easily create this dye for art or woodworking projects. The color of the dye will change slightly from harvest season to harvest season depending on the health of the walnut tree and nuts.

Materials: Two cups of walnut shells, 1 quart water, stove or heating source, large enamel or stainless steel (not aluminum) pot, sturdy wooden spoon, sieve, container to collect dye, material to dye.

Procedures:

1. Review class safety procedures before beginning this experi-

ment. In a large pot, combine two cups walnut shells and one quart water.

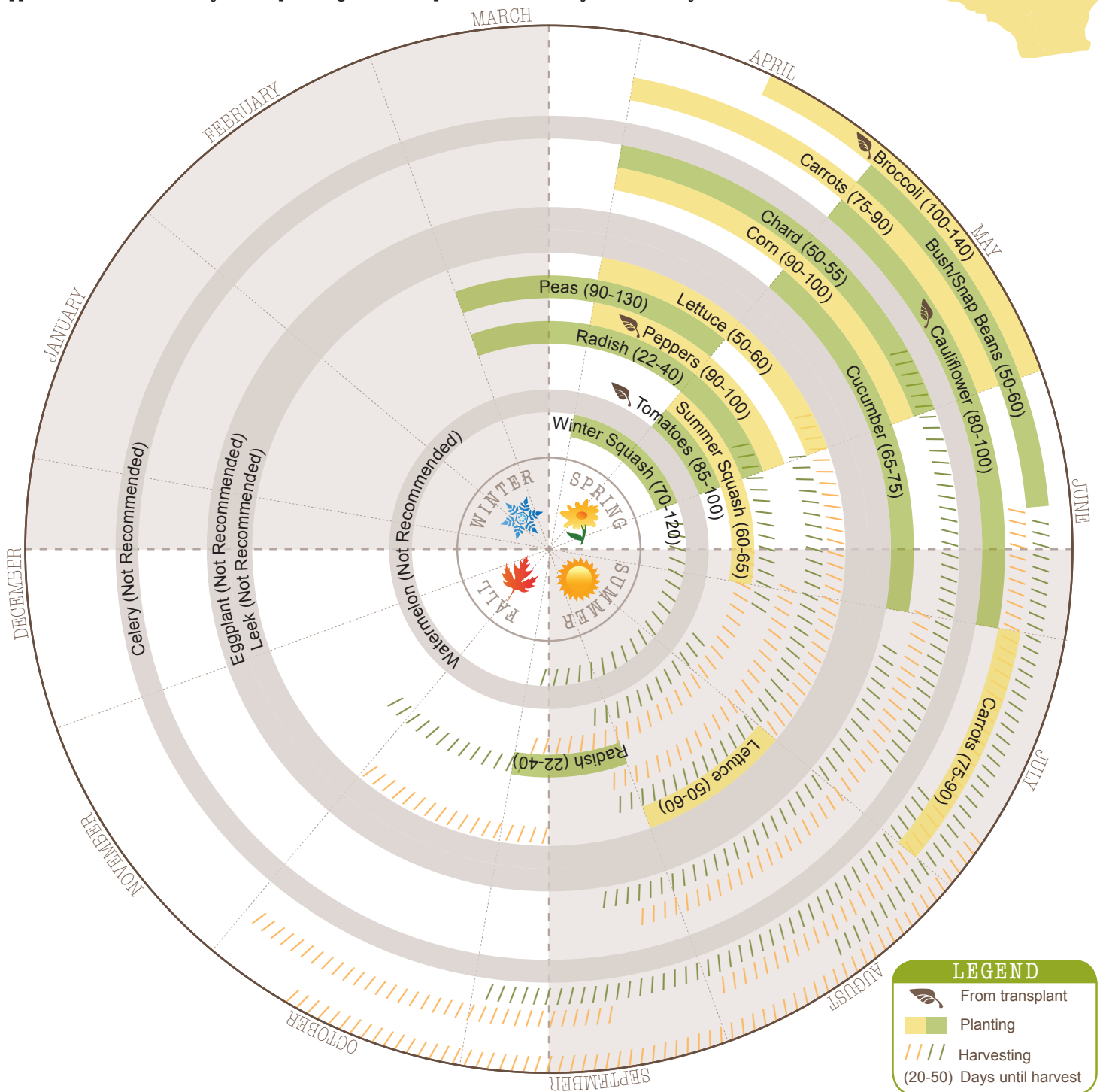
2. Soak the shells in the water overnight.
3. The following day, boil the shells in the water for one hour. Be careful not to let the water evaporate completely.
4. Use the sieve to strain the mixture and discard remaining shells. Add the material to be colored directly into the dye. Let the material soak in the dye until the desired color intensity is reached. The dye may also be applied to hard surfaces using a paint brush.
5. Challenge students to compare the affects of different varieties of walnuts, walnuts grown in different regions and walnut shells cracked into various sized pieces.

CROP Circles

REGION 1: NORTHERN MOUNTAINS

CALIFORNIA REGIONS OF OPTIMAL PLANTING

The CROP Circle is an easy-to-use diagram that illustrates proper planting and harvesting times for 18 crops commonly found in California school gardens. These are optimal and recommended planting and harvesting times that can be altered to better suit your individual microclimate or school calendar. The Circle is divided into four seasons with each individual crop in its own concentric circle. The colored bars represent the months most suitable for planting that specific crop and the hash marks represent the months most suitable for harvesting that same crop. The days indicated in the parentheses are the approximate number of days after planting for the crop to reach maturity and be ready to harvest.



CROP Circles MATH ACTIVITIES

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- Using the information located on the CROP Circle, choose five different crops and determine the mean (average) number of days until harvest for each crop. Round your answer to the nearest whole number.

Example:

Radish (22-40 days until harvest)

$$\frac{22+40}{2} = 31$$

Grade 4: Number Sense (NS) 1.3; Mathematical Reasoning (MR) 1.0, 2.5; Grade 5: Statistics, Data Analysis and Probability (SDP) 1.1; MR 1.0, 2.5; Grade 6: SDP 1.1

- If you plant summer squash on June 30, on what approximate day can you plan to harvest? Assume the average number of days to harvest.

- If you want to harvest carrots on October 1, approximately what day should you plant the crop? Assume the average number of days to harvest.

Grade 4: NS 3.1; MR 2.2; Grade 5: MR 2.2; Grade 6: NS 2.3

- Using the CROP Circle diagram as a guide, determine the number of months each crop can be planted out of the year. Represent your findings in the form of a decimal, fraction and percent.

Example:

Cauliflower is planted in the months of May and June. You can plant cauliflower two months out of the 12 months of the year.

Decimal: .17 Fraction: $\frac{1}{6}$ Percentage: 17%

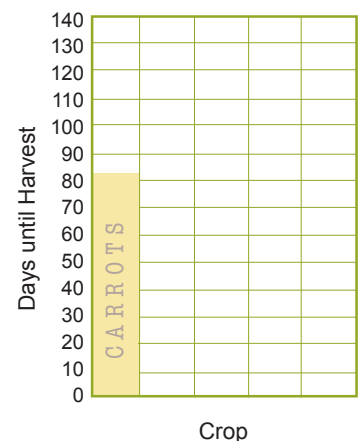
Which crop can you plant the most months of the year?

-

Grade 4: NS 1.6, 1.7, 3.2, 3.4; MR 2.3; Grade 5: NS 1.2; MR 2.3; Grade 6: NS 1.2; MR 2.4

- The following table illustrates the mean (average) number of days it takes for several crops to reach maturity and be ready for harvest. Complete the chart and create a bar graph to represent your data.

Crop	Average Days to Harvest
Carrots	82.5
Leek	
Eggplant	
Celery	
Cauliflower	
Radish	



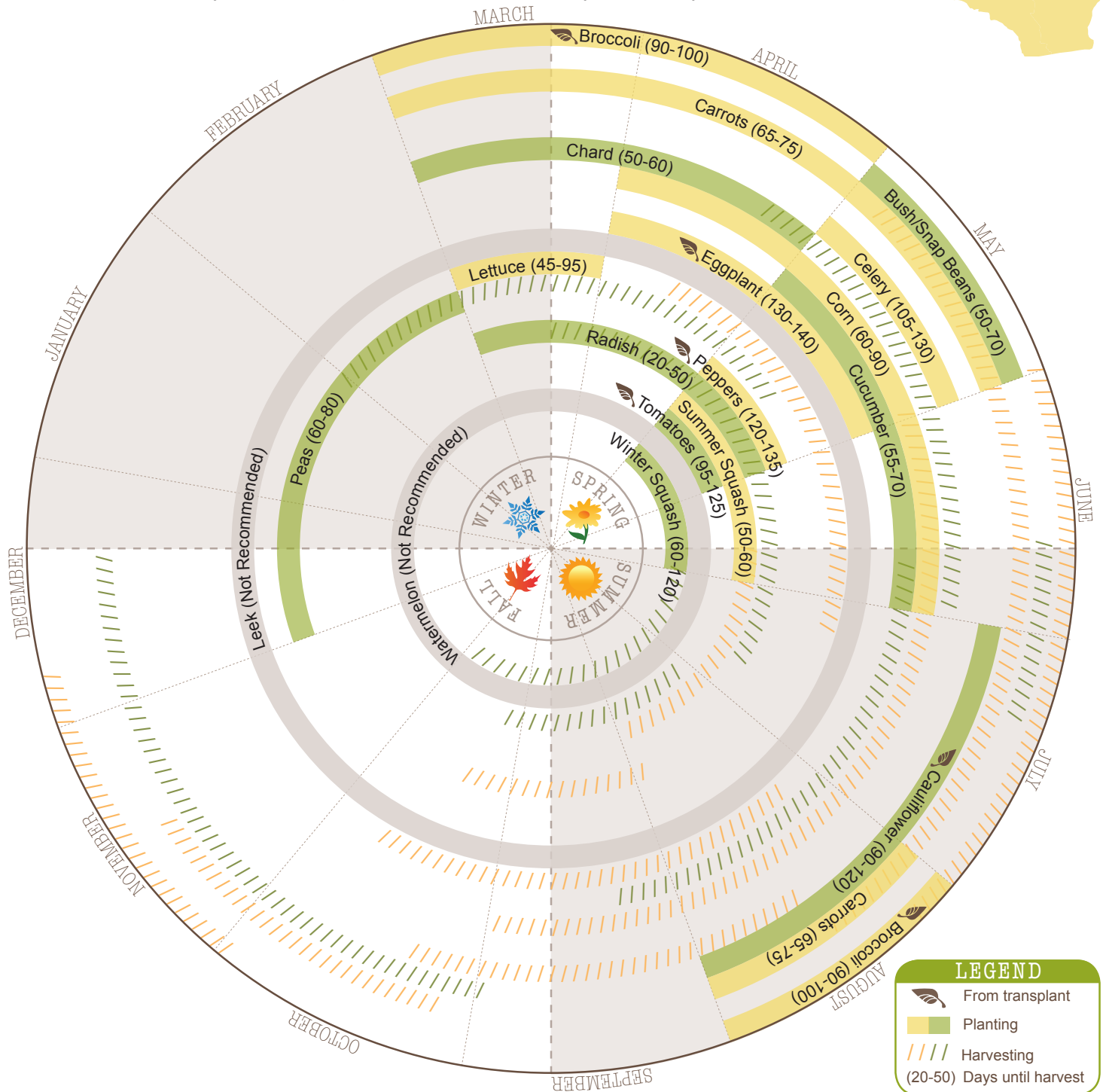
Grade 4: SDP 1.0, MR 2.3; Grade 5: SDP 1.2, MR 2.3; Grade 6: MR 2.4

CROP Circles

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REGION 2: SIERRA FOOTHILLS



CROP Circles MATH ACTIVITIES

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- Using the information located on the CROP Circle, choose five different crops and determine the mean (average) number of days until harvest for each crop. Round your answer to the nearest whole number.

Example:

Radish (20-50 days until harvest)

$$\frac{20+50}{2} = 35$$

- Using the CROP Circle diagram as a guide, determine the number of months each crop can be planted out of the year. Represent your findings in the form of a decimal, fraction and percent.

Example:

Broccoli is planted in the months of March, April and August. You can plant broccoli three months out of the 12 months of the year.

Decimal: .25 Fraction: $\frac{1}{4}$ Percentage: 25%

- Which crop can you plant the most months of the year?

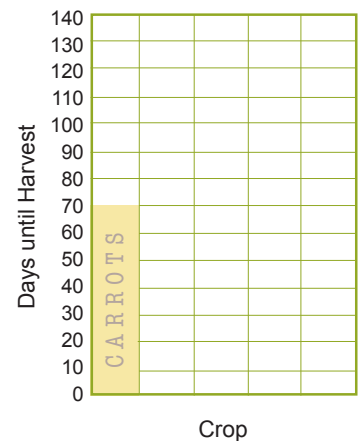
Grade 4: Number Sense (NS) 1.3; Mathematical Reasoning (MR) 1.0, 2.5; Grade 5: Statistics, Data Analysis and Probability (SDP) 1.1; MR 1.0, 2.5; Grade 6: SDP 1.1

Grade 4: NS 1.6, 1.7, 3.2, 3.4; MR 2.3; Grade 5: NS 1.2; MR 2.3; Grade 6: NS 1.2; MR 2.4

- If you plant summer squash on June 30, on what approximate day can you plan to harvest? Assume the average number of days to harvest.

- The following table illustrates the mean (average) number of days it takes for several crops to reach maturity and be ready for harvest. Complete the chart and create a bar graph to represent your data.

Crop	Average Days to Harvest
Carrots	70
Leek	
Eggplant	
Celery	
Cauliflower	
Radish	



- If you want to harvest chard on May 10, approximately what day should you plant the crop? Assume the average number of days to harvest.

Grade 4: NS 3.1; MR 2.2; Grade 5: MR 2.2; Grade 6: NS 2.3

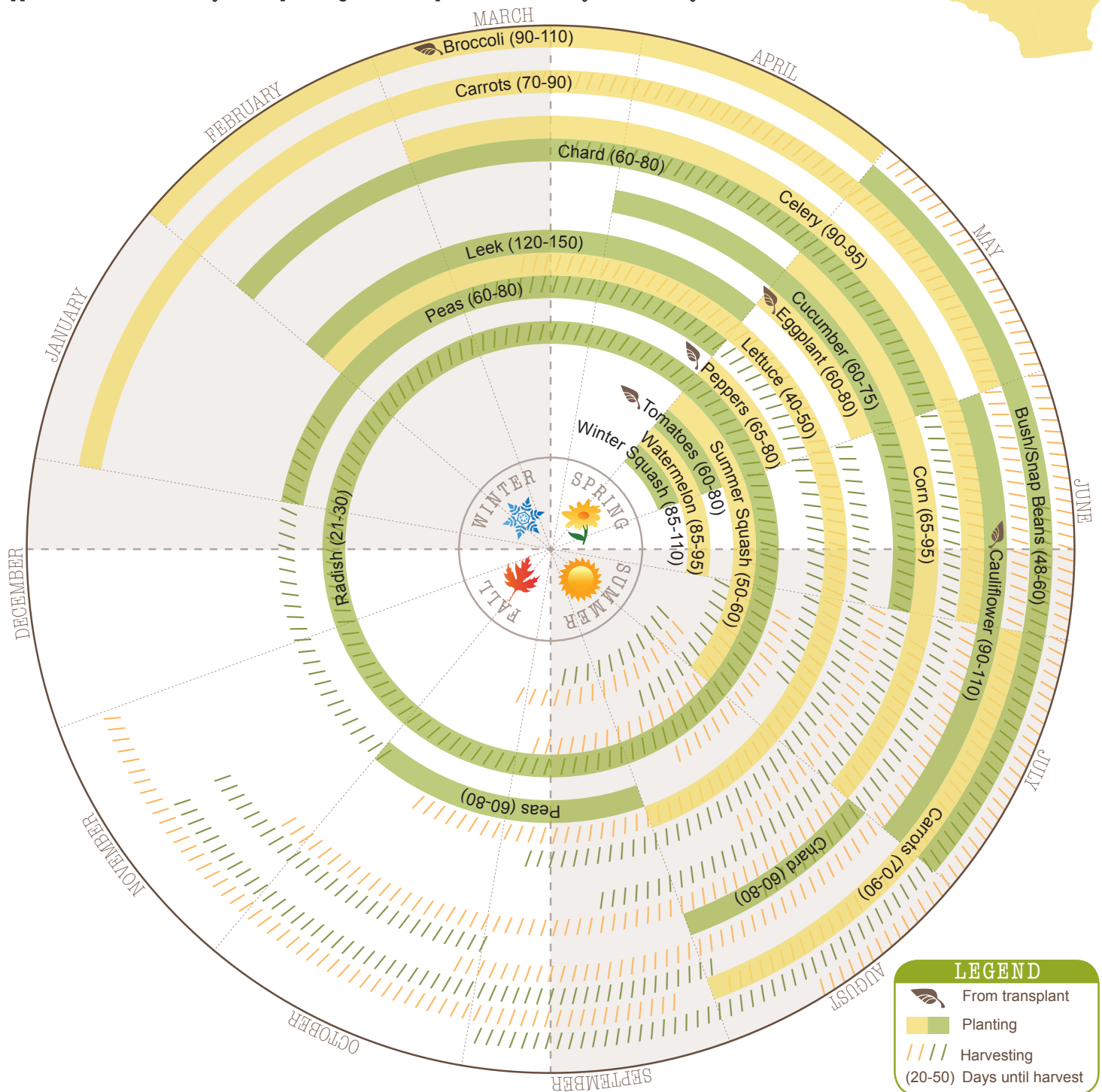
Grade 4: SDP 1.0, MR 2.3; Grade 5: SDP 1.2, MR 2.3; Grade 6: MR 2.4

CROP Circles

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REGION 3: NORTHERN/CENTRAL COAST



CROP Circles MATH ACTIVITIES

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- Using the information located on the CROP Circle, choose five different crops and determine the mean (average) number of days until harvest for each crop. Round your answer to the nearest whole number.

Example:

Radish (21-30 days until harvest)

$$\frac{21+30}{2} = 25.5 = 26$$

Grade 4: Number Sense (NS) 1.3; Mathematical Reasoning (MR) 1.0, 2.5; Grade 5: Statistics, Data Analysis and Probability (SDP) 1.1; MR 1.0, 2.5; Grade 6: SDP 1.1

- If you plant summer squash on June 30, on what approximate day can you plan to harvest? Assume the average number of days to harvest.

- If you want to harvest chard on November 1, approximately what day should you plant the crop? Assume the average number of days to harvest.

Grade 4: NS 3.1; MR 2.2; Grade 5: MR 2.2; Grade 6: NS 2.3

- Using the CROP Circle diagram as a guide, determine the number of months each crop can be planted out of the year. Represent your findings in the form of a decimal, fraction and percent.

Example:

Broccoli is planted in the months of February, March and April. You can plant broccoli three months out of the 12 months of the year.

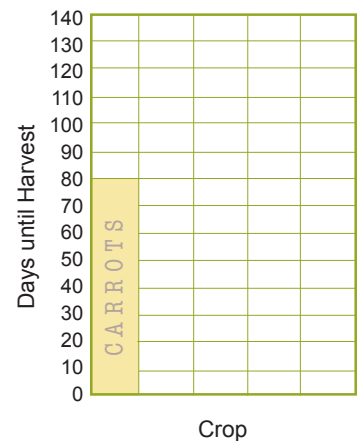
Decimal: .25 Fraction: $\frac{1}{4}$ Percentage: 25%

Grade 4: NS 1.6, 1.7, 3.2, 3.4; MR 2.3; Grade 5: NS 1.2; MR 2.3; Grade 6: NS 1.2; MR 2.4

- Which crop can you plant the most months of the year?

- The following table illustrates the mean (average) number of days it takes for several crops to reach maturity and be ready for harvest. Complete the chart and create a bar graph to represent your data.

Crop	Average Days to Harvest
Carrots	80
Leek	
Eggplant	
Celery	
Cauliflower	
Radish	



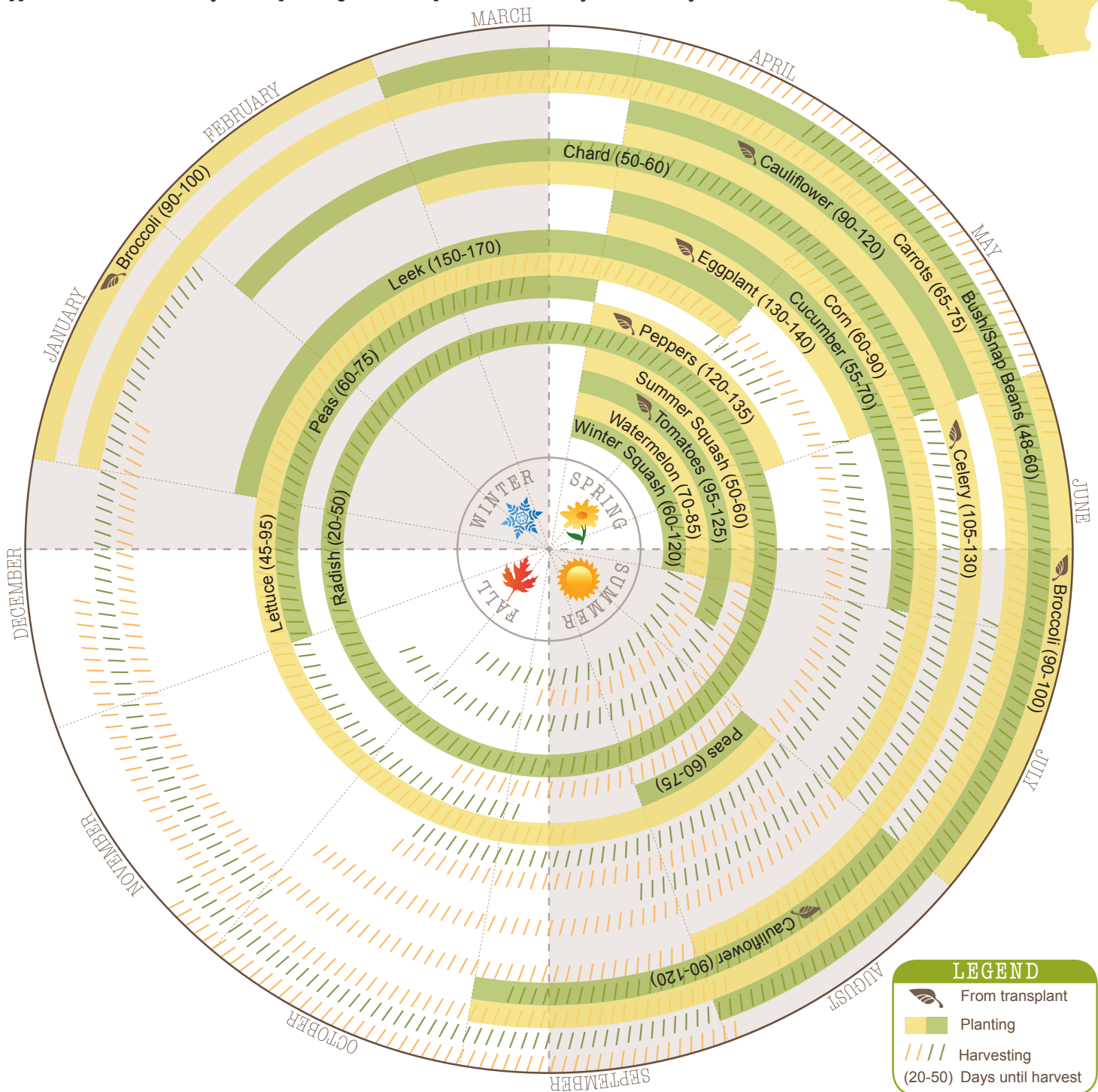
Grade 4: SDP 1.0, MR 2.3; Grade 5: SDP 1.2, MR 2.3; Grade 6: MR 2.4

CROP Circles

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REGION 4: SOUTHERN COAST



CROP Circles MATH ACTIVITIES

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- Using the information located on the CROP Circle, choose five different crops and determine the mean (average) number of days until harvest for each crop. Round your answer to the nearest whole number.

Example:

Radish (20-50 days until harvest)

$$\frac{20+50}{2} = 35$$

Grade 4: Number Sense (NS) 1.3; Mathematical Reasoning (MR) 1.0, 2.5; Grade 5: Statistics, Data Analysis and Probability (SDP) 1.1; MR 1.0, 2.5; Grade 6: SDP 1.1

- If you plant summer squash on June 30, on what approximate day can you plan to harvest? Assume the average number of days to harvest.

- If you want to harvest chard on May 10, approximately what day should you plant the crop? Assume the average number of days to harvest.

Grade 4: NS 3.1; MR 2.2; Grade 5: MR 2.2; Grade 6: NS 2.3

- Using the CROP Circle diagram as a guide, determine the number of months each crop can be planted out of the year. Represent your findings in the form of a decimal, fraction and percent.

Example:

Broccoli is planted in the months of January, February, June and July. You can plant broccoli four months out of the 12 months of the year.

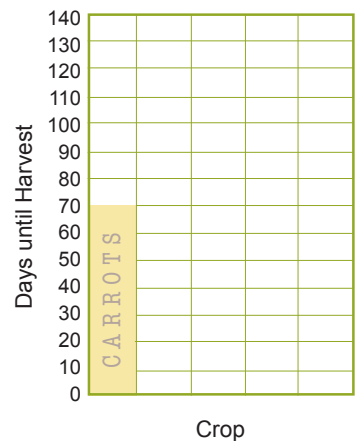
Decimal: .33 Fraction: $\frac{1}{3}$ Percentage: 33%

Grade 4: NS 1.6, 1.7, 3.2, 3.4; MR 2.3; Grade 5: NS 1.2; MR 2.3; Grade 6: NS 1.2; MR 2.4

- Which crop can you plant the most months of the year?

- The following table illustrates the mean (average) number of days it takes for several crops to reach maturity and be ready for harvest. Complete the chart and create a bar graph to represent your data.

Crop	Average Days to Harvest
Carrots	70
Leek	
Eggplant	
Celery	
Cauliflower	
Radish	



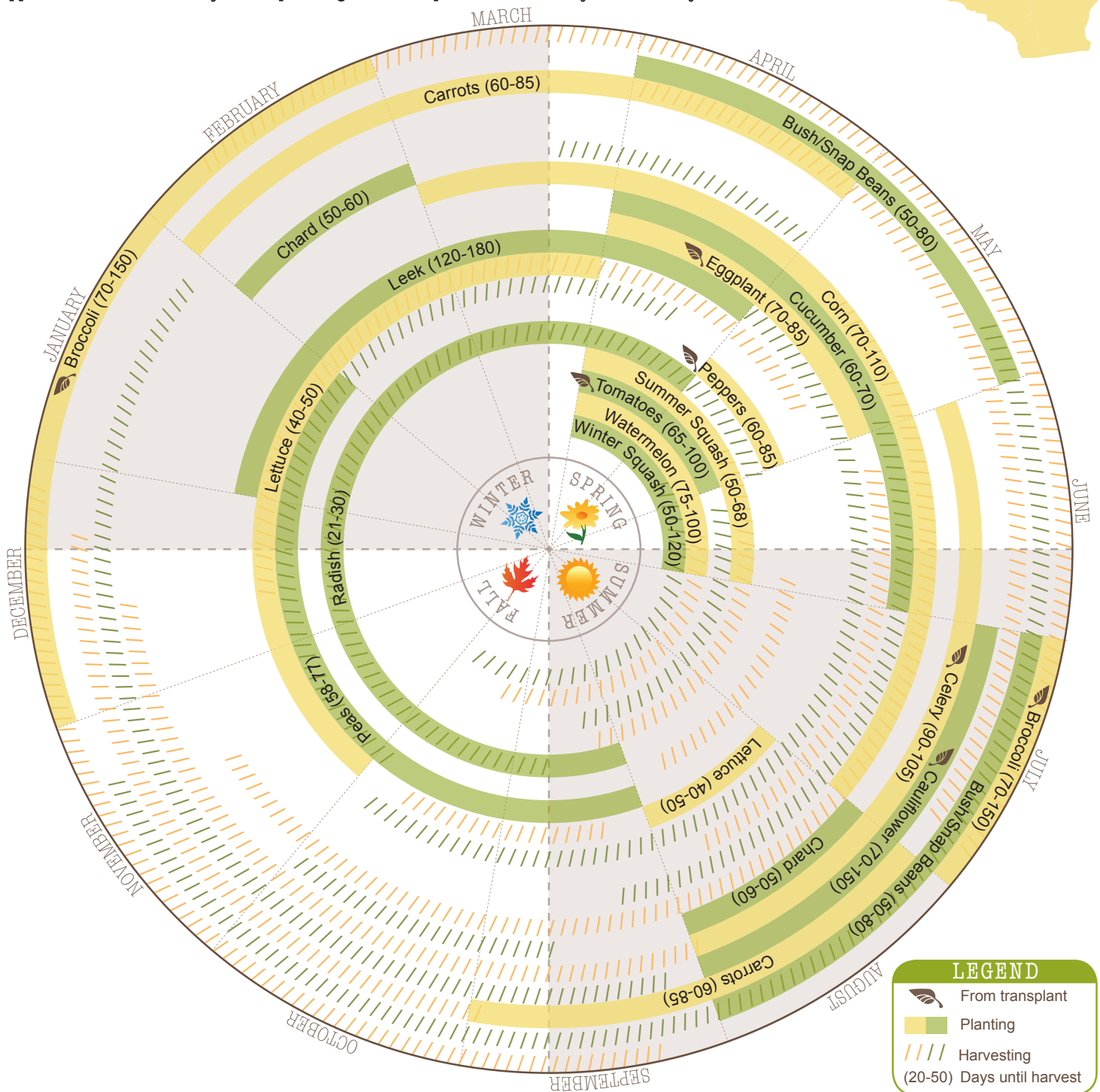
Grade 4: SDP 1.0, MR 2.3; Grade 5: SDP 1.2, MR 2.3; Grade 6: MR 2.4

CROP Circles

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REGION 5: CENTRAL VALLEY



CROP Circles MATH ACTIVITIES

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- Using the information located on the CROP Circle, choose five different crops and determine the mean (average) number of days until harvest for each crop. Round your answer to the nearest whole number.

Example:

Radish (21-30 days until harvest)

$$\frac{21+30}{2} = 25.5 = 26$$

Grade 4: Number Sense (NS) 1.3; Mathematical Reasoning (MR) 1.0, 2.5; Grade 5: Statistics, Data Analysis and Probability (SDP) 1.1; MR 1.0, 2.5; Grade 6: SDP 1.1

- If you plant summer squash on May 30, on what approximate day can you plan to harvest? Assume the average number of days to harvest.

- If you want to harvest cauliflower on November 1, approximately what day should you plant the crop? Assume the average number of days to harvest.

Grade 4: NS 3.1; MR 2.2; Grade 5: MR 2.2; Grade 6: NS 2.3

- Using the CROP Circle diagram as a guide, determine the number of months each crop can be planted out of the year. Represent your findings in the form of a decimal, fraction and percent.

Example:

Broccoli is planted in the months of January, February, July and December. You can plant broccoli four months out of the 12 months of the year.

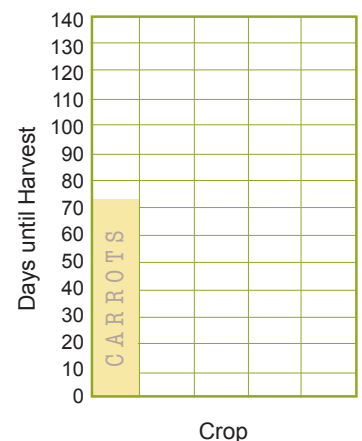
Decimal: .33 Fraction: $\frac{1}{3}$ Percentage: 33%

Grade 4: NS 1.6, 1.7, 3.2, 3.4; MR 2.3; Grade 5: NS 1.2; MR 2.3; Grade 6: NS 1.2; MR 2.4

- Which crop can you plant the most months of the year?

- The following table illustrates the mean (average) number of days it takes for several crops to reach maturity and be ready for harvest. Complete the chart and create a bar graph to represent your data.

Crop	Average Days to Harvest
Carrots	72.5
Leek	
Eggplant	
Celery	
Cauliflower	
Radish	



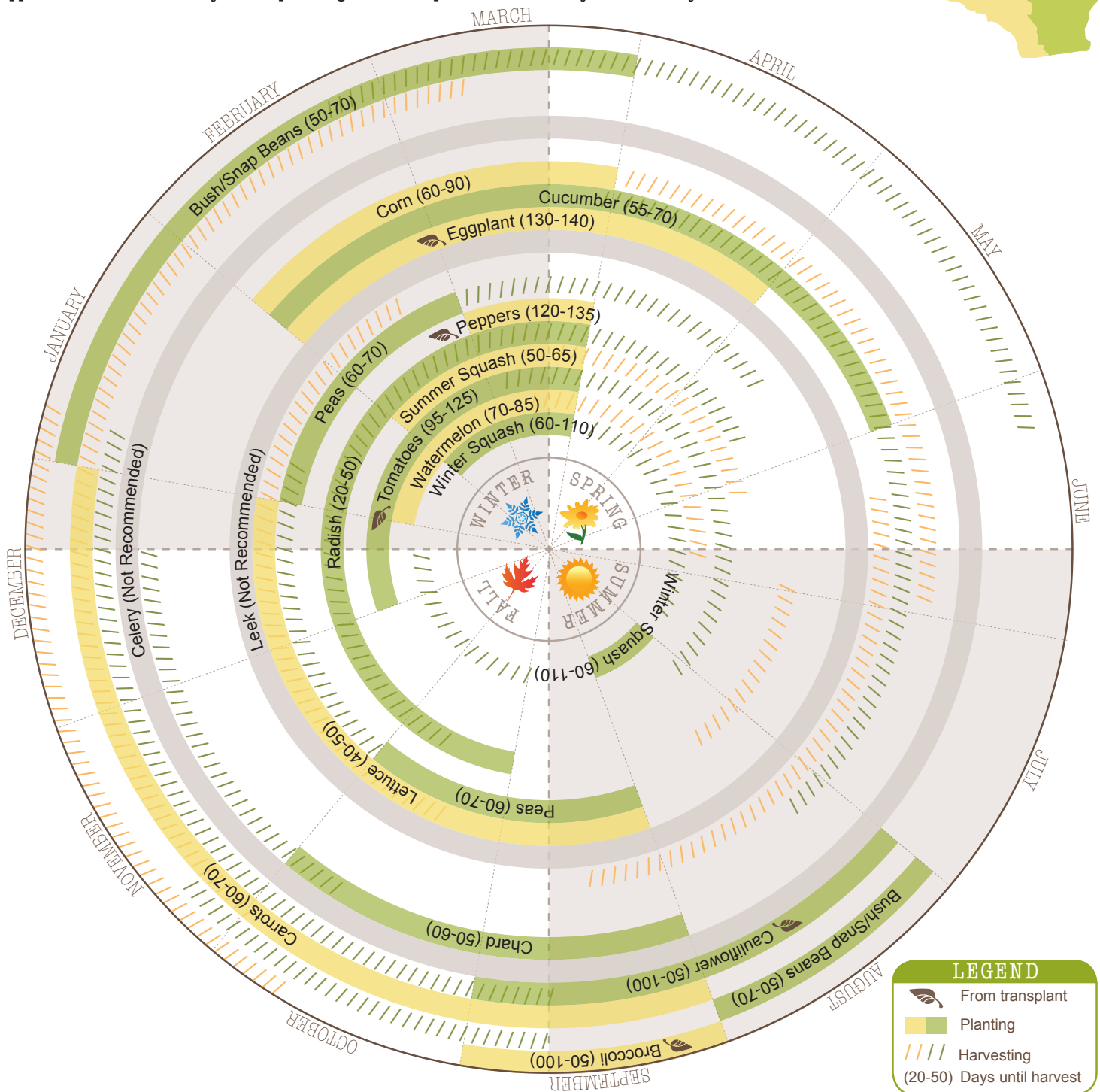
Grade 4: SDP 1.0, MR 2.3; Grade 5: SDP 1.2, MR 2.3; Grade 6: MR 2.4

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REGION 6: DESERT



CROP Circles

MATH ACTIVITIES

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- Using the information located on the CROP Circle, choose five different crops and determine the mean (average) number of days until harvest for each crop. Round your answer to the nearest whole number.

Example:

Radish (20-50 days until harvest)

$$\frac{20+50}{2} = 35$$

- Using the CROP Circle diagram as a guide, determine the number of months each crop can be planted out of the year. Represent your findings in the form of a decimal, fraction and percent.

Example:

Cauliflower is planted in the months of August and September. You can plant cauliflower two months out of the 12 months of the year.

Decimal: .17 Fraction: $\frac{1}{6}$ Percentage: 17%

- Which crop can you plant the most months of the year?

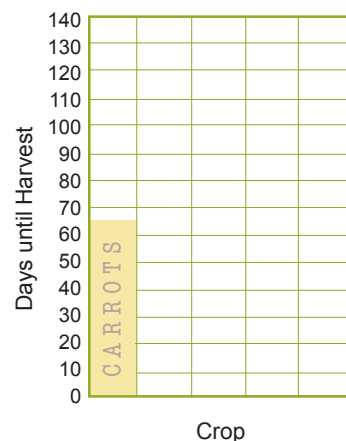
Grade 4: Number Sense (NS) 1.3; Mathematical Reasoning (MR) 1.0, 2.5; Grade 5: Statistics, Data Analysis and Probability (SDP) 1.1; MR 1.0, 2.5; Grade 6: SDP 1.1

Grade 4: NS 1.6, 1.7, 3.2, 3.4; MR 2.3; Grade 5: NS 1.2; MR 2.3; Grade 6: NS 1.2; MR 2.4

- If you plant summer squash on March 30, on what approximate day can you plan to harvest? Assume the average number of days to harvest.

- The following table illustrates the mean (average) number of days it takes for several crops to reach maturity and be ready for harvest. Complete the chart and create a bar graph to represent your data.

Crop	Average Days to Harvest
Carrots	65
Leek	
Eggplant	
Celery	
Cauliflower	
Radish	



- If you want to harvest chard on December 10, approximately what day should you plant the crop? Assume the average number of days to harvest.

Grade 4: NS 3.1; MR 2.2; Grade 5: MR 2.2; Grade 6: NS 2.3

Grade 4: SDP 1.0, MR 2.3; Grade 5: SDP 1.2, MR 2.3; Grade 6: MR 2.4



Desktop Gardens

Create a tiny garden for your students' desktop! Add small toys, rocks, labels or marbles to this oasis in a lid.

Grades 2-5

Preparing your garden plot

1. Take a clean lid from a peanut butter jar or use a plastic soup-cup lid.
2. Fit paper towel into lid, covering any tiny holes.
3. Moisten paper towel with water.
4. Sprinkle seeds on the area where you want growth to occur.
5. Cover the lid with a thick piece of cardboard or aluminum foil to block the light and allow seeds to germinate.
6. Check your garden every day until you see little shoots growing, then remove the cover. Be sure to keep the paper towel damp.
7. Once the seeds have sprouted, let them grow by regularly watering the desktop garden. Decorate with small cars, rocks, or even marbles.

Materials

- Clean lid
- Paper towel
- Seeds
- Aluminum foil or cardstock to block light
- Water

Tip

Use mustard seeds or cress seeds. They are speedy growers and will sprout anywhere as long as they are damp!

Watch Online!

See a video of this Ag-Bite at www.youtube.com/LearnAboutAg

Classroom Activities

Math

- Find out what percentage or fraction of each student's desk is covered by the garden plot.

English-Language Arts

- Have students keep a journal of the growth stages of the garden plot.
- Ask students to create a poem about their garden plot.
- Have students write a story about their plot and submit the top five stories from your class to the *Imagine this...* Story Writing Contest www.LearnAboutAg.org/imaginethis.

Science

- Create an experiment with the desktop gardens. Separate gardens into groups and see how they do with less water or more water, less light or more light. Compare growth of mustard seeds to tomato seeds.

California State Board of Education Content Standards

Grade 2

ELA: Writing 2.0, 2.1

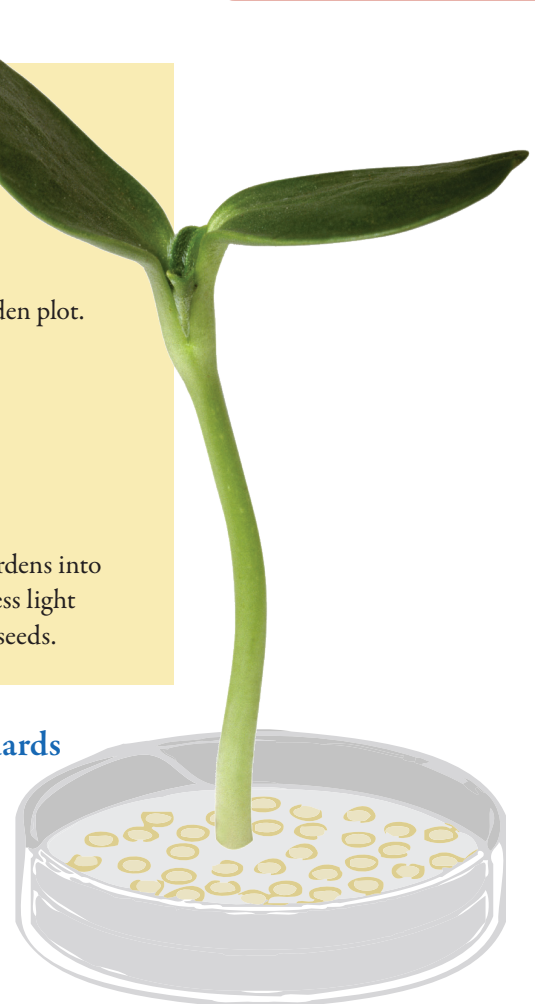
Grade 4

Math: Number Sense 1.0, 1.5, 1.7

Grade 5

Science: Life Sciences 2.f

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



Adapted from The Gardening Book by Jane Bull



Making Recycled Paper

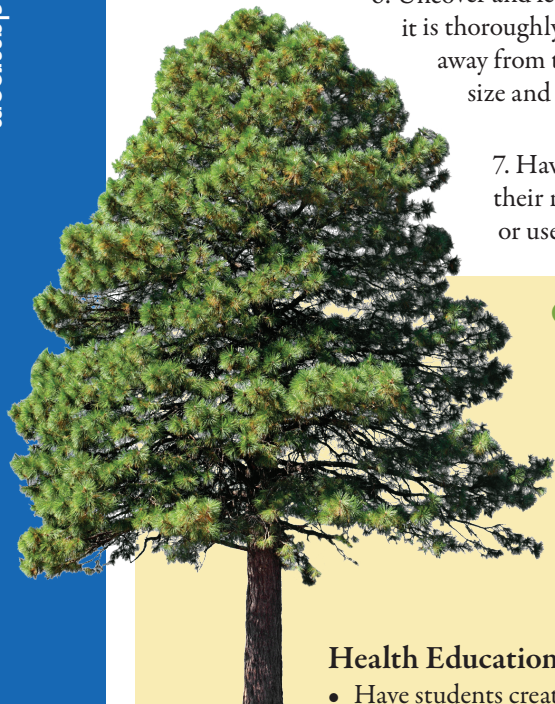
Create recycled paper—a forest product.

Grades K-3

Activity

1. Tear one or two pages of newspaper into small squares of one inch or less.
2. Put the paper chips into a large bowl and add three cups of water to it. Keep adding paper, tearing it and squeezing it, until the mixture looks like thick oatmeal.
3. With the pan turned upside down, place about one cup of the blended pulp over the bottom of the pan. Spread it with your fingers evenly across the entire area.
4. Lay several sheets of newspaper over the pulp, then carefully turn the pan over. Remove the pan. Your pulp square is now sitting on the newspaper.
5. Close the newspaper over the pulp. Using the rolling pin, roll over the newspaper to blot out the extra water.
6. Uncover and let the new paper dry completely. When it is thoroughly dry, peel your new recycled paper away from the newspaper. It can now be cut to any size and used to make a variety of things.

7. Have students make a greeting card out of their recycled paper. They can draw designs or use glitter and glue to write a message.



Materials

- Large square pan about three inches deep
- Large bowl
- Measuring cup
- Water
- A large section of newspaper
- Rolling pin

Tip

Recycle paper in your classroom and encourage students to recycle at home too!

Classroom Activities

English-Language Arts

- Have students write a message in the card using proper grammar, salutations, dates, etc.

Science

- Identify the parts of a tree and the nutrients needed for survival.
- Discuss the importance of trees, what they can be used for, and how they reproduce.

Health Education

- Have students create a skit, rhyme, or song about the importance of recycling.
- Have students bring items to class that can be reduced, recycled, and reused. Start a recycling program in your classroom.

California State Board of Education Content Standards

Kindergarten

Science: Life Sciences 2.c
Health Education: 1.5.P

Grade 1

Science: Life Sciences 2.b, 2.e
Health Education: 1.8.P

Grade 2

ELA: Writing 1.2, Written and Oral Conventions 1.4,
Capitalization 1.6

Science: Life Sciences 2.f

Grade 3

ELA: Sentence Structure 1.1, Grammar 1.2,
Spelling 1.8

Science: Life Sciences 3.a

Health Education: 1.6.P, 7.2.P

Did You Know?

The word paper comes from the Latin word "papyrus," named after the Egyptian reed from which paper was first made.

Adapted from "Forests Today, Tomorrow and Forever" by The Forest Foundation



Comparing Apples and... Earth?

Explore how much of the Earth's surface is needed for growing food for a world of people.

Activity

1. Hold up an apple to the class and tell the students that it represents Earth.
2. Slice the apple into fourths. Set aside three of the fourths, as they represent water on the Earth's surface.
3. Cut the remaining slice in half. Set aside one of the halves as uninhabited deserts, swamps and Arctic areas.
4. Divide the remaining piece into fourths. Set aside three of the pieces for land that is too rocky, wet, hot, or poor for crop production.
5. The remaining piece is $\frac{1}{32}$ of the original apple. Carefully, peel this section. Hold up the peel and explain that it represents the thin layer of soil that is available for producing all of the world's food crops.

Classroom Discussion

- What is the key message underlying the activity?
- What actions can students take to care for their patch of this precious Earth—as individuals, as a class and school, with their families, in their community?
- How are farmers stewards of the land?
- What is sustainability? Introduce the concepts without using the word itself, which can be difficult to define. Produce concept maps based on discussion.
- How do natural resource management, farming techniques, feeding the world, land care, and environmental management play a role in food production in California or your specific region?



Classroom Activities

History

- Research different farming practices used in the past and create a chart with the pros and cons of each one. Report your findings to the class.

English-Language Arts

- Have students journal about this activity, what they learned from the demonstration, and different ways they can take care of the Earth.

Visual and Performing Arts

- Create art stamps using different tools (paperclip, toothpick, popsicle stick) to make designs in the apple pieces. Mix paints to produce different colors and dip the stamps in paint to create art.
- Use the activity as a prompt or an example for students to produce a game, puzzle, poster or other means of delivering a similar message.

Grades 3-5

Materials

Enough for each student:

- Apple (or a paper cutout of an apple)
- Knife
- Chopping board or plates
- Paper towels or wet wipes

Tip

A demonstrator could cut one apple and students eat an approximate amount.

Watch Online!

See a video of this Ag-Bite at www.youtube.com/LearnAboutAg

California State Board of Education Content Standards

Grade 3

Math: Number Sense 3.1, 3.2;
Mathematical Reasoning 2.4, 3.1, 3.3
Science: Life Sciences 3b, 3c; Investigation and Experimentation 5c
History-Social Science: 3.1.1
Health Education: Nutrition and Physical Activity 7.2.P, 8.2.P

Grade 4

Math: Number Sense 1.5;
Mathematical Reasoning 2.3, 3.1, 3.3
Science: Life Sciences 3a; Earth Sciences 5a, 5b, 5c
History-Social Science: 1.3

Grade 5

Math: Mathematical Reasoning 3.1, 3.3
Science: Earth Sciences 3a, 3d
Health Education: Nutrition and Physical Activity 1.6.P, 6.1.P, 8.1.P

Adapted from materials by the Natural Resources Conservation Service



Tops or Bottoms

Encourage students to eat more fruits and vegetables by familiarizing them with the plant parts we eat.

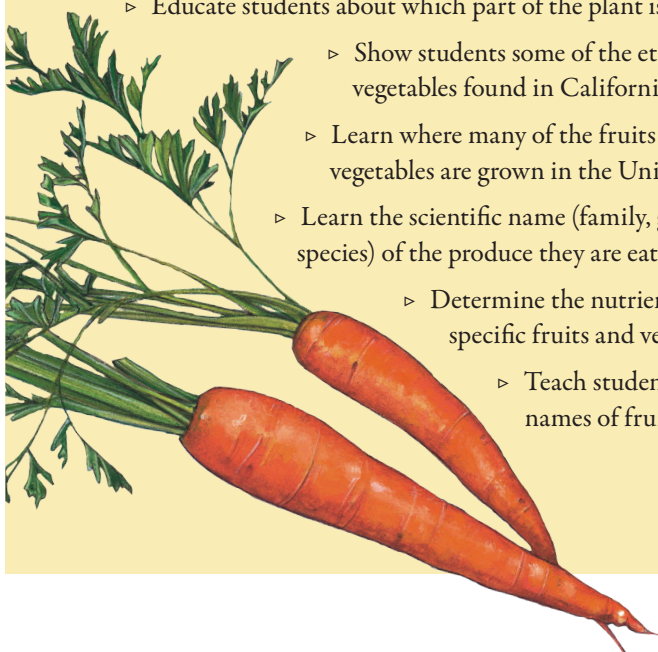
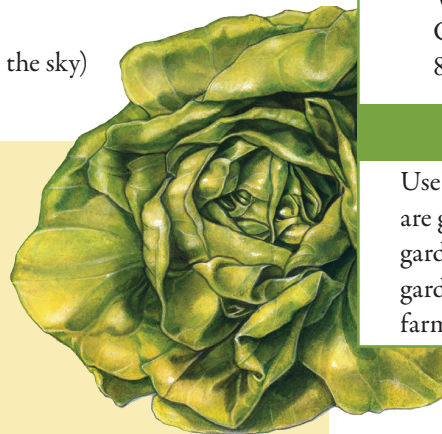
Grades K-3

Activity

1. Read the book "Tops and Bottoms" by Janet Stevens.
2. Have all of the fruits and vegetables from the book in a basket.
Discuss the fruits and the vegetables with the students.
3. As you pull random fruits and vegetables from the basket or grocery bag have students make the following gestures based on how the fruit or vegetable grows:
 - grows underground (touch their toes)
 - grows in the middle (crouch)
 - grow on top of the soil (stand tall with hands to the sky)

Classroom Activities

- Divide a piece of paper into TOP, MIDDLE, and BOTTOM. Brainstorm fruits and vegetables for each category.
- Define these plant parts: stem, roots, fruits, flowers.
- Use California Department of Education's Fresh Fruit and Vegetable Photo Cards to enhance the activity:
 - ▷ Distribute one card per student and instruct them to sort themselves based on plant part we eat, color, calories (highest to lowest), major producing states, or alphabetically.
 - ▷ Introduce students to some of the less well-known fruits and vegetables.
 - ▷ Educate students about which part of the plant is commonly eaten.
 - ▷ Show students some of the ethnic fruits and vegetables found in California markets.
 - ▷ Learn where many of the fruits and vegetables are grown in the United States.
 - ▷ Learn the scientific name (family, genus, species) of the produce they are eating.
 - ▷ Determine the nutrient analysis of specific fruits and vegetables.
 - ▷ Teach students the Spanish names of fruits and vegetables.



Materials

- Tops and Bottoms by Janet Stevens
ISBN 0-15-292861-0
- Grocery bag or basket
- Assortment of fruits and vegetables
- Photos of fruits and vegetables: Fresh Fruit and Vegetable Photo Cards, CDE Press ISBN 978-0-8011-1650-6 (optional)

Tip

Use fruits and vegetables that are growing in the school garden, from students' home gardens, or from a local farmers market.

California State Board of Education Content Standards

Kindergarten

ELA: Reading 1.1, 1.2, 1.3, 1.4, 1.5, 2.1, 2.2; Listening and Speaking 1.1, 1.2
Physical Education: 1.1, 1.4, 1.8, 3.1, 5.2, 5.4

Grade 1

ELA: Reading 1.1, 2.2; Listening and Speaking 1.1, 1.2, 1.3, 1.4, 1.5
Physical Education: 2.2, 3.1, 5.1, 5.2, 5.6

Grade 2

ELA: Reading 2.2, 2.4, 3.1; Listening and Speaking 1.1, 1.2, 1.3, 1.4, 1.6, 1.8, 2.1
Physical Education: 1.2, 5.1, 5.2

Grade 3

ELA: Reading 1.5, 2.3, 2.4, 2.5, 3.3, 3.4; Listening and Speaking 1.1, 1.3



Tasty Testing

Investigate what influences your decision about what you buy to eat.

Grades 9-12

Preparing Taste Test

1. Explain that consumers make decisions that are influenced by a variety of criteria including appearance, taste, advertising, and cost.
2. Brainstorm a list of criteria that would make a good pear (size, color, variety, taste, texture). Have students vote for which criteria they think is most important.
3. Prepare the pears for the taste test by cutting enough for each student to taste each variety. Serve immediately or treat with lemon juice to prevent browning.
5. Place each pear variety (3-5) on a separate numbered plate.
6. Have students taste each pear and rank them based upon the criteria they determined was the most important.
7. Discuss the results from the taste test.

Materials

- Three to five different kinds of pears
- Small cups for sampling
- Chart paper to collect brainstormed criteria
- Sticky dots or markers for voting

Tip

Try taste tests using other products.

Classroom Activities

English-Language Arts

- Write a new advertising jingle for the winning product highlighting the criteria.
- Conduct a market test and write an article with artwork for a consumer report that explains the results.
- Research the career of a marketer. How do these professionals help producers and consumers? Interview someone who has a marketing job.
- If students have a hard time determining what is the most important criteria for the taste tests, have a classroom debate to decide which is the most important.

Nutrition and Physical Activity

- Create a 30-second commercial highlighting the product and present it to the class.
- Create a marketing plan, including packaging and target audience.



California State Board of Education Content Standards

Grades 9-10

ELA: Writing: 1.3, 1.4

Grades 9-12

Nutrition and Physical Activity: 2.1.N

Grades 10-11

ELA: Listening and Speaking 1.1

Grades 12

History-Social Science: Economics 12.2, 12.3

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



Asparagus

Encourage students to explore asparagus production in California.

Grades 4-6

Activity

Asparagus is one of the few perennial vegetables grown in California. As a perennial, asparagus plants will produce spears year after year. Asparagus has a short 90-day growing season and is primarily grown in California's Central Valley, Salinas Valley, and Delta. California asparagus can be purchased at grocery stores, farmers markets, and produce stands in different sizes: standard ($\frac{5}{16}$), large ($\frac{7}{16}$), extra large ($\frac{10}{16}$), and jumbo ($\frac{13}{16}$). The asparagus plant produces all sizes all season long. Contrary to popular belief, the thicker spears are more tender. Tenderness also relates to color—the more green, the more tender. The following activity will introduce students to the size scale used to sort asparagus prior to shipping it in the grocery store.

Measuring Asparagus

1. Have students research the origin of asparagus and identify its growing region on a map of California.
2. To determine the size, asparagus is measured one inch above the bottom of the stem. Collect various sizes of fresh asparagus, or download the measuring worksheet from www.LearnAboutAg.org/agbites/asparagus.
3. Determine the diameter, circumference, and radius of each asparagus spear. Identify if the size is standard, large, extra large, or jumbo.
4. Have students create an infographic to represent their findings.

Materials

- California-grown asparagus in various sizes or measuring worksheet from www.LearnAboutAg.org/agbites/asparagus
- California map
- Ruler

Tip

Ask a local produce specialist to be a guest speaker and talk to the students about asparagus.

Classroom Activities

Science

- Compare and contrast the appearance, growing methods, and market for white and green asparagus. Display the information in a graphic organizer.

English-Language Arts

- Learn about the history of asparagus production, investigating where it was first cultivated and how it arrived in California. Use online tools to create a digital timeline. Share your timeline in an oral presentation.
- Identify and learn more about the costs and benefits of asparagus production. Write a market report that include predictions for future production and value. Cite evidence to support your predictions.



California State Board of Education Content Standards

Grade 4

Math: Measurement and Geometry 3.2;
Mathematical Reasoning 1.2, 2.3
History-Social Science: 4.1.1, 4.1.5

Grade 5

Math: Mathematical Reasoning 1.2, 2.3

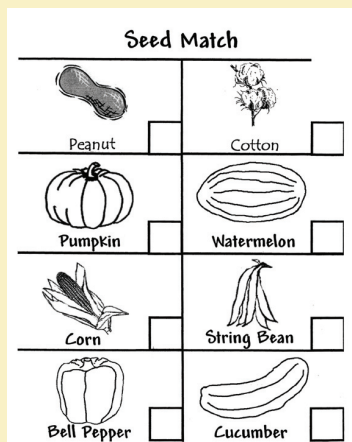
Grade 6

Math: Measurement and Geometry 1.1, 1.2, 1.3;
Mathematical Reasoning 1.1

Seed Match

Make one copy of the seed match worksheet for each student. Create your own based on the model or download from www.LearnAboutAg.org/seedmatch.

1. Have students look at the commodities on the worksheet. Discuss the name of each, determine how each one is part of a healthy diet or used in daily life.
2. Present students with corresponding seeds in an egg carton or sorting box. Discuss the size, shape and appearance of each seed.
3. Challenge students to select seeds from the sorter and place each seed on the picture of the commodity to which it corresponds.
4. Cut or break open each whole commodity and locate the seeds within. Allow students to make corrections on the worksheets by moving seeds.
5. Have students glue seeds in correct locations on their worksheets and color each commodity correctly.



Objective:

Students will understand that the fruits and vegetables we eat and many materials we use come from flowering plants, and that all flowering plants begin as seeds.

California State Board of Education Content Standards

Grade 1: Science: 2a, 2b, 2c, 2e, 4a, 4b

ELA: Listening and speaking 1.o

Grade 2: Science: 2a, 2f, 4c

ELA: Listening and speaking 1.o

Grade 3: Science: 3a, 5d

ELA: Listening and speaking 1.o

This lesson can be easily adapted to meet the educational standards for a variety of grade levels. You can also incorporate these seeds into math lessons!

Other questions: Does it have a scent? What does it sound like when I shake it in a cup?

This lesson has been adapted from California Foundation for Agriculture in the Classroom curriculum. For additional educational resources, visit www.LearnAboutAg.org.

1 UNDERSTANDING HOW PLANTS BEGIN AS SEEDS

Materials:

- Seed Match worksheet
- Commodities depicted on worksheet
- Seeds from selected commodities
- Egg carton or sorting box
- Crayons or markers
- Glue

Vocabulary:

Help your students brainstorm adjectives to describe seed characteristics.

Coat: smooth, rough, dry, wet, spiky, soft, hard, sticky, etc.

Color: dark, light, black, brown, white, tan, grey, etc.

Shape: oval, round, teardrop, etc.

Size: small, medium, large, inches, centimeters, compare to size of a coin, a pencil's eraser, a water drop, etc.

My Life as a Fruit or Vegetable

1. Explain to students that the goal of this activity is to write a fictional, creative story about life as a fruit or vegetable from the farm to the table.
2. Brainstorm with the class a list of questions that students will need to answer as they write their story about the production and development of a specific produce item. Questions might include: How am I planted? Where am I grown and why? How am I harvested? How am I transported? What good things (nutrients) can I offer? How am I prepared/cooked?
3. Ask each student to select a different fruit or vegetable that will be the main character or theme of their story.
4. Instruct students to use the county statistical data from CDFA, the list of questions brainstormed by the class and other resources to create a rough draft. The story should be written in first person narrative, with the fruit or vegetable telling the story.
5. Instruct students to edit each other's work. Students can be assessed on the editing as well as the writing part of the lesson.
6. Have students write final drafts of their stories. The final versions can also include illustrations, a title page and publisher and copyright information. Use this assignment when school starts and submit the top five stories from your class to the *Imagine this...* Story Writing Contest. Visit www.LearnAboutAg.org for contest details.

Objective:

Enhance your students' writing skills while they learn about the production and distribution of California produce. The writing process will include brainstorming, writing rough drafts, peer editing, and illustrating.

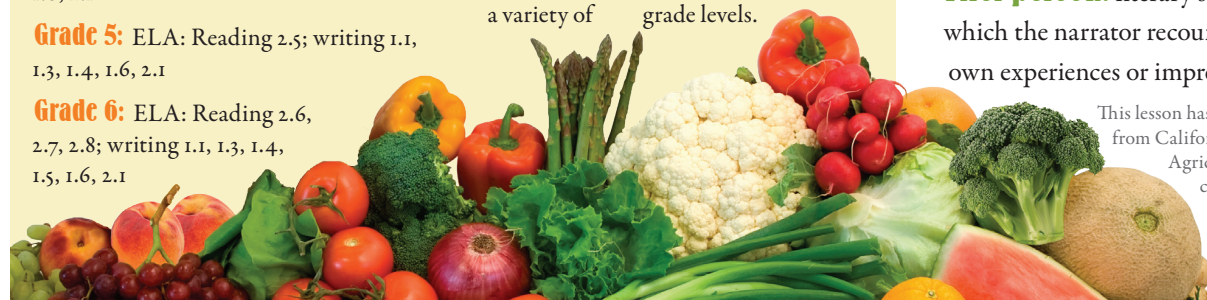
California State Board of Education Content Standards

Grade 4: ELA: Reading 2.2, 2.5; writing 1.0, 2.1

Grade 5: ELA: Reading 2.5; writing 1.1, 1.3, 1.4, 1.6, 2.1

Grade 6: ELA: Reading 2.6, 2.7, 2.8; writing 1.1, 1.3, 1.4, 1.5, 1.6, 2.1

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



2 FOLLOWING FOOD FROM FARM TO FORK

Materials:

- County statistical data from CDFA www.cdifa.ca.gov/statistics.html
- Fresh produce resources: books, magazines, articles and encyclopedias
- California Produces map www.LearnAboutAg.org/caproduces
- Writing paper
- Pens or pencils
- Blank paper for illustrations
- Butcher or chart paper
- Commodity fact and activity sheets www.LearnAboutAg.org/factsheets

Vocabulary:

CDFA: the California Department of Food and Agriculture is responsible for ensuring the state's food safety, the protection of the state's agriculture from invasive species, and promoting the California agricultural industry.

Commodity: article of trade or commerce, especially an agricultural product that can be processed and resold.

First person: literary style in which the narrator recounts his or her own experiences or impressions.

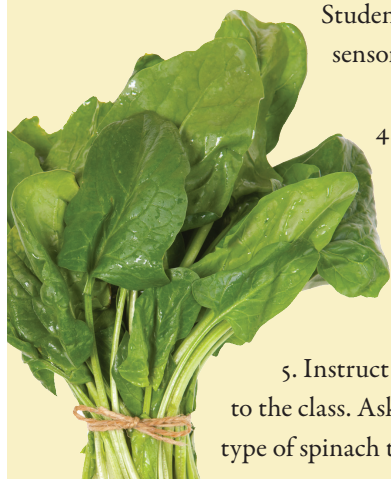
This lesson has been adapted from California Foundation for Agriculture in the Classroom curriculum. For additional educational resources, visit www.LearnAboutAg.org.

Frozen, Canned or Fresh?

Cook three different kinds of spinach. The fresh spinach should be well washed, drained and cooked. Give each student group an equal share of frozen, canned and fresh spinach.

1. Show students a package of frozen spinach, a can of spinach and a bunch of fresh spinach. Discuss the nutritional value of spinach. Explain that each group will design an experiment that will examine the visual appearance, taste, texture and smell of all three types of spinach.
2. Brainstorm with the class possible methods of observing and recording the different features of the spinach. Set clear objectives for the experiments, such as experimental design, time restraints and data organization. Allow students time to develop their plan.
3. Have students present their plan to you (and/or the class) for approval. Provide feedback for each group and allow students to revise their plan.

Students shall wash their hands, conduct their sensory experiments and record observations.



4. Ask students what conclusions they can make based on the information they gathered. Discuss with the class different ways to present the information. Students create graphs and charts to represent their findings.

5. Instruct groups to present their findings to the class. Ask students to explain which type of spinach they liked best and why.

Objective:

Students will design an experiment to compare the flavors and textures of spinach, interpreting their findings with charts and graphs.

California State Board of Education Content Standards

Grade 4: Science: 6a, 6c
Math: Statistics data analysis and probability 1.1, mathematical reasoning 1.0
Health Education: 2.1.N, 5.1.N

Grade 5: Science: 6c, 6g
Math: Statistics data analysis and probability 1.2, mathematical reasoning 1.0
Health Education: 5.1.N

Grade 6: Science: 7b, 6d
Math: Mathematical reasoning 1.0

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



TASTING AND TESTING THE HARVEST

Materials:

- 3 frozen packages of spinach
- 3 cans spinach
- 3 bunches fresh spinach
- 3 medium-sized pots
- Hot plate
- Water
- Forks
- Plates
- Napkins

Vocabulary:

Encourage students to use these words when making observations.

Aftertaste: the persistence of a sensation of flavors when food is no longer present.

Mouthfeel: food's physical and chemical interaction in the mouth, used often in the testing and evaluating of foodstuffs.

Pungent: having a strong odor that stings the nose, especially in acidic or spicy substances.

Vibrant: of bright color.

This lesson has been adapted from California Department of Education curriculum by California Foundation for Agriculture in the Classroom. For additional educational resources, visit www.cde.ca.gov. Duplication for educational uses only.

Six of One, Half Dozen of the Other

On the bottom of each egg carton, write two adjectives. One should be a likely quality of a garden object, such as “wet.” The other should be the opposite (“dry”). Use a variety of words that will encourage students to use their senses, such as dark/light, rough/smooth, scented/unscented, etc.

1. Ask the class what senses can be used to explore opposites in the garden. Ask students to share examples of opposites. Explain that in a few moments, they will be searching for objects that have a specific quality and those that have the opposite quality.
2. Divide the class into groups of three. Tell the class that each group will get a container for collecting 12 items. They should not let any other group see the secret information on the bottom of the carton.
3. Distribute the cartons and demonstrate to each group how the opposites will be placed, with six of each category in a long row. On the bottom of the carton are secret words that describe what kind of objects to collect. Each group will be collecting different opposites.
4. Remind students to handle everything gently and take only small specimens. Allow enough time for students to explore the site and gather objects.
5. When groups are finished, have them exchange cartons and determine the opposite adjectives the other groups collected without looking on the bottom of the carton.
6. Discuss strategies groups used to identify the other groups' classification. Ask each group to share how they used their senses during this activity.

Objective: Students will use their senses to identify and classify objects in the garden laboratory.

California State Board of Education Content Standards

Grade 1: Science: 1a, 2a
Math: Statistics, data analysis, and probability 1.1

Grade 2: Science: 2d, 4a, 4c, 4g

Grade 3: Science: 5c
Math: Measurement and geometry 1.1

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



GATHERING,
GROUPING AND
GUESSING GARDEN
OBJECTS

Materials:

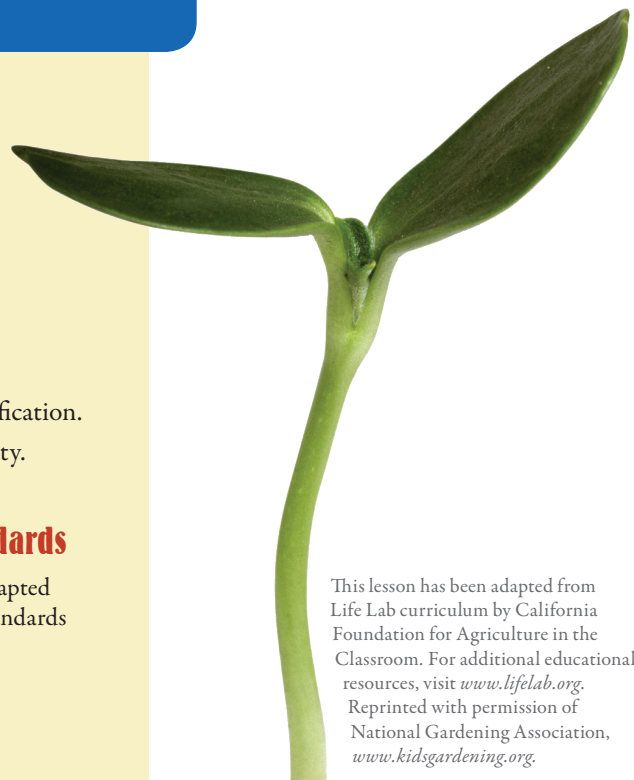
- One egg carton for each group of three

Vocabulary:

Adjective: the part of speech used to limit or describe the noun or pronoun it modifies, as in “wet” leaf.

Classification: the act of distributing things into classes or categories of the same type.

Specimen: a sample, especially one used for diagnostic analysis.



This lesson has been adapted from Life Lab curriculum by California Foundation for Agriculture in the Classroom. For additional educational resources, visit www.lifelab.org. Reprinted with permission of National Gardening Association, www.kidsgardening.org.

California Crops

Use grocery advertisements to find, cut out and laminate 15 different California grown commodities. Place a strip of double-sided tape on the back of each photo.

1. Show students a large map of California. Explain that each commodity grown in California has unique needs and grows best in certain regions of the state. Have the students locate where they live and determine what products are grown locally. Discuss how climate, water and soil affect an area's agricultural growing capacity.
2. Distribute laminated photos of California grown commodities to student pairs. Instruct students to work together to determine where the commodity is produced and why. Ask students to approach the map in pairs and place the commodity where they think it is grown. Use the California Produces map to locate the correct growing areas.
3. Have each student select one fruit or vegetable and write a formal business letter to a corresponding agricultural commodity board. Prior to writing the letter, brainstorm with the class a list of information they wish to obtain from the activity. This list may include questions about production, distribution, harvest, growing locations and conditions, nutritional benefits and economic value of the crop.
4. Mail the letters. Challenge students to use the information received from agricultural commodity boards to assemble a written report. Encourage students to use quotes or paraphrase information from various sources and give credit to all references.

Objective:

Students will appreciate California as a major agricultural state, gather production information about one California grown commodity and create a written report.

California State Board of Education Content Standards

Grade 4: Science: 3b

ELA: Reading 2.2, 2.5; writing 1.1, 1.2, 1.4, 1.5, 1.7, 1.10, 2.3, written and oral language conventions 1.0

History-Social Science: 4.1.3, 4.1.5

Grade 5: ELA: Reading 2.1; writing 1.1, 1.3, 1.6; written and oral language conventions 1.0

Grade 6: Science 5c

ELA: Reading 2.1; writing 1.1, 1.2, 1.4, 1.6, 2.3; written and oral language conventions 1.0

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

10

DISCOVERING
WHAT GROWS
WHERE IN THE
GOLDEN STATE

Materials:

- Large wall map of California
- Reference books on fruits and vegetables
- Commodity cut-outs
- Double-sided tape
- California Produces map
www.cfaifc.org/caproduces

Vocabulary:

Climate: the long-term average weather of a region including typical weather patterns, the frequency and intensity of storms, cold spells and heat waves.

Distribution: the commercial activity of transporting and selling goods from a producer to a consumer.

Economic Value:

the amount of profit received for a specific good and its impact on the surrounding economy.



California is the #1 agriculture producing state in the nation.

This lesson has been adapted from California Foundation for Agriculture in the Classroom curriculum. For additional educational resources, visit www.LearnAboutAg.org.

Busy Bees

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



1. Write the following journal prompt on the board: "Do you think bees are helpful or harmful? Describe." After students brainstorm and write their answers down, ask them to share with the class.
2. Distribute green paper plates and craft supplies. Instruct students to illustrate and narrate the pollination cycle of bees on the paper plates. Use yellow pom-poms to depict the bee. Each quadrant of the plate should explain a different step of the pollination cycle:
 - a. The bee is looking for food.
 - b. The bee lands on the flower and sips the nectar. Pollen gets stuck on its body.
 - c. The bee flies away, looking for more food.
 - d. The bee lands on a new flower with pollen from the last flower. The pollen is transferred.
3. Use brown construction paper to create a tree trunk. Attach to the bottom of the plate with tape.
4. Ask each student to explain the pollination story to a partner using their completed visual aid.

Objective:

Students will identify each step of the pollination cycle and appreciate the importance of bees in agriculture production.

California State Board of Education Content Standards

Grade 1: Science: 2a, 2b
ELA: Listening and speaking 1.0

Grade 2: Science: 2f, 3e
ELA: Listening and speaking 1.0

Grade 3: Science: 3a
ELA: Listening and speaking 1.0

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

11

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 reward 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 www.agintheclass.org.

Why Teach About Food Safety?

Americans enjoy the safest food supply in the world, yet the most common intestinal ailments in the United States are caused by foodborne illnesses. How can this be?

Food Handling Is The Key!

This unit provides fifth through seventh graders a better understanding of food safety through real-life examples and enjoyable activities. They learn that everyone has a responsibility in minimizing foodborne illnesses—farmers, transporters, restaurants, grocery stores... and the consumer! Through reading, games, puzzles, math problems and science investigations, participants identify the roles each one of us plays to ensure the food we enjoy is safe to eat.

The majority of foodborne illnesses associated with fresh fruits and vegetables is due to improper food handling at the foodservice or consumer level.

Food gathering and preparation have changed over time. Americans have gone from growing and preparing their own food to enjoying convenience foods grown by a fewer number of farmers and prepared by someone other than themselves. Thus food safety practices are important in every stage of food production, preparation, and consumption. Here are a few examples of food safety practices from each area.

The Farm

Good Agricultural Practices have been developed jointly by the agricultural industry and government. These provide guidelines that reinforce already stringent laws governing food safety on U.S. farms.

A small percentage of foodborne illness outbreaks can be traced back to the growing, packing, shipping, or processing of fruits and vegetables.

The Food Handlers

Grocery stores, transportation companies, storage facilities and restaurants have food safety rules and require employees to abide by them. Stringent regulations imposed by national, state and local governments, based on sound science, ultimately benefit the consumer.

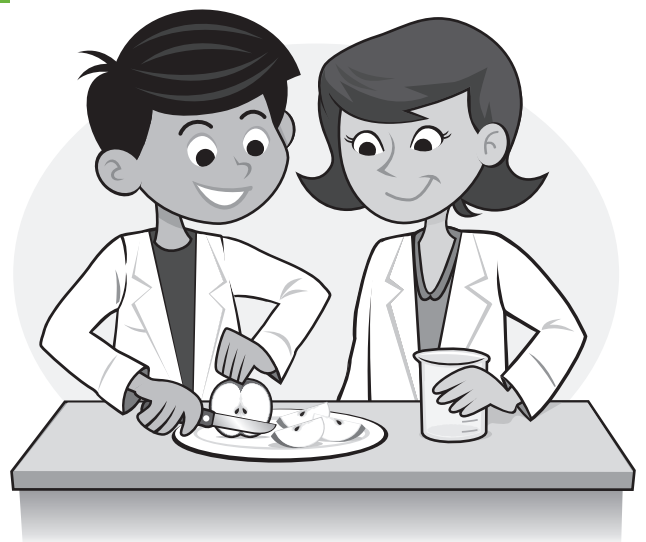
Did you know? It is common to find bacteria on produce, but this bacteria is not harmful to people.

The Consumer

This educational guide is part of a consumer food safety education program. The consumer, the person who eats the food, is responsible for making sure that the food is prepared and stored properly. This is crucial since most foodborne illness outbreaks are associated with improper handling at the restaurant or home.

So take a look through the guide. See how you can use it to teach your students about foodborne illnesses and reduce the number of foodborne illness incidents. At the same time your class will practice reading and writing, investigate and experiment, apply math to real situations, and practice thinking critically about a topic that impacts all of us daily—food safety!

Nutrition! Throughout the lessons, discuss the importance of eating right. The human body has natural defense mechanisms that work best when we eat right, get plenty of exercise, drink lots of water and get enough sleep!

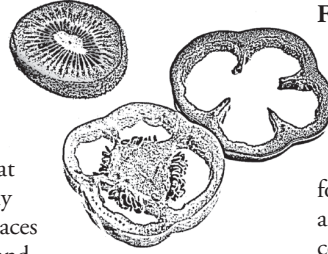


What's All the Talk About Food Safety?

Did you ever have an upset stomach or something that people call the 24-hour flu? If your symptoms lasted less than a day, chances are your brief illness was caused by a foodborne illness. You will learn about ways you can minimize the number of foodborne incidents you have in your lifetime.

What is a foodborne illness?

A **foodborne illness** is a disease that is carried to animals or humans by food. Foodborne illnesses are caused by microorganisms such as bacteria. Not all bacteria cause disease in humans. Those that do are called **pathogens**. They grow rapidly when conditions are right—dark, damp places where temperatures range between 40° F and 140° F. Any type of food can be a source of a foodborne illness; however, high protein foods are responsible for most of them. Examples include milk and milk products, eggs, meats, poultry, fish, seafood, and soy protein food such as tofu.



What is food safety ?

Food safety is the practice of making sure that people have the healthful food they need for an active, healthy lifestyle. Some foods, particularly fresh fruits and vegetables, are not cooked before we eat them. These foods must be handled correctly to make sure they are safe to eat. The Centers for Disease Control reports the majority of foodborne illnesses associated with fresh fruits and vegetables are due to improper food handling at the foodservice or consumer level. They are contaminated with pathogens and then not cooked or stored properly. Since you handle food, you can do your part to keep your food safe.

What is a microorganism?

Microorganisms, also known as microbes, are single-celled organisms so tiny that millions of them can fit between the eye of a needle. Individually, they can only be seen with a microscope. Colonies of microorganisms, such as mold on bread, may be visible with the eye alone. Common microbes associated with foodborne illnesses are bacteria.



Who is responsible?

All people have a personal responsibility to keep food safe.

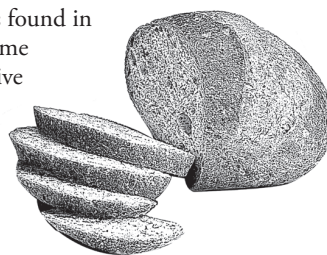
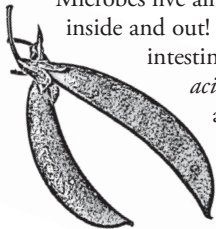
Farmers are the first people responsible for producing healthful food. They must know how to plant, cultivate, irrigate, harvest, and store the food so that the final product is safe for the consumer. Farmers are responsible for making sure that the people involved in their operations follow the guidelines established by the United States Department of Agriculture (USDA). In the 1990s, the agricultural industry adopted some guidelines called GAPs—Good Agricultural Practices—that keep food safe at the farm level.

People who pack, process and transport food must make sure that food is kept at proper temperatures, and handled and washed appropriately. Storage facilities must be kept clean. Grocers and those who prepare and serve food at restaurants are responsible for using proper food safety procedures. You, the at-home consumer, must do your part too! It requires teamwork.



Beneficial Microbes

Microbes live almost everywhere! In fact, you are covered with microbes inside and out! Your mouth contains more than 600 kinds! Your large intestine contains *Escherichia coli*, a bacterium. *Lactobacillus acidophilus* turns milk into yogurt. *Saccharomyces cerevisiae*, also known as yeast, makes bread rise. *Bacillus thuringiensis* (Bt), a natural pesticide, is found in the soil and is used by farmers and home gardeners. Rhizobia are bacteria that live in the nodules of some plant roots, such as beans and alfalfa, and convert nitrogen into a form plants can use. Without microbes to decompose things, the world would be covered with waste. In fact, Earth as we know it would not exist!



Bacteria Out of Control!

Under certain conditions, a bacterium can double in population every 10 to 30 minutes—usually in warm, damp and dark places. People can get sick when they eat foods that have been contaminated by harmful bacteria. *Salmonella* and *E. Coli* are common bacteria that cause foodborne illnesses. Seems funny that one form of *E. Coli* is inside our gut, but if we eat another form, it can make us sick. That's strange but true!

Since pathogens can live almost anywhere, it is important to clean, separate, chill, and cook your food properly... and then eat it in a timely manner.



Playing it Safe

The "Good" Guys

Microbes live almost everywhere and while some are harmful, many make life easier. Without microbes to decompose material, the world would be covered with waste!

Saccharomyces cerevisiae (sack-a-roe-MY-seas sair-a-VIS-e-eye), also known as yeast, makes bread rise.

Bacillus thuringiensis (bah-SIL-lus thoo-RIN-jee-en-sis) is a natural pesticide found in the soil.

Lactobacillus acidophilus (lack-toe-bah-SIL-lus a-sid-OF-ill-us) turns milk into yogurt.

Standards: Science-Grade 3: 3c; Grade 4: 4d

Career Highlight

Name: Rodney Taylor
Career: School nutrition services director
Highest degree: B.S. in public administration
Skills: My love for reading, cultivated by excellent English teachers, has allowed me to expand my horizons in seeking greater educational opportunities. Today, my education and passion for nutritious foods helps me bring fresh, safe and healthy foods into school cafeterias.



In the Garden

Q: It's harvest time in the garden! As I walk through the vegetable plot, I pick a cherry tomato. Should I eat it?

A: Yes, and wash it first! Wash all fruits and vegetables thoroughly before eating to remove soil, organisms and other matter. Microorganisms, also known as microbes, are tiny organisms that can be beneficial or harmful. "Bad microbes" can make us sick.



At Home

Q: At a family picnic I grab a ham sandwich, but set it down to play soccer. It's been sitting on the table for a few hours but it still looks okay. The weather has been very warm. Should I eat it?

A: No! Whether hot or cold, food temperature is very important. Hot foods should be kept hot, and cold foods should be kept cool. Most meat should be cooked to 160°F to kill pathogens, microbes that cause disease. Use a meat thermometer to measure the internal temperature. Place uneaten cooked meats promptly in the fridge.



At School

Q: All my friends are already at our favorite lunch table. I went to the restroom but skipped washing my hands to save time. I pull a sandwich out of my lunch bag. Should I eat it?

A: Wait! First, wash your hands! Use soap and hot water to remove any unseen pathogens and wash for at least 20 seconds. Washing your hands can help reduce the risk of foodborne illness.

Sources: Food Safety from Farm to Fork, CFAITC; www.fcs.uga.edu; University of Georgia; cdc.gov, Centers for Disease Control and Prevention; foodsafety.ucdavis.edu, Food Safety Music



Use various sources to research historical foodborne illness outbreaks, such as the life of Typhoid Mary or the death of Alexander the Great. Using your local newspaper as a guide, create a front page story about the historical incident including accurate dates, facts and sources.

Standards: Health-Grade 4: 1.4.N; Grade 5: 1.5.N; Grade 7: 1.3.N, 1.4.N; Grade 8: 1.3.N, 1.4.N ELA-Grade 3: Writing 1.3; Writing and Oral English Language Conventions (WOLC) 1.0; Grade 4: Writing 1.5, 1.6, 1.7, 1.8; WOLC 1.0; Grade 5: Reading 2.1, 2.2; Writing 1.3, 1.4; Grade 6: Reading 2.4; Writing 1.4; Grade 7: Reading 2.1, 2.2; Writing 1.4, 1.5, 1.6; Grade 8: Reading 2.4; Writing 1.4



Your barbecued pork chops come off the grill with an internal temperature of 60°C. For safe consumption, experts recommend cooking until the internal temperature reaches 160°F. Should you eat it?

Your refrigerator is set at 32°F. Food safety guidelines recommend the internal temperature be no higher than 4.5°C. Is your refrigerator cold enough?

Use the equations below to convert degrees Celsius to degrees Fahrenheit and vice versa.

$$C^{\circ} = \frac{5}{9} F - 32$$

$$F^{\circ} = \frac{9}{5} C + 32$$

Standards: Health-Grade 4: 1.4.N; Grade 5: 1.5.N; Grade 7: 1.3.N, 1.4.N; Grade 8: 1.3.N, 1.4.N Math-Grade 6: Algebra and Functions (AF) 1.0; Grade 7: AF 1.0; Measurement and Geometry 1.1



Use the facts on this page to write a food safety rhyming song or rap. It should be at least 20 seconds long. Share the lyrics to your "hand washing" song with the entire class.

Standards: Health-Grade 4: 1.4.N; Grade 5: 1.5.N; Grade 7: 1.3.N, 1.4.N; Grade 8: 1.3.N, 1.4.N ELA-Grade 3: Listening 1.9; Grade 4: Writing 1.1; Listening 1.9; Speaking 2.4; Grade 5: Writing 1.1; Grade 6: Listening 1.1; Grade 7: Listening 1.6; Grade 8: Speaking 2.5

