



LATE SUMMER-FALL



WINTER

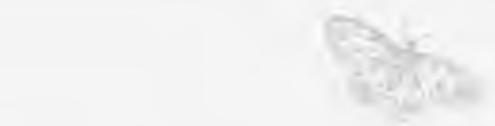


SPRING-EARLY SUMMER

Seasonal Recipes, Activities & Farm Profiles

Kids Cook Farm-Fresh Food

That Teach Ecological Responsibility





Publishing Information

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A Message from the State Superintendent of Public Instruction

During my tenure as State Superintendent of Public Instruction, I have been a strong advocate of a garden in every school. More than 3,000 schools have responded to this call, either to improve child nutrition or, simply, to provide a fun, hands-on learning experience for their students. Increasingly, these schools are linking the gardens to curriculum to teach content standards. Some teachers have even developed entire experiential learning cycles from planting seeds to placing food on the table.

Cooking in the classroom is an important part of that cycle. *Kids Cook Farm-Fresh Food* is an activities guide for students in grades two through seven that links local agriculture to the pleasures of dining. This guide is designed to introduce students and teachers to fresh, seasonal, locally grown produce. The guide links food and nutrition to the concept of organic and sustainable agriculture, which is a commitment to growing and distributing food in an environmentally sound, economically viable, and socially just manner.

California agriculture is large, diverse, complex, and dynamic. The aim in focusing on sustainable and organic agricultural practices in this document is to introduce students to a type of agricultural production most similar to the experience they may have in their school gardens. Students should be familiar with all forms of California agriculture, and the California Department of Education will be publishing a curriculum guide on agricultural literacy and awareness.

In many parts of California, students have the opportunity to visit local farms. The farm profiles in *Kids Cook Farm-Fresh Food* provide a personal look at some of California's family farmers. The guide helps students to develop a deeper understanding of where food comes from,

the role land plays in supporting all life, and how farmers bring life from the land.

Among the states, California is unique in the breadth of farm commodities it produces. The foods used in the following recipes represent the bounty of the California harvest available during the year. Through the recipes, the students will also recognize that food is a language that expresses cultural diversity.

The recipes are based on the belief that children can appreciate a variety of complex tastes and textures and that children will enjoy learning from the art of cooking. It is my hope that school food service programs will receive the support necessary to serve more fresh California agricultural commodities year-round. Students will then understand the connection of food from seed to the table, of this activity guide to the cafeteria, and of California agriculture to healthy nutrition.

This activity guide supports the academic content standards by subject and grade level, so it includes a matrix outlining this relationship. Above all, the guide links standards to the real world through gardens, recycling, nutrition, cooking, and the environment.

Please join me in preparing some of these recipes. I am an avid gardener and cook and have learned many lessons from my garden and from cooking for friends and eating around the table with them. I commend this book to teachers, classroom volunteers, and students throughout California.



DELAINE EASTIN
State Superintendent of Public Instruction



Acknowledgments

Kids Cook Farm-Fresh Food was developed over a period of six years under the auspices of several organizations. It originated with the *Market Cooking for Kids*, a program developed by the Center for Urban Education for Sustainable Agriculture and presented in Bay Area schools from 1995 to 1999. The Chez Panisse Foundation was the initial funder for the publication. In 2001, I undertook completion of the publication under the auspices of Sustainable Agriculture Education (SAGE) in conjunction with the California Department of Education. Major funding for the publication was provided by the National Farm to School Program at the Center for Food and Justice at Occidental College.

Many people assisted in the development of this publication. Key roles were played by the following persons: editor and contributor Leslie Comnes, designer Noreen Rei Fukumori, associate coordinator Carly Strouse, lead recipe developer Kelsie Kerr, and photographers Karen Preuss, Kate Kline May, and Sibella Kraus. Significant roles were also played by contributors Karola Saekel, Elizabeth Meyers, Laurel Miller, and Anna Jennings; curriculum reviewers Ellyn Hament, Lori Mann, and Martha Salzman; sustainable agriculture activity adviser Alan Tangren; and the many farmers who were interviewed for farm profiles. Although circumstances on some farms have changed, those profiles represent accurate snapshots into the lives of family farmers at the time the profiles were written.

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I deeply appreciate the contributions that many talented and dedicated people made to the production and revision of *Kids Cook Farm-Fresh Food*. Any mistakes that remain are my own. I am especially grateful to Ann Evans for her belief in this project and her patience, skill, and spirit that guided it to completion.

Sibella Kraus



LATE SUMMER-FALL



WINTER



SPRING-EARLY SUMMER

California Agriculture

Diverse and Sustainable

Kids Cook Farm-Fresh Food is an introduction to California's diverse farm-fresh produce, explaining how farmers grow it in ways similar to the students' own gardens at school. The hope is that learning how to cook the produce and discovering the delicious flavors of the colorful fresh fruits and vegetables will provide students an incentive for lifelong, healthful eating habits and an interest in the working landscape of California.

Ask typical third-graders where their food comes from, and they are likely to say, "the market." Yet, if pressed for more detail about how it gets to the market, they probably do not have a clear answer. In this busy, technologically advanced world, people rely on many modern conveniences for shopping and eating to save time. However, such conveniences as supermarkets and fast-food restaurants may disconnect people from the original source of food: the farms.

In the past people were aware of the important role farming played in their lives. Many people worked on farms or lived in farming communities. Fresh fruits, vegetables, dairy products, and meats were bought directly from nearby producers. Farms provided healthful, open spaces around cities. Today, however, most people live in urban areas. Although California still has bountiful agriculture, fewer and fewer of its residents are aware of the impact farming has on their lives.

Children, especially, have lost touch with how and where food is grown. They lack an understanding of the ecosystems, the land, the people, and even the plants that produce their food.

The story of where food comes from can quickly turn into a world geography lesson. It is the tale of California's diverse and beautiful working landscape and the creative, entrepreneurial people who cultivate the countryside. Specifically, this guide introduces readers to a lesser-known but growing niche of California's vast agricultural productivity, that of organic and sustainable agriculture. Agriculture is an important part of the state's economy and environment. The state's natural resources and human resources are diverse, with a great capacity for food production.

Organic refers to a particular method used to produce food and fiber. Organic farming systems do not use chemical pesticides or fertilizers. Instead, the systems are based on the development of biological diversity and the maintenance and replenishment of soil fertility. Organic farmers' primary strategy in controlling pests and diseases is prevention.

Organic farmers also rely on a diverse population of soil organisms, insects, birds, and other organisms to keep pest problems in check. When pest populations get out of balance, growers implement various strategies, such as the use of insect predators, mating disruption, traps, and barriers. As a last resort, botanical or other non-toxic pesticides may be applied under restricted conditions. Weeds are controlled through increased cultivation as well as through cover crops, mulches, controlled burns, crop rotation, and similar management methods.

A Growing Market

In 2002 approximately 2,300 California growers were registered with the California Department



of Food and Agriculture as practicing organic agriculture. In California 79,000 acres of cropland are in organic food production, representing \$247 million in gross sales.

Approximately 1 percent of the U.S. food supply is grown by using organic methods. In 2000 this amount represented more than \$3.5 billion in retail sales. Over the past six years, sales of organic products have shown an annual increase of at least 20 percent. Of a total \$400 billion in food sales to Americans, organic food sales count for \$7.7 billion, the fastest-growing category in the supermarket.

Until recently California and a number of other states regulated the term *organic* by state law. The U.S. Department of Agriculture (USDA) now regulates the term *organic* for all states through a mandatory certification process. This means that farms may claim to be organic only if they follow particular farming practices and standards.

Certified organic refers to agricultural products that have been grown and processed according to strict uniform standards, verified annually by independent state or private organizations. Certification includes inspection of farm fields and processing facilities. Farm practices inspected include long-term soil management, buffering between organic farms and neighboring conventional farms, product labeling, and recordkeeping. Processing inspections include review of the facility's cleaning and pest control methods, ingredient transportation and storage, recordkeeping, and audit control.

Sustainable Agriculture

One definition of sustainable agriculture is found in federal legislation that authorized the national Sustainable Agriculture Research and Education Program. It defines sustainable agriculture:

An integrated system of plant and animal production practices having a site specific application that will, over the long term:

- Satisfy human food and fiber needs;
- Enhance environmental quality and the natural resource base upon which the agricultural economy depends;
- Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
- Sustain the economic viability of farm operations; and
- Enhance the quality of life for farmers and society as a whole.

Agricultural Production

Almost one-third of the land in California is devoted to agriculture. For example, California encompasses almost 100 million acres of land, and about 28 million acres are used for agriculture. About half of this total is pasture and rangeland, another 39 percent is cropland, and the remainder is divided between woodland and other land.

California produces a breadth of farm commodities, including animals and animal products, fruit and tree nuts, vegetables, field crops, and nursery and floriculture products. Dairy products, such as milk and cheese, are the top commodities in California.



Although this guide tells the stories of those who operate smaller-scale farms oriented toward local and state markets, many export-oriented agricultural producers are a part of a global food system. Between 16 and 19 percent of California’s agricultural production is exported to international markets annually, primarily to east Asia, Canada, and the European Union. The agricultural sector also affects the state and local economies by providing 7.4 percent of the state’s jobs.

Diversity

Perhaps the most distinguishing feature of California agriculture is its diversity—diversity of farms, farmers, and crops. About 97 percent of California’s 74,126 farms are family- or individually operated. Although the “average” California farm operates on 374 acres, most of the state’s farms are much smaller in terms of acreage and sales. Large farms (\$1 million in gross income) still account for most of the total acreage and sales.

The number of women reported as farm operators almost doubled between 1978 (7.6 percent) and 1997 (13.6 percent). California also has a greater share of farm operators with ethnic

origins compared with the United States average—Hispanic (6 percent) and Asian or Pacific Islander (4.5 percent.)

Almost half of the state’s farm operators do not consider farming their principal occupation, and many spend more days employed off the farm than on it. Nevertheless, those men and women provide hope and inspiration for future generations to find a way to work and preserve a productive and healthy landscape in California.

Foodshed

Just as a watershed refers to a specific geographic area, a *foodshed* refers to a farming region around a metropolitan area that produces and distributes food for the surrounding population. Though agricultural products are marketed throughout California, the nation, and around the world, some farmers produce for the local market—their foodshed.

Eating seasonal foods from the foodshed often gives people a greater understanding of the natural and human resources nearby and inspires an interest in supporting their own health and well-being.

Nutrition Information About Fruits and Vegetables

All fruits and vegetables have nutrients and other protective factors required for lifelong good health. Fruits and vegetables provide carbohydrates that are necessary for energy; dietary fiber that helps maintain a healthy digestive tract and balance blood sugar levels; and an array of vitamins and minerals, such as folate, vitamins A and C, and potassium, that are necessary to maintain good health and to prevent diseases.

Many great-tasting fruits and vegetables are low in calories and are filled with nutrients that help reduce the risk of cancer, heart disease, diabetes, obesity, and some types of blindness. Research shows that eating five or more servings of fruits and vegetables every day reduces the risk of contracting these diseases.

Several plant families contain phytochemicals, natural plant substances that work with nutrients and dietary fiber to protect the body against disease. Some of the fruits and vegetables containing these naturally occurring phytochemicals are highlighted in this publication. Examples are as follows:

Tomatoes contain phytochemicals that may prevent carcinogens from forming, shield cells from carcinogens, or neutralize cancer-causing free radicals. Eating tomatoes may reduce the risk of prostate cancer and heart attack.

Naturally occurring phytochemicals that may help protect the body against cancer, fatty plaque in the arteries, dangerous blood clotting, and loss of eyesight are found in sweet potatoes, persimmons, citrus fruit, carrots and other orange and deep-yellow produce, and dark, leafy salad greens.

Cooking greens, such as kale, bok choy, collards, turnip and mustard greens, kohlrabi, and watercress, as well as broccoli, cauliflower, and Brussels sprouts, contain naturally occurring phytochemicals that may help protect the body's DNA, lower the risk of hormone-related cancers, and boost the body's ability to fight cancer.

Strawberries and other berries contain natural phytochemicals that may aid the immune system and help lower blood cholesterol.

A food serving that contains 20 percent or more of the U.S. Department of Agriculture recommended daily value (DV) for a particular nutrient is considered a high source of that nutrient. A serving containing 10 to 19 percent of the recommended DV is considered a good source.

Additional information on these and other fruits and vegetables is provided throughout this publication.

Source: *Why Eat More Fruits and Vegetables?* Sacramento: California Department of Health Services, 1999 (brochure).



How the Guide Works

The intent of this activity guide is to introduce children—through direct experience—to the pleasures of fresh, seasonal, locally grown produce. By exploring local produce and by cooking seasonal foods in class, students learn about the ecological, economical, and social benefits of sustainable agriculture and the diverse farm-fresh produce available in California.

The guide contains ideas for activities, recipes, profiles of farmers practicing sustainable agriculture, and correlations to academic standards. Growing food and eating are central human experiences through which many aspects of life may be revealed and examined. The guide helps schoolchildren understand the connections between their own health, healthful food, and a thriving regional, sustainable agriculture.

Organization

The guide is designed to connect schoolchildren to the foods they eat and includes crops that are harvested in each season. It is organized in three modules: Late Summer–Fall, Winter, and Spring–Early Summer. In this way students can prepare recipes using crops that are at their peak and taste their very best. The Late Summer–Fall module features six crops that are typically harvested in late summer and autumn. The Winter module highlights six winter crops, and the Spring–Early Summer module details six spring and early summer crops. Because of California’s moderate climate, some of the featured crops have extended growing seasons for many months of the year. In addition to information about that season’s featured crops and recipes that use them, each module contains activities that help to teach students about sustainable agriculture.

Use by Teachers

The guide is also designed to allow teachers flexibility in using it within their curriculum. The activities may be used to teach about cooking and nutrition, sustainable agriculture, and environmental science or to supplement language arts or social science programs. Each chapter provides teachers with background information on a specific crop. The recipes and activities also include teacher instructions to help prepare and teach the lessons.

A typical way that teachers use this guide is to introduce a particular crop through a comparative tasting lesson. Teachers subsequently choose one recipe to make with the class, conduct the related activity, and read the farm profile either with or to students in class, depending on the grade level. Some teachers coordinate lessons from the guide with activities in the school garden. All the components work together to help students explore key concepts about nutrition, cooking, and sustainable agriculture.

The guide suggests using journals to assess student learning. It includes prompts throughout for students to record evidence of their understanding through drawings, diagrams, and writing (see “Use of Student Journals to Assess Learning”). It also suggests opportunities for students to share their findings with the class through class discussions, presentations, and projects.

The suggested extension ideas and resources listed in the appendixes offer opportunities to continue investigations. Contact information is provided for teachers who want to plan field trips to farms, farmers markets, or school gardens. Parent and teacher associations are good sources of information about funding for field trips, equipment, and food for the recipes. A glossary contains definitions of terms used in cooking.

Suggestions for Success



No one knows students' capabilities better than the teacher. Use your judgment in choosing lesson plans, adapting them to an individual class and grade level, and implementing the following suggestions for success.

Cooking with Kids

Cooking is an activity that requires close supervision and careful planning. For this reason, 20 students is the maximum number recommended for a safe and quality cooking experience. If you have more than 20 students, plan a way to cook with half of the class at a time. While one-half cooks, the other half might read and discuss the farm profiles, do the related agriculture activity with a parent volunteer, or finish up math or other work.

Successfully cooking with kids also depends on you, the teacher, anticipating potentially dangerous situations and planning ahead. Choose recipes that are suitable for your students' skill level; each crop includes at least one easy recipe that requires minimal cutting and cooking and often includes one that is more advanced.

Try to get at least one and preferably two family volunteers to help with the cooking; those extra sets of hands, eyes, and ears will really help things go more smoothly. Follow the suggestions noted below to further ensure safety and success:

Health and Safety

- Have all children wash their hands with soap and water before cooking. Discuss hand care, such as keeping hands away from mouth, nose, and hair while preparing ingredients or cooking.
- Clear off tables and clean them with soap and water before cooking.
- Supervise children carefully when using knives. Demonstrate how to keep fingers safe by making an "o" with the hand that is not cutting and placing it firmly on the food being cut.
- Students must agree to use knives properly. Knives with serrated blades with blunt and rounded tips (such as a dinner knife) are good choices.
- Demonstrate using and holding knives safely. Demonstrate the safe way of cutting a fruit or vegetable by holding it on a cutting board while cutting. Emphasize that students are to use knives only at the cutting board.
- Discuss with students proper behavior around hot plates, blenders, and ovens. Always have pot holders handy and show children how to use them to handle hot pans.
- Be aware of any food allergies the students may have.





Materials

Prepare a bucket, box, or trash can for compost waste to place in the school compost, if available. Ask students to bring simple ingredients from home to save on cost and to enable students to feel good about contributing. To reduce disposable items such as paper plates and plastic utensils, many teachers ask students to bring in their own personal set of utensils and a small bowl or covered plastic container. Students may label and keep them in class for other cooking activities and snacks.

Setting Up a Demonstration Table

Many of the recipes involve demonstrating how to prepare the produce or actually cooking the recipe. Set up a table for these demonstrations that includes all the materials you will need and that allows everyone to see what you are doing.

Observation

- Ask students to use their five senses to observe each sample crop before cutting.
- Ask students to record in their journal their observations about the samples.
- Give students time to share their observations along with their predictions about how the sample will change when the recipe is ready to eat.

Working Together

For preparing ingredients and cooking, groups of four students work best. Each pair of students within the group can work together to prepare the sample and discuss observations.

- Individual students should be responsible for recording observations in their own journals.
- You may offer opportunities for children to taste the recipe as it is made and suggest adjustments to seasonings.
- You may review social skills and table manners before the students begin eating.
- While eating, students can share observations and insights.

Cleanup

- Each group is responsible for cleaning its table, cutting boards, knives, bowls, and utensils.
- Groups may take turns to clean class utensils, bowls, and pots.
- Leftovers may be saved for a snack, shared with another class, or taken home.
- If you have a school or classroom compost or worm bin, the cleanup should include composting of food scraps.

Activity or Recipe Format

Preparation Time:	Preparation time for recipe or activity. Does not include shopping time.
Cooking Time:	For recipes that require cooking, the time for cooking.
Total Lesson Time:	Time for entire lesson, including allowance for discussion, observation, and journal writing. If more time is needed, teachers may postpone the activity to another time or eliminate it.
Recipe Level:	Level of cooking skill required to make the recipe: Easy recipes require little, if any, cutting and cooking. Advanced recipes require more cutting or cooking.

Background

Basic information about the recipe or activity is provided.

Objectives

The student outcomes that the lesson will address are presented.

Ingredients

All the needed ingredients are presented for a class of 20 students to make the recipe and get a generous taste. Quantities and directions may be adjusted in accord with the size of your class and the students' abilities. Substitutions are suggested for ingredients that may not be available or ripe.

Materials

For the class:

The needed materials and equipment are presented for a class of 20 students to perform the activity or make the recipe.

For each group of 4:

The needed items are presented for each group of four students to make the recipe or perform the activity.

Preparation

The preliminary steps before the class starts the activity or recipe are presented.

Safety Precautions

Safety precautions should be reviewed with the class. They are located in the subsection Health and Safety under "Suggestions for Success."

Doing the Activity or Making the Recipe

Step-by-step instructions are presented for doing the activity or making the recipe with a group of 20 students. These are general guidelines. Teachers may deviate from them, depending on their teaching style, the class situation, or their learning objectives for the lesson. Experienced cooks often take this flexible approach as they adapt recipes for the best fresh ingredients available.



Comparative Tasting Format

Preparation Time:	20 minutes
Cooking Time:	None
Total Lesson Time:	45 minutes

Introduction

Explain that over the next period of time, the class is going to cook and eat fruits and vegetables that are grown locally. Before they begin, the students are going to do some thinking about food. Ask them why they eat. Acknowledge the many reasons but focus attention on the need for energy.

Explain that plants have an important and unique role in the earth's food web. Ask if anyone knows what that role is. Explain that plants make their own food. Plants capture energy from the sun, carbon from the air, and water from the ground and make their food. People and other animals cannot make their own food. They must eat plants or animals that eat plants to get energy.

Food is the vehicle for passing the sun's energy through the food web, and food is also the vehicle for cycling matter through the food web. Ask students to draw a picture of a plant, showing what the plant needs to make food.

Teachers can review photosynthesis, the carbon cycle, or the role of chloroplasts in cells, depending on the grade level.

Background

This activity is designed to be a generic lesson plan for an introduction to any crop in the guide. In this activity, students have the opportunity to taste and compare the different varieties of a single crop. Most fruits and vegetables come in many varieties that offer different sizes, colors, textures, and tastes. Although a few varieties are available at the supermarket, additional varieties will be found on a trip to a farmers market. For the best results, choose crops when they are in peak season and find the freshest produce possible. If you shop at a farmers market, talk to the farmers; they can give you suggestions for the best-tasting choices and give you interesting background information to share with your students. Produce managers at the local supermarket are also knowledgeable about seasonal varieties.

As an introduction to a new fruit or vegetable, this activity allows students to practice observations using all their senses. Students will investigate the different varieties with their five senses while they prepare for and actually do the comparative tasting. It is also a good activity for building students' vocabulary.

Objectives

Students will be able to:

Use their senses to observe different aspects of a variety of fruits or vegetables during a comparative tasting.

Record their observations in their journals using descriptive words and drawings.

**Materials***For the class:*

- 4 or 5 varieties of the crop, with 5 samples of each variety
- colander
- 20 toothpicks
- 2 or 3 kitchen towels

For each group of 4:

- 2 cutting boards
- 2 serrated knives with rounded tips
- 2 plates
- 4 napkins
- journals

Preparation

1. Wash the fruit or vegetables, and dry them in the colander.
2. Clean and set up tables.
3. Have students wash their hands. Discuss proper methods of handling food.

Safety Precautions

Review safety precautions for using knives (see the subsection Health and Safety under “Suggestions for Success”).

Doing the Activity

1. Announce to students that they will have an opportunity to use all five senses to examine the different varieties of the fruit or vegetable.
2. Show each variety to the class, explaining its name and where and when it is grown.
3. On the board, make a sample chart for recording observations using five senses for each variety. Have students copy the chart into their journals.
4. Explain that student groups will examine each variety and record their observations on the chart in their journals.
5. Provide each table with its materials and a sample of each variety. Students examine the varieties and record their observations. Ask students to share their observations with the class.
6. Have students cut each variety so that everyone in the group gets an equal share. Ask students to examine the cut fruits or vegetables and to record their observations.
7. Tell students they may now taste each variety, noting its taste, texture, and sound. They should record their observations in their journals.
8. After eating, lead a class discussion on the five senses and on each variety’s appearance, texture, taste, smell, and sound.
9. Clean up materials. If there is a school or classroom compost or worm bin, place food scraps there.

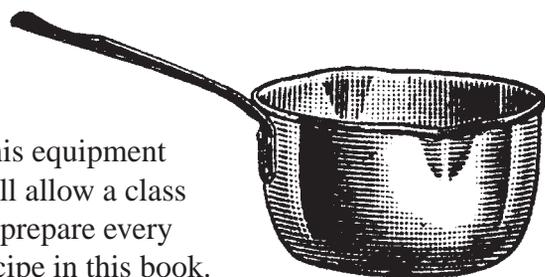


Cooking Equipment

The recipes and activities in this guide may be prepared with everyday kitchen equipment and materials, much of which can be borrowed from home or from the school cafeteria. Try to choose sizes appropriate for a large family. Remember that 20 children is the maximum number of students that is recommended for a safe and quality cooking experience.

If you have the resources for a more permanent set-up, a rolling cart equipped with all the necessary cooking equipment can be a wonderful asset for the school. Properly cared for, it can be used by many classes over many years.

The following kitchen kit includes all the equipment and materials needed for a class of 20 students to perform all the recipes in this guide except those involving an oven. All equipment and materials listed are available at most large drugstores, department stores, or discount stores. The cost of the kit will depend on the quality of materials but may range from \$450 to \$700. Better-quality equipment will last longer and give more satisfactory results; it is often well worth the added expense. A portable convection oven will add about \$250 to the cost.



This equipment will allow a class to prepare every recipe in this book.

As all resourceful teachers and classroom volunteers know, a few pieces of equipment will suffice for many of the recipes. Equipment may be obtained through donations or at thrift stores. For assistance with funding, contact your school's parent-teacher association for information. See also Appendix B, "Farm to School Resources."

Class Equipment

- 2 electric hot plates
- 2 large (12- to 14-inch) nonstick frying pans or skillets
- 1 blender
- Assorted sizes of pots with lids
- 1 steamer insert for saucepan
- 1 chef's knife
- 2 large wooden spoons
- 2 spatulas
- 1 set of tongs
- 3 whisks, assorted sizes
- 1 egg beater
- 3 mixing bowls, assorted sizes
- 1 colander
- 1 ladle
- 1 slotted spoon
- 1 potato masher
- 1 can opener
- 1 salad spinner
- 2 large plastic tubs
- 5 sponges with rough side
- 1 bottle of dishwashing liquid
- 4 kitchen towels
- 4 pot holders
- 2 baking sheets
- 2 large baking pans or dishes
- 2 canisters for salt and pepper
- 1 food mill
- 1 rolling cart
- 3 large plastic containers to store equipment
- first aid kit

Additional Optional Equipment

- electric skillet
- food processor

Student Equipment

- 10 small plastic cutting boards
- 10 serrated knives with rounded ends
- 5 vegetable peelers
- 5 sets of measuring spoons
- 5 sets of measuring cups
- 5 box graters
- 5 small citrus juicers
- 5 medium whisks
- 20 spoons
- 20 plastic bowls
- 20 plastic plates

Use of Student Journals to Assess Learning

A student journal is an excellent means for assessing students' progress and understanding of the activities in this guide. Through a journal, students can organize their thinking, plan and reflect on their learning, and make connections to learning activities over time and across disciplines.

Journals can be open-ended and creative, with sketches, musings, and notes; or they can be more directed, with students writing on topics you assign. Consider the following tips for making the most of student journals:

- A three-ring binder filled with lined and unlined paper works best as a journal. Students can easily insert recipes, farm profiles, and activity sheets directly into this binder. Students may also make journals by stapling together a booklet of lined and unlined paper and then taping or gluing student pages and other information.
- Tell your students that many cooking and agricultural professionals use journals to take notes on experiments, record data they collect, or write down observations or new ideas they want to try.
- Note that the recipes and activities include prompts for students to record evidence of their understanding through drawings, diagrams, and writing. In addition, after reading the farm profiles, you may ask students to write a summary including the main ideas and several facts they found interesting. You

may also ask students to use their journals to record information about the recipes they try (for example, what did they like about the food or how would they improve the recipe next time) and the results of the activities.

- Have students choose pages from the journal that best demonstrate what they have learned. Ask them to create a table of contents that directs you to these samples. Schedule conference times to talk with students about their work.
- Use a rubric to assess students' learning as reflected in their journals. A rubric can help you assess the quality of student work by describing what high-, medium-, and low-level products should contain. You can use one like the sample below or develop one based on the specific learning outcomes you have in mind for your students.

Sample Rubric for Student Journals

Quality of Work

- 5—All components are complete and well organized.
- 4—All components are complete, and 75 percent of them are well organized.
- 3—Components are not complete; 50 percent of them are well organized.
- 2—Components are not complete; 25 percent of them are well organized.
- 1—Components are not complete; they show minimal organization.



Correlation to California Content Standards

The learning activities in *Kids Cook Farm-Fresh Food* help to support each of the content standards noted in the table below in full or in part.* Each standard is linked to one or two lessons. In many cases there are more lessons supporting a standard than those noted in the table. Although the correlation is not complete, the table shows many ways to use the readings, recipes, and activities to apply the standards.

Grade 2	Related English– Language Arts Content Standards	Related History– Social Science Content Standards	Related Mathematics Content Standards	Related Science Content Standards
	<p>Reading Comprehension 2.7: Interpret information from diagrams, charts, and graphs. <i>Activity: See Making Compost “Tea,” p. 78.</i></p> <p>Writing 2.1: Write brief narratives based on their experiences:</p> <p>a. Move through a logical sequence of events. <i>Activity: Use recipes and student journals to describe the experience, p. xxi.</i></p> <p>Listening and Speaking 1.4: Give and follow three- and four-step directions. <i>Activity: Use recipes.</i></p> <p>Listening and Speaking 1.5: Organize presentations to maintain a clear focus. <i>Activity: See Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.</i></p>	<p>2.2.4 Compare and contrast basic land use in urban, suburban, and rural environments in California. <i>Activity: Read and discuss farm profiles.</i></p> <p>2.4.1: Describe food production and consumption long ago and today, including the roles of farmers, processors, distributors, weather, and land and water resources. <i>Activity: Read and discuss farm profiles.</i></p>	<p>Number Sense 4.1: Recognize, name, and compare unit fractions from $\frac{1}{12}$ to $\frac{1}{2}$. <i>Activity: See recipes.</i></p> <p>Number Sense 4.2: Recognize fractions of a whole and parts of a group (e.g., one-fourth of a pie, two-thirds of 15 balls). <i>Activity: See recipes.</i></p> <p>Measurement and Geometry 1.1: Measure the length of objects by iterating (repeating) a nonstandard or standard unit. <i>Activity: See Pre-Sprouting and Sowing Carrots, p. 112.</i></p> <p>Statistics, Data Analysis, and Probability 1.1: Record numerical data in systematic ways, keeping track of what has been counted. <i>Activity: See Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.</i></p> <p>Statistics, Data Analysis, and Probability 1.4: Ask and answer simple questions related to data representations. <i>Activity: See Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.</i></p> <p>Mathematical Reasoning 1.0: Make decisions about how to set up a problem. <i>Activity: See Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.</i></p>	<p>Life Sciences 2(a): Know that organisms reproduce offspring of their own kind and that the offspring resemble their parents and one another. <i>Activities: See Seed Saving and Sowing, p. 22; Pre-Sprouting and Sowing Carrots, p. 112.</i></p> <p>Life Sciences 2(d): Know there is variation among individuals of one kind within a population. <i>Activity: See Pre-Sprouting and Sowing Carrots, p. 112.</i></p> <p>Life Sciences 2(f): Know flowers and fruits are associated with reproduction in plants. <i>Activity: See Seed Saving and Sowing, p. 22.</i></p> <p>Investigation and Experimentation 4(a): Make predictions based on observed patterns and not random guessing. <i>Activity: See Making Compost “Tea,” p. 78.</i></p> <p>Investigation and Experimentation 4(b): Measure length, weight, temperature, and liquid volume with appropriate tools and express those measurements in standard metric system units. <i>Activity: See Making Compost “Tea,” p. 78.</i></p>

*The four academic content standards were approved by the State Board of Education and were published by the California Department of Education (1997–2000).

**Grade 2**
(Continued)**Related English–
Language Arts
Content Standards****Related History–
Social Science
Content Standards****Related Mathematics
Content Standards****Related Science
Content Standards**

Mathematical Reasoning 2.2: Make precise calculations and check the validity of the results in the context of the problem.

Activity: See Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.

Investigation and Experimentation 4(e): Construct bar graphs to record data, using appropriately labeled axes.

Activity: See Making Compost “Tea,” p. 78.

Investigation and Experimentation 4(g): Follow oral instructions for a scientific investigation.

Activity: See Making Compost “Tea,” p. 78.

Grade 3**Related English–
Language Arts
Content Standards****Related History–
Social Science
Content Standards****Related Mathematics
Content Standards****Related Science
Content Standards**

Reading Comprehension 2.5: Distinguish the main idea and supporting details in expository text.

Activity: Read farm profiles and write in student journals, p. xxi.

Reading Comprehension 2.7: Follow simple multiple-step written instructions (e.g., how to assemble a product or play a board game).

Activity: See recipes.

Listening and Speaking 1.8: Clarify and enhance oral presentations through the use of appropriate props (e.g., objects, pictures, charts).

Activity: See Crop Rotation, p. 144.

3.5.1: Describe the ways in which local producers have used and are using natural resources in the past and the present.

Activity: Read and discuss farm profiles.

Number Sense 3.2: Add and subtract simple fractions.

Activity: See Activity or Recipe Format, p. xvii.

Number Sense 3.3: Solve problems involving addition, subtraction, multiplication, and division of money amounts in decimal notation and multiply and divide money amounts in decimal notation by using whole-number multipliers and divisors.

Activity: See A School Produce Stand, p. 66.

Algebra and Functions 2.1: Solve simple problems involving a functional relationship between two quantities (e.g., find the total cost of multiple items given the cost per unit).

Activity: See Calculating Farm Profit or Loss, p. 100.

Measurement and Geometry 1.1: Choose the appropriate tools and units (metric and U.S.) and estimate and measure the length, liquid volume, and weight/mass of given objects.

Activities: See all recipes and Pre-Sprouting and Sowing Carrots, p. 112.

Physical Sciences 1(a): Know energy comes from the Sun to Earth in the form of light.

Activity: See Comparative Tasting Format, p. xviii.

Physical Sciences 1(b): Know sources of stored energy take many forms, such as food, fuel, and batteries.

Activity: See Comparative Tasting Format, p. xviii.

Life Sciences 3(a): Know plants and animals have structures that serve different functions in growth, survival, and reproduction.

Activity: See Pre-Sprouting and Sowing Carrots, p. 112.

Grade 3 (Continued)	Related English– Language Arts Content Standards	Related History– Social Science Content Standards	Related Mathematics Content Standards	Related Science Content Standards
			<p>Mathematical Reasoning 2.6: Make precise calculations and check the validity of the results from the context of the problem.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p>	<p>Investigation and Experimentation 5(a): Repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p> <p>Investigation and Experimentation 5(b): Differentiate evidence from opinion and know that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p> <p>Investigation and Experimentation 5(c): Use numerical data in describing and comparing objects, events, and measurements.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p> <p>Investigation and Experimentation 5(d): Predict the outcome of a simple investigation and compare the result with the prediction.</p> <p><i>Activities: See Uncovering Cover Crops, p. 174, and Making Compost “Tea,” p. 78.</i></p> <p>Investigation and Experimentation 5(e): Collect data in an investigation and analyze those data to develop a logical conclusion.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p>



Grade 4	Related English– Language Arts Content Standards	Related History– Social Science Content Standards	Related Mathematics Content Standards	Related Science Content Standards
	<p>Reading 1.1: Read narrative and expository text aloud with grade-appropriate fluency and accuracy and with appropriate pacing, intonation, and expression. <i>Activity: Read crop descriptions and farm profiles.</i></p>	<p>4.1.3: Identify the state capital and describe the various regions of California, including how their characteristics and physical environments (e.g., water, landforms, vegetation, climate) affect human activity. <i>Activity: Read and discuss crop descriptions and farm profiles.</i></p>	<p>Number Sense 2.1: Estimate and compute the sum or difference of whole numbers and positive decimals to two places. <i>Activity: See A School Produce Stand, p. 66.</i></p>	<p>Life Sciences 2(a): Know plants are the primary source of matter and energy entering most food chains. <i>Activity: See Comparative Tasting Format, p. xviii.</i></p>
	<p>Reading 2.4: Evaluate new information and hypotheses by testing them against known information and ideas. <i>Activity: See Finding the Right Soil for Your Plant, p. 56.</i></p>	<p>4.1.5: Use maps, charts, and pictures to describe how communities in California vary in land use, vegetation, wildlife, climate, population density, architecture, services, and transportation. <i>Activity: Use maps showing farm locations.</i></p>	<p>Number Sense 3.1: Demonstrate an understanding of, and the ability to use, standard algorithms for the addition and subtraction of multidigit numbers. <i>Activity: See A School Produce Stand, p. 66.</i></p>	<p>Life Sciences 2(c): Know decomposers, including many fungi, insects, and microorganisms, recycle matter from dead plants and animals. <i>Activity: See Making a Worm Compost Bin, p. 166.</i></p>
	<p>Writing 2.4: Write summaries that contain the main ideas of the reading selection and the most significant details. <i>Activity: Read crop descriptions and farm profiles and write summaries in student journals, p. xxi.</i></p>	<p>4.4: Explain how California became an agricultural and industrial power, tracing the transformation of the California economy and its political and cultural development since the 1850s. <i>Activity: Read and discuss crop descriptions and farm profiles.</i></p>	<p>Number Sense 3.3: Solve problems involving multiplication of multidigit numbers by two-digit numbers. <i>Activity: See Calculating Farm Profit or Loss, p. 100.</i></p>	<p>Life Sciences 3(b): Know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all. <i>Activities: See crop description of sweet potatoes, p.48; Finding the Right Soil for Your Plant, p. 56; and Farm Profile: Nakashima Farms, p. 58.</i></p>
	<p>Listening and Speaking 1.1: Ask thoughtful questions and respond to relevant questions with appropriate elaboration in oral settings. <i>Activities: See Finding the Right Soil for Your Plant, p. 56, and Uncovering Cover Crops, p. 174.</i></p>		<p>Statistics, Data Analysis, and Probability 1.1: Formulate survey questions; systematically collect and represent data on a number line; and coordinate graphs, tables, and charts. <i>Activity: Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.</i></p>	<p>Life Sciences 3(c): Know many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter. <i>Activity: See Seed Saving and Sowing, p. 22.</i></p>
	<p>Speaking Applications 2.1(a): Relate ideas, observations, or recollections about an event or experience. <i>Activity: See Comparative Tasting Format, p. xviii.</i></p>		<p>Mathematical Reasoning 2.4: Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work. <i>Activity: See Making Compost “Tea,” p. 78.</i></p>	<p>Investigation and Experimentation 6(b): Measure and estimate the weight, length, or volume of objects. <i>Activity: See Pre-Sprouting and Sowing Carrots, p. 112.</i></p> <p>Investigation and Experimentation 6(c): Formulate and justify predictions based on cause-and-effect relationships. <i>Activity: See Uncovering Cover Crops, p. 174.</i></p>

Grade 5**Related English–
Language Arts
Content Standards**

Reading 1.1: Read aloud narrative and expository text fluently and accurately with appropriate pacing, intonation, and expression.

Activity: Read crop descriptions and farm profiles.

Reading 2.3: Discern main ideas and concepts presented in texts, identifying and assessing evidence that supports those ideas.

Activity: Read crop description and farm profiles and record thoughts in student journals, p. xxi.

**Related Mathematics
Content Standards**

Number Sense 2.1: Add, subtract, multiply, and divide with decimals; add with negative integers; subtract positive integers from negative integers; and verify the reasonableness of the results.

Activity: See A School Produce Stand, p. 66.

Number Sense, 2.5: Compute and perform simple multiplication and division of fractions and apply these procedures to solving problems.

Activity: See recipes and Activity or Recipe Format, p. xvii.

Statistics, Data Analysis, and Probability 1.2: Organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.

Activities: Making Compost “Tea,” p. 78, and Frozen, Canned, or Fresh: Which Do You Prefer? p. 88.

Mathematical Reasoning 2.6: Make precise calculations and check the validity of the results from the context of the problem.

Activity: See A School Produce Stand, p. 66.

**Related Science
Content Standards**

Life Sciences 2(f): Know plants use carbon dioxide (CO₂) and energy from sunlight to build molecules of sugar and release oxygen.

Activity: See Comparative Tasting Format, p. xviii.

Life Sciences 2(g): Know plant and animal cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO₂) and water (respiration).

Activity: See Comparative Tasting Format, p. xviii.

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

Activity: See Making Compost “Tea,” p. 78.

Investigation and Experimentation 6(h): Draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion.

Activity: See Making Compost “Tea,” p. 78.



Grade 6	Related English– Language Arts Content Standards	Related Mathematics Content Standards	Related Science Content Standards	Related Home Economics Careers and Technology Education Challenge Standards
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Reading 1.1: Read aloud narrative and expository text fluently and accurately and with appropriate pacing, intonation, and expression.

Activity: Read crop descriptions and farm profiles.

Reading Comprehension 2.4: Clarify an understanding of texts by creating outlines, logical notes, summaries, or reports.

Activity: Read crop descriptions and farm profiles and record notes or summaries in student journals, p. xxi.

Listening and Speaking Strategies 1.3: Restate and execute multiple-step oral instructions and directions.

Activity: See recipes.

Number Sense 2.3: Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations.

Activities: See A School Produce Stand, p. 66, and Calculating Farm Profit or Loss, p. 100.

Algebra and Functions 2.2: Demonstrate an understanding that rate is a measure of one quantity per unit value of another quantity.

Activity: See Calculating Farm Profit or Loss, p. 100.

Mathematical Reasoning 2.7: Make precise calculations and check the validity of the results from the context of the problem.

Activities: See A School Produce Stand, p. 66, and Calculating Farm Profit or Loss, p. 100.

Ecology 5(b): Know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment.

Activity: See Comparative Tasting Format, p. xviii.

Ecology 5(c): Know populations of organisms can be categorized by the functions they serve in an ecosystem.

Activity: See Lady Bug Release, p. 184.

Ecology 5(e): Know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors, such as quantities of light and water, a range of temperatures, and soil composition.

Activities: See Crop Rotation, p. 144, and Farm Profile: T&D Willey Farms, p. 148; Finding the Right Soil for Your Plant, p. 56, and Farm Profile: Nakashima Farms, p. 58.

Resources 6(b): Know different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and know how to classify them as renewable or nonrenewable.

Activity: See Farm Profile: Van Dyke Ranch, p. 196.

Investigation and Experimentation 7(d): Communicate the steps and results from an investigation in written reports and oral presentations.

Activity: See Making Compost “Tea,” p. 78.

Food and Nutrition, Meal Planning and Preparation 4.1: Describing and using safe and sanitary ways of handling and preparing food.

Activity: See Suggestions for Success, p. xv.

Food and Nutrition, Meal Planning and Preparation 4.2: Identifying the functions and the safe use of food preparation equipment.

Activities: See Suggestions for Success, p. xv, and recipes.

Food and Nutrition, Meal Planning and Preparation 4.3: Preparing simple, nutritious meals using basic food preparation techniques.

Activity: See recipes.

Transferable, Employability, and Leadership Skills 3.2: Applying creative thinking skills to identify new ways to perform tasks or solve problems.

Activity: See A School Produce Stand, p. 66.

Transferable, Employability, and Leadership Skills 3.3: Considering multiple options for solving problems and applying appropriate problem-solving strategies.

Activities: See A School Produce Stand, p. 66, and Calculating Farm Profit or Loss, p. 100.

Transferable, Employability, and Leadership Skills 5.2: Identifying steps in planning, producing, promoting, and selling a product or service related to a home economics career pathway.

Activity: See A School Produce Stand, p. 66.

Grade 7	Related English– Language Arts Content Standards	Related Mathematics Content Standards	Related Science Content Standards	Related Home Economics Careers and Technology Education Challenge Standards
	<p>Writing Applications 2.5: Write summaries of reading materials:</p> <p>a. Include the main ideas and most significant details.</p> <p><i>Activity: Write summaries of crop descriptions and farm profiles in student journals, p. xvi.</i></p>	<p>Number Sense 1.7: Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.</p> <p><i>Activity: See A School Produce Stand, p. 66.</i></p> <p>Mathematical Reasoning 2.8: Make precise calculations and check the validity of the results from the context of the problem.</p> <p><i>Activity: See Calculating Farm Profit or Loss, p. 100.</i></p>	<p>Structure and Function in Living Systems 5(b): Know organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.</p> <p><i>Activities: See Fooling Moths—Natural Pest Control, p. 34, and Farm Profile: Apple Farm, p. 36.</i></p> <p>Structure and Function in Living Systems 5(f): Know the structures and processes by which flowering plants generate pollen, ovules, seeds, and fruit.</p> <p><i>Activities: See Seed Saving and Sowing, p. 22; Fooling Moths—Natural Pest Control, p. 34, and Farm Profile: Apple Farm, p. 36.</i></p> <p>Investigation and Experimentation 7(c): Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p> <p>Investigation and Experimentation 7(e): Communicate the steps and results from an investigation in written reports and oral presentations.</p> <p><i>Activity: See Making Compost “Tea,” p. 78.</i></p>	<p>Food and Nutrition, Meal Planning and Preparation 4.1: Describing and using safe and sanitary ways of handling and preparing food.</p> <p><i>Activity: See Suggestions for Success, p. xv.</i></p> <p>Food and Nutrition, Meal Planning and Preparation 4.2: Identify the functions and the safe use of food preparation equipment.</p> <p><i>Activity: See Suggestions for Success, p. xv, and recipes.</i></p> <p>Food and Nutrition, Meal Planning and Preparation 4.3: Preparing simple, nutritious meals using basic food preparation techniques.</p> <p><i>Activity: See recipes.</i></p> <p>Transferable, Employability, and Leadership Skills 3.2: Applying creative thinking skills to identify new ways to perform tasks or solve problems.</p> <p><i>Activity: See A School Produce Stand, p. 66.</i></p> <p>Transferable, Employability, and Leadership Skills 3.3: Considering multiple options for solving problems and applying appropriate problem solving strategies.</p> <p><i>Activities: See A School Produce Stand, p. 66, and Calculating Farm Profit or Loss, p. 100.</i></p> <p>Transferable, Employability, and Leadership Skills 5.2: Identifying steps in planning, producing, promoting, and selling a product or service related to a home economics career pathway.</p> <p><i>Activity: See A School Produce Stand, p. 66.</i></p>

LATE SUMMER-FALL

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LATE SUMMER-FALL



WINTER



SPRING-EARLY SUMMER

Corn

Corn is a staple in many parts of the world, especially throughout Central and South America. In many parts of the world, corn is called maize. Although it is now grown the world over, it originated from central Mexico, where native farmers began to cultivate wild corn (called *teosinte*) about 7,000 years ago. These early corn plants had ears that were the size of a person's thumb. Over the course of thousands of years, native people brought corn north through the Americas. When European

settlers came to the New World, they had never seen corn before and were amazed at its many uses. Native Americans used the kernels for food, the husks for preparing tamales, the silk for medicinal teas, and the stalks for animal fodder. Today, people also use many by-products made from corn, including cornmeal, flour, oil, syrup, and starch. Many different corn varieties are used for specific purposes. Sweet corn is the type of corn that people eat fresh, and its ears can range from thumb size to arm length,





depending on the variety. Popcorn is dried, then eaten after being heated until the kernels pop open. Some types of corn, called *dent* and *flint* corn, are dried and made into flour and *masa*, which is used to make tortillas. Most of the world's corn is fed to animals.

Seasonality and Growing Conditions

California-grown sweet corn is available from June through early October. Like all grasses, corn is pollinated by the wind. When the corn plant is midway through its growing season, ears will appear on the stalks. For pollination to occur, pollen clinging to the tassels on top of the stalks must be blown onto the corn silk extending out of the ears. Once pollinated, the ears will continue to grow and develop kernels. Farmers use a simple test to determine whether sweet corn is ripe for picking. They pull back the husk and pierce a kernel with their thumbnail. If a clear fluid appears, it is too early to harvest, while a thick, milky substance means the corn is overly mature. A thin, milky liquid means it is time to harvest the ears. Most sweet corn varieties are harvested at this milk stage, although they may vary in sweetness, color, and kernel size.

Sustainable Farming Issues

In general, if corn is grown under the right conditions—with well-drained soil and lots of sun—problems with pests or disease can be kept under control.

A common disease is corn smut, which makes the kernels swollen and black. Corn smut is not harmful to eat. In fact, it is a favorite delicacy

in Mexican cooking. Corn ear worms are a common pest. If you find worms burrowing in the tops of the ears, simply discard or cut away the affected portion. The rest of the corn is still fine to eat. The corn ear worm will grow up to be a little speckled moth. Corn smut does not affect enough ears to be a problem. Corn ear worm may be avoided by planting the corn early in the spring and harvesting in early to midsummer.

Sustainable agricultural practices include the use of Bt, a naturally occurring bacterium that is harmless to animals and beneficial insects and develops into toxic form only once the corn ear worm ingests it. When people eat vegetables, such as corn, that have been sprayed with Bt, no Bt toxin is consumed. That is why this natural pesticide is a part of the strategy for corn ear worm control used by farmers practicing sustainable agriculture.

Selection, Storage, and Nutrition Information

The natural sugars in corn begin to convert to starch the moment the corn is picked, so corn ideally should be bought as fresh as possible and eaten immediately after purchase. When choosing ears, check the husk, silk, and kernels for freshness. The husk should still have a healthy green appearance, while the silk should be golden and sticky underneath the husk. Check the kernels to ensure they are small and plump. Perform the thumbnail test described above. Corn is a good source of fiber and potassium.

Corn & Avocado Salad with Cilantro

Preparation Time: 30 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

This lesson offers a great opportunity to introduce three varieties of sweet corn: yellow, white, and bicolor. Each may vary in sweetness, intensity of color, and size of kernel. Before making the recipe, students can make detailed observations of the common characteristics of corn. Ask students to draw and label parts; as students shuck corn, have them discuss the functions of the different parts. If you cannot find three varieties, try two (yellow and white are commonly available). If you can find only one, use it and focus the lesson on the parts of the corn.

Objectives

Students will be able to:

Identify three different varieties of sweet corn.

State the parts of the corn ear (kernel, cob, stem, husk, and corn silk).

Understand the functions of different parts of the corn ear.

Ingredients

For a class of 20:

10 ears corn (three different varieties or colors, if possible)
 2 avocados
 1 red onion
 3 limes, large
 1 bunch cilantro
 1 tablespoon rice wine vinegar
 1 teaspoon salt
 ½ cup pure olive or canola oil

Materials

For the class:

1 large mixing bowl
 knife
 cutting board
 paper towels

For each group of 4:

2 cutting boards
 2 knives
 2 small bowls
 4 napkins
 4 plates
 4 forks
 journals

**Preparation**

1. Wash the cilantro. Pat dry with paper towel.
2. Have students wash their hands. Discuss proper methods of handling food.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Provide each group of students with two ears of corn, each a different color variety. Give students a couple of minutes to examine and record observations about each variety. Have groups switch corn with other groups so that everyone has an opportunity to examine all three varieties of corn.
2. Demonstrate shucking the corn and then cutting the kernels from the cob. It is best to cut each cob in half and then place the flat edge of the cob on the cutting board to cut the kernels. (Teachers may want to do that themselves if the students are very young. More experienced students can stand the whole cob on end and cut off the kernels that way.)
3. Demonstrate removing the seed, scooping out the flesh, and chopping the avocado. Have each group of students shuck and cut two ears of corn. Divide the tasks so that different groups prepare the avocado, peel and finely chop the onion, halve and juice the limes, and chop the cilantro.
4. Have students place their prepared ingredients into the small bowls. Gather the bowls and mix the ingredients into a large mixing bowl. First add onion and corn, then the juice of two limes, vinegar, salt, and oil. Stir well and taste for salt and acidity. Mix in the avocado.
5. Have a volunteer taste and add more lime juice and salt if needed. Serve and eat.
6. While the students eat, have each group share its observations about the different varieties of corn. Facilitate the discussion so that the class understands the similarities and differences among the varieties of corn.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Corn on the Cob with Chipotle Butter

Preparation Time: 20 minutes
 Cooking Time: 10 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Easy

Background

Like the previous corn recipe, this is a great lesson for discovering the three major varieties of sweet corn: yellow, white, and bicolor. Students can try all three varieties and discuss similarities and differences in their basic characteristics, such as kernel color, size, pattern on the cob, size of cob, color and texture of silk and husk. Chipotle chiles are smoked chiles. They may be found in small cans in the Hispanic section of a grocery store. If chipotle chiles are not available, offer students mild chile powder to sprinkle on the cooked corn along with a squeeze of lime and optional salt and butter.

Objectives:

Students will be able to:

Identify three different varieties of corn.

State the parts of the corn (kernel, cob, stem, husk, and corn silk).

Ingredients

For a class of 20:

10 ears of corn (3 different color varieties, if available)
 1 or 2 chipotle chiles
 4 tablespoons butter
 1 lime
 1 teaspoon salt if butter is unsalted
 chile powder (optional)

Materials

For the class:

large pot with lid (8-quart)
 water
 mixing spoon
 hot plate
 1 small mixing bowl
 tongs
 measuring spoons

For each group of 4:

2 cutting boards
 2 knives
 2 small bowls
 4 napkins
 journals



**Preparation**

1. Because the chipotle can irritate eyes, prepare the chipotle butter before class. Chop the chipotles in very small pieces and mix them into the butter. Set the butter aside. Make sure you wash your hands after handling the chipotles.
2. Place a large pot of water on a hot plate to boil.
3. Have students wash their hands. Discuss proper methods of handling food.

Safety Precautions

Prepare the chipotle butter before class to avoid eye irritation. Be cautious when adding and removing corn from boiling water. Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Provide each group of students with two ears of corn. Give students two minutes to examine and record their observations (see Background). Have groups switch corn with other groups so that everyone has an opportunity to examine all three varieties of corn.
2. Demonstrate shucking corn. Have students shuck the corn and break it in half. Allow students to examine different pieces and make more observations.
3. Ask students to put the corn in small bowls and place them on the demonstration table. When the water has boiled, add corn. Do not crowd too many ears into one batch. It will probably take two to three batches, depending on the size of the corn. Each batch should cook for 3 to 5 minutes.
4. While waiting for the corn to cook, have a student squeeze the lime juice and mix salt into the chipotle butter. Stir the butter mixture.
5. Remove the corn with tongs and give each student half of an ear to eat. Let the students put the butter on if desired and eat.
6. While the students eat, have each group share its observations about the different varieties of corn. Facilitate a discussion so that the class understands the similarities and differences among the varieties of corn.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Corn Cakes

Preparation Time: 40 minutes
 Cooking Time: 10 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Advanced

Background

Making corn cakes allows students to learn many cooking techniques: blending, whisking, separating eggs, and folding mixtures. Further, students will practice measuring solids and liquids. The whole process is fairly messy, but students love trying each part of the recipe. As the class proceeds, students can make predictions about how corn cakes are made and why the instructions require such details.

Objectives

Students will be able to:

Measure liquids and solids by using kitchen measuring instruments.

Observe, demonstrate, and label the different steps of cooking (blending, separating and beating eggs, folding, and panfrying).

Understand the functions of different tools for cooking.

Ingredients

For a class of 20:

10 ears of corn
 2½ cups flour
 2 teaspoons salt
 5 teaspoons baking powder
 ⅝ cup corn flour (finely
 ground cornmeal)
 5 eggs
 3 cups milk
 ¼ cup canola oil

Materials

For the class:

1 egg (for demonstration)
 hot plate
 measuring spoons
 1 small mixing bowl
 wooden spoon
 3 measuring cups
 serving spoon
 spatula
 large pot (8-quart)
 egg beater or whisk
 water
 griddle, large skillet,
 or electric skillet
 (optional)

For each group of 4:

2 cutting boards
 2 knives
 4 bowls (1 small, 2 me-
 dium, and 1 large)
 2 egg beaters (optional)
 4 plates
 4 forks
 4 napkins
 journals



Preparation

Have students wash their hands. Discuss proper methods of handling food.

Safety Precautions

Review safety precautions for using knives and the hot plate. Remind the children to immediately wipe up any spills when they handle raw eggs and to wash their hands after handling the eggs.

Making the Recipe

1. Have each group of students shuck two ears of corn and then cut the kernels off the cob. Students will place the kernels in a bowl and set them aside.
2. Direct each group to measure and combine in a bowl $\frac{1}{2}$ cup flour, $\frac{1}{8}$ cup corn flour, 1 teaspoon baking powder, and a scant $\frac{1}{2}$ teaspoon salt. Note that groups will need to share measuring cups and spoons. Have them set the flour mixture aside.
3. Demonstrate how to separate an egg. Carefully crack an egg over a small bowl and tip all the egg into one-half of the shell, letting the clear white of the egg drain into the bowl. Drain as much of the white as possible and place the yolk in a medium mixing bowl.
Note: Egg separation is messy with students of any age. If you are uncomfortable with students separating the eggs, make it a class demonstration.
4. Have each group separate one egg and place the yolk in a medium mixing bowl (or provide them with a separated egg). With a whisk, students beat the egg yolk with $\frac{1}{2}$ cup plus 2 tablespoons milk and 1 scant tablespoon oil.
5. Have each group add the flour mixture bit by bit, whisking it into the yolk mixture until the batter is smooth. Then have them stir in the corn kernels and set the batter aside.
6. Show students how to whip their egg white with an egg beater or whisk until it just forms stiff, white peaks, being careful not to overbeat. Each group should gently fold the egg white into the batter. (Chilled egg beaters and bowls help form peaks.)
7. Have each group bring its batter to the demonstration table to cook.
8. Heat and lightly oil the skillet or griddle. Drop spoonfuls of batter onto the griddle. Cook until bubbles start to form on the surface and the edges become slightly dry, then carefully turn over with a spatula to cook the other side. You may want to re-oil the pan after a batch or two.
9. As each group of students cooks its corn cakes, have the rest of the class write in their journals, describing the fun compared with difficult parts of making the recipe.
10. While the students eat, have each group discuss its experience in making the recipe.
11. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Designing Your Own Farm

Preparation Time: 10 minutes
Total Lesson Time: 50 minutes

Background

Many children have little, if any, direct experiences with a working farm. For many of them, a farm has a sort of mythic quality, which is mostly influenced by movie and storybook representations. When asked what they would find on a farm, many of these students will be able to name chickens, goats, or corn but not much else.

In this activity, students take a close look at a map showing what a local farm might look like in September. This particular farm, Full Belly, has a spectacularly rich diversity in what it produces over the course of a year and can help to broaden students' understanding of the concept of *farm*. Students then have an opportunity to design their own farm, imagining what they would want to produce and what farm elements they would like to have.

Objectives

Students will be able to:

Determine which of the foods they eat are grown on a local farm.

Create a farm plan that includes a variety of elements.

(For older students) Consider the season in their farm plan.

Materials

For each group of 4:

- 4 copies of Full Belly Farm farm profile (optional)
- 2 copies of Full Belly Farm map
- 2 copies of Full Belly Farm crop list (optional)
- 4 large sheets of drawing paper
- crayons or colored pencils

Preparation

1. Make copies of materials.
2. Make a chart with three columns on the board. Label the first two columns "Foods" and "Farm Products" and leave the third column blank.

**Doing the Activity**

1. Ask the class to name one or two foods that they have eaten in the last two days. Write these under the “Foods” column in the chart on the board. Then ask students what the crops or farm products are that make up each food. For example, for toast, the farm product is wheat; for orange juice, the farm product is oranges; for pepperoni pizza, the farm products are wheat, tomatoes, onions, herbs, milk, and beef.
2. Ask groups of four students to work together to list all the foods they have eaten in the last two days and the farm products associated with them.
3. (Optional) Give students a copy of the Full Belly Farm farm profile. Read the farm profile as a class. Ask students to name or guess which of their farm products might be found at Full Belly in the fall.
4. Give each pair a map of Full Belly Farm. In their groups, have students look for the farm products on their group’s list. Have them place a check mark next to each product that is found on the Full Belly map. Using the chart on the board, label the third column “More Products at Full Belly” and have students list any additional products they find on the map that were not on their farm products list.
5. Have students look for and color the following farm elements on their map:

Barn	Greenhouse	Racks
Trees (other than crops)	Compost pile	River
Roads	Open fields	Houses
6. Discuss as a class what the importance of each of these elements might be. For example, the barn may be used for storing or sorting crops, for storing tools and machinery, and for storing animal feed as well as for housing animals; trees offer shade as well as habitat for pollinating birds and insects; roads provide access to the back areas of the farm; the greenhouses enable the farmer to grow seedlings or plants in an environment warmer than the outside temperature (and thus increase the variety of plants produced); compost piles create a rich fertilizer for the plants; open fields provide space for the next season’s plants; and drying racks allow the farmer to dry fruit and tomatoes for storing and selling in the winter months.
7. For older students: Have students look at the Full Belly crop list and determine which of their group’s farm products may be on the list but offered in a different season from those in the fall. Lead a discussion about why crops are offered only at certain times of the year, introducing the concept that crops have certain seasons that provide the best growing conditions for them. Remind the class about storage crops, such as dried fruits and nuts, that are available year-round.
8. Give each student a piece of drawing paper. Invite the students to imagine that they will be designing their own farm. First, have them list all the crops and other elements they would want or need on their farm (they may use the Full Belly Farm map and Full Belly Farm crop list for ideas). Then have them draw a map or illustration showing their farm, including all the elements they have selected. You may also encourage them to think in terms of a logical layout for their farm.
9. Post the designs and ask students to point out some of the features of their farms.

Full Belly Farm

The farmers at Full Belly Farm in Guinda, near the town of Woodland in Yolo County, know that fresh-picked corn is the sweetest corn.

Dru Rivers, who started Full Belly with her husband and two friends in 1983, explains what it takes to get the freshest corn to customers. “When we sell at the farmers market, we get up at 3 o’clock in the morning to pick corn,” says Dru. “We’re out there in the field with flashlights.” At the market, Full Belly’s corn has become so popular that people swarm around the stand to buy every last ear.

About 12 to 15 acres of Full Belly’s 200 acres are devoted to corn. Every year, Full Belly grows thousands of corn plants. During corn season, which usually begins in late June and ends in October, a crew of workers picks corn every single day.

Like most relatively small organic farms, Full Belly does not grow just one crop, but grows 70 to 80 different crops each year. One example is the Moon and Stars heirloom variety of watermelon shown in the photograph. “We’re really lucky that our wonderful climate allows us to harvest vegetables all year round,” says Dru.

Full Belly sells about one-third of its produce through Community Supported Agriculture (CSA). With CSA, farms sell their produce directly to individual consumers rather than to wholesalers or stores. CSA members pay a weekly fee in exchange for a box of vegetables. Usually, the members live in cities where they cannot grow their own vegetables yet want really fresh, organically grown produce. Most subscribers pick up their boxes of vegetables every week at a drop-off place, such as a school or a church. Sometimes, for an extra fee, the



farmer will deliver the produce boxes right to the member’s door. Full Belly, one of the most successful CSA farms in California, has more than 600 CSA members.

Why would a farmer decide to sell produce in this way rather than just truck it all to a wholesaler? Dru explains that when selling directly to the customer, farmers can get better prices for the produce because they do not have to share profits with the wholesalers and the markets. In addition, when selling to stores or even at a farmers market, farmers can never be sure that all the produce will sell. Sometimes, especially during the rainy season, not many



customers come out to the market. And sometimes stores will decide that they do not want everything the farmer is selling. With Community Supported Agriculture, farmers can always be sure that they sell everything they grow because members pay in advance and agree to take a box every week.

For the CSA members, this arrangement means always eating the freshest produce and eating only what is in season. It also means getting a surprise every week because they never know exactly what is going to be in the box. To make sure customers are not frustrated by some fruit or vegetable they have never eaten or cooked, each week's box comes with a newsletter that tells about all the produce in the box and gives some recipes.

A typical summer box will contain Full Belly's sweet corn as well as tomatoes, melons, eggplant, peppers, basil, and summer squash. As the season changes to winter, Full Belly members receive broccoli, cabbage, carrots, turnips, beets, and leafy greens, such as kale and chard.

One customer admits that before she joined Full Belly, she was never sure what was in season. "I love eating with the seasons and also learning how to cook vegetables I wouldn't normally buy at the store," she says.

If you are a Full Belly member, you can visit the farm any time you want. "People are always welcome to come and pitch a tent on the land," says Dru. "We also organize work days where members can come and help out." By far the favorite day to visit is Full Belly's annual "Hoes Down," a day when the farmers literally put their hoes down and stop working to celebrate the harvest. On this day, as many as 3,000 people visit the farm for tours, music, crafts, and a chance to try such farming activities as milking cows, shearing sheep, and grinding corn.

With Community Supported Agriculture, Dru explains, "We're not just providing fresh vegetables. We're providing an education for our members and a connection to our farm."

Full Belly Farm Crop List

Crop	Spring	Summer	Fall	Winter
Almonds*	N/A	N/A	÷	÷
Almond Butter*	÷	N/A	÷	÷
Asparagus	÷	N/A	N/A	N/A
Basil	N/A	÷	÷	N/A
Beets (red, chioggia, gold)	÷	N/A	÷	÷
Broccoli	÷	N/A	N/A	÷
Cabbage	÷	N/A	N/A	÷
Carrots	÷	N/A	÷	÷
Cucumbers	N/A	÷	N/A	N/A
Daikon (several varieties)	÷	N/A	÷	÷
Eggplant	N/A	÷	÷	N/A
Flowers	÷	÷	÷	N/A
Garlic-dry*	N/A	÷	÷	N/A
Garlic-fresh	÷	N/A	N/A	÷
Grapes	N/A	÷	N/A	N/A
Greens**	÷	N/A	÷	÷
Hard Squash*	N/A	N/A	÷	÷
Leeks	N/A	N/A	÷	÷
Lettuce	÷	N/A	÷	÷
Melons***	N/A	÷	N/A	N/A
New Potatoes	÷	N/A	÷	N/A
Okra	N/A	÷	N/A	N/A
Onions (red, yellow, torpedo)	÷	÷	N/A	N/A
Sweet and Hot Peppers	N/A	N/A	÷	N/A
Peaches	N/A	÷	N/A	N/A
Pumpkins	N/A	N/A	÷	N/A
Salad mix	÷	N/A	÷	÷
Spinach	÷	N/A	÷	÷
Strawberries	÷	N/A	N/A	N/A
Sugar Snap Peas	÷	N/A	N/A	N/A
Sun Dried Fruit, Onions, and Tomatoes*	÷	÷	÷	÷
Sweet Corn	N/A	÷	N/A	N/A
Tomatoes	N/A	÷	N/A	N/A
Turnips	÷	N/A	÷	÷
Walnuts*	÷	÷	÷	÷
Zucchini, Summer Squash	N/A	÷	N/A	N/A

÷ Symbol designating the season crop is available.

* Full Belly stores this crop and has it available well after its harvest season.

** Greens: arugula, chards, kales, mizuna, mustard, other Japanese greens

*** Melon varieties: canteloupes, red watermelons, yellow dolls, canary melons, honeyloupes



Full Belly Farm map in late summer-early fall

Farm map by Ellen Toomey

Tomatoes

Tomatoes are one of the most popular vegetables grown in home gardens. They originally grew wild in Peru and were first cultivated in Mexico. The Spanish colonists of the fifteenth and sixteenth centuries introduced tomatoes to countries all over the world. Tomatoes did not immediately become popular in Europe and colonial North America because tomatoes are in the nightshade family, which contains many poisonous plants. The first recorded evidence of Europeans eating tomatoes was in an Italian cookbook from the 1600s. The French ascribed aphrodisiac properties to the fruit and called it the *pomme d'amour*, which means love apple.

It was not until the early 1900s that the tomato became popular in the United States. Today tomatoes are one of America's favorite summertime foods. California is one of the leading suppliers of tomatoes, especially heirloom varieties, producing 90 percent of the nation's processed tomatoes.

Heirlooms are varieties of fruits and vegetables that were popular in the eighteenth, nineteenth, and early twentieth centuries. Heirloom varieties of tomatoes offer consumers a new range of flavors, textures, and colors. Popular heirloom tomatoes include the Brandywine, Green Zebra, and Cherokee varieties.





In general, commercial tomatoes are picked green and unripe so that they can withstand the rigors of travel. The tomatoes are then ripened in rooms with ethylene gas, which is a natural by-product of the tomatoes' ripening process. Although this method is convenient, the only way for tomatoes and other fruits to develop their true, sweet flavors is by sun ripening on the tree, bush, or vine.

Seasonality and Growing Conditions

Tomatoes require warm, sunny weather and grow well in hot, dry climates. Some varieties have been bred to tolerate cooler climates. For example, Early Girl can tolerate cool summer nights. The peak tomato season in California is from July through October.

Tomato vines are of two major types: *determinate* plants, which have short vines and grow in a contained manner, and *indeterminate*, which are long, stringy, climbing plants that must rely on a trellis or staking in order to support the plant and its fruit.

Tomato plants require fine, loose, well-drained soil that is fortified with abundant, decomposed organic matter. Adequate drainage is vital in order to prevent bacterial wilt, stunting, and fruit rot. On indeterminate varieties, pinching

the side shoots (known as suckers) to produce one or two main shoots will result in larger, more flavorful tomatoes and will also help to support the fruit and keep it off the ground.

Sustainable Farming Issues

Tomatoes are prone to pests such as tomato hornworms, aphids, whiteflies, and cutworms, but spraying with soapy water or removing pests by hand may control them. Leaf blight and fungus may be avoided by proper air ventilation between plants. Some farmers will “water-stress” their vines—let them dry out between waterings—in order to create sweeter fruit.

A few farmers “dry farm” their tomatoes. In this system, well-mulched plants get needed water from ground moisture only and produce dense, sweet tomatoes.

Selection, Storage, and Nutrition Information

Tomatoes should be smooth and slightly firm, with no splits or mushy spots. Never refrigerate tomatoes as this will make them mealy. Store them on the counter out of direct sunlight. Tomatoes are high in antioxidant vitamin C and a good source of vitamin A.

Salsa Fresca

Preparation Time: 20 minutes
Cooking Time: None
Total Lesson Time: 45 minutes
Recipe Level: Easy

Background

Salsa can be a fun way for students to taste the fresh version of a condiment they buy in processed form. Preparing salsa also is an opportunity to look at the different parts of plants that people eat: bulbs (onion and garlic), stems and leaves (cilantro), and fruits (tomatoes).

Ingredients

For a class of 20:

6 to 10 medium tomatoes
1 bunch cilantro
1 clove garlic
1 white or red onion
2 limes
½ teaspoon salt
1 bag corn chips or
baked tortilla chips

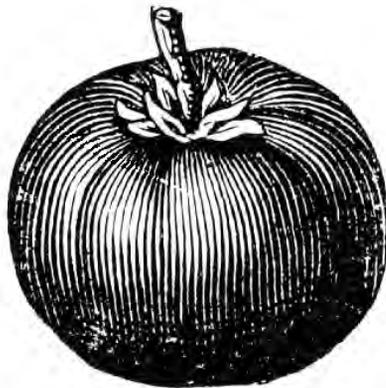
Materials

For the class:

1 large mixing bowl
mixing/serving spoon
colander
knife
serving bowls
measuring spoons
kitchen or paper towels

For each group of 4:

2 knives
2 cutting boards
1 small mixing bowl
4 napkins
journals



**Preparation**

1. Wash the tomatoes and cilantro and let them dry in the colander. Gently pat the cilantro with a paper towel or clean dish towel to remove any excess water.
2. Clean and set up tables.
3. If you want each group to make its own salsa, rather than as a whole class as described in the directions, you will need to divide the ingredients and tasks accordingly.
4. Have students wash their hands. Discuss proper methods of handling food.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Determine which students are going to prepare the various ingredients: tomatoes, garlic, onions, and cilantro.
2. Before handing out ingredients, demonstrate to the whole class how to prepare each item: tomatoes—core and then cut them into medium cubes; garlic—smash it and then chop finely; onion—dice it finely; cilantro—chop the leaves.
3. Provide each table with materials and ingredients. One student from each pair can get their materials; the other can get the ingredients.
4. Circulate among the groups, helping students dice and chop.
5. After all the tomatoes, onions, garlic, and cilantro have been prepared, have students bring ingredients to the large mixing bowl, adding tomatoes first, then garlic, onions, and cilantro. Students who finish early can clean their cutting board and knife and begin copying the recipe into their journals.
6. Cut a lime in quarters and have two students squeeze the juice of a quarter lime into the mix.
7. Have another student add $\frac{1}{2}$ teaspoon of salt and mix. Add salt and more lime juice to taste.
8. Ask students to sit in a circle and pass the mixing bowl so that each student will have a turn at mixing the salsa (three times each is plenty).
9. Serve salsa fresca in students' serving bowls at each table. Serve chips on a napkin for each student.
10. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Garden Tomato Sauce

Preparation Time:	20 minutes
Cooking Time:	10 minutes
Total Lesson Time:	40 minutes
Recipe Level:	Advanced

Background

Many families cook dishes with store-bought tomato sauce, so for some students this might be the first time they have the opportunity to actually make tomato sauce from raw ingredients. As the teacher prepares this tomato sauce in the skillet, students watch and make observations. Some interesting things to observe include the steam rising from the sauce, the gradual thickening of the sauce, the simmering of the sauce, and the new smells created as the ingredients cook together.

You can use numerous types of tomatoes for this recipe. Big Beef, Early Girl, and Roma varieties are great for cooking. However, save the heirloom varieties for eating fresh.

Objectives

Students will be able to:

Make observations while the teacher prepares the sauce.

Discuss the reasons for each observation.

Discuss how cooking and doing experiments are similar and different.

Ingredients

For a class of 20:

- 12 red tomatoes or 4 baskets
of cherry tomatoes
- 3 cups rice, uncooked,
or 2 lbs pasta
- 12 large basil leaves
- 4 cloves garlic
- ½ cup extra virgin olive oil
- 1 teaspoon salt (or to taste)

Materials

For the class:

- hot plate
- 8-quart pot or, for rice, rice
cooker or 4-quart pot
- scissors
- medium bowl
- large skillet
- measuring spoons
- 2 measuring cups
- 2 wooden spoons
- 3 bowls for raw ingredients
- paper towels
- journals

**Preparation**

1. Wash the tomatoes with water and dry in the colander. Wash basil and pat dry gently in towels.
2. Clean and set up tables.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Set up the hot plate.
5. Follow the instructions on the package to cook the rice or pasta.

Safety Precautions

Be careful when adding ingredients to hot oil. Review safety precautions for handling knives and the hot plate.

Making the Recipe

1. Demonstrate how to prepare each ingredient: coring, cutting, and dicing the tomatoes; making a chiffonade of basil (by rolling the basil leaves, cutting into thin slices, and cutting with scissors); peeling and chopping garlic. Provide each table with materials for four students.
2. At each table, have pairs of students share the responsibilities of chopping tomatoes, making a chiffonade of basil, and peeling and chopping the garlic. Students place prepared ingredients into separate bowls.
3. Collect ingredients into three separate bowls and ask students to gather around the demonstration table. Explain that you will be cooking the sauce and that as you add each ingredient, students will make observations using their senses. What are some of the sounds they hear? Smells? What do they see?
4. Heat the oil in the skillet over medium heat. When the oil is hot, have a volunteer add the garlic. Let it sizzle for a minute. Ask another volunteer to add the tomatoes and basil. Turn down the heat and let the sauce simmer for 5 to 8 minutes or until tomatoes are just starting to become saucy. Have a volunteer measure and add the salt. Stir it in.
5. Have students return to their tables to write their observations in their journals while you serve up the sauce with rice or pasta.
6. As students eat, ask them to share their observations.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Seed Saving and Sowing

Preparation Time:	10 minutes
Total Lesson Time:	Part 1 – 30 minutes, plus 10 minutes each day for the next three or four days (in the fall)
	Part 2 – 15 minutes
	Part 3 – 30 minutes (in late January or early February)

Background

In this activity, students learn about saving seeds and growing tomato plants. Tomatoes are an excellent choice for seed saving because they are self-pollinating and usually grow successfully from seed.

Tomatoes are in season from the late spring to early autumn, but tomato seeds are best planted in late January or early February. This means that they are at their ripest many months before it is time to plant the next crop. In this activity, students dry and store seeds in the fall for later planting.

At each stage of the harvesting, saving, and sowing process, the teacher can facilitate discussions about student observations and inferences, which can then be recorded by the students in their journals. As the tomato plants grow, students can also make illustrations of them, write poems about the life cycle of tomatoes, and measure the stem and leaf growth of tomato plants over time.

It is important to choose *open-pollinated* or *nonhybrid* varieties of tomatoes for this activity. The seeds of hybrid varieties will not grow up to resemble their parents and may not taste good.

Objectives

Students will be able to:

Demonstrate the proper method to save tomato seeds.

Understand the life cycle of the tomato plant.

Materials

For the class:

wax paper or baking sheet
paper bag
5 pounds potting soil or compost
5 1-foot-deep pots or school garden
2 quarts water
paper towels

For each group of 4:

2 heirloom or other *open-pollinated*
variety tomatoes
1 small bowl
2 plastic spoons
1 knife
1 paper bowl
journals



Preparation

Clear an area near a source of natural light, such as a windowsill, for the bowls.

DOING THE ACTIVITY

Part 1: Harvest and Preparation

1. Lead a discussion to elicit students' knowledge about the life cycle of plants. Write student responses on the board, and ask students to explain where seeds come from.
2. Ask students to explain in their journals their ideas about the life cycle of plants. Encourage them to make drawings with labels and explanations.
3. Demonstrate how to harvest seeds from a tomato. Cut a tomato in half, then use a spoon to scoop out the seeds and pulp. Place the seeds and pulp in a bowl and add enough water to cover them. Explain that this is done to sort out the viable seeds: the viable seeds will sink to the bottom, but nonviable ones will float.
4. Provide materials to student groups and supervise as they harvest and prepare seeds.
5. Set the bowls on a windowsill for three to four days. Each day, a student from each group will skim off the floating seeds and pulp and stir the mixture. Remind students to keep the viable seeds in the bowl (the ones that have sunk).

Part 2: Drying and Saving

1. After three or four days, collect the seeds for drying. Drain the seeds from the bowl and rinse them thoroughly.
2. Lead a discussion about whether it would be a good idea to plant the tomato seeds now. Point out that tomato plants need warm soil and plenty of sunshine to grow and that drying the seeds until a better planting time is a good way of storing them.
3. Spread seeds on wax paper or a baking sheet and let them dry for one week.
4. Remove seeds from the wax paper or baking sheet and store in a labeled paper bag or envelope until ready to sow.

Part 3: Sowing

1. In late January or early February, retrieve the seeds for sowing.
2. Provide potting soil or, if your school has a compost bin, take the class to collect a bucket of compost.
3. Demonstrate sowing seeds in paper bowls filled with soil. In each paper bowl, sow four to five seeds $\frac{1}{4}$ inch to $\frac{1}{2}$ inch deep. Keep the soil moist but not muddy.
4. Place bowls in a dark area or cover the bowls with damp paper towels because seeds germinate better in darkness.
5. Check daily for sprouts, and water to keep the soil moist. Once seeds have sprouted, select the healthiest sprout in each bowl and pull out the others.
6. When the tomatoes reach six inches high, transplant them into one-foot-deep pots filled with potting soil or in an outdoor garden.
7. Lead a discussion about how tomato seeds get dispersed in nature without the help of people. Ask students for their ideas. Explain that sometimes tomatoes fall to the ground and decompose, leaving on the soil seeds ready to grow when the conditions are right. Other times, animals eat the tomatoes. The seeds pass through their digestive systems and are dropped on the ground. If they are viable and land in some soil, they will grow. Animals depend on plants for food. Plants depend on animals to spread seeds.

Eatwell Farm



Eatwell is a small organic farm located near the town of Winters, not far from Davis and Sacramento. The farm was started by Nigel Walker and Frances Andrews in 1993. Their twin sons, Andrew and Eric, were born on the farm in 1997.

Nigel and Frances each had different careers before they chose to start a farm. Nigel worked for a broadcasting company in his native England, and Frances worked for the brokerage firm Morgan Stanley in New York. When they decided to try their hand at farming, they picked a rich agricultural region. “The land is flat,” Nigel explains, “and we’ve got deep, fertile soil—beautiful stuff.” Their neighbors include another farm, a walnut orchard, a prune orchard, cows, and sheep.

Eatwell encompasses 70 acres altogether, with two and one-half acres devoted to tomatoes. “We’ve got 25,000 tomato plants on our farm and 25 different varieties,” says Nigel.

Nigel and Frances take pride in the unique tomatoes they grow, including the striped Green Zebra (it is still bright green when ripe), dark red Brandywine, little Yellow Pear, and Green Grape. Many of the unusual varieties are called *heirlooms*. Nigel explains that this term describes the oldest varieties of a crop, the ones that were brought to this country by settlers from different parts of the world. The seeds of these plants have been passed down from one generation to the next.

Unlike the hybrids that have been developed for most commercial tomato farming, “Heirloom tomatoes have the richest and deepest flavor,” Nigel explains, “but they have very thin skins, so they can’t travel long distances on a truck.” Because of their fragility, heirloom tomatoes are rarely found in supermarkets, which get most of their tomatoes from far away. Commercial tomatoes are generally picked before they are ripe and then ripened with ethylene gas pumped into storage facili-



ties. That turns the tomatoes red, but the taste is not the same as that of a tomato ripened on the vine by the sun.

“Heirloom varieties were bred to be picked and eaten straight from the garden,” says Nigel. These tomatoes are perfect for a home or school garden as well as for small farms that sell directly at farmers markets or farm stands.

In addition to tomatoes, Nigel and Frances grow grapes, fruit trees—including nectarines, peaches, pomegranates, apples, pears, and citrus—and a wide range of vegetable crops, such as potatoes, carrots, peppers, and onions. Having many crops means that there is always something in season at Eatwell Farm. It also helps to ensure the farm’s success: If one crop is damaged by bad weather or pests, Nigel and Frances can still sell their other crops. “Diversity is the key to a healthy farm,” says Nigel.

Another crop grown at Eatwell is lavender. Nigel started growing it as a hobby and then grew it on a large scale for sale. The Eatwell Farm crew often stuffs bunches of lavender in baskets delivered to consumers who subscribe to a weekly delivery of produce through the Community Supported Agriculture program. “It’s a freebie,” Nigel says with a laugh.

However, Nigel and Frances have been surprised by how many recipes, especially from fine restaurants, use lavender as a food flavoring. Flans, custards, cookies, salads, and some savory dishes can actually be enhanced with the delicate flavor of lavender.

Unlike many jobs, being a farmer means working seven days a week. But Nigel says, “I enjoy what I do. Every day is really different. Running a farm involves many different tasks, like using machinery, learning about soil and plants, working with people, meeting your customers and learning what they want.” Nigel and Frances not only work in the field, but also take their crops to the farmers market. They have even designed their own Web site and newsletter.

Over the years, Nigel and Frances have gotten to know many of their regular customers. “They’re really appreciative of what we do,” says Nigel, “and this keeps me going on those cold, rainy days out in the field.”



Apples

Although apples have been eaten in Europe and western Asia since prehistoric times, they were not domesticated until about 2,500 years ago when the ancient Greeks discovered grafting. Today apples grow in temperate climates throughout the world.

In the 1600s, the Pilgrims brought apples with them from England and established the first orchards in North America. Soon after, the colonists began fermenting the fruit for cider, which became a very popular beverage.

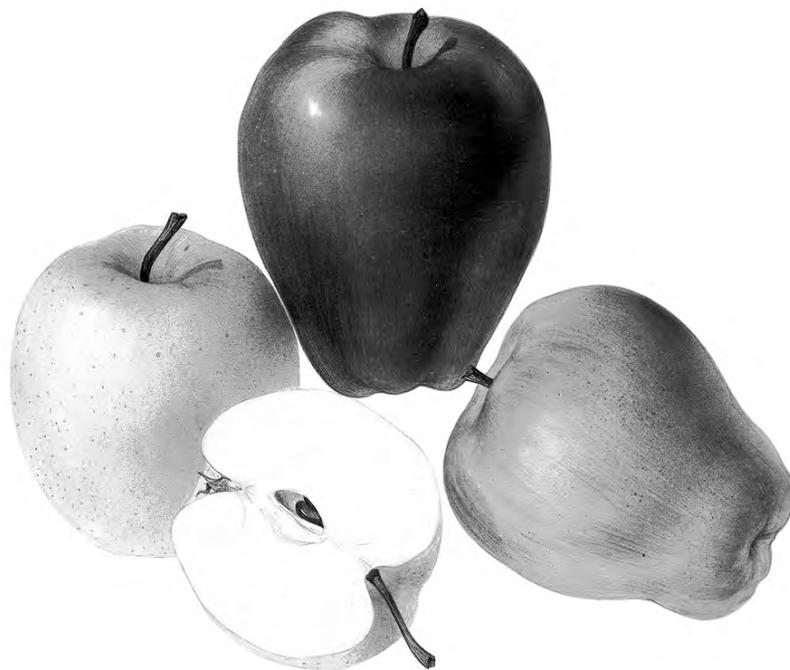
A beloved American folk hero, Johnny Appleseed, introduced the apple to the rest of the United States. Born in 1774 as John Chapman, Johnny Appleseed was a knowledgeable horticulturist and is credited with propagating apple trees throughout the country.

Apples are pomes, a class of fruit that possess seeds encased in membranous chambers sur-

rounded by fleshy fruit. Apples range from juicy, crispy varieties that are best eaten out of hand to softer types that are better for applesauce or desserts. Many people are familiar with the common Red Delicious, Golden Delicious, Granny Smith, Pippin, and Fuji varieties of apples. Some of the lesser-known delicious eating apples include Pink Pearl, Arkansas Black, Spritzenberg, Sierra Beauty, Cox's Orange Pippin, Orleans Reinette, and Ashmead's Kernel. There are also varieties of apples that resemble wild apples called *crab apples*. They bear fruit that are small and sour. Farmers plant a few crab apple trees in their orchards to pollinate the other "eating" apples.

Seasonality and Growing Conditions

The leading regions in apple growing are Washington state (U.S.A.) and the countries of China, Poland, Turkey, France, and Italy. There are approximately 7,000 known varieties of





apples, but only about 50 are grown commercially in the United States.

Most apple varieties are self-sterile, meaning they are unable to pollinate themselves and rely upon cross-pollination from bees. Crab apple trees are the best source of pollen for cross-pollination.

Apple trees can range from full-sized trees reaching 25 to 40 feet in height to dwarf varieties that are only four to eight feet high. On average, the trees begin producing fruit at between three and 10 years of age and can continue to do so for up to 100 years.

Apple trees prefer a temperate climate and require winter cold (chilling). The trees must be pruned every year to produce flower buds. During the spring and summer, apple trees require frequent watering. If there is enough water, apple trees can tolerate a great deal of summer heat.

Sustainable Farming Issues

Apple trees are susceptible to many pests and diseases difficult to control. Conventional apple farming uses frequent applications of pesticides to control these problems. The popularity of organic apples increased in the 1990s after the 1989 Alar contamination scare frightened consumers away from purchasing conventionally grown apples. Alar, a chemical compound used to redden apple crops, was discovered to pose a cancer risk, and its use was eventually banned on domestic apple crops. While more labor intensive, organic apple farming is viable.

Apples are prone to a number of fungal and bacterial ailments, the most common of which

are fireblight and apple scab. Fireblight, so named because the branches look as though they were burned by a fire, is a bacterial infection that enters the tree through the blossom in the springtime. It is a serious disease that can kill the tree. Conventional and organic growers generally control fireblight by cutting off affected branches.

Apple scab and other fungal diseases cause scars called *russetting* on the fruit. It is not harmful to eat russeted fruit. In sustainable agriculture it is controlled by building soil health. Using cover crops and spraying compost “tea” are ways to build soil health.

The greatest challenge for organic apple growers is the codling moth, which in conventional agriculture is controlled by frequent application of pesticides. Organic producers use beneficial insects and pheromone confusion and diligently remove wormy fruit. Codling moth worms (larvae) grow up inside the apples. They eat a hole in the apple, and mold grows where they have been. Never eat an apple that has mold in it; the mold is carcinogenic.

Selection, Storage, and Nutrition Information

Early apple varieties tend to have tender flesh and low acid. Therefore, they last only a few weeks in storage. The shelf life for fall varieties varies. In general, apples that have dense, firm, acidic flesh can be stored longer than softer-fleshed apples and hence are dubbed the “keepers.” Apples should always be stored in a cool, dark place. Choose fruits that have firm, tight skins and that are free of wrinkles and bruises. Apples are a good source of fiber.

Waldorf Salad

Preparation Time: 30 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

This recipe provides students with the opportunity to sample many different flavors in one meal. Sweet-tart apples, such as Granny Smith, Rome, Newton, pippin, and Gravenstein, contrast well with the sweet grapes. While students make this recipe, they can investigate the differences in flavors as well as the different parts of the plants used.

Objectives

Students will be able to:

- Compare the different flavors and types of crops.
- Determine which part of a plant is used for food.

Ingredients

For a class of 20:

- 2 cups shelled walnuts*
- 8 apples, large
- 2 cups red seedless grapes
- 1 head celery
- 1 cup mayonnaise
- 1 to 2 lemons, juiced

Materials

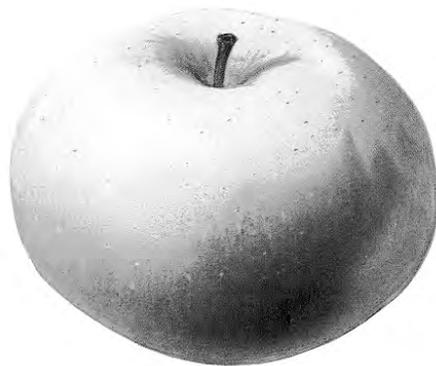
For the class:

- colander
- 1 large or 2 medium mixing bowls
- 2 large serving spoons
- measuring spoons
- 2 measuring cups

For each group of 4:

- 2 cutting boards
- 2 knives
- 1 mixing bowl
- 4 plates
- 4 forks
- 4 plates

* Check to make sure no students are allergic to walnuts.



**Preparation**

1. Chop the walnuts, or you may buy walnuts in the shell and have the students shell the walnuts before chopping them. If you do, add nutcrackers to your materials list.
2. Wash all produce and dry it in the colander.
3. Have students wash their hands. Discuss proper handling of food.
4. Have each small group share preparation responsibilities for a small part of all the ingredients in this salad. Each table will need 2 apples, $\frac{1}{2}$ cup walnuts, $\frac{1}{2}$ cup grapes, and 1 celery stalk.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Determine which students in each group are going to prepare the various ingredients: apples, grapes, celery, and walnuts.
2. Before handing out ingredients, demonstrate to the whole class how to prepare each item. Quarter and core an apple and cut it into $\frac{1}{2}$ inch cubes. The celery stalk should be finely sliced. The grapes should be cut in half. Chop walnuts coarsely—cut each half into fours.
3. Provide each table with materials and ingredients. One student from each pair can get the group's materials; the other can get the ingredients.
4. Circulate among the groups, helping students work.
5. Have students place all the prepared ingredients in their group's small mixing bowl.
6. Gather each group's ingredients into the large mixing bowl. Have a couple of volunteers measure the mayonnaise, lemon juice (squeeze lemons first), and honey (if using). Mix everything together.
7. Serve the salad to students and enjoy. While students are eating, ask them if they can pick out where on their tongue they taste the different flavors of the various ingredients.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Applesauce

Preparation Time: 20 minutes
 Cooking Time: 20 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Advanced

Background

Applesauce is simple to make, and children usually love it. It can be made with several different kinds of apples. Some common varieties of apples are Jonathan, Granny Smith, Red Delicious, Golden Delicious, Gala, and Fuji. If possible, pick apples of different colors to remind students that not all apples are red. Students can also taste apples and find that they vary in sweetness and texture.

In this activity, students make detailed observations of the common characteristics of apples. Ask students to draw and label the parts of the apple. After they have cut the apples for the sauce, ask them to discuss the function of each part of the apple. They will probably notice the skin (for protection), the fleshy part (which helps keep the seed viable and aids in seed dissemination), the seeds (for reproduction), and the stem (which attaches the apple to the tree). While waiting for the apples to cook, students can write their ideas in their journals. Once the applesauce is made, students may eat it while they share ideas from their journals.

Objectives

Students will be able to:

Identify different varieties of apples.

State the parts of the apple.

Understand the functions of different parts of the apple.

Ingredients

For a class of 20:

12 large apples
 water or 2 cups apple cider
 for all or part of the water
 2 cinnamon sticks (optional)
 or 1 tablespoon cinnamon
 (optional)
 1/3 cup sugar (optional)

Materials

For the class:

food mill, potato masher,
 or food processor
 1 large mixing bowl
 4-quart heavy, deep pot
 with lid
 knife or apple corer/slicer
 wooden spoon
 serving spoon
 hot plate

For each group of 4:

2 cutting boards
 2 knives or apple
 corers/slicers
 4 bowls
 4 spoons
 4 napkins
 journals

**Preparation**

1. Wash the apples with water.
2. Set up the hot plate.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Review safety precautions for using knives and the hot plate.

Safety Precautions

Hot applesauce can cause serious burns. Use caution when stirring and blending the applesauce. Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Demonstrate wedging and coring apples, then cutting the wedges into several pieces. Point out that it is good to have pieces about the same size so that they cook evenly (about ½ inch is a good size). Have student pairs cut the apples. While the students cut the apples, they can make observations about the parts of the apple.
2. Place all apple pieces in the pot. Add enough water and/or cider so that it covers about half the apples. You may add a couple of whole cinnamon sticks to the pot, if desired.
3. Put the lid on the pot and cook the apples at low heat until they are soft. You will need to stir them a few times so they cook evenly. Be careful when you take off the lid: lots of steam will come out.
4. While the apples cook for about 10 minutes, have students work in their groups drawing and labeling the parts of the apple and discussing their functions.
5. When the apples are soft, remove the cinnamon sticks. Purée the apples by using a food mill, a potato masher, or a food processor. Add powdered cinnamon and sugar, if desired.
6. Serve and eat.
7. While the students eat, ask each group to share its observations about apples with the rest of the class. Facilitate the discussion so that students understand the parts of the apple and their functions.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Apple Crisp

Preparation Time: 30 minutes
 Cooking Time: 30 to 45 minutes
 Total Lesson Time: 1 hour and 15 minutes
 Recipe Level: Advanced

Background

Apple crisp is a simple, delicious dessert. It is best to use cooking apples. They retain their shape during cooking and have a good sweet-tart balance. Gravenstein, McIntosh, Rome Beauty, or pippin are good choices. Check your foodshed* to see what kind of apples are grown there. Walnuts or pecans could be substituted for the almonds.

This recipe works well when paired with a comparative tasting; during the baking time students can taste and investigate many different types of apples (see the section “Comparative Tasting Format”).

Objectives

Students will be able to:

Discuss mixtures when making the topping for the apple crisp.
 Use their senses to observe different aspects of a variety of apples during comparative tasting.
 Record observations and write conclusions in their journals.

Ingredients

For a class of 20:

12 medium apples
 1 cup almonds or walnuts
 ½ cup sugar
 ¾ cup brown sugar
 2 cups flour
 1 cup butter, softened
 2 tablespoons lemon juice
 1 teaspoon cinnamon
 ½ cup water

Materials

For the class:

1 large mixing bowl
 1 medium mixing bowl
 colander
 baking sheet
 oven
 timer
 knife or food processor
 2 10-inch round or
 9-inch x 9-inch square
 baking pans or dishes
 measuring spoons
 3 measuring cups
 2 serving spoons

For each group of 4:

2 cutting boards
 2 knives
 2 vegetable peelers
 2 mixing spoons
 2 bowls
 4 napkins
 4 plates
 4 forks
 journals

*See glossary.

**Preparation**

1. Wash apples with water and dry in the colander.
2. Clean and set up tables.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Preheat oven to 375°F.

Safety Precautions

Review safety precautions for using knives and the oven. Let the crisp cool before serving as it will be very hot.

Making the Recipe

1. Place almonds on the baking sheet and in the oven to toast; set the timer for 7 minutes. While almonds toast, demonstrate peeling, coring, and slicing the apples (peeling the apples first is optional). Point out that apple slices should be the same thickness, about ½-inch width is good.
2. Divide the apples among the groups. Have students slice apples and place them in small bowls.
3. When the almonds are cool, have student groups chop almonds and place them in separate small bowls.
4. Have each group contribute its apples to the large mixing bowl. Mix the apples with ¼ cup white sugar, the lemon juice, cinnamon, and water.
5. Ask for volunteers to measure the rest of the sugars and flour into the medium mixing bowl. Mix the ingredients. Have other volunteers measure, cut up, and mix the butter into the flour-sugar mixture. When the mixture holds together and looks crumbly, stir in the chopped almonds.
6. Have some other volunteers spread the apples out in the baking pans and cover them with the topping. Place the pans in the oven at 375°F for 30 to 45 minutes until a knife can penetrate the apples easily.
7. While the apple crisp bakes, have students do the comparative tasting (see Background) using apples.
8. If possible, let the crisp cool a bit before serving as it will be very hot. Allow students to discuss, using their senses to make observations, how cooking apples change. Have them record their ideas in their journals.
9. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Fooling Moths – Natural Pest Control

Preparation Time: 10 minutes
Total Lesson Time: 30 to 40 minutes

Background

In this activity, students learn about one organic farming technique that helps eliminate one type of pest, the codling moth. If you have eaten many apples over your lifetime, you probably have encountered a “worm” in at least one of those apples. Those things that look like worms in apples are actually the larvae of a codling moth. A *codling* is an immature apple. Codling moths afflict apples of all sizes, including codlings.

Adult codling moths emit a particular scent, called a pheromone, which enables them to find each other at mating time. After they mate, female codling moths lay their eggs on the apple, and when the eggs hatch, the larvae eat their way into the apples. These larvae are the “worms” that you find in your apple. Eventually, each larva will leave the apple, form a cocoon, and develop into an adult codling moth.

Since farmers know that codling moths use pheromones to mate, farmers use this fact to prevent moths from eating and destroying their apples. Farmers set out pheromone emitters, which overwhelm the moths’ sense of smell, confusing them so they cannot find each other to mate.

Objectives

Students will be able to:

Understand the life cycle of codling moths and how they use pheromones.

Explain how organic farmers can control codling moths without using pesticides.

Materials

For the class:

- peppermint oil or other scent
- masking tape
- 2 healthy and 2 “wormy” apples
(see Preparation)
- film canisters (one per student)
- cotton balls (one per student)
- Apple Farm farm profile
- journals

**Preparation**

1. Obtain two healthy and two “wormy” apples from a neighbor’s yard or ask at your local farmers market.
2. Place cotton balls into film canisters.
3. Scent two of the cotton balls with peppermint oil.
4. Place a small strip of tape on the bottom of the two scented canisters to represent mating moths.

Doing the Activity

1. Show the fruit to students, asking for their observations about the healthy and the unhealthy fruit. Cut the fruit in half so that students can also observe the insides. Have them write in their journals their observations about the fruit and ideas about why there may be differences between them.
2. Read the farm profile. Ask students what they understand about codling moth “worms.” If necessary, explain to them the life cycle of codling moths and how pheromones help them find mates.
3. Explain that students will act out how pheromone strips prevent codling moths from mating. Give out canisters to students. Explain that two of the students are moths looking for their mates; they are the ones with the tape on the bottom of the film canister. Have students look at the bottom of the canister but not say out loud whether they are a moth or not. Have students use their noses to find their mates.
4. Solicit observations from the students about what happened. (The students with the scented canisters paired up.)
5. Collect the canisters and scent all cottonballs while students write their observations in their journals.
6. Give out canisters again and have the “moths” pair up again by using only their sense of smell. Since this time everyone is scented, it will probably be very difficult for the moths to find their mates.
7. Have students discuss the differences between the two activities. What variables changed? How did that affect the students’ ability to identify mates? How does this activity relate to what farmers do with codling moths?
8. After the discussion have students write their conclusions and supporting ideas in their journals.

Apple Farm



At Apple Farm in Philo, a small community in the Anderson Valley in Northern California, growing and selling apples is a family affair.

Three generations live and work on the farm. Karen and Tim Bates bought the property in 1983 and have raised four children there. Karen's parents, Don and Sally Schmitt (who years ago founded one of California's most famous restaurants, the French Laundry in the Napa Valley), came to live on the farm several years ago. Growing and selling apples is the main focus at the farm, but the Bates family also makes and sells apple jams, jellies, and vinegars. They produce these in a big kitchen they built on their property.

Recently, they decided that a lot of people might like to make their own chutneys and jams, so they started a series of cooking classes at the farm. "The majority of the apples we sell are Golden Delicious," says Karen, "although we grow 60 different varieties." Many of the varieties the Bateses grow are ones you will never see at the supermarket, though 50 or 100 years ago those were common varieties well known in different parts of the country. Often the apple names suggest the place where they were grown originally. They have interesting names: Sierra Beauty, Splendor, Arkansas Black, and Pink Pearl, which is bright pink when cut open.

Apple Farm is located on the banks of the Navarro River. Beyond the orchards, near the river, a lot of land has been left wild, which means there are many birds and other wild animals. In the orchards, which take up 18 acres of the farm, there are about 1,800 apple trees and 200 pear trees—2,000 trees altogether.

Apple trees cannot be grown from seed because seedling trees do not resemble their parents and usually have sour fruit. Instead, growers graft a branch from a chosen variety, such as Sierra



Beauty, onto a seedling tree or to a *rootstock* variety that has been specially bred to resist soil-borne diseases or to influence the shape of the tree. It takes between five and 15 years for the tree to mature and bear fruit.

The Bateses farm organically. “We built our house out in the middle of the orchard,” says Karen, “so it’s especially important to us to not use harmful pesticides. We want our kids to be able to run out and play in the trees.”

One of an apple grower’s worst enemies is the codling moth, a tiny insect that lays eggs on the trees in spring and that can do great harm to the crop. To decrease the moth population, the Bateses hang up pheromone strips, which emit a scent that is identical to the scent of the female moth. With this scent all around them, the male moths usually cannot find the females. Of course, if the moths do not mate, there are no eggs.

You may think of wasps as a big nuisance when they swarm around your food at a picnic, but one species of wasps is an organic apple farmer’s friend. This wasp is a natural enemy of the codling larvae because it lays its eggs inside the codling moth worm. The young wasp eats the worm from the inside out. Karen and Tim purchase those particular wasps and grow lots of blooming flowers to make sure there is a healthy habitat for the wasps. The wasps are tiny and do not sting.

Karen is happy to have three generations living and working on the farm. “It takes all of us to make things work, and we each have different areas that we’re best at,” she says. Her husband, Tim, manages the orchard,

while Karen tends the garden and does the bookkeeping. Her father, Don, is in charge of building and maintenance, and her mother, Sally, oversees the cooking classes and the commercial kitchen.

The kids help out wherever they are needed—sometimes in the kitchen, sometimes in the orchard, and sometimes at the farm stand by the road where they sell apples and apple products to visitors. The children also take care of all farm animals: ducks, pigs, rabbits, horses, a cow, cats, and two dogs. “My husband and I don’t have time to take care of the animals, so my kids know that if they want animals, they have to tend to them,” Karen explains. Karen and Tim admit that they did not know a lot about farming before they bought the Apple Farm. Over the years they have learned through experience.



Polly Bates, one of the four Bates children, likes picking her own ripe Golden Delicious apple.

Peppers

Throughout history, peppers have been a staple ingredient in the cuisine and folklore of indigenous peoples of the Americas. Peppers, like tomatoes, are members of the Capsicum and nightshade family and are native to tropical Central and South America, where they grow all year as perennials. In most of North America, including California, they are annual plants, dying after the growing season. Botanically, peppers are classified as fruits.

There are two main types of peppers, sweet and hot, as well as many in between. In general, sweet peppers have a thicker skin and milder taste and are larger than hot peppers. Popular varieties include pimiento, Sweet Banana, and many varieties of the ubiquitous bell. Hot peppers or chile peppers were introduced to Europeans by Christopher Columbus from his travels in the New World. Chile peppers are an important ingredient in the cuisines of Africa, China (Szechwan), India, Mexico, South America,

Spain, and Southeast Asia. There are hundreds of varieties of chile peppers, most of which are indigenous to Mexico or Central America. Chile peppers can range in size from 1 inch to 12 inches in length. Most of the chemical that gives chiles their fiery flavor is contained in the ribs and seeds of the fruit. Chiles are rated according to the Scoville scale, which ranks the intensity of their heat. The Scotch Bonnet, Chile de Arbol, and the Habanero are some of the hottest peppers according to the Scoville scale. Some Southeast Asian chiles may be even hotter.

Seasonality and Growing Conditions

Peppers are available year-round but are at their peak at California farms from July through October. Because they are in the same botanical family as the tomato, they like the same growing conditions. In Northern California, peppers must be started indoors because they are very sensitive to the cold. The plants require warm,





sunny conditions and must be planted in fine, loose soil with good drainage. Humus (organic matter that is in an advanced state of decomposition) is also necessary to provide nutrients.

Sweet pepper plants typically produce between four to eight fruits per plant. The fruits are picked with a 1/2-inch stem still attached. Peppers may be harvested while still green, which makes for a milder flavor in both hot and sweet varieties. Red, mature peppers will have either a sweeter or a hotter flavor. Peppers are also available in a rainbow of colors, including yellow, orange, purple, and black. Chiles are often sold smoked or dried.

Sustainable Farming Issues

Peppers are not very susceptible to insect pests. Cutworms pose the biggest threat and

may be kept away from the plants by placing cardboard collars around the plant stems. Mosaic, a viral infection, is a more serious worry. It causes malformed, mottled leaves and stunted plants. It is best to remove and destroy any affected plants and thoroughly wash hands and garden tools to prevent the spread of infection.

Selection, Storage, and Nutrition Information

When choosing peppers, look for ones that are shiny, smooth, firm, plump, and without wrinkles, cracks, or bruises. They should feel heavy for their size. Peppers can be stored in the refrigerator for up to two weeks. Peppers contain high-potency vitamin C and are a good source of vitamin A.

Quesadillas with Sweet Peppers

Preparation Time: 30 minutes
 Cooking Time: 10 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Advanced

Background

This recipe is a favorite of students. When assorted sweet peppers are used, the recipe is an excellent opportunity for students to practice learning a new vocabulary that describes tastes, textures, visual features, and smells. Use a variety of sweet peppers: California Wonder, pimiento, and Yolo King are all good sweet varieties. Peppers may be eaten when they are at an immature green stage, but to really experience the different sweet flavors, you should buy or pick peppers at their ripest.

Although the recipe usually uses only sweet peppers, you may wish to introduce some of the milder hot pepper varieties. Some common varieties are jalapeño, serrano, and New Mexico (also known as Anaheim). Jalapeños are small (two to three inches long), smooth, and usually dark green. As they ripen, they tend to turn bright red. They are considered medium hot but will probably be too hot for most students. Serranos (one to two inches) are even hotter than jalapeños. They can vary in spiciness, depending on ripeness. When they are dark green, they are milder. As they turn to red, orange, and even yellow, they become hotter and hotter. New Mexico chiles, which are medium hot, are commonly seen in the Southwest hanging in *ristras* (bunches of chiles tied together).

Many children prefer to eat sweet peppers raw rather than cooked. However, in traditional Mexican cooking, peppers are usually sautéed and are called *rajas*. You may want to try sautéing some of the peppers and see which ones the children prefer in their quesadillas.

Objectives

Students will be able to:

- Identify different varieties of sweet and hot peppers.
- Use new vocabulary to describe sense experiences.
- Prepare peppers for cooking.

Ingredients

For the class:

- 8 to 12 assorted peppers,
depending on size
- 1 red or white onion (optional)
- 3 bunches cilantro
- 2 lbs Monterey Jack cheese
- 3 tablespoons olive oil
- 10 to 20 flour or corn tortillas,
preferably handmade
- ½ teaspoon salt

Materials

For the class:

- 1 heavy sauté pan with lid or
electric skillet or griddle
- hot plate
- colander
- measuring spoons
- 4 large mixing bowls
- box grater
- oven (optional)
- knife
- cutting board

For each group of 4:

- 2 cutting boards
- 2 knives
- 3 bowls
- 4 napkins
- 4 plates
- journals

**Preparation**

1. Wash vegetables and dry them in the colander.
2. Clean and set up tables.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Divide the vegetables equally for the five groups.

Safety Precautions

Review safety precautions for using knives, the hot plate, and the oven.

Making the Recipe

1. Allow students time to examine whole peppers, make observations, and record their observations in their journals.
2. Demonstrate how to cut open a pepper, wash or wipe out the seeds, and cut up the flesh into thin strips. Also show how to peel the onion, cut it in half, and hold the cut side on the cutting board as you dice the onion.
3. Divide the peppers, onions, and cilantro among the groups for chopping and placing in separate bowls. As they chop, students can discuss and share descriptive words with others in their group.
4. Have one group grate the cheese.
5. Gather all the cilantro into one mixing bowl, all the peppers into another bowl, and all the onions into another bowl. Separate any hot peppers and place in their own small bowl.
6. Gather students around the demonstration table to watch the cooking. Toss peppers with the oil and salt.
7. Heat a large, heavy pan over medium heat and add a tortilla. Flip over the tortilla when it begins to get crispy, and sprinkle on it some grated cheese, peppers, cilantro, and (optional) onion.
8. Remove the quesadilla and place it in a warm oven to hold until all are made. If you like, you can fold the quesadilla in half with the filling in the inside.
9. While you cook the other quesadillas, have students return to their seats and plan using descriptive words to tell a story about a delicious eating experience.
10. Cut each quesadilla in half and serve on small paper plates. While students eat, have them record their taste sensations by using descriptive words. Have the class share story ideas and begin writing the stories.
11. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Bulgur Salad with Red Peppers, Cucumbers, & Cheese

Preparation Time: 30 minutes
 Cooking Time: 30 minutes
 Total Lesson Time: 1 hour and 15 minutes
 Recipe Level: Advanced

Background

This Moroccan salad is a staple for the people of the Atlas Mountains in northern Africa. It is a wonderful lesson in which to discuss ethnic foods and foods grown in specific regions throughout the world. The recipe is a bit time-consuming, but it allows students to experience several facets of cooking: preparing the vegetables, roasting the peppers, observing the bulgur absorb the water, and mixing the ingredients together into a salad.

Objectives

Students will be able to:

Observe, demonstrate, and name the different facets of the cooking process (preparing, roasting, absorbing, and mixing).

Understand the functions of different tools for cooking.

Ingredients

For a class of 20:

- 6 red bell peppers
- 3 cups bulgur
- 5 cups water
- 2 bunches scallions
- 3 cucumbers
- 3 garlic cloves (2 if large)
- 6 tablespoons chopped mint
- 6 tablespoons chopped cilantro
- 3 cups feta cheese, crumbled
- 9 tablespoons lemon juice
- salt and pepper
- $\frac{3}{4}$ cup olive oil

Materials

For the class:

- 1 large mixing bowl
- hot plate
- colander
- measuring spoons
- 2-quart pot
- oven

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 bowls
- 4 napkins
- 4 forks
- 4 plates
- journals

**Preparation**

1. Wash vegetables and dry them in the colander.
2. Have students wash their hands. Discuss proper methods of handling food.
3. Preheat the oven to 400°F and put water on the hot plate to boil.

Safety Precautions

Review safety precautions for using knives, the hot plate, and the oven.

Making the Recipe

1. Place the peppers in the preheated oven for 20 minutes and roast them until skins are blistering.
2. Place the bulgur in a bowl and add the boiling water. Keep the bulgur covered for 20 minutes.
3. Demonstrate how to chop scallions, cucumbers, garlic, mint, and cilantro. Provide each group with a portion of these ingredients to prepare.
4. Have groups prepare the ingredients and place them into separate bowls.
5. Have one group crumble the cheese.
6. When the peppers are ready, give students time to examine the whole roasted peppers. Peel off the skin and then cut the peppers into ¼-inch strips.
7. In a small bowl, mix the lemon juice with 1½ teaspoons salt and ¼ teaspoon pepper, then stir in the olive oil. Now add and stir in the chopped herbs.
8. Show students the bulgur, pointing out how it absorbed the water. Stir the oil mixture into the bulgur and add the chopped vegetables. Stir and taste for salt and pepper seasoning. Add crumbled cheese and serve on small paper plates.
9. While students eat, review with them the different tasks involved in the cooking process.
10. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Making a Harvest Garland

Preparation Time: 20 minutes
Total Lesson Time: 50 to 60 minutes, plus
10 to 15 minutes at least
one week later

Background

In the Southwestern United States, people string fresh chiles and hang them to dry. These beautiful strings of peppers, called *ristras*, are used both for cooking and for decoration. In this activity, students string a variety of plant materials into a garland to take home for a lovely fall harvest decoration.

You can get free or inexpensive materials for making garlands from a number of sources: your school garden, students' yards or kitchens, or your local farmers market (ask for leftover produce that would be appropriate for drying).

Objectives

Students will be able to:

Observe the changes of the chiles and other plant materials as they dry.

Produce a garland for home decoration.

Materials

For the class:

assorted chiles
an assortment of other plant materials
for stringing: Indian corn (red, blue,
and other colors); popped popcorn;
cranberries; tiny pumpkins; seed pods;
decorative leaves, such as maple or
eucalyptus; decorative fruits, such as
pyracantha or toyon; apple or Fuyu
persimmon slices; small pomegranates;
garlic bulbs; and marigolds, cosmos,
or other small flowers
heavy thread
newspaper

For each group of 4:

4 copies of Tierra Vegetables farm
profile (optional)
4 large embroidery needles
4 plastic bags
journals

**Preparation**

1. Clear an area near a sunny window where you will be able to hang garlands for about one week to dry in the sun.
2. If using dried Indian corn to make the garland, soak the corn overnight so that it is soft enough for students to string.
3. Cut heavy thread into three- to four-foot lengths, one per student.
4. Clean and set up tables. Cover the tables with newspaper.

Doing the Activity

1. Ask students if they have ever seen dried fruits or vegetables; ask them how drying helps prolong the useful life of produce.
2. (Optional) Have students read the Tierra Vegetables farm profile. Discuss how drying and smoking the chiles helps Lee and Wayne sustain their farm during the months when they cannot sell fresh peppers.
3. Give each group of students two different chiles to observe. Ask them to draw the chiles in their journals and to write observations about their texture, smell, and color.
4. Give each student a length of thread and a needle. Demonstrate how to thread the needle and to tie off the end. Show students the assorted materials from which they will create their garlands. Point out that apple or Fuyu persimmon slices should be strung with the thread running parallel to the flat side; this will allow the slices to dry more quickly. It is also a good idea to tie a knot in between fresh (and dried) materials to space them apart so that mold will not form. When stringing chile peppers, students should *tie* the thread around the stem and *not* use the needle (avoid contamination by the burning chemical). Make sure that students wash hands carefully after handling chiles.
5. Allow time for students to create their garlands. If possible, encourage each student to include at least one chile in the garland.
6. Hang the garlands horizontally in a sunny window for a week or more to dry.

Day Two (At least one week later)

1. Have students make observations of the dried chiles, draw a picture in their journals, and write observations about texture, smell, and color. Compare observations of the fresh and dried chiles. Also discuss observations about how the other plant materials have changed.
2. Provide plastic bags for students to take their garlands home to enjoy with their families.

Tierra Vegetables

How many different kinds of peppers can you think of?

Chances are farmer Lee James can think of more. On their farm, Tierra Vegetables, in Healdsburg, Lee and her brother Wayne grow 70 different varieties of sweet and hot peppers in a wide range of shapes, sizes, colors, and flavors. Most people would consider 70 to be a large number, but Lee says it is only a fraction of the number of pepper varieties out there: people in countries all over the world grow literally thousands of different kinds of peppers.

Peppers are divided into two main types: sweet and hot. Sweet peppers have no heat, just a pleasant, mild taste. Hot peppers are also called chiles. “Hot peppers can have a little or a lot of heat,” Lee explains. “The hotness comes from a clear liquid chemical held in blisters in the pepper’s pith, the white fiber where the seeds are found.” That is why you can reduce the heat of even very hot peppers by removing the seeds and the fibrous pith.

The outside of a hot pepper is not hot. “You can take the whole pepper and put it in your mouth,” says Lee. But once you cut into it and break the blisters, watch out! Some peppers are so hot you should wear rubber gloves when you cut them up, or you can actually get blistery burns on your hands. And you certainly would not want to put a cut-up hot pepper straight into your mouth. Hot peppers need to be mixed with a lot of other food before they are edible.

Chile de Arbol and Habañero chiles are two of the hotter varieties. Lee explains that a long spell of hot weather will make these peppers even hotter.

At Lee’s and Wayne’s farm, the peppers begin their lives in trays in the greenhouse, where seeds are planted in March. From there, the tiny plants are transplanted to six-pack containers. When the plants are big and strong enough, they are planted in the field, usually in May or June. Lee plants the peppers from the back of a tractor her brother drives around the field. The peppers ripen in the summer heat and are ready to be picked from July through October.

Starting in October, Lee and Wayne dry and smoke their peppers to sell at farmers markets during the winter. To smoke the chiles, Wayne built a special smoker—a big box with trays stacked in it and a wood-burning fire underneath. The smoked chiles are called *chipotles*, which is an Aztec word meaning *chile* and *smoke*. Chipotles are used in Latin American cooking. Lee and Wayne sell their peppers throughout the San Francisco Bay Area, at farmers markets. “We sell at markets on Saturdays and Sundays,” says Lee. “Sometimes I think it would be nice to take a day off and maybe not work the Sunday market, but then we’d have a lot of disappointed chile eaters on our hands.”



Lee James plants the peppers from the back of a tractor her brother Wayne drives around the field on their farm, Tierra Vegetables.

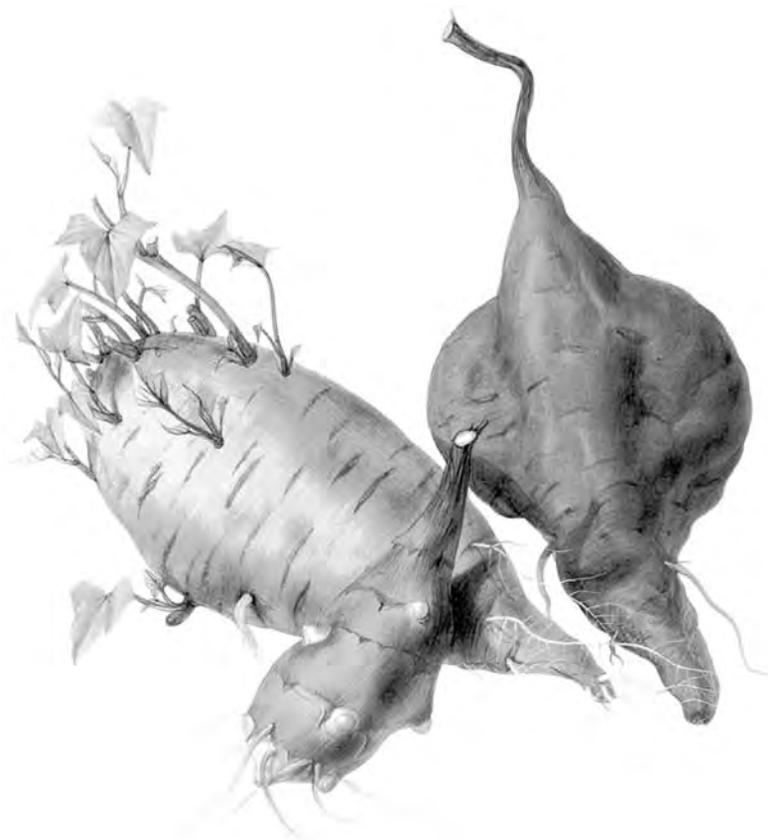
Sweet Potatoes

Sweet potatoes are a root vegetable with a sweet taste and flesh that ranges in color from yellowish-white to dark orange. They are native to a large area from central Mexico to tropical South America. Sweet potatoes are members of the morning glory family. They should not be confused with potatoes, which are in the nightshade family.

Sweet potatoes are also sometimes confused with yams, another crop in the morning glory family and a native of tropical Africa and Asia. Yams produce tubers (not roots). To make matters more confusing, sweet potatoes are sometimes labeled yams in retail food stores.

The most commonly grown varieties of sweet potatoes in California are Garnet and Jewel. Both have a tender, moist flesh when cooked, but Garnet has a higher moisture content.

Garnet sweet potatoes have a purple-red skin and a deep orange, moist, and sweet flesh. They are often sold canned under the name *candied yams*. Jewels have copper or tan flesh and a sweet, somewhat mealy consistency. Other often-seen varieties are Jersey, Japanese (also called *Koto-buki*), All Gold, and Puerto Rico.





Seasonality and Growing Conditions

As tropical plants, sweet potatoes are very sensitive to frost. They are harvested in the fall but are available year-round due to cold storage. However, sweet potatoes are sweetest and most flavorful around harvesttime (fall).

Unlike other plants but similar to potatoes, sweet potatoes can sprout shoots from their roots. In March, sweet potatoes or their roots are placed in covered hot beds filled with moist sand or sawdust. The sweet potatoes will sprout numerous baby roots and slender shoots with small leaves. In mid-May when the soil is warm, the sturdiest shoots, called slips, are replanted in the fields. Slips should be between eight and 12 inches long. Sweet potatoes like a hot, dry climate, and the areas around the vines should be kept free of weeds. They grow best at 90 degrees or higher.

Sweet potatoes require lots of water, typically requiring irrigation once or twice a week. In August or early September, water is cut off to allow the potatoes to cure. Curing the potatoes helps them to last longer in storage. After curing, a mechanical digger-harvester unearths

the potatoes, and workers sort them by size. Sweet potatoes may also be cured by placing them in a hot, well-ventilated place for up to four to seven days, after which they will be shipped to market.

Sustainable Farming Issues

Black rot, soft rot, and scurf are diseases that may affect sweet potatoes. These can be controlled in one of two ways without chemicals: by hand removal of infected leaves or by using only healthy roots for replanting.

Selection, Storage, and Nutrition Information

When purchasing sweet potatoes, choose ones with smooth, firm skin and no bruises or cracks. To store, place the potatoes for up to four weeks in a dark, dry place that maintains a temperature of about 55 degrees. Do not refrigerate as this will convert the potatoes' natural sugars to starch and destroy the flavor and texture. Sweet potatoes are high in vitamins A and C and are a good source of fiber and potassium.

Make-Your-Own Baked Sweet Potato

Preparation Time: 5 minutes
 Cooking Time: 45 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Easy

Background

For many students, baked whole sweet potatoes are a new experience. While preparing and eating them, students can examine and learn about the different varieties of sweet potatoes. Four varieties are commonly grown in California: Garnet, Jewel, Jersey, and Japanese (also known as Koto-buki). In markets, you can usually find all but the Japanese variety. Students can discuss the differences among these varieties and compare baked sweet potatoes to the baked potatoes they may be more used to.

Objectives

Students will be able to:

Understand why it is necessary to poke holes in sweet potato skins before baking.

Use their senses to compare different sweet potato varieties and topping combinations.

Ingredients

For a class of 20:

10 large sweet potatoes
 (assorted varieties)
 1 pint low-fat sour cream
 1 stick butter
 1 cup grated cheddar cheese
 1 cup brown sugar
 1 cup pecans or walnuts,*
 chopped coarsely

Materials

For the class:

colander
 baking sheet
 6 serving spoons
 oven
 4 small bowls
 1 knife
 fork

For each group of 4:

2 cutting boards
 2 knives
 4 plates
 4 napkins
 4 forks
 journals

*Make sure no students are allergic to pecans or walnuts.

**Preparation**

1. Wash potatoes and dry in the colander.
2. Clean and set up tables.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Preheat oven to 400°F.

Safety Precautions

Take care when removing sweet potatoes from the oven as they will be very hot. Allow them to cool slightly before serving to students.

Making the Recipe

1. Demonstrate how to poke holes with a fork into the sweet potatoes while leading a discussion about why it is necessary to do so. Sweet potatoes (and potatoes) have a water-tight skin. Without holes in the skin, the sweet potato would burst open because of the pressure inside. To prevent this, poke holes in the sweet potato skin to allow air and steam to escape. Students may use a fork to poke holes in the sweet potatoes' skin.
2. Place the sweet potatoes on a baking sheet and bake them for 30 to 45 minutes or until a knife can easily puncture the sweet potatoes.
3. Have students arrange the toppings (sour cream, butter, brown sugar, cheese, and nuts) in bowls on the demonstration table. Discuss with students which topping combinations might go well together. Have students predict in their journals which combination will taste best and suggest other toppings that might be good.
4. When baked sweet potatoes are ready, cut them in half. Serve half of a potato to each student. Students may arrange their own toppings.
5. While students eat, ask them to share their observations about how the sweet potatoes taste. Encourage students to try different potatoes and topping combinations. Washed skins are also edible.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Oven-Roasted Sweet Potato Chips

Preparation Time: 10 minutes
 Cooking Time: 20 to 30 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Easy

Background

Some people encounter sweet potatoes only at Thanksgiving. However, any time during the fall harvest season is a great time to try the sweet, savory taste of a sweet potato. This is an interesting recipe because it offers a delightful and surprising twist to chips. It also leads to thoughtful discussions about the differences between potatoes and sweet potatoes.

Objectives

Students will be able to:

Describe differences between potatoes and sweet potatoes.

Ingredients

For a class of 20:

10 medium sweet potatoes
 1 to 2 teaspoons salt
 pepper
 ½ cup olive oil

Materials

For the class:

1 large mixing bowl
 colander
 2 baking sheets
 large spoon
 oven
 knife
 measuring spoons
 2 serving spoons

For each group of 4:

2 cutting boards
 2 knives
 1 small bowl
 4 paper plates
 4 napkins
 4 forks

**Preparation**

1. Wash the sweet potatoes and let them dry in the colander.
2. Clean and set up tables.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Preheat the oven to 450°F.

Safety Precautions

Review safety precautions for using knives and the oven. Use caution when serving and eating the chips as they may be very hot.

Making the Recipe

1. Demonstrate how to slice sweet potatoes into half-moon shaped pieces. The safest way for students to do this is to slice the sweet potato in half lengthwise and then place the flat side on the cutting board to make $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch slices. You do not need to peel the potatoes.
2. Divide the sweet potatoes among the groups and have students slice the potatoes and place them in a bowl.
3. Gather bowls at the demonstration table. After students have gathered around the table, have a student volunteer place the slices into the large mixing bowl. Ask two volunteers to measure $\frac{1}{2}$ cup olive oil and toss the oil and salt with the sweet potatoes.
4. Ask other volunteers to arrange the sweet potato slices on the baking sheets in a single layer. At this point you may wish to ask students for their ideas about why you arranged the slices in this manner and why you put olive oil on the slices.
5. Place the slices in the oven for 20 to 30 minutes, checking frequently to make sure they do not burn.
6. While the sweet potato slices bake, make a T-chart on the board with the two columns labeled “Potatoes” and “Sweet Potatoes.” Lead a discussion comparing these two vegetables. Record student ideas on the chart.
7. When the sweet potato slices are golden and crispy, remove and season with more salt and pepper, if desired. Serve on plates and remind students to be careful if the chips are hot.
8. While students eat, ask them to share their observations about how sweet potato chips taste compared with French fries. Add their observations to the T-chart.
9. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Sweet Potato Pie

Preparation Time: 20 minutes
 Cooking Time: 1 hour and 30 minutes
 Total Lesson Time: 2 hours
 Recipe Level: Advanced

Background

This recipe combines the nutritious sweet potato with spices that bring out its sweet, savory taste.

Students who have never had sweet potatoes may be reluctant to try the pie, but it is a favorite of children all across the southern United States. The best variety for sweet potato pie is Garnet or Jewel. Both have a moist, tender flesh when cooked. Garnet has purple-red skin and deep orange flesh, and Jewel has copper or tan skin and bright orange flesh.

In this recipe students have the opportunity to learn about the nutritional value of the sweet potato while enjoying its sweet taste. You probably want to make two pies for 20 children since this recipe is very popular. (Double the following recipe for two pies.)

Objectives

Students will be able to:

Enjoy the nutritional significance of a sweet potato.

Ingredients

For a class of 10:

- 3 medium sweet potatoes
- ½ teaspoon cinnamon
- ⅛ teaspoon nutmeg
- ⅛ teaspoon cloves
- 1 teaspoon vanilla
- ½ cup brown sugar
- ⅓ cup white sugar
- 1 cup heavy cream
- 3 eggs
- pinch of salt
- 9-inch pre-baked pie shell
- 1 tablespoon orange juice concentrate (optional)

Materials

For the class:

- 1 large mixing bowl
- colander
- large spoon
- oven
- knife
- measuring spoons
- 2 serving spoons
- fork

For each group of 4:

- 2 plastic spoons
- 4 plastic forks
- 4 plates
- 4 napkins

**Preparation**

1. If you have no nutmeg or cloves, use 1 teaspoon cinnamon for the spices.
2. Wash sweet potatoes and dry them in the colander.
3. Have students wash their hands. Discuss proper methods of handling food.
4. Preheat oven to 400°F.
5. After showing the sweet potatoes to the class, puncture the skins with a fork and bake for 45 minutes.
6. (Optional) If you do not have an oven, steam cut-up sweet potatoes in a 4-quart pot by simmering for 15 minutes or until they are tender.

Safety Precautions

Allow sweet potatoes to cool before having students scoop them out. Review safety precautions for using the oven.

Making the Recipe

1. Lead students in a discussion of some of the nutritional benefits of sweet potatoes.
2. When sweet potatoes are cooked, have students use spoons to scoop out the fleshy part onto plates and place the skins into the compost bucket. Have them mash the flesh with their forks. When the flesh is fully mashed, have students place it in a large mixing bowl at the demonstration table. There should be approximately 1½ cups mashed sweet potato.
3. After students have gathered around the table, have volunteers measure and add spices and all other ingredients except the pie shell to the sweet potatoes.
4. Pass the bowl around so that each student can have a turn at stirring (three stirs per student is enough). Pour the mixture into the pre-baked pie shell and bake for 60 minutes at 325°F, until the crust is golden brown.
5. When the sweet potato pie is ready, cut and serve on plates. Remind students to be careful if the pie is hot.

Finding the Right Soil for Your Plant

Total Lesson Time:	1 to 1½ hours
Soil Observation:	10 to 20 minutes
Drainage:	20 to 30 minutes
Settling:	15 minutes

Background

This activity involves the comparison of three types of soil. Students will use their senses to observe characteristics of each type and perform two soil experiments. Students will look at one soil characteristic, texture, and think about how it affects the suitability of a particular soil for growing sweet potatoes, which are at risk of rotting should they sit too long in a soil where water does not drain quickly. *Soil texture* refers to the proportions of different size particles that make up soil. Sand, silt, and clay are terms that define particle size, with sand being the largest, silt the intermediate, and clay the smallest. These particles combine in varying proportions to comprise a range of soil texture classes: sand, loam, and clay.

Students will identify and think about the organic matter component of soils. Soil organic matter consists of a wide range of materials and is concentrated in the top two layers of the soil profile. The top layer is generally an inch or two thick and consists of fresh and decaying plant matter: fallen leaves, dried leaves, stems, and other plant parts. The next layer, called *topsoil*, consists of dead insects and worms, partially composted materials, and humus, the dark stable fine material that is no longer identifiable as having been a plant, animal, or other living thing. Topsoil is an area of intense biological activity where plant roots, bacteria, fungi, and animals perform various functions. In the settling experiment, students will find that the organic matter separates from the mineral components (sand, silt, and clay). When compared with the mineral components, organic matter is darker in color, feels different, and smells distinctive, especially when moist.

Objectives

Students will be able to:

Observe and identify the mineral components of soil (sand, silt, clay).

Observe and identify the organic matter component of soil.

See that one soil is not the same as another and that soil texture affects crop choice.

Materials

For the class:

- 1 quart sand from a sandbox
- 1 quart soil from the school yard
- 1 quart soil from the school garden
or 1 quart commercial potting soil
- ½ gallon water
- newspaper

For each group of 4:

- 4 copies of Nakashima farm profile (optional)
- 3 paper towels
- 1 1-quart clear plastic container
with tight-fitting lid
- 1 large funnel
- 3 coffee filters (size 4)
- 1 plastic cup
- watch or clock (with a second hand)
- journals

**Preparation**

1. On the day before the activity, have students collect soil from the school yard, school garden, and school sandbox. (If you do not have a school garden, you can use commercial potting soil.)
2. Clean and set up tables. Cover the tables with newspaper.
3. For each group, prepare three paper towels with a cupful of one of the three types of soil on each towel.

Doing the Activity: Soil Observation

1. (Optional) Have students read the Nakashima farm profile and discuss the soil requirements for sweet potatoes.
2. Ask students in each group to examine the three soils and to compare the color, texture, size of particles, and types of particles in each pile. Ask them to write down the features that make each pile different from the others.
3. Have volunteers from each group share their observations. On the board, write descriptive words for each type of soil. Ask students to predict which soil will allow water to drain the quickest. Have students write in their journals their predictions and the reasons for their predictions.

Drainage

1. Provide each group with a funnel, three coffee filters, a plastic container, and a plastic cup filled with water. Demonstrate how to put the coffee filter into the funnel and place the funnel on top of the plastic container. Demonstrate how to place a half cup of one of the soils into the funnel and then slowly pour the cupful of water into the funnel.
2. Ask students to set up the equipment as demonstrated and to measure the time it takes for the water to drain through each type of soil. Remind students to pour water into the filter at the same rate for each of the three trials. (Students will need to save the soil for the settling activity.)
3. Have students use the watch or clock to note the order of drainage (fastest to slowest) for the three soils and record the results in writing.
4. Have each group share its results. As a class, discuss reasons for differences in drainage rates. Have students write their conclusions in their journals.

Settling

1. Have each group empty one of the three coffee filters from the drainage activity into the clear plastic container. Students record the site where soil was collected. They are then to fill the container nearly to the top with water and twist the lid on tightly.
2. Have students shake the containers well and place them on a table. Have students observe and record which components of soil settle first. Record the total time needed for the soil to settle.
3. Have each group share its results. As a class, discuss reasons for different soils settling differently. Have students write their conclusions in their journals.

Nakashima Farms



For the Nakashima family in Merced County, growing sweet potatoes in California's Central Valley is a cherished family tradition.

Tom Nakashima's family has been farming near the town of Livingston for almost 100 years. Tom's father was part of the Yamato Colony, a Japanese American community established in Livingston in 1906. Tom and his wife have raised three daughters and a son on their farm. Late August to late October is harvesttime for sweet potatoes. By late summer, the fields are a tangle of low-growing vines with wiry stems and fleshy leaves. To check if the crop is ready for harvesting, Tom pulls some of the vines aside and shovels sandy dirt out of the way to reveal the swollen magenta roots: the ripe sweet potatoes. "I love to farm and to see things grow," he says.

In other fields, harvesting machines move slowly down the long rows of vines. The machines pull the sweet potatoes from the ground, then 10 men sort them by size and type. After the tractor-pulled machines pass, swarms of blackbirds land in the field to feast on the worms and other insects turned up by the harvest.

The Nakashima farm is a large family farm; it has 300 acres of sweet potatoes and more than 400 acres of almonds and peaches. The Livingston area is well known for its sweet potatoes. In the 1920s and 1930s, there were around 13,000 acres of sweet potatoes grown in this part of the valley. Today, there are only about 8,000 acres left, but they still provide most of the sweet potatoes eaten by people on the Pacific Coast.



Many crops would not do well in Livingston's sandy soil, but sweet potatoes thrive in it. Under that sand—which looks like beach sand in some places—there is a lot of water. And that is precisely the combination the tough sweet potato vines thrive on: sand and water.

Portuguese farmers who, like the Japanese, settled in the Livingston area almost 100 years ago were the first to plant sweet potatoes there. They knew that sweet potatoes can grow in soil too poor for many other food plants. Tom actually learned about sweet potato farming from a Portuguese neighbor who was renting land on the Nakashima farm during the 1950s. Tom has been growing sweet potatoes ever since, for almost 50 years now.

Sweet potatoes have brought prosperity to Livingston's Japanese American farming community and have helped the community to overcome the hardship of World War II. During that time, in the 1940s, the government ordered Japanese Americans to move to what were called internment camps. At the time, the United States was at war with Japan, and the government feared that Japanese Americans might become spies against the United States even though most of them had been living in the United States for a long time and were loyal American citizens.

When families such as the Nakashimas were finally able to return to their homes after the war ended in 1945, many of their businesses and farms were in a poor state, and most of their fruit trees were dead or dying. That is when a number of Japanese farmers started growing sweet potatoes because the crop can be harvested the same year it is planted, thus providing immediate income.

Tom recalls that the uprooting of their family made his father so bitter that he moved to Japan in retirement. Tom was only a high school student when all this happened, and he says younger people found it easier to adapt than their elders did. So he took up where his father left off and continued the family farm tradition. And he has been at it ever since.

Persimmons & Pomegranates

Persimmons and pomegranates are two of the most ancient fruits known to humans. Today's commonly cultivated persimmon was domesticated in China and Japan over 4,000 years ago. Many different persimmon varieties are grown in California. There is a species native to the United States though it is not commercially grown. The two most common types of persimmon are the intensely sweet Hachiya, which has a jelly-like interior when ripe, and the firm, spicy Fuyu, which has vivid orange flesh and apricot and cinnamon flavors. Hachiyas are ideal for puddings, cakes, and muffins, while Fuyus make excellent additions to salads and dessert toppings and can be eaten fresh, like apples.

Persimmons have a high tannin (an astringent substance found in some plants) content, which makes them mouth-puckeringly tart when unripe. The tannins also make even ripe persimmons corrosive to certain cookware, so be sure to use only stainless steel or enamel-coated pots and pans.

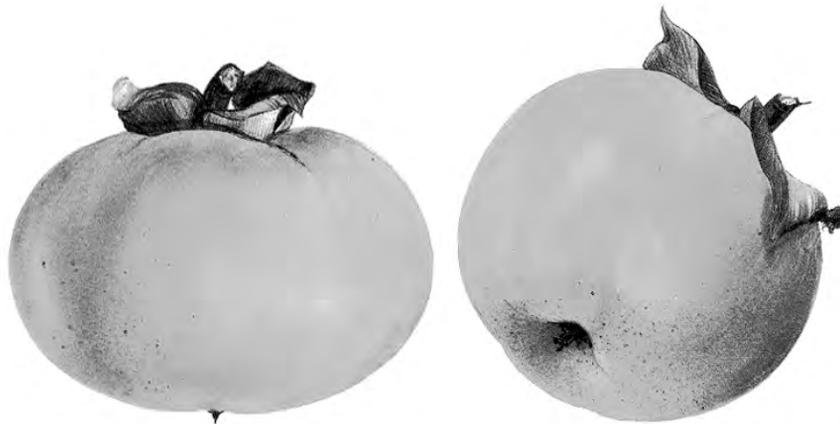
Pomegranates are native to the Middle East. Spanish missionaries brought the fruit to

California in the eighteenth century. The ancient Chinese saw the pomegranate as a symbol of economic prosperity; in Middle Eastern theology, it was the pomegranate, not the apple, that Eve picked and gave to Adam.

Pomegranates have an unusual structure composed of a spongy white pith encasing hundreds of succulent crimson seeds, or arils. The fruit is often eaten out of hand by popping out the pithy seeds and eating them whole. You can also roll the fruit to loosen the juice from the seeds, punch a hole in the skin, insert a straw, and drink the juice. Pomegranates are also made into juice, jelly, or pomegranate molasses or syrup, which are all popular in Middle Eastern and Mediterranean cooking. The two main pomegranate varieties that are grown in California are Wonderful and Spanish Ruby.

Seasonality and Growing Conditions

Persimmons and pomegranates require growing conditions similar to those of other fruit trees. Both trees are adaptable to many soils. The pomegranate does best in areas with hot, dry summers, such as the Central Valley of California. The persimmon prefers a similar climate





to that of the pomegranate. The fruits of both trees are at their peak from fall to early winter.

Good water drainage, adequate soil organic matter, and aerated soil allowing for deep root development are all essential to growing persimmons and pomegranates. The trees do not tolerate harsh winters; a flavorful and abundant fruit yield depends on plenty of sunshine. Both trees have flowers with self-fertile pollen; however, the trees will produce more fruit if the flowers are cross-pollinated by bees.

Sustainable Farming Issues

Persimmon trees are not subject to any severe pests or diseases. They require pruning to prevent the tree from growing too tall or overproducing. Overproduction in one year means a small crop the next year. This condition is called *alternate bearing* and is found in most trees. Birds love the brightly colored orange fruits. Sometimes farmers set out near the ripe fruit shiny flags that move in the wind to frighten the birds away.

Pomegranates do not have any severe diseases but may be subject to scale insects and mealy bugs. Those pests are controlled by applying a soap spray on the fruit and growing cover crops to attract to the orchard beneficial insects that eat scales and mealy bugs. Pomegranate trees are also subject to alternate bearing.

Selection, Storage, and Nutrition Information

When choosing persimmons, look for fruit with smooth, glossy, bright skin. Hachiyas should feel soft and gelatinous, and Fuyus

should be firm with a slight give. Avoid mushy, blemished fruit. Persimmons that are not quite ripe can be kept at room temperature, then refrigerated as they ripen. Persimmons are high in antioxidant vitamins A and C. They are also a good source of fiber.

Ripe pomegranates range from pink to deep red, depending on the variety and the weather. Cold weather enhances the red color. A ripe pomegranate feels heavy for its size. Cracking is a sign of ripeness in pomegranates; make sure the pomegranate is not overripe. Pomegranates are a good source of vitamin C.



Persimmon & Pomegranate Salad

Preparation Time: 30 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

Here is an opportunity for students to taste fresh fruit in a savory salad and also become familiar with two distinctive, yet not widely known fruits. The recipe is a great springboard for developing new vocabulary around taste, color, and texture. When choosing the fruit for this salad, look for Fuyu persimmons for their firm, deep orange flesh. Do not use Hachiya persimmons; they tend to be mushy, a texture that does not work well in salads.

Full-flavored lettuce greens dressed with a tangy vinaigrette set off those sweet fruits very well. You may want to substitute a head of frisée, a type of curly endive.

Note: Pomegranate juice stains. Be careful not to get the juice on clothes. Clean juice spills as quickly as possible.

Objectives

Students will be able to:

Investigate and become familiar with pomegranates and persimmons.

Develop vocabulary describing sensations of touch, sight, and taste.

Ingredients

For a class of 20:

2 pomegranates
 3 heads of sturdy dark green lettuces
 6 Fuyu persimmons
 1½ cups pecans (optional)
 3 tablespoons red wine vinegar
 ¾ cup olive oil
 salt and pepper

Materials

For the class:

1 small mixing bowl
 1 large mixing bowl
 measuring spoons
 measuring cups
 fork or small whisk
 2 serving spoons
 salad spinner

For each group of 4:

2 cutting boards
 2 knives
 bowl or plate
 4 plates
 4 forks
 4 napkins
 journals

**Preparation**

1. Clean and set up tables.
2. Have students wash their hands. Discuss proper methods of handling food.
3. Wash salad greens and dry in the salad spinner.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Give each group one persimmon, a pomegranate, and some greens. Give students time to examine the produce and write down descriptive words for them in their journals.
2. Show how to peel and cut persimmons into wedges. Explain how to cut the pomegranate in half, place the cut side down, and then tap the back of the fruit with a spoon or fork to loosen the seeds. Have students place the prepared ingredients in their group's bowl or plate.
3. Collect ingredients at the demonstration table and ask students to gather around the table. Ask one student to mix the ingredients in a large mixing bowl.
4. Ask two students to measure and pour the oil and vinegar into a small mixing bowl for the vinaigrette dressing. Students whisk the oil and vinegar and add salt and pepper to taste.
5. Serve the salad on plates and allow students to taste the salad without vinaigrette, then let them add the vinaigrette to their own salad to individual taste. Have students write words that describe the tastes. As they eat, allow students to share words from their journals.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Persimmon Cake

Preparation Time: 30 minutes
 Cooking Time: 1 hour and 15 minutes
 Total Lesson Time: 2 hours
 Recipe Level: Advanced

Background

This recipe allows students to bake a cake from start to finish. The procedure noted below is written as a class demonstration. However, your class may also enjoy working in groups to bake their own small cake.

Persimmons come in two major varieties: Fuyu, known for its firm, deep orange flesh, and Hachiya, often described as mushy when sweet enough to eat. For this cake, you will need the Hachiya variety.

Objectives

Students will be able to:

Measure solids and liquids accurately by using cooking measurement tools.
 Use different baking utensils.

Ingredients

For a class of 20:

- 2 cups shelled walnuts*
(halves)
- 6 very ripe Hachiya persimmons (about 3 lbs)
- flour and oil to coat baking pans
- 6 eggs
- 1 cup vegetable oil
- 1 cup white sugar
- 1 cup brown sugar
- 4 cups flour
- 2 teaspoons ground cinnamon
- 1 teaspoon ground cloves
- 1 teaspoon allspice
- 1/8 teaspoon salt
- 2 teaspoons baking powder

Materials

For the class:

- 3 medium mixing bowls
- 2 9-inch round cake pans
or 1 9-inch x 13-inch
cake pan
- measuring cups
- baking tray
- oven
- knife
- measuring spoons
- 2 large mixing spoons,
wooden or metal

For each group of 4:

- 2 small plates or bowls
- 2 plastic spoons
- 4 forks
- 4 plates
- 4 napkins
- cutting boards
- journals

*Make sure no students are allergic to walnuts.

**Preparation**

1. Clean and set up tables.
2. Have students wash their hands. Discuss proper methods of handling food.
3. Preheat oven to 375°F.
4. Place walnuts on the baking tray and toast in the oven at 375°F for six minutes.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Have each group of students cut two persimmons in half. Each student in a group will scoop pulp out of the persimmon peel with a spoon. Have students mash the pulp with forks on cutting boards and place it on the group plate or bowl.
2. Provide an equal amount of walnuts to each group to chop coarsely and place on another plate.
3. Gather plates of mashed persimmons and chopped walnuts at the demonstration table. Have students gather around the table.
4. Have two students oil and flour the baking pans. Have other students measure and add eggs, oil, and sugars into the mixing bowl and thoroughly mix. Ask other students to add the persimmons and mix well.
5. Ask three students to measure and add flour, spices, salt, and baking powder into another mixing bowl. Mix well. Have yet another pair of students slowly mix the dry ingredients into the wet ingredients until they are evenly combined. Add and mix in the walnuts.
6. Pour the batter into the two pans. Place the pans in the oven for 75 minutes or until a fork inserted in the cake comes out clean. While waiting for the cake, clean up and let students write about their experience in making the recipe.
7. While the students eat, have each group discuss its experience making the recipe. Questions for discussion: What went well? What did not? What things should you consider the next time you cook? Does the cake taste the way you thought it would?
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

A School Produce Stand

Preparation Time: Will vary, depending on your situation
Total Lesson Time: Will vary

Background

One of the most important parts of a farmer's job is selling or marketing the farm produce. Many farmers employ a number of strategies to sell their produce to a variety of consumers. One that is beginning to become more popular as consumers become educated about farms is Community Supported Agriculture (CSA). CSA depends on a close relationship between consumers and the farm. CSA members pay in advance a seasonal or monthly fee and, in return, receive weekly shares of the farm's harvest. CSA farmers benefit from a guaranteed market, and members receive a diverse supply of fresh, seasonal produce.

Another marketing strategy used by farmers is working with a wholesaler or broker who buys produce from the farmer and then sells it to markets in neighboring towns and cities. Many wholesale relationships are very close because the farmer and the wholesaler both have a need to be successful. A farmer who sells produce through a wholesaler does not receive money for the crop for a few weeks or sometimes months after it is shipped to the wholesaler.

In this activity, students simulate the third strategy—the produce stand. Many farmers set up farm produce stands in a local farmers market or on their property next to a road or highway, where people can stop and buy fruits and vegetables. Although it takes more work for the farmer, the produce stand gives the farmer the opportunity to make more money because the sale is direct to the consumer. For students, the produce stand offers the adult responsibilities of selling and managing money.

A produce stand is ideal for a school with a bountiful garden. However, schools without gardens can also have stands with produce donated by local markets or wholesalers or a stand with dried tomato seeds (from Chapter 2, "Tomatoes"), harvest garlands (from Chapter 4, "Peppers"), or baked goods (such as persimmon cake) made by the students. The produce stand may be open once a week, once a month, or once a year, depending on the school's situation. Many schools have stands that are open during recess or at lunch.

Objectives

Students will be able to:

Name the three primary methods of marketing for farmers.

Develop a plan for selling produce (or other goods) at school to other students.

Use communication skills with customers.



Materials

For the class:

2 large folding tables with tablecloths
cash box or toy cash register
4 to 6 chairs for sitting and displaying produce
signs and posters advertising the event
4 to 6 boxes or baskets for display
maps of farms (if using donated produce)
water bowls for washing hands
paper towels for drying hands
compost containers for peels, seeds, etc.

For each group of 4:

4 copies of Dad's Ranch
farm profile (optional)

Preparation

1. Before the sale, check with the school principal for permission to set up the produce stand and for guidance on policies related to this activity. Plan what the students will sell (see Background for ideas in addition to produce). If donations are needed, plan ahead to make necessary arrangements and give recognition to the donating organizations.
2. At least one week before the sale, spend one class period making signs. Lead a student discussion about what should be included in the signs. The signs should include information such as the time and date of the sale, prices of items to be sold (a quarter is a common price), and nutritional and agricultural information about the produce.
3. Have students research the produce or other merchandise so that they can expertly inform other students and staff about it. They might find out the name and location of the farm where the produce was grown, the produce's growing requirements, and the specific varieties that will be offered.
4. Have students develop and practice specific jobs for the stand, such as a cashier who handles the money, a customer educator who explains information about the produce to the customer, and a produce manager who makes sure the produce is displayed properly.
5. Plan to have two to three adults supervising the students to help them with problems that might arise during the sale.
6. (Optional) Ask students to read the Dad's Ranch farm profile. Ask students to name some of the strategies Dad's Ranch uses to sell its produce (for example, growing produce that is in season at different times of the year; looking for customers in places other than California).

Doing the Activity

1. On the day of the sale, help students set up the stand.
2. After the sale, have a class discussion about how it went, what they would do differently next time, and what to do with the stand proceeds.
3. Encourage students to track the proceeds over time to determine the best days, times, seasons, and crops for the produce stand in the future.

Dad's Ranch

While some farms may slow their pace during the fall months, Dad's Ranch in Fresno, California, keeps busy harvesting more than 30 acres of pomegranates and persimmons from late September through December.

Both persimmons and pomegranates grow on trees and are fall or winter crops. Stan Schletewitz, the "Dad" of Dad's Ranch, explains that having crops year-round helps to ensure that workers on the farm will have jobs throughout the year. This means the workers do not have to look for a second job during the slow season.

Other crops on Dad's Ranch include grapes, navel oranges, Valencia oranges, and lemons. Since 1990, Dad's Ranch has grown all its fruit organically.

Stan, who was born in 1937, has been doing farm work for as long as he can remember. His grandfather started farming in Fresno in 1917. Then Stan's father took on the family farm until he passed away in 1957. At that point, Stan was in college and came back to take care of the farm and his younger brothers. Today, Stan's two sons and daughter-in-law run the farm. "We have been farming here for four generations," says Stan.

Growing up on the farm, Stan was one of six children. "All of us had responsibilities," he recalls. "Before we walked to school, we had to feed the chickens and milk the cows. My brother and I had our own projects too—like raising our own rabbits and chickens."

When he was young, all Stan's neighbors were farmers, too. When the chores were through, he and the neighboring children had fun camping, building their own toys, and making up and performing their own plays. "This was before we had TV," Stan remembers, "and there was always a lot to do. It was a small farming community, but we had lots of kids around."

Today, Stan's sons, Craig and Rick, are running the farm. Craig, the younger son, is in charge of distribution. His job is to make sure that there are buyers for the farm's produce. Most of the produce is eventually sold in stores—not just in California but also throughout the United States, Canada, and even Japan. Craig's wife, Alison, manages the office and does the book-keeping.

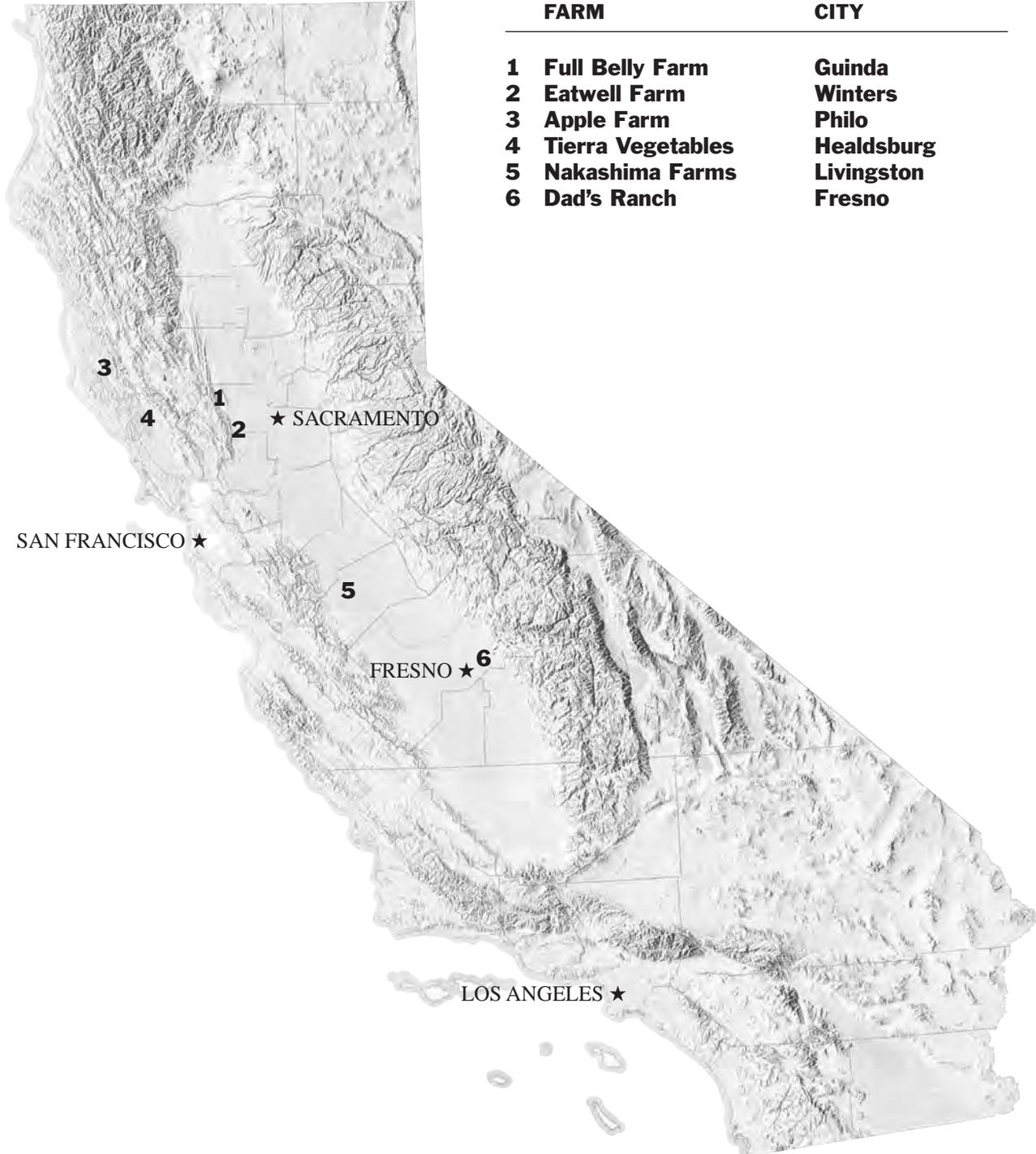
Stan's older son, Rick, left the farm for a while to become a chef. He has returned and now works as the farm manager, overseeing the daily operations of the farm.

Now that his sons are taking care of things on the farm, Stan and his wife, Floretta, have moved into a smaller house in town. Stan is glad to have his sons carrying on the family tradition but adds that he never pressured them to come back to the farm. "I just let them decide what they wanted to do, and this was it," says Stan.



An intensively planted California fruit orchard that features a cover crop. Cover crops are frequently used to increase soil fertility, build up humus, and provide a living mulch.

Locations of Farms Profiled in Late Summer–Fall





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Demi Bowell second grade

All citrus fruits have
peels and seeds.

Citrus fruits are cheapst
in the winter.

If you squeeze the peel
of the peels of fruits

It is an air freshener.

Citrus fruits grow in
warm places. I love
Citrus fruits!





Tangerines

Tangerines are a member of the citrus family, which also includes oranges, grapefruit, lemons, and limes. California-grown tangerines come into season in late November and December. Tangerines originated in China. They are also called *mandarins*, after the Mandarin Chinese traders who introduced the fruit to Europeans. The Chinese consider the tangerine a symbol of good luck, and tangerines are a prominent part of the Chinese New Year.

The tangerine's loose skin makes it easy for children to peel and eat, and its small segments are a perfect size for young students. Popular varieties of tangerine include D'ancy, Fairchild, Pixie, Satsuma, and Honey. Tangerines trees are available in dwarf varieties as well as full-size trees.

Seasonality and Growing Conditions

Tangerines grow well in the warm, temperate zones of California and are generally not planted in California's foggy, coastal regions. Tangerines can withstand cold better than oranges can but may still be injured by cold spells. During cold spells, some growers heat the trees by placing oil or gas heaters, burning wood, or wind machines in the orchards. The temperature in the orchards may also be modified through irrigation.

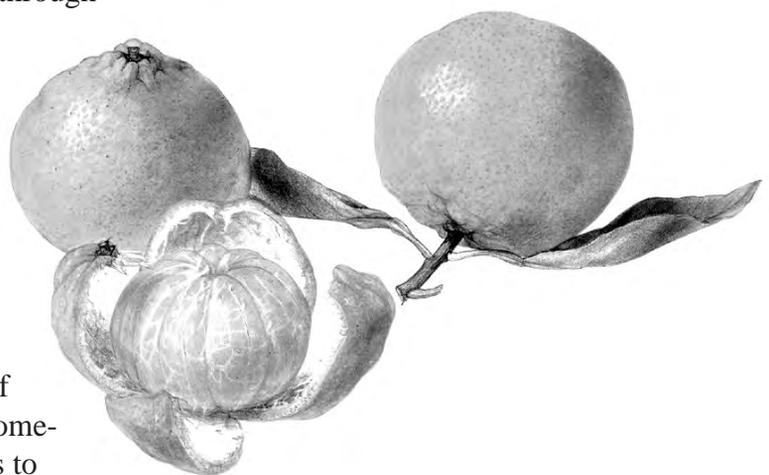
Citrus trees prefer acidic soil. They commonly will develop a deficiency of iron, zinc, or other minerals. Growers generally fertilize their trees with composted manure and treat severe deficiencies by spraying iron or zinc chelates on the leaves.

Tangerines can fall prey to a variety of insect pests. Dormant oil sprays are sometimes used during the summer months to

smother insect eggs before the trees bear fruit. Snails may also be a problem; they crawl up the trees and nibble on the fruit. Snails may be curtailed by placing copper bands around the tree trunks and by hand removal. Botrytis can be a detrimental disease to citrus, including tangerines. A severe outbreak of this disease can prevent the fruit from developing and can mean the devastating loss of an entire crop. Botrytis, a fungus, may be prevented by spraying compost "tea" on the fruit, adding organic matter to the soil, and careful sorting at harvesttime. Botrytis may appear as soft spots in harvested fruit.

Selection, Storage, and Nutrition Information

Fresh fruit provides the best source of vitamins. Processed citrus products (such as juice) lose some nutrients during the pasteurization process. Rigid, hard fruit is usually an indication of frost damage and is to be avoided. Tangerines are ideal for eating out of hand because of their loose peel; their sweet, tangy flavor also works well for juice and desserts. Tangerines are high in vitamin C and a good source of fiber. Ripe fruit has the strongest and sweetest aroma.



Tangerine Popsicles

Preparation Time: 10 minutes
 Cooking Time: 25 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Easy

Background

With this recipe, students investigate the different parts of the tangerine: zest, pith, segments, seeds, and sacs. When buying tangerines, try to find some that still have stems and leaves attached (farmers markets usually have these tangerines). The stems will assist students in making the connection that tangerines come from trees.

If making popsicles is too time-consuming or if you do not have a freezer, you can also construct a simple and effective lesson on the topic of fresh, squeezed juices. Fresh, squeezed juice is a treat and a wonderful new experience for children who generally drink reconstituted, fortified, or sweetened juices. To teach this lesson, buy the most flavorful tangerines (or a couple of kinds) that you can find. Have the children squeeze the tangerines and taste the juice, then describe it, and perhaps compare it with other juices they regularly drink.

Objectives

Students will be able to:

Identify and label the different parts of the tangerine fruit.

Show how the addition of a little sugar can heighten the flavor of tangy fruits.

Ingredients

For a class of 20:

20 large or 30 small to
 medium tangerines
 ½ cup sugar

Materials

For the class:

2 hand juicers (optional)
 3 ice trays
 40 toothpicks*
 1 box file-folder stickers
 (optional)
 plastic wrap
 vegetable peeler
 1 small saucepan
 hot plate
 8-cup pitcher
 freezer

For each group of 4:

2 vegetable peelers
 2 knives
 2 cutting boards
 2 spoons
 napkins
 journals

*Round or flat but not colored.

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash the tangerines thoroughly to remove any wax, dust, or residues.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Show the tangerines to the class. With a vegetable peeler, peel off the zest from one of the tangerines (the zest is the colored part of the peel, but not the white part). Take the peel off the tangerine; bend it so that the oil from the peel squirts into the air. Encourage students to smell the fragrant oil when they examine their own tangerines but also tell them that the oil can sting if it gets in someone's eyes. Point out the pith (the white part of the skin just below the zest) and mention that it has a bitter taste. Separate the segments, which hold the citrus flesh and seeds in a thin membrane. Identify the seeds and the sacs (tiny, individual pouches where the juice is stored).
2. Provide each student group with four tangerines to examine. Have students peel a small section of one tangerine with a vegetable peeler and investigate the zest and the pith.
3. Demonstrate how to cut a tangerine in half and juice it into a bowl either by using a hand juicer or by squeezing it and spooning out any seeds from the juice.
4. Allow students to juice their tangerines, remove any seeds from the juice, and pour the juice into the small bowl. Ask a student from each group to pour the juice from the small bowl into the common pitcher. Ask a student in one of the groups to mix $\frac{1}{2}$ cup juice with the sugar in a small saucepan. Place over medium heat and stir until the sugar is dissolved. Pour the sweetened juice back into the pitcher and stir.
5. Have one person from each group pour the juice into the three ice trays. Cover the trays with plastic wrap.
6. Provide each student with two toothpicks and two file-folder stickers. Have students write their name on the stickers, decorate them, and fold each around one toothpick.
7. Help students carefully push toothpicks through the plastic wrap into the middle of each cube. The toothpicks may not stand up straight, but you can adjust them later after the juice is partially frozen.
8. Place the ice trays into the school freezer.
9. Let the juice freeze solid. Usually, you will need to freeze the juice overnight, but if your school has a good freezer, you can do this recipe in the morning and the popsicles will be ready for an end-of-the-day snack.
10. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Candied Tangerine Peels

Preparation Time:	10 minutes
Cooking Time:	25 minutes
Total Lesson Time:	60 minutes
Recipe Level:	Advanced

Background

Any tangerine will work for this recipe, but varieties with thick, loose skins are the easiest to handle. Most markets have the Satsuma, a wonderfully flavorful variety that has a good peel for this recipe.

Because citrus fruits have so many layers (the zest, the pith, the membrane of each segment, and sacs inside the segment), it is fun for students to dissect the tangerines as they make the recipe.

Objectives

Students will be able to:

Identify and label the different parts of the tangerine fruit.

Ingredients

For a class of 20:

- 20 tangerines
- 2 quarts water
- 2 cups sugar

Materials

For the class:

- hot plate
- 4-quart pot with lid
- slotted spoon
- 2 large plates
- bowl
- measuring cups

For each group of 4:

- 2 peelers
- 4 napkins
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash tangerines thoroughly because students will be eating the peels.
3. Boil 2 quarts of water in a 4-quart pot.

Safety Precautions

Review safety precautions for using knives and the hot plate. Take care when removing the candied peels from the pot and be sure to allow the peels to cool before serving and eating.

Making the Recipe

1. Show the tangerines to the class. With a vegetable peeler, peel off the zest from one of the tangerines (the zest is the colored part of the peel that is often used for cooking). Take the peel off the tangerine and bend it so that the oil from the peel squirts into the air. Encourage students to smell the fragrant oil when they examine their own tangerines but also tell them that the oil can sting if it gets in someone's eyes. Point out the pith (the white part of the skin just below the zest) and mention that it has a bitter taste. Separate the segments, which hold the citrus flesh and seeds in a thin membrane. Identify the seeds and the sacs (tiny, individual pouches where the juice is stored).
2. Provide each student group with four tangerines to examine. Have students peel the tangerines and investigate the zest and the pith, recording their observations in their journals.
3. Ask students to peel the zest and a little bit of the pith from the skins. This step prevents the peeled zest from becoming too fragile to handle. Collect these peels and place them in the pot of boiling water; reduce heat and simmer for 10 minutes.
4. While the peels simmer, have students investigate the other parts of the tangerine: the sections, the citrus sacs, and the seeds.
5. Allow each student group to draw and label the parts in their journals.
6. Ask students to gather around the demonstration table to observe the tangerine peels cooking. With the slotted spoon, remove the peels from the pot and set them aside in a bowl. Measure out 2 cups of the water and discard the rest. Put the 2 cups of water back in the pot.
7. Have a student add 2 cups of sugar to the water. Stir with the slotted spoon until the sugar dissolves in the water. Place the peels back into the pot and let them simmer for about 10 minutes on low heat until they become translucent.
8. Take the pot off the hot plate. Have a student use a slotted spoon to remove the peels from the pot and put them onto the large plates. Ask the class for observations about what happened to the peels.
9. Allow the peels to cool completely before eating them.
10. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Making Compost “Tea”

Preparation Time:	Varies
Total Lesson Time:	30 to 50 minutes to set up the experiment, then a few minutes every three to five days for four weeks

Background

In sustainable agriculture different types of compost are used for many reasons. Compost improves the soil and helps it provide nutrients that plants need. Many farmers apply cow, horse, or chicken manure or other compost directly onto the soil. Other farmers make compost “tea” by mixing the compost with water. They may spray this tea on the soil before planting or during the growing season as part of the watering routine. (Compost tea is also often sprayed directly on the plants for several reasons, including disease suppression.) Some farmers do not necessarily use compost as a fertilizer but as a means of adding microbes, which then cycle nutrients.

In this activity, students will make compost tea and conduct an experiment to find out the effect of compost tea on growing plants. They will use a control plant (with only water) and compare the results with the entire class at the end of the data-gathering period. For safety reasons, do *not* use fresh or unsterilized manure. All animal manure is potentially hazardous and may contain *E. coli* or other disease-causing pathogens. Use only sterilized or fully composted manure for this activity. Aged manure is *not* the same as composted and may contain disease-causing organisms.

Objectives

Students will be able to:

Make observations about compost or worm castings.

Make compost tea.

Describe the results of an experiment that compares the effects of compost tea and water on growing plants.

Differentiate between opinion and conclusions supported by observations.

Materials

For the class:

waterproof pen

For each group of 4:

copies of Beck Grove farm profile
 1 large paper cup (12 oz)
 3 cups worm castings or decomposed (mature) compost from school compost bin or fully composted or sterilized chicken manure from nursery
 paper towels
 4 plants of similar height in pots
 2 1-quart jars
 journals
 plastic measuring cup or other device for measuring liquids
 ruler

Preparation

1. Buy seedlings that are in season (beans for spring, tomatoes for summer, carrots for winter). Set up the plants in a sunny spot.
2. Using a pencil, poke small holes in the bottoms of the paper cups to use cups as strainers.
3. Buy or collect compost.



Doing the Activity

1. As a class read the Beck Grove farm profile. Ask students what they understand about biodynamic farming. Introduce the activity by explaining that compost tea is one of the “preparations” used in biodynamic farming.
2. Show students the compost for making the compost tea and discuss the origin of compost. (If you have a classroom worm box or school yard compost bin, students should easily be able to make the connection between lunch scraps and compost. Help them understand that compost is nutrient-rich material consisting of decomposed leaves, peels, or other organic matter.)
3. Ask students how they might be able to test whether compost tea helps plants grow and how they will distinguish evidence from opinion. Explain to them that they will make compost tea and that they will compare what happens when they apply compost tea to some plants and plain water to other plants.
4. Give each group a handful of worm castings, compost, or fully composted or sterilized chicken manure on a paper towel. Students examine the compost and then make drawings and write descriptions about the compost in their journals.
5. Demonstrate how to make compost tea: Place compost in the one-quart jar and fill with water. Cover and let stand overnight. Have the students fill their own containers in the same way. Explain how letting the mixture stand will allow more nutrients in the compost to enter the water. The following day, demonstrate how to filter the solution. Place a paper towel inside the paper cup that has been perforated and set the cup into the neck of the empty jar, pouring the solution slowly into the cup. Ask the students to take care not to pour too much of the solids into the cup and to pour slowly to avoid overflowing.
6. Give each group the materials to make compost tea. After making the tea, students record in their journals their observations about the tea.
7. Ask the class to predict which plants will grow more: the three that are watered with compost tea or the one watered with plain water. Have students record their predictions and the reasons for these predictions in their journals.
8. Have students examine their group’s four seedlings and record their observations. Students may make many different observations, but make sure they record the height of the seedlings and the number of leaves on each plant. Have each student in the group measure the height and have the group agree on the correct measurement. Discuss the idea of how repeated measurements increase the chances of accuracy. Have students use a waterproof pen to label one plant “water” and the other three “tea.” Students will water or “tea” each plant when needed. Make sure students understand that the four plants should get the same amount of water or tea by using the measuring cup.
9. Have the students help design and make a class chart for recording the height and number of leaves for each plant. Set a schedule to make observations about once every three to five days.
10. After each observation session, discuss with the students some of their observations. Continue the investigation for about four weeks. Compare the results with the entire class at the end of the data-gathering period.
11. At the end of the investigation, have students compare the results with their original predictions. They can organize their results into charts, graphs, or diagrams and present their findings to the class. Discuss how the data allowed them to make their conclusions and the difference between a conclusion based on data and one based on unsupported opinion.
12. (Optional) When the plants are large enough, transplant them into the school garden and continue to monitor them until they are ready to harvest.

Beck Grove

It is 5:30 a.m. at Beck Grove, a 33-acre farm in Southern California. While most of California is fast asleep, Helene and Robert Beck are up and ready to start their day.

At this early hour, the Becks are making sure that they have buyers for their produce. “We’re making phone calls, taking sales orders, passing out picking lists, and seeing that the fruit gets to market,” explains Helene.

The main crops at Beck Grove are citrus fruits. “We’ve got Minneola tangerines, blood oranges, navels, kumquats, limes, and Meyer lemons,” says Helene. In addition to all this citrus fruit,

the Becks also grow persimmons, Asian pears, and lemongrass.

Of all of their fruit crops, Helene claims the tangerines are the sweetest. The Becks have almost 400 Satsuma tangerine trees yielding 30,000 pounds of fruit each year. The Becks have little trouble finding buyers for their tangerines, which are sold at markets all over the country.

Customers, Robert says, often ask for Beck tangerines by name. “It kind of gives you a nice glow,” he adds.





One thing that attracts customers to the Becks' tangerines is the fact that they are organic. Beck Grove is certified organic, which means that a third party has inspected the grove and found that only organic farming practices are used. Therefore, all the fruit has a label that assures buyers that the fruit is grown in accord with the U.S. Department of Agriculture regulations defining organic practices.

Actually, the Becks practice a special type of organic farming called biodynamics, which is based on the writings of a German scientist, Rudolph Steiner, who wrote during the early part of the twentieth century. Farmers who practice biodynamics make up so-called preparations, which are special mixes of such things as cow manure, cow horns, nettles, and other natural ingredients. These preparations are applied to the soil at specific times and on specific days, determined by the phases of the moon. Planting is also done according to this special timetable.

Few farmers in the United States practice biodynamics; Robert estimates that there are no more than 20. When asked if farming this way is a lot of work, Robert laughs and replies, "Well, the trees do a big part of the work for us."

Tangerine trees are slow growing, Robert explains. This means that he has had to do almost no pruning (cutting back the branches) and that harvesting the fruit is easy. "The branches are so low that I don't even need to use a ladder to pick them," says the grower.

In the years since 1983, when the Becks bought their farm, they have seen the surrounding countryside change. Many neighboring farms have been sold and divided into residential lots. Where once there was farmland, now there are houses. "Pretty soon we'll be an island," says Helene of their grove. "It's disappointing, but it isn't going to change what we do. We will continue on."

Cooking Greens & Cabbage

Cooking greens (sometimes called braising greens) are dark green, leafy vegetables, also called cole crops, that can be eaten fresh but are generally cooked. Many of them have strong, assertive flavors and tough, fibrous leaves. Cooking the greens helps to break down their structure, making them tender and delicious. *Braising* refers to a cooking method in which tough cuts of meat or vegetables are nearly covered in liquid and then slowly simmered until tender. One example of a braised green is the southern dish of collards with ham hocks.

Though spinach is the most well-known green, other greens are having a resurgence in popularity, including kale, chard, collards, and green cabbage.

Spinach was domesticated about 2,000 years ago in Iran. By 1,000 years ago, spinach was introduced to southern Europe. Spinach contains oxalic acid, a compound that inhibits calcium and iron absorption in the human body and also gives the green its slightly bitter taste. Oxalic acid, however, does not significantly diminish





spinach's nutritional benefits. Many varieties are available, including Bloomsdale Savoy Long Standing, a ruffled spinach with distinctive, curly leaves, and King Denmark, a smooth-leaf variety.

Most other cooking greens, including kale, collards, and cabbages, are members of the botanical family Brassicaceae (also called Cruciferae). These plants are almost always eaten cooked because they are spicy when eaten raw. This spiciness is caused by the same chemical found in the mustard plant, also a member of this family. Table mustard is made from the ground seeds of this plant.

Kale, also known as borecole, is a member of the crucifer (cabbage) family. It is an old crop, but its exact date of domestication is uncertain, anywhere from hundreds to thousands of years B.C. It is eaten only as a cooked vegetable. It is popular in the northern European diet because it can remain fresh and good to eat while there is snow on the ground. As with all dark, leafy greens, it is a nutritional powerhouse. Red Russian is one of the more popular varieties.

Collards are another member of the crucifer family. Long a traditional staple in the southern United States, they require long, slow cooking. Their hardy constitution makes them better able to withstand intense summer heat than can most other cooking greens. Collards closely resemble wild cabbage, which is still found throughout Europe. Their leaves are similar to those of cabbage, but they do not form heads.

Cabbages form heads in a variety of shapes, including flat, conical, and round. The green cabbage is composed of heavy, tightly wrapped leaf bundles, while some varieties, such as the Savoy and Napa (or Chinese) cabbages have elongated heads with intricate, lacy leaves.

Cabbage comes from the French word *cab-oche*, meaning "head."

Seasonality and Growing Conditions

Cooking greens can be grown year-round in moderate climates but are generally thought of as winter vegetables; they enhance soups, stews, braised meat, and other winter dishes. Cooking greens, especially kale, do well in most soils. Collards prefer a very fertile soil enriched with rotted manure, while cabbage likes any soil type as long as there is adequate moisture and it is fertilized with composted manure or other soil amendments. Spinach is a cool-weather crop, requiring well-drained and mulched soil with lots of moisture.

Cooking greens are susceptible to a number of insect pests, the most common being flea beetles and aphids, which may be removed by spraying the vegetables with a hose. Diseases common to greens include clubroot and black-leg, which are fungi. Greens in the cabbage family are also susceptible to cabbage worms, which are controlled with a Bt spray. Farmers add limestone to the soil to deter these diseases; vigilant mulching and composting will help as a preventive measure.

Most greens are harvested by individual leaves, which are cut from the plant, allowing new leaves to sprout. Cabbage is harvested by cutting the whole head.

Selection, Storage, and Nutrition Information

Choose greens that have good color for their type and leaves that are crisp and stiff to the touch. Cabbage should feel heavy for its size and have tightly wrapped leaves unless it is the Savoy or Napa type. Greens are high in vitamins A and C. Spinach is also high in folate and iron and is a good source of fiber. Cabbage is high in vitamin C.

Braised Collards with Bacon

Preparation Time:	20 minutes
Cooking Time:	10 minutes
Total Lesson Time:	60 minutes
Recipe Level:	Advanced

Background

Collards came to the United States when Africans brought collard seeds with them and grew them in their gardens for food. Collards were an important source of vitamins and minerals for Africans enslaved in the southern United States. These greens grew year-round because they adapted well to the climate. Africans added ham, when it was available, to enhance the flavor and the nutritional quality.

Because collards have such large leaves, students can examine them in great detail. Students can dissect the leaves and identify the veins that transport nutrients to and from the leaf; the cuticle, which is the waxy, waterproof outer layer of the leaf; and the epidermis, which is the green under-layer of the leaf.

Objectives

Students will be able to:

Observe and describe the patterns and parts of the collard leaves.

Describe the origins of collards as a staple food in the early history of the United States.

Ingredients

For a class of 20:

- 3 large bunches collards
- 6 slices bacon*
- 2 teaspoons salt
- water

Materials

For the class:

- knife
- cutting board
- hot plate
- large, heavy-bottomed pot
(8-quart)
- plates
- paper towel
- spatula
- forks
- napkins
- journals

*If students have dietary restrictions against eating pork, replace with 6 tablespoons olive oil.

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate collards into five equal portions, one for each student group.

Safety Precautions

Review safety precautions for using the hot plate.

Making Braised Collards with Bacon

1. Give each group its portion of collards. Have students observe the collard leaves and write their observations in their journals (see Background).
2. Have students gently wash the collard leaves, shake off the excess water, and place the collards on the plates. Cut the collard leaves lengthwise into 2-inch pieces.
3. Collect the plates of collards. At the demonstration table, cut the bacon into half-inch pieces. Introduce the origin of this recipe (see Background). Ask students to name other recipes that may have significance in their families.
4. Cook the bacon in the pot over medium heat. Once the bacon begins to sizzle, turn it. When the bacon is cooked but not crispy, have another student add the collards and a cup of water. Turn the heat down to low. Add salt and cook covered for about 15 minutes, depending on the thickness of the collards. Check periodically and add a few tablespoons of water as necessary to maintain a little braising liquid.
5. Remove the pot from the hot plate when the collard leaves are completely tender. Serve on plates.
6. While students eat, continue a discussion about the cultural significance of collards.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Kale & Potato Soup

Preparation Time: 20 minutes
 Cooking Time: 45 minutes
 Total Lesson Time: 1 hour and 15 minutes
 Recipe Level: Advanced

Background

One of the heartiest greens, kale grows well in winter because it can survive snow and frost in the harshest climates. Kale is popular all over northern Europe, especially in Russia, for this reason. In this recipe the kale's pungent flavor marries well with the sweetness of waxy potatoes, such as Yellow Finn and Yukon Gold. Such potatoes are often labeled "boiling" potatoes in retail food stores. When you select potatoes for this soup, stay away from the starchy potatoes, such as Russet, because they will fall apart in the soup.

There are many different varieties of kale, including Dinosaur Kale (named for its ribbed leaf texture) and Red Russian, which vary greatly in texture and taste. If possible, look for different kale varieties at the farmers market or supermarket and use them to illustrate the diversity within crops.

This recipe is adapted from a traditional Portuguese dish. The most traditional versions include slices of spicy sausage, such as linguiça.

Objectives

Students will be able to:

- Work in collaborative groups to make a recipe.
- Read and discuss how one farm grows greens.

Ingredients

For a class of 20:

- 3 bunches kale
- 3 onions
- 3 lbs potatoes
- 15 cloves garlic
- 6 tablespoons olive oil
- 3 sprigs thyme
- 1 bay leaf
- 3 quarts vegetable stock,
low-sodium chicken stock,
or water
- 1 to 2 teaspoons salt
- ½ teaspoon dried red pepper
flakes (optional)

Materials

For the class:

- hot plate
- 6-quart pot with lid
- colander
- measuring spoons and cups
- ladle
- large spoon
- vegetable peeler

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- 4 bowls
- 4 spoons
- 4 plates
- 4 napkins
- copies of Green Gulch
farm profile
journals



Preparation

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate the kale, onions, potatoes, and garlic into five equal portions, one for each student group.

Safety Precautions

Review safety precautions for using knives and the hot plate. When serving the soup, make sure that it is not burning hot.

Making the Recipe

1. Demonstrate how to peel and slice an onion by cutting it in half, turning the flat side down, and slicing. Demonstrate how to wash and chop the kale. Demonstrate how to peel and cut a potato into $\frac{1}{4}$ -inch cubes by cutting it in half, turning the flat side down, slicing, then cubing. Demonstrate how to smash garlic. To chop it finely, separate the cloves of garlic. Place the garlic clove (with its skin intact) on the cutting board, lay the flat side of the knife blade on the clove, and smash the blade with your fist. This action will break open the garlic skin, making it easy to remove. Mince the garlic by cutting it first one way and then the other in a repetitive motion.
2. Give each group its equally divided portion of kale, onions, potatoes, and garlic to prepare. Have groups place their ingredients on separate plates.
3. Collect the plates and place them on the demonstration table. Have students gather around the demonstration table.
4. Heat the oil in a pot over medium heat. Ask one student to add the onions and 1 teaspoon salt.
5. Stir and cook for 5 minutes until the onions are soft.
6. Add the potatoes, garlic, (optional) red pepper flakes, thyme sprigs, and bay leaf. Cook for another 5 minutes.
7. Stir in the kale, then cover with water or vegetable stock. Bring to a boil and let the soup simmer for 30 minutes. Taste for salt. Meanwhile, read or have students read the Green Gulch farm profile and lead a discussion about living on a farm such as Green Gulch.
8. When the soup is ready, take out the bay leaf and the thyme before serving the soup in the bowls. While students eat, discuss words that describe the different flavors in the dish. They can write these words in their journals.
9. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Frozen, Canned, or Fresh: Which Do You Prefer?

Preparation Time: 10 minutes
Total Lesson Time: One to two hours,
depending on class

Background

In this activity, students design an experiment; carry it out; and report on the differences between frozen, canned, and fresh spinach. This activity can serve as a basic outline for a teacher or student who wishes to perform a more thorough examination of the same food preserved and fresh. The activity is designed to explore taste preferences rather than nutritional content.

Objectives

Students will be able to:

Design an experiment to compare the flavors and textures of spinach.

Explain the differences by using charts and graphs during their group presentation.

Decide from their findings whether they prefer frozen, canned, or fresh spinach.

Materials

For the class:

- 3 frozen packages spinach
- 3 cans spinach
- 3 bunches fresh spinach
- journals
- 3 medium-sized pots
- hot plate
- water
- forks
- plates
- napkins

**Preparation**

1. Cook or heat up the three kinds of spinach. The fresh spinach should be well washed, drained, and cooked in the residual moisture.
2. Divide spinach so that each student group has an equal share of frozen, canned, and fresh spinach.

Doing the Activity

1. Show students a frozen package of spinach, a can of spinach, and a bunch of fresh spinach. Explain that each group will design an experiment that will examine the visual appearance, taste, texture, and smell of frozen, canned, and fresh spinach.
2. As a class, discuss possible methods of observing and recording the different features of the spinach. As students make suggestions, write them on the board so that they can see various methods for designing their experiment.
3. Set clear objectives for the experiments, such as teacher approval of experimental design and recording methods; time limits for examination; and organization of the data, such as graphs or charts for presentation.
4. Give each student group its share of the three kinds of spinach. Remind students that they need to set up a plan to investigate the spinach before handling it.
5. Have students present their plan (it should have between 3 and 5 steps) to you for approval. This is a good time to raise any problems you foresee with a given proposal. If needed, let students revise their plan.
6. Allow 20 to 30 minutes for students to conduct their experiments and record their observations.
7. Ask students what conclusions they can make based on the information they gathered. At this time, it may be important to discuss with the class different ways to present the information.
8. After the discussion, allow groups time to create graphs, charts, or other materials for making a brief presentation to the class. Make sure groups plan how each group member will participate in the presentation.
9. Provide time for groups to practice their presentation. Give each group one to two minutes to present its findings.
10. Clean up materials and compost the spinach if compost is available.

Green Gulch Farm



Just north of San Francisco along the California coast, Route 1 winds its way past beautiful views of the Pacific Ocean and lush green hills. One of the most stunning sights along the way is a small farm nestled in a valley. This farm, called Green Gulch, is also a center where people come to meditate and study Zen Buddhism.

Meditation is a way of “quieting the mind,” says Emila Heller, who lives and works at Green Gulch. For most people, this means sitting in silence, focusing on breathing and clearing away all their thoughts and worries. Meditation is a spiritual practice of Zen Buddhism, a religion that was founded on the teachings of Buddha, who lived in India over 2,000 years ago.

“This is a unique place where we live together, meditate together, study Buddhism together, and work on the farm together,” says Emila.

Emila notes that farming is not the main purpose of Green Gulch, but it is an integral and important part of life there. Many of the people who come to live and study at Green Gulch have never worked on a farm before, so this is a totally new experience for them.

“We get up at 4 o’clock in the morning and we sit in meditation until 7 o’clock. Then we work on the farm until noon. After lunch we go back out to work for the rest of the afternoon,” says Emila. In the evening, there are classes on Buddhism. Green Gulch also offers lectures and farm activities for visitors, including classes on gardening, composting, bread making, crafts, writing, and the study of plants and wildlife on the farm.



Because Green Gulch is on the Pacific coast, the weather is usually cool and often foggy. This means that cool-season crops—those that usually grow in the winter in California’s Central Valley—do very well at Green Gulch in the summer. One such crop is cooking greens. Cooking greens look a bit like salad greens, such as lettuce, but they are much tougher and usually taste best when they are cooked. Only when they are very young with small leaves are they tender enough to mix into a salad.

The most familiar cooking greens are spinach, kale, collards, and chard. All these greens may be found all year long at Green Gulch.

While the weather favors the growing of these crops, there are sometimes problems with pests, such as flea beetles, eating the tender leaves of young plants. Emila explains that the best way to protect the plants is to make them healthy and vigorous. This task is accomplished at Green Gulch by applying to the soil an organic compost high in nutrients.

Sometimes the workers at Green Gulch will make a compost “tea” by mixing compost with water and letting it sit a while. (See also the compost tea activity in Chapter 7.) Workers carry spray bottles of this tea in backpacks. Wearing the backpack, a worker will walk through the fields, spraying the compost tea on plants. This strengthens the leaves and the roots to help the plant fight off pests and diseases.

Most of the cooking greens and other vegetables grown at Green Gulch are used to feed people on the farm, both the residents and the many visitors who come out for a day. The farm feeds anywhere from 60 to 200 people each day.

Some of the produce goes to local restaurants. What is left goes to some of the farm’s neighbors and a few markets.

Green Gulch also hosts field trips, often from city schools with many students who have never been to a farm before. “We give classes a tour of the farm, and they get to do some harvesting,” explains Emila. Because Green Gulch farm is close to San Francisco, it gets many requests for field trips. Schools are asked to make reservations well in advance of when they want to visit.

One type of harvesting is called gleaning. After the main harvest, there are usually some leftover vegetables in the fields. Gleaning means picking these vegetables so they do not go to waste. Green Gulch donates these vegetables to a soup kitchen. By helping with the gleaning, kids visiting the farm help feed people who are hungry.

Broccoli & Cauliflower

Broccoli and cauliflower are both in the cruciferous family of plants, also called cole crops. Originally from the northern Mediterranean countries of France, Italy, and Greece, broccoli and cauliflower grow best in moderate climates. Most of the broccoli and cauliflower eaten in the United States are grown on the southern part of the Central Valley in winter and in Monterey County year-round. Both broccoli and cauliflower come to market with few leaves and a prominent head of flowers.

Broccoli grows with its leaves spread out to catch the sun's rays and develop the plant's chlorophyll. A common type of broccoli has large inflorescences (clusters of tightly packed flowers) that are often very big (up to six

inches wide). Broccoli raab (broccoli rabe) is another type that has smaller inflorescences and thinner stems. The flavor is slightly stronger. Romanesco broccoli is a beautiful, geometrically shaped broccoli with pointed, spiral clusters on its inflorescence, a lighter green color, and a flavor similar to that of cauliflower. The leaves of broccoli are also edible and tasty and resemble collard greens.

Cauliflower is another vegetable that has a big inflorescence, called *curds*, or head. Cauliflower curds are a pale color. As the plant grows, its big leaves shield the head of the cauliflower from the sun. Compared with broccoli, cauliflower has hardly any stem.





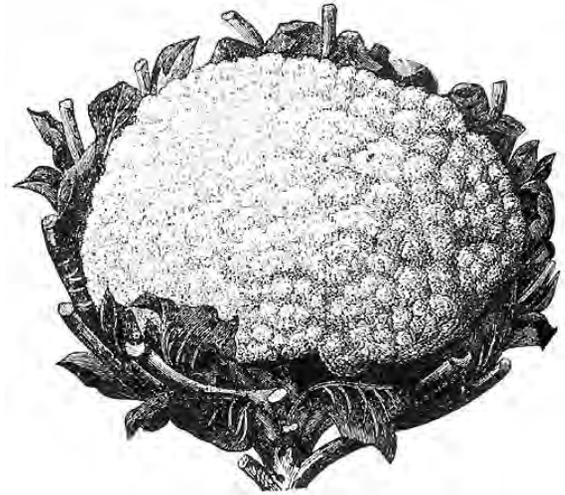
There are more than 40 varieties of cauliflower, most of which are defined by their varying leaf patterns. School gardeners should select varieties with large leaves that will provide adequate sun protection. Cauliflower seeds or transplants can be planted directly into the garden. Tie the leaves with string.

Seasonality and Growing Conditions

In foggy coastal climates, broccoli and cauliflower grow year-round, but in most other parts of the state they are winter vegetables. Depending on the variety, they will grow well in fall or spring, producing a stronger flavor that not everyone likes.

Broccoli requires a moderately rich, well-drained soil with lots of moisture. After the main head has been cut from sprouting varieties, side shoots will continue to form heads and provide a steady harvest. For maximum flavor, broccoli should be harvested before the flower buds begin to expand and bloom. Broccoli raab, however, is often sold after the flower buds have opened.

Cauliflower needs a deep-dug, loose, high-nitrogen soil. The nitrogen helps to develop the heads. A deficiency of nitrogen will result in yellow, stunted, dead leaves. Composted manure is a source of nitrogen. Cauliflower should be harvested when the heads are six inches in diameter and the curds are still compact. When the curds have already begun to separate, the plant is past its harvesting date. Broccoli and cauliflower are susceptible to various insect pests, including aphids, cabbage maggots, cabbage worm, slugs and snails,



and a disease known as clubroot. Pests may be removed by hand or by spraying with a hose. Adding limestone to the soil can prevent clubroot.

Selection, Storage, and Nutrition Information

When choosing broccoli, look for heads that are a deep, green color with tight buds. Avoid limp heads or those with open or yellowing buds. Broccoli can be stored in an airtight plastic bag in the refrigerator for up to four days. The plants are nutritional powerhouses high in vitamins A and C and a good source of fiber and folate.

Cauliflower heads should feel heavy for their size and have tight, compact curds that are a creamy white color. Storage is the same as for broccoli. Cauliflower is high in vitamin C and is a good source of fiber.

Broccoli Italian Style

Preparation Time:	20 minutes
Cooking Time:	15 minutes
Total Lesson Time:	60 minutes
Recipe Level:	Advanced

Background

This recipe reminds one of broccoli's Italian origins. All the spices and herbs in this recipe complement the taste of broccoli to make it even more delicious. When preparing recipes with broccoli or any of the plants from the cabbage family, be careful not to overcook it. A sure sign of overcooked broccoli is a distinct, sour odor caused by the release of sulfur compounds.

In this activity allow plenty of time for the students to examine the broccoli while they break it apart. Have students identify parts (stem, leaf, and flower). You may want to have them write down observations as they prepare the recipe.

Objectives

Students will be able to:

Describe, draw, and label the stem, flower, and leaf of a broccoli plant.

Understand that the most edible part of broccoli is its flower.

Ingredients

For a class of 20:

- 4½ lbs broccoli
with leaves attached
- 6 to 8 garlic cloves
- 1 tablespoon chopped,
fresh oregano, marjoram,
or thyme
- water
- 2 teaspoons salt
- ½ cup olive oil
- 2 lemons

Materials

For the class:

- hot plate
- 8-quart pot
- colander
- large skillet
- wooden spoon
- measuring spoons
- cutting board
- slotted spoon

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- 4 napkins
- 4 plates
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate the broccoli, garlic, and oregano into five equal portions, one for each student group.
3. Fill the pot halfway with water. Add 1 teaspoon salt and set to boil while students are making observations of the broccoli.

Safety Precautions

Review safety precautions for using knives and the hot plate. Use caution when adding ingredients to the hot oil as it can splatter and burn.

Making the Recipe

1. Provide each group a set of materials and a portion of the broccoli, garlic, and oregano.
2. Demonstrate how to trim the stem from the head, peel the stem, and cut it into half-inch slices. Demonstrate breaking the head into florets. Demonstrate peeling and chopping garlic and chopping the oregano. Have students prepare the ingredients and arrange them neatly on the plates.
3. Collect the broccoli and place it into the salted boiling water for three to four minutes or until crisp-tender. Scoop out the broccoli and set it aside on a plate.
4. Collect plates of chopped garlic and oregano and place them on the demonstration table next to the skillet and the hot plate. Have students gather around the demonstration table.
5. Heat the oil in the skillet. Ask a student to scrape the garlic into the skillet. When the garlic begins to sizzle, have another student add the broccoli, 1 teaspoon salt, and the oregano. Stir ingredients for another three to four minutes.
6. Take the skillet off the hot plate. Stir the broccoli as two students squeeze lemon halves onto the broccoli. Serve on plates.
7. While students eat, discuss other types of flowers that people eat.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Cauliflower with Cheese Sauce

Preparation Time: 20 minutes
 Cooking Time: 15 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Easy

Background

This recipe is a nutritious and delicious version of macaroni and cheese, a favorite of many children. You can make different versions with broccoli or a combination of both broccoli and cauliflower instead of just cauliflower. You may also expand the recipe to a main dish by combining it with a pound of pasta (cooked) and doubling the recipe for the sauce. Students can dissect the cauliflower to discover the stems, leaves, and flower. If you buy cauliflower at the farmers market, it will usually come with its leaves still covering the flower, shading it from the sun.

While preparing this dish, you may want to draw attention to the cooking process of the butter, flour, milk, and cheese. Students are always fascinated when watching transformations.

Objectives

Students will be able to:

Understand that they are eating the flower part of cauliflower.

Observe and describe the transformation process of making the sauce.

Ingredients

For a class of 20:

3 medium heads cauliflower
 4 cups milk
 4 tablespoons butter
 5 tablespoons flour
 1½ teaspoons salt
 1 lb cheddar cheese
 pepper

Materials

For the class:

hot plate
 large, 6-quart pot
 colander
 2-quart pot
 large skillet
 measuring spoons
 and cups
 wooden spoon
 3 cheese graters
 whisk

For each group of 4:

2 cutting boards
 2 knives
 2 plates
 4 napkins
 4 forks
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate cauliflower into five equal portions, one for each student group.
3. Begin to boil water while students are making cauliflower observations. Add 1 teaspoon salt to the water.

Safety Precautions

Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Give each group a set of materials and a portion of the cauliflower.
2. Demonstrate how to trim the stem from the head and break the head into florets. Have students prepare cauliflower florets and arrange them neatly on plates. Have students gather around the demonstration table.
3. Collect the cauliflower and place it into the salted boiling water for 5 minutes or until tender. When it is done, drain the cauliflower in a colander and set it on the demonstration table.
4. Ask two students to measure out 4 tablespoons butter, 5 tablespoons flour, and 4 cups milk. While they measure out the butter, flour, and milk, ask three other students to grate the cheese.
5. Make the sauce. Warm the milk in the 2-quart pot. Melt the butter in the large skillet over medium heat. Whisk in the flour and $\frac{1}{2}$ teaspoon salt. Now slowly whisk in the warmed milk. Ask students to make predictions about what will happen to the sauce as it cooks.
6. Once the sauce has thickened and is smooth, slowly add the cheese while stirring constantly. Ask students what role stirring plays in the cooking process. Add ground pepper, if desired.
7. When the cheese is thoroughly melted, serve the cauliflower and cheese sauce on plates. While students eat, review the cooking process with the class.
8. Clean up materials and compost food scraps.

Spiced Broccoli & Cauliflower

Preparation Time: 20 minutes
 Cooking Time: 15 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Advanced

Background

This recipe is inspired by Indian cuisine and is a great opportunity to lead a discussion about ethnic dishes. Tie this lesson together with a history or geography lesson, using a world map to show where India is located and discussing various spices commonly used in Indian dishes, such as ginger, cumin, and mustard seed. Discuss other ethnic foods the students have eaten. Find the places on the map where those foods originated.

The spices needed for this dish can be found in most grocery stores. The spices, when mixed together at medium heat, combine to give the broccoli and cauliflower a unique, spicy flavor.

In this activity, allow plenty of time for students to compare broccoli and cauliflower as they break them apart. You may want students to record their observations in their journals while they observe different parts of the produce. While cooking, discuss with students some of the differences of garlic, broccoli and cauliflower, cumin and mustard seeds, peppers, ginger, and cilantro. Have students try to identify which ingredients represent different plant parts.

Objectives

Students will be able to:

Describe, draw, and label the stem, flower, and leaf of broccoli and cauliflower plants.

Understand that the most edible part of broccoli and cauliflower plants is the flower.

Ingredients

For a class of 20:

- 3 lbs each of broccoli and cauliflower
- $\frac{3}{4}$ bunch cilantro
- 6 garlic cloves
- $\frac{1}{2}$ cup vegetable oil
- 2 teaspoons salt
- 3 dried chili peppers (optional)
- $1\frac{1}{2}$ teaspoons mustard seeds
- $1\frac{1}{2}$ teaspoons cumin seeds
- 1 medium knob ginger root (about 1 inch by 1 inch)
- $1\frac{1}{2}$ teaspoons black onion seeds (nigella) (optional)
- 2 lemons

Materials

For the class:

- 2 hot plates
- 2 small mixing bowls
- colander
- measuring spoons
- wooden spoon
- 2 12-inch skillet
- cutting board
- knife

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- 4 napkins
- 4 forks
- 4 plates
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate the broccoli, cauliflower, cilantro, and garlic into five equal portions, one for each student group.

Safety Precautions

Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Provide each group of students with materials and ingredients.
2. Demonstrate how to trim the stem from the head of the broccoli, peel the stem if it is tough, and cut it into eighth-inch slices. Demonstrate breaking the heads of the broccoli and the cauliflower into small florets. Demonstrate peeling and chopping the garlic and chopping the cilantro. Have students prepare the ingredients and place them neatly on plates.
3. Collect plates of broccoli and cauliflower and place them on the demonstration table. Collect plates of chopped garlic and cilantro and place them on the demonstration table next to the skillet and the hot plate. Have students gather around the demonstration table.
4. Heat oil in the skillets over medium heat. Divide the piles of ingredients equally for the two skillets. Add all the spices and seasonings to the oil in the two skillets. Add the cauliflower and cook for 3 or 4 minutes and then the broccoli, which takes a little less time to cook. Add $\frac{1}{2}$ cup water.
5. Cook on low heat and stir the ingredients for another 10 minutes or until vegetables are tender. *Note:* Keep ingredients at a temperature at which everything is cooking but not burning.
6. Take the skillet off the hot plate. Top with cilantro and serve the vegetables on plates. Cut the lemons in half and pass around to squeeze onto vegetables. While students eat, discuss words that describe the different flavors in the dish.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Calculating Farm Profit or Loss

Preparation Time: 10 minutes
Total Lesson Time: 40 to 50 minutes

Background

At the end of each season, farmers calculate how much money they made from each crop. They do this by subtracting how much it cost them to grow and harvest the crop (total expenses) from how much money they received for selling the crop (gross income). When a farmer sells to a wholesaler or to a broker, that mark-up will have to be subtracted as well. When farmers receive more money for selling their crop than it costs them to grow and harvest it, they make a profit. When farmers receive less money for selling their crop than it costs them to grow and harvest it, they lose money.

This activity looks at the costs involved in growing broccoli. The price of broccoli fluctuates. When prices are low, many farmers choose not to grow it because they do not want to lose money.

Objectives

Students will be able to:

Understand the words *expense*, *gross income*, *profit*, and *loss*.
Understand how to calculate farm costs and profits.

Materials

For the class:

Broccoli Balance Sheet student page
Coke Farm farm profile
red pencils or crayons



Preparation

Make copies of the student page and farm profile.

Doing the Activity

1. Read the Coke Farm farm profile and discuss with the class the steps involved in growing and harvesting broccoli.
2. Explain to students that they will explore how much money a farmer can make off one acre of broccoli. Explain that they will analyze profit in terms of various prices that the farmers might receive for the broccoli. Point out that the figures are based upon 20-pound boxes of broccoli.
3. Ask students what factors might affect the number of boxes that might be harvested from a particular plot of land (factors may include weather, soil fertility, water, healthiness of the transplants, and how well pests are under control).
4. Provide each student group with copies of the student page. Have them calculate the income per acre of broccoli with different prices and yields.
5. Discuss with students the process of broccoli production and the different kinds of expenses involved. Discuss buying transplants or seed, paying labor costs, and renting land and have the students think about other costs the farmer must assume. Explain that overhead costs are the general expenses involved in running a farm, such as insurance, office costs, purchase of new equipment, irrigation systems, rent of the land, labor costs, energy costs, and so on. Point out that production expenses are the same no matter how much broccoli is harvested, whereas harvesting expenses vary with the amount harvested.
6. Have students calculate the production expenses, harvesting expenses, and total expenses for each column.
7. Have students then calculate the amount of money the farmer gains or loses for each particular situation by subtracting the total expenses from the gross income. If the total expenses are more than the gross income, the result will be a loss; have students write or color losses in red. If the total expenses are less than the gross income, the result will be a profit; have students write the profits in black. (Losses are written in parentheses on the teacher answer page.)
8. As a challenge, have students figure out the exact amount farmers must charge in order to break even by dividing the total expenses by the number of boxes.
9. *Note:* Interested students can also calculate the cost per pound when the farmer sells the broccoli. If they assume a 50 percent mark-up by the time it is sold in the store, how much does it cost consumers per pound?

Broccoli Balance Sheet

Student Page

Gross Income per Acre of Broccoli

(From sale of broccoli to wholesaler or market)

	400 boxes	500 boxes	600 boxes
Gross Income at \$10 per box			
Gross Income at \$12 per box			
Gross Income at \$15 per box			
Gross Income at \$20 per box			

Expenses per Acre of Broccoli

	400 boxes	500 boxes	600 boxes
Production Expenses			
Lease per year	\$ 600	\$ 600	\$ 600
Broccoli transplants (40,000 transplants)	\$ 800	\$ 800	\$ 800
Compost and fertilizer	\$ 200	\$ 200	\$ 200
Water	\$ 200	\$ 200	\$ 200
Machinery: Tractor, etc.	\$ 200	\$ 200	\$ 200
Labor:			
Pre-planting	\$ 100	\$ 100	\$ 100
Planting	\$ 500	\$ 500	\$ 500
Weeding	\$ 200	\$ 200	\$ 200
Overhead (general farm expenses shared over all crops)	\$1,000	\$1,000	\$1,000

Total Production Expenses

Harvesting Expenses

Wax boxes (\$1 per box)	\$ 400	\$ 500	\$ 600
Cooling and storage (\$2 per box)	\$ 800	\$1,000	\$1,200
Labor:			
Harvesting (\$1 per box)	\$ 400	\$ 500	\$ 600
Sales commission (\$1 per box)	\$ 400	\$ 500	\$ 600

Total Harvesting Expenses

Total Expenses per Acre

Projected Profit or Loss per Acre of Broccoli

(Gross Income minus Total Expenses)

	400 boxes	500 boxes	600 boxes
If sold at \$10 per box			
If sold at \$12 per box			
If sold at \$15 per box			
If sold at \$20 per box			

Challenge Question:

How much would the farmer need to charge per box to break even (which means that gross income equals gross expenses) with 400 boxes per acre, 500 boxes per acre, and 600 boxes per acre?

**Teacher Answer Page****Gross Income per Acre of Broccoli**

(From sale of broccoli to wholesaler or market)

	400 boxes	500 boxes	600 boxes
Gross Income at \$10 per box	\$ 4,000	\$ 5,000	\$ 6,000
Gross Income at \$12 per box	\$ 4,800	\$ 6,000	\$ 7,200
Gross Income at \$15 per box	\$ 6,000	\$ 7,500	\$ 9,000
Gross Income at \$20 per box	\$ 8,000	\$10,000	\$12,000

Expenses per Acre of Broccoli

	400 boxes	500 boxes	600 boxes
Production Expenses			
Lease per year	\$ 600	\$ 600	\$ 600
Broccoli transplants (40,000 transplants)	\$ 800	\$ 800	\$ 800
Compost and fertilizer	\$ 200	\$ 200	\$ 200
Water	\$ 200	\$ 200	\$ 200
Machinery: Tractor, etc.	\$ 200	\$ 200	\$ 200
Labor:			
Pre-planting	\$ 100	\$ 100	\$ 100
Planting	\$ 500	\$ 500	\$ 500
Weeding	\$ 200	\$ 200	\$ 200
Overhead (general farm expenses shared over all crops)	\$ 1,000	\$1,000	\$1,000
Total Production Expenses	\$ 3,800	\$3,800	\$3,800
Harvesting Expenses			
Wax boxes (\$1 per box)	\$ 400	\$ 500	\$ 600
Cooling and storage (\$2 per box)	\$ 800	\$1,000	\$1,200
Labor:			
Harvesting (\$1 per box)	\$ 400	\$ 500	\$ 600
Sales commission (\$1 per box)	\$ 400	\$ 500	\$ 600
Total Harvesting Expenses	\$2,000	\$2,500	\$3,000
Total Expenses	\$5,800	\$6,300	\$6,800

Projected Profit or Loss per Acre of Broccoli

(Gross Income minus Total Expenses)

	400 boxes	500 boxes	600 boxes
If sold at \$10 per box	(\$1,800)	(\$1,300)	(\$4,800)
If sold at \$12 per box	(\$1,000)	(\$ 300)	\$ 400
If sold at \$15 per box	\$ 200	\$1,200	\$2,200
If sold at \$20 per box	\$2,200	\$3,700	\$5,200

Answer to Challenge Question:

The farmer would need to charge \$14.50 per box to break even with 400 boxes per acre ($\$5,800 \div 400$); \$12.60 per box with 500 boxes per acre ($\$6,300 \div 500$); and \$11.33 per box with 600 boxes per acre.

Coke Farm



In 1980, Dale Coke, who had enjoyed a successful career repairing fuel-injection engines, decided that he wanted to become a farmer. “I had a turning point in life when I was diagnosed with cancer,” Dale explains. “I started looking around. I was interested in organic food.” Dale took that interest and turned it into a new career in organic farming.

When Dale started out, there were very few organic farms. “I knew there were other ways to do things,” he says. “My neighbor kept telling me that what I was doing was impossible. So that gave me another reason to try harder.”

Starting with just a quarter of an acre of strawberries at his home in Aromas, near Watsonville, Dale has expanded the farm by making it a family business and buying and renting additional growing fields. Dale, his wife, Christine, and his sister Madeline grow about 30 different crops on about 200 acres. A few years ago the farm was twice as big and employed 70 people.

“The size of the farm and the crop mix are right for us just now,” says Christine. In addition to the home farm in Aromas, Coke Farm has land in the San Juan Valley, a small valley surrounded by a ring of low mountains. Aromas has a cool, coastal climate—perfect weather for growing crops such as lettuce and broccoli year-round and strawberries all summer. The warmer climate of San Juan is well suited to tomatoes, apricots, and strawberries that start early in the season.

Diversity, Dale believes, is good for the farm. “Having lots of different crops is hard,” he says. “You can’t water all at once, plant all at once, harvest all at once, or sell all at once because different crops all have different needs and different schedules. But you also don’t have the same growing or selling problems all at once.”



One of the most harmful pests for Coke Farm’s broccoli is the flea beetle. “This is just a little black beetle that hops around like a flea. They build up in the summer as it gets hotter,” Dale explains. “Each beetle takes only a small bite, but together they can ruin the whole plant.”

Dale has found that the best way to keep down pests such as the flea beetle is to rotate crops. This means that he never grows the same crop in the same place twice in a row. Where he plants broccoli one year, he might plant lettuce the next. Dale also believes in growing diverse crops next to each other. “Here, you’ll never look out and see just fields and fields of broccoli,” he explains. “You will see lettuce and fennel, then a few rows of chard, and then some cauliflower and onions.”

At times the broccoli harvest has been a very profitable one. Dale, an expert machinist, has special farm equipment that makes the harvesting, handling, and packing efficient. When it is time to pick the broccoli, a trailer with a wide table attached to it is driven through the fields. Workers walk behind the trailer, cutting off broccoli stalks and throwing them onto the table. Other workers riding on the trailer take the stalks and drop them in a machine that wraps rubber bands around the broccoli and cuts off the ends so that they are even. The bunches of broccoli are then put in boxes, and the boxes filled with crushed ice. The ice

keeps the broccoli cold and fresh. Piled high, the boxes are stored in a giant cooler awaiting trucks to deliver them to stores and restaurants in San Francisco, Oakland, Los Angeles, and even outside California.

This year Coke Farm is not growing broccoli. “There are more big organic growers coming in,” says Christine, who manages the day-to-day farming operation. “They grow so much, they can afford to sell it a lot more cheaply than we can.” As the market for organic produce grows, these bigger growers along with consolidated big buyers are bringing down the price of organic crops such as broccoli. Bigger quantities allow these farmers to have smaller profit margins so that they can charge less. That is good for consumers. However, it does not work for farmers with small- and medium-sized farms who do not have lots of money or other kinds of income that can help balance out low-profit crops.

Harking back to their beginnings, the Cokes have once again made strawberries one of Coke Farm’s key crops. Since the farm began in 1980, the number of people wanting to buy organic produce has grown. This trend is part of what has made the farm so successful. “But we’ve also paid a lot of attention to figuring out the crops we can grow well in rotations and sell profitably,” Dale says. “Success is due to a lot of hard work, perseverance, and flexibility.”

Carrots

The well-known cultivated carrot originated in Afghanistan some time before the tenth century. The first domesticated carrots were purple. During the next several centuries, carrots were introduced throughout Europe and Asia. The modern varieties of carrots were bred in the Netherlands in the seventeenth century.

Increasingly, there is a demand for heirloom varieties of carrots. These may range in color from maroon to white and have differing nuances in flavor.

Wild carrots are white and fibrous and woody in texture. Wild forms of carrots are found all over the world. Carrots are members of the parsley family. Like wild mushrooms, wild carrots should never be picked; they closely resemble poison hemlock, one of the world's deadliest plants. Death will result from eating a single leaf of poison hemlock, which is also a member of the parsley family.

Seasonality and Growing Conditions

Carrots are biennial plants, meaning that they live for two growing seasons. This fact allows farmers more flexibility in deciding when they wish to harvest carrots. The longer carrots are in the ground, the larger they become, but they also lose their characteristic sweet flavor as they mature. Most farmers harvest their carrots at about three months.





Like many edible roots, carrots are sensitive to physical and nutritional changes in the soil in which they are grown. Healthy, long, straight carrots grow best in loose, well-worked soil that is rich in humus. The carrots are planted in raised beds so that rain will drain from the soil to eliminate flooding and decrease the chances of root rot. Carrots thrive best in temperatures between 50 and 60 degrees with abundant moisture. However, carrots will tolerate higher or lower temperatures once they are established.

Carrot seeds are very finicky. They need temperatures that are neither too high nor too low and constant moisture to sprout (germinate). The carrot seedlings are thinned until they stand two inches apart, giving the roots adequate room to grow. Carrots split or become tough if they are not watered regularly. Too much nitrogen (from composted manure or other sources) causes the roots to fork. It is important for the soil to be loose and free from stones or clods, which cause the carrots to bifurcate or become bumpy.

Selection, Storage, and Nutrition Information

When choosing carrots at the market, look for roots that are not limp, damaged, or split. Carrots may be available with their green stems and leaves still attached, loose without stems or leaves, or prepackaged.

Carrots should be stored in the refrigerator or a cool, moist area as close to 32 degrees as possible. They can be stored for up to two weeks before they lose their crispness.

Carrots are high in vitamin A. The orange color in carrots indicates the presence of carotene, a fat-soluble pigment that becomes vitamin A in our bodies. Vitamin A is essential for both normal human growth and eyesight. Carrots are also a good source of fiber.

Carrot-Orange Salad

Preparation Time: 15 minutes
 Cooking Time: 20 minutes
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

Carrots brighten salads, appetizers, and main dishes, but rarely are they the central ingredient in those dishes. In this simple salad, the sweet taste of carrot is a central flavor that contrasts well with the citrus flavors of oranges and lemons. The chervil adds a licorice taste to the salad. If chervil does not appeal to you or if you cannot find it, substitute parsley, cilantro, or tarragon. Carrots with their green tops are easy to find at the farmers market and will help students visualize the whole plant. Students can imagine carrots growing and being harvested for market.

To truly enjoy this salad, let it marinate for about 20 minutes while you read and discuss the farm profile with the class.

Objectives

Students will be able to:

Identify the parts of the carrot plant: the root, the stem, and the leaf.
 Understand the process of planting, growing, and harvesting carrots.

Ingredients

For a class of 20:

- 3 lbs carrots with green tops
- 2 large, juicy oranges
- 1½ lemons
- 6 tablespoons olive oil
- 6 tablespoons chopped fresh chervil, parsley, or cilantro
- 1 teaspoon salt

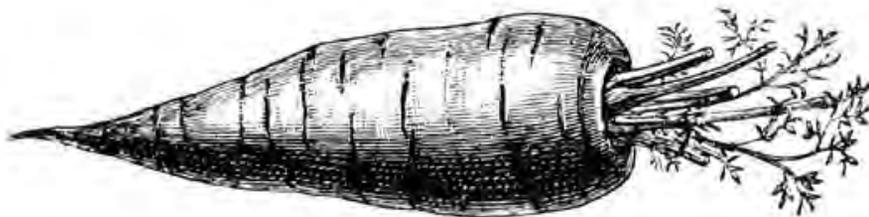
Materials

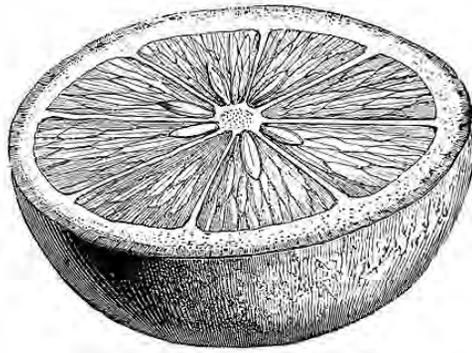
For the class:

- large mixing bowl
- colander
- strainer
- large spoon
- measuring spoons
- knife
- Stony Farms farm profile
- small bowl
- small grater
- cutting board
- vegetable peeler

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers or box graters
- 4 plates
- 4 napkins
- 4 forks
- journals



**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash carrots thoroughly and separate them into five equal portions, one for each student group.

Safety Precautions

Review safety precautions for using knives and peelers.

Making the Recipe

1. Provide each group of students with a set of materials.
2. Demonstrate how to trim the stems and leaves from the carrots and to use the peeler to peel carrots into short, thin slices. Have students make thin carrot peels and arrange them on the plates. Alternatively, use box graters to grate the carrots.
3. Collect the plates of carrots and set them aside on the demonstration table. Have students gather around the demonstration table. Ask two students to place the carrots into the mixing bowl.
4. Make the vinaigrette: Ask a student to finely grate the peel from one orange. Ask another student to cut the oranges and lemons in half. Ask three other students to squeeze the oranges and lemons through strainers into the small bowl. Ask two other students to measure and add salt and oil. Mix ingredients thoroughly and add to the grated carrots.
5. Let the salad marinate while you read (or have students read) the Stony Farms farm profile. Discuss the growing process of carrots.
6. After reading and discussing the farm profile, serve the salad on plates and garnish with chervil, parsley, or cilantro.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Moroccan Carrot Dip

Preparation Time: 20 minutes
 Cooking Time: 20 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Advanced

Background

As part of a midmorning snack, Moroccan carrot dip allows students to taste a carrot's sweetness while they enjoy pita bread or crackers. This recipe also shows students what happens to carrots as they cook. Students can observe the changes in their consistency and flavor.

You may use a food processor, if you have one, instead of the potato masher to give the dip a smoother consistency. For a decorative touch, sprinkle finely chopped parsley (about ¼ bunch) over the dip before serving.

Objectives

Students will be able to:

Observe the transformation of the carrot's texture from hard to mushy.

Ingredients

For a class of 20:

4½ lbs carrots
 6 cloves garlic
 1½ onions
 4 cups water
 2 teaspoons salt
 6 tablespoons olive oil
 1½ teaspoons ground cumin
 ¾ teaspoon caraway seed
 1 large lemon
 freshly ground black pepper
 10 small pita breads
 1 bunch parsley (optional)

Materials

For the class:

hot plate
 2-quart pot steamer
 colander
 large and small mixing
 bowls
 measuring spoons
 wooden spoon
 food mill or potato masher
 cutting board
 knife
 vegetable peeler

For each group of 4:

2 cutting boards
 2 knives
 2 plates
 4 napkins
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash carrots thoroughly and separate carrots, garlic, and onion into five equal portions, one for each student group.
3. Place water in the 2-quart pot and place it on the hot plate to boil.

Safety Precautions

Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Demonstrate how to cut carrots into $\frac{1}{4}$ -inch “full moons.” Demonstrate how to peel and chop the onion finely and smash and mince the garlic. Have students prepare carrots and garlic first and arrange them on plates.
2. Bring water in the steamer to a boil.
3. Collect the plates. Place the carrots into the steamer and cook until very soft. Meanwhile, have students prepare the onions and arrange them on plates. Collect those plates and put them on the demonstration table next to the large pot. Have students gather around the demonstration table.
4. Remove the carrots from the steamer and set them aside in the large mixing bowl. Have a student measure and add oil to the large pot. Have two other students add the onions, cooking over medium heat until translucent (about 5 minutes). Add the garlic, spices, and salt and gently sauté another 3 minutes, stirring often. Have another student stir in the carrots for 1 minute to infuse the flavors of all the ingredients.
5. Remove the pot from the heat. Have two students pass the spiced carrots through the food mill or mash the mixture until it is a thick paste. Place the dip in the small mixing bowl and add 3 tablespoons lemon juice. Add salt, lemon juice, and black pepper to taste.
6. Cut up the pita breads and serve with the dip.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Pre-Sprouting and Sowing Carrots

Preparation Time: 20 minutes
Total Lesson Time: 30 minutes first day, and then
10 minutes a day for 10 days

Background

To get a head start on the growing season and to ensure that plantings are successful, farmers often pre-sprout the seeds. That means that they allow seeds to germinate, usually in greenhouses, before they are actually planted in the ground.

Pre-sprouting carrot seeds is especially useful because it reduces the long germination period for carrots. For germination to occur, there must be favorable conditions, including a moist and warm environment. Sunlight is essential.

In this activity, students will pre-sprout carrot seeds and then transplant them into pots or the school garden. Students will be interested to know that sweet-tasting carrots depend on a soil that has humus and loose soil. Humus holds water and nutrients in the soil and keeps the soil light and fluffy. Loose soil is especially important for carrots because it allows the root to grow deeply and smoothly. Carrots also need soil with sufficient lime and potassium. Unlike many vegetables, however, carrots do not need a lot of nitrogen. In fact, too much nitrogen produces a less-than-sweet carrot and may cause the carrot to bifurcate.

Objectives

Students will be able to:

Pre-sprout carrot seeds.

Understand the conditions needed for germination (sprouting).

Explain why farmers pre-sprout seeds.

Describe the best soil conditions for optimal growth.

Materials

For the class:

2 quarts water

2 packets carrot seeds

wax pencil

school garden, or pots and potting soil

journals

rulers

paper towels

paper cups

**Preparation**

1. Obtain several packets of carrot seeds.
2. Gather materials for student groups.

Doing the Activity

1. Tell the students that plants grow from seeds and discuss the process. Relate the discussion to how and why farmers pre-sprout seeds in greenhouses at their farms.
2. Explain to the students that carrots are hard to germinate and that the seeds do not live very long. Let students pre-sprout as many carrot seeds as possible, observe them daily, and record their observations. Students may find the date of the seed on the back of the seed packet. If there are different years, students may want to record and observe any differences in sprouting. Show the seeds to the students and let them examine the seeds and draw them in their journals.
3. Give each group four cups, four paper towels, and about 40 carrot seeds. Demonstrate how to fold the paper towel into thirds and roll it into a tube. The diameter of the tube should be a bit smaller than the diameter of the plastic cup. Place the paper towel tube in the cup so that it rings the inside of the cup. Pour water into the bottom third of the cup. As the paper towel slowly absorbs the water, place about 10 seeds between the cup and towel.
4. Have students prepare their cups and seeds for pre-sprouting. Have students draw a picture of the cups and seeds and write their predictions of what will happen in 10 days.
5. Use a wax pencil to identify each cup with the student's name. Place the cups in the warmest part of the classroom.
6. For the next 10 days, provide time (about 10 minutes) for students to observe the seeds and record their observations. Add sufficient water to make sure paper towels stay moist. These observations may lead to discussions about the germination process. Common observations are that some seeds do not germinate, the seed cracks open, the root grows out of the seed before the shoots (stem), and the leaves unfurl from the stem. Encourage students to measure the growth of the roots and stems by using rulers. You may also want to take a couple of seeds from the cups and dissect them to investigate what is inside.
7. When leaves unfurl from the stems, help students transplant the largest plants into the school garden or pots. Discuss what the carrot plants need for optimal growth. Continue to monitor the growth of the carrots until they are ready to harvest.

Stony Farms



Don and Shirley Ward bought Stony Farms in 1987 after Don had retired from his career as a businessman in Southern California. Don had always kept a small vegetable garden as a hobby, so when he retired, the Wards decided to pursue this hobby full time. After Shirley found the farm in Santa Rosa, north of San Francisco, the couple moved in and began a new life as farmers.

Stony Farms is relatively small—just eight acres, of which five are devoted to growing vegetables. Despite this small size, in an average year Don and Shirley grow 12,000 pounds of carrots.

The Wards' carrots are exceptionally sweet. What makes these carrots so good? Shirley admits with a laugh that even she is not sure. "It might be the stones—the same ones that give us the name Stony Farms," she claims.

It might also be the special variety of carrots the Wards plant, the name of which is top secret. "When we started, I asked my mother—who is from Iowa—what we should plant. She told us what to do, what kinds of seeds to buy," says Shirley.

Although the Wards will not reveal the name of their carrots, they are glad to tell you how they planted the carrots. First, Don uses a tractor to rip up the soil, digging down one foot deep. Then he applies an organic fertilizer, such as compost, and tills the soil again. Next, he scatters or "broadcasts" the carrot seeds, throwing them over the prepared soil.

"We don't plant the carrots in rows," says Shirley, "That takes up too much space. That's how we can grow more."

After the seeds have been broadcast, a layer of rich compost is laid over the top of the bed, and the planting is complete. When it comes



time to harvest, the Wards pull up all the carrots in the bed at the same time. This gives them a wide variety of sizes. Shirley says she has found that customers like having choices, some preferring tiny baby carrots and others big, fat ones.

When they are harvesting, the Wards cut off the carrot tops right in the field. They then turn these back into the beds where they will decompose, adding rich nutrients to the soil.

After harvest, Shirley says, “We wash, and we wash, and we wash the carrots. Then we count and weigh them before we go to market.”

The carrots are planted and harvested between March and October. The last planting of the year (in October) stays underground during the cold winter months while the rest of the farm shuts down and the Wards take their annual vacation. When the weather warms, the carrots start to grow; in March, they are ready to harvest.

While Don takes care of the planting, Shirley takes care of the business side of the farm. She sells the vegetables at the market and keeps careful records of how many pounds are grown and sold and how much money is made. But Don and Shirley also share many of the farm duties: Shirley often drives the tractor while Don is in the field, and Don usually comes to the market to help Shirley with the selling.

The Wards have a special working relationship with their friends, Spencer and Helene Marshall. The Marshalls sell honey at farmers markets and in stores throughout the San Francisco Bay Area. Between 10 and 15 of the Marshalls’ beehives are at Stony Farms. In exchange for housing the bees, the Wards not only get some of the honey but also benefit in another way. As they explain, “The bees do our pollination for us.” Pollination is a necessary step in producing fruits and vegetables, so bees are essential for a healthy and productive farm.

Next to carrots, the Wards’ most popular crops are tomatoes and cucumbers. But all told, they grow more than 80 varieties of vegetables and fruits—so there is always something fresh to eat at Stony Farms.

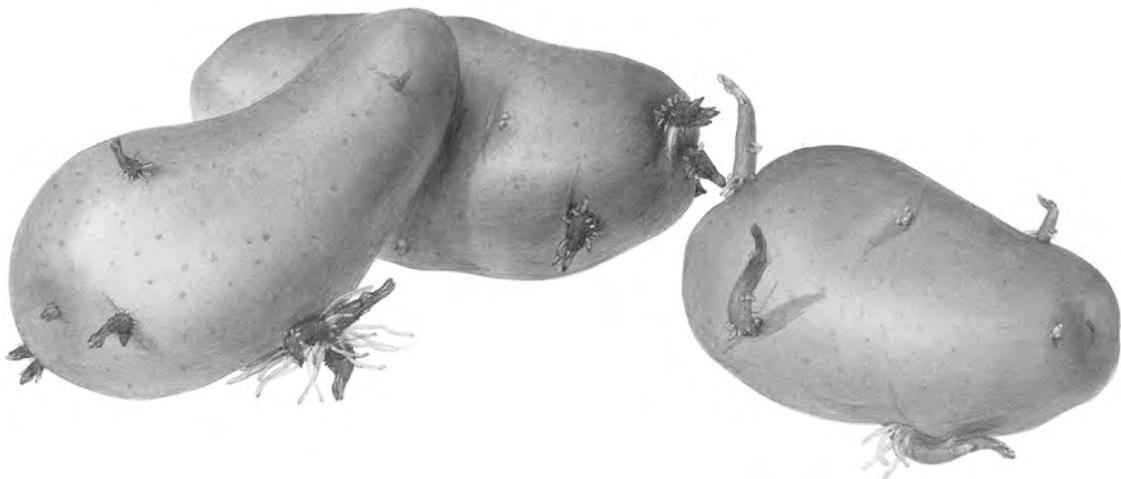
Potatoes

Potatoes are native to South America. They were first cultivated by the Incas in the Peruvian highlands at least 2,000 and possibly up to 8,000 years ago. Now they are a dietary staple for cultures around the world.

The potato is a member of the nightshade family, along with tomatoes and peppers. Potatoes were introduced to Europe in the sixteenth and seventeenth centuries. However, potatoes did not become popular as a food for another century. People were suspicious of potatoes because many poisonous plants are in the nightshade family. Potatoes eventually became an important dietary staple. For example, the potato became such an important dietary staple in nineteenth-century Ireland that when there was a serious potato blight in 1854 and 1846, widespread starvation occurred throughout the country, and many Irish immigrated to the United States. Irish potato crops were vulnerable to disease because there was only one variety of potato, called Lumpers.

Potatoes are tubers, meaning they are thick, fleshy, underground stems. The buds (called *eyes* by farmers) are found all over the tuber. Hundreds of varieties of potatoes are grown worldwide, with most limited to Peru. However, in the United States, several closely related varieties of Russets are much more popular than others.

Russet, or Burbank, potatoes are named after horticulturist Luther Burbank, who revolutionized the hybridization of thousands of fruits and vegetables. Russets have rough brown skin, numerous eyes, an elongated shape, and a high starch content that makes for mealy, fluffy flesh. They are the preferred potatoes for French fries and baking. Because their skin is so thick, Russets store better than other varieties of potatoes.





Other kinds of potatoes are common as well. Long white potatoes have a thin, pale skin, small eyes, and an elongated shape. They are good for baking, broiling, and roasting. White rose is a common variety of the long white potato. Round white and round red potatoes are medium-sized boiling potatoes with a waxy flesh. Because they have a low starch content, their flesh is more moist.

New potatoes are any variety of young potatoes in which the sugars have not fully converted to starch, so the flesh is crisp and waxy. Heirloom potatoes are varieties of potatoes popular in the eighteenth, nineteenth, and early twentieth centuries. They are coming back in popularity today, especially yellow varieties (such as Yukon Gold and Yellow Finn), fingerling varieties, and even blue varieties. Most have thin skin and need not be peeled.

Seasonality and Growing Conditions

Potatoes grow well in many cool conditions, such as the coastal Northern California in summer and the high desert in spring or fall. They are available year-round, although spring and fall are peak seasons.

Potatoes require well-drained soil; without it they suffer from rot. Potatoes tolerate acidic soil better than do most crops. Acidic soils are common in the northern regions, such as the states of Idaho and North and South Dakota,

so potatoes grow better in those places than do most other crops. The seed tubers are planted about four inches underground and about 10 to 12 inches apart. Potatoes should be planted in a different location each year, preferably following a legume crop, such as beans, peas, or vetch. Legume crops are valuable because they fix nitrogen in the soil, making it available for subsequent crops.

Potatoes should never be planted on a plot following a tomato crop as the two plants are subject to the same diseases.

One of the concepts of sustainable agriculture is to find the varieties that are best suited to a region. By growing diverse varieties, the farmer protects against an entire crop being lost due to susceptibility to various blights and fungi.

Selection, Storage, and Nutrition Information

Potatoes are harvested about three months after being sown. When choosing potatoes, look for firm, well-shaped specimens without green spots (the green is solanin, a substance toxic in large quantities). When stored in a cool, dry, dark, well-ventilated place, potatoes can last for up to two months. Potatoes are a good source of potassium, fiber, and vitamin C.

Roasted Potatoes with Herbs

Preparation Time: 15 minutes
 Cooking Time: 30 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Easy

Background

This recipe follows a format similar to the comparative tasting instructions found in the introduction of this guide. Unlike other fruits and vegetables that may be eaten raw during a comparative tasting, potatoes need to be cooked. (Raw potatoes contain a mildly poisonous substance that is destroyed by cooking.) This recipe allows students to compare many different types of potatoes. Select several different varieties, such as Yukon Gold, Yellow Finn, Reddale (or any red-skinned potato), Burbank/Russet, and All Blue (blue-fleshed). Give students plenty of time to compare the different varieties before roasting the potatoes. Because the potatoes differ greatly in size, color, texture, and taste, students use all their senses in exploring these varieties.

The recipe may seem to call for a lot of potatoes, but potatoes cook down quite a bit as they roast. The rosemary in this recipe as well as herbs for other recipes in this book may be found in your school garden.

Objectives

Students will be able to:

Use their senses to observe different aspects of a variety of potatoes.
 Record observations and write comparisons in their journal.

Ingredients

For a class of 20:

- 4 or 5 each of 4 to 5 different types of potatoes, such as Yellow Finn, Yukon Gold, Reddale, All Blue or blue-fleshed, new potatoes, or fingerlings (20 to 25 potatoes total or about 4 lbs)
- 6 tablespoons olive oil
- 1 small bunch rosemary or thyme
- 1½ teaspoon salt
- 1 head garlic (optional)

Materials

For the class:

- large bowl
- colander
- oven
- 2 9-inch x 13-inch baking dishes, or larger
- spatula
- measuring spoons
- cutting board
- knife

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 sponges with rough green scrubbing side
- 4 plates
- 4 forks
- 4 napkins
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate potatoes so that each student group receives one of each type of potato.
3. Preheat the oven to 450°F.

Safety Precautions

Review safety precautions for using knives and the oven.

Making the Recipe

1. Provide student groups with one of each type of potato and some rosemary or thyme. After students make and record observations in their journals about the potatoes, they can share their observations with the class. Have students remove rosemary or thyme leaves from their stems.
2. Show your students how to wash the potatoes with the rough side of a scrub sponge, inspect the potatoes for greenish areas on the skin, and cut off any green area. The green areas contain solanine, a substance that is toxic in large quantities. The green indicates that the potato has been exposed to the sun.
3. Demonstrate how to cut the potatoes into quarters. It is best to cut the potatoes in half and then put the flat side down while quartering. Cut potatoes in more pieces, if necessary, so that all pieces are roughly the size of a ping-pong ball.
4. Have students wash and prepare their potatoes for roasting and place the potatoes on a plate. While doing so, students can record further observations. A couple of students should separate the head of garlic (if using) into cloves.
5. In the large bowl toss together the cut potatoes with the herbs, oil, salt, and unpeeled garlic cloves. Put the seasoned potatoes into the two baking dishes. Place the potatoes in the oven for 30 to 40 minutes at 450°F (or until done.)
6. While waiting for the potatoes to roast, students can share their observations and make predictions about which type they will like the best.
7. Serve the potatoes on plates, making sure that each student receives a piece of each type. While eating, students can discuss their observations with the class, focusing on appearance, texture, taste, and smell.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Potato Salad

Preparation Time: 20 minutes
 Cooking Time: 15 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Advanced

Background

The best potatoes for potato salad are waxy, yellow-fleshed varieties, such as Yellow Finn, Yukon Gold, fingerlings, or small red potatoes. Fingerlings get their name from their fat, fingerlike shape. If you choose Burbank/Russet or any of the more starchy potatoes, be aware that they tend to lose their shape and fall apart in the salad.

You may also make this salad with an oil-based vinaigrette by eliminating the mayonnaise and adding instead an extra $\frac{3}{4}$ cup olive oil and an extra 3 tablespoons vinegar.

Objectives

Students will be able to:

Understand that a potato is a tuber or swollen stem that grows underground.

Observe whether the potato keeps its shape during cooking.

Ingredients

For a class of 20:

4½ lbs potatoes (use waxy
 boiling potatoes, not
 starchy baking potatoes)
 water
 6 eggs
 1 bunch chives
 5 stalks celery
 1 bunch green onions
 ½ cup plus 1 tablespoon
 apple cider vinegar
 ¾ cup olive oil
 1 cup mayonnaise
 2½ teaspoons salt
 ¼ to ½ teaspoon pepper

Materials

For the class:

hot plate
 measuring spoons and cups
 colander
 slotted spoon
 2 large mixing bowls
 6- to 8-quart pot
 steamer insert
 small saucepan
 whisk

For each group of 4:

2 cutting boards
 2 knives
 4 napkins
 4 plates
 4 forks
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Cook the eggs in boiling water for 9 minutes. Set up the steamer and start heating.

Safety Precautions

Review safety precautions for using knives and the hot plate. Remind students to use caution around the steamer as steam can cause burns.

Making the Recipe

1. Provide each group of students with a set of materials and an equal amount of potatoes, green onions, and chives. Have students wash the potatoes, green onions, and chives.
2. Demonstrate how to cut the raw potatoes into ½-inch cubes. It is best to cut potatoes in half and then chop the halves with the flat side on the cutting board. Collect the potatoes and add to the boiling steamer.
3. While the potatoes are steaming, demonstrate how to thinly slice the green onions and chop the chives. Have students prepare the ingredients and place them neatly on plates.
4. Collect the plates and set them aside on the demonstration table. Provide each group with an egg and let them peel and chop the egg into small pieces. Have the students place the egg neatly on a plate. Collect the egg plates and place them on the demonstration table. Have the students gather around the demonstration table.
5. Check the potatoes. When they are tender, move them from the steamer to a large bowl to cool. Let students volunteer to mix the vinaigrette. In a large mixing bowl, measure and whisk together the vinegar, oil, mayonnaise, salt, and pepper.
6. Have the students pour the dressing over the now warm potatoes. Point out how the dressing soaks in quickly because the potatoes are warm. Have the students add the chopped egg and herbs and mix gently. Taste and adjust seasoning.
7. Serve a small portion of the salad on plates for students to try. While the students eat, discuss the flavors and textures of the salad.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Mulching for Water Conservation

Preparation Time: 20 minutes
Total Lesson Time: 30 minutes to set up experiment, then
5 minutes each day for three days to monitor,
and 15 minutes for closure on the last day

Background

Mulch is a soil covering that farmers and gardeners place on top of the soil to save both water and soil. Mulch may be made of a variety of materials, such as plastic sheeting, wood chips, compost, or straw.

In the summer, a nonmulched field must be watered more frequently than a mulched one. Mulch also helps shade the soil surface, keeping it cooler and thus preventing further water evaporation.

Mulch also helps hold the soil in place. Rain can easily erode bare soil, taking important topsoil with it. In many parts of California, soil erosion is evident on hillsides.

In this activity, students will conduct an experiment to see the effect of mulch on the amount of water that evaporates from soil.

Objectives

Students will be able to:

Conduct an experiment to compare water evaporation with and without mulch.
Describe the role of mulch in conserving water.

Materials

For the class:

potting soil or garden soil
garden mulch (if available)
newspapers
shredded newspaper or paper towels
water
waterproof pen for labeling
balance scale, postal scale, or kitchen scale

For each group of 4:

2 copies of Springhill Farm farm profile
2 clear plastic cups (9-oz. size)
2 1-cup measuring cups

**Preparation**

1. Gather materials. Groups may share the measuring cups.
2. Cover tables with newspaper.

Doing the Activity

1. Give each pair of students a copy of the Springhill Farm farm profile and read it together as a class. Ask students whether anything surprised them about the reading. Lead the discussion toward the fact that Larry Peter dry-farms his potatoes. Make a list of the conditions that dry farming requires: good soil, good mulch, and so on.
2. Ask students what mulch is and have them share their ideas about the purpose of mulch. Explain that farmers and gardeners commonly use mulch to conserve water, to reduce the number of weeds, and to prevent soil from washing away. Tell the class that they will be conducting an experiment to see whether mulch affects the amount of water that evaporates from soil.
3. Have each group measure out $\frac{1}{2}$ cup soil into each of their cups. Have them measure and pour $\frac{1}{2}$ cup water into each cup.
4. Have each group place about one-half inch of shredded newspaper, paper toweling, or garden mulch on top of the soil in one cup. For comparison purposes, the other cup will have no mulch.
5. Have students weigh each cup and record its weight (the two cups will weigh about the same). Have them use a waterproof pen to label the two cups with the groups' names and the date.
6. Place all the cups on a countertop or windowsill.
7. Once a day for the next two or three days, give students time to weigh each cup and record the weights.
8. After the experiment, have students share their results with the class. Discuss how the mulch affected the amount of moisture in the soil.

Springhill Farm



Some are big. Some are long and skinny. Still others are round and as small as marbles. They come in red, purple, yellow, white, and blue with names such as Russian Banana, German Butterball, White Rose, and Ruby Crescent. What are they? Potatoes!

Many varieties of potatoes are grown by Larry Peter at his 320-acre farm in the rolling hills west of Petaluma in Sonoma County. Larry grows at least 15 different types of potatoes each year and sells them as Springhill potatoes. In addition, Larry keeps more than 300 cows that supply milk for his Springhill dairy, where he produces many kinds of cheeses. These are called farm cheeses because they are made the old-fashioned way in small batches, which gives them lots of character.

You could say that being a potato farmer is in Larry's blood. His ancestors were potato farmers in Ireland, and his parents raised their large family on an 18-acre farm outside Santa Rosa. "We all did garden chores, and I milked the cow," Larry remembers. He recalls that potatoes grew exceptionally well on his family's land and that they were part of most family meals.

On his own farm, Larry uses a technique called dry farming, which he learned from his parents. In dry farming, plants are not watered; they use the moisture already in the ground.



Dry farming requires the soil to be specially prepared. In March, after the soil has dried out a bit from the usual winter rains, Larry begins his work. First, he digs down 15 inches and turns the soil over. He does this every week for three weeks in a row. This brings ground water (water already in the soil) up to the surface so there is enough moisture to keep the young potato plants alive. As this surface water begins to dry out, the growing plants will send their roots down deeper to seek out more water. If all goes well, the potatoes will be ready for harvest in 65 to 75 days.

Harvesting potatoes is a little like digging for treasure. When the green part of the plant above the soil dies, the potatoes are ready to be taken from the ground. This can be done by a machine or by hand with a shovel. Larry uses both techniques.

Larry's parents, Virgil and Georgia, used to take his potatoes to their house and wash and sort them before they were sent to market. These days, his dad is his top salesman at the Santa Rosa farmers market, one of several farmers markets where Springhill potatoes and cheeses are sold.

At the markets, Larry and his dad tell customers what the different types of potatoes taste like and suggest ways to cook them, since different potatoes are suited to specific dishes. Some are great for baking but would not make a good potato salad. Some are especially nice steamed with their skins on, and others make great mashed potatoes. Larry undoubtedly could tell you what kind of potato makes the best French fries. Educating consumers is a role Larry clearly enjoys. "I need a break in the routine to get away from the cows and to see people," he grins.

Pears

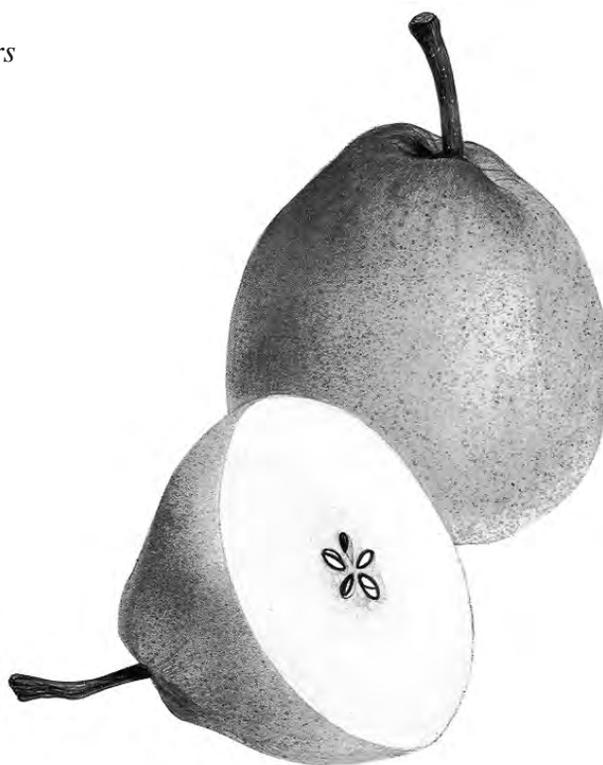
Pears originated around 4,000 years ago in central Europe and northeast Asia. They are one of the oldest known cultivated fruits. In early days of cultivation, the pear was prized among the wealthy and nobility. Today, there are at least 5,000 varieties of pears, the most common being the Bosc, Bartlett, Anjou, and Comice, which is known as the “Queen of Pears” for its sweet, flavorful flesh and luscious aroma. Other varieties that are good for cooking and eating are the tiny Seckel and the French Butter. All those varieties named are “European” pears. Asian pears are pears too, but the word *Asian* is always specified because Asian pears are a distinctly different species of pear.

Seasonality and Growing Conditions

Pears grow best in deep, well-drained loam soil with lots of water. In addition to full-size trees, pears are also grown in dwarf varieties, which are ideal for small gardens and *espaliers* (a lattice on which trees are trained to grow in two dimensions). Nearly all pear varieties require cross-pollination.

Pear trees are planted as one-year old “whips” (young tree stocks), then severely pruned back. As the tree grows, the branches will continue to be heavily pruned to remove fireblight (a bacterial infection that enters the tree through the blossom in the springtime), to shape the tree, and to control the size of the crop (to prevent overbearing).

Unlike most other fruit, “European” pears do not ripen on the tree. For this reason, they are picked when they are still hard and green. Farmers generally use one of two methods to determine when pears are ready to be picked. The first method requires the farmer to test the sugar content of the fruit on the tree. When the sugar content has reached its peak, the pear is picked to ensure that the fruit is at its sweetest as it ripens in storage.





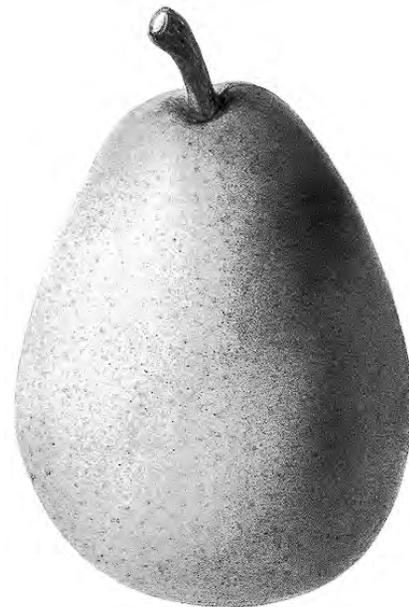
In the other method, the farmer tests the pressure of the pear. When the pear has reached its maximum pressure (when the fruit is at its hardest), it is picked so that it will soften as it ripens.

After being harvested, pears are kept in a cool storage area for two weeks to two months before being shipped to market. Cold storage delays the natural ripening process.

Selection, Storage, and Nutrition Information

When purchasing pears, choose fruit that is still somewhat firm; pears should generally be ripened for a day or two at home in even temperature and out of direct sunlight. Pears are ripe when they give slightly to gentle pressure at the neck and stem, but be careful because they bruise easily. Refrigerate ripe pears.

Pears tend to discolor quickly when the cut fruit is exposed to air, so you will need to add acid (such as lemon juice) to the cooking liquid or to cut fresh fruit to prevent it from turning brown. Pears are a good source of fiber and vitamin C.



Pear, Celery, & Parmesan Salad

Preparation Time: 25 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

This salad is refreshing and delicious. It does not have much seasoning, so it is important to use the freshest ingredients and ripe pears. Comice pears are a good variety to use because their sweetness really comes through in this salad. Texture in food is important, as this salad demonstrates. The soft pears contrast with the crunchy walnuts, the crisp celery, and the tangy dressing. You may also have students taste the pears, celery, walnuts, and cheese separately and then as part of the salad so that students taste how the flavors enhance each other. You might want to provide a loaf of crusty bread and serve it in slices with the salad.

Objectives

Students will be able to:

Understand the importance of fresh food for flavorful salads.

Compare the taste, smell, texture, and appearance of ingredients separately and in a salad.

Ingredients

For a class of 20:

- 6 large Comice pears
- 4 to 6 celery stalks
- 6 ounces Parmesan cheese
(not grated)
- 1 cup walnuts, halves or
coarsely chopped*
- 1 large lemon
- 6 tablespoons olive oil
- pepper
- ½ teaspoon salt

Materials

For the class:

- measuring spoons
and cups
- colander
- wooden spoon
- small mixing bowl
- vegetable peeler/corer
- cutting board
- knife
- whisk
- juicer
- large platter

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- journals
- 4 plates
- 4 napkins
- 4 folks

*Check to make sure no students are allergic to walnuts.

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Before starting the class, wash the pears and celery.

Safety Precautions

Review safety precautions for using knives and peelers.

Making the Recipe

1. Provide each group of students with a set of materials and an equal amount of pears, celery, walnuts, and Parmesan cheese.
2. Demonstrate how to peel pears, core them, and slice thinly. Demonstrate how to remove the strings from the celery stalks and slice thinly in diagonals. Make sure the celery slices are about $\frac{1}{16}$ -inch thick. If the celery pieces are much bigger, they overpower the pears. Demonstrate how to cut walnuts into quarters and how to “peel” the cheese thinly with a vegetable peeler. Have students prepare ingredients and arrange them neatly on plates.
3. Collect the plates and set them aside on the demonstration table. Have students gather around the demonstration table. Have a student cut the lemon and juice it in a juicer to make 2 tablespoons juice. As you review the recipe with students, discuss how each ingredient will influence the taste of the other ingredients.
4. Ask a student volunteer to make the vinaigrette by measuring the oil, lemon juice, salt, and a little black pepper and whisking together in a small bowl. Taste and adjust seasoning.
5. Have students arrange the pears and celery on a large platter and scatter walnuts on the top. Drizzle with the vinaigrette. Gently scatter the thin peels of cheese over the salad. Serve salad on plates.
6. While the students eat, discuss the differences between eating ingredients separately and in a salad. Students can compare their predictions with the actual experience.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Poached Pears

Preparation Time: 10 minutes
 Cooking Time: 25 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Advanced

Background

Poached pears are a special treat. Your students may never have had poached pears, but once they do they will want them again and again. You can serve them as a snack by themselves or as a dessert with ice cream. You can also format this recipe to compare different varieties of pears. Bosc, Comice, Winter Nelis, and Anjou are all suitable for poaching. As the class prepares the pears for poaching (simmering in liquid), lead a discussion about the similarities and differences among them.

Objectives

Students will be able to:

Describe the cooking concept of poaching.

Compare the shape, color, skin texture, smell, and taste of different pear varieties.

Discuss how the cinnamon, ginger, and lemon complement the flavor of the pears.

Ingredients

For a class of 20:

- 6 cups water
- 2 cups sugar
- 10 ripe, but firm pears
(a mixture of Bosc,
Comice, Winter Nelis,
and Anjou, if possible)
- 2 cinnamon sticks
- 1 small knob fresh ginger
- 1 lemon

Materials

For the class:

- hot plate
- 6-quart pot with lid
- colander
- slotted spoon
- measuring cups
- vegetable peeler/corer
- knife
- cutting board
- wooden spoon

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- 4 napkins
- 4 plates
- 4 forks
- journals



Preparation

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate the ingredients into five equal portions, one for each student group.
3. While students are comparing pears, heat the water in a large pot at high heat. Stir the sugar into the water until it dissolves. When the water boils, turn it down to low heat so that it stays warm but does not continue to boil. Wash the lemon thoroughly.
4. While the sugar water heats, brainstorm how to record the different characteristics of the pears. Allow each student group to select its own method to record the shape, color, skin texture, smell, and taste of different varieties of pears. Allow students to share recording methods.

Safety Precautions

Take care when removing pears from the pan; they will be very hot. Review safety precautions for using knives, peelers, and the hot plate.

Making the Recipe

1. Demonstrate how to peel, cut in half, and core the pears. While students prepare the pears, ask them to make observations in their journals about the pears. Have students place their pears on plates. Gather the plates and set them on the demonstration table. Ask a couple of students to help cut the lemon and ginger into slices.
2. Have students gather around the demonstration table. Heat the water until it boils. Place pears, cinnamon sticks, and lemon and ginger slices in the water, then turn down the heat so that the pears simmer for 20 minutes while the pot is covered.
3. While the pears simmer, allow students to share their journal entries with the class. Lead a class discussion about the different characteristics of pears. Ask students to make predictions about how poached pears will taste.
4. When pears are translucent but still firm, remove them with a slotted spoon and place them on plates. Allow them to cool for a few minutes. Serve.
5. As students eat the poached pears, ask them to compare their predictions about the pears' taste with their actual experience.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Washing Fruits and Vegetables

Preparation Time: None
Total Lesson Time: 40 to 50 minutes in two parts,
if possible, with an hour in between
to allow the insect spray to steep

Background

All farmers must contend with a variety of pests that can harm the crop. Although farmers may use organic methods to control pests, a residue of any spray applied may still remain on the fruits and vegetables. In this activity, students apply an organic, garlic-based insect spray onto a fruit or vegetable and make observations. They also explore different types of fruit and vegetable skins: the tough impermeable skins we usually do not eat (such as orange, banana, and tangerine) and semipermeable skins that we often do eat (such as apple, pear, and peach). The term *permeable* refers to the skin's ability to absorb liquids and is an indication of the thickness and toughness of the skin.

Students will also learn how to wash produce, before using it, to remove dirt or any residue from the farm. Fruits and vegetables should be washed just before using because storing wet or damp produce makes them spoil more easily.

Note: The all-purpose insect spray can be stored in a tightly covered jar in the refrigerator for up to one week.

Objectives

Students will be able to:

Compare semipermeable and impermeable fruit and vegetable skins.

Understand the importance of washing fruits and vegetables.

Materials

For the class:

- 1 garlic bulb
- 1 small onion
- 1 tablespoon cayenne pepper
- 1 quart water
- 1 tablespoon liquid soap detergent
- 1 blender
- 1 sponge or towel

For each group of 4:

- 1 1-quart spray bottle
- 1 banana or orange
- 1 pear or apple
- 1 leafy green (spinach, chard,
or lettuce leaf)



Doing the Activity

1. Read the Todd Ranch farm profile as a class and begin a discussion of how farmers control pests. Discuss how farmers sometimes use dormant oil sprays and other means to control pests on fruit trees and vegetables.
2. Explain to students that they will examine different fruit skins and discuss ways in which they are alike and different.
3. Provide each student group with samples of the two different skins so that they can compare the thickness, texture, pores, and flexibility of the skins. Have students record their observations in their journals. Have students explain in their journals why we might eat some skins but not others. Allow students to share their ideas with the class.
4. Prepare the all-purpose insect spray by putting garlic, onion, and cayenne in a blender jar with some of the water. Blend, then add the remaining water. If possible, allow the insect spray to steep for an hour. Add the liquid soap (the soap helps the spray cling to plants). Put the spray into spray bottles.
5. Give each group a spray bottle filled with the insect spray and demonstrate how to lightly spray it onto the sample fruit or vegetable. Allow the produce to dry (5 to 10 minutes). Ask students to make predictions about what they may find on the skins after drying.
6. When the produce is dry, have students make observations.
7. Ask students whether they would want to eat the fruit or vegetable after it has been sprayed. Ask them why or why not. (In this case, it would leave a strong, undesirable taste.) Ask them whether it makes a difference whether the fruit or vegetable is eaten with or without the peel. Point out that it is important to wash all fruits and vegetables before cooking or eating them, especially those that are eaten with the peel.
8. Demonstrate how to wash fruits and vegetables. Wash under cold running water while wiping the entire surface of the fruit or vegetable with a sponge or cloth towel. This process ensures that all residues will be removed.
9. Next time the class cooks a recipe, allow students to practice washing the produce.

Todd Ranch

The Todd Ranch pear farm is nestled against the hills surrounding Potter Valley in Northern California's Mendocino County. From his farm in the winter, Dan can see snow on the tops of the hills. Many creeks and streams run down toward the ocean, and a nearby canal brings water from the Eel River to help irrigate Dan's orchards.

On his 32-acre farm, Dan grows three types of pears: Bartlett, Red Sensation, and Bosc. The Bartletts, the oldest trees in the orchard, were planted in 1961. Dan remembers helping to plant them. He was five years old at the time. "I grew up on the farm, and I worked on the farm while I was growing up," Dan recalls. "Then I went away to college for a few years,

but I decided that what I really wanted to do was to be a farmer."

So Dan came home and eventually bought his father's pear farm, where he now lives with his wife, Alice, and three children. His sons, Andy and Luke, are 16 and 14 years old, and his daughter, Rebekah, is 11.

"The kids work on the farm. They help out at harvesttime. My oldest son drives the tractor," says Dan. Just like their dad when he was young, Dan's children enjoy their life on the farm, and they love exploring in the hills near their home. "There's a lot of wildlife here," says Dan, who often sees deer, skunks, and raccoons. "Sometimes a black bear will





come down from the hills into the orchard,” he reports. “We’ll see footprints or maybe a half-eaten pear left on the tree, and we’ll know that the bears have been there.”

One of the things Dan likes most about farming is the constant challenge. “You have to think of ways to solve problems and be willing to experiment with new ideas,” he says. “A farmer isn’t just some guy in overalls who’s sitting there and watching things grow.”

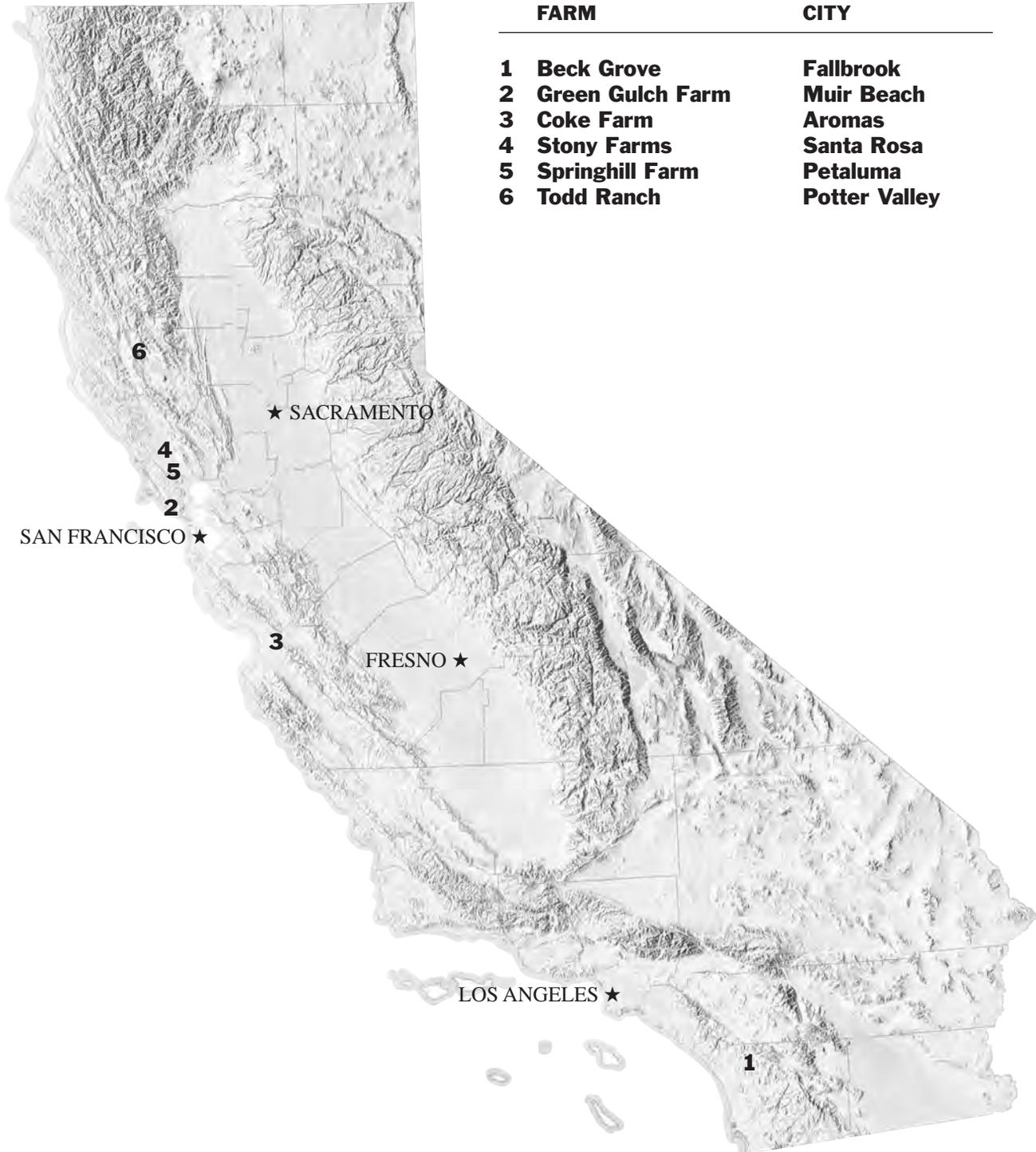
With pears, there are many challenges. One of these is pests, such as the codling moth, whose larva eats the fruit of any pear tree. (See a discussion of the codling moth in Chapter 3, “Apples.”) Because Dan has decided to grow his fruit organically, he will not spray

pesticides to kill the moths. Instead, he has introduced beneficial insects, such as wasps, which eat the larva. In a new experiment, he has built several bat houses to attract bats to live in his orchard. Bats eat large quantities of flying insects in their nightly forays, so they are very helpful in keeping insect populations down.

Dan’s decision to farm organically not only helps the environment but also has made his farm a financial success. His pears are sold at markets throughout the United States and are also used in organic baby food and juice. “My father always told me that you can’t make any money being a farmer,” Dan says with a laugh. “But I’ve proven him wrong.”

Locations of Farms Profiled in Winter

FARM	CITY
1 Beck Grove	Fallbrook
2 Green Gulch Farm	Muir Beach
3 Coke Farm	Aromas
4 Stony Farms	Santa Rosa
5 Springhill Farm	Petaluma
6 Todd Ranch	Potter Valley





LATE SUMMER-FALL



WINTER



SPRING-EARLY

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SUMMER



SPRING-EARLY SUMMER

Beans & Peas

The study of legumes can occupy an entire lifetime. Two familiar types of legumes are discussed: peas and beans. All legumes have seedpods that split along the sides.

Peas originated at the same time as lentils about 10,000 years ago in the Middle East. Peas were used in their dry form (split peas) until about the sixteenth century when forms with tender seeds were developed that could be eaten fresh. Other members of the legume family, such as the lentil, the peanut, and the long bean, are neither pea nor bean. The lentil is a staple food throughout the world, especially in the Indian subcontinent. The peanut, also known as the groundnut, originated in South America about 5,000 years ago. Long beans, called cowpeas or black-eyed peas when mature and dried, originated in West Africa.

There are three types of beans: common, or phaseolus, beans; fava beans; and soybeans. Phaseolus beans are from Central and South America and date back to about 5,000 B.C. Phaseolus, or common, beans include green beans as well as dried beans, such as haricot,

cannellino, pinto, navy, kidney, black, marrow, and flageolet. The fava bean (also spelled *faba*) is a second type of bean. The fava bean is from the Middle East and dates back to roughly 6,500 B.C. It was formerly more widely eaten than today as phaseolus beans have replaced it. The soybean (also spelled *soya*) was domesticated in China around 3,000 B.C.

One may eat beans or peas in several ways: eat the entire pod when it is immature (e.g., green beans and snow peas); eat the immature seeds without the pod (e.g., English peas and the fava bean); or eat the dry, mature seeds (e.g., pinto beans or split peas).

Other types of legumes, such as alfalfa, clover, and vetch, are grown as animal fodder. These legume animal feeds are a cheap source of digestible nutrients and protein. The soybean, which is used for both human and animal consumption, is considered to be one of the most nutrient-rich foods in the world. Legumes are also prized as soil-building crops because they return nitrogen to the soil.



**Seasonality and Growing Conditions**

Fresh legumes, such as sugar snap peas, English peas, and fava beans, are favorite spring treats. In moderate coastal climates, beans and peas can be grown from spring to fall. As summer and fall arrive, cranberry beans and other shelling beans turn up in farmers markets. Dried legumes are a hearty winter staple in many households and are used to fortify soups, stews, and casseroles.

Growing conditions for legumes depend upon the type. Vetches and clovers prefer cool climates; other legumes like hot, dry weather. Regardless of climatic conditions, legumes like soil rich in phosphorus and potassium. They will tolerate low nitrogen levels in the soil.

Although most plants strip away nutrients from the soil, legumes are unique in that they can replenish the earth with nitrogen. Nestled in the roots of legume plants are millions of bacteria called *rhizobia*. *Rhizobia* can take nitrogen, a necessary plant nutrient, from the air and “fix” it in the plant. If the plants are plowed into the soil after harvesting, they help to increase the nitrogen levels in the soil.

One of the best legumes for nitrogen fixation is the fava bean. Prior to the fava flower’s bloom, farmers chop up the plants with machetes or a farm machine called a disc and then plow the plants back into the ground. This “green manure” then puts nitrogen into the soil.

The only serious disease to affect legumes is powdery mildew. Sulfur dust will help to curb this fungus. Snails, aphids, mites, and whiteflies are generally not a problem as long as good growing conditions prevail; pests can be removed by hand or pressure from a spray hose.

Selection, Storage, and Nutrition Information

When selecting fresh beans or peas, look for firm, plump, bright-colored, unblemished specimens. Dried beans should not be moldy, broken, or discolored. Check for little stones among the beans when washing them. Fresh beans will keep in a plastic bag in the refrigerator for several days.

Green peas are a good source of folate, iron, and potassium. They are high in antioxidant vitamins A and C as well as in fiber. Snap peas and string beans are high in vitamin C. Fava beans are high in fiber and iron. Long beans are high in vitamins A and C.

Pea Salad with Fresh Herbs

Preparation Time: 20 minutes
 Cooking Time: 10 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Easy

Background

With this recipe, students get a chance to learn about the unique characteristics of three different peas. The peas can be eaten with the vinaigrette as a dipping sauce or dressed as a salad. Use small- to medium-sized pods and equal amounts of each type.

Here is a good opportunity to discuss the difference between mature and immature pods. The English peas are sold as mature pods (the peas are readily separated from the pods), but the sugar snap and snow peas are usually sold as immature pods (the peas are embedded in the pods and are difficult to separate). As students work, discuss the different sizes, shapes, textures, and flavors of the different peas.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *vinaigrette*, *blanch*, *English peas*, *sugar snap peas*, and *snow peas*.

Examine the differences between English peas, sugar snap peas, and snow peas.

Ingredients

For a class of 20:

- a mixture of peas:
 - 1 lb sugar snap peas
 - 1 lb snow peas
 - 1 lb English peas
- 1 bunch mint
- 1 bunch cilantro
- 1 bunch Italian parsley
- 1 cup light olive oil
- $\frac{1}{4}$ cup seasoned rice vinegar
- $\frac{1}{3}$ teaspoon salt

Materials

For the class:

- colander
- salad spinner
- blender
- 4-quart pot with lid
- 1 large and 1 small mixing bowl
- measuring cups and spoons
- hot plate
- 2 quarts water
- small strainer
- serving spoon
- large baking sheet

For each group of 4:

- 2 cutting boards
- 2 knives
- 4 bowls
- 4 forks
- napkins
- journals
- bowls

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash peas and place them in a colander to drain.
3. Divide the peas and herbs into five equal portions.
4. Set a 4-quart pot of water to boil on the hot plate.

Safety Precautions

Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Demonstrate taking the leaves off the stems of the herbs.
2. Have students snap or cut off the tip (the stem end) of the snow and sugar snap peas and shell the English peas. Have them place the snow and sugar snap peas in one bowl and the English peas in another. Have students remove the stems from the herbs; wash and dry the herb leaves in a salad spinner; and place them in another bowl.
3. Collect the bowls and place them on the demonstration table next to the hot plate. Have students gather around the demonstration table.
4. Have three students measure oil, vinegar, and salt into the blender. Add the herb leaves and blend the vinaigrette until smooth. Set aside in the small bowl.
5. Gather all the peas and blanch them in batches by dipping them in boiling water and removing quickly, being sure to cook sugar snap and snow peas separately from the English peas. Blanching is a method of cooking the vegetables quickly so that they stay crisp. When the peas are tender (after about 2 minutes), scoop them out with the small strainer and lay them out to cool on a baking sheet covered with a towel. Do not pile them up or they will keep cooking.
6. When the peas are all blanched, put them back in the big bowl. Dress them as a salad or use the vinaigrette as a dipping sauce.
7. While students eat, discuss the differences in texture and taste of the pea varieties.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Long Beans with Ginger

Preparation Time: 20 minutes
 Cooking Time: 10 minutes
 Total Lesson Time: 1 hour
 Recipe Level: Advanced

Background

Long beans are readily found in Asian markets during the same season as green beans. They are almost a foot long and are green or purple in color. They are quite delicious, and this recipe is an easy way to prepare them.

In this lesson, discuss with students the differences between immature and mature beans. Immature beans have tender, edible pods that are not fully developed, with seeds still closely embedded in the pod. Mature beans have large seeds, which are easily separated from the pod; with mature beans only the seed, commonly called cowpea or black-eyed pea, is eaten. Long beans are sold as immature beans, and the entire pod is eaten.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *long beans*, *sauté*, and *top*.
 Investigate immature bean pods.

Ingredients

For a class of 20:

- 3 lbs long beans
- 1½-inch knob of ginger root
- 6 tablespoons soy sauce
- 3 tablespoons fish sauce (from the supermarket or an Asian grocery)
- ¾ cup water
- 6 tablespoons canola oil

Materials

For the class:

- colander
- hot plate
- wok or heavy skillet
- cutting board
- measuring spoons and cups
- serving spoon
- 1 large and 3 small mixing bowls
- water
- pot holders

For each group of 4:

- 2 cutting boards
- 2 knives
- napkins
- 4 plates
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash the beans and place them in the colander to drain.

Safety Precautions

Review safety precautions for using knives and the hot plate. An adult should peel and slice the ginger root. When cooking, have students stand at least three feet away from the hot plate so that the oil does not spatter them.

Making the Recipe

1. Give each group an equal portion of the beans.
2. Have students “top” the long beans (this means to cut off the very tip of the stem end and pull off the string). Cut or “snap” the beans into 3-inch pieces. Place the prepared beans in a bowl. Collect bowls and place them on the demonstration table next to the hot plate. Have students gather around the demonstration table.
3. Peel the ginger root’s thin brown skin with a paring knife. Because slicing ginger root thinly is difficult, an adult should cut the peeled ginger into slices and then into fine strips.
4. Gather the beans into a large mixing bowl. Have two students measure out the soy sauce and fish sauce into separate small bowls. Have another student measure the water.
5. When all the ingredients are ready, place the skillet on the hot plate. Set the hot plate on high. When the skillet is hot, turn the hot plate to medium.
6. Cook the beans in two different batches. First add half of the oil and half of the ginger root. (Make sure students are at least three feet away so that they are not spattered by oil.) When the ginger begins to sizzle, add half of the beans and stir. After three minutes add half of the fish sauce, soy sauce, and water. Cook until tender, covering if necessary. Repeat with the next batch.
7. Serve from the skillet into student bowls.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Crop Rotation

Preparation Time: 5 minutes
Total Lesson Time: 60 minutes

Background

Staying ahead of pests and keeping soil healthy is one of the most important and time-consuming challenges farmers face. Beans and other legumes are important in helping to keep soil healthy.

Nestled in the roots of legume plants are millions of bacteria called *rhizobia*. Rhizobia can take nitrogen, a necessary plant nutrient, from the air and fix it in the plant. Thus these plants do not deplete nitrogen from the soil. In fact, if they are plowed into the soil after harvesting, the plants actually help to increase the nitrogen levels within the soil.

In this activity, students will simulate the planning that farmers perform to help their crops stay healthy. One technique employed in sustainable agriculture is to use crop rotation to keep pests (crop-eating insects) away and to keep soil healthy. Most crop rotation plans follow two rules: Always plant a crop that uses the soil differently from the one harvested. The rationale is that crops from the same group (e.g., root crops) tend to use up the same nutrients from soil and are prone to similar pests. The second rule is to plant a crop of a plant family different from the one harvested in order to control disease.

To help avoid unhealthy soil and pests, farmers rotate crops on a seasonal basis. Usually, plant families that are heavy feeders (those that take a lot of nutrients from the soil) are followed by light feeders or soil builders (such as legumes). In this activity, students are given an information chart that lists plants according to the type, soil feeder or builder. Using the chart, students plan four seasonal plantings for four farm plots.

Objectives

Students will be able to:

Describe why farmers use crop rotation.

Simulate the planning process for crop rotation.

Differentiate between heavy feeders, light feeders, and soil builders.

Materials

For the class:

T&D Willey Farms farm profile

20 copies of Seasonal Crop Rotation Chart and Map, one per student

**Preparation**

Read the background information to review the rationale and methods of crop rotation.

Doing the Activity

1. Lead a discussion about some of the dangers to healthy crops on a farm, such as pests, poor soil, or weather.
2. Read aloud or have students read silently the farm profile on T&D Willey Farms.
3. Explain crop rotation to students, describing how farmers rotate crops of heavy or light feeders and soil builders to keep the soil healthy.
4. Show them the Seasonal Crop Rotation Chart and explain what it means.
5. Tell the students that they will be farmers planning the crops on their farm for four seasons.
6. Give each group copies of the map and the chart. Tell the groups that they can work together to figure out which crop should be planted in which plot for each growing season to ensure the healthiest plants and soil.
7. Model how they might use the charts to create the plan. Monitor and assist the groups.
8. After each student has developed a crop rotation plan, ask the students to write a paragraph to explain the reasons for their plan.
9. Ask volunteers to present their plans to the class. Discuss the following questions: How many different ideas did the class have? Can different students have different ideas and still be correct? How does this activity relate to what farmers do?

Crop Rotation

Seasonal Crop Rotation Chart

Crop	Family	Feeder	Season
Corn	Grass	Heavy	Summer
Cucumber	Gourd	Heavy	Spring
Lettuce	Composite	Heavy	Spring
Spinach	Goosefoot	Heavy	Winter
Squash	Gourd	Heavy	Summer
Tomato	Solanaceae	Heavy	Summer
Carrot	Umbelifer	Light	Winter
Pepper	Solanaceae	Light	Fall
Potato	Solanaceae	Light	Winter
Swiss chard	Goosefoot	Light	Fall
Pea	Legume	Soil builder	Winter
Soybean	Legume	Soil builder	Summer
Fava bean	Legume	Soil builder	Spring
Lima bean	Legume	Soil builder	Fall
Green bean	Legume	Soil builder	Summer



Seasonal Crop Rotation Map

The maps shown below represent your farm in each of the four seasons. Plan crops for each plot (A, B, C, and D) so that the soil stays as healthy as possible.

Spring

A	B
C	D

Fall

A	B
C	D

Summer

A	B
C	D

Winter

A	B
C	D

T&D Willey Farms



Tom Willey with Mr. Poe, the Arkansas farmer who inspired the Willeys to use a rotation of beans in their crop mix.

The T&D Willey Farms harvests a variety of vegetables, such as eggplants, squash, and potatoes, but the beans are by far the favorites. Tom Willey believes in the goodness of beans. “They are a great crop,” Tom says. “They give good nutrients back to the earth, and they are good for you to eat as well. They’re like a gift.”

Back in 1980, Tom and his wife, Denesse, started the organic farm bearing their initials. Fields and orchards surround their farm, but only one mile away is the spreading construction of Fresno’s new housing and mall developments. Although the majestic Sierra Nevada ranges stand 30 miles to the east of T&D Willey Farms, the smog and haze often make them hard to see.



The Willey farm is fortunate to be located in the San Joaquin Valley with its rich soil and sunny days. Snowmelt from the Sierra Nevada provides the water that keeps the vegetables growing all year round. But even with these natural gifts from the earth, vegetables cannot thrive if the soil becomes sapped of its nutrients. Two ways to keep the soil healthy are to rotate the crops and, more fundamentally, to apply well-made compost before planting every crop. In the crop rotations, it is a good idea to include crops, such as beans, that give nutrients back to the earth.

Tom learned these old-fashioned ways from a neighbor farmer. Rotating crops means different vegetables are grown in different parts of the farm every year. Where squash grew one year, beans might be planted the next year. In that way, one vegetable will not use up all the soil's natural nutrients. In fact, beans give back some of the nutrients taken away by other vegetables.

The techniques used in sustainable agriculture of rotating crops, attracting good insects, and planting diverse crops all help to decrease the need for artificial pest control. The best protection against insects, Tom says, is to improve the soil and produce healthy plants that can resist insect attacks. Tom and Denesse believe they must take care of their soil so that they can harvest good vegetables for years to come.

In the middle of T&D Willey Farms stands a tall group of cottonwood trees. This is where Tom and Denesse pack their vegetables into boxes to be sold in the markets. Denesse includes in each box what she calls a PID, or public information document. These PIDs tell the customers how to store their vegetables to keep them fresh and how to cook and serve some of the more unfamiliar crops, such as Romano beans. Denesse even includes quotations from their farming heroes, Wendell Berry and Masanobu Fukoka. For Tom and Denesse, educating the public means carrying on the tradition and respect taught to them by other farmers.

Even with all the help and guidance of other farmers, Denesse and Tom never lose sight of the most important fact for farmers: success depends on learning to work with nature. As Tom says, "Farming is great. There is so much to learn. But even after we do all we can, we still need the timely blessing of Mother Nature: consistent crop-ripening heat in the summer and her angel kisses of rain in the winter."

Note: Since this profile was written, the Willey farm in Fresno was paved over for development. Tom and Denesse have started a new farm on the outskirts of Madera.

Salad Greens

Lettuce was domesticated about 3,000 years ago in the Middle East. Before that, wild lettuce was eaten for several thousands of years. The ancient Greeks and Romans grew lettuce in their gardens for its culinary and healthful properties. Lettuce is a member of the composite family. Wild lettuce is found all over the world as a common weed in fields and vacant lots.

There are four principal types of lettuce: loose-leaf, butterhead, cabbagehead, and cos (or romaine) lettuces. Loose-leaf lettuces are nonheading varieties (e.g., Grand Rapids). Butterheads (e.g., Big Boston) have soft, buttery leaves in a loosely formed head. Cabbageheads

have tight, compacted leaves (e.g., iceberg). They are challenging to grow because they will not create a firm head in hot weather. Cos have long, elongated heads with spoon-shaped leaves. They are a good summer variety (dark green cos).

Other common salad greens are arugula, cress, and chicory. Arugula, also called *rocket* or *roquette*, is a low-growing spicy plant from the mustard family. There are many types of cress, of which watercress is the most common. Cress is a member of the mustard family. Chicory is a member of the composite family and contains types known as escarole, frisée, and endive.



**Seasonality and Growing Conditions**

Lettuce grows only in moderate weather. It tolerates neither freezing nor summer heat. This means that in most regions of California, lettuce is a winter crop. But in foggy, coastal valleys, the weather is cool and damp all year-round; therefore, lettuce can always be grown. Lettuces require fertile loam soil that is well drained in order to prevent leaf rot. Spreading sand around the base of seedlings also helps prevent rot by reducing contact between mature leaves and the soil. Lettuces require lots of moisture and cool days.

Lettuces should be kept uncrowded and be thinned periodically as they grow. Crowded plants will get leggy (grow long stems rather than stay compact). Another key to good lettuce is adding plenty of nitrogen (e.g., well-rotted manure).

Lettuce seedlings are almost irresistible to birds, cutworms, slugs, and snails. Slugs and snails often hide deep at the base of leaves and can, if undetected, do a lot of damage. Hand picking slugs is one way to remove them. In general, however, lettuces suffer little from insect pests and disease. The lower leaves may often be subject to rot because of the moist conditions necessary to grow the plants, but rotted leaves can be removed by hand. If left unchecked, the rot can spread to the heart of the plant, killing it.

Selection, Storage, and Nutrition Information

Lettuces should be crisp, unblemished, and free of signs of rot or insect damage. Avoid wilted, limp leaves. In stores, you can find salad mixes of young, tender loose-leaf varieties and other greens, such as arugula. You may also create your own salad mixes (called *mesclun*). Some peppery and slightly bitter leaves, such as watercress and frisée, mix well with mild lettuces, such as a butterhead or red leaf. You may add edible flowers (such as calendula and nasturtium) if you have them.

All salad greens should be stored in the refrigerator in an airtight plastic bag and will keep for up to five days. Never wash leaves until they are ready for use; after washing, drain the leaves in a colander or salad spinner. Iceberg lettuce, with its high water content and pale leaves, has much less nutritional value than other lettuces have. Loose leaf, butterhead, and romaine (cos) are all high in vitamin A. Loose leaf and cos, the darker green leaf-lettuce, are also good sources of folate, which is nutritionally important to help reduce the risk of birth defects and heart disease.

Avocado Dressing

Preparation Time: 20 minutes
 Cooking Time: 15 minutes (optional)
 Total Lesson Time: 45 to 60 minutes
 Recipe Level: Easy

Background

This recipe is a great way to introduce various types of lettuce that differ in color and flavor. Sweet lettuces, such as romaine, butter leaf, red leaf, and red oak leaf, complement this tangy avocado dressing. The dressing may be tossed with the lettuce or spooned on torn leaves of lettuce arranged on a plate. The croutons make a great crunchy treat on top, but because they require an oven, they are optional (available for purchase at a retail food store).

When showing the class the different lettuce varieties, have students dissect some of the leaves. Review the different parts of a leaf: the veins that transport water and minerals to the leaves from the other parts of the plant; the waxy cuticle that protects the leaf's epidermis; and the stomates, which are tiny openings for gas exchange on the underside of a leaf.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *sweet lettuces, romaine, whisk, and avocado.*

Make a salad dressing.

Ingredients

For a class of 20:

3 tablespoons finely chopped parsley
 1 tablespoon finely chopped chives
 2 tablespoons finely chopped basil
 3 small to medium avocados
 6 thick slices bread (optional)
 2 shallots
 1 lemon
 4 tablespoons red wine vinegar
 $\frac{3}{4}$ teaspoon salt
 pepper
 $\frac{3}{4}$ cup extra virgin olive oil
 4 tablespoons cream
 3 to 6 heads of romaine, butter, or oak leaf lettuce, depending on size

Materials

For the class:

salad spinner
 1 large mixing bowl
 1 small mixing bowl
 whisk
 serving spoon
 measuring spoons
 oven, optional
 baking sheet, optional
 cutting board, optional
 knife
 pot handlers

For each group of 4:

2 cutting boards
 2 knives
 4 plates
 4 forks
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash lettuce, tear leaves, and dry in the salad spinner. Wash and dry herbs in the salad spinner.
3. Preheat oven to 375°F, optional.

Safety Precautions

Review safety precautions for using knives and the oven (if using it).

Making Avocado Dressing

1. Give each group an equal portion of herbs and avocado to prepare.
2. Demonstrate removing leaves from stems and chopping the herbs. Demonstrate removing the seed, scooping out the flesh, and chopping the avocado.
3. Have each group of students prepare its herbs and avocado and place them on a plate.
4. (Optional) Demonstrate cutting the bread into small cubes for croutons. Have students prepare the remaining bread.
5. Collect the plates and place them on the demonstration table next to the small mixing bowl. Have students gather around the demonstration table. While you have one student peel and finely dice the shallot, have two other students cut a lemon in half and squeeze its juice into the small mixing bowl. Ask another student to measure and add the vinegar, 1 teaspoon salt, and a few grinds of black pepper. Add the shallots. Mix and set aside.
6. (Optional) Toss the bread cubes with 2 tablespoons olive oil and bake them on a baking sheet in the oven at 375°F for 10 to 15 minutes or until they are golden and crunchy. When the croutons are done, take them from the oven and sprinkle them very lightly with salt.
7. Ask three students to mash the avocados on a plate and blend them into the vinegar mixture. Add the herbs and then whisk in the olive oil and the cream. Go slowly, whisking the whole time to make a thick dressing. Taste the dressing and add more salt, lemon juice, or oil, as needed.
8. In a large mixing bowl, toss the lettuce and dressing and serve the salad on plates. (Optional) Garnish with the croutons.
9. While students eat, discuss how the dressing enhances the flavor of the lettuce.
10. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Salad of Mixed Greens

Preparation Time: 20 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

This recipe allows students to experiment with different salad greens and different types of olive oil and vinegar. Many types of greens are sold in markets, either as mixed greens (called *mesclun*) or separately. For this salad, select greens that are colorful and offer a variety of tastes. In this recipe, a basic oil and vinegar dressing is used. Remember, the better the vinegar and olive oil, the better the dressing. There are many kinds of vinegar, such as red wine, white wine, sherry, rice wine, and balsamic, each varying in acidity. (Wine vinegar has no alcohol content.) Try experimenting with different ones: two parts balsamic to one part red wine vinegar is a ratio children often like.

In this recipe, students discover a variety of greens, all having similar parts. Review the different parts of a leaf: the veins that transport water and minerals to the leaves from the other parts of the plant; the waxy cuticle that protects the leaf's epidermis; and the stomates, which are tiny openings for gas exchange on the underside of a leaf.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *vinaigrette*, *bitter greens*, *salad greens*, and *olive oil*.

Examine the difference between a variety of salad greens and different olive oils and vinegars.

Make a salad dressing.

Ingredients

For a class of 20:

12 handfuls mixed lettuces
 and other salad greens
 3 tablespoons vinegar
 salt and pepper
 12 tablespoons olive oil

Materials

For the class:

salad spinner
 1 large mixing bowl
 1 small mixing bowl
 whisk
 serving spoon
 measuring spoons
 water

For each group of 4:

napkins
 4 plates
 4 forks
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash and dry salad greens in the salad spinner in two or three batches.

Making the Recipe

1. Have students gather around the demonstration table. Have a student measure the vinegar into the small bowl and add $\frac{3}{4}$ teaspoon salt and a few grinds of black pepper. Have another student measure and slowly pour in the olive oil as another student uses a whisk to mix the oil and vinegar. Taste the dressing and adjust the taste to your liking by adding more oil if it is too sour or more vinegar if it needs more acid. If you do not use the vinaigrette right away, it will separate and you must re-mix it before dressing the salad.
2. If your class chooses to have more than one type of dressing (see Background), a good ratio of ingredients is 2 tablespoons vinegar to 8 tablespoons olive oil.
3. Have students taste each type of salad green so they can decide which combination they want in their salad. Discuss the different flavors and tastes.
4. Have students make their own salad and choose their own dressing. Demonstrate how to place the salad on the plate, spoon on the dressing, and mix so that the dressing is distributed evenly.
5. While students eat, discuss the tastes and textures of the different greens in the salad.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Growing Arugula

Preparation Time: Growth time will vary.
Total Lesson Time: 30 minutes, then a few minutes every few days to observe plant growth

Background

Many parts of coastal California have cool, foggy summers. Although sweet corn or juicy tomatoes have a harder time growing along the coast, the cool, foggy summers are great for growing salad greens. If you live in a place that gets foggy summers and cool winters, your backyard or kitchen window may be the perfect location for growing salad greens.

Arugula is an easy plant to grow in a window or outside in a small plastic container. A member of the mustard family, it is also known as *rocket* or *roquette*. Its unique flavor—a bit spicy or nutty—is fun for most students to try.

In California, arugula may be planted at any time of year. If some of the plants go to flower, the blossoms may also be put into salads for extra color. Often, the flower is a bit spicier than the leaf, so have students try both to see which flavor they prefer.

Objectives

Students will be able to:

Grow and harvest arugula.

Describe how cool and moderate climates are well suited to growing salad greens.

Materials

For the class:

arugula seeds

potting soil

watering can

Berkeley Youth Alternatives Garden Patch profile

plastic garden pots

**Preparation**

Gather materials.

Doing the Activity

1. Read the Berkeley Youth Alternatives Garden Patch profile to the class or have students read it on their own. Discuss with students the coastal area's unique climate and compare it with climates further inland or in other areas of the state or nation. Have students explain why coastal areas may be well suited for growing salad greens year-round. Ask them whether arugula could grow in their environment.
2. Explain to students that they will have an opportunity to grow arugula, a salad green with a unique flavor. Ask them whether they have ever tasted this green before.
3. Give each group a pot and have them fill it with potting soil. Have them scatter seeds on the top of the soil and then cover the seeds with $\frac{1}{4}$ inch to $\frac{1}{2}$ inch of soil. Water the pots.
4. Keep the pots in a sunny window or in an outside location.
5. Every few days, have students check the plants to see whether they need water and to monitor their growth. As the plants start to grow, students can thin them so that they stand four to six inches apart. If you wish, they can wash the thinnings and taste them.
6. When the plants are just under six inches high, harvest them whole or harvest just the leaves, or you can cut them an inch or two from the ground and let them grow again.
7. Wash the greens and allow students to taste them. Since arugula has a strong flavor, students will probably enjoy them more as part of a mixed green salad. Use either of the salad green recipes provided.

Berkeley Youth Alternatives

GARDEN PATCH

At the Berkeley Farmers Market, a shopper can see produce stands lining the street, brimming with sun-ripened fruits and vegetables, a bountiful feast for the eyes and senses. Colorful signs in front of the stands show the names of farms from all over Northern California, except for one particular stand.

This stand is staffed by local youths and young adults bagging salad greens and making change for the shoppers in a professional and courteous way. What shoppers might not know, unless they ask, is that these young people not only manage the stand but also tend an urban garden that produces collard greens and salad leaf mixes right in the heart of the city of Berkeley.

Berkeley Youth Alternatives Garden Patch is a program of Berkeley Youth Alternatives (BYA), which was founded 30 years ago as a shelter for runaway teens. Over the years BYA has grown. The organization now runs more than 15 programs to meet the needs of thousands of children and their families each year. Some of these programs are a comprehensive counseling center, a preschool, an after-school center, a summer camp, a computer center, a teen center, and several sports programs.

The Berkeley Youth Alternatives Garden Patch is part of BYA's youth employment, youth enterprise, and job training program for high school students. Teenagers learn to grow organic vegetables and fruits from sowing the seed to harvesting and selling the vegetables. A variety of crops are grown in the Garden Patch. The crops that the youths harvest during the winter months are carrots, beets, collard greens, Swiss

chard, broccoli, potatoes, green garlic, and many more. Some of the summer crops they grow are several tomato varieties, green beans, summer squashes, corn, apricots, plums, basil, and cilantro.

The youths also grow specialty salad greens for sale to local restaurants—high sierra, crisp, red romaine, red oak leaf, red sail, and green buttercup—as well as edible flowers. The Berkeley Youth Alternatives Garden Patch operates largely on organic principles. To control pests, the young gardeners learn organic growing techniques, such as double crop rotation and the planting of many different kinds of flowers and vegetables to attract beneficial insects.

One of the most damaging pests in a salad garden is the common snail. Snails love to munch on tender leaves, causing unattractive holes if not outright destroying the plants. Because snails prefer shady spots away from the sun, the young gardeners have learned to weed and to leave a bare, exposed border around plant beds so that the snails have no place to hide.

The youths have also learned what all farmers know: you must accept the forces of nature and learn to live with a certain amount of damage to your crops. In addition to learning about organic farming practices, young adults learn every aspect of managing a garden. They take on the roles of business manager, garden manager, and greenhouse manager. They also go out to schools and educate other youths about teen nutrition.



Learning to market their produce teaches youths about management, community relations, customer relations, and business. So whether or not the teenagers decide to pursue a career in farming, they will come away from the program with skills they may apply to many other jobs and situations.

Some former garden project participants have gone on to become nursery workers, school garden teachers, business and sales associates, and farm employees. Depending on their interests and needs, the garden project managers try to help the teenagers achieve their goals. So the garden project cultivates not only a garden but also a community and people.

Asparagus

Asparagus is a perennial plant whose roots send up tender, delectable shoots. It grows wild in marshy parts of Europe and Asia. Asparagus was cultivated by the ancient Greeks and Romans. In Europe, during the Middle Ages, the plant was prized for its purported medicinal qualities; it was seen as a restorative to compensate for a poor winter diet. Most of the asparagus eaten in the United States is grown



in Northern California. Asparagus is a member of the lily family.

In this country, green asparagus is more readily available than purple and white varieties. In Europe, particularly France, the white asparagus is held in high esteem and is considered a delicacy. White asparagus is the result of chlorophyll deprivation. Farmers grow the plants under rows of dark plastic so that they have no exposure to the sun. As a result, the plant's chlorophyll is not activated, and the asparagus spears are an ivory color with a mild flavor. This technique, called *blanching*, is also used for chicory and a few other vegetables.

Seasonality and Growing Conditions

Asparagus is the quintessential spring vegetable, available to California growers from February to May. Farmers start their asparagus crop from *crowns*, roots that are grown from seed by a nursery. Before planting, farmers carefully prepare the soil by using rich compost and fertilizer so that the asparagus has a nutritious environment in which to grow. The plants take up to three years to produce a sizable crop yield, and each asparagus plant produces many spears for harvest. The perennial nature of the plant means that the same plant can produce for 10 to 15 years.

Asparagus plants require winter chilling in order to produce good spears. The spears that are commonly eaten are the first new shoots that the asparagus root puts out in the spring. If the shoots are not harvested, they grow into branches covered with leaves that look like ferns. Asparagus fern is not really a fern despite its name.



Asparagus requires sunny, rich, deep, well-drained soil. The roots can penetrate up to five or six feet into the ground and may have the same spread outwards. They are planted far apart in well-composted trenches. Once established, the plants will thrive with little care for many years.

Keeping asparagus beds weed-free and away from trees (tree roots may interfere with the asparagus's extensive root system) and removing slugs and snails are the key to growing healthy plants.

Farmers harvest the spears by hand when the spears reach a height of six to 10 inches. They carefully snap the spears at or just below the soil so that the roots are not damaged or exposed. Each plant can withstand a harvest for a certain number of weeks, then it must be left to grow and develop its shrubby tops (they are related to the asparagus fern). In that way, the plant's energy can be redirected to the roots for the long dormant period that follows each growing season.

Selection, Storage, and Nutrition Information

When you select asparagus at the market, it is important to remember that, like corn, the spears begin to lose their sweet flavor as soon as they are picked and the plant's natural sugars are converted to starch. You may purchase tender, pencil-thin spears or the thicker, tougher, and more intensely flavored spears. In either case, look for bright green spears that have tight tips, and avoid spears that are pale, fibrous, and have dried-out bases. You can store asparagus tightly wrapped in plastic in the refrigerator for up to four days, but it is best to cook it right away.

Asparagus is high in folate and a good source of vitamins A and C.

Asparagus with Lemon & Parmesan

Preparation Time: 25 minutes
 Cooking Time: 5 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Easy

Background

Students may enjoy this recipe because it allows them to closely examine asparagus spears and their fascinating structure. Allow students to cut spears crosswise and lengthwise to explore the internal structure. After the students have shared their observations, use different-sized asparagus to prepare this simple recipe. This procedure will allow students to notice the differences in preparation and cooking time and taste spears of different sizes.

This dish may be served cold as a salad or warm as an appetizer. Use a block of Parmesan cheese instead of pre-grated because it is fresher; it has a sweeter, fuller taste; and grating is fun.

Objectives

Students will be able to:

- Identify the parts of an asparagus spear.
- Compare spears of different thicknesses.

Ingredients

For a class of 20:

- 40 asparagus spears
- 2 lemons
- salt to taste
- 1/4 cup extra virgin olive oil
- 7 ounce piece of Parmesan cheese
- 4 cups water

Materials

For the class:

- colander
- 1 large mixing bowl
- measuring spoons
- 6-quart pot with lid
- slotted spoon or tongs
- hot plate
- cheese grater
- vegetable peeler

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers
- 4 napkins
- 4 plates
- 4 forks
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. After washing the asparagus and drying it in the colander, separate it into five equal portions.
3. Bring salted water to boil on the hot plate while students make observations about the asparagus.

Safety Precautions

Review safety precautions for using knives and the hot plate.

Making the Recipe

1. Demonstrate how to peel the asparagus and remove any woody sections at the bottom. Students will need to peel the thick spears but not the thin ones. Discuss the reasons for peeling the larger spears. Have groups prepare their asparagus and place it on a plate.
2. Collect the plates and place them on the demonstration table next to the hot plate. Have the students gather around the demonstration table. Select two students to place the asparagus in the pot to cook briefly (about two to five minutes, depending on thickness). The spears should be just tender enough to allow a knife to pierce through the middle. Ask two other students to cut lemons into quarters and another to grate the Parmesan cheese. Alternatively, students may use a vegetable peeler to “shave” thin pieces of cheese.
3. Remove the spears with a slotted spoon or tongs (tongs are much easier to use) and place them on plates. While the asparagus cools, discuss any changes that students observe in the smell, color, or texture. (*Note:* To cool the asparagus quickly and, therefore, preserve its green color, you may want to put the hot asparagus in a bowl of cold water or run tap water over it.) Ask the students to make predictions about the taste.
4. When the asparagus is cool, have a student drizzle olive oil and squeeze lemon juice on it. Mix the spears to coat them well. Let another student sprinkle or place the Parmesan cheese on top. Serve and eat.
5. While the students are eating, discuss the differences between the thick and thin spears.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Asparagus with Oyster Sauce

Preparation Time: 20 minutes
 Cooking Time: 10 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Advanced

Background

This is a tasty and easy recipe to make. In addition to examining the parts of the asparagus spear, students can observe a variety of cooking techniques. Peeling the asparagus is necessary only when the stalks are big with tough, fibrous ends.

The sesame oil and the oyster sauce give this dish a strong flavor, so you may wish to use small amounts and have students taste it before serving.

Objectives

Students will be able to:

Identify the different parts of an asparagus spear.

Observe different cooking techniques.

Ingredients

For a class of 20:

- 40 asparagus spears
- 5 small garlic cloves
- 9 tablespoons oyster sauce
- 1½ cups water or chicken stock
- 4 tablespoons canola oil
- 6 teaspoons sesame oil
- 6 teaspoons rice wine vinegar

Materials

For the class:

- colander
- 1 large mixing bowl
- 3 small mixing bowls
- measuring cup
- skillet
- wooden spoon
- serving spoon
- measuring spoons
- hot plate

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 peelers, optional
- napkins
- 4 plates
- 4 forks
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Separate asparagus and garlic into five equal portions.

Safety Precautions

Review safety precautions for using knives and the hot plate. When adding ingredients to the hot oil, have students stand at least three feet from the hot plate to avoid spatter from the hot oil.

Making the Recipe

1. Give each group of students two spears and ask them to identify the different parts. Have them cut each spear crosswise and lengthwise to explore the internal structure. Encourage students to draw in journals and discuss their observations.
2. Demonstrate how to trim, peel, and cut the asparagus. Demonstrate how to peel and slice the garlic. Have the students prepare the vegetables and place them on separate plates. Ask a student from each group to collect the plates and place them on the demonstration table.
3. Have students gather around the demonstration table. Put the asparagus into a large bowl and the garlic into a small bowl. Have one student measure out the oyster sauce and the water or chicken stock into two separate small bowls so they are ready for cooking.
4. Put the skillet on the hot plate to heat on medium. When the skillet is hot, add the canola oil. Have one student add garlic while another student stirs. Sauté the garlic until it sizzles but do not wait for it to brown. Add asparagus and stir. Let the asparagus sauté for 2 minutes, stirring constantly.
5. Have another student add the chicken stock or water and stir over high heat until the mixture simmers. Stir in the oyster sauce and rice wine vinegar. Simmer until the asparagus is tender (a knife should be able to easily pierce the center of a spear). During the last minute, stir in the sesame oil.
6. Serve on plates. While students eat, discuss the different cooking techniques used and how they affect the preparation of the dish.
7. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Making a Worm Compost Bin

Preparation Time: 30 minutes
Total Lesson Time: 45 to 60 minutes to set up and then some time periodically over the next several months for observation

Background

Almost all the recipes in this guide generate some sort of food scraps. If your class or school does not already have a worm bin, here is how to get one started. The cycle of gardening, cooking, and eating completes itself when the class maintains a *vermicomposting* system, known commonly as a worm bin. The use of a worm bin not only demonstrates the process of decomposition but also allows students to feed worms the organic waste generated by cooking in the classroom. The compost bin or system is a habitat in which worms are only part of a small but complex food web. The natural by-product of the vermicomposting process—worm castings—may be used as a natural soil or potting mix amendment, thus recycling nutrients and organic matter.

For more information about worm composting, see Mary Appelhof's *Worms Eat My Garbage: A Children's Activity Book* (Flower Press). For suggestions about school or classroom vermicomposting activities, see Mary Appelhof's *Worms Eat Our Garbage* (Happy D Ranch).

Objectives

Students will be able to:

- Help build a worm compost bin.
- Understand how to recycle vegetables and fruit.
- Demonstrate how to compost food waste.

Materials

For the class:

- newspaper
- vegetable or fruit scraps
- 2 pounds red worms (check your local nursery)
- 2 quarts water
- 1 plastic storage container with lid (1 foot by 1 foot by 1 foot)
- large, slotted spoon
- drill with $\frac{1}{2}$ -inch and $\frac{1}{4}$ -inch bits
- 5 buckets

**Preparation**

1. Save the scraps from recipes that generate fruit or vegetable waste. Be sure to keep scraps covered to minimize odors and flies.
2. Drill holes of varying sizes ($\frac{1}{2}$ inch and $\frac{1}{4}$ inch) in all four sides of the plastic storage container. Holes should be about 4 inches apart from each other.

Doing the Activity

1. Ask students for their ideas about different ways to dispose of food scraps. If they do not mention it, tell them about composting as one way to recycle food wastes and explain about worm composting.
2. Introduce the activity by showing the worms to the students and asking them what kind of home the worms will need.
3. Provide each group of four students with a section of newspaper, a bucket with one pint of water, a large handful of soil, and a large handful of leaves.
4. Have students shred the paper lengthwise into one-inch strips and place them in the bucket.
5. Have each group of students use their hands to mix the paper, soil, leaves, and water.
6. Place the newspaper strips in the plastic container. Add the worms.
7. Place organic garbage (no meat or dairy products) underneath the layer of bedding.
8. Have students wash their hands after construction is completed.
9. After the students have constructed the worm bin, ask them to examine the components of the bin. Who are the inhabitants of the bin? What is their shelter? What are their meals? Where do they spend most of their time? How does this home compare with our homes? After the discussion, ask students to write a story from the worm's perspective about how it might feel to live in a worm bin.
10. Make sure the bin is covered and placed in a cool place, out of direct sunlight (optimal room temperature is 60 to 75 degrees). Add organic material once or twice per week in a different location of the bin. After two to three months, the worms should have digested the bedding and garbage and produced fertile worm castings.

Fong Farm

In Yolo County, between the towns of Esparto and Woodland, Cliff Fong and his brother stoop and cut stalks of pencil-thick asparagus.

They use a special, long-bladed knife that allows them to cut the asparagus without having to bend forward too much. Cliff Fong has been farming for more than 20 years on the same farm where he grew up; his father was the first to farm. While he was growing up, Cliff did not think he wanted to be a farmer. In fact, he recalls, “Growing up, I wanted to get as far away from the farm as possible.”

While taking some time off from college, Cliff Fong traveled to several island countries where he was struck by the way people lived a simple life in balance with the earth. For Cliff, that journey away from the farm ultimately brought him back to his childhood home. He returned to his father’s farm looking for a simpler way of life. He also returned with the firm belief that people should try to produce foods organically.

Fong Farm began to cultivate its asparagus in 1991. The spears of thin or thick asparagus seen at farmers markets and grocery stores come from asparagus plants more than three years old. For the first few years, growers must let the asparagus plants grow and just cut them back at the end of each season. This process allows the plants to store energy in their roots so that the next year, after a dormant winter, they will have energy to send up their shoots, the aspara-

gus spears. Only after the plants have been cut back for two to three years will the stalks be thick enough for harvesting and eating.

The older the plant, the thicker the spears grow. The first harvest has a short season, lasting only a few weeks. Most of the plants’ energy must still go back into the fleshy storage roots. But after the fourth harvest season, spears can be harvested for about two months. Asparagus plants can yield crops for many years.

Cliff Fong notes, “Unlike other crops, planting asparagus means a long commitment. These plants last for up to 14 years.” Fong Farm produces two varieties of asparagus: a type developed by the University of California, called UC157, and the Atlas variety. In order to keep the ground fertile and rich with nutrients, Cliff Fong uses compost, feather meal, and special guano (bird or bat droppings) from Peru.

To deal with such pests as the European asparagus aphid, Cliff inspects his plants closely, especially in August, when aphid populations peak. Cliff makes sure there are enough ladybugs in his field to gobble up those pesky aphids.

When the asparagus is ready to harvest and the stalks have been cut, there is one last task that needs attention if the asparagus is going to make it to market fresh and green—the packing.



Asparagus stalks need plenty of moisture and cool air or they will wilt. The stalks are bunched together with rubber bands and then placed in crates lined with moist pads. These pads keep the cut ends of the stalks damp and prevent them from becoming limp.

The trucks that transport the asparagus from the farm to market are equipped with refrigeration units that keep the inside temperature at a chilly 36 degrees.

Cliff chuckles, “I learned the hard way about how delicate newly cut asparagus stalks can be,” when he tells how he lost some because of careless handling. But one bad experience did not faze him. It is just a part of what he has always known: “Farming takes a long time and a lot of experience.”

Oranges

Oranges were probably domesticated in China, where their cultivation is attested as early as 4,000 years ago. Oranges are members of the citrus family. This familiar group includes lemons, limes, pomelos, grapefruit, and tangerines. There are two species of oranges: the familiar sweet orange and the bitter orange, also called Seville orange or sour orange.

Christopher Columbus introduced the bitter orange to the New World during his second voyage in 1493. Other colonists later introduced the sweet orange. Popular varieties of sweet orange include Valencia (the juice orange of retail food stores), Washington navel, and blood orange. The blood orange has crimson flesh, juice, and rind and a sweet, perfumed flavor.

Seasonality and Growing Conditions

Orange trees are broadleaf evergreens. They thrive on warm summer days, but they need cold (not freezing) winters for the fruit to ripen. The cold weather helps to increase the sugar level in the developing fruit. The trees, which are not hardy, must often be protected from a cold spell by the use of oil or gas heaters, burning wood, or wind machines placed in the orchards to heat the air.

Irrigation is the most important factor in orange production. Most varieties require about 35 inches of water per year. The trees also require a well-drained, aerated, fertile soil. Orange trees require more fertilization than most fruit trees. Cover crops are used to provide additional nutrients and organic matter in addition to added fertilizers.

Orange trees may grow up to 40 or 50 feet high, but dwarf varieties are also available for the small garden. The trees usually bear fruit at about four to six years of age. Oranges are





susceptible to a variety of insect pests, including whiteflies. Beneficial insects, such as ladybugs, can be used as a control measure, as can the fungus Red Aschersonia. Insects, such as scales, are controlled by the use of dormant oil sprays well before harvesttime. The black, sooty mold often seen on citrus leaves and fruit grows on the excrement of scales and aphids.

Selection, Storage, and Nutrition Information

Citrus fruits are a source of high-potency vitamin C and are high in fiber. Citrus fruits were routinely included on long sea voyages hundreds of years ago because they helped

travelers avoid scurvy, a disease resulting from vitamin C deficiency. Processed products, such as orange juice, lose some of the nutrients during pasteurization.

When choosing oranges, look for weighty, firm fruit with smooth, thin, shiny skin. Oranges should be stored in a cool, dry place out of direct sunlight. To get the maximum juice yield from an orange (or any citrus fruit), first roll the fruit firmly on a countertop to loosen the pulp.

Orange, Radish, & Olive Salad

Preparation Time: 20 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

This salad is very popular in Spain, North Africa, and throughout the rim of the Mediterranean Sea, where the main ingredients of this recipe are commonly grown. These ingredients are also grown in many parts of California that have a similar climate.

Include a red onion in this recipe only if it is mild tasting and the students can cut it finely. Alternatively, substitute one bunch of green onions, in which case you would not use the chives as garnish. To save a step, you may buy pitted black Kalamata olives. The dish needs cured olives.

Note: For more recipes using oranges, see Chapter 7, “Tangerines.” You may substitute oranges for the tangerines used in those recipes.

Objectives

Students will be able to:

Define the following words: *pith*, *zest*, *membrane*, and *citrus*.

Examine and identify the parts of an orange.

Ingredients

For a class of 20:

- 12 navel oranges
- 1 small red onion (optional)
- 1 cup black Kalamata or oil-cured olives (optional)
- $\frac{3}{4}$ cup olive oil
- pinch cayenne pepper
- $1\frac{1}{2}$ teaspoons salt (2 teaspoons if olives are omitted)
- 3 to 4 bunches radishes (about 2 lbs)
- 6 tablespoons lemon juice (from 1 to 2 lemons)
- $\frac{3}{4}$ teaspoon ground cumin
- 1 teaspoon paprika
- 1 tablespoon sugar
- $\frac{1}{4}$ lb baby arugula leaves or 1 bunch chives for garnish

Materials

For the class:

- measuring spoons
- measuring cup
- large serving platter
- vegetable peeler
- cutting board
- knife
- small bowl
- whisk
- scissors

For each group of 4:

- 2 cutting boards
- 2 knives
- 4 plates
- 4 forks
- napkins
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Divide the oranges and radishes (and onions and olives, if using them) into five equal portions, one for each group.
3. Wash and dry the arugula leaves in a salad spinner.

Safety Precautions

Review safety precautions for using knives.

Making the Recipe

1. Provide materials for each group of students.
2. Show an orange to the class. With a vegetable peeler, peel off the zest, the colored part of the peel that is often used for cooking. Show the oil pores on the peel. Bend the peel so that the oil from the peel squirts into the air. It is very fragrant, so make sure students smell it when they investigate their orange (but warn them that the oil can burn if it gets in someone's eyes). Identify the pith, the white part of the skin just below the zest; it has a bitter taste. Separate the segments that hold the citrus sacs and seeds in a thin skin, or membrane. Identify the seeds and the sacs (the tiny, individual pouches where the juice is stored).
3. Demonstrate how to peel oranges to remove all the pith, slice the oranges, and remove their seeds. Demonstrate how to remove greens from radishes and slice them thinly. Demonstrate how to prepare the onion (if using): cut an onion in half, remove the peel, hold the onion with the flat side down, and then chop it very finely. Demonstrate how to pit the olives (if using): place an olive between your thumb and index finger and squeeze.
4. Have students peel and slice the oranges, slice the radishes into thin rounds, peel and chop the onions, and pit the olives. Have students place the sliced oranges, chopped onions, and pitted olives on separate plates.
5. Have students measure out oil, cumin, paprika, salt, and sugar. Squeeze the lemons and measure the lemon juice. Whisk these ingredients in a small bowl. Add a pinch of cayenne. Taste and adjust the seasoning.
6. Collect the plates and set them on the demonstration table. Have students gather around the demonstration table. Ask two students to arrange the oranges on the serving dish and have another student cover the orange slices with a thin layer of radishes, olives, and chopped onion. Ask another student to drizzle with the vinaigrette. Garnish with arugula leaves or chives (snip with scissors over the platter).
7. Allow students to serve themselves and eat while discussing how the divergent tastes come together in this salad.
8. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Uncovering Cover Crops

Preparation Time: 10 minutes
Total Lesson Time: 20 to 30 minutes

Background

Farming requires a close connection to the seasons. As temperature and precipitation change over the course of the year, so do farm activities. In California, spring is a time for getting the soil ready for planting.

Farmers who practice sustainable agriculture often use a technique called *cover cropping*, which uses nature to help prepare the soil for planting. Cover cropping is the practice of growing plants to cover otherwise fallow fields with crops that help to build soil fertility. Before the cover crop goes to seed, it is tilled into the soil in a process called *green manuring*.

Cover cropping and green manuring improve soil by:

- Increasing the nutrient content of the soil.
- Decreasing the leaching of nutrients that occurs when water runs through the soil.
The roots of cover crops act as a net to hold the soil and use the water, thus preventing the water from leaching the nutrients out of the soil.
- Holding the soil in place, reducing erosion.
- Providing channels for water percolation, worm and bacteria movement, and gas exchange.
- Reducing weeds by choking unwanted plants or shading low-lying weeds that need sun to grow.
- Reducing the extremes of heat and moisture that can affect bare soil.
- Loosening the soil and improving its texture.

Farmers use many different kinds of cover crops, depending on what they plan to plant in their fields. Common cover crops are legumes (including vetch, sweet peas, and fava beans) and grasses (including grains, such as wheat, rye, and sorghum). Mixes that include several different grasses and legumes are common. Some farmers let cover crops flower before tilling the plants under because the flowers attract beneficial insects.

Objectives

Students will be able to:

Describe differences in results when watering bare soil compared with grassy soil.

Name at least two ways that cover crops can help soil.

Materials

For the class:

- 1 watering can with sprinkle head (or empty tin can with holes punched in the bottom with a nail)

water

**Preparation**

Find two different 3-foot by 3-foot areas on the school grounds for students to observe: one with bare soil and the other with grassy or weed-covered soil. If possible, both areas should be level. Mark each area with string or yarn.

Doing the Activity

1. Take students to one of the two different areas. Ask them what they think will happen when you sprinkle the area with water from the watering can (or from a tin can with holes punched in the bottom). Sprinkle water on the entire area and have students observe for about 5 minutes what happens. Does the water carry away soil? Does the water sit on top of the soil? Does the water percolate into the soil?
2. Ask students to describe what they observed.
3. Take students to the other area and ask them what they think they will observe when you sprinkle this area with water. If they think there will be differences in their observations, ask them their reasons for thinking so. Sprinkle water on the entire area and have students observe for about 5 minutes.
4. Ask students to describe what they observed.
5. Back in the class, explain to students what cover crops are and ask students why farmers might use cover crops.

Heath Family Farm



It might seem strange that such sweet fruit as oranges and tangerines are grown right next to snow-covered mountain ranges, but cold weather makes citrus fruits develop their sugar content.

The majestic snowy peaks of Mount Shasta and Mount Lassen stand in the background as the Heath family—Ron, Melanie, and their two grown children, Zachary and Marisa—perch on their picking ladders reaching through lush green foliage for their bright navel oranges.

“We get real nice, sweet oranges here,” says Ron Heath. “This cold really brings up the sugar.” He adds that orange and tangerine trees develop and ripen their fruit in winter temperatures of 32 to 60 degrees.

Sometimes his fruit even become ice-coated and look like round orange popsicles. But although this cool climate benefits the Heath Family Farm most of the time, it can also spell trouble if the weather stays freezing for a prolonged period of time.



In 1990, the farm was hit by a freeze that not only wiped out most of that year's crop but also killed 40 percent of the trees. For the first few days and nights of the subfreezing weather, the Heaths turned on their irrigation sprays. They do this in freezing weather because a thin coat of ice protects the fruit and foliage. But when the subfreezing weather continued to hold its icy grip on the region, the trees and fruit on the Heath Family Farm became frozen waterfalls and looked like eerie ghosts of ice.

"Mother Nature can be rough on us," Ron Heath comments wryly. The Heaths say that the worst part of the disaster was the waiting that followed. Not until nine months later could they tell which of the devastated trees were totally lost and which would show signs of life—a little bud or root shoot. With the help of friends, including his wholesaler, who formed a work party to help clean up the damage, the Heaths were able to recover from the freeze.

Now the Heath Family Farm once again thrives with Valencia oranges, Satsuma tangerines, Clementine mandarins, blood oranges, and some sour oranges that are good for making marmalade.

The 19-acre farm is thickly carpeted with soft grass, creating a parklike setting for the rows of older trees, which are as much as 30 feet tall, as well as for the younger, head-high citrus trees.

Part of this parklike setting is created by the Heaths' organic practices. To combat infestations of scale, a tiny insect that causes disease, the Heaths regularly release scale-eating wasps and ladybugs on their farm. To keep up the fertility of the soil, they spread aged horse manure around the orchard and plant cover crops of bell beans and grass. The Heaths are so firmly committed to organic farming that they helped pioneer the organic certification standards for citrus growers.

The fright of the 1990 freeze made the Heaths rethink some of their practices. They have planted citrus that ripen in early winter as well as a wider variety of trees. Ron has been experimenting with the new red navel oranges, the Cara Cara, which originated in Venezuela, and some new varieties of mandarins that can be harvested in the early, middle, or late part of the season.

Although Ron and Melanie did not start out as farmers (Ron worked as a full-time jeweler), when they bought the farm in 1978, they were already committed to organic practices. They also knew it would be a great place to raise their children. Keeping the farm organic and on a small scale allows them to manage the production and operation of the farm as a family. Their son, Zachary, a student at Chico State University studying plant and soil science, sees the farm as the future for himself and his fiancée: "When I was traveling in Germany, I saw farms that had been in the same family for hundreds of years. That appeals to me."

Strawberries

The strawberry, a member of the rose family, has grown wild in Europe and the Americas for hundreds of years. Although ancient Romans valued the fruit for its therapeutic, medicinal qualities, it was not domesticated until the eighteenth century. Wild strawberries grow on foggy coastal cliffs and shady forest floors. The cultivated strawberry, as it is known today, was the result of a chance cross between a wild Virginia species and a Chilean species.

Today there are many varieties of cultivated strawberries. California is the leading producer of strawberries in the United States. The fruit favors cool, moderately foggy conditions, so most strawberry farms are found in coastal areas. A number of strawberry varieties have been developed to grow in the specific microclimates of Northern California's coast.

Seasonality and Growing Conditions

Strawberry plants are perennials, but most farmers grow them for only one year. Plants may be started from seed or by transplanting shoots called runners.

There are two modern hybrid categories of strawberries: spring-bearing and ever-bearing. Spring-bearing berries produce most of their fruit during the early part of the season, which begins in March. These varieties include the Sequoia, which produces large, intense fruit, and the Chandler, which is the earliest-bearing type. Ever-bearing berries, such as Fern, Seascape, and Hecker, produce medium-sized fruit throughout the season, which extends until October.

Strawberries thrive in sandy, well-drained soil with lots of moisture. Raised beds help to provide good drainage, which inhibits fungal growth. Drip irrigation and heavy mulch help to give the plants the moisture they need. Many





farmers use plastic to cover the soil around the plants to control both weeds and pests. By warming the soil, the plastic covering improves crop yields and helps to ripen the berries and protect them from decay. Cool winters also help the plant produce more fruit at harvest-time.

Organic strawberry farmers rely on hand-removal of insect pests and grow beneficial flowers, such as rose, sweet clover, baby's breath, and sunflowers, to help attract insects that eat pests. Weeds are removed by hand, and the plastic ground covering is tucked around berry plants to help exclude pests. Keeping the soil smooth around the base of the plants also helps to prevent fruit decay.

Selection, Storage, and Nutrition Information

Strawberries generally do not ripen after picking. When ready for harvest, only completely ripe berries should be picked. The most difficult part of the farmer's job is to see that the strawberries are transported to market without bruising or crushing the fruit. Gentle handling and careful picking by hand is time-consuming and labor intensive.

In the market, look for berries that are fragrant, unblemished, deep red in color, and without mushy or juicing spots. Although hard to find, the tiny, sweet, wild *fraises des bois* (strawberries of the woods, or wild strawberries) originating in France are considered to be the most intensely flavorful strawberry. Strawberries should not be washed until ready to use. To wash, quickly spray the fruit with water as they tend to absorb liquid, which dilutes the flavor of the fruit and destroys the texture. Store strawberries in a moisture-proof container in the refrigerator for up to three days. Avoid storage in a plastic bag, which makes the fruit mushy.

Strawberries are high in vitamin C and folate and are a good source of fiber.

Strawberry Lemon-Limeade

Preparation Time: 20 minutes
 Cooking Time: 5 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Easy

Background

This is a very easy recipe to make. It is not imperative to cook the sugar and zest if there is not a hot plate available, but cooking does make it a much tastier drink. If you prefer, you may substitute other berries (raspberries, blueberries, etc.) for the strawberries or use only limes or lemons.

When introducing this recipe, discuss with students the differences between strawberries and lemons. Explain how lemons and limes grow on trees, whereas strawberries grow on small, low-lying plants. Have students compare their structures: lemons and other citrus have skins that can be peeled and cooked and have pith, sacs, and seeds; strawberries have a very thin skin, and their seeds are embedded in the skin. Strawberries are sweet and may be eaten whole, but lemons and limes are too sour for most people to eat directly from the tree.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *zest, simmer, and garnish.*

Compare the anatomical structure of strawberries, lemons, and limes.

Ingredients

For a class of 20:

- 2 pints strawberries
- 12 lemons
- 9 limes
- 18 cups water
- 2 cups sugar
- 2 trays ice

Materials

For the class:

- colander
- hot plate
- 2 half-gallon pitchers
- blender
- measuring cups
- ladle
- small saucepan
- small strainer
- 3 small mixing bowls
- vegetable peeler
- knife
- cutting board
- pot holders

For each group of 4:

- 2 cutting boards
- 2 knives
- 4 vegetable peelers
- 3 bowls
- 4 small cups
- napkins
- journals
- 1 citrus juicer

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash the strawberries and put them in the colander to drain. Wash all the citrus.
3. Divide the lemons, limes, and strawberries into five equal portions, one for each student group, saving two lemons for garnish.

Safety Precautions

Review safety precautions for using knives and the hot plate. Unplug the blender before putting utensils or hands into it.

Making the Recipe

1. Provide each group of students with ingredients and materials.
2. Demonstrate stemming the strawberries, peeling the zest off the lemons and limes, and juicing the citrus. To peel the zest, use a peeler and carefully peel off just the colored portion of the peel, leaving the white, pithy portion on the fruit. Students will peel the zest off half of the lemons and limes and use a citrus juicer to extract the juice.
3. Have each group stem, peel, and juice the fruits as demonstrated and place them in separate bowls. Save two lemons for garnish.
4. Collect the bowls and place them on the demonstration table. Have students gather around the demonstration table. Select two students to pour the lemon juice and the lime juice through the strainer to catch all the seeds.
5. Ask two students to measure $1\frac{1}{2}$ cups water and 2 cups sugar, then add the water, sugar, and all the zest to a small saucepan. Slowly bring the mixture to a boil and simmer on low heat for 5 minutes.
6. While the sugar simmers, help two volunteers purée the strawberries and $1\frac{1}{2}$ cups water in a blender. As the sugar syrup cools, have three students pour an equal amount of lemon and lime juice in each of the pitchers. Have students add equal portions of the strawberry purée to the pitchers. Stir the mixture thoroughly.
7. While still waiting for the sugar to cool, have the class make the lemon garnish, which will be a thin slice of lemon for each cup.
8. When the syrup is cool, add it to the pitchers. Stir the mixture thoroughly. Have students taste for sweetness and add more sugar if needed. Serve over ice or as it is with the garnish.
9. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Strawberry Shortcake

Preparation Time: 30 minutes
 Cooking Time: 15 minutes
 Total Lesson Time: 60 minutes
 Recipe Level: Advanced

Background

Strawberry shortcake is a classic American dessert. Students will prepare strawberries so that their juice will flow over the baked shortcakes.

Ripe, sweet strawberries are fragile and require careful handling. They should be washed just before using, with their calyxes (the green leafy part) still on, to minimize the amount of water they absorb.

Objectives

Students will be able to:

Demonstrate a working understanding of the following terms: cut butter into flour, preheat, bake, and whip.

Prepare a recipe that involves baking.

Ingredients

For a class of 20:

Filling

5 pints strawberries
 3/4 cup sugar

Shortcakes

3/4 teaspoon salt
 3 tablespoons sugar
 6 teaspoons baking powder
 3 cups flour
 3/4 cup butter
 1 cup heavy cream

Topping

3 cups whipping cream
 3/4 teaspoon vanilla extract

Materials

For the class:

colander
 egg beater
 wooden spoon
 oven
 rolling pins
 3 medium mixing bowls
 biscuit cutter or small
 drinking glass
 cutting board
 3 measuring cups
 baking sheet
 2 serving spoons
 measuring spoons
 fork
 pot holders
 potato masher

For each group of 4:

2 cutting boards
 2 knives
 4 bowls
 4 forks
 napkins
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash strawberries in the colander and allow them to drain.
3. Set aside 20 strawberries, then separate the remaining strawberries into five equal portions, one for each student group.
4. Preheat the oven to 400°F.

Safety Precautions

Review safety precautions for using knives and the oven.

Making the Recipe

1. Demonstrate stemming and slicing the strawberries, pointing out it is best to try to cut them all to the same thickness (about 1/2-inch thick).
2. Have student groups slice their strawberries and place them in a bowl.
3. Give each group an equal portion of the 20 strawberries you had set aside. Demonstrate crushing them with a fork in a separate bowl. Have students crush their strawberries.
4. Collect the bowls and place them on the demonstration table. Have students gather around the demonstration table. Have two students add the sliced strawberries, crushed strawberries, and sugar to the large mixing bowl. Mix well, cover, and set aside. While the mixture sits, it should become very juicy.
5. For the shortcake recipe, have selected students measure out all the ingredients, stir together the dry ingredients in a medium mixing bowl, and cut the butter into small slices. Add the butter pieces to the flour mixture. Demonstrate how to cut the butter into the flour: use the tips of your fingers to rub the butter pieces into the flour mixture until it resembles a coarse cornmeal. Allow students to assist.
6. When the mixture is ready, have two students add 1 cup heavy cream and stir until the flour is just moistened. Turn out the dough and let a few students knead the dough briefly and roll it out about 1/2-inch thick on a floured surface. Have each student cut out a shortcake by using a biscuit cutter or small glass. Place the shortcakes on a baking sheet. Bake for 10 to 15 minutes or until the tops are lightly brown.
7. When ready to serve the shortcakes, use the egg beater to whip 3 cups cream. When the cream is ready (it should be quite thick), add the vanilla extract and sugar.
8. Cut the shortcakes in half like a sandwich. Put the bottom sections on a plate, spoon an equal portion of strawberries over each one, put on the top sections of the shortcake, then add a spoonful of whipped cream to each.
9. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Ladybug Release

Preparation Time: Will vary, depending on availability of materials
 Total Lesson Time: About one hour

Background

Insects may be a major problem when growing strawberries. A technique used in sustainable agriculture to combat this problem is to use biological controls. For example, the two-spotted spider mite lives on strawberry leaves and can completely overrun the plant if the population gets too large. To combat the mites, a predator mite is released into the fields. The predator mites prey on the spider mites, reducing their population and saving the strawberries.

Similarly, ladybugs help strawberries by feeding on pesky insects called aphids. A female ladybug can lay up to 1,500 eggs. The eggs then move to the larval stage, which lasts for three to six weeks. After the adult emerges from the pupa, it takes only five to 13 days before it lays its own eggs. In the larval stage, each ladybug can eat around 400 aphids, and in the adult stage each ladybug can eat more than 5,000 aphids in its lifetime. Therefore, releasing many ladybugs results in fewer aphids in a small amount of time.

Because these insects are so beneficial to farms and gardens, places called *insectaries* breed and collect them. To get large populations of ladybugs, insectaries collect them from overwintering sites. These sites are usually in the mountains, where aggregations form after the ladybugs have migrated from valley feeding areas. Insectaries supply nurseries and farmers with ladybugs. Another way for farmers to attract ladybugs and other beneficial insects is by growing particular flowers, such as roses, sweet cover, baby's breath, sunflowers, crimson, and wild radishes, along the borders of the strawberry plants. Creating a diverse insect population is a natural way of keeping insect growth in check.

Objectives

Students will be able to:

Explain how releasing ladybugs into the school garden helps the plants.

Study ladybugs up close by touching them, looking at them magnified, and noticing how long they live and how quickly they reproduce.

Materials

A box of ladybugs (around 500 ladybugs) from a local nursery
 Magnifying glass(es)





Preparation

1. Buy a container of ladybugs. If none are available at the local nursery, search on the Internet for sources of insectaries.
2. If you buy the ladybugs before the day you plan to release them, store the container in the refrigerator or any cool, dark place at 40 to 60 degrees. If you store them for longer than a week (but no longer than three weeks), let the container warm to room temperature once or twice a week, sprinkle it with water, and let it sit and absorb the water for about two hours.

Doing the Activity

1. Choose a time to release your ladybugs when it is relatively cool or overcast (e.g., the morning). Water the plants on the day you will release the bugs.
2. Have students come up to the container one or two at a time and gently scoop up some ladybugs. The bugs will crawl up their arm a bit, but remind the students that the ladybugs will not hurt them. If you have a magnifying glass, have the students look at the bugs up close. Then have each student walk calmly to a place in the garden and gently brush the bugs from their arms onto a plant of their choosing.
3. Have the students observe what the ladybugs do in the garden and have them record their observations. Discuss how the release of the ladybugs will affect the garden.
4. In the days and weeks following the release of the bugs, ask the students to notice whether ladybugs are still in the garden and, if so, whether there seem to be more or fewer than at the time they were released. Also have them notice any other changes: Are there less harmful bugs in the garden? Do the plants look healthier?
5. *Optional:* If you have a copy of *What About Ladybugs?* by Celia Godkin, read it and talk to the class about the different types of symbiotic relationships found in nature: mutualism, commensalism, and parasitism.

Swanton Berry Farm



The experts told Jim Cochran that it could not be done.

The memory of the sweet fragrance and taste of strawberries his grandmother used to serve lingered in Jim Cochran's mind. So he set out to recreate those flavorful berries he remembered from childhood.

Jim started Swanton Berry Farm from two rented acres along the Pacific Coast near a tiny town called Davenport, located on the California coast between San Francisco and Santa Cruz. He expanded the farm to 80 acres, where he grows strawberries as well as artichokes, broccoli, peas, cauliflower, black raspberries, and blackberries. Swanton Berry Farm follows organic farming practices.

Jim found that instead of using fumigation and pesticides, he could employ a long-term soil-building program that involved crop rotation, biodynamic compost (a special compost that is enriched with organic material), and products made from sea kelp. He also grows and plows into the soil cover crops, such as grains and legumes, which enrich the soil for strawberries.

Creating a healthy, rich soil is only half the work of growing organic strawberries. There is also the problem of harmful insects. Without the use of pesticides, the strawberry plant is in danger of being eaten before even bearing fruit.



For example, the two-spotted spider mite lives on strawberry leaves and may completely overrun the plant. To combat the mites at Swanton, workers rely on the age-old cycles of nature. When the spider mites become so numerous that they constitute a real threat, a predator mite cultivated in nurseries is released into the fields. The predator mites do not hurt the berry bushes but love to chow down on the spider mites.

Another way to combat the insects is to grow certain flowers that attract beneficial insects. Along the borders of the strawberry beds, flowers such as roses, sweet clover, baby's breath, sunflowers, crimson, and wild radish flowers bloom, attracting insects that will also attack the spider mites.

For Jim and the people working at Swanton Berry Farm, the commitment to environmentally safe farming practices includes a commitment to fair labor policies.

Jim did not see the point in his farming if the workers were underpaid, overworked, and treated without respect. Swanton Berry Farm was one of the first strawberry farms and the first organic farm in the United States to sign a contract with a farmworkers union. Swanton Berry Farm's contract guarantees workers good hourly wages, good working conditions, health benefits for the worker's entire family, paid vacation and sick leave, and a retirement package.

He believed that the first step in creating good work conditions was to offer a chemical-free environment. The second step was to pay by the hour worked rather than by the number of boxes of strawberries picked.

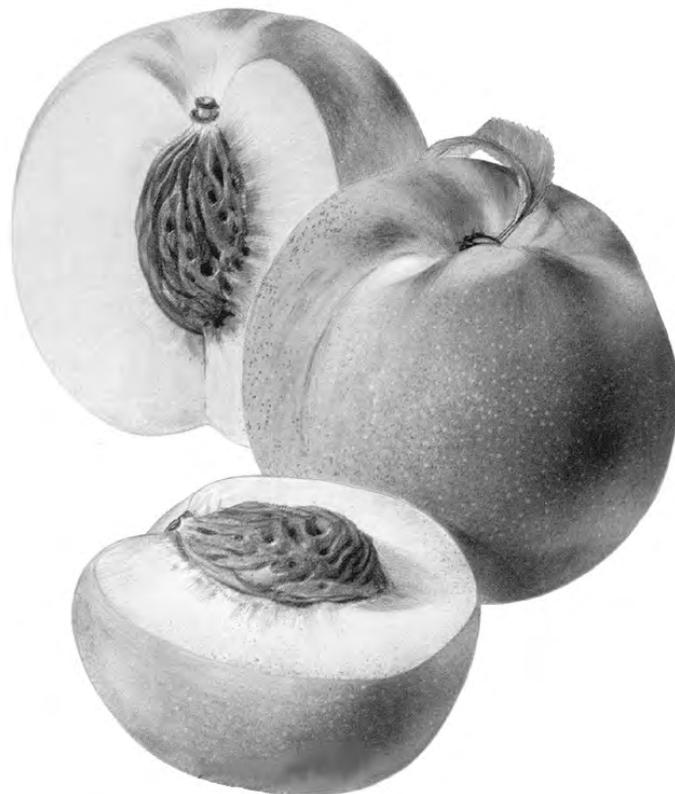
In addition, workers at Swanton are given a variety of tasks during the week so that they will not become bored with a job or harm their bodies through repetitive motions.

Stone Fruit

Peaches, nectarines, apricots, plums, and cherries are all classified as stone fruit, or *drupes*, which means they possess a single, large seed or stone surrounded by sweet, juicy flesh. Peaches and apricots originated in western China about 4,000 years ago. Several species of plums were domesticated in Roman times in Europe and independently in China and Japan in the distant past. Cherries are thought to originate from a number of places, including Eastern Europe and Asia. The Chinese were the first to cultivate these succulent fruits, but Alexander the Great is credited with introducing them to the Greco-Roman world. Today, California is the leading producer of stone fruit in the United States because of its temperate climate and rich soils.

Peaches, which were popular during colonial times right after they were first introduced to North America, can be grown in most areas. There are two categories of peaches: freestone and cling. The cling peaches have pits that are attached to the fruit and are used primarily for canning; the freestone peaches have pits that detach easily from the fruit's flesh and are used for eating out of hand and for cooking. Nectarines are varieties of peaches that have no fuzz. Nectarines have originated many times as bud spurs (mutations in a single branch) on peach trees.

Cherries are also divided into two categories: sweet and sour. Sweet cherries are used for eating out of hand (e.g., Bing, Royal Anne, and Larian). Sour cherries (e.g., Montmorency and English Morello) are used for canning and pies.





Varieties of plums have different characteristics of texture, flavor, color, time of harvest, and environmental preferences. Plums are available in a wide range of colors, including red, green, yellow, purple, and black. In recent years, plum hybrids, such as the pluot (a plum/apricot cross), have increased in popularity, and many delicious varieties are now available at farmers markets.

Seasonality and Growing Conditions

Stone fruits are synonymous with late spring and summer. The season usually begins in mid-May with cherries and apricots; then peaches, nectarines, and plums follow. The stone fruit season generally extends until early October except for cherries and apricots, which finish in late June.

Stone fruits need warm days in summer and cool nights in winter to produce mature, ripe fruit. Good drainage is a must. Peach, plum, apricot, and nectarine trees take three to five years to bear fruit; cherries average about five to seven years. Peach and apricot trees normally are thinned to increase the size of the fruit.

Cover crops are sometimes used to add organic matter to the soil, which makes the trees healthier and better able to resist diseases.

Cherries and plums tolerate cold winters and, therefore, grow well in the northern United States, Canada, northern Europe, and Asia.

Peaches and apricots do not tolerate as much cold but grow well in California, the southern United States, southern Europe, and much of central Asia.

Dormant oil sprays are sometimes used to combat scale and mealy bugs. The spray smothers the insect eggs before they hatch. Stone fruits have very thin skins and consequently can easily rot on the trees. Some growers spray compost tea on the fruits to protect them from rotting.

Selection, Storage, and Nutrition Information

With the exception of cherries, stone fruit is generally picked while still slightly firm. This practice minimizes crushing or bruising by the time it arrives at market.

Look for peaches and nectarines with smooth, firm, deep golden-hued skin; plums with taut skin and a dull matte finish; and golden-hued apricots. Stone fruit should be purchased ripe. If necessary, place unripe fruit in a paper bag on a counter. Refrigerate stone fruit only if it is overly ripe.

Apricots are high in vitamins A and C and are a good source of potassium. They are also a good source of fiber, as are cherries and nectarines. Peaches, cherries, and nectarines are a good source of vitamin C. Plums are high in vitamin C.

Nectarine & Peach Smoothies

Preparation Time: 20 minutes
 Cooking Time: None
 Total Lesson Time: 45 minutes
 Recipe Level: Easy

Background

Nothing is easier to make or more appealing to kids than a batch of fruit smoothies. You can substitute the kinds of fruit you use as the seasons pass or mix and match in any season.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *purée*, *smoothies*, and *stone fruit*.

Describe the different fruits in the stone fruit family.

Compare nectarines and peaches.

Ingredients

For a class of 20:

6 nectarines
 6 peaches
 4½ cups plain, unsweetened
 yogurt (or milk)
 4½ cups orange juice
 6 tablespoons honey

Materials

For the class:

colander
 blender
 2 large pitchers
 1 large mixing bowl
 measuring spoons
 measuring cups
 knife
 cutting board

For each group of 4:

2 cutting boards
 2 knives
 2 bowls
 4 cups
 napkins
 journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash nectarines and peaches, scrubbing off peach fuzz, in particular, and place them in the colander to drain.

Safety Precautions

Review safety precautions for using knives. Unplug the blender before putting utensils or hands into the blender jar.

Making the Recipe

1. Demonstrate cutting the peaches and nectarines into wedges and then cutting them from their pits. Show the different parts of the fruit: pit, skin, and flesh or meat.
2. While students prepare the wedges for the recipe, have them examine the parts of each fruit and make notes in their journals about the texture, size, color, shape, and smell of each part of each fruit. Have students place the wedges in bowls.
3. Collect the bowls and place them on the demonstration table next to the blender. Have students gather around the demonstration table. Ask two students to put all the fruit in a large mixing bowl and mix. Add the measured yogurt, orange juice, and honey.
4. Ask students how many batches they think it will take to blend the ingredients for the smoothies. Have students divide the ingredients into equal batches and place each batch separately into the blender. Blend each batch until smooth and pour into the pitchers.
5. When all is puréed, serve in a cup. While students drink the smoothies, discuss the differences among the fruits.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Plum Jam

Preparation Time: 20 minutes
 Cooking Time: 2 hours
 Total Lesson Time: 2 hours and 30 minutes
 Safety Suggestions: Advanced

Background

Any kind of plum may be used for this jam as long as it is flavorful and has a good sweet-tart balance, such as Santa Rosa. The cooking time includes one hour for the plum mixture to sit and one hour to simmer and stir. You will want to coordinate this recipe with other class lessons so that students can periodically stir the jam while it simmers. This recipe works well if your class prepares the plum jam before lunch so that the jam can sit for a while and then be cooked after lunch during a reading or writing period.

Objectives

Students will be able to:

Demonstrate a working knowledge of the following words: *plum, stone fruit, and jam.*
 Compare the parts of different varieties of plums.

Ingredients

For a class of 20:

- 3 lbs plums
(one or several varieties)
- 2½ cups sugar
- 2 lemons
- water
- whole wheat bread or crackers

Materials

For the class:

- large, heavy-bottomed
cooking pot
- colander
- measuring spoons
- measuring cup
- serving spoon
- potato masher
- cherry pitter (optional)
- hot plate
- pot holders
- cutting board
- knife

For each group of 4:

- 2 cutting boards
- 2 knives
- 2 plates
- 2 bowls
- napkins
- journals

**Preparation**

1. Have students wash their hands. Discuss proper methods of handling food.
2. Wash plums and place them in the colander to drain.
3. Divide plums into five equal portions, one for each student group.

Safety Precautions

Review safety precautions for using knives and the hot plate. Hot jam has the potential for causing serious burns. Make sure that students use extreme care when stirring the jam.

Making the Recipe

1. Demonstrate how to cut the plums in half and then cut them from their pits. Show the different parts of the fruit: pit, skin, and flesh or meat.
2. Give each group a portion of the plums to prepare. While they prepare the plums for the recipe, have them examine the plums and make notes in their journals about the texture, size, color, shape, and smell of each part of each fruit. Have students place prepared plums into bowls. Have students save the pits in another bowl.
3. Collect the bowls and place them on the demonstration table next to the hot plate. Have students gather around the demonstration table. Ask two students to gather the fruit in the cooking pot. Have another two students measure and add sugar into the mixing bowl. Ask two other students to quarter the lemons and squeeze the juice into the pot. Allow students to take turns mashing the plums. Place four to six pits in the mixture so the aroma permeates it. Let it sit for an hour.
4. Place the pot on medium heat and cook for one hour, stirring frequently to prevent scorching or burning. It works well to assign student pairs to stir at five-minute intervals while the rest of the class is reading or writing.
5. When the jam is thick (in about one hour), take it off the hot plate and let it cool. Have the kids serve themselves by putting some jam on bread or crackers. Refrigerate and consume within three to five days.
6. Clean up materials. If you have a school or classroom compost or worm bin, place the food scraps there.

Cities and Farms

Preparation Time: None
Total Lesson Time: 30 to 60 minutes

Background

Can you imagine a farm where your house is? Well, that is probably how it was 100 years ago. Even the sites of big cities, such as San Francisco and Los Angeles, were once some of the richest and most productive farming areas in the United States. Fragrant orange groves once covered the fertile plains surrounding Los Angeles. Vegetables and pears grown in the rich peat soils of the Delta were floated down to waterfront markets in San Francisco by barge. Apricot, plum, and cherry trees covered the Santa Clara Valley, which was nicknamed the Valley of Heart's Delight. Wheat grown right around Mount Diablo was of such good quality that it was in demand all over the world. Fresno was once, not so long ago, a farming town, and it is now a large, sprawling city.

But the climate that was good for farming was also good for people. In 2001, more than 33 million people were living in California. In 20 years there will be 15 million more. Much of the good farmland has been paved over. Planners, policymakers, and farmers are working hard to figure out how to preserve agricultural lands. After all, people need fresh food; and being close to beautiful orchards, natural fields and streams, and healthful open spaces makes people feel good.

Objectives

Students will be able to:

Name ways in which cities and farms are connected.

Describe why local farms are important to people.

Materials

For the class:

Van Dyke Ranch farm profile
map of California

For each group of 4:

drawing paper
crayons, marking pens, or colored pencils

**Doing the Activity**

1. Have students read the farm profile, either individually or as a class. Lead a discussion about some of the challenges the Van Dykes have faced because of the increasing population in their area.
2. On the board, write the words “cities” and “local farms” and ask students to name some of the benefits of cities and some of the benefits of local farms.
3. Point out to students that California needs both cities and local farms and that the trick is to find a balance that is best for all. You might use the analogy of schoolwork and play: What would happen if students had only schoolwork all day or if they only played all day? How is a balance of schoolwork and play good for children? Why is a balance between cities and farms important? What would happen if there was no room for local farms? What would happen if there was no room for cities?
4. Ask students if they can think of ways that cities and local farms depend on each other or are connected. Where appropriate, make arrows between items on the two lists to show these connections.
5. Give pairs or small groups of students a piece of drawing paper and ask them to draw a picture showing a city and surrounding farms that are in balance. They should draw and label different connections between the two that would help them stay in balance (for example, transportation between the two, enough food for the city and enough customers for the farms, and so on).
6. Ask volunteers to share their drawings, pointing out the features that keep the city and local farms in balance.
7. For older students: Display a map of California and ask students to identify cities and farming areas. Remind them of the farm profiles they have read in class and the locations of those farms. Ask them to record in their journals their thoughts about the changing balance of farms and cities. For homework, students interview an adult who has lived in the area for at least ten years. They record his or her responses about the ways in which the balance of farms and cities has changed. Students may share their findings in the next class meeting.

Van Dyke Ranch

Dark, glossy red cherries and pale, pink-orange apricots hang like ornaments from the dark green trees all over the Van Dyke Ranch. It is harvesttime.

The sweet fragrance of cut apricots drying in trays under the summer sun fills the air. The plump cherries swing from their stems as a gentle breeze brings welcome relief from the heat.

“The quality of the fruit is beautiful,” says Betty Van Dyke, who owns and operates the farm near Gilroy with her three grown sons, Kurt, Peter, and Eric. Betty took over the ranch from her father, who had farmed with his father in Cupertino. Farming has been in the Van Dyke family since Betty’s grandparents came from Yugoslavia at the turn of the twentieth century.

In the 1950s, Betty’s father was forced by subdivision development to sell the Cupertino farm and move the ranch to two pieces of land (107 acres and 53 acres) near Gilroy.

“Dad was an incredible workhorse,” says Betty. In fact, he *was* the horse, pulling the plow himself before they could afford a tractor. Betty worked side by side with her father until his death in 1978. Before he passed away, he said to Betty, “I see you know what to do. Now it is all up to you.”

Betty had learned from her dad that using as few pesticides as possible and depending on cover crops, rock minerals, and other natural methods kept the land healthy and produced the best-tasting fruits.

The Santa Clara Valley is perfect for growing cherries and apricots, she explains, because of the high water table and gravelly soil that drains well, along with warm days and cool nights. This environment and thoughtful organic farming practices give the Van Dyke cherries and apricots exceptional flavor.

Yet sadly, the Van Dyke Ranch may be threatened by the suburban sprawl and water politics of nearby development. Betty and her sons have learned the hard way that running a successful farm means not only sound farming practices, hard work, and smart marketing but also political activism.

The Van Dyke Ranch is located in an area that the Santa Clara County government has designated for agriculture only; however, the area is in danger of being developed. Betty’s son Peter, who was appointed a member of the Agricultural Advisory Committee of the Santa Clara Valley Water District, says, “Since our local water district came under the jurisdiction of the county government a few years ago, our water rates have tripled. Besides that, our electricity rates for pumping water have quadrupled.”

These rising costs make it difficult for farmers in the county to turn a profit from their produce. All around them, land is selling at ever-rising prices, making it tempting for struggling farmers to sell their land to developers who would build subdivisions.



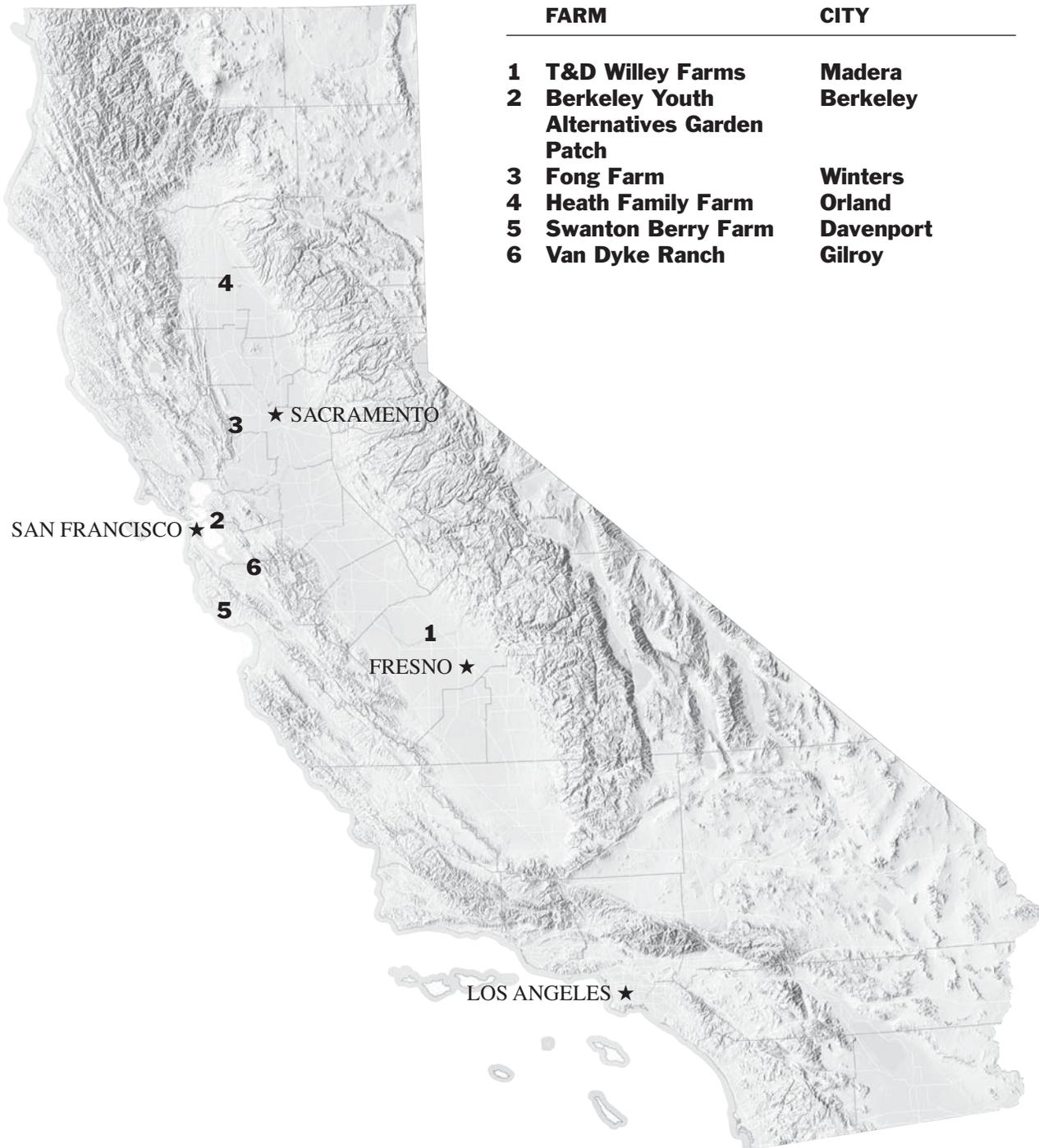
“We love what we do,” Peter explains, “but we are struggling to make ends meet. It is depressing to see nearby land selling for almost \$100,000 per acre.” Adding to this problem is the loss of skilled farmers who are getting out of the business and are not being replaced by people new to farming.

For now, the Van Dykes are holding on to their ranch. Instead of selling their land, they are trying to make their business more profitable. For years, the Van Dykes dried 90 percent

of their apricots. But with more demand and better prices for fresh apricots, the Van Dykes decided to sell more fresh apricots. Other strategies include opening a fruit stand, selling fruit juice and baby food, and growing late-season summer vegetables.

These are all steps that the Van Dykes hope will keep their ranch going for generations to come.

Locations of Farms Profiled in Spring–Early Summer





LATE SUMMER-FALL



WINTER



SPRING-EARLY SUMMER

Extension Ideas

If you find that you and your class want to do more investigating about farm produce, agriculture, or cooking, here are some possibilities for extending the activities in specific subject areas.

Science

- Students make an inventory of the different foods that they find at home and place the items into categories according to the part of the plant that they come from: leaves, stems, flowers, roots, or seeds.
- Students examine the patterns of veins in a variety of leaves. They dissect leaves and observe them under a microscope.
- Students explore differences between mixtures and solutions.
- Students research different varieties of a particular crop to determine their origins.
- Students research methods that farmers use to make their crops grow faster.
- Students research and compare the nutritional value in the same amount of frozen, canned, and fresh food.
- Students develop a school garden.
- Students draw a map of the crops in the school garden and make a crop rotation plan for it.
- Students visit the school garden and inventory all the different insects in it. They research to learn which are beneficial and which hurt the garden plants.
- Students compare compost and garden soil. They observe and record the color, smell, soil compaction, soil quality, and moisture of each.

History–Social Science

- Students use a map of California to locate areas where citrus fruit or other specific crops grow.
- The class visits a restaurant for a behind-the-scenes look at how food is prepared for meals.
- Students research a particular crop (such as rice or corn) to learn about its cultural significance in different regions of the world.
- Students take a field trip to a local farm or farmers market (or invite a farmer to your class) to help students learn about marketing practices, pricing, and customer relations.
- Students fill in a map of the world by identifying different cultures that make certain foods.

Math

- For a given crop, students make a graph showing which varieties the class likes best.
- Students create a survey to find out what families typically eat for different meals and snacks.
- Students use measuring spoons and cups to determine the ratios among teaspoons, tablespoons, $\frac{1}{3}$ cup, $\frac{5}{8}$ cup, and 1 cup.
- Students create a survey about favorite ethnic foods and conduct the survey among other students or friends and family. Students record the results on a graph.
- Students examine the patterns in broccoli florets: Do the patterns repeat themselves? Are the patterns random?

English–Language Arts

- Students observe family members cooking at home and share their observations in class.
- Students write a letter to a farmer about questions they may have on growing certain crops or other related issues. Contact the Community Alliance with Family Farmers (see Appendix B) to locate a farmer.
- Students look up potato salad recipes (or other common recipes) to see how many different versions they can find. Discuss how these recipes might vary in taste, texture, smell, and appearance when they are prepared.

Art

- Students make produce prints by cutting cross sections of onions, apples, broccoli florets, and so on and dipping them in paint.
- Students examine artwork of historical eras being studied to see how fruits and vegetables were depicted.

Computers/Technology

- Students research the history of a commodity, its nutritional value, and so forth.
- Students visit the agricultural Web sites noted in the *Teacher Resource Guide*, published annually by the California Foundation for Agriculture in the Classroom (see Appendix B).



Farm to School Resources

The following information is provided for teachers who want to plan field trips for their students or who seek additional resources for their programs:

Farmers Markets

Farmers markets are the best places to buy fresh, seasonal farm products directly from local farmers and to learn about how, where, and by whom local farm products are grown. Market managers are generally happy to arrange market tours for school groups, and some markets offer special programs for children, such as tastings and cooking classes. To find a farmers market nearby, contact your local county agriculture commissioner or the following sources:

California Federation of Certified Farmers' Markets

Janice Price, Director
Direct Marketing Program
California Department of Food and Agriculture"
1220 N St.
Sacramento, CA 95814
(916)654-0919

Farms

Many farms welcome visitors and public participation. Quite a few offer special programs and seasonal activities for school groups and families. Others offer Community Supported Agriculture programs. For a list of such farms, contact:

Community Alliance with Family Farmers
P.O. Box 363
Davis, CA 95617
(530)756-8518

Desmond Jolly, Director
Small Farm Center
University of California, Davis
One Shields Ave.
Davis, CA 95616
(530)752-8136

County Farm Bureau

As listed in the business section of the White Pages telephone directory. Or call California Foundation for Agriculture in the Classroom at 800-700-AITC or visit the Foundation's Web site.

School Gardens

The following organizations offer information about developing school gardens, utilizing gardens in the curriculum and for nutrition education, and providing ongoing teacher training and support. They also have lists of school gardens in their areas and information about other school garden resources.

Garden Enhanced Nutrition Education
Nutrition Services Division
California Department of Education
1430 N St., Fourth Floor
Sacramento, CA 95814
(916) 323-2473
Deborah Tamannaie

Department of Pomology
Capitol Region School Gardens Resource Center
University of California, Davis
Davis, CA 95616
(530) 752-7655
Carol Hillhouse
Cynthia Havstad

Inland Empire Region School Garden Resource Center
California State Polytechnic University, Pomona
3801 W. Temple Ave.
Pomona, CA 91768
(909) 869-2173
Peggy McLaughlin

San Diego County School Garden Resource Center
Resource Conservation District of Greater
San Diego County
332 So. Juniper St., Ste. 110
Escondido, CA 92025
(760) 745-2061
Tiana Sudduth

Tina M. Poles, School Garden Teacher Training
Program Director
Occidental Arts and Ecology Center
15290 Coleman Valley Rd.
Occidental, CA 95465
(707) 874-1557, Ext. 202

**Informal Nutrition Education, Garden,
and Farm Education Programs**

County University of California Cooperative Extension and 4-H programs are excellent resources for a wide variety of informal education programs:

California Foundation for Agriculture
in the Classroom
P.O. Box 15949
Sacramento, CA 95892-0949
2300 River Plaza Drive
Sacramento, CA 95833-3293
(916) 561-5625 or (1-800) 700-AITC
Fax (916) 561-5697

University of California Cooperative Extension
DANR
One Shields Ave.
Davis, CA 95616-8575

Farm to School Programs

Following are some primary resources for financial and technical support, training, and information:

California Nutrition Network/5-A-Day
California Department of Health Services
P.O. Box 942732, MS-662
601 N. 7th St.
Sacramento, CA 94234-7320
(916) 445-6727

Farm to School Program
Community Food Security Coalition
P.O. Box 209
Venice, CA 90294
(310) 822-5410
Marion Kalb

Food Systems Project
Center for Ecoliteracy
2522 San Pablo Ave.
Berkeley, CA 94702
(510) 548-8838
Melanie Okamoto

California Agricultural Directory
California Farm Bureau Federation

This Web site provides more than 2,000 listings for agricultural associations and cooperatives, government agencies, university schools and programs, irrigation districts, fair associations, and more.

(916) 561-5550

Students Share in a Farm's Harvest

One Teacher's Experience

by Phoebe Tanner

Opening the biweekly vegetable box from Terra Firma Farm was always a highlight in my sixth grade classroom. As soon as the large, waxed cardboard box appeared, students started guessing what was in it. I opened the box, wondering right along with them what gifts from the earth were inside this week. I held up the vegetables, one by one, calling on students to identify them. By two weeks into December, everyone could distinguish Swiss chard from red Russian kale.

Carrots were always greeted with cheers. Most students were interested in eating them or getting the peeling-and-cutting-carrots job, which, of course, included tasting. There were several students who, using classroom resource books, attempted to pin down the variety of carrots, learning to distinguish the Nantes from the Chantenays.

Students learn classroom routines especially quickly when the routine is an activity they like. Making a salad was high on my students' list. Cutting boards were passed out, one to a table, with no directions from me. I assigned the remaining jobs, being sure to rotate those of washing the lettuce and using the salad spinner, a favorite job. In short order students distributed all vegetables that did not need cooking to the chopping stations. We always cut up kale and chard and minced leeks. Potatoes were among the few items that did not

make it into the salad unless I had the foresight and time to take them home the night before and cook them.

I passed out the knives with words of caution. Only once in two years did I have to reach into the box of adhesive strips during salad time.

There was much discussion over salad dressings. Most students wanted ranch dressing. We invited a chef from a local restaurant to join us one day. He worked with the salad dressing group and showed students how adding minced leeks and various amounts of salt and pepper to oil and vinegar could alter the taste. He encouraged the students to dress the salad only lightly, allowing the taste of the vegetables to come through. After the chef's visit, the job of making salad dressing became a favorite.

I tossed the salad in a large bowl. Students placed it on plates and served their classmates. One day, once everyone was served, I asked the class to pause before eating and think of all the steps involved in getting our salad to our plates—from the sun that provided energy and the green leaves that took that energy and, through photosynthesis, transformed it into food for the plant; to the farmers at Terra Firma who tilled the soil, tended the growing plants, harvested the crops, loaded the truck, and delivered it to our school; to our class, who washed, chopped, tossed, served, composted, and, finally, ate together, taking in the energy from the sun and the nutrients from the soil. Spontaneously, the students stood and applauded.

Phoebe Tanner, Sixth Grade Teacher, Edible Schoolyard, M. L. King Middle School, Berkeley, California; California Visiting Educator, California Department of Education, 2000–2002

Community Supported Agriculture (CSA) is a connection between a local farmer and the people who eat the food the farmer produces. Consumers make a monthly financial commitment to the farm and, in return, get a weekly box of seasonal fruits and vegetables. Consumers share in the inherent risks and potential bounty of the farm and get the opportunity to know where their food comes from. Farmers obtain a steady income year-round. The idea of a committed financial relationship between consumers and farmers originated in Japan and Europe in the 1970s. Coincidentally, CSA vegetable boxes are a wonderful teaching tool in the preliminary stages of developing a school garden.



Farm Field Trips for School Groups: A Primer for Teachers

For many young people, farmers and farming have an almost mythical quality as people, places, and activities imagined but not directly experienced. Children read books that include farm animals and sing about old MacDonalD, but few have ever been to a farm or met a farmer. If future generations are going to care about farms and farming, they need to be directly exposed to the people and places that produce their food.

Benefits of Farm Field Trips

Farm field trips provide an opportunity for students to use all their senses to learn: the more they can touch, smell, and taste the things they are learning about, the more deeply they will understand and remember what they learn. Learning on the farm is a natural extension to related school activities such as nutrition education, school garden classes, and classroom cooking. It also provides tangible applications for science, math, social studies, and geography concepts (e.g., for a fourth grade study of California geography, culture, and history).

This primer outlines steps for planning, conducting, and following up on farm field trips that will ensure the most rewarding experience for students, teachers, and farmers alike. More extensive trips to farms for overnight stays are becoming more popular but are not covered here.

Some farmers offer educational field trips as a part of their farming operation. Others encourage visits but may not have developed specific activities. Either experience is valuable.

Planning

Where to go: There are several resources for finding farms in your area that host field trips. A good place to start is by inquiring at your local farmers market for farmers who live within field trip distance and who host school groups. Harvest trail groups (listed in Yellow Pages or contacted through visitor ser-

vices) also have lists of farms that host groups and offer other amenities to the public. (See also the listings in Appendix B, “Farm to School Resources.”)

When: Fall, the traditional harvest season, and spring, the start of summer production, are popular times to take farm field trips. However, winter is also an excellent time for on-farm learning because even on farms that do not grow winter crops (and many do), students experience the off-season activities that are essential to bountiful harvests.

What/who: The best farm field trips offer hands-on activities, and these are most successful when groups are small. Farmers will often have other family members or their employees available so that activity groups can be small even if the overall group is large. Teachers or parent chaperones should be teamed with each activity group. Discuss planned activities and expectations with the farmer ahead of time, including the number of students that the farm can comfortably accommodate and age-appropriate activities.

Price: Some tours are free of charge. Some farmers charge a fee of \$1 to \$5 each for a day visit to help cover their time. A charge for farm products that the students take home may be included in or added to this fee. Costs for transportation to the farm are, of course, separate and may be expensive.

Logistics: Discuss the following items with the farmer in detail: directions to the farm, estimated travel time, parking and turnaround information for car or bus drivers, availability of bathrooms and water, insurance, clothing/footwear needed, other desirable things to bring (e.g., drawing books, baskets), any safety considerations and special needs, and contingency plans for bad weather.

Preparation activities: Successful farm trips start with preparation in the classroom. This may include general discussion about such subjects



as seasonality, nutrition, plant and animal biology, geography, and specific agricultural practices (e.g., composting, mulching, cover cropping, pest management) and what local or regional means (maps are a great tool for this.) Some farms have written information they can provide about their place, products, growing practices, and customers.

Learning on the Farm

Greeting, orientation, and ground rules: The farmer (and other field trip hosts) greets and orients the students, including pointing out bathrooms and a lunch/snack spot and giving an overview of planned activities. Either the farmer or teacher should be explicit about ground rules, including places that are off limits, prohibited activities, cautions (e.g., poison oak, bees), appropriate behavior around animals, and other information about respectful and safe behavior.

Activities: Farmers experienced with field trips will have activities planned and will advise on and be prepared for a certain number of students for each activity. Common hands-on activities include planting seeds, transplanting seedlings, harvesting/gleaning, making compost, hunting for and identifying insects, milking cows, and climbing on tractors. Calmer activities include tasting, making flower bouquets, learning about cover crops and beneficial insects, touring an orchard or greenhouse, and discussing the wildlife on the farm.

Plan on rotating groups of students through several activities. It is also important to allow a little time

and a place for the children to play (check with the farmer) and imagine themselves as farmers.

Following Up

Back in the classroom: Follow-up activities can be basic, such as simply sharing impressions and writing and drawing in a journal. Farm field trip experiences may also foster deeper discussion about themes such as stewardship of the land, the price of food, a sense of place, and the relationships between farms and cities and farmers and consumers. Products brought back from the farm may be used for a cooking class. Seeds or plants from the farm might be planted in a school garden. Farm field trips can also provide an opportunity for family involvement by asking children to find out about their own family's history of involvement in farming and/or growing plants or raising animals. Another idea is to organize a classroom or school to subscribe to a Community Supported Agriculture (CSA) program.

Thanking the farmer: Farmers appreciate getting thank-you notes from the students. When students are appreciative and show how much they have learned, it encourages farmers to keep hosting field trips. Some farmers might facilitate continued contact by providing information about how and where to buy their products, selling food to the school food service, returning the visit, or simply sending the class a photo of the harvest or a newborn animal.

Note: The University of California Sustainable Agriculture Research and Education Program (UC SAREP) provided funding for a Farm Field Trip Guide for Farmers, which is the basis for this document.

National Farm to School Program

Improving Small Farm Viability and School Meals

The National Farm to School Program links schools with local farmers to provide fresher, tastier, healthier school meals. When fresh, farm-direct, seasonal food is included in school lunch programs, both children and farmers benefit. When healthy school lunch choices are combined with nutrition education, farm visits, school gardens, and cooking projects in the classroom, children have a better opportunity to develop healthy eating habits that last a lifetime.

When fresh, nutritious food is offered in school lunch programs, children learn to make healthful choices. Children respond enthusiastically when they are offered a wide variety of fruits and vegetables. Fresh foods not only taste great but also contain more nutrients.

Farmers profit, too, with the Farm to School Program. Glorious fresh fruits, vegetables, and nuts are grown everywhere in California and are available directly from the farmers who produce them. By selling their fresh, seasonal produce directly to schools, farmers enhance their prospects of remaining viable contributors to the community.

Most people do not know where their food is grown. Food purchased at the grocery store and

found in school cafeterias has often traveled thousands of miles before it reaches the table. Some fruits and vegetables are stored for six months or more, losing a significant amount of their vitamins and flavor before they are consumed. Many fruits store and ship better when they are picked green and never have a chance to develop their full flavor and nutritional value. Choosing locally grown, farm-fresh foods helps conserve energy, is beneficial to the environment, and ensures that produce is ripe, tasty, and nutritious. Consider these questions:

- Where does the food served in your school come from?
- Can you identify which foods are grown locally?
- Who makes the decisions about what is served in your school lunch program?

If you want to start a Farm to School Program in your school, contact:

National Farm to School Program
The Community Food Security Coalition
P.O. Box 209
Venice, CA 90294

The National Farm to School Program is a project of the Urban and Environmental Policy Institute at Occidental College and is funded through the USDA Initiative for Future Agriculture and Food Systems program.



The Santa Monica–Malibu Unified School District

by Peggy Adams

The students in the Santa Monica–Malibu Unified School District can choose a salad bar lunch filled with fruits and vegetables right from the farmers market.

In the fall of 1997, the fruits and vegetables in McKinley Elementary School’s salad bar were replaced by seasonal items grown by regional farmers and prepared on site each morning. Participation in the district’s salad bar tripled when the farmers market produce was introduced.

Students toured the farmers market and noted that items grown in the farmers’ gardens were often featured in the school salad bar. This observation helped them connect to the source of their food. One student was featured on the local news, saying, “I love the salad bar because it’s healthy for your body.”

Through grants from the Nutrition Network, a federal and state program, the school district hired one staff member to coordinate the program and new employees at each cafeteria to prepare the fresh fruits and vegetables each day.

In 1998 the district began expanding the farmers market salad bar program to other schools with high proportions of low-income children. By 2001 the district had expanded the program to all 16 schools in the district.

The district has purchased a cooking cart for each school, providing an opportunity for chefs to come into the classroom and conduct cooking demonstrations. The program now includes regular trips to farms and to the farmers market, and plans are in the works to create plots in the school gardens devoted to growing produce for the school salad bar.

As more students began using the salad bar, the district food service director found that he was able to shift staff from other areas into the farmers market program. He believes that the program is cost-effective and able to support itself without grant funding. He can now focus on the benefits of the program and states, “Child nutrition is my new bottom line.”

Peggy Adams, Project Director, Farm to School Program,
Urban and Environmental Policy Institute, Occidental College,
Los Angeles, California

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Glossary

Agriculture Terms

Agriculture. The art or science of cultivating the ground to produce food. Agriculture includes both crop farming (plants) and animal husbandry.

Bt. A toxin produced by a bacterium called *Bacillus thuringiensis*. This bacterium is a disease of caterpillars, but it is harmless to other insects and to humans.

Biodynamic agriculture. A worldwide agricultural movement inaugurated in 1924 by Austrian scientist Rudolph Steiner. It is the oldest, non-chemical agricultural movement and predates “organic” agriculture by 20 years. Biodynamics seeks to actively work with the health-giving forces of nature. Farms may be certified biodynamic by the Demeter Association, an international certifier.

Certified organic. A guarantee by an accredited certification organization that the farm does not use toxic, chemical-based pesticides, herbicides, and fungicides.

Compost. A mixture that consists of decayed organic matter and is used for fertilizing the soil. The mixture may also contain manure.

Cover crop. A crop, such as beans, planted in an open field to cover the open ground, to encourage beneficial insects, and to restore soil health.

Crop rotation. Planting different crops in the same field each year.

Fertile soil. Soil that has a rich microbial life, contains plant matter and nutrients, is neither too dry nor too wet, and is therefore well suited to growing healthy plants.

Fertilizer. Manure or other substances added to soil so that plants will grow better.

Foodshed. The farming regions around metropolitan areas that produce food for the surrounding population.

Germinate. To begin to grow or cause to grow; to sprout.

Heirloom. An antique variety of a plant popular in the eighteenth, nineteenth, and twentieth centuries, the seeds of which have been passed down from generation to generation.

Humus. A form of decomposed organic matter that resists further decomposition. It is a dark-colored organic residue and, like sand, silt, and clay, is a fraction of the soil. Humus is critical to the fertility of soil.

Mulch. A covering, as of leaves or straw, placed around growing plants to keep them moist or protect them against cold.

Organic. Farming systems that optimize the health and productivity of interdependent communities of soil life, plants, animals, and people. Organic farmers manage pests and weeds with earth-friendly methods, such as beneficial insects and mechanical controls; they work to build soil fertility so plants can be strong and healthy without the use of artificial fertilizers. Organic foods, when processed, do not contain artificial ingredients, preservatives, or irradiation.

Pest. An insect, animal, or disease that harms plants.

Pesticide. A chemical used to kill harmful pests.

Pheromone. A scent produced by animals, especially insects, to communicate with others of their kind.

Pollination. The transfer of pollen from a stamen (male portion of a flower) to an ovule (female portion of a flower), which is necessary for most plants to bear fruit.

Seasonal. Coming with a particular time of year.

Soil. Soil that consists of unconsolidated (if it is consolidated, it is called rock) mineral fragments, water, air, organisms (such as plant roots, fungi, and earthworms) and organic matter. It is found on the surface of Earth.

Sustainable agriculture. A social commitment to growing and distributing food to meet the needs of the present without compromising the needs of the future in a manner that is environmentally sound, economically viable, and socially just.

Variety. A group of plants within a species that differ from the others in the species in a particular way (such as color or size).

Cooking Terms

Blanch. To immerse briefly in boiling water, often as a preliminary step.

Blend. To combine thoroughly and completely.

Chiffonade. Fine strips of a leafy green vegetable, such as basil.

Fold. To stir very gently by doubling one portion over another.

Garnish. To decorate food with something, usually herbs or flowers, that adds flavor or color.

Knead. To work a substance by folding, stretching, and pressing it.

Pith. The soft, spongy part of citrus peels.

Preheat. To heat to a specific temperature before cooking.

Purée. A thick liquid made by cooking and then rubbing through a sieve or chopping in a food processor.

Shuck. To remove the husk and silks of the corn ear.

Simmer. To cook just at or below boiling point.

Whip. To beat something into foam.

Zest. Orange or lemon peel used as flavoring.

Selected References

Cooking

Children's Quick & Easy Cookbook, by Angela Wilkes. New York: DK Publishing, 1997.

Simple, interesting recipes using fresh ingredients for the most part; lots of photographs, with a picture for every step of the directions in the recipes.

Cooking Art, by MaryAnn F. Kohl. Beltsville, Md.: Gryphon House, 1997.

"Easy edible art for young children"; activities for making decorative kitchen utensils, placemats, displays, etc.; good recipes, but more useful for the activities than for the recipes.

Cooking with Children, by Marion Cunningham. New York: Alfred A. Knopf, 1995.

Fifteen classic recipes using fresh ingredients; simple instructions and layout; sketches of children cooking.

Fanny at Chez Panisse, by Alice Waters. New York: HarperCollins, 1997.

A book of stories and recipes told from the viewpoint of Fanny, a little girl whose mother and friends run Chez Panisse.

The Good Housekeeping Illustrated Children's Cookbook. New York: Morrow Junior Books, 1997.

Good introduction, which includes information on all kitchen utensils, terms, etc.; simple, interesting recipes that use fresh ingredients for the most part; photographs.

A Good Soup Attracts Chairs, by Fran Osseo-Asare. Gretna, La.: Pelican Publishing Co., 1993.

"A first African cookbook for American kids"; good introduction, which explains African spices; interesting recipes.

Hasty Pudding, Johnnycakes, and Other Good Stuff, by Loretta Frances Ichord. Brookfield, Conn.: The Millbrook Press, 1998.

Simple recipes using fresh ingredients; includes modern, updated recipes along with the colonial

ones; includes a history of the foods of the different colonies, slaves, and Native Americans; beautiful colorful illustrations.

Kids Cook! by Sarah Williamson and Zachary Williamson. Charlotte, Vt.: Williamson Publishing, 1992.

"Fabulous food for the whole family"; simple, interesting recipes using fresh as well as canned foods (no emphasis on using fresh food); fun food, geared to kids; includes black and white drawings. Recipes written by kids.

Kids in the Kitchen, by Micah Pulleyn and Sarah Bracken. New York: Sterling Publishing Co., 1994.

One hundred delicious, fun, and healthy recipes to cook and bake; simple, wacky recipes (salad people, for example); more snacks than meals; all photographs from the seventies and not updated.

The Kids' Multicultural Cookbook, by Deanna F. Cook. Charlotte, Vt.: Williamson Publishing, 1995.

Simple, basic recipes from countries around the world, including rice, couscous, homemade pasta; explains where the food comes from and how and when it is traditionally eaten; includes ideas for parties and other activities; color photographs, including pictures of children around the world.

Leprechaun Cake and Other Tales, by Vonnie Winslow Crist. Baltimore: Vegetarian Resource Group, 1995.

A vegetarian story cookbook, including four fantasy tales and more than 40 recipes; simple recipes using fresh ingredients; black and white drawings.

The Little House Cookbook, by Barbara M. Walker. New York: Harper & Row, 1979.

Simple recipes using fresh ingredients; long, interesting explanations, including historical references and changes in food growth; beautiful illustrations.



Pretend Soup and Other Real Recipes, by Mollie Katzen and Ann Henderson. Berkeley, Calif.: Tricycle Press, 1994.

A cookbook for preschoolers and up; wholesome but fun recipes (green spaghetti, for example) using fresh ingredients; good explanations; simple layout with drawings of the recipes; gourmet.

Roald Dahl's Revolting Recipes, compiled by Josie Fison and Felicity Dahl. New York: Viking Press, 1994.

Recipes from Roald Dahl's stories, including explanations of which story and where in the story the recipes come from; crazy names and crazy food; uses fresh ingredients; great illustrations.

Baking

Knead It, Punch It, Bake It! by Judith and Evan Jones. Boston: Houghton Mifflin Co., 1998.

"The ultimate breadmaking book for parents and kids"; good recipes, detailed explanations; black and white sketches.

My First Baking Book, by Rena Coyle. New York: Workman Publishing Co., 1988.

Simple recipes; beautiful illustrations.

Gardening and Composting

The Children's Kitchen Garden, by Georgeanne and Ethel Brennan. Berkeley, Calif.: Ten Speed Press, 1997.

Includes basic gardening information; describes 18 types of vegetables and 13 herbs, with planting and cooking tips; includes seasonal recipes highlighting the foods grown at that season as well as other recipes for the entire year; photographs.

Dinner from Dirt, by Emily Scott and Catherine Duffy. Salt Lake City: Gibbs Smith Publisher, 1998.

"Ten meals kids can cook and grow"; for example, a salsa garden which includes growing tomatoes, cucumbers, and all the other ingredients to make salsa, with a recipe at the end; simple explanations; photographs.

Garden Crafts for Kids, by Diane Rhoades. New York: Sterling Publishing Co., 1995.

Good explanations of various aspects of gardening; includes creative ideas for garden design (for example, growing plants in an old shoe) as well as ideas for garden tools, storage, and so on.

Gardening Wizardry for Kids, by L. Patricia Kite. Hauppauge, N.Y.: Barron's Educational Series, 1995.

"Green thumb magic for the great indoors"; more than 300 indoor gardening projects and fascinating folklore; uses inexpensive materials available in any household; simple, well-explained activities.

Ready, Set, Grow, by Suzanne Frutig Bales. New York: Macmillan, 1996.

Instructions for creating gardens designed for kids; illustrated plant guide to no-hassle, quick-growing plants; craft and activity projects; information on beneficial bugs and planting tips; includes a guide to all the public gardens in the country.

Worms Eat My Garbage: A Children's Activity Book, by Mary Appelhof. Kalamazoo, Mich.: Flower Press, 1982.

Gives step-by-step directions for setting up and using a worm bin in the home or classroom.

Nature/Science

Be a Friend to Trees, by Patricia Lauber. New York: HarperCollins, 1994.

Explains why trees are important, how to help save a tree, and how to plant one.

Fall, by Maria Rius. Hauppauge, N.Y.: Barron's Educational Series, 1998.

One in a series about the seasons designed "to teach young children about the aspects of daily life"; includes activities and things to discuss about the season; explains the crops and seasonal foods.



PLANTS WE EAT Series, by Meredith S. Hughes.
Minneapolis: Lerner Publishing Group, 1998.

Buried Treasures: Roots and Tubers

Cool As a Cucumber; Hot As a Pepper: Fruit Vegetables

Flavor Foods: Spices and Herbs

Glorious Grasses: The Grains

Green Power: Leaf and Flower Vegetables

Spill the Beans and Pass the Peanuts:

Legumes

Stinky and Stringy: Stem and Bulb Vegetables

Historical and contemporary uses of human foods; includes botanical information as well as recipes. For middle school students.

Science Experiments You Can Eat, by Vicki Cobb.
New York: HarperCollins, 1994.

Fun activities geared to kids; includes experiments about the nature of different foods; for example, explores how eggs are used in the kitchen and the different uses of the yolk and the white; black and white illustrations.

Science with Plants, by Mike Unwin. Tulsa, Okla.: E D C Publishing, 1992.

Simple experiments, such as how to change the color of a leaf, how to tell the age of a tree, and why a seedling always grows the right way up.

What About Ladybugs? by Celia Godkin. San Francisco: Sierra Club Books for Children, 1998.

Vibrant, beautifully detailed illustrations in this simple story of one garden; introduces the important concept of the balance of nature.

Winter, by Nicola Baxter. New York: Children's Press, 1996.

One in the series of all the seasons; includes activities and things to discuss about the season.

Picture Books

Arianna and the Strawberry Tea, by Maria Falconer. Nashville: Ideals Children's Books, 1998.

The story of a young girl's request for strawberry tea and chocolate tarts that starts a new sensation at a hotel; includes a recipe.

Bread and Jam for Frances, by Russell Hoban.
New York: HarperCollins, 1993.

The tale of Frances who will not eat anything but bread and jam until that is all her mother feeds her.

Brother Eagle, Sister Sky, by Chief Seattle. New York: Dial Books, 1991.

A message from Chief Seattle to the children about preserving the earth for themselves and future generations.

The Carrot Seed, by Ruth Krauss. New York: HarperCollins, 1993.

The story of a boy who plants carrot seeds and waits for them to grow, although everyone tells him they will not.

Day of the Dead, by Tony Johnston. San Diego: Harcourt Brace & Co., 1997.

A book explaining the Mexican holiday and the special foods that are eaten.

The Earth and I, by Frank Asch. San Diego: Gulliver Books, 1994.

A story in which a young boy explains his friendship with the Earth.

Eating the Alphabet, by Lois Ehlert. San Diego: Harcourt Brace & Co., 1996.

The fruits and vegetables from A to Z.

Farm Days, by William Wegman. New York: Hyperion Books for Children, 1997.

A tale of a city boy going to visit his cousins on the farm and learning to garden.

The First Strawberries, by Joseph Bruchac. New York: Dial Books for Young Readers, 1993.

A Cherokee Indian tale of the first strawberries; teaches respect and friendship.

The Gardener, by Sarah Stewart and David Small. New York: Farrar, Straus, & Giroux, 2000.

The story of a young child moving to the city to live with her uncle and being able to re-create part of the country in her rooftop garden.

Giving Thanks, by Chief Jake Swamp. New York: Lee & Low Books, 1995.

A Native American good morning message encouraging us to live in peace with and give thanks to Mother Earth.

The Great Redwall Feast, by Brian Jacques. New York: Philomel Books, 1996.

A story of the Redwall animals who secretly prepare a feast for their beloved leader.

Have You Seen Trees? by Joanne Oppenheim. New York: Scholastic, 1995.

A book about varieties of trees and their changes through the seasons.

The Leaf Men and the Brave Good Bugs, by William Joyce. New York: Laura Geringer Books, 1996.

The tale of a dying garden needing to be rescued and good bugs trying to save the day.

Matzo Ball Moon, by Leslea Newman. New York: Clarion Books, 1998.

A holiday story about a family running out of matzo balls, finding one in an unexpected place, and rediscovering the meaning of Passover.

Midnight Farm, by Carly Simon. New York: Simon & Schuster Books for Young Readers, 1997.

Tells of two young boys who awaken to find the animals and vegetables on the farm having a midnight celebration.

Planting a Rainbow, by Lois Ehlert. San Diego: Harcourt Brace Jovanovich, 1988.

A colorful story of a mother's and child's flower garden and the bouquets that are made from it.

The Reason for a Flower, by Ruth Heller. New York: Grosset & Dunlap, 1983.

A book describing the cycle of growing from a flower to a fruit or a vegetable.

Red Leaf, Yellow Leaf, by Lois Ehlert. San Diego: Harcourt Brace Jovanovich, 1991.

The story of a friendship between a young child and a sugar maple tree; explains the parts of a tree and when and where to plant the tree.

Saturday Sancocho, by Leyla Torres. New York: Farrar, Straus, & Giroux, 1995.

The tale of a young girl making *sancocho*, a chicken stew, with her grandparents one Saturday, that requires some extra work to get the ingredients; includes a recipe.

Scarecrow, by Cynthia Rylant. San Diego: Harcourt Brace & Co., 1998.

Watching a garden grow from a scarecrow's point of view.

Stone Soup, by Marcia Brown. New York: Aladdin Books, 1986.

The classic tale of three soldiers seeking food and shelter who convince the town to make stone soup.

The Summer My Father Was Ten, by Pat Brisson. Honesdale, Pa.: Boyds Mills Press, 1998.

A young boy and an older man building a friendship through growing a garden together.

Sunflower House, by Eve Bunting. San Diego: Harcourt Brace & Co., 1996.

The story of a young boy planting a circle of sunflower seeds to grow into a playhouse and what happens when the sunflowers die.

The Tiny Seed, by Eric Carle. Saxonville, Mass.: Picture Book Studio, 1990.

The adventure of a tiny seed through the seasons.

Thunder Cake, by Patricia Polacco. New York: Philomel Books, 1990.

A story of a grandmother teaching her granddaughter not to be afraid of thunder through the distraction of making thunder cake; includes a recipe.

Tops & Bottoms, by Janet Stevens. San Diego: Harcourt Brace & Co., 1995.

A fable of Bear and Hare becoming business partners and growing vegetables to sell; Hare always ending up with the vegetables and Bear the inedible parts!



Tortillas and Lullabies, Tortillas y Cancioncitas, by Lynn Reiser. New York: HarperCollins Children's Book Group, 1998.

A book about family traditions and how they have changed yet have remained the same throughout the years.

A Tree Is Nice, by Janice May Udry. New York: Harper, 1956.

A story of the many reasons to love trees for their beauty and for their uses, such as for treehouses and places for shade.

Yoko, by Rosemary Wells. New York: Hyperion Books for Children, 1998.

A tale about Yoko being ridiculed for bringing sushi to school for lunch and finding a friend who shares her love of food.

Books for Older Children

All-of-a-Kind Family, by Sydney Taylor. New York: GRM Associates, 2000.

The story of a family of five young girls growing up in New York; includes references to Jewish foods.

Along Came a Dog, by Meindert DeJong. New York: HarperCollins Children's Book Group, 1980.

A tale of a dog coming to the farm and forming a friendship with the rooster and whether the farmer will let him stay.

... *And Now Miguel*, by Joseph Krumgold. Boston: Houghton Mifflin Co., 1992.

The story of a young boy attempting to prove to his family that he can go on the sheep drive this year, praying to San Ysidro, the saint for farmers everywhere, and getting his wish but with devastating consequences.

Arthur, for the Very First Time, by Patricia MacLachlan. New York: Harper & Row, 1980.

The adventures of Arthur going to stay on his uncle's farm and finding a whole new world of fun.

The Barn, by Avi. New York: Orchard Books, 1994.

The story of a boy and his siblings struggling to complete their father's dream of building a barn for their farm while their father is dying.

Breakaway, by Paul Yee. Toronto: Groundwood Books, 2000.

The story of a young boy growing up in the Depression, toiling on his family's farm, and trying to win a soccer scholarship.

Charlotte's Web, by E. B. White. New York: HarperCollins Children's Book Group, 1999.

The classic story of a young girl, her pig, and a spider's magic web.

The Children of Noisy Village, by Astrid Lindgren. New York: Puffin Books, 1988.

A year in the life of six Swedish children living on farms in the countryside.

The Cook's Family, by Laurence Yep. New York: Penguin Putnam Books for Young Readers, 1999.

The struggle of a young girl finding a place with the cook's family and redefining her place in her own family.

The Cookcamp, by Gary Paulsen. New York: Orchard Books, 1991.

The longings of a young boy for home after going to live with his grandmother at a cookcamp.

Fantastic Mr. Fox, by Roald Dahl. New York: Puffin Books, 1998.

A story of three farmers and the cunning Mr. Fox, who outwits all of them.

Gib Rides Home, by Zilpha Keatley Snyder. New York: Delacorte Press, 1998.

The story of a young boy who farms out as a laborer to help his family but also has a special ability to talk to horses.

The Haymeadow, by Gary Paulsen and others. New York: Delacorte Press, 1992.

The tale of John being given the job of tending the sheep in the haymeadow in summer.

Indian Captive, by Lois Lenski. New York: HarperCollins Children's Book Group, 1995.

The adventures of a young farm girl captured by native people, desperately trying to run away until the people are kind to her and teach her about the Earth, its plants, and its creatures.

Justin and the Best Biscuits in the World, by Mildred Pitts Walter. New York: Lothrop, Lee & Shepard, 1986.

The story of Justin at his grandfather's ranch, learning to mend fences, to catch fish and, most important, to make the best biscuits in the world.

Little Britches: Father and I Were Ranchers, by Ralph Moody. Lincoln: University of Nebraska Press, 1991.

The story of a young boy growing up on a Colorado ranch.

Mandy, by Julie Edwards. New York: HarperTrophy, 2001.

The adventures of Mandy, who escapes from an orphanage, finds a small, abandoned cottage, and makes it her special place by growing flowers and plants to keep it beautiful.

Marisol and Magdalena, by Veronica Chambers. New York: Jump at the Sun, 1998.

A young girl growing up in New York torn between her American life and her family's Panamanian traditions; includes references to Panamanian food, which the daughter helps to cook for her mother.

Miracles on Maple Hill, by Virginia Sorenson. San Diego: Harcourt Brace Jovanovich, 1990.

The story of a family in the country, where the seasons and nature are a large part of their lives.

Out of the Dust, by Karen Hesse. New York: Scholastic, 2000.

Told in blank verse; the tales of fifteen-year-old Billie Jo on the hardships of living on her family's wheat farm in Oklahoma during the Dust Bowl years of the Depression.

Popcorn Days and Buttermilk Nights, by Gary Paulsen. New York: Puffin Books, 1989.

The story of Carey, who is going crazy and getting into trouble in the city. He is sent to live with his uncle in the country.

Rabbit Hill, by Robert Lawson. New York: Puffin Books, 1977.

The tale of local animals wondering if the new folks moving in are folks with guns or planting folks.

Rebecca of Sunnybrook Farm, by Kate Douglas Wiggin. New York: William Morrow & Company, 1994.

The story of a young, vibrant girl growing up on a farm.

Roll of Thunder, Hear My Cry, by Mildred D. Taylor. New York: Phyllis Fogelman Books, 2001.

The story of a family, their connection to the land, and their fight to keep it.

Seedfolks, by Paul Fleischman. HarperCollins Children's Book Group, 1999.

A tale of a Vietnamese girl who plants a seed in a trash-filled, inner-city lot. One by one, she draws people of varying ages and backgrounds into creating a community garden and, in the process, transforming themselves.

Shades of Gray, by Carolyn Reeder. New York: Macmillan, 1989.

The story of Will who, after the Civil War, is forced to stay with his traitor uncle, a Confederate, and learns to grow food and hunt and discovers the truth of the past.

Sing Down the Moon, by Scott O'Dell. Santa Barbara, Calif.: Cornerstone Books, 1989.

The story of a young Navajo girl who is captured by the Spaniards to be their slave; includes references to both Spanish and Native American food.



Sour Land, by William H. Armstrong. New York: Harper & Row, 1971.

The story of a friendship that forms between a white family and the black teacher who moves next door and helps them save their farm and about the town that does not approve.

Strawberry Girl, by Lois Lenski. New York: HarperCollins Children's Book Group, 1995.

The struggles of a young girl and her family moving to Florida and starting their farm.

Sugar Lump, The Orphan Calf, by Lynn Sheffield Simmons. Argyle, Tex.: Argyle Books, 1994.

The tale of a young girl raising an orphan calf. Will she have to give it up?

Thimble Summer, by Elizabeth Enright. New York: Henry Holt Books for Young Readers, 1990.

The story of one girl's magical summer on a Wisconsin farm.

Zeely, by Virginia Hamilton. New York: Aladdin Books, 1986.

A story of the adventures of Elizabeth and the summer she spent on her uncle's farm.

Poetry

Animal Crackers, by Jane Dyer. Boston: Little, Brown & Company, 1996.

A collection of poems, pictures, and lullabies for young children, including sections on food, nature, and animals.

A Child's Seasonal Treasury, by Betty Jones. Berkeley, Calif.: Tricycle Press, 1996.

A compilation of songs, verses, activities, and recipes for children to read about and do in each season.

The Sky Is Always in the Sky, by Karla Kuskin. New York: Laura Geringer Books, 1998.

A fun collection of poems about "nature, food, and you."