

Chapter 4

Fruits



Fruits are an important component of a healthy, well-balanced diet. Most Americans do not eat enough fruit or select a wide enough variety of fruits. As a professional who can guide individuals in making healthier lifestyle choices, it is important for you to role model positive behavior by eating a wide variety of fruits and promoting fruit consumption.

In order to be effective in encouraging fruit intake among your students, clients, and family members, you will need to be knowledgeable about fruit availability, nutrient composition, and cost as well as how to select, purchase, prepare, incorporate, and utilize fruits into a healthy diet that your consumers and clients will enjoy.

 THINK ABOUT IT

- ◆ List a few fruits that you eat regularly and some details about each fruit such as the nutrient composition and how to select/purchase it.

- ◆ List 3 things you would like to learn about fruits or 3 questions you have relating to fruits.

1.

2.

3.

LAB ASSIGNMENT:

Oranges, Apples & Prunes

There are so many different types and varieties of fruits that it is impossible to work with all fruits in one laboratory period. This laboratory will focus on principles of fruit science and preparation using oranges, apples, and prunes (dried plums).

Overview:

All students will view demonstrations of proper techniques for preparing oranges and other fruits as selected by the instructor. Two groups will begin by preparing stewed prunes. All students will prepare an apple crisp and an enzymatic browning observation with their assigned apple variety. All students will peel, segment, and taste organic and nonorganic oranges. Students will taste all products and complete evaluations.

Kitchen 1: Apple crisp: Red Delicious apples
Organic oranges

Kitchen 2: Apple crisp: Red Delicious apples
Organic oranges

Kitchen 3: Apple crisp: Granny Smith apples
Organic oranges

Kitchen 4: Apple crisp: Granny Smith apples
Organic oranges

Kitchen 5: Apple crisp: Rome apples
Nonorganic oranges

Kitchen 6: Apple crisp: Rome apples
Nonorganic oranges

Kitchen 7: Stewed prunes: Soaked overnight*
Nonorganic oranges
Apple crisp, Gala apples

Kitchen 8: Stewed prunes: Not soaked*
Nonorganic oranges
Apple crisp, Gala apples

* Note for Kitchens 7 & 8: In order to complete your assignments within the allotted time, you will need to begin preparing the prunes before preparing the apple crisp.

Evaluation Tools:

- Evaluation of Apple Crisps and Prunes
- Evaluation of Raw Apples
- Evaluation of Raw Oranges

Directions:

1. Always begin by washing your hands and thoroughly cleaning/sanitizing work surfaces.
2. Gather ingredients needed for assigned fruit recipes.
3. Complete all assigned recipes.
4. While waiting for the apple crisps to bake and the prunes to cook, prepare your apples for an enzymatic browning observation. Observe and taste all apple varieties. Complete the “Evaluation of Raw Apples” tool.
5. Peel and section oranges as demonstrated by your lab instructor. Complete the “Evaluation of Raw Oranges” tool.
6. Read “Fruit Science” and “Fruit Tips for Consumers.” Complete the “Fruit Questions.”
7. When all apple crisps and prunes are ready, observe and taste each variety. Complete the “Evaluation of Apple Crisps and Prunes” tool.
8. Clean your work station and check out before leaving.

RECIPES:

Apple Crisp and Stewed Prunes

Stewed Prunes, Soaked Overnight

Ingredients:

16 pre-soaked prunes
1/2 cup sugar

Enough water to cover fruit

Method:

1. Place soaked prunes in a medium saucepan and add enough cold water to cover the fruit. Cover the saucepan with a lid and simmer for 30 minutes. Check prunes periodically and add more water, if necessary, to cover the prunes.
2. Remove the lid from the saucepan. Add the sugar.
3. After adding the sugar, simmer uncovered for 3 minutes.

Stewed Prunes, Not Soaked

Ingredients:

16 prunes
1/2 cup sugar

Enough water to cover fruit

Method:

1. Wash prunes in warm tap water. Lift the fruit pieces out of the wash water.
2. Place prunes in a medium saucepan and add enough cold water to cover the fruit.
3. Heat over high heat until water begins to boil. Turn off heat. Cover with a lid and allow the pan to sit on the warm burner for 25 minutes.
4. Simmer the fruit on low heat for 40 minutes. Keep the lid on the saucepan. Check prunes periodically and add more water, if necessary, to cover the prunes.
5. Remove the lid from the saucepan. Add the sugar.
6. After adding the sugar, simmer uncovered for 3 minutes.

Apple Crisp

Ingredients:

2 cups apples, pared, cored, thinly sliced	2 tablespoons sugar, granulated
4 tablespoons, all-purpose flour, divided	Pinch salt
1/4 teaspoon nutmeg	1/4 teaspoon cinnamon
1/4 cup brown sugar, packed	1/4 cup oatmeal, quick cooking
2 tablespoons margarine, soft	Additional margarine to grease pan

Method:

1. Preheat oven to 375° Fahrenheit.
2. Lightly grease the bottom of an 8x8-inch baking dish.
3. Prepare your assigned apples. Begin by washing them. Next, pare or trim/peel the skin off. Then, use a corer to remove the cores or quarter the apples and cut the core out of the center of each apple piece. Thinly slice the apples. Finally, measure two cups of apples.
4. In a medium bowl, combine the granulated sugar, 2 tablespoons flour, salt, nutmeg, and cinnamon. Add the apples and toss. Place in the greased baking dish.
5. In a small bowl, combine the brown sugar, oatmeal, and 2 tablespoons flour. Using a pastry blender, cut the softened margarine into the other ingredients until thoroughly blended.
6. Sprinkle the oatmeal mixture over the apples.
7. Bake for 30 to 35 minutes.

Apple Enzymatic Browning

Ingredients:

2 whole apples

Method:

1. Wash 2 of your assigned apples. Set one apple aside.
2. Core the other apple and cut it into 16 slices.
3. Place the slices on a white plate and set aside for 15 minutes.
4. After 15 minutes, core the second apple and cut it into 16 slices. Place slices on a second white plate. Be sure to label each plate with the apple variety and time allowed for browning.
5. Announce to the class that your variety is ready to be observed and tasted. Be sure to feel, smell, and taste each apple. Be aware of how the apple feels in your mouth (crunchy, mushy, etc.). Use descriptive words/adjectives to describe the color, texture, and flavor.

Supreming Oranges

Ingredients:

1 whole orange

Method:

1. Observe the supreming demonstration and then supreme your assigned orange. Taste slices of organic and nonorganic oranges.

EVALUATION OF RAW APPLES

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent).
2. Provide comments/descriptions to justify the numerical score.

VARIETY	COLOR/ APPEARANCE	TEXTURE/ TENDERNESS	FLAVOR	OVERALL QUALITY
FRESH RED DELICIOUS APPLES				
FRESH GRANNY SMITH APPLES				
FRESH ROME APPLES				
FRESH GALA APPLES				
BROWNING RED DELICIOUS APPLES				
BROWNING GRANNY SMITH APPLES				
BROWNING ROME APPLES				
BROWNING GALA APPLES				

EVALUATION OF RAW ORANGES

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify the numerical score.

VARIETY	COLOR/ APPEARANCE	TEXTURE/ TENDERNESS	FLAVOR	OVERALL QUALITY
ORGANIC ORANGE				
NONORGANIC ORANGE				

EVALUATION OF APPLE CRISPS AND PRUNES

1. Taste each variation and place the numerical score for each characteristic in the upper left hand corner of each box. (Score System: 1=very poor; 2=poor; 3=fair; 4=medium; 5=good; 6=very good; 7=excellent)
2. Provide comments/descriptions to justify the numerical score.

VARIETY	COLOR/ APPEARANCE	CONSISTENCY/ TEXTURE	TENDERNESS	FLAVOR	OVERALL QUALITY
APPLE CRISP RED DELICIOUS					
APPLE CRISP GRANNY SMITH					
APPLE CRISP ROME					
APPLE CRISP GALA					
PRUNES SOAKED					
PRUNES NOT SOAKED					

LEARN MORE:

Fruit Science

- ◆ Botanically, fruits are structures that develop from the ovaries and associated parts of fruit flowers. Their purpose is to protect and aid in distributing seeds. The sweetness of ripe fruit attracts animals, which eat the seeds and then spread the seeds to new locations as the seeds pass through their digestive tracts.
- ◆ Botanically, any plant structure that holds seeds is considered a fruit. Tomatoes, peppers, and pumpkins are botanically the fruits of a flower. However, they are not as sweet as other fruits and they are prepared in the kitchen in ways similar to that of vegetables. Therefore, they are classified as vegetables rather than fruits based on their common usage. Sweeter botanical fruits, such as apples, peaches, and cantaloupe are classified as fruits.
- ◆ Fruits take many forms depending on how many flowers and which parts of the flowers are involved in their development. They are classified into three major types:
 - **Simple Fruit:** Fruit developed from a single ovary from one flower. Examples: apples, peaches, oranges
 - **Aggregate Fruit:** Fruit developed from multiple ovaries from one flower. Examples: raspberries, blackberries
 - **Multiple Fruit:** Fruit developed from a group of flowers. Example: pineapple
- ◆ Simple fruits are further classified based upon how their seeds are organized.
 - **Pomes:** Simple fruit with a somewhat leathery core which encases multiple seeds. The core is surrounded by a thick fleshy layer. Examples: apples, pears
 - **Drupes:** Simple fruit with a hard casing (the “stone”) which holds a single seed. The stone is surrounded by a thick fleshy layer. Examples: cherries, peaches
 - **Berries:** Fruit commonly defined as fleshy fruit with many seeds embedded throughout (examples: strawberry, raspberry, blackberry). However, the botanical definition of berries is a simple fruit where the entire inside of the fruit is fleshy except for the outer skin (examples: melons, citrus fruit, grapes, bananas). Botanically, berries are classified into three types:
 - » **True berries:** Berries with thin skins (Examples: grapes and tomatoes)
 - » **Pepo berries:** Berries with thick rinds (Example: melons)
 - » **Hesperidium:** Berries with leathery skins (Examples: citrus fruits and bananas)

- ◆ Cell walls give fruits structure and rigidity. Cell walls can be pictured as bundles of **cellulose** fibers embedded in a gel of **hemicellulose**, with **pectin** acting as cement to hold cells together. Cooking softens fruit by softening the cellulose, breaking down the hemicellulose, and dissolving the pectin.
- ◆ **Osmosis** plays an important role in fruit cookery. Osmosis is the tendency of water to move across cell membranes toward areas of higher solute concentration in order to equalize the concentration of dissolved particles on either side. This is why soaking dried fruit in plain water causes it to rehydrate. If you add sugar to the soaking water, the concentration of the water changes and interferes with the rehydration.
- ◆ Cut fruits turn brown in a process called **oxidative enzymatic browning**. This occurs when phenols, substances in the fruit, are exposed to oxygen in the air. The phenols and oxygen react to produce brown compounds called “melanin.” This reaction is catalyzed by phenolase enzymes, which work best under fairly neutral pH (pH=7) conditions. Apples, peaches, and bananas contain high levels of phenols and brown easily.
- ◆ There are several strategies used to minimize fruit browning:
 - **Avoid exposure to oxygen:** Hold sliced fruit under water or coat with sugar/syrup.
 - **Lower the pH so that the phenolase enzyme activity is reduced:** Coat sliced fruit with kitchen acids such as lemon juice or commercially-prepared ascorbic acid.
 - **Add a substance that reacts with oxygen faster than the phenol:** The vitamin C (ascorbic acid) in lemon juice is quickly oxidized, making it a great antioxidant.
 - **Destroy the enzyme:** Heat destroys enzymes, which is why fruit is often blanched before freezing by briefly immersing it in boiling water.

Fruit Tips for Consumers

- ◆ Eat 2 cups of fruits every day (based on a 2,000 kilocalorie diet).
- ◆ A half cup equals a medium apple, pear, banana, or orange; a half of a grapefruit or a wedge of melon; 1/2 cup of berries; 1/2 cup canned fruit; or 1/4 cup dried fruit.
- ◆ 1/2 cup of 100% fruit juice counts as a half cup of fruit too. Limit juice intake due to its high sugar content and lack of dietary fiber as compared to what is found in whole fruit.
- ◆ Fruits contain many vitamins and minerals, are low in fat and sodium, and provide plenty of potassium and dietary fiber. Try to eat the skin, whenever possible, because many vitamins are concentrated in the thin layer just under the skin and the skin is a good source of **insoluble fibers**.
- ◆ Fruits can make a great tasting, healthy dessert when prepared properly. Try serving a fruit salad, fruit-kabobs, fruit and yogurt parfaits, or fresh fruit with low-fat yogurt dipping sauce. Other fruit desserts including pies, rhubarb crunch, and apple crisp can be made healthier by cutting the sugar used in recipes by one-third and/or replacing half the flour with whole wheat flour.
- ◆ Try to consume fresh or frozen fruits when possible. Look for frozen fruits without added sugar. Pick up frozen fruits at the end of your shopping trip, take them home in an insulated bag, and place them in the freezer immediately.
- ◆ Selecting high-quality fresh fruit takes a little practice.
- ◆ As the popularity and availability of **organic** produce continues to grow, consumers need to balance the nutritional, environmental, and financial aspects of buying organic foods. Many environmental benefits are associated with buying organic foods, but these foods may be more expensive. To minimize cost, try buying organic foods that are in season and grown locally.
- ◆ Many fruits continue ripening after harvest. To speed ripening, place them on the kitchen counter in a paper bag with a banana or apple – these fruits give off **ethylene gas**, a natural ripening hormone of mature fruit. Check fruits daily and refrigerate when ripe.

- ◆ Always wash fresh fruits thoroughly just before using in a recipe or eating them. Fresh fruit will keep better if stored unwashed. Buying expensive produce washes is unnecessary. For thick-skinned fruit like watermelon, wash using a clean vegetable brush. For delicate fruit, place in a colander and gently spray with water. Even if you plan to peel the fruit (banana or orange, for instance) before eating, you should wash it because substances on the outside can be transferred to the inside when cutting or peeling. Dry the fruit with a clean cloth towel or paper towel to further remove germs and pesticide residues.
- ◆ When buying canned fruit, choose fruit canned in 100% fruit juice or water rather than syrup. They contain the same amount of nutrients with fewer calories.
- ◆ For canned fruit packed in syrup, drain and rinse it with water before eating.

Fruit Questions

1. Which apple varieties are better for cooking and which ones are better for eating raw?

a. Do you agree with this? Why or why not.

2. You plan to make 3 apple pies and decide to pare, core, and slice apples for all three pies at the same time. When you finish, you notice that the apples for the first pie are already brown. Are you concerned that your apples are turning brown? Why or why not?

3. Explain what causes fruits to brown.

4. Which apple variety(s) appear to be impacted the most by enzymatic browning?

Fruit Teacher Tips

Overview

This lab experience is short compared to the other labs and can be combined with another lab or special project.

- ◆ The students will compare taste, flavor, color, and texture of different varieties of the same fruit.
- ◆ The students will learn about enzymatic browning and ways to control this reaction.
- ◆ The students will study ways to make fruit more appealing to children and adults who do not eat fruit.
- ◆ The students may be introduced to equipment they have not used previously such as blenders, microwave (for something other than popcorn or warming frozen food), food processors, mandolin, and a juicer (optional).

Lab Management

Demonstrations

- ◆ This is a good opportunity to demonstrate and review knife selection, care, storage, and safety.
- ◆ This is a good time to demonstrate ways to peel fruits to minimize waste.
- ◆ If available, demonstrate the use of a mandolin to slice fruit.
- ◆ If available, demonstrate the use of food processor blades or a mandolin to slice or grate fruit. Discuss the methods for slicing fruit and how it impacts the final appearance and mouthfeel of a product.
- ◆ Demonstrate how to zest an orange. Discuss terms like essential oils and pith. Adding the zest of a lemon, lime, or an orange to a recipe is one way of providing flavor when salt is removed.
- ◆ Identify and demonstrate what a pastry blender is and how to use it before students start the lab.

Time Management

- ◆ The day before this lab, rehydrate half of your prunes in water and refrigerate.

- ◆ Apples for the apple crisps need to be peeled. Students can use a vegetable peeler to do this. Inform groups that are making the apple crisps that slices need to be uniform in size. Specify how apples should be cut.

Sensory Evaluation

- ◆ Instruct the students on how to display and when to evaluate the products. As time allows, a student from each kitchen should comment about the preparation of the dish and the final product.
- ◆ Evaluate at the same time, side by side: all raw apples; all raw oranges; all apple crisps; and all prunes.

Nutrition Points for Discussion:

- ◆ The Dietary Guidelines for Americans recommend that all Americans eat more fruits because they contain nutrients that are typically under consumed including folate, magnesium, potassium, dietary fiber, vitamins A, C, and K.
- ◆ People who consume more fruits have lower risks for chronic conditions including some cancers, heart disease, and obesity.
- ◆ Eating approaches like the Mediterranean Diet and the DASH (Dietary Approaches to Stop Hypertension) Diet include a plate that has 2 ½ cups of fruits and vegetables.
- ◆ Review topics like how to incorporate fruit (fresh, frozen, canned, and dried) into your client's diet and how to wash fresh fruit. No special washes are needed.
- ◆ Discuss the differences between conventional and organic fruits. What are the costs and the benefits? Provide the students with the price of the conventional and the organic produce.
- ◆ Discuss the function of fat in each of the recipes where it is used.
 - What is the function of margarine in the Apple Crisp? Could the amount be reduced or eliminated?
- ◆ Salt has either been eliminated from the traditional recipe or listed as optional. Discuss with the students the function of salt in these recipes. What other spices could be used if the students find them lacking in flavor?
- ◆ Discuss ways to enhance the enjoyment of eating fruit without adding fat or sugar.

◆ Select a nutrition tip for each of the recipes. For example:

- The prune is often valued for its effect on laxation. Is this a myth or a fact?
- For the apple comparisons: does enzymatic browning affect the nutrient value of the apple? Do all apple varieties have the same nutrient profile?
- Is it a good idea to promote desserts, even if they are a vehicle for fruit?
- Do organic and conventional oranges differ in their nutrient profile? Cost?

SHOPPING LIST: (8 SECTIONS)

Item	Utilized Unit/Lab Section	Purchased Unit
Oranges	4	4
Organic oranges	4	4
Red or Yellow Delicious Apples	5	5
Granny Smith Apples	6	6
Rome Apples	6	6
Gala Apples	6	6
Prunes	32	1 cont.
Sugar	2 cups	1 sml. bag
Flour	2 cups	1 sml. bag
Salt	8 pinches	1 cont.
Brown Sugar	2 cups	1 bag
Margarine	1 cup	1 box
Nutmeg	2 tsp.	1 cont.
Cinnamon	2 tsp.	1 cont.
Oatmeal, quick cooking	2 cups	1 cont.