

SIMPLY GOOD: APPLES

INTRODUCTION

Growing fruit trees in the school garden gives students a chance to observe perennial, woody plants that live and produce a harvest for many years. Unlike annual vegetables that produce their harvest in one growing season, it may take 4 or 5 years after planting before your young gardeners are able to begin picking apples. However the wide array of educational opportunities these trees offer makes it well worth the investment. Apples are one of the fruit trees you may want to consider planting in your school "orchard" since there are thousands of varieties of apple trees adapted to different growing conditions in all 50 states.

One of the lessons offered by growing apple trees is an opportunity for in-depth study of pollination, showcasing the important relationship between plants and pollinators. All fruit trees rely on pollinators like honeybees to transfer pollen from flower to flower. In the case of apples, most varieties are not self-pollinating, so these pollinators must also move the pollen from flowers of one variety of apple tree to the flowers of another variety of apple tree. Since all the individuals of a particular variety or cultivar have the same genetic makeup (all 'Delicious' apples are genetically identical, for example), two plants of the same variety cannot pollinate each other. Therefore, when you plant apple trees, you must plant at least 2 different varieties of trees. Further more, you must make sure that both of the chosen varieties bloom at the same time and are planted within 100 feet of each other so that pollinators can successfully complete the transfer of pollen.

FUN FACT:

According to the U.S. Apple Association, 2,500 varieties of apples are grown throughout the U.S. The top 15 varieties that make up 90% of commercial production include Braeburn, Cortland, Empire, Fuji, Gala, Ginger Gold, Golden Delicious, Granny Smith, Honeycrisp, Idared, Jonagold, Jonathon, McIntosh, Red Delicious, and Rome. The top apple producing states are Washington, New York, Michigan, Pennsylvania, California, and Virginia.

Nutrition Facts

Serving Size 1 large apple (242g)

Amount Per Serving

Calories 130

Calories from Fat 0

% Daily Value*

Total Fat 0g

0%

Saturated Fat 0g

0%

Trans Fat 0g

0%

Cholesterol 0mg

0%

Sodium 0mg

0%

Total Carbohydrate 34g

11%

Dietary Fiber 5g

20%

Sugars 25g

Protein 1g

Vitamin A 2%

Vitamin C 8%

Calcium 2%

Iron 2%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories	2,000	2,500
Total Fat	Less Than	65g	80g	
Saturated Fat	Less Than	20g	25g	
Cholesterol	Less Than	300mg	300mg	
Sodium	Less Than	2,400mg	2,400mg	
Total Carbohydrate		300g	375g	
Dietary Fiber		25g	30g	

Calories per gram:

Fat 9 Carbohydrate 4 Protein 4



Apple trees also provide an opportunity to observe the importance of weather on plant life cycles. As a way to keep plants from flowering and producing fruit too early in the spring with the risk of damage from freezing temperatures, apple flowers trees must experience a minimum number of chill hours (hours where the temperature is between 32 degrees F and 45 degrees F) to break their winter dormancy and bloom. Different varieties of apples have different chill hour requirements ranging from needing 250 to 1700 chill hours. So if you plant a tree with a high chill hour requirement too far south, even though it may be healthy otherwise, it will never bloom and set fruit because it will not be able to experience the needed chill hours.

Finally, growing apple trees allows you to explore the horticultural technique of grafting. Since apple seeds are the product of two different varieties of trees, growers must rely on asexual propagation to produce trees of the same variety. Grafting is the process of connecting two different plants so they grow as one. All grafts are composed of two parts: the detached part of one plant, called the scion, which becomes the flowering and fruiting top part of the plant; and the rooted and growing part of another plant, called the rootstock. The point at which the rootstock and scion are joined is called the graft union; it looks like a small bump on the trunk. One of the advantages of grafting is that it combines attributes that don't naturally occur in a single plant. So, for instance the scion you choose will determine the characteristics of the fruit that is grown, while the rootstock you choose can be chosen to offer benefits of disease resistance and will also determine the overall size of the adult tree (dwarf, semi-dwarf or standard).

ORIGIN AND BRIEF HISTORY

Believed to be the oldest cultivated fruit tree, fossil records indicate the predecessors of our modern day apple tree grew in the Caucasus Mountains of Asia and Eastern Europe in prehistoric times. Apples were prized by the Romans, who planted them in orchards across Europe. Apples arrived in the U.S. in the early 1800's and were actively planted throughout the Midwest by John Chapman, better known as Johnny Appleseed. Apples were a staple in the diets of colonists and early Americans because they were one of the few fruits that could be saved into the winter months by being placed in root cellars or sliced and dried.

FUN FACT:

As reported by the University of Illinois Extension, the largest apple ever picked weighed three pounds.



PLANTING

PLANNING

- Contact your local Extension office to find a list of apple tree varieties recommended for your area.
- Choose at least two different varieties with similar bloom times.
- Buy dormant, bare-root, 1-year-old trees, if possible.
- Decide if you want to plant dwarf, semi-dwarf, or standard sized trees. Rootstock choice determines mature size. Dwarf trees grow to be 8 to 12 feet tall and just as wide; semi-dwarf trees grow to be 12 to 18 feet tall and wide; and standard trees grow to be 18 to 22 feet tall and wide.

PREPARATION

- Choose a site with full sun, moderate fertility, and good air circulation and water drainage. Apples will tolerate a wide range of soil types and fertility can be improved, but poor drainage is almost impossible to correct.

PLANTING

- Spring planting is recommended in central and northern areas. Where fall and winter weather is generally mild and moist, fall planting can be successful.
- Dig a hole a foot wider and a foot deeper than the root ball, then partially fill it with topsoil or compost. Space standard trees 30 to 35 feet apart, semi-dwarfs 20 to 25 feet apart, and dwarfs 15 to 20 feet apart. Insert a stake on the downwind side of dwarf and semi-dwarf sized trees for support. Support is not essential for standard-sized trees, but it is still a good idea for the first few years.
- Place your tree in the hole and spread the roots carefully. Make sure that the graft union (the small swelling near the base of the trunk) remains at least 1 inch above ground, or the upper variety will take root and override the desired influence of the rootstock.
- Before you fill the hole, place a mouse guard around the trunk to extend about 10 inches or so above the ground.
- Water and mulch young trees right after planting.

CARE

- Water young trees regularly, especially those on semi-dwarfing or dwarfing rootstocks, to ensure that the root system becomes well established.
- Renew the mulch periodically, but pull it away from the tree in the fall so mice don't nest over the winter and eat the bark.

- Apple trees need regular pruning. Begin training trees to their permanent framework in the first season. In the early years of growth, it's important to create a strong framework of scaffold branches because apples can bear heavy crops year after year. Train dwarf apple trees to the central leader system. Semi-dwarfing trees can be trained to a central leader shape, but are more easily trained to a modified leader system. Standard trees should also be trained to a modified leader.

PESTS

- Unfortunately, apple trees are the target of many insect and diseases. When choosing your apple varieties, make sure to look for trees that were selected for their resistance to diseases such as apple scab, cedar-apple rust, and fire blight.
- Try to control other pests such as scales, mites, and aphids by encouraging beneficial parasite and predator populations. For example, around your apple trees you could plant perennial flowers attractive to these beneficial insects, such as purple coneflower, to provide food and shelter for ladybugs, lacewings, and parasitic wasps from early spring until late fall.
- Other organic pest controls are available, but make sure to carefully read all labels, get approval from school administrators, and follow instructions when using them.

HARVESTING

- It may take 4 to 5 years before your trees produce fruit to harvest.
- The harvest season ranges from midsummer to late fall, depending on the variety. Most apples are ready to pick when they separate easily from the tree. Another indicator is the color of seeds in the core - when they turn dark brown, the apples are ready.
- To avoid pulling out the stem when you harvest, cup the apple in your hand, tilt it upward, and twist to separate it from the spur at the point of attachment.
- Homegrown apples can be kept in a refrigerator for 6-8 weeks or dried.



LESSON IDEAS

UNDERSTANDING THE SEASONS

Modern day transportation allowing for the importing and exporting of fresh fruit has resulted in the availability of common fruits year round at most grocery stores. Students may be surprised to learn the harvesting of fruit is closely tied to the seasons. Invite farmers from your community to visit the classroom and talk to students about the fruits grown locally and when they are harvested. Create a chart showing the seasonal availability of different fruits and vegetables. Research the origins of the fruits available at your grocery stores at different times of the year.

POLLINATORS

Apple tree flowers are attractive and fragrant not for our benefit, but to attract insects (known as pollinators) who visit the flowers to collect nourishing nectar and pollen, and in the process move the pollen found on the stamens (male plant parts) to the pistils (female plant parts) of other flowers. Without proper pollination, flowers will not develop into fruits and produce seeds. As a class, research pollination and learn what attracts pollinators to your garden. Take time to observe pollinators at work in your garden and track what you see. If there is little pollinator activity, you may want to consider some adding some pollinator attracting plants to your beds (see Creating a Pollinator Garden: <http://www.kidsgardening.org/classroom-projects/creating-pollinator-garden>).

VARIETY COMPARISONS

All orchard apple trees share the same scientific classification (genus and species) of *Malus domestica*. However, when we go to buy an apple tree we usually choose it by its variety name, such as McIntosh or Empire. (The full scientific name is written *Malus domestica* 'McIntosh', with the variety name in single quotes.) A variety (or more properly, cultivar, which comes from "cultivated variety") is a plant that has been selected by humans for specific characteristics and propagated vegetatively, using grafting, cuttings, or tissue culture to keep plants genetically identical and maintain those desired characteristics. Apple breeders select for a wide range of characteristics such as fruit color, taste, ripening date, disease resistance, and winter hardiness. There are over 7,500 different apple varieties worldwide, each with a unique set of characteristics. This wealth of choices makes it easier for gardeners to find the plants that will perform well in their garden or produce fruits that best meet their needs. Some of the ways varieties may differ include:

- Physical characteristics (e.g., 'Red Delicious' apples produce red fruit and 'Golden Delicious' apples produce yellow fruit)
- Tolerance for different growing conditions (e.g., 'Dorsett Golden' apples only need 100 chill hours to produce fruit, but 'Granny Smith' apples need 600 chill hours)
- Harvest time ('Ginger Gold' apples ripen five weeks earlier than most other varieties, while 'Gold Rush' is a late-ripening apple)

Bring in a selection of apples of different varieties. Most grocery stores will have 5 to 10 different varieties available at any time. Compare the physical characteristics of each and then host a taste test. Ask students to vote on their favorite variety. Advanced students can also research the chill hours and harvest time and determine which would be the best to grow in your area.

APPLE SAMPLING EVENT

Prepare the Bring Home the Fun Recipe with your class. By demonstrating preparation methods and sampling the final product in the classroom, students will be ready to share the recipe with their family.



FUN FACT:

Since most apple trees cannot self-pollinate, planting apple seeds will not result in trees that are identical to either parent plant.

SIMPLY GOOD: BRING HOME THE FUN WITH APPLES

Growing apple trees requires a fair amount of patience and care, but if you have the space for at least a couple of trees, the reward of picking apples from your own garden is worth the effort. You will need a site with full sun, moderate fertility, and good air circulation and water drainage. With thousands of varieties available, the selection process may be a bit overwhelming. Contact your local Extension office for a list of recommended varieties for your area.

If growing your own apple trees seems overly ambitious for your gardening efforts, check to see if there are any apple orchards in your area and take a family trip during harvest time so your kids can see how apples are grown and taste them at their peak.

Apples are one of the first foods introduced into a child's diet and are a favorite fruit for many. Apples are easy to clean. Remove the stems and leaves, if present, twisting rather than cutting the stem to get all of it out of the fruit. Soak for 2-3 minutes in cold water and a produce wash, using the manufacturer's directions. Dry the apples with a clean cloth.

If you can, avoid peeling apples. Doing so doesn't negate their health benefits, but does significantly reduce fiber and vitamins A and C gained from the fruit. Try this recipe for a raw 'caramel' dip with no refined sugar for a special snack. As mentioned above, it's hardly necessary to make apples more appealing, but this might spark your students' culinary creativity and a healthier alternative to the highly processed caramels that are often used in this raw-apple favorite.



Raw Caramel Dip

Serving Size: 2 Tbsp per 1/2 Apple, Makes 56 Servings

25 apples or 1/2 apple per student
4 cups dates, pitted
3 cups avocado oil or other rich, flavorless oil such as sunflower,
canola, or safflower
1 tsp ground cinnamon
1 tsp salt
Water, as needed

1. Core the apples using a coring tool or paring knife and cut into wedges.
2. Blend dates, oil, cinnamon and salt together in a blender or food processor and add water until a smooth, liquid consistency results.
3. Serve in portion cups for dipping, with apple wedges.

