Chapter 26

Heathy Gardener

**Learning Objectives**

1. Relate the health benefits from eating home grown fruits and vegetables
2. Promote the benefits of gardening for a family’s physical, mental and spiritual health
3. Construct developmentally appropriate children’s activities to help stimulate a lifelong interest in gardening
4. Organize effective activities to demonstrate and teach sustainable gardening activities for diverse audiences.
5. Present various ways Master Gardeners can educate the public to protect themselves while gardening outdoors.
Healthy Gardener

Within the landscape of our daily lives, we experience the wonder, variety and beauty of a wide assortment of plants. As we plant and care for these plants throughout the year, we are exercising our minds and bodies in the process. In return, these plants provide fruit, beauty, fragrance, color and a peaceful retreat. To really thrive, plants need us and we need plants. This chapter focuses on the holistic benefits of gardening, how to successfully garden with children and how to stay healthy when working outdoors.

Gardening improves the mind: By offering a retreat that stimulates all the senses and soothes the mind, gardening improves the mind. A garden requires learning, reading, documentation, planning ahead for each season’s crop, experimentation for best results and problem solving. The icing on the cake is the satisfaction and enhanced health benefits of reaping and harvesting what has been sown.

Gardening improves the body: Digging, pruning, tilling, bending, walking and reaping provides regular exercise that burns calories and uses every muscle in the body. The act of gardening also provides a gardener with healthy foods rich in vitamins and nutrition.

Gardening can involve the whole family: Because it offers something for every age and ability level, gardening can involve the whole family. It provides for meaningful sharing and communication within family and community, and it promotes lifelong habits of self-sufficiency while fostering a respect for the environment, and an understanding of, and desire for, a healthier lifestyle.

Gardening can provide an extra outside room: Gardens can become a retreat from our world of high technology, sensory overload, and noise. It can grow into an oasis of green, a place to meditate and reconnect with nature by providing a habitat for birds, butterflies and wildlife.

Gardening improves the environment: By decreasing air pollution as plants absorb excess carbon, a component of the smog that impairs our breathing, gardening improves the environment. Gardens shade and insulate our homes and outdoor spaces, decrease our consumption of energy and lower heating and cooling demands. They help control water polluting run-off. And finally, gardens increase the value of our surroundings as they enrich our lives with the bounty of wholesome foods and landscapes of color, shape, fragrance and texture.

Eating Healthy Garden Foods

The food choices that are made today affect our future health. The Dietary Guidelines suggest that one should, “eat a variety of nutrient-dense foods within the food groups while choosing foods that limit intake of saturated fat, added sugars and alcohol.” An easy way to do this is by having a colorful diet that is rich
in reds, purples, greens and oranges. Eating plenty of fruits and vegetables is one way to meet this recommendation. Fruits and vegetables are loaded with nutrients and contain very little fat.

Fruits and vegetables contain many different vitamins, minerals and other healthy compounds called phytochemicals. Phyto means plant. Some of these plant compounds are found in the pigments that give the plant its color. Phytochemicals are related to plant pigments. The phrase, “eat a rainbow,” refers to eating fruits and vegetables with different phytochemicals. Yellow, orange, red, green and purple colored fruits and vegetables generally contain the most phytochemicals.

Dr. Dean Kopsell, The University of Tennessee of the Plant Sciences department, has been doing research that focuses on producing vegetables that are loaded with beneficial phytochemicals and identifying the phytochemical content of vegetables based on their genetic make-up and how the crop is grown. Factors such as light, water and fertilizer can greatly impact how nutritious fruits and veggies can be. He has found more than 900 phytochemicals in plant foods. In addition to being colorful, these pigments and other substances help protect the heart, improve eyesight, prevent cancer, lower blood pressure and help rid the body of toxins.

As scientists learn more about the vital health benefits from eating plants, they try to isolate these individual compounds and put them into pills. This is not necessarily a good idea. It has been discovered that most of these substances need helpers to do their work. These helpers are already naturally occurring in the food alongside the phytochemicals the chemists are trying to isolate. We have learned that the very best health protection comes not from taking a pill, but from eating the food. Fresh fruits and vegetables provide the greatest benefits, especially when they are consumed in their natural state.

Eating fresh garden produce is good for you! Research continues to show that eating fresh fruits and vegetables everyday is one of the most important things that can be done for personal health. We already know the essential nutrients in fresh fruits and vegetables can provide protection from many different diseases and conditions, but eating a diet with lots of fresh produce also provides individuals with more energy, weight reduction and may even reduce the effects of aging.

It is recommended that five to nine servings of fruits and vegetables should be eaten per day. The average American eats only one to two servings per day. More specifically, to maintain proper health, men should eat up to nine servings per day, while women are encouraged to have at least 7 servings per day.

Once produce is cooked, it quickly loses the beneficial qualities. Thus, if vegetables are to be cooked, they should be only lightly sautéed or steamed. To retain the highest amount of nutrients, the crunch should be maintained. Once vegetables lose their crunch, they have also lost their nutritional value. For example, research from the University of Illinois has shown that steaming broccoli for longer than 3 minutes reduces its nutritional value.

Gardening not only provides fresh fruits and vegetables, it also encourages the eating of them. Most people find that once they have a bushel basket of tomatoes, they will have a newfound interest in finding recipes for tomatoes. Also, picking fresh produce from the garden is a great way to get children to eat fruits and vegetables.

**Using the Fruits of Labor**

Gardening provides many benefits. Some of the most rewarding are the fresh fruits and vegetables that are harvested. To get started on thinking about how to incorporate more daily servings, the sections below have some great recipes and share tips and nutritional infor-
Tomatoes

The Aztecs and Incas cultivated tomatoes as early as A.D. 700. The early explorers took them back to Spain and Italy where they were incorporated into their cooking. Tomatoes contain a substance called lycopene that researchers have found may protect against lung cancer and prostate cancer. The body is not always able to get lycopene from raw tomatoes because it is bound so tightly to the cell walls and fiber in tomatoes. But making a sauce from the tomatoes breaks down the cell walls and frees the lycopene so the body can absorb it. Scientists believe that lycopene is not acting alone when protecting the body. There are other compounds that work with lycopene to give the healthful benefits. Eating tomato products is beneficial to good health but taking lycopene supplement will not provide the same benefits because its helpers will not be present. Other nutrients found in tomatoes include vitamins A and C, potassium, iron, and fiber. Nutritionally speaking, a tomato is a vegetable; however, botanically, it is the fruit of the tomato plant.

Beets

Beets have not been as well studied as some of the other vegetables, but scientists believe that beets may help protect against skin, lung and liver cancer. They may also help protect against heart attacks. More research is needed to fully describe the protective effects of eating beets. Many gardeners grow beets and then do not know what to do with them. Below is a fun and easy recipe to serve straight from the garden.

Onions

People in the ancient world associated onions with eternal life, and the ancient Egyptians described them as a tonic for the blood. Onions get their pungent flavor and their eye-watering traits from compounds produced when enzymes are released upon cutting. These combine with tears to form sulfuric acid. Refrigerating onions before cutting slows the reactions and chemical changes inside the cut onion and will decrease tearing. Also, cutting

---

**Beet Salad with Goat Cheese**

**Ingredients:**
- 4 Medium beets—scrubbed, trimmed and cut in half
- 1/3 Cup chopped walnuts
- 3 Tablespoons maple syrup
- 1 (10 ounce) package mixed baby salad greens (or greens from the garden)
- 1/2 Cup frozen orange juice concentrate
- 1/4 Cup balsamic vinegar
- 1/2 Cup extra-virgin olive oil
- 2 Ounces goat cheese

1. Place beets in a saucepan and cover with enough water to cover. Bring to a boil. Cook until tender, about 20 to 30 minutes. Drain and cool, then cut into cubes.
2. While beets are cooking, place the walnuts in a skillet over medium-low heat. Heat until warm and starting to toast, then stir in the maple syrup. Cook and stir until evenly coated. Remove from the heat and set aside to cool.
3. To make the dressing, in a separate bowl whisk together the orange juice concentrate, balsamic vinegar and olive oil.
4. Place a large helping of baby greens onto four salad plates, divide candied walnuts equally and sprinkle over the greens. Place equal amounts of beets over the greens and top with dabs of goat cheese. Drizzle each plate with some of the dressing (347 calories; serves 6).
the onion underwater will decrease tearing. Onions are beneficial to humans because they may not only help protect against heart disease and cancer, but they may also help prevent osteoporosis by boosting the mineral content in bones.

**Carrots**

Carrots may be the original health food. Along with green vegetables, tomatoes and crucifers—broccoli, cabbage and cauliflower—carrots are a top cancer-fighting food. Additionally, carrots appear to reduce the risk of stroke. A large study of 87,000 nurses found that those who ate five large carrots a week lowered their risk of having a stroke by 68 percent, as compared with those who ate only one carrot a month or none at all. Carrots also help lower cholesterol levels. A study in Great Britain showed that participants who ate two large carrots a day for 3 weeks lowered their cholesterol level by 11 percent.

**Sweet Potatoes**

When Columbus landed in the new world, he was apparently intrigued by the sweet potato. According to his ship’s log, he took some sweet potatoes back to Spain with him. The sweet potato is loaded with nutritional value. It contains beta-carotene, vitamins A, C and E, folate, iron, copper, calcium, and fiber. An important health benefit of sweet potatoes is that it helps the body fight off infections.

Interestingly, sweet potatoes are only distantly related to potatoes. Sweet potatoes are the tuberous roots of a plant. The potato itself is actually a tuber, which is the swollen part of the stem that grows beneath the soil. Sweet potatoes are not yams either, although the two terms are used interchangeably. A true yam comes from a botanical family, the lily, and is found overseas in Africa and the Caribbean. True yams are less flavorful, drier in texture and lower in nutrients than sweet potatoes.

**Squash**

There are more than 40 different kinds of squash that includes the soft-skin summer varieties as well as the tough-skin winter types. A rule-of-thumb in estimating the nutritional content of the different kinds is to remember the darker the squash, the more nutrients it contains. Winter squash usually contains more vitamins, minerals and fiber than summer squash, but all have health benefits and are definitely worth including in the diet.

**Corn**

Corn is such an important staple in the American diet that the phrase being “corn-fed” is a synonym for “wholesome.” Corn provides protein, vitamins, minerals and fiber. It is an important source of one of the B vitamins, thiamin, which helps the nervous system stay healthy. Yellow corn also contains two carotenoids: lutein and zeaxanthin. Like other carotenoids, lutein and zeaxanthin appear to help fight cancer and heart disease. They also have a role that is different from the rest of the carotenoids; they protect a very sensitive area of the eye called the macula. The loss of that part of vision is called macular degeneration. This condition is the leading cause of blindness in the elderly. Below is a good recipe to try with corn.

**Grilled Corn with Lime Butter**

**Ingredients**

- 1 ½ Tablespoons butter, melted
- ¼ teaspoon grated lime rind
- 1 ½ Tablespoons fresh lime juice
- ½ teaspoon salt
- ¼ teaspoon ground red pepper
- 8 Ears shucked corn

**Cooking spray**

1. Prepare grill or broiler
2. Combine butter, rind, juice, salt and pepper in a small bowl
3. Spray grill rack or broiler pan with non-stick cooking spray.
4. Place corn on the grill or in the pan. Cook 10 minutes, turning frequently. Remove from heat and brush corn with butter (97 calories, serves 8-9).
Greens
Greens are a powerhouse of nutrition. They contain vitamins A, C and K, folate, potassium, riboflavin, thiamin, iron, calcium, zinc, and fiber. In addition, they contain the photochemical lutein that helps prevent blindness due to macular degeneration and cataracts. Lutein is one of the main antioxidants in the eye. The body can use lutein to manufacture zeaxanthin that is also important in protecting eyes. Important sources of lutein include kale, collard greens, spinach, mustard greens, okra, red peppers, romaine lettuce, broccoli, Brussels sprouts and yellow corn.

The question of whether to cook spinach or to eat it raw is simple to answer. Cooking degrades folate and vitamin C; however, it frees up the carotenoids such as beta-carotene and makes lutein more bioavailable. Thus, spinach should sometimes be eaten raw and other times be cooked before eating. Spinach salad is a great way to eat raw spinach. However, if cooked spinach is desired, below is a great recipe for a crustless spinach, onion and feta quiche.

Broccoli
Broccoli used to grow wild along the Mediterranean Sea where the Italians included it as a part of their cooking. Once transplanted to America, George Washington and Thomas Jefferson both grew it in their kitchen gardens. Despite this, many Americans were slow to include this vegetable into their diets. However, in the past decade, consumption has more than doubled. This is likely due to the news about broccoli’s extraordinary health benefits. To date, it is one of the most effective vegetables at preventing cancer. In addition to its cancer-fighting properties, broccoli contains vitamin A, vitamin C, vitamin K, vitamin E, folate, potassium, phosphorus, calcium, iron and fiber. Broccoli also contains lutein and beta-carotene, a powerful antioxidant. Broccoli also protects against heart disease.

Brussels sprouts
Brussels sprouts are crucifers that originated in Belgium and are grown extensively in the area around the capital city. Brussels sprouts are not sprouts at all; they are small cabbages. They provide vitamin A, vitamin C, vitamin K, calcium and fiber. They also, along with other cruciferous vegetables, lower cancer risk.

---

**Crustless Spinach, Onion and Feta Quiche**

**Ingredients**
- 1 Medium onion, diced
- 6 Ounces fresh baby spinach
- 2 Large eggs
- ½ Cup egg whites
- ½ Cup all-purpose flour
- ½ teaspoon baking powder
- ¼ teaspoon salt
- 1 Pinch of cayenne pepper
- 1 1/3 Cups skim milk
- ½ Cup feta cheese

1. Preheat oven to 400 degrees F. Lightly grease a 10-inch quiche/tart pan or pie plate.

2. In a medium frying pan, cook diced onion with a bit of oil or cooking spray over medium-high heat until translucent and tender. Add in fresh spinach and cook until just wilted. Set aside to cool for a few minutes.

3. In a large mixing bowl, whisk together eggs, egg whites, flour, baking powder, salt and cayenne pepper. Whisk in milk and then stir in the spinach-onion mixture. Pour quiche base into the prepared pan. Top with feta cheese.

4. Bake for 25 minutes, or until the center is set and the outside is golden brown. Let set for 5 minutes, then slice and serve (142 calories, serves 6).
Eggplants
Eggplants have cultivated in China and India since the fifth century. In the 12th century, the Arabs introduced them into Spain. Europeans were slow to accept them. English speakers likely first encountered eggplants as white, egg-shaped fruits that gave the illusion of eggs growing on small trees. Eggplants contain a class of phytochemicals called saponins. Saponins are thought to have antihistaminic, antioxidant and anti-inflammatory properties. They contain a type of fiber called pectin that helps lower blood cholesterol. In addition, eggplants contain a little folate, potassium, copper, iron and fiber. One last recipe that combines a multitude of fresh garden vegetables is called Italian Vegetable Bake. It is listed below.

Blackberries
Blackberries grow wild in most parts of Tennessee, but they are also popular in gardens. The pigment that gives blackberries their color is loaded with antioxidants. In fact, blackberries place right after blueberries in their antioxidant strength. In addition to their antioxidant properties, blackberries contain vitamin C, vitamin E, folate, manganese, potassium, magnesium, calcium, iron and fiber.

The growing season for blackberries is short, but they can be canned or frozen. However, blackberries that grow along the side of highways should never be eaten because emissions from traffic can leave an unhealthy residue on the berries.

Blueberries
Blueberries are a true American fruit that originated in North America and were valued by Native Americans for their medicinal strength. Their powerful antioxidant and anti-inflammatory properties make them one of the best foods for protecting the brain. In addition, blueberries are an excellent source of vitamin A, vitamin C, vitamin E, folate, potassium, folate, iron, zinc and fiber.

The most powerful antioxidants, ranking just below blueberries and blackberries. In addition, they are a very good source of vitamin C and provide folate, potassium, iron, calcium and fiber. Wild strawberries grow and ripen in late spring and early summer. They are much smaller than cultivated strawberries, but wild strawberries contain just as much flavor stuffed into a smaller package. These tiny strawberries are good in oatmeal, pancakes, fruit salads and cereal.

Italian Vegetable Bake

Ingredients

2 Whole tomatoes
1 Medium onion, sliced
½ Lb. fresh green beans, sliced
½ Lb. fresh okra, cut into 1/2” pieces
¾ Cup finely chopped green pepper
2 Tablespoons lemon juice
1 teaspoon chopped fresh basil
1½ teaspoon chopped fresh oregano
3 Medium zucchini, cut into 1” cubes
1 Medium eggplant, pared and cut into 1” cubes
2 Tablespoons grated parmesan cheese

1. Coarsely chop tomatoes. Mix together tomatoes and their juice, onion, green beans, okra, green pepper, lemon juice and herbs. Cover and bake at 325 degrees F for 15 minutes.
2. Mix in zucchini and eggplant and continue baking, covered, for 60 to 70 minutes, or until vegetables are tender. Stir occasionally.
3. Sprinkle top with Parmesan cheese just before serving. (74 calories, serves 9).
Concord Grapes

Concord grapes originated in Concord, Massachusetts and bear the name of the town. These grapes are high in antioxidants and help promote heart health by preventing plaque build-up in the arteries. In addition to their antioxidant property, Concord grapes provide vitamin C, calcium, iron and fiber.

How Much to Eat?

The amount of fruits and vegetables necessary for maintaining good health is based on the number of calories needed each day. The USDA and the Agricultural Research Service (ARS) Children's Nutrition Research Center at Baylor College of Medicine provides an online guide to help determine how many calories an individual needs each day. This website is listed in the Resources section at the end of this chapter.

Many adult women who are trying to lose weight should consume no fewer than 1600 calories each day; recommendations for men range form 1800 to 2000 calories. The fruit and vegetable recommendation for different calorie levels are given in Table 1.

Food Miles

“Food miles” is a term to describe how far produce travels from the farm to the table. It is an area of agriculture that is not often thought about by consumers. According to the National Sustainable Agriculture Information Service, most fruits and vegetables in the United States travel an average of 1,500 miles before it is purchased in the convenience store. This astonishing distance only accounts for those products grown in the United States. It does not account for the produce we consume that is shipped from the rest of the world. With each day, the produce inside a truck during transportation loses nutrients. By the time the food reaches the market, its nutrient value could be half of what it would be had it been picked out of the backyard. In addition to food miles, here are a few facts about transportation:

- Fruits and vegetables are covered with wax to prevent drying
- Produce is usually sprayed with chemicals to preserve freshness

Table 1. Amount of Fruits and Vegetables Recommended for Various Calorie Levels

<table>
<thead>
<tr>
<th>Calorie Level</th>
<th>1600</th>
<th>1800</th>
<th>2000</th>
<th>2200</th>
<th>2400</th>
<th>2600</th>
<th>2800</th>
<th>3000</th>
<th>3200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>1.5 c (3 servings)</td>
<td>1.5 c (3 servings)</td>
<td>2 c (4 servings)</td>
<td>2 c (4 servings)</td>
<td>2 c (4 servings)</td>
<td>2 c (4 servings)</td>
<td>2.5 c (5 servings)</td>
<td>2.5 c (5 servings)</td>
<td>2.5 c (5 servings)</td>
</tr>
<tr>
<td>Vegetable</td>
<td>2 c (4 servings)</td>
<td>2.5 c (5 servings)</td>
<td>2.5 c (5 servings)</td>
<td>3 c (6 servings)</td>
<td>3 c (6 servings)</td>
<td>3 c (6 servings)</td>
<td>4 c (8 servings)</td>
<td>4 c (8 servings)</td>
<td>4 c (8 servings)</td>
</tr>
</tbody>
</table>

Dark Green
- Orange 2 c/wk 3c/wk 3c/wk 3c/wk 3c/wk 3c/wk 3c/wk 3c/wk 3c/wk
- Legumes 2.5c/wk 3c/wk 3c/wk 3c/wk 3c/wk 3c/wk 3.5c/wk 3.5c/wk 3.5c/wk
- Starchy 2.5c/wk 3c/wk 3c/wk 6c/wk 6c/wk 7c/wk 7c/wk 7c/wk 7c/wk
- Other 5.5c/wk 6.5c/wk 6.5c/wk 7c/wk 7c/wk 8.5c/wk 8.5c/wk 10c/wk 10c/wk

Source: USDA Eating Plan, 2005 Dietary Guidelines for Americans

Note: c/wk means cups per week. This number represents the amount that should be eaten on average over the week.

Tips for Eating More Fruits and Vegetables

- Snack on raw vegetables instead of potato chips
- Add fruit to cereal at breakfast
- Use the salad bar when going out for lunch or to the grocery store, but avoid the dishes or salad dressings loaded with mayonnaise; put salad dressing on the side
- Drink juice instead of coffee, tea or soda; V8 and V8 Fusion Light are excellent choices
- Take raw vegetables for lunch
- Eat at least two vegetables for lunch and two for dinner
- Try at least one new vegetable each week
- Choose fruits and vegetables from each of the color groups: blue/purple, green, yellow/orange, red and white
▪ Unripe fruits and vegetables are held with a chemical to induce ripening upon arrival at the local market
▪ Fossil fuel use and air pollution created from transportation is enormous

Food Safety
Food safety is constantly in the headlines. As a result, many people are growing their own food for both nutritional and safety reasons. However, improper use of chemicals and microbial contamination can occur at many points from the garden to the table.

To help avoid chemical contamination, the product label must be followed exactly, especially with regard to usage rates and withdrawal times. Additionally, fresh produce should always be washed with plenty of fresh, clean water before consumption.

Although chemicals can account for some food contamination, most food safety issues are attributed to microbial contamination. There has been food borne illnesses traced back to sprouts, tomatoes, carrots, cabbage, melons, strawberries, raspberries, apple cider and most other fresh fruits and vegetables.

Thus, it is important to remember that minimally processed produce, meaning it has not been heated, increases the likelihood of food borne illness. To minimize microorganisms on produce grown in the home garden, there are a few key elements to address:

▪ Site selection: Select a site for the garden that will not have run off from streams, rivers or ponds; do not place the garden close to domestic animal production facilities where water can run off these facilities.
▪ Application of manure or compost as fertilizer: Know how to compost materials correctly. Apply this material in the fall and not in the spring. Always compost a manure fertilizer and remember which crops received it.
▪ Water: Assure the water being used is drinkable. If surface water or well water is being used, it should be tested before use. If at all possible, drip irrigation should be used instead of overhead irrigation to avoid the spread of diseases and waste of water.
▪ Hand washing, health and hygiene: Good personnel hygiene is very important when handling fresh produce. Hands should be washed frequently and thoroughly. If gloves are worn during harvest or when handling produce post harvest, they should be washed and clean.
▪ Cleaning and Sanitizing: Clean and sanitize containers before placing fresh produce in them. Hand tools should also be kept clean and sanitary. To sanitize containers and equipment, first rid the item of loose soil by giving it an initial scrape or a water flush. After this, clean the item with a detergent and then rinse off the detergent with fresh water. The last step is to spray or dip the item with a sanitizer such as a dilute bleach solution. A good bleach solution to use is: ¼ cup of household bleach to 1-gallon water.

Family Gardening Activities
Extension Environmental Horticulture Specialist Diane Relf, Virginia Cooperative Extension, recommends these activities to encourage families to spend time together in and out of the garden:

▪ Plant a tree to celebrate a birth. A tree planted in the year a child was born can grow along with the child. It can be a reminder to the child of how much he or she changes from year to year. The tree’s growth will somewhat mirror the child’s growth—it will take lots of care and nurturing in the early years

Extension Family and Consumer Science
Master Gardeners should be aware of the diverse resources available to the community through the local Extension office. Extension’s Family and Consumer Sciences department and staff develop programs that focus on helping Tennesseans progress as social, economic and technological conditions evolve.

Each county has an FCS agent who provides a resource for a wide variety of information relating to healthy living. This information includes nutrition, parenting, childcare, family financial management, indoor air quality, sustainable housing and children’s environmental health.
Lead in Gardening

Lead poisoning continues to be a problem, even decades after laws were passed to control the amount of lead used in products. Today, lead dust is the most common way people are poisoned by lead. Before the invention of the catalytic converter in cars, lead would pass through the emissions of the car and fall onto the ground thereby contaminating the soil. That soil may still be contaminated today. Frequently, housing developments are built on old farmlands that may remain contaminated. Lead arsenate was routinely used to dust orchards. Lead was also commonly used in plumbing and was found in high concentrations in paint before 1978. From a gardener’s standpoint, lead contamination without remediation is forever, and testing the soil is very simple, see the reference at the end of this tip box.

To combat growing a garden in a lead-contaminated soil, gardeners should be very careful where they plant. If a garden is too close to an older, busy road, the soil around the road may still be contaminated. It is possible for lead to pass from the soil into the vegetables that are grown. When these vegetables are consumed, the lead could pass to the person eating the vegetables. Women of childbearing years should be especially cautious because the lead could pass from her to the unborn child. Anyone who has been in the garden should also wash their hands thoroughly to get all of the dirt out from underneath their nails.

Lead poisoning has especially severe effects on children. It can cause mental retardation, lower IQ, learning disabilities, seizures or hearing loss. Lead poisoning can also affect the gastrointestinal tract; symptoms would be abdominal pain, nausea, vomiting, diarrhea and/or constipation.

The only definitive way to know if a child has been poisoned is through a lead test. The test consists of taking a small amount of blood from the child’s finger or heel. A pediatrician should be contacted immediately if it is suspected that a child has been exposed to lead. All children should be tested at 12 and 24 months for lead poisoning. If a child is under the age of 6 and has never been tested, a test should be done at their next appointment. Pets can also get lead poisoning through contaminated soil or lead dust.

The good news is lead poisoning is 100% preventable. Lead in soil can be controlled, but precautions must be taken. Remember not to plant near a busy road. Additionally, for areas around the home or where children have access, lead contaminated soil should be covered with mulch, plants or shrubs. For a child’s play area, sand for a sand lot should be used. If it is unknown whether soil is contaminated, a soil test should be done. Local Extension offices, local health departments or the Tennessee Department of Environment and Conservation/TDEC at 1-888-891-8332 can give information or send out test kits for soil tests.
ally, these gifts are true gifts because they are gifts of time and love.

Cynthia Davis Klemmer, Children’s Education Coordinator with the Massachusetts Horticultural Society, offers these ideas for family gardening:

▪ Leave an area where children can dig, even after planting. This is sometimes children’s favorite part of gardening. An earthworm bed is also something that children can enjoy.

▪ Use plants to create secret places in the garden. Sunflowers, pole beans or vining plants trained over a wire frame create fantastic secret places.

▪ Plant herbs to allow children to engage their sense of smell in the garden. Show them how to rub herbs between their fingers to get a strong fragrance.

▪ Teach children how to compost. They can be responsible for adding the scraps from the yard or kitchen to the pile. Also, they can be taught what to include—vegetable peelings, grass clippings, coffee grounds, eggshells, tea bags, etc.—and what not to include, such as anything that walked, swam or flew.

Developmentally Appropriate Gardening for Kids

When planning gardening activities for children, the purpose in getting them involved needs to be considered. For example: Is there a desire for them to learn to love nature and gardening? Is there a need for some help in the garden? If the desire is for children to learn from and enjoy their experiences, activities that meet their developmental needs will need to be provided. This is called developmentally appropriate gardening.

Children are active learners. They learn by doing hands-on activities and through play and discovery. Children will learn more about gardening if they get to dig in the dirt, plant seeds, water and weed, and pick their produce. This means that they will get dirty. This also means that they will make mistakes. They may pull up vegetable plants when they are weeding the garden. They may plant in crooked rows. They may pick the tomatoes before they are ripe. They may plant the plants too close together. However, if the desire is for them to have fun, then they should be allowed to do these things. This means that a separate garden space for the children, such as a section set

Plants to Avoid in a Children’s Garden

Certain plants need to be avoided in a children’s type garden. Plants that require a lot of maintenance, such as hybrid tea roses, or that have thorny features, such as roses, should be placed carefully or avoided entirely. Also, children are apt to put anything in their mouths. Therefore, a toxic or poisonous plant list should be consulted before any planting decisions are made.

Gardening can be a rewarding outdoor activity for the family.

Poison Control

Services of the Tennessee Poison Control are free and the lines are open every day. The phone number is 1-800-222-1222
off by landscape timbers or a garden planted in a plastic swimming pool with drainage holes punched in the bottom, should be provided. Alternatively, part of the family garden could be set aside exclusively for children. If space is limited, gardening experiences can be provided by giving pots for gardening on the deck or on a porch.

As with other activities, while gardening, children will need guidance and supervision. Though children learn by doing, they may need help in doing some activities so that they will not become frustrated. Their success in the garden can be aided by ensuring that they have tools that are the right sizes for them and that match their abilities. Very young children will be more successful at digging if they have a small hand spade instead of a hoe. Tasks young children can do include planting seeds in cups of soil to start transplants, watering plants using a small watering can, raking with a child-sized tool and carefully picking some types of produce.

As children get older, they can do more complicated tasks such as choosing the seeds or the plants for their part of the garden, pulling weeds, planting transplants, watering the garden and checking for insects.

A child’s level of mental development needs to be considered when working in the garden. Children are visual learners. They may not be able to read some words, or they may not be able to understand some concepts. However, they can “read” pictures. Therefore, when labeling the plants in the garden, signs that have a picture and the name of the fruit or vegetable should be made. Also, rows should be set out with a string to give children a visual guide for making straight rows. Children will also need to be taught how to tell the difference between the garden plant and a weed, how to tell when the fruits and vegetables are ripe and how to pick them carefully.

**Personal Health in the Garden**

There are few people who enjoy being outdoors as much as gardeners. However, like the plants that they tend to, gardeners must also take care of themselves. They must take care to stay hydrated, not overheat and to avoid too much sun. The following section will discuss ways to protect the body from the potentially damaging effects of the outdoors as well as

### Choosing What to Plant with Children

When allowing children to choose seeds or plants, it is helpful to narrow the choices to plants that are known to do well in the location and to plants that grow fairly quickly. Slower growing plants are okay, but at least one or two plants should show some results pretty quickly to help the child feel successful. Showy plants, such as sunflowers or cherry tomatoes, are popular with children. Plant varieties that are disease resistant or that tolerate insects well should be selected.
detail common heat related injuries and their symptoms.

**Protecting The Skin**

Using sunscreen is the most important thing that gardeners can do to protect themselves from sunburns, skin cancer and premature aging. Sunscreen should be applied about 20 minutes before going outside, at any time of the year, regardless of skin type or ethnicity. The American Academy of Dermatology (AAD) recommends that anyone who is going to be outside for at least 20 minutes should apply a water resistant sunscreen with a Sun Protection Factor (SPF) of at least 15 with UVA and UVB protection, with re-application of the sunscreen occurring every 2 hours.

Because all sunscreens are labeled with an SPF number, it is important to understand what this number means. Higher SPF numbers offer greater protection from sunburns, which are mostly caused by UVB rays. The SPF rating is calculated by comparing the amount of time needed to produce a sunburn on sunscreen-protected skin to the amount of time needed to cause a sunburn on unprotected skin. For example, a sunscreen with an SPF of 15 would allow a person to multiply their initial burning time by 15. This means that it would take 15 times longer for that person to get a sunburn, or 150 minutes. Also, it is important to know that SPF protection does not increase proportionately with a designated SPF number. For example, while an SPF 15 indicates 93 percent absorption, an SPF 30 absorbs 97 percent of the sun's burning rays.

Sunscreens aid the body's natural defense mechanisms by protecting it against harmful ultraviolet (UV) radiation from the sun by either absorbing, reflecting or scattering the sun's rays on the skin. While sunburns are caused by the UVB rays, the more deadly skin cancer melanoma is thought to be caused from exposure to the UVA rays. Thus, broad-spectrum sunscreens should be used. Broad-spectrum sunscreens protect the skin from both UVA and UVB rays. Broad-spectrum sunscreens are sunscreens that contain sulisobenzone, ecamsule, titanium dioxide, zinc oxide, oxybenzone and/or avobenzone.

- Gardening requires protection against the weather. Therefore, keep these tips in mind:
- Limit outdoor activities when the sun's rays are the strongest, usually between 10 a.m. and 4 p.m.
- Gardening should be done, when possible, in accordance with the weather; in the summer, the bulk of the gardening should be done early in the morning and late in the evening.
- Seek shade whenever possible.
- Wear protective clothing and accessories, such as wide-brimmed hats, sunglasses and white cotton clothes, which reflect heat.
- According to the Skin Cancer Foundation:
  - Apply sunscreen liberally and often, even on cloudy days. A sunscreen with an SPF of 15 or higher should be used everyday.
  - One ounce (2 tablespoons) of sunscreen should be applied to the entire body 30 minutes before going outside, and the sunscreen should be reapplied every 2 hours.
  - Talk with a doctor to see if any medications being used increase sensitivity to the sun.

### Treatments for Sunburns

Sunburns can be very painful. Below are some tips for alleviating the pain.

- Taking the recommended amount of Aspirin or Ibuprofen will help with the pain.
- Cool water will help with the swelling and redness.
- Lotions with 1% hydrocortisone will help with the pain and itching.
- Products that contain menthol will help soothe the burn.
- Stay out of the sun for a minimum of 2 weeks with a sunburn.

### Protection from Insects, Thorny Plants and Disease

Insects possibly encountered in the garden are known to carry some very nasty diseases. Because insect stings and bites can be more than just a nuisance, sprays and gels that repel insects such as ticks, flies and mosquitoes should be applied frequently. The neck, hands, arms...
and legs should be covered with appropriate clothing. Because bacteria also reside naturally in the garden, any stab wound or prick from a thorny plant or tool can be an entry site for an infection.

### Skin Cancer

Pre-cancerous spots can appear on the tops of ears, bald spots, noses, temples, lower lips and on the tops of hands. The three main types of skin cancer cells are:

- **Basal cell carcinomas**: These carcinomas grow slow on the body and fast on the face. They are the least intrusive and they rarely spread.
- **Squamous cell carcinomas**: These carcinomas cause red crusty growths and are more likely to spread than basal cell carcinomas.
- **Melanoma**: This type of cancer is less common than basal and squamous cell carcinomas. However, it can metastasize early and it is more likely to be terminal. This type of cancer often originates from childhood sun exposure.

### Preventing and Treating Dry Hands

To keep hands from getting dried out, before gardening it is important to choose the right glove. If the majority of the gardening is going to involve wet work, thorns or spines, a leather glove is a good choice. If the work being done is going to be really wet, or if chemicals are going to be handled, then rubber cotton-lined gloves are a good choice. If general gardening is going to be done, then a plain cotton glove will work great, and if it is cold outside, then gloves with the finger tips cut-off of the dominant hand’s glove should be used.

Unfortunately, even if sunscreen is worn and the proper gloves are selected, sometimes hands still get dried out. To treat dry hands and fingernails, soak them in tepid water at bedtime and then thickly apply a petroleum jelly, glycerin or lanolin-based product, taking care to massage the selected product into the fingernails and cuticles. Finally, apply overnight gloves for in-depth moisturization. Please note that lotions or oils should not be used for treating dry hands because they are too thin. Also, when working with fertilizers, gloves should always be worn and hands should be washed immediately after contact with fertilizer.

### Protecting Eyes from the Sun

The section above discussed how important it is to use sunscreen to protect the skin when working outdoors. Similarly, the same harmful rays that damage the skin can also damage the eyes and increase the risk of developing eye problems. One short-term eye problem that can develop in people who spend a lot of times outside without adequate eye protection is photokeratitis. Photokeratitis is reversible...
Avoiding West Nile Virus

When dealing with West Nile virus, the Center for Disease Control and Prevention recommends that prevention is the best bet. Fighting mosquito bites reduces the risk of getting this disease, along with others that mosquitoes can carry. These steps can reduce the risk:

- Clean out the mosquitoes areas of work or play, and help the community control the disease
- Apply mosquito repellent
- Wear clothing to help reduce mosquito bites; this includes wearing long-sleeved tops, long pants and socks when outdoors
- Be aware of peak mosquito hours, which are the hours from dusk until dawn, and apply extra repellent and wear protective clothes
- Drain standing water because mosquitoes lay their eggs in standing water

Sunburn of the cornea. It is painful and can result in temporary vision loss.

Fortunately, wearing appropriate sunglasses can protect the eyes from the sun’s damaging rays. Appropriate sunglasses are ones that block at least 99 percent of both UVA and UVB radiation. New sunglasses should have a label detailing the degree of protection and old glasses can be taken to an eye-care professional who can determine the degree of protection. Additionally, sunglasses should be dark enough to reduce glare, but not dark enough to distort colors and affect the recognition of traffic signals.

Safety Precautions for Heavy Work

Working with power tools and sharp implements can be particularly dangerous if they are used improperly. Thus, extra caution should be employed when using power equipment. Before use, it is important to be very well informed upon the proper techniques for operation. The manufacturer’s instruction manual should always be read and followed. Protective clothing and safety gear such as goggles, gloves, and boots should be worn. Take care to always lift with the legs to avoid back strain, and take rest breaks periodically to avoid injuries that are more likely to occur with fatigue.

Accessible Gardening

It is always important to consider the abilities of the gardener whether a Master Gardener is gardening for them or providing a gardening area for someone else. Adaptive or assessable gardening is becoming more necessary as we age and find our abilities changing. Raised beds make it easier to access the soil and plants. A variety of containers can be used as needed for portability and convenience. Walkways can be paved and made wider to make for easier movement in the garden. Tools and water supply should be readily accessible. Ergonomic or adaptive tools are available for a wide variety of special needs.

Tetanus

Tetanus, commonly known as lockjaw, is caused by a bacterial toxin that affects the nervous system. Gardeners are vulnerable to exposure to tetanus because tetanus is contracted through a cut or a wound that becomes contaminated with tetanus bacteria that is found in soil, dust and manure. The bacteria can get in through even a tiny pinprick or scratch, but deep puncture wounds and cuts are especially susceptible to infection. If such a wound is received, the injured areas should be scrubbed with soap and water immediately. Next, a protective dressing should be applied until the wound is healed. Finally, gardeners should know the status of their last tetanus shot. The best protection against tetanus is getting a tetanus shot. If it has been more then 10 years since having a tetanus booster shot, or if a tetanus shot has never been received, then it is time to be vaccinated. A doctor can tell if the vaccine or a booster is needed.
Recognizing and Protecting Gardeners from the Effects of Heat

The information below is from a series of informational fact sheets from the Center of Disease Control. It can be found online at http://www.cdc.gov/niosh/topics/heatstress. Gardeners often find themselves working in hot environments, sometimes for extended periods. When the body is unable to cool itself by sweating, several heat-induced illnesses can occur. These illnesses can sometimes result in death. The following information details different types of heat stress, the effects on the body and how heat stress can be prevented.

Several factors can lead to heat stress. Some of these factors include high temperature, humidity, direct sun or heat, limited air movement, physical exertion, poor physical condition, some medicines, inadequate tolerance for hot workplaces, and insufficient water intake. Heat stress can lead to several types of heat disorders, each with their own health effects and treatment. Heat stroke, heat exhaustion, heat cramps and heat rashes are discussed below.

Heat Stroke

Heat stroke is the most serious heat related disorder and occurs when the body’s temperature regulation system fails and the body temperature rises to critical levels. Working in extreme high heat or vigorous physical activity in the sun may cause this condition. Dehydration is also a cause of heat stroke as a person may not be able to sweat fast enough to dissipate the heat and cool their body.

Gardeners, athletes, infants and the elderly are the most susceptible individuals. Heat stroke is a true medical emergency that, if not treated promptly and properly, may result in death. The primary signs and symptoms of heat stroke are:

▪ confusion,
▪ irrational behavior,
▪ loss of consciousness,
▪ convulsions,
▪ lack of sweating (usually),
▪ hot and dry skin,
▪ rapid pulse,
▪ abnormally high body temperature.

If a person shows signs of possible heat stroke, emergency medical assistance should be obtained immediately by calling 9-1-1. Until professional medical treatment arrives, help the affected person with some immediate first aid measures. Place the victim in a shady, cool area or inside under the air conditioner and remove the outer clothing. They should then be doused with cool, but not cold or freezing, water and fanned to circulate the air and improve evaporative cooling. If ice packs or cold packs are nearby, wrap them in a cloth and place them on the groin, wrists, ankles, neck and under the armpits where they can cool the large blood vessels. Keep the person lying down and watch for symptoms of breathing difficulty until help arrives.

Gardening can be a rewarding outdoor activity for the family. Wide Brim Hat and Cover Hands with Protective Gloves

Figure 5.
Heat Exhaustion

Heat exhaustion is only partly due to exhaustion; it is a result of the combination of excessive heat and dehydration. Symptoms may occur after several days of exposure to high temperatures with inadequate fluid replacement. Warning signs and symptoms of heat exhaustion are heavy sweating, paleness, muscle cramps, headache, nausea or vomiting, dizziness, weakness, thirst, and giddiness. The victim's skin may be deceptively cool and moist. The pulse will be fast and weak. Fainting or heat collapse is often associated with heat exhaustion. Someone suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should be encouraged to take a cool shower or bath, get adequate rest, and remain in an air-conditioned environment until symptoms pass. If symptoms worsen or last longer than 1 hour, seek medical attention.

Heat Cramps

Performing hard physical labor in a hot environment usually causes heat cramps. Heat cramps are painful, brief muscle spasms that usually involve muscles fatigued by heavy work such as calves, thighs, abdomen and shoulders. Heat cramps have been attributed to an electrolyte imbalance caused by sweating a great deal with exercise without adequate fluid and electrolyte replacement. It is imperative that workers in hot environments drink water every 15 to 20 minutes and also drink carbohydrate-electrolyte replacement liquids, such as sports drinks, to help minimize physiological disturbances during recovery. Heat cramps may occur hours after exercise. If a person is unable to replenish their fluids, symptoms worsen or do not go away after fluids and rest, seek medical attention.

Heat Rashes

Heat rashes are the most common problem in hot work environments where the skin is persistently wetted by unevaporated sweat. Heat rash looks like a red cluster of pimples or small blisters. It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases. The best treatment for heat rash is to provide a cooler, less humid environment. The affected area should be kept dry. Dusting powder may be used to increase comfort, but ointments or creams should be avoided because they keep the skin warm and moist. Calamine lotion can be used if the prickly unpleasant feeling persists. Heat rash normally clears on its own but can occasionally become infected showing redness, increased swelling and pain, and even pustule formation. This requires medical treatment.

Preventing Heat Related Problems

There are several ways to offset heat stress. However, workers and the people responsible for those workers must be diligent in implementing these practices. Methods of preventing heat stress are discussed below.

- **Drink small amounts frequently.** Drinking one cup of non-alcoholic, caffeine-free fluid every 20 minutes should help prevent heat stress. Thus, ample supplies of liquids should be placed near all work areas.
- **Reduce physical demands.** Reducing physical exertion, such as excessive lifting, climbing or digging, can reduce physical demands. Relief workers can also be assigned to minimize overexertion.
- **Provide recovery areas.** A recovery area can be an air-conditioned enclosure or any other place that is out of the sun. Recovery areas should provide water and a place to rest.
- **Reschedule hot jobs.** Hot jobs, like gardening in the summer, should be scheduled for cooler parts of the day.
Also, routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.

▪ **Acclimatize workers.** Workers can be acclimatized by exposing them to work in a hot environment for progressively longer periods of time.

▪ **Monitor workers.** All workers should be monitored, especially ones who are at risk of heat stress, such as those wearing semi-permeable or impermeable clothing when the temperature exceeds 70 degrees F. Personal monitoring can be done by checking the heart rate, respiration rate and oral temperature. Each of these vital signs is elevated in heat stress.

▪ **Wear personal protective equipment (PPE).** PPE that can minimize heat stress include loose fitting reflective clothing, worn as loosely as possible; wetted clothing, especially if reflective or other impermeable protective clothing is worn; or water or ice-cooled garments that may have a battery-driven circulating pump, liquid-ice coolant and a container.

### Protecting Against Dehydration

Every year, millions of people, many of them infants and older adults, die of dehydration. In the simplest terms, dehydration occurs when more water is lost than is taken in. As a result, the body does not have enough water to carry out its normal functions. Because water is essential to human life, even a slight imbalance can cause serious problems. Mild dehydration, which is as little as 1 to 2 percent loss of body weight, can cause symptoms such as weakness, dizziness and fatigue, all of which may have a negative effect on long-term health. Severe dehydration occurs when there is a 9 to 15 percent loss of body weight; this is a life-threatening medical emergency.

Fortunately, increasing the intake of fluids can often reverse the effects of mild to moderate dehydration. However, severe dehydration requires immediate medical attention. To avoid dehydration, it is essential to monitor fluid loss, particularly in hot weather, and to frequently and consistently replace what is lost. Acceptable replacement fluids include water, diluted fruit juice-half water and half fruit juice- and commercial sports drinks. Carbonated drinks, caffeinated beverages and alcoholic beverages should be avoided because they may cause dehydration.

### Garden Stretch

Stretching should be done everyday. It should be easy to do and it should be done slowly so that the movement can be enjoyed and one can get in touch with their muscles. It should not be labor intensive or stressful. Stretching should be done in the morning, after sitting or standing for a long time, when the body feels stiff and/or at odd times during the day when stretch feels needed. Everyone, regardless of their age, flexibility, physical condition or health should stretch because of the numerous benefits. Some of these benefits are that it reduces muscle tension, relaxes the body, helps with the coordination of movement, increases range of motion, prevents injuries, prepares

---

Is It a Stroke? Something we all need to know when working with the public.

Sometimes symptoms of a stroke are difficult to identify. Unfortunately, this lack of awareness spells disaster. The stroke victim may suffer brain damage when people nearby fail to recognize the symptoms of a stroke. Fortunately, a bystander can help recognize a stroke by asking three simple questions:

▪ Can you SMILE?
▪ Can you RAISE BOTH ARMS?
▪ Can you SPEAK A SIMPLE SENTENCE?

If he or she has trouble with any of these tasks, 9-1-1 should be phoned immediately and the symptoms should be described to the dispatcher. Another sign of a stroke is if the person sticks out their tongue and it goes to one side or the other. Because most people can identify facial weakness, arm weakness and speech problems, the general public is urged to learn the three above questions. Widespread use of this test could result in prompt diagnosis and treatment of the stroke and prevent brain damage.
the body for activity, develops body awareness, loosens the mind control of the body, promotes circulation, and it feels good.

Some useful techniques for stretching include not stretching too far, not bouncing, holding in a comfortable position, thinking about the area being stretched and trying not to be too flexible. Additionally, when stretching, one may feel different everyday, so it is important to stretch within personal limits. Stretches for gardening are listed below.

- **Bent Knee**: Bend knees slightly with heels flat on the ground and toes straight ahead. Feet should be shoulder width apart. Relax and breathe. Do this stretch for 20 seconds.

- **Calf Stretch**: Stand near a solid support, lean on it with the forearms. With the head resting on hands, bend one leg and place it in front. Keep the other leg straight and move hips forward while keeping the lower back flat. Keep heels flat on the ground and toes straight ahead. Do this stretch for 20 seconds on each side.

- **Toe Touch**: Place feet shoulder width apart with toes straight ahead. Keep heels flat on the ground with knees slightly bent. Let the arms and neck relax and slowly bend forward. Stop when a slight stretch is felt. Do this stretch for 20 seconds.

- **Squat**: From a standing position, squat down. Feet should be flat on the ground with toes pointed out and heels apart. Keep knees outside of shoulders; keep

### Horticultural Therapy

The therapeutic effects of gardens have been recognized for many years. Dr. Benjamin Rush, a signer of the Declaration of Independence, and considered to be the “Father of American Psychiatry,” recognized that garden settings held curative effects for people with mental illness. Horticultural Therapy is a health science degree offered at some colleges across the United States. A Registered Horticultural Therapist (HTR) specializes in using the natural connection that people have with plants therapeutically. According to the American Horticultural Therapy Association, “Horticultural therapists serve as members of rehabilitation teams (doctors, psychiatrists, psychologists, and occupational and physical therapists among others) who involve the client in all phases of gardening - from propagation to selling products - as a means of bringing about improvement in their life.” People with physical or mental challenges can learn to garden or to do other plant related activities using adaptive skills and tools as a part of a horticultural therapy program.

Figure 7. Stretching prior to gardening will reduce the stress on the body and increase flexibility.
lax and take note of any kinks. Do this 5 times each way.

- **Quad and Knee Stretch**: Support the body with the right hand and hold the top of the right foot with the left hand, pull the heel gently toward the buttocks. Do this stretch for 20 seconds on each side.

- **Calf Stretch**: Stand near a solid support and lean on it with the forearms. Rest head on hands and bend one leg. Place it in front while keeping the other leg straight. Move hips forward and keep the lower back flat with the heels flat on the ground. Keep toes straight ahead. Do this stretch for 20 seconds on each side.

### Summary
Gardening can enhance the mind, the body and the soul. It offers a purposeful hobby with rich rewards. However, gardening can be dangerous if precautions are not taken. After reading this chapter, Master Gardeners should know how to enjoy a garden and its harvests as well as how to stay safe and healthy while gardening.

### Terms To Know
- antioxidants
- beta-carotene
- carotenoids
- Dehydration
- Folate
- Food miles
- Food Safety
- Heat stress
- Horticulture therapy
- Lead
- Lyme disease
- Lutein
- Stroke
- Photokeratitis
- Sun protection factor
- Tetanus
- Thiamine
- West Nile Virus

### Test Your Knowledge
1. What makes gardening such a healthy activity?
2. What does it mean to eat “colorfully”?
3. What is horticultural therapy?
4. Give some examples of developmentally appropriate gardening practices for young children.
5. List some ways gardeners can protect themselves from the effects of heat?
6. How can gardeners properly prepare themselves for gardening activities outdoors?
7. Why is it critically important to protect skin and eyes from the sun?
8. Identify the poisonous heavy metal we might encounter in our soil and explain how it might have gotten there?

### Resources
- OSHA
- U.S. Department of Labor
  (800) 321-OSHA
  osha.gov
- (202) 693-1999 and the teletypewriter (TTY) number is (877) 889-5627
- The University of Tennessee, Dr. Dean Kopsell’s website
  plantsciences.utk.edu/kopsell/kopsell.htm
- The University of Tennessee Extension
  extension.tennessee.edu/
- The University of Tennessee, Master Gardener mastergardener.tennessee.edu
- 4-H Foundation
  4-h.org
- American Academy of Dermatology
  aad.org/public/publications/pamphlets/sun_sunscreens.html
- American Horticultural Therapy Association
  www.ahta.org
- Extension Junior Master Gardener Program
  jmgkids.us
- Garden Mosaics
gardenmosaics.org
Klemmer, Cynthia D. Gardening with Kids
teachervision.fen.com/plants/activity/114.html
National Cancer Institute: Skin Cancer
cancer.gov/cancertopics/types/skin
USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine
bcm.edu/cnrc/caloriesneed.htm
Dietary Guidelines for Americans 2010
Center for Disease Control
cdc.gov