EXTENSION

# Basic Plant Care: Understanding Your Plant's Needs

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## Introduction

As a beginning gardener, it can feel overwhelming when learning the basic principles of gardening. There is an abundance of terms to understand related to planning, planting and caring for a garden. Why is it important to understand basic plant terminology and requirements? Every plant is unique and has its own requirements of sunlight, water and fertilizer. When given the correct conditions, plants will be healthy and thrive. A common mistake beginning gardeners make is purchasing plants and planting them in areas where their basic requirements are not met. How much sunlight will your garden receive every day? Does the soil drain well or stay saturated because of higher clay content? Are the nutrient levels in the soil adequate to support your choice of plants? These are important questions to ask yourself before purchasing plants for your garden. While the environment can be slightly adjusted (e.g. fertilizers, raised beds, etc), a gardener will have the most success when the right plant is selected for the right environment. "Right plant, right place" is a common phrase of experienced gardeners and horticulturists. This fact sheet was developed to understand and apply the information presented on a plant label.

## Plant Names

Identifying plants is usually one of the first things to do when learning about how to care for them. All plants have their scientific name within the binomial naming system. The binomial naming system was created by Carl Linnaeus, a Swedish botanist, to identify all living things. These Latin names are used worldwide. Let us use *Echinacea purpurea*, otherwise known as purple coneflower, as an example (Figure 1). The genus, or group name, of this plant is *Echinacea*. If only the genus is known, a lot of information can be found, but it may not be exact information for the particular plant you have. The

**Figure 1. Purple Coneflower (*Echinacea purpurea*).** (Photo courtesy Loren Park.)

second part of the Latin name, *purpurea*, is the more specific name or specific epithet. Both names together, *Echinacea purpurea*, are known as the species. Sometimes the specific epithet translates to a description of the plant, such as a color or a physical description. The current example, *purpurea* in Latin means purple. The two names combined are what many people use as the common name, purple coneflower. However, the common name of a plant can be deceptive, as it may not describe the plant at all. Many plants are known by several different common names. There are many common names used to describe plants around the United States and all over the world. Many unrelated plants could have the same common name, while one plant could be known by several common names, making it confusing when communicating with others. In cases related to eating or using a plant for medical purposes, getting it wrong could be a fatal mistake. It may be difficult to remember the Latin names of plants, but it is the most accurate way to find the plants you want, the information you need for its care and eliminate any mistaken identities.

Different species, varieties and cultivars can have different requirements for care. Differentiating varieties and cultivars can be tricky and are two terms that should be used correctly, especially in the horticulture industry. A variety is a plant that will have the same characteristics as the parent plant, such as flower or leaf color. Varieties often occur naturally and will normally reproduce true from seed, meaning they look like their parents. On the other hand, most cultivars require human intervention to maintain specific traits and characteristics. Cultivar is short for cultivated variety. Cultivars usually occur from a mutation or can be a hybrid from two plants, but often are not able to be regrown from collected seeds. Scientists select specific traits to breed plants to create a new cultivar. A cultivar might not look any different, but may be more cold tolerant or better adapted to different conditions. The cultivar name is at the end of the specific epithet, usually in single quotation marks, such as *Echinacea purpurea* 'Magnus.'

## Annual vs. Perennial vs. Biennial

Two important terms to understand when choosing plants are annual and perennial. Another term you may come across is biennial. These terms indicate the lifespan of the plant. An annual plant is one that grows, flowers and reproduces to complete its life cycle in one season. These plants are typically good for adding color to the landscape. Coleus (*Solenostemon scutellarioides*), petunias (*Petunia integrifolia*) and pansy (*Viola tricolor*) are examples of annuals in zone 7 (Figure 2). A perennial is a plant that lives for several seasons and may flower and reproduce each year. Herbaceous perennials often "die" back to the ground during freezing temperatures, but start growing again when the weather warms up. Woody perennials will typically maintain a shrubby or woody branch growth throughout the winter. Some woody perennials are called evergreens, meaning retain their leaves in the winter months. Other woody perennials are deciduous, meaning they drop their leaves in colder temperatures. Perennials will stay in the same place for several years, so you want to plant them in a place that allows for this, keeping in mind the natural size of the plant. Hostas (*Hosta crispula*), butterfly weed (*Asclepias tuberosa*), and clematis (*Clematis koreana*) are a few examples of zone 7 perennials. Just because a plant is perennial in one location does not mean it is perennial in another. A perennial in hardiness zone 7 may be an annual in zone 5 because the colder temperatures may kill the plant. Knowing whether a plant is annual or perennial allows you to give it enough space to grow for the amount of time it will live. Biennials are a little different than annuals and perennials. They will only live for two growing seasons. They usually produce foliage in their first year, then flower, produce seed and die the following year. If there is a drought, extreme cold and hot periods or any other extreme weather patterns, the plant could complete its life cycle in one year. A few examples of biennial plants include carrots (*Daucus carota*) onions (*Allium cepa*) and Canterbury Bells (*Campanula medium*).

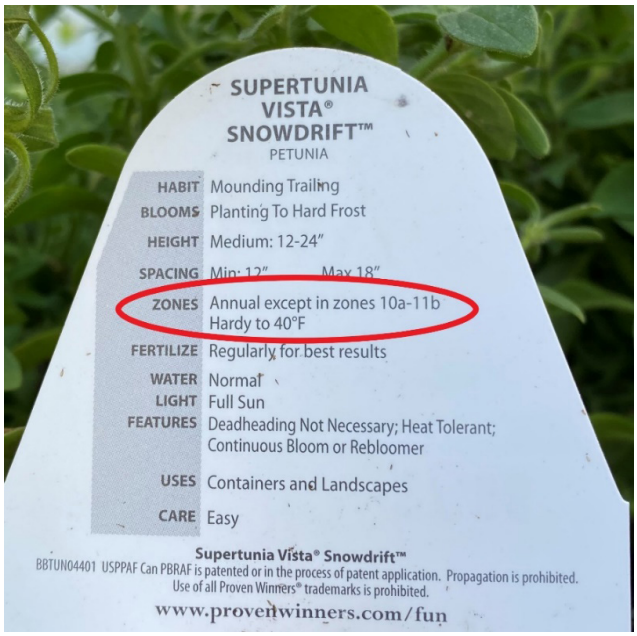


**Figure 2. Example of annual plant in zone 7.**

## Hardiness/Heat Zones

The USDA Hardiness Zone map was developed to show the average low winter temperatures (Figure 3). This allows gardeners to know what plants are most likely to survive in their area. There are 13 zones with a 10-degree F difference between the zones. Each zone is further delineated with 5-degree F differences dividing the zone further into a and b, 7a and 7b for example. Oklahoma is divided into three hardiness zones. The northwest corner of the state is in zone 6a and progressively increases to the southeast corner of the state in zone 8a. Although the hardiness map shows the average minimum temperature, it does not consider microclimates. Microclimates are localized areas that differ from the average climate, which provide a small area with different growing conditions. This could be on a side of a building, brick wall or a tree blocking the sun or wind; or being in a valley or on top of a hill. A tree could reduce the temperature by several degrees, or a building could block the wind from drying the ground. A wall made of bricks, especially on the south side of a building, could radiate a lot of heat. This could cause the plants next to the wall to dry out or overheat. Microclimates also can be used to the gardener's advantage by providing a space more appropriate for a plant that might not otherwise work in their landscape. It is important to notice these differences before planting your landscape garden. Make sure plants can tolerate these different microclimates. Another factor to consider is how much heat the plants can withstand. The American Horticultural Society created the heat zone map (Figure 4), which shows how many days a year an area is more than 86 F. It starts with zone 1, which has less than one day a year over 86 degrees F to zone 12 which has more than 210 days a year over 86 degrees F.

## Plant Light Requirements

All plants need at least some degree of sunlight to survive, whether it is direct or indirect. Sunlight is necessary for plants to photosynthesize and create energy for themselves. A major factor to take into consideration is the amount of sunlight your landscape or garden is exposed to each day during the growing season. Understanding the terms used to describe the light requirements for your plants also is important. What does full sun, part sun, part shade and full shade mean? Before learning the specifics of these terms, it is important to know how

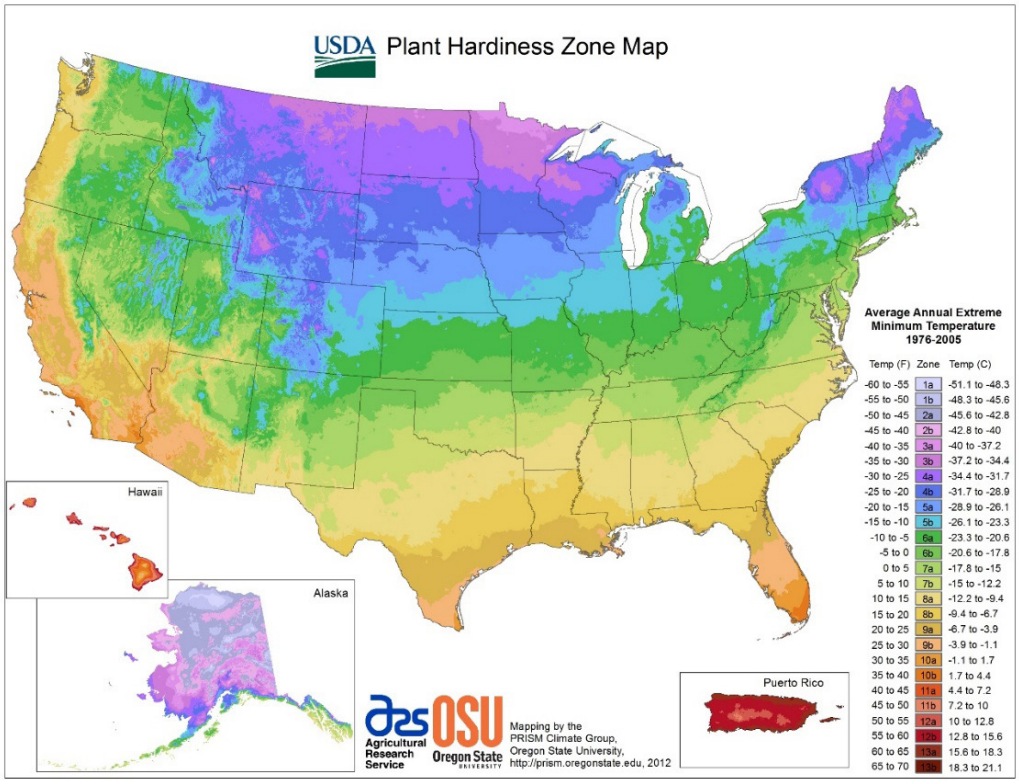


**Figure 3. USDA Hardiness Zone Map.**

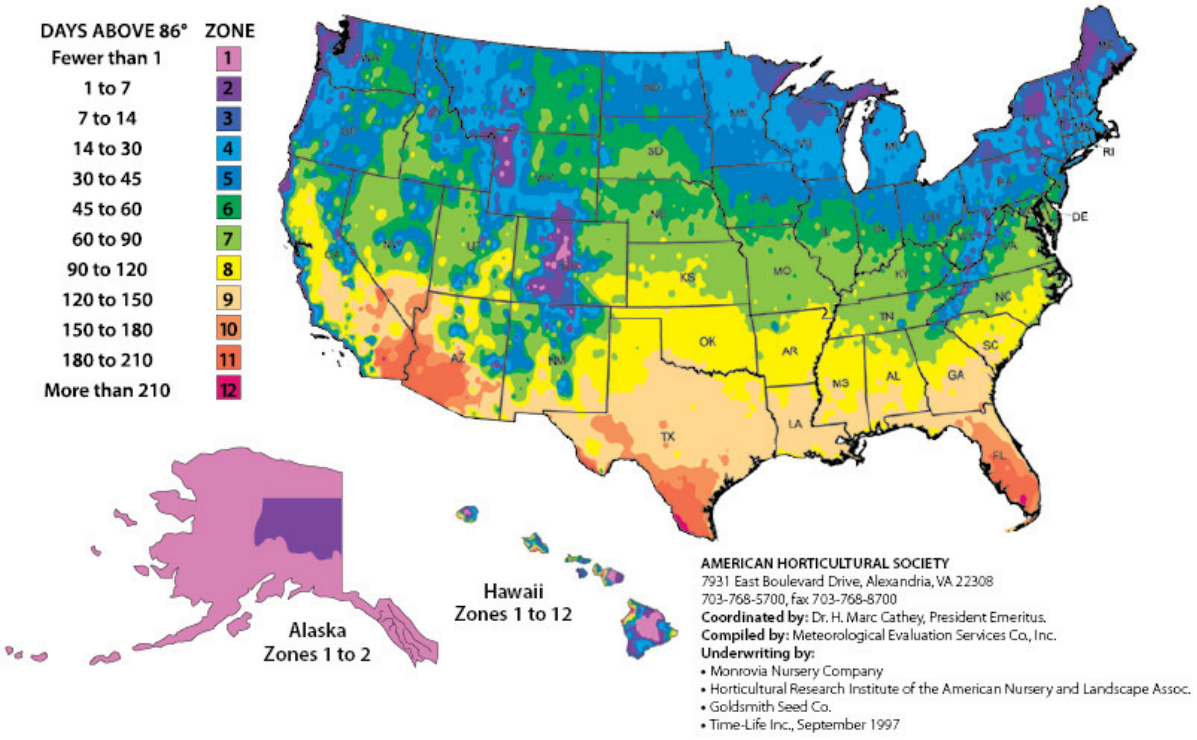


**Figure 4. Heat Zone Map.**

much sun you can provide to plants. Spend some time tracking how much sunlight the different areas of your garden receive. Also, make note if the sunlight is received during the morning or afternoon. Morning sun, especially during the summer, is less intense and is better for plants that like shade. Keep in mind the sun exposure will change throughout the season as the sun is further north in the summer.

Full sun is probably the easiest term to understand of the light requirements. This term is applied to plants that need at least six or more hours of direct sunlight a day. Plants that produce fruit or vegetables usually need full sun to produce successfully. Some plants, even though they need full sun, struggle in the intensity of the Oklahoma summer sun during the afternoon. It is imperative to keep an eye on the plants to make sure they are thriving where they were planted. If they are struggling, move them to an area with less afternoon sun.

Part sun plants will thrive with three hours to six hours of direct sunlight per day. Plants such as herbs often can perform well in part sun. Part shade plants require between three hours and six hours of sunlight per day but need to be protected from the mid-day sun. These types of plants will thrive when receiving morning sun. Full shade plants tolerate two or fewer hours of direct sunlight per day. If they receive sun, it should be during the morning when the sun rays are less intense or filtered sun through a tree. Sometimes more than one term is used to describe the light requirement of a plant. The plant care tag could state sun/part sun, shade/part shade or part sun/shade (Figure 5). The first term listed is what the plant needs, but it can tolerate the second term listed. For example, the Lakota™ Fire Coneflower requires full sun/part sun as seen in this image. It thrives being exposed to full, direct sun but also can survive in an area that receives some shade.


**Figure 5. Example of plant sun requirement.**

## Soil

Soil is a living body and the first major building block for any garden. Soil provides air, water, physical support, temperature moderation and nutrients for plants. Soil is composed of approximately 45% mineral matter, 25% air, 25% water and 5% organic matter.

### Soil Texture

The mineral particles of soil are divided by size and categorized as either sand, silt or clay. Sand particles are the largest in size, clay the smallest. The relative proportion of grain sizes in a soil is the soil's texture. To help describe soil texture, names have been given to soil types, i.e. sandy loam, clay loam, etc. (Figure 6). Sandy soils drain quickly, but have low nutrient- and water-holding capacity. Clays have high nutrient- and water-holding capacity, but drain very slowly. Loamy soils are the ideal soils with the best nutrient- and water-holding capacity.

### Soil Structure and Drainage

Soil structure is determined by the way sand, silt and clay are arranged into aggregates called peds. Peds come in different shapes: blocks, plates, columns, spheres and structureless. Soil structure determines the movement of water through the soil, affects seedling emergence, root growth and depth of the rooting system. Without good soil structure, the soil will have slow internal drainage. Without good internal drainage, soil air is reduced, roots die, hormone production in the root tip slows or stops completely, salts build up to toxic levels and water absorption across the root membrane ceases.

Soil drainage is defined as the depth from the surface, and the amount of time the soil stays saturated in an area; it is not a measure of how quickly water drains from the soil. Good drainage is vital for a successful garden. The main classifications of soil drainage are:

- **Well Drained** – water is readily removed from the soil and does not interfere with root growth (Figure 7).
- **Moderately Well Drained** – water is removed from the soil somewhat slowly at times during the growing season and sometimes has an adverse effect on plant roots.

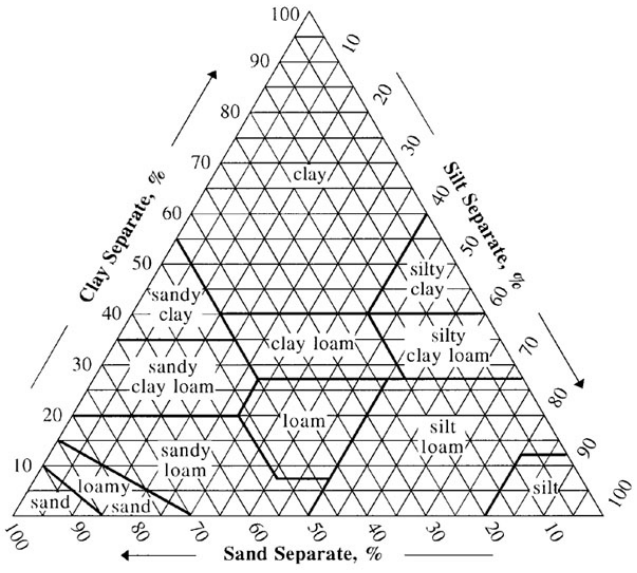


**Figure 6. Soil Texture Triangle.**


**Figure 7. Example of plant soil requirement.**

- **Somewhat Poorly Drained** – water is removed slowly, leaving the soil wet at a shallow depth for long periods of time during the growing season. The wetness of the soil inhibits the growth of most plants. Artificial drainage can be used to mitigate this problem.
- **Poorly Drained** – water is removed so slowly that the soil stays wet at a shallow depth for most of the year. Without artificial drainage, most plants cannot survive.
- **Very Poorly Drained** – water is removed so slowly that without artificial drainage, most plants cannot be grown. The water table in this classification is near the ground surface for most of the year.

Soil drainage can be tested by digging a hole at least 6 inches deep and filling it with water. If the water level has not changed much in an hour, drainage is poor. If the water is totally gone, the soil does not hold water, and in turn, will not hold nutrients vital for plant survival. For more information on garden soils, reference OSU Fact Sheet HLA-6436, "Healthy Garden Soils."

Poor-quality soil can be amended to build up aggregates that will allow for good drainage. Organic matter added to soil can enhance the water and nutrient capacity of the soil.

## Soil Testing and Nutrient Needs

The ideal way to begin a garden is to have the soil tested prior to planning and planting. A basic soil test provides information on the levels of nitrogen (N), phosphorus (P) in the form of $P_2O_5$ (phosphate), potassium (K) as $K_2O$ (potash) and soil pH. Other elements may be tested upon request.

A soil sample from your yard or garden can be submitted to the local OSU Extension office for testing. They will send the sample to the OSU Soil, Water and Forage Analytical Laboratory to be processed. OSU Extension leaflet L-249, "Soil Testing…the Right First Step" is an excellent resource for information on how to collect and submit a soil sample. Soil test results include recommendations for pH modifications and/or nutrients needed to amend the soil, based on what you are planning to grow.

Soil pH is a measure of how alkaline or acidic a soil is. The pH scales ranges from 0 to 14, with 7 being considered neutral. Above 7 is basic or alkaline, below 7 is acidic. The ideal pH for most plants is between 6.5 and 7.5. Lime can be applied to soil that is too acidic, while sulfur can be applied to lower the pH of the soil. Soil pH is important for plants, because nutrients in the soil are only available to the plant within specific pH ranges.

Although plants have different growth habits and amounts of sun or water needed, they all require at least 16 chemical elements to grow and reproduce. These nutrients are broken up into macronutrients (the nutrients plants need in the largest amount) and micronutrients (those not needed in large amounts). The six primary macronutrients are carbon, hydrogen, oxygen, nitrogen, phosphorus and potassium. Most plants' carbon and oxygen needs are provided from the atmosphere in the form of carbon dioxide and oxygen gas, while hydrogen is supplied through water. The secondary macronutrients are calcium, magnesium and sulfur. The micronutrients are molybdenum, manganese, copper, chlorine, boron, iron and zinc. Additional nutrients are sometimes needed for certain species' best performance.

Nitrogen deficiency is the most common nutrient deficiency in plants because it is needed for so many plant functions and it is mobile in the soil. This means it can be used up more quickly when there is root competition between plants; and it readily leaches out of the soil. Nitrogen is necessary for DNA and protein assembly that help plants grow and is a major component of chlorophyll, which is vital for photosynthesis to take place. Although potassium is immobile, in regions with high annual rainfall (greater than 35 inches), it can become deficient.

To correct nutrient deficiencies, synthetic and/or organic fertilizer may be added to the soil. Also remember to adjust soil pH if necessary, to allow nutrients to be available to plants. Synthetic fertilizers are premixed and labeled with three numbers that indicate the percentage by weight of nitrogen, phosphorus and potassium in the container. It is important to note that nitrogen (N) is always listed first on the container label, second is phosphorus (P) and third is potassium (K). This is also referred to as N-P-K. A complete fertilizer contains all three of these macronutrients, for example, 10-10-10. An incomplete fertilizer contains only one or two of these elements, for example 5-0-5 or 10-0-0. If your soil test indicates a deficiency of all three elements, a complete fertilizer should be used, if not, choose the incomplete fertilizer matching the element(s) needed. Organic fertilizers are by-products of a living organism, i.e. chicken litter, cow manure, compost or anything from once-living organisms. Most organic fertilizers do not have a nutrient guarantee like synthetic fertilizers do, which makes it difficult to know exactly how much to apply to correctly amend the soil. Regardless of the fertilizer chosen, be sure to amend the soil of the entire area intended for planting. It is important to only apply nutrients needed by your plants. Too much of one nutrient can affect the absorption of other minerals and can even harm the plants. More is not better and

can result in nutrient runoff, which is a waste of money and pollutes nearby streams and bodies of water.

## Bloom Time

When creating and designing a landscape garden, you will want to have color or flowers blooming throughout the growing season. Bloom time simply refers to the time frame a plant produces flowers. Herbaceous perennials and many shrubs typically bloom only at a particular time of year; while annuals can provide color throughout the whole growing season. Planning a garden with plants that have different bloom times will allow you to have color in your garden throughout the growing season. A few spring-blooming perennials include primroses, irises and peonies. Summer-blooming perennials include, but are not limited to roses, dianthus and garden phlox. A few examples of fall-blooming perennials include chrysanthemums, goldenrod and black-eyed Susans. Because different perennials will be blooming at different times, it creates a garden that changes as the season goes on. Some annuals to consider using are lantana, pentas and coleus. Using a combination of perennials and annuals will create a garden that changes during the growing season, but always has color. Grouping plants that have different bloom times together allows for continuous blooms and color in your landscape (Figure 8 and 9). Before planting a variety of plants into your garden, make sure they are planted in groups that have similar growing requirements such as sun exposure and water requirements.

## Plant Size and Spacing

It is important to know the expected height and width of a plant. This information will aid in deciding how far apart to space the plants. Correct spacing of plants allows for better airflow, thereby reducing possible diseases in your plants. Correct spacing also reduces competition for water and nutrients amongst plants. When properly spaced, perennials will not need to be divided too soon after planting. Most plants come with spacing instructions on their labels. The spacing of annual plants is not as critical as perennials, since they grow only for one season. If your annuals are given the proper conditions for growth, they can be planted slightly closer together and thrive. This practice will create more instant gratification as the plant will fill the garden bed faster. Keep in mind this will cost more, as it will require more plants to fill the same space. Disease problems can become a problem later in the season as the plants are maturing and have less air flow around them. Plant height is an important consideration when planning where to place your plants in the garden. Place the tallest plants at the back of the bed, medium height plants in the middle and the shorter plants in the front of the bed. This arrangement allows for a more dynamic view, making your garden more aesthetically appealing.

## Planting: When and How

The general rule for planting herbaceous annuals is after the last expected frost. According to data from the Oklahoma Mesonet, the average last freeze date ranges from March 26 in southern Oklahoma to April 25 in the Oklahoma panhandle. The last date to plant for a late summer garden ranges from six weeks to eight weeks or more before the first killing frost, which can occur from late October into early November in


**Figure 8. Example of summer & fall blooming plant.**


**Figure 9. Example of continuous blooming plant.**

Oklahoma. The best time to plant woody ornamentals such as shrubs and trees is late summer and fall and as late as October and early November. Dates will vary in other hardiness zones. If a frost occurs, you can cover the plants with row cloth to protect them. If you do not have row cloth an old sheet can be used. Just be careful in the placement of the cloth, to avoid plant breakage.

Before planting, consider the water needs of the plants. Placing plants with similar water needs together is an important step for successful plant growth. It also is a good idea to place the plants still in their pots, in the bed to help visualize the completed garden area (Figure 10); this will enable you to move the plants around prior to placing them in the soil.

The size and depth of the hole created for each plant is extremely important. The general rule is to dig the hole two to three times as wide as the plant container. Be sure to slope the sides of the hole to give the plant roots the maximum area to spread. The crown of a plant is where the shoots and roots meet. The hole should be dug to the depth where the crown of the plant sets right at or just above the soil line. The base of the stem could begin to rot if it is planted too deeply in the soil. If the roots are exposed from being planted too shallow, the plant could dry out quickly because the root ball is exposed to the air.

Once the hole is ready, carefully remove the plant from its container. To avoid damaging the plant, do not pull it from the container by the stem. Turn the container upside down and tap the bottom to loosen the plant. It may be necessary to gently squeeze the sides of the container to remove the plant. Check the root ball before placing it in the ground. Many times, the roots have grown in circles in the pot because they have been in it for too long. Spread the roots out by using your fingers to loosen them. If they are too tightly interwoven, the rootball may need to be vertically cut 3 or 4 times with a knife. Be sure the roots point outward when placing into the hole. If the hole is too deep when you place the plant in it, remove the plant and add some soil to the hole, pressing it into the bottom of the hole, then set the plant. Now, add soil to fill the hole around the plant. Gently press the soil around the plant. The newly set plants need to be thoroughly watered. Apply water until it puddles in the soil around the plant. The fact sheet HLA-6414, “Planting Trees and Shrubs” provides more information on proper planting.

**Figure 10. Example of planning before planting the landscape garden.**

## Irrigation and Mulch

Irrigation is an important component of any type of garden. There are many variations of irrigation on the market. The most efficient and water conscious type is drip irrigation. Drip irrigation systems operate at lower pressures than conventional systems, can be installed above ground and provides water at the base of individual plants, which is precisely where the plants need it most. Because it operates under lower pressure, and typically produces large droplets of water that are slowly applied, the water does not get carried away by the wind or dampen the foliage, which could cause fungal issues.

Another way to help the ground stay moist is by using mulch (Figure 11). Mulch helps the soil retain water and creates a layer between the soil and the sun. This slows the evaporation of water, reducing the need to water as frequently. Mulch also suppresses weed growth, minimizes the time needed for weeding and provides a nice finished look to the landscape. There are many types of mulch on the market available for purchase including natural and synthetic variations. Natural mulches are among the most popular types of mulch; a few include straw, grass clippings, leaves, hulls (pecan, cottonseed, cocoa), paper/cardboard and wood chips. Organic mulch will improve organic matter in the soil as it decomposes through time. The organic mulch should not have any viable weed seeds, chemicals or herbicide residues. It also is important to make sure there are no diseases or pests in the natural mulch. Examples of synthetic mulches include various types of rock, plastic and landscape fabric. Plastic mulches do not break down over time, so do not add nutrients or organic matter to improve the soil. Dark mulches are good for warming the soil because they absorb heat from the sun. Each mulch has pros and cons and should be chosen based on the gardener’s desired effect and need. Generally, 3 inches to 4 inches of organic mulch should be applied annually, as it will break down. Thicker layers of mulch may limit oxygen to the roots, resulting in shallow root growth. Irrigation should be laid down before placing the mulch to allow for moisture to reach the soil and rootzone. If using a sprinkler over impermeable plastic mulch, slits will need to be cut into the plastic to allow the water to penetrate the plastic.

## Plant Pests and Pathogens

If the correct amounts of water, nutrients and light are provided to plants, but defoliation, discolored or yellowing leaves or other signs that something is amiss, it may be due

**Figure 11. A mulched landscape with drip irrigation.**

to a garden pest or plant pathogen. The most accurate way to identify a possible pest or pathogen is to consult the local OSU Extension educator. To find the nearest office, visit https://extension.okstate.edu/county/. If they are unable to determine the problem, they will send a sample to the OSU Plant Disease and Diagnostic Laboratory. For detailed instructions on how to receive a diagnosis please refer to OSU Extension leaflet L-220, "Plant Disease & Insect Diagnostic Laboratory."

## Summary

Planting and maintaining any kind of garden is a lot of work and can seem like a daunting task. However, there is little else as rewarding as watching the little plants you planted grow with each season and fill the garden. Gardening allows you to get outside in the fresh air and take a step back from the busyness of life. Understanding these basic concepts is a great jump start to having a healthy and beautiful landscape garden. Information is always being updated, and new, more efficient techniques are being adopted. The best way to learn and become knowledgeable about how your garden performs is by getting your hands dirty. Do not be afraid to experiment with new plants or try different techniques. The OSU Extension office is a great resource to utilize.

**For more information:**

E-1034 Master Gardener's Manual
HLA-5425 Annual Flowers for Specific Uses in Oklahoma
HLA-6004 Oklahoma Garden Planning Guide
HLA-6410 Perennial Flowers for Specific Uses in Oklahoma
HLA-6414 Planting Trees and Shrubs
HLA-6436 Healthy Garden Soils
L-220 Plant Disease & Insect Diagnostic Laboratory
L-249 Soil Testing…the Right First Step

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