

Master Gardener

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Establishment and Care of Herbaceous Ornamentals

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Herbaceous ornamental plants comprise a large group of annual and perennial plants. They offer a variety of color, form, foliage, texture and fragrance that add distinctive touches of beauty and interest to personalize your garden and landscape.

Most herbaceous ornamentals are easy to grow and care for. They bring pleasure to the gardener and to those who observe their blossoms and foliage. They also provide a supply of flowers to cut for bouquets for one's own enjoyment or to share or sell.

Get ready to grow

With hundreds of different types of decorative herbaceous plants, the possibilities for their uses are nearly endless. Plants' varied color, texture, form, height, bloom season and environmental needs and adaptations make designing a flower garden an exciting labor. Yet this variation can also make it a daunting prospect to plan a flower garden or a landscape that will include multiple flower species.

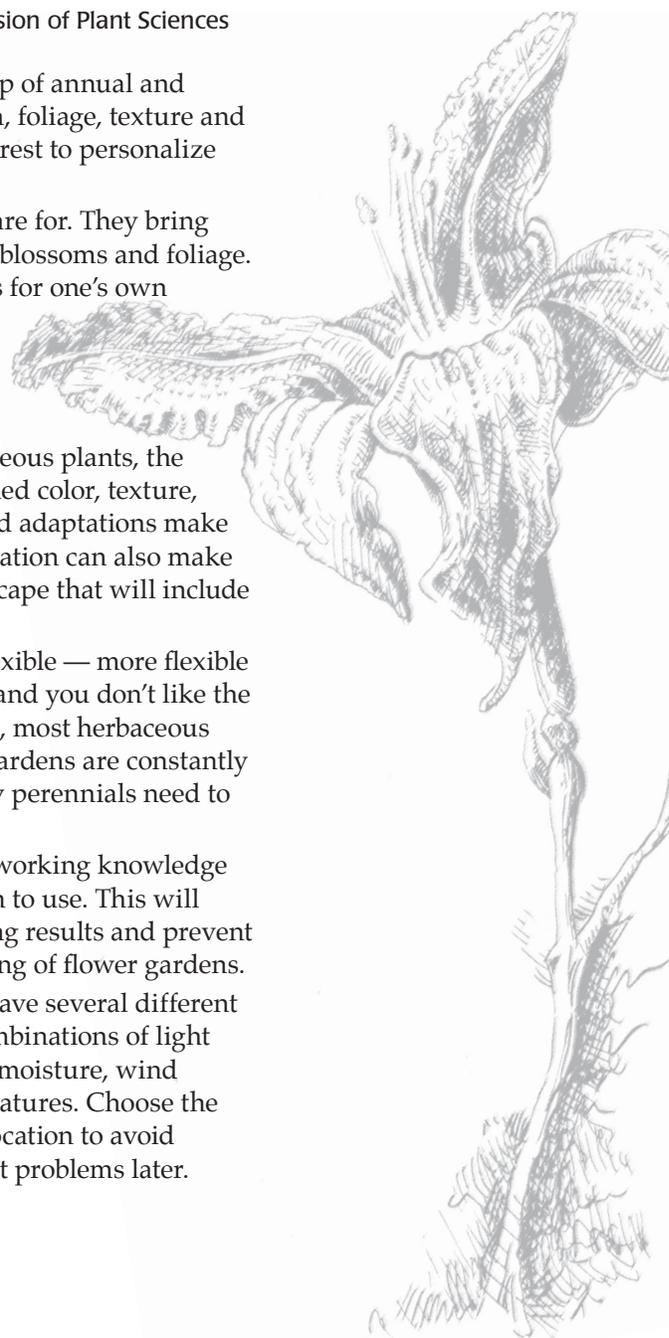
Keep in mind that annual and perennial plants are flexible — more flexible than woody trees and shrubs. If you plant a flower bed, and you don't like the effect, or the flowers do not perform well in that location, most herbaceous ornamentals can readily be moved or replaced. Flower gardens are constantly changing. Annuals must be planted each year, and many perennials need to be divided and transplanted every few years.

Start with a good working knowledge of the plants you plan to use. This will ensure more satisfying results and prevent unnecessary reworking of flower gardens.

Most landscapes have several different microclimates, or combinations of light exposure, soil types, moisture, wind exposure and temperatures. Choose the right plant for each location to avoid maintenance and pest problems later.

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Light

The amount of sunlight available is a primary consideration for placing plants in the right location. As you select plants for your landscape, look for the following terms that describe plants' light preferences:

- **Full sun** is customarily defined as at least 6 hours of direct sunlight per day.
- **Partial or light shade** are terms used when a plant receives direct sun much of the day, but is shielded from direct sunlight for several hours. These terms also apply when the plant receives only a little direct sun early or late in the day, under trees pruned with high clearance or where the main light is reflected from buildings.
- **Shade or dense shade** refers to areas with low light levels most or all the time, such as under large trees with heavy foliage. Plants growing in such conditions not only must adapt to low light levels, but also must withstand competition from tree roots.

As a general rule, the more sunlight, the more profusely plants will bloom. A plant that prefers full sun might bloom in partial shade, but blossoms will be fewer. Similarly, one that blooms well in light shade might have only sporadic blooms in dense shade. In sunny regions, several hours of shade during the hottest part of the day help protect plants from the peak of summer heat. (See MU Extension publication G6911, *Gardening in the Shade*, online at extension.missouri.edu/explore/agguides/hort/g06911.htm.)

Soil

Soil type, texture and condition are as important as light availability. A rich garden soil works best for most flowers. This type of soil holds moisture well and provides a good growing medium. Clay soils tend to crust over or form large cracks as they lose moisture. Rocky soils are too shallow to permit good root growth, and sandy soils dry out too quickly. In areas where clay, rocks or sand predominate, soil amendments or replacement will improve plant performance.

To correct any of these situations, either plan to bring in additional, high-quality topsoil to build raised beds on top of the existing soil or plan to improve the existing soil deeply and thoroughly by incorporating organic matter before planting. Normally, 2 to 3 inches of compost, peat moss or well-rotted manure worked into the top 6 to 8 inches of existing soil will be sufficient. After thorough soil preparation, roots will be able to penetrate more deeply to reach nutrients and moisture. Plants will be more vigorous and less susceptible to pest problems.

Water and drainage

The moisture-holding capacity of the soil and its internal drainage are closely linked to soil type. The ideal soil consists of about 45 percent mineral matter, 5 percent organic matter and 50 percent pore space, which should be split evenly between water-filled and air-filled pores. When pore space is too small, the soil lacks oxygen and is said to be poorly drained.

Excellent internal soil drainage is important. This is especially true for perennials. Without good drainage, plants are subject to crown rots, root diseases and heaving during winter's alternating freeze-thaw cycles. Soils can be improved, or amended, by adding organic matter. This will improve internal drainage.

Information in this publication is adapted from text originally developed by Denny Schrock, formerly with the Department of Horticulture, University of Missouri.

External drainage of the site matters, too. If the spot is low and moisture that drains through the soil has nowhere to go, additional drainage may be needed. Creating a raised bed, or berm, is a possible solution (see box). If little or no drainage improvement is feasible at a certain location, limit your plant selection to those that can tolerate poor soil aeration and wet conditions.

Air movement

Air circulation is another important environmental consideration for a flower bed site. Poor circulation may be caused by windbreaks, fences, buildings, trees, shrubs or even other flowers planted closely together. Where stagnant air pockets occur, foliage will remain damp for extended periods from dew, rain or irrigation, which encourages diseases to develop.

Air movement may be increased by providing adequate spacing between plants, thinning out branches from trees and shrubs, or by pruning trees high to allow air flow beneath their canopies. Air movement can also be increased by funneling breezes through constructed landscape features such as arbors or narrow openings between buildings.

Where a site is exposed, there can be too much air movement, especially for plants that are not considered hardy. You may need to provide wind protection for such sites. Good air flow is desirable, but high winds can easily damage seedlings and tender blooms and knock down tall plants.

Diseases and pests

Although most herbaceous ornamentals have few serious disease or insect problems, the incidence of pests varies in type and severity from year to year in different areas. You can control most of them effectively if you follow these general recommendations:

- Buy plants that are free of diseases and insects.
- Purchase disease-resistant species and varieties when available.
- Remove seriously diseased or insect-infested plants from your garden as soon as you notice them.
- Apply fungicides and insecticides only as needed, and follow label directions carefully.

Temperature and climate

Herbaceous ornamentals may be classified as either cool-season or warm-season plants, according to their preferred growing temperature range. Many plants have both an upper and a lower temperature threshold, beyond which they do not thrive. Whether a plant is considered hardy or nonhardy depends on its ability to withstand cold temperatures. Most plants will sustain damage if the temperature drops below their winter hardiness threshold. For some plants, this might be zero degrees Fahrenheit. For others, it may be as low as minus 20 degrees or as high as 40 degrees.

Hardy plants that tolerate cold temperatures often have a correspondingly low upper temperature threshold: If the temperature rises above this point for several days, these plants are likely to sustain heat-related damage. These plants are referred to as cool-season plants, and they generally do not thrive in areas with higher summer temperatures. In contrast, warm-season plants more easily tolerate heat and will sustain cold injury at warmer temperatures.

Berms and raised beds

A berm is a raised bed area where the gardener elevates the bed by bringing in a higher quality topsoil and building the planting bed up from ground level by at least 10 inches. Soil in a raised bed warms and dries out more quickly in the spring, which can give plants a good start.

Berms can be as small as one truckload of topsoil, or as large as multiple truckloads. They can be shaped to create a nice garden oasis, or shaped in a straight line to create a visual barrier. A berm should be proportional to the overall landscape and blend in as naturally as possible with the overall garden design.

Berms also divert water or block the natural flow of water, so use caution in locating them to avoid creating drainage problems elsewhere.

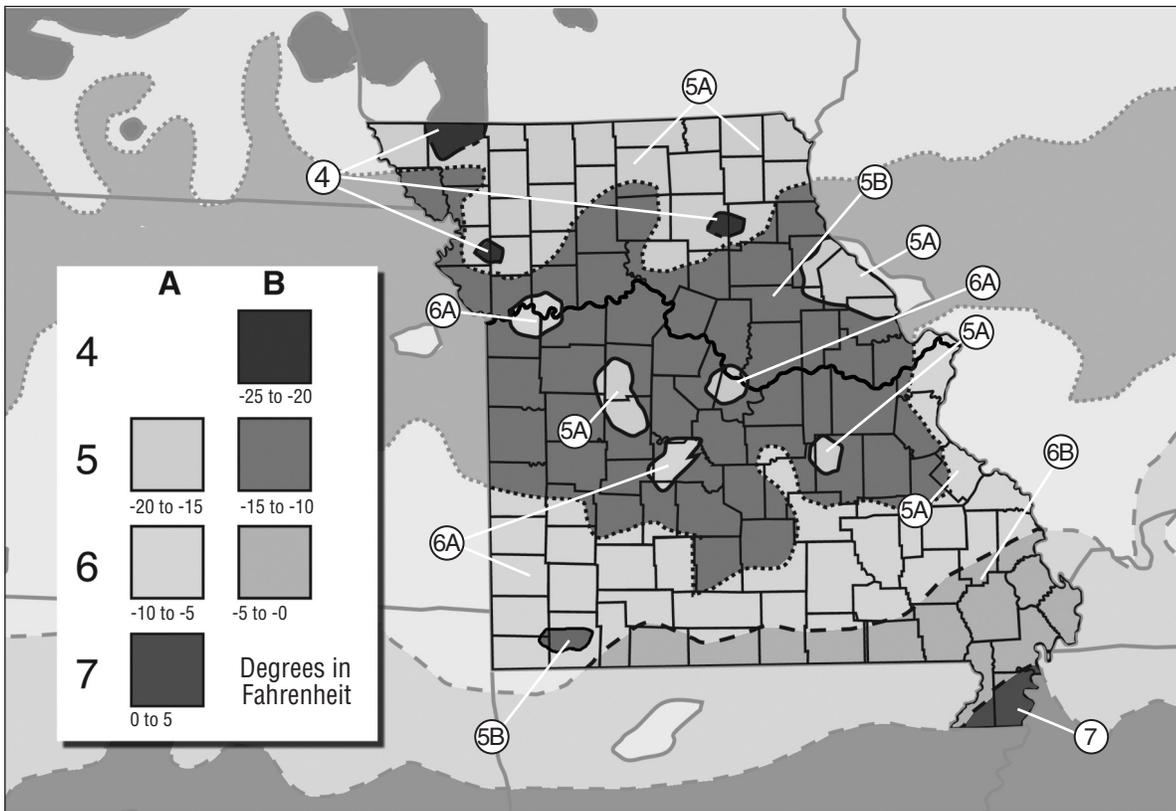


Figure 1. Plant hardiness zone map of Missouri.

Information about an area's typical weather conditions such as the plant hardiness zone can help gardeners select species and varieties well-suited to local growing conditions.

Source: U.S. Department of Agriculture

Several maps have been compiled to provide gardeners with useful information about temperature and weather patterns in different locations in the United States (see Figure 1). The following maps portray climatic information in different ways:

- U.S. Department of Agriculture Plant Hardiness Zone Map shows 11 distinct plant hardiness zones for North America, online at usna.usda.gov/Hardzone/ushzmap.html or see the updated version from the National Arbor Day Foundation at arborday.org/media/zones.cfm.
- American Horticultural Society Heat Zone Map shows 12 heat zones that are based on the average number of days when temperatures reach or exceed 86 Fahrenheit, online at ahs.org/publications/heat_zone_map.htm.
- Sunset Garden Climate Zones Map takes into account heat, cold, moisture and altitude for specific geographical areas in the United States, online at sunset.com/sunset/garden/article/1,20633,845218,00.html.
- Most states also provide state-specific agricultural weather-related information, such as average dates of last spring frost and first fall frost, through the state extension service and partner agencies. In Missouri, this information is available at agebb.missouri.edu/weather.

At a smaller scale, microclimatic temperature differences that occur over a landscape or garden can also have a dramatic impact on the success or failure of herbaceous ornamentals. For example, southwest slopes exposed to full sun are much warmer than north-facing slopes. Match the plant's temperature preference to your microclimate for best performance.

Planning and design

Landscape design can be defined as organizing and enriching outdoor space through the placement of plants and structures in an agreeable and useful relationship to the natural environment. Merely planting trees and shrubs is not landscaping. Landscaping is creating a plan or design to make the most of a site's natural features and advantages. Herbaceous ornamentals are usually an integral part of a landscape design. Not only do they add beauty and interest, but in some cases, strategic selection and placement of ornamental plants can help solve practical landscaping problems, such as by camouflaging unsightly features of a yard or highlighting walkways or other features.

Flower garden styles

Two typical types of flower beds are borders and island beds. A flower border is anchored in place by its backdrop. The backing may be one of several features — a home or outbuilding, a fence, a wall or woody plant materials. A border is generally meant to be viewed from one side and placed where it can be seen from indoors or from outdoor living or traffic areas. In contrast, an island bed is meant to be viewed from all angles. It is out in the open, usually in the middle of the lawn and may have a central focal point, such as a tree or a bird bath.

Another way to categorize flower beds is by formal or informal style. Formal beds have distinct geometric planting patterns such as circles, rectangles, triangles or straight lines. The geometry may be repeated in the overall shape of the bed, with a long, straight edge to a border or a perfect circle island bed. Plant spacing, color combinations and layout are precise. In general, beds are more formal and borders more informal in their design. An herb knot garden is an example of a formal planting. Informal flower beds are characterized by curved, free-form flowing bed edges, relaxed color combinations and intermingled plants of varying height. A classic example of the informal garden is the English cottage garden. A wildflower meadow is another example of informal style.

Dimension and scale

Dimensions will depend on the scale of the landscape. Normally, a flower border is several feet deep from front to back and many feet long. A 3-foot by 8-foot border next to a patio may present pleasing proportions, whereas a 12-foot by 100-foot border may have more appropriate dimensions for an open farmstead. When the flower border is deeper than 4 feet, you will need access points or walkways to facilitate weeding, watering, deadheading and other maintenance chores. Similar size and scale considerations apply to island beds.

Arrangement

In most cases, the tallest plants are placed at the rear of a border or in the center of an island bed. Then, plant height gradually decreases from the back to the front of the border or from the center to the edge of the island bed. Plants should be placed in groups rather than used as single, isolated plants. This is particularly true of front- (under 1 inch tall) or middle-border (1 to 3 inches tall) plantings where one or a few plants do not have enough impact to stand alone. However, if they are sufficiently large, single specimens of back-of-the-border or central island bed plants might be used attractively.

A cluster of three, five, seven or more plants, depending on individual size, could create a planting of sufficient visual mass to attract attention. Avoid even numbers of plants and planting in long straight lines. Instead, use double or triple rows with staggered spacing to create the impression of a somewhat natural drift rather than a regimented row. However, front-of-the-border plantings may be set in elongated, narrow groupings to create an edging effect that enhances the appearance of a long stretch of border.

Color

Color can be used to create a specific mood in the garden, accentuate a particular feature or alter the impression of distance. Color choices help personalize a garden and provide interest to the landscape.

Color combinations

Those who are timid about mixing flower colors can follow tried-and-true color combinations. Colors directly opposite one another on the color wheel (Figure 2) make good pairings. For example, yellow zinnias planted next to purple heliotrope, or orange marigolds and blue lobelia, make striking combinations. These color pairings are called complementary.

Another color strategy is to use colors next to one another on the color wheel, such as yellow, yellow-orange and orange. These color combinations, called analogous, provide a pleasing association.

A color triad is a color pattern that often provides dramatic results. In this color scheme, the combinations result from drawing an equilateral triangle inside the color wheel.

Red, yellow and blue make up one triad; green, violet and orange are another.

Monochromatic, or one-color schemes use lighter tints and darker shades of the same basic color. For example, pink, red and burgundy are a monochromatic color scheme based on the color red.

Several colors are considered neutral. That is, they can be used with other color combinations without significantly changing the effect. Gray and white are the main colors usually considered neutral, but you can also use green foliage as a neutral feature in flower gardens. Neutral colors are good for toning down the effect of sharply contrasting colors. They also help separate colors that may each be strong or that may even clash if placed next to one another.

These color strategies are long-time favorites, but adventurous gardeners need not stick with set color schemes. Feel free to use any combination that appeals to you. After all, the landscape that you plan and manage is there for your enjoyment.

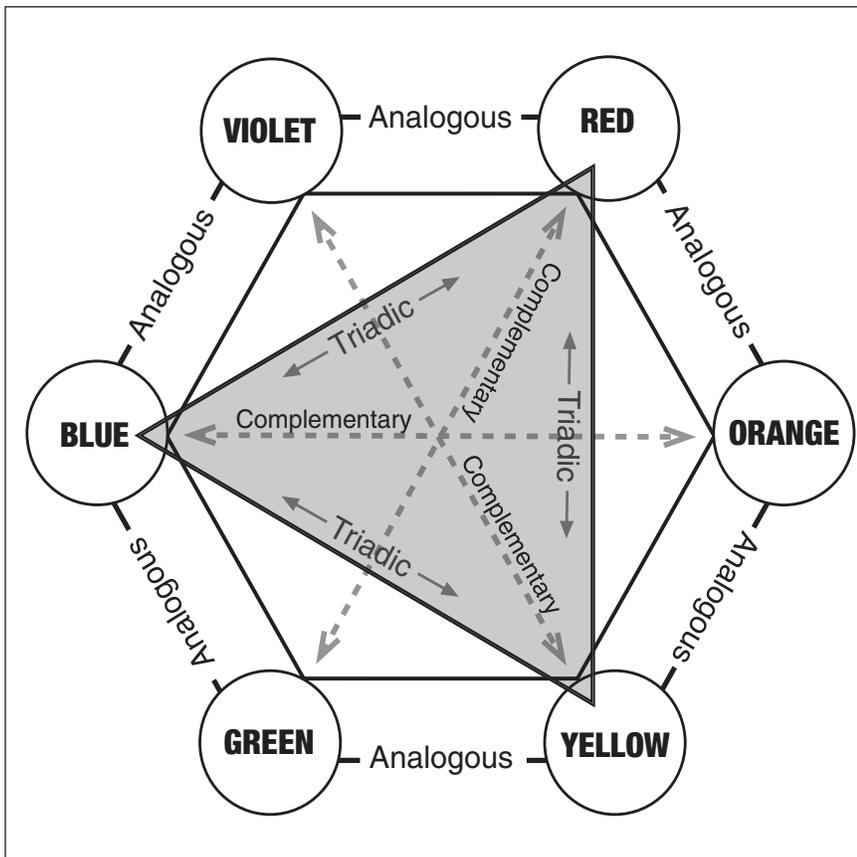


Figure 2. Color wheel.

Gardeners can use a color wheel to plan color combinations for landscaping effects.

Color effects

Thoughtful use of color can help achieve special effects in the landscape or even solve practical problems. For example, to create the impression of a more intimate space, with less distance between the viewer and the planting, choose bright colors that tend to draw a viewer's attention. Use bright reds, oranges and yellows in the distance. Bright colors also create a festive mood, so use fiery color combinations next to outdoor entertainment areas. For the same reason, red and yellow flowers are good to use near landscape focal points such as a front entry or a featured island bed planting. If you have steps in your garden, consider planting yellow flowers next to them to provide a subtle alert that pedestrians should walk carefully.

Dark colors like blue and purple appear to recede. They seem farther away than they really are. In a small area, use these darker colors to give an impression of spaciousness. Blues and purples also create a sense of coolness, even in 95-degree heat. Add the soothing effect of pink, and you can create an amiable color backdrop for quiet, outdoor conversation or relaxation.

If evening is the main time you enjoy your outdoor living spaces, use light tints of white, pale pink or creamy yellow that stand out in twilight or in shady areas. Line paths with light-colored flowers to help define walkways.

Preparation and planting

When it comes to flowering plants, a little preparation will go far to ensure the gardener's success and satisfaction. The advance work for your flower garden should include preparing the seedbed, initiating weed control and setting up an irrigation system. It is also important to choose viable seed and healthy plants and to plan the timing of gardening activities.

Good informational resources include MU Extension publications, which are often online, other garden-related Web sites, such as those listed at the end of this publication, and the staff at your local garden center.

Preparing the soil

Proper soil preparation enhances success with flowers. First, have the soil tested and adjust the pH and fertility levels as recommended. Conduct your own percolation test to check drainage. If water poured into a 10- to 12-inch-deep hole does not drain completely within several hours, plan to improve the drainage. Add organic matter to loosen heavy clay soil. Also, avoid working the soil when it is too wet, which can ruin soil structure.

You might also consider creating a raised bed for flowers. A raised bed is merely a planting bed where you pile up amended soil, or more rich topsoil brought in from another location. These raised areas can be any shape or size to suit your space and desires. Raised beds increase drainage and soil quality and usually provide a looser soil that plant roots can more easily penetrate. Try to avoid creating raised beds around trees. Soil piled against a tree trunk creates ideal conditions for collar rot, which can kill the tree. Extra soil piled over the root system of a sensitive tree can severely damage or kill the tree because the root system does not receive adequate aeration. Also, some tree species, such as walnuts, can exude allelopathic substances into the surrounding soil, discouraging growth of other plants (see box).

Allelopathic

An allelopathic substance is a byproduct from one organism that inhibits growth in another organism.

Controlling weeds

Preparation is the first step to controlling weeds in ornamental beds. If at all possible, plan to work the bed for at least one year before planting to kill weeds as seeds germinate. Weed the plot regularly and thoroughly sift out roots of perennial weeds such as bindweed or quackgrass. This time also provides an opportunity to test the soil and make any needed improvements, such as incorporating fertilizer, lime or organic matter. A good seedbed sets the stage for healthy plants that can compete with weeds.

If perennial weeds are likely to be a problem, you may need to treat the area with a nonselective herbicide such as Round-up or Finale. Another method is to cover the bed with cardboard, newspaper or black plastic for about six weeks during the hottest part of the growing season, which will kill many perennial weeds and weed seeds.

Once the bed is established, mulch well to help reduce weed growth and conserve soil moisture. There are a number of good products to use for mulch, including hay, straw, shredded newspapers and landscape plastics or fabrics. More information about the pros and cons of different types of mulches and recommendations for their effective use are provided in the MU Extension publication G6960 *Mulches*, online at extension.missouri.edu/explore/agguides/hort/g06960.htm.

Timing

Spring and fall are preferred planting times, depending on the type of plant, though container-grown plants can be planted year-round. Annual flowers are usually planted in the spring as soon as danger of frost has passed. A number of frost-tolerant annuals, such as snapdragon, alyssum and dianthus, can be planted earlier if first hardened off (gradually adjusted to cooler temperatures). Annuals that thrive in hot weather (e.g., vinca) fare better if planting is delayed until the soil warms. Plant flowering kale late in the growing season for extra color until severe freezes arrive. Plant pansies in the early fall for late winter and early spring color.

For perennial flowers, a rule of thumb is to plant in the season opposite bloom. Early spring bloomers, such as iris, peonies and flowering bulbs, are best planted in the fall, while late summer bloomers are best to plant in spring.

Selecting and planting

Annuals are most often grown from transplanted seedlings sold in packs that contain multiple plants. Many can also be directly sown in the garden or started from seed indoors. They must be started each new growing season.

Perennials live several years. They are usually started from transplants or from “divisions” of plant roots or bulbs that the gardener separates from overgrown plantings. Some, however, can be grown successfully from seed if the gardener starts early.

Choosing seeds or transplants

Unless you have a greenhouse, well-lit sun room or seed-starting system with special plant lights, you may want to purchase transplants from a commercial grower. This is especially true for fine-seeded annuals such as petunias and begonias that take several months to reach blooming size. Even faster-growing annuals like marigolds and zinnias will become stretched and

weak if grown indoors from seed under inadequate light. The resulting poor quality transplants usually take a long time to recover once set outdoors.

Select only healthy plants that have good leaf color and texture, and are free of insects and diseases. If possible, check the roots by gently tapping the plant out of its pot. If this is not possible, and for plants in small multiple packs, look for roots hanging out at the bottom. This is usually indicative of root-bound plants whose roots have used up all available space. Unless they were watered frequently, these plants may already have suffered water stress. Good care after wilting does not always bring success to water-stressed plants. Perennials represent a greater investment per plant than annuals, so it is worth making an extra effort to select healthy plants.

Dormant plants are harder to evaluate than those that are growing. In general, if the bare parts of dormant plants are not excessively dry and plant structures look, smell, and feel healthy, the plants will grow. Avoid those that have started to grow in storage — the new growth may have long, floppy shoots, or it may be white or yellow or starting to decay. Such stressed plants may send out replacement shoots, but they often get a late start on weakened roots.

Setting out transplants

Before setting out plants, gradually harden them off for a few days. Before transplanting, make certain each cell or pot is moist. Prepare the planting site by digging a hole large enough to easily accommodate the root system and allow adequate space between plants to give them room to develop. Choose a cloudy day to transplant (see Figure 3).

At transplanting, thoroughly moisten the plant's root system. Remove plants from the packs by pressing on the bottom and gently popping them out. For a container-grown plant, tip the pot upside down and give it a sharp rap to remove the root ball, or cut the roots away from the pot. Loosen roots if they are growing in a tight mass or they encircle the root ball. For large root masses, make shallow, vertical slices in the root ball in several locations to encourage outward-growing roots to develop.

Set the plant no deeper than it was growing in its original container; the plant's crown should be even with the soil line. Then, fill in with soil and firm around the roots. Water generously, soaking the soil surrounding the root system of the new planting. To give plants a boost at transplanting, use a starter fertilizer high in phosphorus.

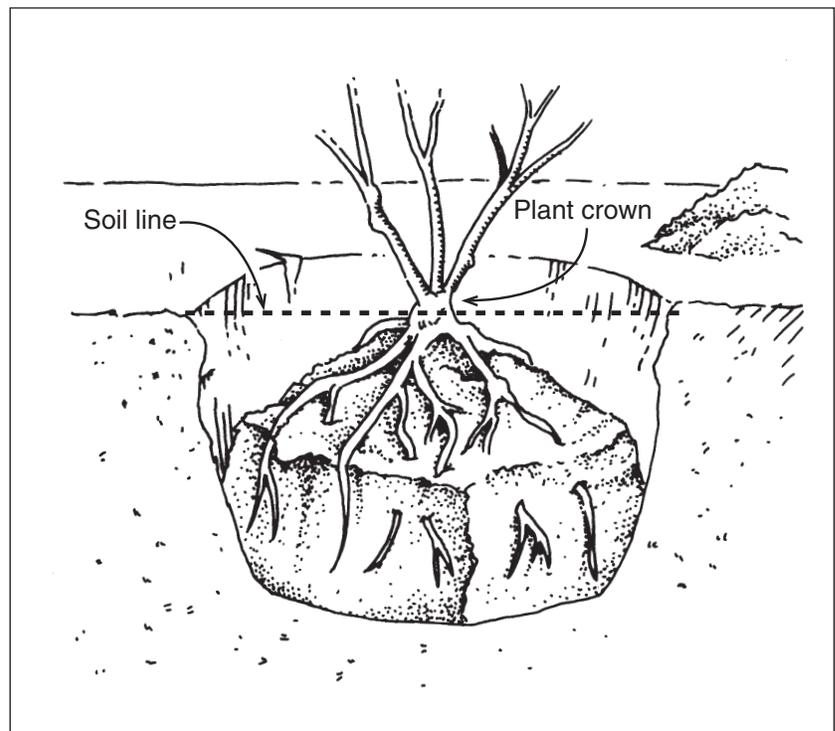


Figure 3. Starting transplants correctly.

Dig a hole large enough to accept the plant's root system comfortably. Set the bare-root plant into the soil so that the crown is even with the soil line and spread the roots over mounded soil. Fill in with soil and water with a solution that includes a starter fertilizer high in phosphorus.

Maintenance

Most herbaceous ornamentals are relatively easy-care additions to the home garden and landscape. With good planning and preparation, gardeners can limit the hours required for plant care. However, requirements range widely depending on species and varieties. To get the best results, gardeners can select plants that are most likely to suit their temperament and time availability. Regular maintenance tasks include watering, weeding, dividing plants, and disbudding to keep plants blooming and attractive. Cleaning up for winter will help prevent next year's pest and disease problems.

Watering

A basic irrigation system should be part of the plan for flower beds because rainfall is rarely sufficient during the growing season to maintain consistent, optimum moisture levels. Most herbaceous ornamental plants require between one and two inches of water per week during summer months. When watering, thoroughly moisten the entire bed but do not oversaturate. Allow the soil to become moderately dry before watering again.

A soaker hose is an effective way to water flower beds; it allows water to seep directly into the soil without waste and without splashing leaves and flowers. The slow-moving water does not disturb the soil or reduce its capacity to absorb water. Water wands and drip systems can also be used successfully. However, when using a hose-end water wand, the gardener must be patient: apply enough water to fully saturate the soil to an adequate depth.

Sprinklers are less effective for irrigation. Water from sprinklers wets the flowers and foliage, which makes them more susceptible to diseases. Soil structure can also be degraded by the impact of water drops falling on the surface. The soil may puddle or crust, preventing free entry of water and air. Sprinklers also waste more water than other types of irrigation as droplets evaporate or fall outside of the area that drains to plants.

Mulching

When used correctly, mulches can provide many benefits. Mulches help conserve soil moisture by reducing evaporation and they suppress weed growth. They also prevent crusting of the soil surface. Organic mulches add humus, or organic matter, to the soil. Bark, pine needles or shredded leaves make good mulches for flowers.

Generally, apply mulch 2 to 4 inches thick, using shallower depths for annual flowers and thicker layers for perennials. Taper the mulch layer from thicker at the outside edge to thinner near the plant. Do not pile mulch heavily over a plant's crown, which encourages rotting. Landscape fabric weed barriers have limited use in flower beds because dividing perennials or replanting annuals will require digging in the soil, which disrupts the fabric.

Mulching tips

Apply mulch carefully. Improper mulching can damage plants. Do not pile mulch heavily over a plant's crown, as this encourages rotting. Wait until late fall, after several killing frosts, to mulch. If you apply it too early, the retained warmth could encourage new growth that can damage plant tissues not sufficiently "winter hardened."

Remove winter mulch when growth starts in the spring to allow the soil to warm and assure that the plant receives needed light.

Source: *Maryland Master Gardener Handbook* (1996) by the Maryland Cooperative Extension Service.

Controlling weeds

Once the bed is established, mulch is the most effective, efficient and economical weed control. Because of the diversity among perennials, it is risky to chemically treat weeds with a non-selective herbicide when they are in close proximity to valuable plantings. A few herbicides are labeled for particular flower species. Check herbicide labels for safe and proper chemical use on both the flowers to be protected and the weed species to be controlled. If a specific type of flower or a specific weed is not listed on the label, that product should not be used for your situation.

You will likely need to pull some weeds by hand and do some cultivation or hoeing. Use a light hand, though. After plants are set out, try to limit cultivation to breaking crusts on the soil surface and uprooting shallow weeds. Deeper cultivation between plants can damage fine feeder roots. It also stirs the soil and brings additional weed seeds to the surface where they can germinate.

Disbudding and deadheading

To encourage large blooms instead of more numerous smaller ones, you can disbud plants. To disbud, remove small side buds. This allows the plant to concentrate its energy on producing one or a few large terminal blooms.

Some species of herbaceous ornamentals benefit from the removal of spent flowers before they are allowed to form seed. This procedure is called “deadheading.” With spent flowers removed, the plant continues to bloom instead of directing its energies into seed production.

Some perennials, such as mums and asters, which normally stop blooming after several weeks, can bloom for a second cycle when sheared back to force new growth.

To get compact, bushy plants with plentiful buds, pinch the growing tips as soon as plants are 6 to 8 inches high. This stimulates branching and the onset of more flower buds. Within weeks after pinching, new shoots will form. When these new shoots reach 6 to 8 inches, pinch them back again. In Missouri and surrounding plant hardiness zones 4-7, pinch three to six times until mid-July. After mid-July, allow the plant to fully develop flower buds.

Staking

Tall-growing flowers, such as dahlias, often need support to keep them from falling over in strong wind or rain. Stakes should be shorter than the ultimate height of the plant to keep them as inconspicuous as possible. Begin staking when plants are about one-third their mature size. Place stakes near the plant, but take care not to damage the root system. Secure plant stems to the stakes in several places with soft, loose ties that will not cut into the stem.

An alternative to staking is to grow tall plants within a framework of caging. Peony hoops, tomato cages or stakes with crossing strings can be used for support. When set up early in the plant’s growth stage, foliage will cover the cage to permit a natural-appearing plant form.

Fertilizing

When preparing beds for planting, add fertilizer according to soil test recommendations. Regular fertilization with a balanced fertilizer that contains similar levels of nitrogen (N), phosphorous (P) and potassium (K) is necessary to keep annual plants vigorous and blooming. Make a light application (one-half to 1 pound of N per 1,000 square feet) several times during the growing season to give a continuous supply of nutrients to annual plants. Make a first application in late April or early May, then repeat once or twice, depending on the needs of the species. Water the bed after applying fertilizer to wash it off the foliage and move it down into the plants' root zone.

Avoid applying excess N to annuals, especially those that are not flowering. The result is likely to be lush vegetative growth and poor, delayed flowering. Also, use caution when fertilizing nearby turf with "weed and feed" products. These often contain 2-4,D, a herbicide that can damage flowering plants.

Perennial plants have greater reserves from which to draw and usually do not require as much fertilizer as annuals. A light application of a balanced fertilizer when plants begin their spring growth is sufficient for most perennial species.

Preparing for winter

In the fall, after freezing temperatures have killed annual flowers and turned perennial foliage brown, remove dead leaves, stems and spent flowers. These materials often harbor insects and disease-causing organisms.

Plants such as ornamental grasses and perennials with sturdy stems that stand up well may be left in place to provide winter interest to the landscape. In late winter, cut such plants back to ground level to prepare for new growth.

Apply several inches of winter mulch to tender perennials after the soil temperature drops enough to develop a frozen crust. Winter mulch will insulate the soil to help prevent damage to tender roots. It also helps reduce damage from alternating freeze-thaw cycles that can heave roots out of the ground.

Annuals

Botanically speaking, an annual is a plant that completes its life cycle in one growing season. It goes from seed to flower and then produces seed again the same year (see MU Extension publication MG2, *Plants and Their Environment*). For landscape reference, annuals are also described as nonwoody ornamentals that produce decorative flowers or foliage during their first season of growth and are killed by freezing temperatures in the fall. While most annuals produce abundant flowers, others are grown strictly for their foliage. This definition includes many tender perennials that are not hardy in the climate of the Midwest, but which would come back year after year in their native areas. For example, tender, tropical woody species, such as hibiscus, desired for their attractive flowers, are often treated as annuals in Missouri. Some annuals tolerate light frosts, but normally do not survive heavy freezes.

Annual flowers are used primarily to brighten the landscape with color. They are unsurpassed for adding interest to beds or borders or to patios or decks when grown in containers. They may also be used for cut flowers, rock gardens, window boxes, hanging baskets, screens, temporary fillers and ground covers.

Advantages and disadvantages of annuals

The main advantage of annuals is their quick, abundant color. They are often purchased already in bloom to add instant color to the landscape. Many annuals may also be directly seeded in their permanent location, where they grow rapidly. Once the colorful display of blooms or foliage starts, it lasts for many weeks, often for the rest of the growing season.

Most annuals are versatile, sturdy and relatively inexpensive. They produce a lot of bloom for the time and money invested in them. Annuals also offer a chance to experiment with color, height, texture and form. If you regret a design combination, it only lasts one growing season. You can easily change the style, texture and color of your home landscape from year to year.

Annuals are useful to fill in spaces until permanent plants are installed or until trees and shrubs spread to their full size. Annuals can also fill in seasonal color gaps in perennial flower beds, covering holes left by dieback of spring flowering bulbs. They work well to fill planters, hanging baskets and container gardens. In addition, annuals may serve specialty purposes such as providing cut flowers for indoor arrangements or culinary herbs or edible blossoms for table use.

Seed

If you desire to start annuals from seeds, buy viable seed packaged for the current year. Keep seeds dry and cool until planted. The cost of seed is minor compared with the value of the plants, so it is seldom worth purchasing “bargain” seed that may be of questionable quality.

Plant breeders have produced many outstanding annual hybrids with good vigor and disease resistance. These hybrids generally will produce more flowers with better substance and be more uniform in appearance than open-pollinated varieties. However, some gardeners prefer the old-fashioned look of non-uniformity available from saved, open-pollinated seed.

Caring for annuals

Perhaps the biggest drawback to annual flowers is their short-lived nature. They must be set out as plants or resown every year. Some annuals, such as cleome, moss rose and balsam, reseed themselves quite reliably, but in the process they can spread so much they become a weedy nuisance. Also, since many annuals are hybrids, the seeds they produce will not be “true to type,” and the resulting seedlings may not possess the same qualities as the plant that bore them.

The annual flower’s main goal in life is to produce seed and die, so regular removal of faded flowers is often needed to keep them blooming. If seeds are left to mature on the plant, flowering usually slows down or may stop all together. Many annuals begin to look unattractive by late summer and must be cut back severely or replaced.

Perennials

A perennial plant is one that lives two or more years. By definition, herbaceous perennials are nonwoody plants whose above-ground parts usually die to the ground each year. They survive winter weather by means of a vigorous root system, bulbs, corms, tubers, rhizomes or other underground root or stem modifications. Several shrubs that often die back to the ground each year are frequently grouped with herbaceous perennials even though they are technically woody plants. Roses, tree peonies and Russian sage are examples of flowering shrubs more frequently considered flowering perennials. Even though they are woody plants, they regrow vigorously each year from the root system if harsh winter weather causes a complete dieback.

Herbaceous perennials can be further subdivided into hardy and tender plants, based on the plant's ability to survive the winter. Examples of hardy perennials are tulips, lilies, daylilies, peonies and irises. Tender perennials include dahlias, gladioluses and cannas. While it may seem a misnomer to classify a nonhardy plant as a perennial, the presence of a storage organ (e.g., a corm or tuber) puts a plant into the herbaceous perennial category.

Herbaceous perennials are considered the backbone of most flower gardens. Plants provide almost year-round interest with a variety of flower color, form, foliage, texture and fragrance. Careful planning can ensure a succession of bloom that provides a changing kaleidoscope of color through the seasons.

Advantages and disadvantages of perennials

Perennials have several garden advantages. While plants may be more expensive initially, the long-term cost is usually less. For example, peonies may live for decades, which helps justify their initial expense. Perennials do not need to be planted every year, though some will require replacing more often than others.

Most perennials do not bloom for an extended length of time. Most perennials produce flowers for two or three weeks each year at most. However, some, such as black-eyed Susan, do bloom through much of the growing season. With careful planning, you can choose plants that flower at different times to create a perennial garden or border that blooms continuously from spring until fall. You may wish to add annual flowers to the bed for spots of color during periods when perennials are not at their peak. Also, strategically placed annuals can hide unattractive foliage after a perennial plant is done blooming.

Caring for perennials

For perennials, as for any plants, good soil preparation is a key to success. Most perennials prefer well-drained soils enriched with organic matter. Adequate water and fertilization are also important to keep your plants happy. Soaker hoses work well. Apply fertilizer as new growth emerges in the spring. Follow the package directions carefully.

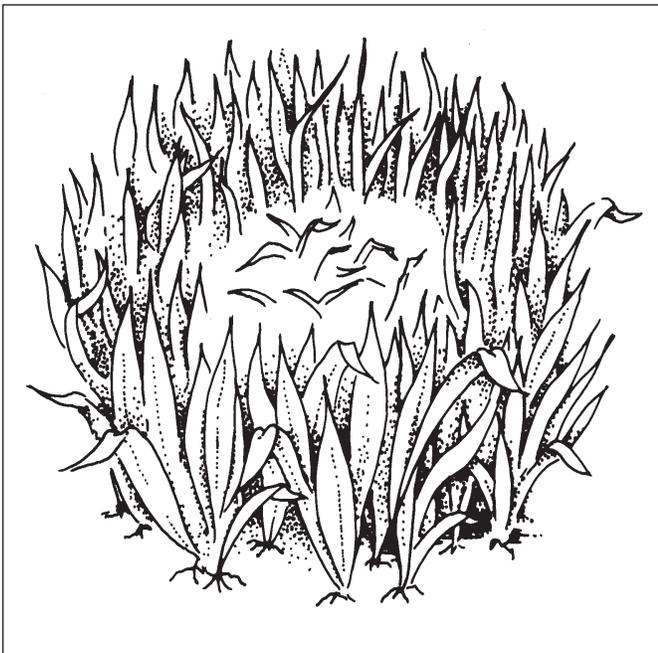


Figure 4. Perennial beds need periodic dividing.

Perennials eventually become overcrowded and develop dead, unsightly centers. The middle of the clump will have a "doughnut" appearance, and flowers there will grow poorly. Divide perennials that show these characteristics.

Dividing plants

Some perennials need periodic division to continue to flourish. If a planting looks overgrown or overcrowded, or if flowering levels decline, it can often be rejuvenated by division (Figure 4). Division is also needed where clumps have developed dead, unsightly centers.

Where there are many plants that need periodic division, divide several plants in a section of a flower bed each year rather than the whole bed at one time. This way, you will have a continuous population of established perennials for display. Divide mature clumps of perennials early enough in fall so that they can become reestablished before the ground freezes. Or divide them just before growth begins in late winter to early spring (see box).

Be aware that some species of perennials with large taproots should not be divided or moved unnecessarily. Examples are plants popularly known as baby's breath, balloon flower, butterfly weed and lupine.

Propagating plants

Perennials such as garden phlox may be propagated by stem cuttings. Make cuttings 3 to 6 inches long, remove the lower leaves and treat with a rooting hormone before placing them in a rooting medium. Once roots form, transplant these cuttings to pots or garden beds. Late-spring cuttings will have ample time to develop roots and become established before winter.

Many perennials can also be propagated from seed, a method that avoids carrying over diseases that may infect growing plants. Start perennials from seed either in mid to late summer or in the spring.

Divided they prosper

For optimal growth and appearance, most perennials need to be divided every few years. This is also an economical way to spread beauty through the landscape and share with friends. In the upper Midwest, division is usually done in the spring, while plants are still dormant. In warmer areas, it is often done in the fall.

To divide perennials successfully, follow the simple steps below:

- Wait until after spring and summer bloomers flower, either in late summer or fall, and allow the foliage to die down. Fall-blooming herbaceous perennials are usually divided in the spring when the foliage is 2 to 3 inches tall. This gives plants an entire growing season to recover.
- Water the bed a few days in advance if the soil is dry to make digging easier and keep roots damp. Prune the plants by half if the stems are still present.
- Dig out the entire root mass. Then, separate the healthy living portions into smaller clumps by working them apart with fingers or making small cuts with a knife. Use a spading fork to divide large, dense clumps.
- Separate the clumps into sections of three to five vigorous side shoots or growing points from the outer part of the clump. Divisions as small as single shoots may be done if numerous new plants are desired, but new plants will take longer to reach showy, blooming size.
- In general, replace healthy divisions in the original hole and plant the others elsewhere.
- Discard weak or diseased sections.

Some perennials, such as bearded iris, have rhizomes. Lift the rhizomes out of the ground after leaves die back in summer. Then, break or cut the rhizomes into smaller sections with a clean knife. Leave at least one growing point on each section.

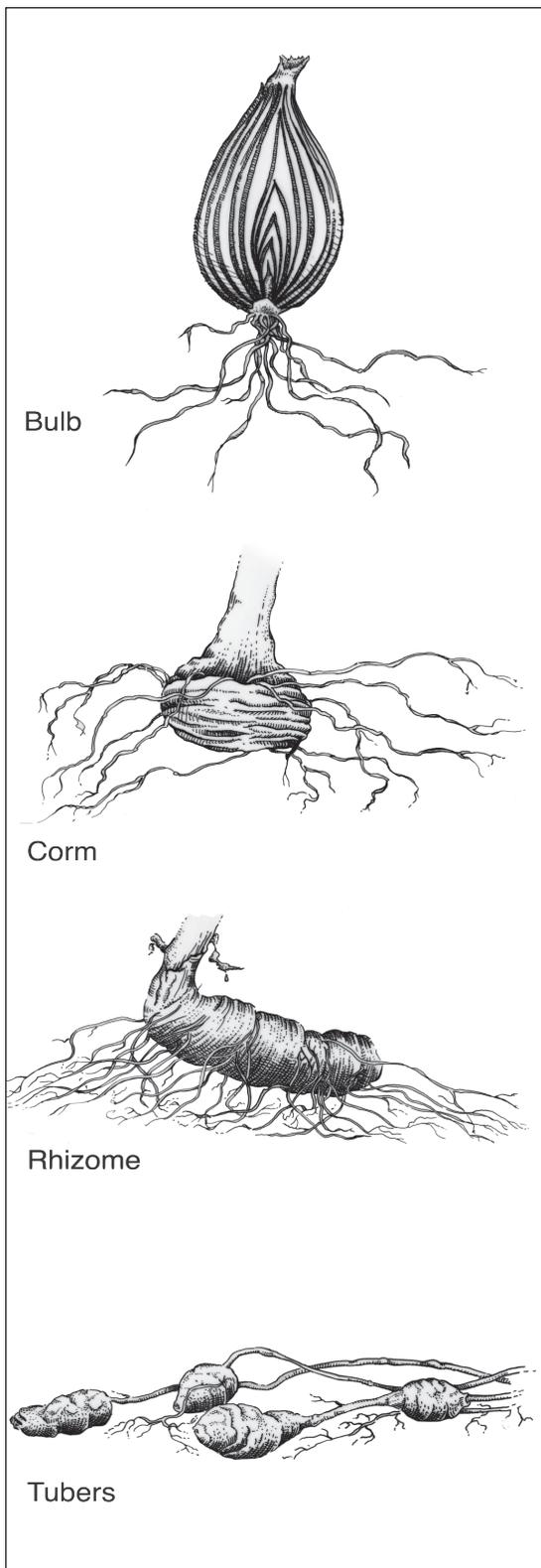


Figure 5. Identifying bulbs and bulblike structures.

Bulbs include a variety of plants that have underground or ground-level swollen stems or leaves.

Bulbs and bulblike structures

To a botanist, the word “bulb” refers only to a true bulb, which is a complete or nearly complete miniature plant encased in fleshy, modified leaves called scales that contain food reserves. However, to most gardeners, bulbs include a variety of plants that have underground or ground-level swollen stems or leaves. In this broad sense, the category of bulbs also includes corms, tubers, tuberous roots and rhizomes (Figure 5).

- Bulbs are shortened, compressed, underground stems surrounded by fleshy scales that are modified leaves. These envelop a central bud located at the tip of the stem, which is usually buried deeply and protected by the thickened scales.
- Corms lack a true bulb’s fleshy scales. Corms are the base of a stem that becomes swollen and solid with nutrients.
- Rhizomes are thickened stems that grow horizontally at or just below the soil surface, sending stems above ground at intervals.
- Tubers are underground stems that store food. They differ from true bulbs or corms because they have no covering of dry leaves and no basal plate from which roots grow. Usually short, fat and rounded, tubers have knobby surfaces with growth buds, or eyes, from which shoots emerge. Tuberous roots are the only bulb form that can be considered true roots. Their food supply is kept in root tissue, not in stem or leaf tissue as in other bulbs.

Bulbs are generally grouped as spring-flowering (February to May) and summer-flowering (June to September).

Spring-flowering bulbs

Spring bulbs provide early color before most annuals and perennials bloom. Selecting spring bulbs of good quality is important because the flower bud has already developed before the bulb is sold. Look for plump, firm bulbs. For specimen plantings, select the largest sizes available. Smaller sizes may be suitable for naturalizing (planting in a way that suggests natural growth).

Spring bulbs require exposure to cool temperatures in order to flower. For this reason, they are usually planted in autumn. If bulbs cannot be planted immediately, store them in a cool (50 to 65 degrees) location until planting time.

One of the problems with spring bulbs is that the foliage remains after blooming and can be unsightly as it dies back. Even so, the foliage should not be removed until it turns yellow and dies back naturally. After flowering, the plant needs green leaves to manufacture food for next year’s growth and bloom. Removing the foliage too early will cause the bulbs to decline and die out. Foliage on smaller bulbs such as snowdrops will die back quickly and cause little trouble. However, foliage of larger bulbs, such as tulips and daffodils, can take several weeks to die back. To divert attention from dying foliage, interplant annual

flowers or late-emerging perennials such as hosta, balloon flower or plumbago among the bulbs.

Another way to enjoy spring bulbs is to bring them inside to “force” blooming during the winter. This practice is commonly used as a way to enjoy daffodils, hyacinths, tulips, crocus and other spring bulbs during cold months. With proper planning and care, bulbs can supply color for the home from late November until early April, when they begin to flower outdoors.

See MU Extension publication G6550, *Spring Bulbs for Indoor Blooming*, online at extension.missouri.edu/explore/agguides/hort/g06550.htm

Nonhardy, summer bulbs

Summer-flowering bulbs include amaryllis, tuberous begonia, caladium, calla lily, dahlia, gladiolus, lily and spider lily. As with spring bulbs, select summer-flowering bulbs that are large, firm and plump.

Be aware that many of these bulbs are not cold hardy. In the Midwest, they have to be dug and properly stored in a frost-free location over the winter. Nonhardy summer-flowering bulbs should be dug and stored when leaves turn yellow or frost kills the tops. Use a spading fork to gently lift the bulbs from the ground. Wash off soil that clings to the bulb. Spread the washed bulbs in a shady place to dry. When dry, store bulbs away from sunlight in a cool, dry area. Discard any plants that appear undersized or diseased.

Bulbs can be stored in a container with peat moss, sand, perlite or vermiculite. If you have just a few bulbs, you can keep them in paper bags, but be sure that air can circulate around the stored bulbs. Never store more than two or three layers deep. Do not store bulbs in an area with fruits and vegetables, because ethylene gas produced by the ripening fruits and vegetables can cause flower buds to die in the bulbs.

Planting and propagating bulbs

The general rule of thumb for planting spring bulbs is to plant them two to three times as deep as the bulb is tall. Thus, plant most large bulbs such as tulips or daffodils about 8 inches deep and smaller bulbs like crocus or scilla about 3 to 4 inches deep. Measure the planting depth from the bottom of the bulb. This guidance does not apply to summer bulbs, which have varied planting requirements.

The best method of planting bulbs is to dig and loosen the entire bed to the proper depth. Press the bulbs into the soil in the planting area, cover with soil and firm gently. Because the soil in a spaded bed is better drained and prepared, the planting will last longer.

Bulbs can be propagated by dividing, or separating, and replanting them. Often, they can also be propagated by removing small bulblets and planting them. The bulblets can first be planted in a transplant bed before relocating to a more permanent location (Figure 6).



Figure 6. Propagating bulbs.

Mature bulbs can be propagated by separating and replanting them, or by removing and planting the bulblets.

Roses

Roses are a group of plants long prized for their special beauty and widely varied colors and fragrances. Although they are not herbaceous, roses are often treated as such, in part because they excel as flowering landscape plants and as flowers to cut for bouquets. Roses have acquired a special mystique as emblems of romance and enduring friendship. Few garden shrubs can compare with roses for astonishing diversity and continuous bloom throughout the summer.

The best roses grow where the conditions of light, soil and fertility come close to matching their specific requirements. Though roses are often considered a specialist group of plants to be grown in a place set apart from others, many do well in mixed plantings.

Roses have the reputation of being difficult to grow. Though many varieties do require special care, roses are getting easier to grow, thanks to efforts aimed at creating varieties that are more carefree with improved winter hardiness and disease resistance. At the same time, the new roses are being bred to have improved flower quality, appealing growth habits and attractive foliage. The majority of modern shrub roses are also on their own rootstock, which means if they die back to the crown in the winter, they can recover vigorously from the roots the next spring.

Providing the right conditions

Most roses thrive in full sun to partial shade (4 to 6 hours daily is considered ideal). However, many rose varieties also perform well in shadier spots, especially the shrubs, older garden roses and older climbers and ramblers. An eastern exposure with morning sun will help flowers and leaves dry early in the day. Flowers and foliage that remain wet for extended periods are more susceptible to diseases.

Roses grow best in well-drained soil. Good, loamy topsoil with plenty of humus or organic matter in the top 20 to 24 inches is ideal. Roses prefer slightly acid conditions in a pH range from 6.0 to 6.8, but they will generally grow well in soil with a pH up to 7.5. Avoid planting in poorly drained or waterlogged soils. The soil should allow water to penetrate and then drain so that air can reach plant roots.

Watering roses

For a general guide based on time, water new plantings every one to two weeks during dry periods in the first season and water established roses every few weeks as needed. Soil that is dry at a depth of 1 to 3 inches indicates a need to water. Other tips include the following:

- Apply water at ground level, either by hand or from drip or trickle irrigation. This will keep plant tops dry and make them less susceptible to fungal infections.
- Water by hand to best control how much each plant receives and to ensure that every plant is watered.
- Use a trickle irrigation system, which moistens soil more slowly. This is better to reach far-spreading roots. Supplement trickle irrigation with hand watering until plants are established.
- Aim to moisten the top 6 to 9 inches of soil during each watering. The amount of water needed depends on soil type: Clays absorb more water than sandy soils, and loam soils are somewhere between.

- Avoid sprinkler-type watering. This is not recommended for roses because it wets the top growth as well as the soil, which provides near-perfect conditions for disease development. Sprinklers also lose a lot of water to evaporation. If no other irrigation method is readily available, use sprinklers in the early daylight hours so foliage has a chance to dry before night.

Fertilizing roses

Roses can grow quickly and, without other limiting factors, will respond to added nutrients at the start of new growth, both in spring and after the first flush of flowering. Develop a regular fertilization program to ensure healthy growth and development. The following tips for fertilization can help a gardener successfully grow most roses.

- Wait until leaves are fully open to make the first spring fertilizer application. New plantings often leaf out later than established roses.
- Make a follow-up application after the first blossoms fade to encourage new growth.
- Apply subsequent treatments through mid to late summer, ending about weeks before the expected first frost date. Though roses flower into early fall, growth is already slowing down as days shorten and nights cool. No fertilizer is needed after this point.

Pruning roses

Prune roses to rejuvenate the plants for vigorous young growth and better flowering. Pruning also maintains an open, attractive habit with adequate space for shoot growth. The best and most prolific flowers form on first- and second-year shoots. Pruning maintains a succession of new growth, either from the base or from strong, established canes.

The best time to prune is in early spring after the last normal hard freeze. This is also the time to remove any winter-killed canes and to reduce cane length. This will allow for new growth. Shape established plants before canes start growing. Trim in fall only to reduce potential wind damage.

For both pruning and trimming, make clean sloping cuts with sharp clippers or pruning shears. Reduce cane length as appropriate and check that the wood is alive. Swelling buds indicate living canes. Dead canes are brittle, dry and gray-black. Living canes are somewhat flexible; one-year wood often has green bark and older wood is green just under the bark. The cut ends should be a healthy-looking green with creamy white centers. If the central pith, exposed by the pruning cut, is brown or black, cut again lower down the cane until the stem looks healthy. Dispose of pruned material away from garden and compost areas to prevent potential reinfection from plant diseases or pests.

Once roses are established, regular pruning maintains their health and vigor. Before each growing season, cut off wood that has been damaged or winter-killed. Remove canes that are growing across others. Shorten and thin the remaining canes according to plant type and space available, making each clean cut just above a bud that is well situated for new growth. Cut healthy canes back to pencil-thick wood.

Suckers are shoots that grow from the rootstock. Their features usually differ in obvious ways from the rose variety; for example, they will have smaller leaves and more prickles. Once the difference is clear, remove the suckers as close to the base as possible.

Caring for ramblers and climbers

Rambling and climbing varieties of roses both produce long canes that need support from a trellis. Rambling roses are more vigorous than climbers, and considered more informal in appearance.

These varieties also have different pruning needs (Figure 7). Once these roses are established, you can use the following basic information as a guide.

Ramblers

Ramblers flower on one-year canes and branches. Cut rambler canes back to about a foot in order to stimulate new growth. Remove the oldest wood of rambling roses by cutting out entire canes or by pruning back to strong new shoots.

Pruning may not be possible for the most vigorous and informal varieties. However, smaller ramblers respond well to pruning, which encourages them to produce more flowers.

Climbers

New plants should be trimmed to remove just the top 2 inches. As they grow, climbers flower best on wood younger than four years old.

Before growth of climbing roses begins each spring, prune the flowered shoots back by half, to two or three buds. Take out older and weaker branches.

Train each first-year cane almost horizontally to encourage flowering shoots to develop along the cane's length rather than just at the tip. In succeeding years, train secondary branches more vertically to fill out a wall or trellis.

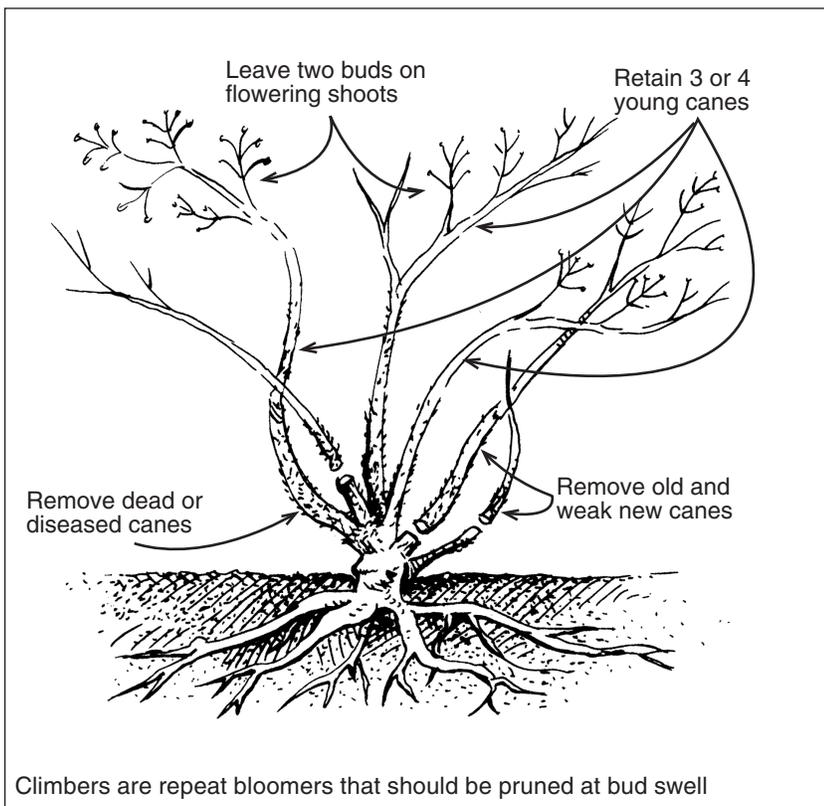
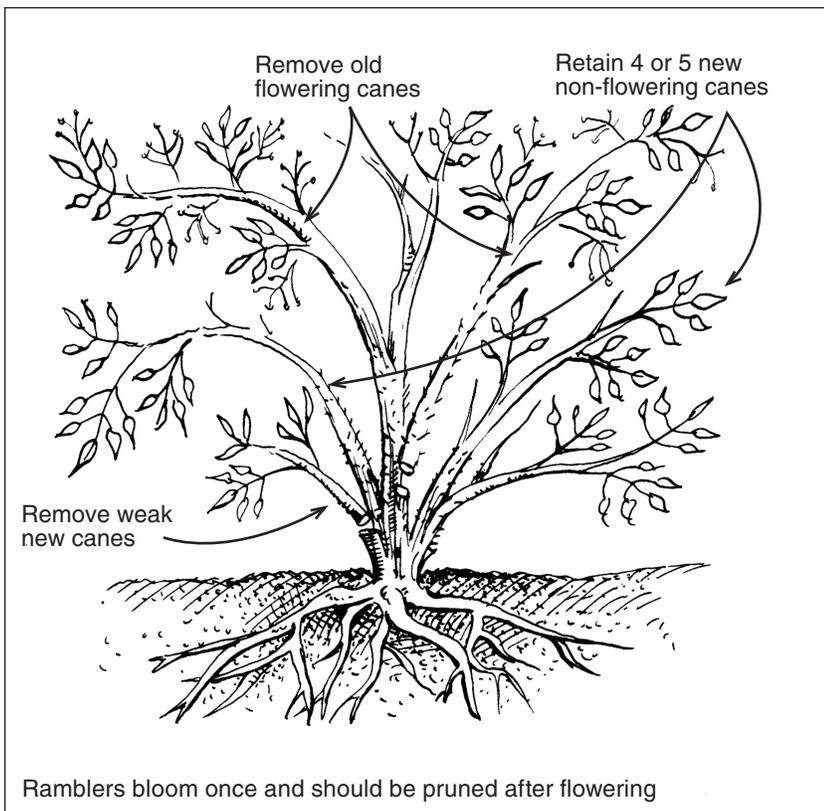


Figure 7. Pruning rambling and climbing roses.

Though these varieties often look much alike, they have different pruning needs.

Preventing diseases in roses

From the start, plan and plant so that roses have at least 6 hours of sun daily. Space them far enough apart to provide good air circulation that will allow the leaves to dry and prevent moisture sitting on the leaf surface. If possible, it is good to avoid wetting the leaves when watering: Apply water at ground level so the leaves will stay dry. Keep your plants healthy through regular care, and they will resist infection. Remove all plant waste from around the roses, including trimmings and fallen leaves to eliminate all possible sites for infection.

The most destructive disease of roses is black spot. It becomes severe during wet and humid conditions, as it requires wet leaf surfaces to spread. It shows up first as spots or rings on the leaf — black areas that are often surrounded by yellowish halos. Affected leaves turn yellow and drop from the plant. If severe, this defoliation will reduce flowering and make the plant more susceptible to winter damage. Black spot is difficult to control as sprays are mostly preventive. The chemical must be on the leaves before infection occurs. Once black spot spores germinate on the leaf, the infection cannot be reversed. Successful protection requires weekly spraying during wet periods, which can be quite a chore. Hybrid tea roses are the most susceptible to black spot. In recent years, rose breeders have worked to develop black spot resistant roses and there are many available now. Modern shrub roses can tolerate black spot and still bloom well despite its presence.

Keep roses healthy to help them resist black spot and other diseases. Remove and destroy any infected leaves as soon as you see black spots developing. The fungus overwinters in dead leaves and infected stems. Rain and splashing water then spread the spores from old leaves or stems.

Rose rosette virus is a rapidly emerging problem on roses in the Midwest. For some time, it has infected wild multiflora roses in pastures, woods and field edges. More recently, it has emerged as a disease of domestic roses. Often referred to as witch's broom because of its appearance, the early symptoms include rapid stem elongation, followed by certain branches of the plant developing thickened, abnormally thorny stems. Then, many short, deformed shoots will form that often have a red pigmentation and reduced, misshapen leaves. Roses usually die within a year or two as the disease spreads throughout the plant. The exact cause of this disease is still uncertain, but it is known to be spread by insects and mites. At this point, there is no effective control for rose rosette virus. Remove and destroy infected plants.

Ornamental grasses

Ornamental grasses are becoming popular as landscape plants to give gardens and yards a distinctive new look. They can be used as shrub substitutes, ground covers, screens or focal points in the landscape. Many form clumps that make them ideal for borders, hedges or showy specimen plantings. The wide range of grass colors, textures and sizes permits them to emphasize bed lines and enhance the landscape design, especially to express verticality. Foliage colors are available in blue, yellow, bronze and red, as well as variegated white and yellow with green. Textures range from threadlike fescues to coarse giant reeds and bamboos.

Grasses bring more than one season of interest to the garden. Through the growing season, many change color, and they often hold their form through winter as well. Grasses moving in the wind lend an element of motion and sound to the garden that is not possible with other types of plants.

Popular ornamental grasses

Short (less than 24 inches)

| | | |
|---|-------------|-----------|
| Blue fescue (<i>Festuca ovina</i> var. <i>glauca</i>) | Cool-season | Clump |
| Japanese blood grass (<i>Imperata cylindrica</i> var. <i>rubra</i>) | Warm-season | Spreading |
| Ribbon grass (<i>Phalaris arundinacea</i> var. <i>picta</i>) | Warm-season | Spreading |

Medium tall (24 to 48 inches)

| | | |
|--|-------------|-------|
| Feather reed grass (<i>Calamagrostis arundinacea</i>) | Cool-season | Clump |
| Fountain grass (<i>Pennisetum alopecuroides</i>) | Warm-season | Clump |
| Maiden grass (<i>Miscanthus sinensis</i> 'Gracillimus') | Warm-season | Clump |
| Northern sea oats (<i>Chasmanthium latifolium</i>) | Warm-season | Clump |
| Porcupine grass (<i>Miscanthus sinensis</i> 'Strictus') | Warm-season | Clump |
| Purple fountain grass (<i>Pennisetum setaceum</i> 'Rubrum') | Warm-season | Clump |

Tall (more than 48 inches)

| | | |
|---|-------------|-----------|
| Giant Chinese silver grass (<i>Miscanthus floridulus</i>) | Warm-season | Clump |
| Indian grass (<i>Sorghastrum nutans</i>) | Warm-season | Clump |
| Plume grass (<i>Erianthus ravennae</i>) | Warm-season | Clump |
| Silver banner grass (<i>Miscanthus sacchariflorus</i>) | Warm-season | Spreading |
| Switch grass (<i>Panicum virgatum</i>) | Warm-season | Clump |

Selecting warm- or cool-season varieties

Perennial grasses are often classified as warm- or cool-season plants, according to when they are actively growing (see box). Warm-season grasses are usually dormant through winter. They grow in spring and summer and often have good fall color. Cool-season grasses grow earlier in the year, from late winter on, and become dormant in summer heat.

An additional way to classify ornamental grasses is according to their growth habit: clump-forming or spreading. Clump-forming grasses are usually larger in stature and used as specimen plants. Spreading grasses are usually shorter and used as ground covers.

Planting and care

It is usually best to plant ornamental grasses in the spring. Fall planting can be successful if container-grown plants are used, but winter protection may be necessary. Large, mature grasses may benefit from spring division, especially if the center of the plant is dead. However, this can be a major job that requires a sharp ax, a spade and a strong back.

Generally, ornamental grasses prefer to grow in sun, but some are adapted to partial shade. Established ornamental grasses rarely need fertilization or irrigation except in extreme drought or when planted in very sandy soil. They have few insect or disease problems. Once established, maintenance consists primarily of an annual cutback.

Cutting back ornamental grasses to within a few inches of the ground should be done each year in late winter or early spring before new growth starts. If grasses are not cut back, spring growth will be delayed and plants will be less attractive late into the growing season. Manual trimming with a string or electric hedge trimmer works well for small areas. Large areas can be burned if burning is permitted locally and if the project is closely supervised. Do not cut back or burn in the fall because winter injury may result, and you will lose the winter beauty of the plants.

Container gardening

One of the easiest ways to grow colorful flowers is in containers. Colorful bowls of flowers have become popular additions to the landscape and offer many benefits, including that you can garden just about anywhere. Balconies on a high-rise building can become urban gardens. Splashes of color can enhance a backyard deck or patio. If the containers are not too heavy, you can easily move and rearrange potted plants. Growing in containers gives an opportunity to try something new on a small scale. It also allows you to see how a plant performs in a given location's microclimate.

Container gardens require less weeding than in-ground counterparts, making them ideal for busy people who like to garden but have limited time. However, be prepared to water daily or even twice a day. Pots with a small soil volume dry out quickly and require frequent watering, especially when it is very sunny or windy. Even a gentle summer breeze will wick moisture from plants.

One of the special advantages of container gardening is that you can extend the bloom season by moving pots indoors when the weather cools. If you do this, put containers where they will receive maximum daylight. Eventually, winter's shorter days will take their toll, but you can keep plants growing indoors for months after their usual outdoor life.

Choosing containers

Virtually anything that will hold a potting medium can be a good growing container — from a bag of soil with holes punched for planting and drainage to wooden tubs, old boots, milk cans, hanging baskets and ornamental pots. Darker containers will absorb more heat, which can get plants off to a quicker start, but these containers are likely to need more watering. Lighter-colored containers may be better for most locations.

Select a container that will give your plants' roots ample room to grow, but one that will still allow the plants to eventually fill out the pot. Consider the mature size of the plants you will grow and follow appropriate spacing recommendations, keeping in mind that you can space plants closer together in a container than in a conventional garden. Plant leaves should grow to touch each other to provide shade that will help retain moisture in the pot.

Unglazed clay containers may seem more natural or appealing, but plastic planters offer advantages if they are to be placed in full sun. Unglazed clay pots are porous, which allows water to evaporate quickly. Plastic containers do not breathe and, therefore, will not need watering as often. In addition, lightweight plastic pots are easier to move. Some plastic look-alikes even have the appearance of clay.

Selecting what to grow

Once you decide where to locate your container garden — sun or shade — choosing what to grow is the next step. Plan each container or grouping of containers. One common mistake is choosing a combination of plants that require different growing conditions. Do not mix shade-loving plants with sun-loving ones. Neither type will do its best.

For appealing groupings, include plants of different height, colors and textures (Figure 8). Flower forms are generally grouped into three basic shapes: line, mass and focus. Line forms such as salvia or snapdragons are tall and spiky. Mass forms, including daisies, petunias and marigolds, have many small or large flowers. Focus forms, characterized by large or distinctive flower clusters, include flowers such as geranium or canna. One example of combining these forms would be a large container of red salvia (tall, line form), blue petunias (medium height, mass form) and white alyssum (low, trailing, mass form).

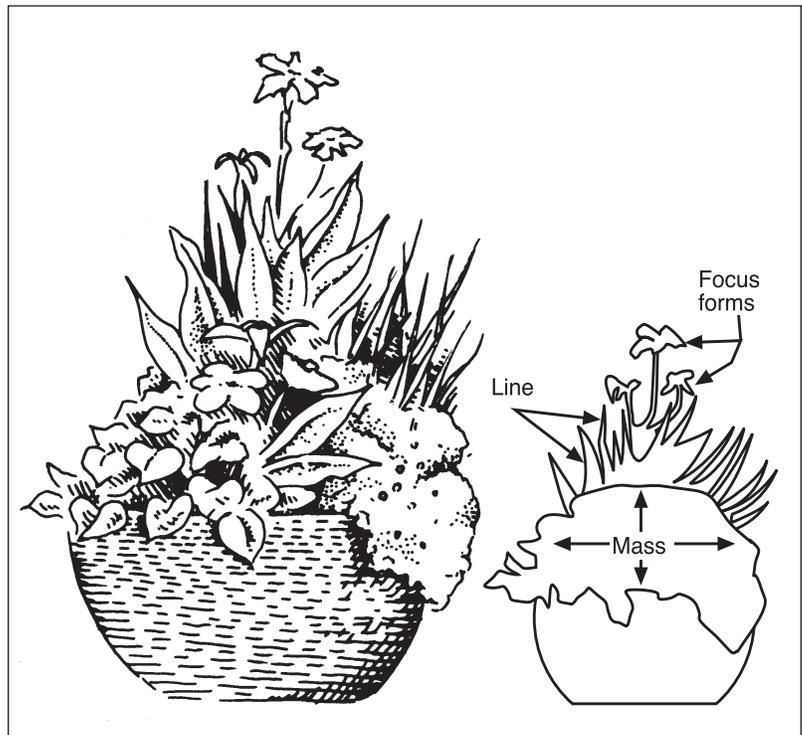


Figure 8. Vary flower forms for appealing groupings.

Use different heights, colors and textures of flowers, along with their varied types of basic shapes (line, mass and focus) to make plantings more interesting and three-dimensional.

Container planting mixes

You can make your own soil-less planting mix to use in growing containers. These two general recipes work well for most plants. However, adjustments will be needed to achieve the best results with some plants that have special requirements.

Planter mix

- 1 part pine or fir bark (nuggets)
- 1 part ground pine or fir bark
- 1 part peat moss
- ½ oz. dolomite limestone per gallon
- ¼ oz. triple super phosphate per gallon

Mix for smaller containers (up to one gallon)

- 1 part peat moss
- 1 part vermiculite
- ½ oz. dolomite limestone per gallon
- ¼ oz. triple super phosphate per gallon

Sources: MU Extension and the Missouri Botanical Garden

Be creative with design elements of color, texture, form and even fragrance. You can combine colors and forms in a grouping of containers or in one pot. A distinctive foliage plant, such as *Asparagus sprengeri*, can add texture. Let trailing plants spill over the pot's edges to soften plantings and lend an informal look. Keep in mind that plants taller than one and one-half times the height of the container may look unbalanced. For maximum interest, and to create depth, plan groupings of three to five containers of varied sizes.

Form and function can be complementary. For example, you might use a container display close to the house that doubles as a small kitchen garden with beautiful, edible flowers such as nasturtiums and pansies and decorative, fragrant herbs such as parsleys, basil and lemon balm.

Planting and care

Use a good, sterile, porous potting medium in containers. Mixtures of peat and perlite or peat and vermiculite are usually good choices (see box). Commercially available container potting mixes are available. Avoid using garden soil because it drains very poorly when in containers. Mixing a time-release fertilizer into the medium can help maintain uniform fertility for the plants as they grow. If fertilizer is not mixed into the growing medium, a dilute solution of fertilizer should be applied regularly when watering.

A container must allow for drainage. If a pot does not have a drain hole in the bottom, add one. If you do not want to put a hole in a decorative ceramic container, put a smaller pot inside the decorative one, making sure there is some room at the bottom for drainage — add a few inches of gravel in the bottom of the larger pot to keep the roots out of the drainage reservoir.

For further information

If you have questions that this publication or other references do not answer, contact your local extension center.

MU publications at extension.missouri.edu/explore/

G6550 *Spring Bulbs for Indoor Blooming*

G6600 *Roses: Selecting and Planting*

G6601 *Roses: Care after Planting*

G6629 *Flowering Annuals: Characteristics and Culture*

G6650 *Flowering Perennials: Characteristics and Culture*

G6660 *Wildflowers in the Home Landscape*

G6911 *Gardening in the Shade*

NCR461 *Ornamental Grasses for the Midwest*

Container Gardening for All. Online at extension.missouri.edu/gkcmg/container.html

Missouri Environment and Garden newsletter, online at ppp.missouri.edu/newsletters/meg/

Related Web sites

The American Nursery and Landscape Association, online at anla.org

Missouri Botanical Garden, online at mobot.org/

Missouri Department of Conservation. Grow Native Program, online at grownative.org