Chapter 8
Herbaceous Plants

Flower gardening is the horticulturist's reward for hard work. Flowers and flower borders provide color against the predominant green of a landscape. They are the accent and contrast that make a landscape lively and interesting. Flowers also complement most of the features that conventional landscaping materials, such as trees and shrubs, establish. Besides adding color, they can add depth and dimension, form and texture, and change heights and slopes. Flowers also can be useful, providing culinary herbs for the table and cut flowers for arrangements.

Planning the Flower Border

Much of the excitement of creating a herbaceous border lies in its great flexibility of design. In form, placement and selection of plants, the contemporary border follows few rigid rules and allows fullest expression of the gardener's taste.

The first step in planning the material for an all-season, mixed perennial border is to select key plants for line, mass, color and dependability. Line is the silhouette or outline of a plant, mass is its shape or denseness, and dependability refers to its ability to remain attractive with a minimum of problems. Garden books and catalogs can be very useful for reference.

The most attractive flower borders are located in front of a suitable background such as a fence, shrubbery, or a building. In some cases, tall flowers such as hollyhocks or sunflower may serve a dual purpose as flowers in the border and as background plants. Annual or perennial flowers of medium height may serve as background plants for a short border planting.

A general rule, unless the garden is very spacious or formal, is to avoid a ruler-straight front edge. A gentle to boldly sweeping curve, easily laid out with a garden hose, is best even along a fence, and the border can taper as it recedes from the main viewing point if an effect of distance is desired. The deeper the curve the slower the eye moves and the greater the visual enjoyment. A border outlined with bricks or flat stones set flush with the soil is better than a steeply cut lawn edge that must be trimmed after mowing.

Even the advanced gardener finds it advantageous to plan a border to scale on graph paper. The hardest task, organizing the selection of plants, will be simplified if only two main mass forms are considered: drifts and clumps. Drifts are elongated groupings of a plant that flow through sections of the border. Clumps consist of circular groupings of a variety, or a single large plant such as a peony. The length of drifts and the diameter of clumps, as well as their heights, should be varied for best effect, and the dimensions should always be in proportion to the overall size of the border.

Establish plants in groups large enough to form masses of color or texture. As a rule, five to seven plants will create the desired effect. A large delphinium or peony will be of sufficient size to be attractive, but a random collection of different small- to medium-sized plants will present a disorganized, checkerboard appearance. Each group of flowers should have an irregular shape. These masses of color and texture should blend into a pleasing pattern of color harmony. Dwarf flowers may be used as a continuous edging or border along the front of the bed.

Flower borders may be of any width, depending on the space available. In a small yard the bed may be only 2 or 3 feet wide. In a spacious location, the border planting may have a width of 6 or 8 feet. If the border is quite deep, a pathway of stepping stones may be helpful as a means of working among the flowers without compacting the soil.

Tall flowers should be selected for the back part of the bed, with medium-height species in the middle and dwarf varieties along the front as edging plants. This is very easily done because the height of all varieties is stated in seed catalogs. Plants along the front edge of the flower bed should be located back far enough to allow easy mowing of the lawn.

Plant height is best limited to two-thirds the width of the border, e.g., no plants taller than 4 feet in a border 6 feet wide. Height lines should be broken up by letting some tall plants extend into the medium height groups, with a few recessed clumps or drifts leading the eye back into the border. This gives a more natural effect than a step profile. Try to vary heights, but in general, keep taller plants in the back and shorter ones toward the front.

The distance between plants in a flower border depends on the form of the individual plants and the effect that is desired in the landscape. Allow adequate space between plants. Many gardeners crowd their plants too much.

As a rule, the tall, spiked-type flowers – such as hollyhock, gladiolus and rocket snapdragons that are trained to a very few stems – should be spaced about one-fourth as far apart as their mature height. Tall bushy plants may be spaced about half as far apart as their mature height. Rounded, bushy annuals and perennials should be spaced about as far apart as their mature height. Creeping, groundcover-type plants may be spaced about twice as far apart as their mature height. In all cases, if a solid mass of plants is desired, spacing may be reduced. If individual plants are to be conspicuous as specimens and be allowed to produce large flowers, distances should be increased.

The enormous color range in perennials, plus their easy relocation if disharmony occurs, give the gardener great latitude in choosing and combining colors. A border in tones of the same color can be effective, or several closely related colors may be used, or the border may be made wildly exuberant with a vast variety of hues in one or more seasons. Hues are modifications of color such as orangish-red. The objective is a balanced composition in every season, with no section being too heavily weighted with one color and the bloom so distributed that it always makes a pleasing pattern through the bed.

Many gardening books give excellent lists of compatible colors; these plus a garden notebook and camera are invaluable for planning and revising color schemes. For real floral artistry, it is perhaps more important to consider intensity, which is the vividness of a color, rather than hue. For example, light tones placed near dark ones, or contrasting palest tones with the most intense, can give new interest and life to the border. Location and color should also be considered. Near patios, white is especially good because it shows up well in the evening or dusk hours when patios are often in use. Some colors are suitable only as dramatic accents. Deep, pure red clashes with almost anything (unless softened by dark green foliage), yet properly used, it confers strength and depth. White flowers and gray foliage are indispensable as separators of conflicting colors.

Red, orange and yellow are warm colors. Blue, green and violet are cool colors. The use of warm colors in the flower border of a small yard will give the illusion of little space. Conversely, the use of cool colors gives the impression of openness and space. In general, the smaller the area, use fewer warm colors.

As a gardener becomes adept at producing constant color harmony in the border, he or she becomes more aware of the roles played by plant forms and foliage. Good foliage is vital in plants with short blooming periods. Consider how much of the plant foliage will be usable and whether it is a positive or negative attribute. Some plants practically disappear when their blooming season is over (i.e., oriental poppy and bleeding heart), but others stay presentable when not in flower. Plants with distinctive forms, color and foliage — airy and delicate, or strong and solid — are useful for creating interest. Ornamental grasses and even handsome-foliaged vegetables like broccoli and asparagus can be used for effect.

The most logical way to choose plants is first by location, second by period of bloom, then by height and width and by color. Location takes into account the amount of sun or shade and water required. This information is easy to find in books on perennials and in catalogs.

The only restrictions on any given plant will be environmental: a lack of ability to tolerate winter or summer temperature extremes; special soil, moisture; or light needs; and any limits the gardener must place on time available for maintenance.

Even in a small border, single plants of different varieties should not be used. This gives a jumbled look. Do not set in precise rows, but in groups, as they might grow in nature. Allow enough space for each group to grow comfortably. Decide which flowers you like best and let these be the basis of your planting. Place them in several spots down the length of the border, but don't overdo any one plant.

The longer the border has flowers in bloom, the more you will enjoy it. Consider the months when each plant will be at its best. Do not confine yourself to material that blooms all at one time. Aim for a steady chain of color.

A last bit of advice: don't be afraid to be bold, even if it results in some mistakes. Flowers are easy to move, change or take out. There is no need to be conservative or confined. Flowers are fast growers and can be transplanted at almost any time to help create the desired effect.

Annual Flowers

Annual flowers live one growing season, during which they grow, flower and produce seed to complete their life cycle. Annuals must be set out or seeded every year because they don't persist. Some varieties will self-sow, or naturally reseed themselves. This may be undesirable in most flowers because the parents of this seed are unknown, and hybrid characteristics will be lost. Plants will scatter everywhere instead of their designated spot. Examples are alyssum, petunia and impatiens. Some perennials, plants that live from year to year, are classed with annuals because they are not winter-hardy and must be set out every year; begonias and snapdragons are examples. Annuals have many positive features. They are versatile, sturdy and relatively cheap. Plant breeders have produced many new and improved varieties. Annuals are easy to grow, produce instant color and most important, they bloom for most of the growing season.

There are a few disadvantages to annuals. They must be set out as plants or sowed from seed every year, which involves some effort and expense. Old flower heads should be removed weekly for continuous bloom. If they are not removed, plants will produce seed, complete their life cycle and die. Many annuals begin to look disreputable by late summer and need to be cut back for regrowth or replaced.

Annuals offer the gardener a chance to experiment with color, height, texture and form. If a mistake is made, it's only for one growing season. Annuals are useful for filling in spaces until permanent plants are installed, to extend perennial beds and fill in holes where an earlier perennial is gone or the next one has yet to bloom; to cover areas where spring bulbs have bloomed and died back; and to fill planters, window boxes and hanging baskets.

Culture and Maintenance of Annuals

Site Selection. Consider aspects of the site that affect plant growth such as light, soil characteristics and topography. Different annuals perform well in full sun, light shade or heavy shade. The slope of the site will affect temperature and drainage. Soil texture, drainage, fertility and pH influence plant performance.

Site Preparation. Preparation is best done in the fall. Proper preparation of soil will enhance success in growing annuals. First, have the soil tested and adjust the pH if needed. Check and adjust drainage. To do this, dig a hole about 10 inches deep and fill with water. The next day, fill with water again and see how long it remains (should not exceed eight hours). If drainage is poor, plan to plant in raised beds. The next step is to dig the bed. Add 4 to 6 inches of organic matter to heavy clay to improve soil texture. Dig to a depth of 12 or 18 inches and leave rough in fall or early spring. In spring, add fertilizer, spade again and rake the surface smooth.

Seed Selection. To get a good start toward raising vigorous plants, buy good seed packaged for the current year. Seed saved from previous years usually loses its vigor. It tends to germinate slowly and erratically and produce poor seedlings. Keep seed dry and cool until planted. If seed must be stored, place in an air-tight container with powdered milk to absorb excess moisture, and refrigerate. When buying seed, look for new varieties listed as hybrids. Plants from hybrid seed are more uniform in size and more vigorous than plants of open-pollinated varieties. They usually produce more flowers with better substance.

Starting Plants Indoors. The best media for starting seeds is loose, well-drained, fine-textured, low in nutrients and free of disease-causing fungi, bacteria and unwanted seeds. Many commercial products meet these requirements. Fill clean containers about two-thirds full with potting medium. Level the medium and moisten it evenly throughout. It should be damp but not soggy.

Make a furrow ¼ inch deep. Sow large seed directly in the bottom of the furrow. Before sowing small seed, fill the furrow with vermiculite and sow small seed on the surface of the vermiculite. Seed may be sown in flats following seed package directions or directly in individual peat pots or pellets, two seeds to the pot.

After seed is sown, cover all furrows with a thin layer of vermiculite, then water with a fine mist. Place a sheet of plastic over seeded containers and set them in an area away from sunlight where the temperature is between 60 and 75°F. Bottom heat is helpful.

As soon as seeds have germinated, remove plastic sheeting and place seedlings in the light. If natural light is poor, fluorescent tubes can be used. Place seedlings close to the tubes.

After the plastic is removed from the container, the new plants need watering and fertilizing because most planting material contains little or no plant food. Use a mild fertilizer solution after plants have been watered. When seedlings develop two true leaves, thin plants in individual pots to one seedling per pot. Transplant those in flats to other flats, spacing 1½ inches apart, or to individual pots.

Planting Times. Do not be in a rush to start seeds outdoors or to set out started plants. As a general rule, delay sowing seed of warm-weather annuals outdoors or setting out started plants until after the last frost date. Most seeds will not germinate well in soils below 60°F. If soil is too cold when seed is sown, seeds will remain dormant until soil warms and may rot instead of germinating. Some cold-loving annuals, like larkspur or Shirley poppies, should be sown in late fall or very early spring.

Sowing Seed Outdoors. Annuals seeded in the garden frequently fail to germinate properly because the surface of the soil cakes and prevents entry of water. To avoid this, sow seed in vermiculite-filled furrows. Make furrows in soil about ½ inch deep. If soil is dry, water the furrow, then fill it with fine vermiculite and sprinkle with water. Then make another shallow furrow in the vermiculite and sow the seed in this furrow. Sow at the rate recommended on the package. Cover the seed with a layer of vermiculite and using a nozzle adjusted for a fine mist, water the seeded area thoroughly. Keep the seed bed well-watered or cover with a mulch, such as newspaper, to prevent excess water evaporation. Remove mulch promptly after germination starts, so that young seedlings will receive adequate sunlight.

Setting Out Transplants. By setting started plants in the garden you can have a display of flowers several weeks earlier than if you sow seeds of the plants. This is especially useful for annuals (such as verbena and scarlet sage) which germinate slowly or need several months to bloom. You can buy plants of these or other annuals or you can start your own. Buy only healthy plants, free of pests and diseases. Before setting out transplants, harden them off by exposing them to outside conditions during the day, which will provide more light and cooler temperatures than they received inside. After the last frost date, annual plants may be set out. Dig a hole for each plant large enough to accept its root system comfortably. Lift out each plant from its flat with a block of soil surrounding its roots. Set the soil block in a planting hole and backfill it so the plant sets at the same level. Irrigate each hole with a water soluble starter solution fertilizer. Follow package directions.

If plants are in fiber pots, remove the paper from the outside of the root mass and set the plant in a prepared planting hole. When setting out plants in peat pots, set the entire pot in the planting hole, but remove the upper edges of the pot so all of the peat pot is covered when soil is firmed around the transplant. If a lip of the peat pot is exposed above the soil level, water may be wicked away from the plant and into the air. After setting the plants, water them with a starter solution as described above. Provide protection against excessive sun, wind, or cold while plants are getting settled in their new locations. Inverted pots, newspaper tunnels, or cloches can be used.

Thinning. When most outdoor-grown annuals develop the first pair of true leaves, they should be thinned to the recommended spacing. This spacing allows plants enough light, water, nutrients and space for them to develop fully above and below the ground. If they have been seeded in vermiculite-filled furrows, excess seedlings can be transplanted to another spot without injury. Zinnias are an exception. In many varieties of zinnias, flowers will appear with a large, nearly naked corolla and few colorful petals. This phenomenon is sometimes referred to as Mexican hats. To avoid such plants in your garden, sow two or three seeds at each planned location. Wait until the plants bloom for the first time, then remove the plants with this undesirable characteristic. Thin remaining plants to the recommended 8- to 12-inch spacing. Another exception to the rule for thinning is sweet alyssum. This annual is particularly susceptible to damping-off. To ensure a good stand of plants, sow the seed in hills and do not bother to thin the seedlings.

Watering. Do not rely on summer rainfall to keep flower beds watered. Plan to irrigate them from the beginning. When watering, moisten the entire bed thoroughly, but do not water so heavily that the soil becomes soggy. After watering, allow the soil to dry moderately before watering again. A canvas soaker hose is excellent for watering beds. Water from the

soaker hose seeps 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 are also good. Sprinklers are not as effective as soaker hoses. Water from sprinklers wets the flowers and foliage, making them susceptible to diseases. Structure of the soil may be destroyed by impact of water drops falling on its surface; the soil may puddle or crust, preventing free entry of water and air. The least effective method for watering is with a hand-held nozzle. Watering with a nozzle has all the objections of watering with a sprinkler. In addition, gardeners seldom are patient enough to do a thorough job of watering with a nozzle; not enough water is applied and the water that is applied is usually poorly distributed.

Mulching. Mulches help keep the soil surface from crusting and aid in preventing growth of weeds; organic mulches can add humus to the soil. Grass clippings make a good mulch for annuals, if they do not mat. Sheet plastics also may be spread over the soil surface to retard evaporation of water and to prevent growth of weeds. However, these materials are unsightly for use in the flower garden.

Weeding (cultivating). After plants are set out or thinned, cultivate only to break crusts on the surface of the soil. When the plants begin to grow, stop cultivating and pull weeds by hand. As annual plants grow, feeder roots spread between the plants; cultivation is likely to injure these roots. In addition, cultivation stirs the soil and uncovers weed seeds that then germinate.

Deadheading (removing old flowers). To maintain vigorous growth of plants and assure neatness, remove spent flowers and seed pods. This step is particularly desirable if you are growing ageratum, calendula, cosmos, marigold, pansy, scabiosa, or zinnia.

Staking. Tall-growing annuals, such as larkspur, or tall varieties of marigold or cosmos, need support to protect them from strong winds and rain. Tall plants are supported by stakes of wood, bamboo, or reed large enough to hold the plants upright but not large enough to be conspicuous. Stakes should be about 6 inches shorter than the mature plant so their presence will not interfere with the beauty of the bloom. Begin staking when plants are about one-third their mature size. Place stakes close to the plant, but take care not to damage the root system. Secure the stems of the plants to stakes in several places with paper-covered wire or other materials that will not cut into the stem. Plants with delicate stems (like cosmos) can be supported by a framework of stakes and strings in criss-crossing patterns.

Fertilizing. When preparing beds for annuals, fertilizer should be added according to recommendations given by soil sample analysis, or derived from observation of plants that have grown on the site. Lime may also be needed if soil test results indicate it. Use dolomitic limestone rather than hydrated lime. Ideally, lime should be added in the fall so it will have time to change the pH. Fertilizer should be added in the spring so it will not leach out before plants can benefit from it.

Once annuals have germinated and begin to grow, additional fertilizers may be needed. This is especially true if organic mulches are added, because microorganisms decomposing the mulch take up available nitrogen. Thus a fertilizer high in nitrogen should be used in these situations. A teaspoon of 10-6-4 per plant every two to three weeks is sufficient. Be sure to work the fertilizer in around the plants in such a way as to avoid direct contact between the stems and the fertilizer.

Controlling Insects and Diseases

Insect Pests. Do not apply an insecticide unless it is necessary to prevent damage to flowers or shrubs. Most insect pests in the garden will not cause appreciable damage if their predators and parasites are protected by avoiding unnecessary applications of insecticides. However, if there is a pest that usually causes serious damage unless an insecticide is used, apply the insecticide as soon as the infestation appears and begins to increase.

Watch for such insect pests as spider mites, aphids, Japanese beetles and other beetles, lacebugs and thrips. These are some of the insects most likely to need prompt treatment with insecticides. Do not treat for soil insects unless you find numbers of cutworms, white grubs, or wireworms when preparing the soil for planting.

When using a pesticide, be certain that the pest and the flower or shrub are indicated on the label. Read and follow all directions for use, including precautions, shown on the label. If pesticides are handled, applied, or disposed of improperly, they may be injurious to human

beings, animals and fish as well as to plants, flowers and beneficial insects. Use pesticides only when needed and handle them with care.

Diseases. Because annuals only grow in the garden for one season, diseases are not as serious a problem as they are for perennials. Select plant varieties that are disease resistant, follow recommended practices for planting and maintaining annuals and you will avoid most disease problems. However, there are times when weather conditions are highly favorable for diseases. If this happens, determine what disease is affecting the plants, then apply the appropriate pesticide according to label directions.

Damping-off causes seeds to rot and seedlings to collapse and die. The disease is carried in soil and may be present on planting containers and tools. Soil moisture and temperature necessary for germination of seeds are also ideal for development of damping-off. Once the disease appears in a seed flat, it may travel quickly through the flat and kill all seedlings planted there. This can be prevented. Before planting, treat the seed with a fungicide, sterilize the soil and use sterile containers. Treat the seed by tearing off the corner of the seed packet and through the hole in the packet, insert about as much fungicide dust as you can pick up on the tip of the small blade of a penknife. Close the hole by folding over the corner of the packet, then shake the seed thoroughly to coat it with the fungicide dust.

Unless you use artificial soilless mixes, sterilize the soil in an oven. Fill a metal tray with moist, but not wet, soil. Hold it at 180°F for 30 minutes. Do not overheat. This will produce an unpleasant smell.

To avoid introducing the damping-off organism on containers, use fiber seed flats or peat pots. These containers are sterile, inexpensive and easily obtained from garden shops. Fiber flats are light and strong. They cost so little that they can be thrown away after one use. Peat pots can be set out in the garden along with the plants they contain; roots of the plants grow through the walls of the pots. Plants grown in peat pots suffer no setback when they are transplanted to the garden. Larkspur and poppy, which ordinarily do not tolerate transplanting, can be grown in peat pots satisfactorily. If wooden boxes or clay flower pots are used for soil containers, clean them well. Soak clay pots in water and scrub them to remove all the white fertilizer crust from the outside. Sterilize clay pots by swabbing them with a solution of 1 part chlorine bleach to 10 parts water. Allow containers to dry thoroughly before filling them with soil. If, despite precautions, damping-off appears in seedlings, discard the containers and soil and start again.

Recommended Annuals for Kansas

Annuals often are classified as tender (T), half-hardy (HH) or hardy (H). This refers to their ability to withstand cold winter temperatures and early spring frosts. A hardy annual will begin growth in the spring from self-sown seed that survives the winter. The plants may or may not be winter hardy. Half-hardy annual plants and their seed will withstand some cold but not hard frosts. The seed will not survive winter temperatures, but will germinate in cold soil when sown outdoors in the early spring. Seedlings will not be damaged by a light frost if they have not emerged from the soil. A tender annual cannot withstand freezing temperatures. The seed must be sown after the danger of frost has passed.

Ageratum, Flossflower, *Ageratum houstonianum* (HH). Ageratum, an old favorite for the annual flower bed, has small blue flowers, grows 4 to 12 inches tall and makes an excellent border for the sunny flower bed. It will also do well in partial shade, preferably afternoon shade. The cultivar blue Danube is a standard bedding plant. There are some white varieties that will perform better in the shade than under full sun conditions. These plants are basically disease- and insect-free.

Cup Flowers, *Nierembergia hippomanica violacea* (T). Cup flower is a little-known annual with excellent characteristics. It flowers continually throughout the summer, peaking in July and August, bearing small lavender to blue star-shaped blossoms. Forming 6- to 9-inch mounds, it can withstand full sun conditions and does well in containers and as a border plant. The variety Purple Robe is most common.

Flowering or Ornamental Tobacco, *Nicotiana alata* (T). A member of the petunia family, this attractive species of tobacco is a welcome addition to the selection of bedding plants. The flowers of white, pink, red, yellow, lime green and lavender form on stalks above the rosette of foliage. The plants range from 1 to 3 feet tall and are an excellent choice for the middle to

back of a flower bed in full sun. Once the first flush of flowering is complete, the flowering stems should be cut back to encourage continued bloom through the summer. The Nicki series is very popular.

Geranium, *Pelargonium hortorum* (T). The geranium is probably the most labor-consuming annual for the garden. The old, faded flower heads need to be removed weekly in the summer to ensure continuous bloom. If not, several diseases can occur when spent flowers fall on the foliage and create pockets of moisture that allow fungal spores to germinate. Geraniums range in height from 12 to 20 inches and have a round growth habit. Flower color range includes red, pink, salmon, white and a few bicolors of red or pink with white. Geraniums are suited to massive color displays or container growing. The new varieties, Red Cascade and Orange Cascade, have trailing growth habits; the ivy geranium, *pelargonium peltatum* was used for hanging baskets or to cascade over porch boxes but it does not perform well under hot conditions. Geraniums need a sunny site and require mulching to maintain cool soil temperatures for proper root growth.

Madagascar Periwinkle, *Catharanthus roseus, formerly Vinca rosea* (T). An excellent annual for full sun and dry conditions, this species forms uniform mounds of glossy dark green foliage covered with flowers in shades of white, pink and rose. The popular little series grows 10 inches high at maturity. This annual is heat-tolerant, withstands pollution and is an excellent choice in urban settings.

Marigold, *Tagetes spp.* (HH). Marigolds are probably the No. 1 bedding plant for Kansas. They come in a range of heights and flower shapes. The French marigold is commonly two-toned in shades of yellow, orange or red-brown with crimson and maroon. The flowers may be single, double or the anemone-type head. The African marigold is distinguished by large, globe-shaped flower heads in shades of white through pale yellow to yellow, gold and orange. The triploid marigold, a hybrid between the French and African marigolds, can have flowers of African or French of an intermediate type. French marigolds are commonly used in the front to middle of the flower bed, since they range in height from 6 to 18 inches. The African marigolds are taller plants, ranging from 10-inch dwarfs to 36-inch-tall cultivars. Although triploid marigolds tend to have a dwarf growth habit — 10 to 15 inches — and poorer germination, they are more heat-tolerant than other marigolds. Spider mites can become a problem during the hottest part of the summer. Most marigolds have a strong odor to the foliage, but some odorless ones are now available. The Galore and Inca series of African marigolds, the Queen series, the varieties Glowing Embers and Honeycomb of the French type and Honeybee and Gingersnap of the triploids all grow well in Kansas.

The Signet marigold is becoming more popular due to its dwarf, compact, dainty appearance. Its foliage is extremely fine and the plants are no more than 8 to 10 inches tall. Several cultivars are available with single flowers in shades of yellow, orange or gold. They will flower freely throughout the summer when grown in full sun to partial shade conditions.

Petunia, *Petunia hybrids* (HH). The ever-popular petunia is available in shades of white, pink, red, burgundy, blue, purple, yellow and as pinwheels and picotees. Flowers can be single or double. Plants are classified as grandifloras (few but very large flowers 3 to 5 inches across) or multiflora (many but smaller flowers 2 to 3 inches across). Petunias prefer a full sun to partial shade location where they can spread outwards to 12 to 18 inches and form mounds 8 to 15 inches tall. Given adequate moisture, they will flower profusely throughout the summer.

Plumed Cockscomb, *Celosia cristata (T)*. Plumed cockscomb offers a good flower shape for the garden. These brightly colored flowers, available in red, orange, yellow, gold and pink, can be used in dry flower arrangements. Plant height varies from 1 to 2½ feet. This species is best adapted to full to partial sun locations.

Rose Moss, Moss Rose, Portulaca, *Portulaca grandiflora* (T). Rose moss is a drought- and heat-resistant plant suited to Kansas. This pest-free, low-growing succulent will thrive under adverse conditions, forming colorful blankets of flowers. However, the flowers do not open on overcast days and will close as light intensity drops at sunset. The Sunglo series and the Calypso Mixture perform well in Kansas.

Salvia, Red Salvia, *Salvia splendens* (T); **Mealycup Sage,** *S. Farinacea* (HH). Two species of salvia are commonly grown as annual flowers — the more common red salvia and the lesser-known mealycup sage or blue salvia. Red salvia is best grown in a sunny location that receives some late afternoon shade. Cultivars of red salvia are available with red, purple or white flowers. The purple and white flowering forms require more shade as they appear to be less vigorous plants. The flowers are borne on spikes above the dark green foliage and offer a showy display of color throughout the summer. The dwarf cultivars are more suited to containers and urban lots while the taller cultivars (above 20 inches) perform well in island beds and in large mass displays.

Mealycup sage, also known as blue salvia, has spikes of pale blue flowers from late spring until frost. Victoria, an attractive cultivar with intense blue flowers, reaches a height of 18 inches and a spread of about 14 inches. Mealycup sage, a dependable annual year after year, has gained tremendously in popularity and availability.

Snapdragon, *Antirrhinum majus* (HH). The snapdragon has been a favorite flower of children for generations. It is available in a wide range of colors, often sold as a mixture of colors rather than single shades. The dwarf cultivars, Floral Carpet and Little Darling, are suited to flower borders and do not break over during rainstorms. Taller cultivars (the Rocket series), grown for cut flowers, will require staking. This annual will do well in sun or partial shade. Removing older, faded flowers will encourage continued bloom through the summer.

Spider Flower, *Cleome hasslerana* (HH). An annual that deserves more attention, spider flower is an excellent choice for hot, dry, windy, sunny locations. Reaching a height of 3 to 4 feet, spider flower makes an excellent backdrop for shorter annuals. The plant bears flowers throughout the summer. It is available in white, pink, lilac, violet and red and should be used in mass plantings.

Sultana, Impatiens, Busy Lizzie, *Impatiens wallerana* (T). The No. 1 bedding plant nationwide, the impatiens is tops for the shade. During the hottest part of the summer, it will have a very high demand for water. The plant is available in numerous varieties ranging in height from 6 to 18 inches and flower colors from white through pink to red, lavenders and oranges. A few new varieties have double flowers. Another reason to grow this annual is that the red and pink flowers will attract hummingbirds.

Other Annuals for Kansas

Amaranthus, Jacob's Coat, *Amaranthus tricolor* (T)

Annual Phlox, *Phlox drummondii* (HH)

Arctotis, African Daisy, *Arctotis stoechadifolia* (T)

Bachelor's Button, Cornflower, *Centaurea cyanus* (H)

Balsam, *Impatiens balsamina* (H)

Begonia, fiberous rooted, *Begonia x semperflorens-cultorum* (T)

Bells of Ireland, *MoluCella laevis* (H)

Black-eyed Susan Vine, *Thunbergia alata* (HH)

Browallia, Sapphire flower, *Browallia speciosa* (T)

Burning Bush, Summer cypress, *Kochia scoparia* (HH)

California Poppy, *Eschscholzia californica* (H)

Calliopsis, *Coreopsis tinctoria* (HH)

Candytuft, *Iberis umbellata* (H)

Canterbury Bells, Bellflower, *Campanula medium* (H)

Castor Bean, *Ricinus communis* (T)

China Pink, *Dianthus chinensis* (H)

Coleus, *Coleus hybridus* (T)

Cosmos, *Cosmos bipinnatus* (HH)

Creeping Zinnia, *Sanvitalia procumbens* (T)

Dahlberg Daisy, *Dyssodia tenuiloba* (H)

Dusty Miller, *Senecio cineraria* (H)

Firecracker Plant, Cigar plant, *Cuphea ignea* (T)

Flowering Kale, Ornamental Cabbage, *Brassica oleracea* (H)

Four o'clock, *Mirabilis jalapa* (HH)

Gaillardia, annual, *Gaillardia species* (HH)

Gazania, *Gazania species* (HH)

Gerbera, *Gerbera jamesonii* (T)

Globe Amaranth, *Gomphrena globosa* (T)

Lobelia, *Lobelia erinus* (T)

Mexican Sunflower, *Tithonia roundifolia* (HH)

Morning Glory, *Ipomea purpurea* (HH)

Nasturtium, *Tropaeolum majus* (T)
Ornamental Pepper, *Capsicum annuum* (T)
Snow-on-the-Mountain, *Euphorbia marginata* (HH)
Strawflower, *Helichrysum bracteatum* (HH)
Sunflower, *Helianthus annuus* (H)
Sweet Alyssum, *Lobularia maritima* (H)
Sweet William, *Dianthus barbatus* (HH)
Verbena, *Verbena x hybrida* (HH)
Wallflower, *Cheiranthus cheiri* (H)
Zinnia, *Zinnia species* (HH)

Heat-tolerant annuals

Cockscomb, *Celosia*
Creeping Zinnia, *Sanvitalia*
Dusty Miller, *Senecio*
Four o'Clock, *Mirabilis*
Firecracker Plant, *Cuphea*
Globe Amaranth, *Gromphrena*
Jacob's Coat, *Amaranthus*
Madagascar Periwinkle, *Catharanthus*
Marigold, *Tagetes*
Mexican Sunflower, *Tithonia*
Ornamental Pepper, *Capsicum*
Petunia, *Petunia*
Rose Moss, *Portulaca*
Salvia, *Salvia farinacea*
Snow-on-the-Mountain, *Euphorbia*
Verbena, *Verbena*
Zinnia, *Zinnia*

Annuals for shade

Begonia, *Begonia*
Browallia, *Browallia*
Coleus, *Coleus*
Impatiens, *Impatiens*
Nicotiana, *Nicotiana*
Salvia, *Salvia splendens*
Pansy, *Viola*

Drought-tolerant annuals

Burning Bush, *Kochia*
Creeping Zinnia, *Sanvitalia*
Dusty Miller, *Senecio*
Four o'Clock, *Mirabilis*
Gazania, *Gazania*
Jacob's Coat, *Amaranthus*
Madagascar Periwinkle, *Catharanthus*
Mexican Sunflower, *Tithonia*
Rose Moss, *Portulaca*
Salvia, *Salvia farinacea*
Snow-on-the-Mountain, *Euphorbia*
Sweet Alyssum, *Lobularia*

Annuals for cut flowers

Annual Baby's Breath, *Gypsophila*
Annual Phlox, *Phlox*
Bells of Ireland, *Molucella*
China Pink, *Dianthus*
Spiderflower, *Cleome*
Cockscomb, *Celosia*
Cornflower, *Centaurea*
Globe Amaranth, *Gomphrena*
Marigold, *Tagetes*
Mexican Sunflower, *Tithonia*
Nicotiana, *Nicotiana*
Petunia, *Petunia*
Salvia, *Salvia*
Strawflower, *Helichrysum*
Zinnia, *Zinnia*

Biennial Flowers

Biennials are plants that complete their life cycle in two years of growing seasons. During the first growing season they produce leaves, usually a rosette; then in the second growing season, preceded by a cold period, they produce blooms and die. For the flower gardener, biennials present the obvious disadvantage of producing only foliage the first year and no blooms. For this reason, new varieties have been developed that produce early bloom. "Foxy" is a variety of foxglove that will bloom the first year. Biennial seeds can be sown in midsummer to produce plants that develop in the fall, forcing the plant to bloom the next year. Popular biennials are stock and hollyhock. Cultural practices are basically the same as for annuals, except the plants remain two years.

Annuals by color and height		Height
Variety	**Color of Bloom**	**(Inches)**
African Daisy	white, yellow, salmon	6–12
Ageratum	blue, white	4–24
Amaranthus	red or red and green	48–96
Anterrhinum majus	red, orange, yellow, white, purple	6–36
Arctotis	white, bluish eye	24
Aster	yellow, pink red, blue, white, lavender	18
Balsam	rose, purple, white	12–18
Basil, red	grown for red-purple foliage	15
Browallia	blue, violet, white	24
Calendula	yellow, gold	12–24
California Poppy	red to yellow	12
Cabbage, flowering	red to white	8–14
Candytuft	pink,lilac,white	12–16
Chrysanthemum	yellow, purple, orange	36
Castor Beans	red inconspicuous flowers	72–96
Cineraria	violet, pink, blue, white,	10–14
Clarkia	white, pink, red, pink and red	18
Cockscomb	yellow to crimson	12–48
Cornflower	pink, blue, white	36
Coleus	grown for variegated foliage	8–20
Cosmos	lilac, red, yellow, white	36–72
Dusty-miller	silver foliage	24
Forget-Me-Not	blue, pink	12
Four O'Clock	pink, white, yellow	24
Gaillardia	yellow, orange, red	15–24
Gloriosa Daisy	yellow, orange, red	24–30
Gomphrena	white, pink, purple	15–30
Heliotrope	rose	10
Impatiens	red, pink, white, orange	8–24
Larkspur	blue, pink, white, purple	18–36
Lobelia	blue, violet, white	4–18
Lupine	pink to purple	24–36
Marigold	yellow, orange to red-brown	8–48
Mimulas	yellow and red	12–30
Nemophila	blue	10
Nicotiana	red, white	24–48
Nigella	white, blue, violet	12–15
Pansy	blue, purple, white, yellow	8–12
Periwinkle	rose, white	18
Petunia	white to rose, purple	6–8
Phlox	white, rose, purple	6–18

Annuals by color and height		Height
Variety	**Color of Bloom**	**(Inches)**
Poppy	red, pink, blue, orange	varies
Portulaca	yellow, white, rose, orange	8
Salvia	blue, red	18–36
Scabiosa	purple, pink, white	36
Snapdragon	blue, purple, yellow, orange, red	6–18
Statice or sea lavendar	yellow, rose, violet, white, lavender	18–24
Strawflower	white, red, yellow	36
Sweet Alyssum	white	3–10
Sunflower	yellow to red-brown	12–108
Sweet Pea	orange, yellow, rose, purple, white	48+ (vine)
Verbena	white, pink, blue, red	18–24
Vinca	white, purple, red	6–18
Torenia	white, blue, violet	12
Zinnia	red, pink, yellow, orange	6–36

Perennial Flowers

Perennials are plants that live year after year. Trees and shrubs are perennial. Most garden flowers are herbaceous perennials. This means the tops of the plants — the leaves, stems and flowers die back to the ground each fall with the first frost or freeze. The roots persist through the winter and every spring, new plant tops arise. Any plant that lives through the winter is said to be hardy.

There are advantages to perennials, the most obvious is that they do not have to be set out, like annuals, every year. Some perennials, such as delphiniums, have to be replaced every few years. Another advantage is that with careful planning, a perennial flower bed will change color, as one type of plant finishes and another variety begins to bloom. Because perennials have a limited blooming period of about two to three weeks, deadheading, or removal of old blooms, is not as frequently necessary to keep them blooming. However, they do require pruning and maintenance to keep them attractive. Their relatively short bloom period is a disadvantage, but by combining them with annuals, a continuous colorful show can be provided. Most require transplanting every three years.

Perennial plant hardiness is described in terms of hardiness zones, based on average minimum winter temperatures. Kansas falls in Zones 5 and 6 (the dividing line runs diagonally across the state from Seward County in the southwest to Leavenworth and Jefferson counties in the northeast). Zone 5 has expected average minimum winter temperatures in the range of –10˚ to –20˚F; Zone 6 is in the 0˚ to –10˚F range. The northernmost hardiness zone that a perennial can survive will be listed in garden catalogs and books. Because hardiness zones are based on averages, not extremes, some perennials will be susceptible to winterkill in the northernmost areas of their hardiness range.

Another consideration is summer survival. Many perennials can withstand the cold winters but will not survive the hot, dry Kansas summers. Unfortunately, this problem generally is not mentioned in books and catalogs.

Culture and maintenance of perennials

Site Location. You need to consider many of the same aspects of site selection for perennials as you do for annuals; sunlight (full sun to heavy shade), slope of the site (affects temperature and drainage), soil type and the role the plants selected will play in the garden. This is especially important with perennials, as they usually are left in the site for several years. In general, it is best to plant clumps of perennials rather than one plant. Large plantings may be made if space allows. An ideal location would provide a background such as

a wall or hedge against which perennials will stand out while in bloom. In island beds, perennials can provide their own background if tall ones are planted in the center and low ones toward the edges.

Soil Preparation. Preparing the soil is extremely important to perennials. Many annuals can grow and flower in poorly prepared soil, but few perennials survive more than one year if the soil is not properly prepared.

For new beds, begin preparing soil in the fall before planting time. Have the soil tested first. Results will indicate how much lime or acidifier needs to be added during preparation and how much fertilizer needs to be added in the spring. Materials to adjust pH need time to work. Before preparing new beds, check the soil to see that it is well-drained, and has water-holding capacity. Test for drainage as described in the section on annuals. If drainage is inadequate, dig furrows along the sides of the bed and add soil from the furrows to the bed. This raises the level of the bed above the general level of the soil. Excess water can then seep from the bed into the furrows. Raised beds may wash during heavy rains. This can be prevented by surrounding the beds with wooden or masonry walls. Because raised beds dry out more quickly than flat beds (little moisture moves up into the bed from the soil below), water beds frequently during the summer. After forming the beds, spade the soil to a depth of 8 or 10 inches. Turn soil over completely, incorporating 2 to 4 inches of organic material. Remove debris and leave rough during the winter.

In the spring just before planting, spade again. At this spading, add recommended levels of fertilizers. Be sure to work any phosphorous deeply into the soil, where plant roots can get it. Rake the soil surface smooth. After raking, the soil is ready for seeding or planting.

Selecting Plants. It is best to select plants with a purpose in mind, such as edging plants, accents for evergreens, masses of color, rock garden specimens, etc. With specific purposes in mind, you can choose perennials by considering their characteristics and deciding which plants best meet your requirements.

For a good display from a limited number of plants in a limited space, select named varieties. Observe the flowering times of perennials in your neighborhood to assure you will be able to choose plants that will flower together and plants that will be showy when little else is in bloom. Flowering time may vary as much as six weeks from year to year, but plants of the same kind and their cultivars usually flower at the same time. To obtain details on particular plants or groups of plants, consult plant societies, specialty books, nurseries specializing in herbaceous perennials and local botanical gardens.

Plants of many perennials can be bought at a local nursery. These plants usually are in bloom when they are offered for sale, which allows you to select the colors you want. Buy perennial plants that are compact and dark green. Plants held in warm shopping areas are seldom vigorous and generally have thin, pale, yellow stems and leaves. Avoid buying these plants. Buy named varieties of plants for known characteristics of disease resistance, heat and cold resistance, growth habits and colors.

Many perennials do not grow true to type if grown from seed saved from old plants. If you plant seed that you have saved, many off-types of color, flower form and plant habit are produced. Purchased seed, whether hybrid or strains, usually give uniform results. You can sow perennial seeds directly in the beds where the plants are to bloom, or you can start early plants indoors or in a cold frame and set them out in beds after the weather warms.

Planting Times. Generally, late-summer or fall-flowering perennials are planted in the spring, while spring-flowering perennials are planted in late summer or early fall. However, it is wise to check exact planting dates for specific perennials. Regardless of the time of planting, perennials should be allowed sufficient time to establish themselves before blooming or the onset of cold weather.

Planting Seed Outdoors. Perennials seeded in the garden often fail to germinate properly because the surface of the soil cakes and prevents entry of water. To avoid this, sow the seed in vermiculite-filled furrows. For planting directions, see the previous section on annuals.

Setting Out Plants. Whether you buy plants from a nursery, mail-order source, or start your own indoors, set them out the same way. When the time comes to set plants out in the garden, remove them from flats by slicing downward in the soil between the plants. Lift out each plant with a block of soil surrounding its roots and set the soil block in a planting hole. If the plants are in fiber pots, remove the fiber from the outside of the root mass and set the plant in a prepared planting hole. When

setting out plants in peat pots, remove the top edge of the pot to prevent it from drying out and limiting the root development of the plant. Thoroughly moisten the pot and its contents to help the roots develop properly. Drench the soil around the planting hole with a liquid fertilizer (16-12-10 or 20-20-20 mixed 1 tablespoon per gallon of water) to stimulate root growth. Set the moistened pot in the planting hole and press the soil up around the plant. Allow plenty of space between plants, because perennials need room to develop. Perennials usually show up best when planted in clumps or groups of plants of the same variety.

Watering. Since herbaceous perennials grow back from the roots every year, it is important to encourage healthy, deep roots. Proper watering promotes good root development. Make sure that all the roots are reached when watering. Follow directions on watering in the section on annuals.

Mulching. Mulch gives an orderly look to a garden and cuts down on weeding. Mulches are very useful for maintaining uniform moisture conditions in the garden. Soil temperatures are modified by mulches to various degrees. Organic mulches may add some nutrients and humus to the soil, improving its tilth and moisture-holding capacity. Most organic mulches should be applied after plants are well-established and when there is reasonably good soil moisture. Inorganic mulches, such as plastic films and paper are applied before planting. Black plastic and similar materials should be spread on land that has been completely prepared for planting and has a high moisture level. Bark, pine needles and shredded leaves are common organic mulches used in perennial beds. Gravel and black plastic are inorganic materials to use. All mulches require care to keep them attractive; litter is very noticeable.

Perennials should be mulched during winter months to protect them from the heaving that results from repeated freezing and thawing of the soil. However, you must be careful with winter mulching, as it can do more harm than good. Be careful not to pile mulch heavily over the crowns, as this would encourage rotting. Boughs of evergreens give ample protection but allow air circulation. Apply mulch around the plants only after the soil temperature has decreased after several killing frosts. If winter mulch is applied too early, the warmth from the protected soil will cause new growth to start. Severe damage to the plant can result from new growth being frozen back. Remove winter mulch as soon as growth starts in the spring. If you don't, new growth will develop abnormally with long, gangly stems and insufficient chlorophyll.

Weeding. Follow weeding directions in the section on annuals. A few preemergent herbicides are now registered for use on perennial flowers.

Fertilizing. Regular fertilization is necessary. Perennial plantings can rob the soil of its natural fertility. However, do not fertilize perennials heavily. A light fertilization program gives a continuous supply of nutrients to produce healthy plants. Place fertilizer in small rings around each plant in March. Repeat twice at six-week intervals. This should be enough to carry plants through the summer. Apply another treatment of fertilizer to late-blooming plants in late summer. Always water the bed after applying fertilizer. This will wash the fertilizer off the foliage and prevent burn. It will also make fertilizer available to the plants immediately.

Deadheading. After perennials have bloomed, spent flowers should be removed. Cut flower stems down to a healthy leaf or to the ground, if there are no more buds. This will keep the beds looking neat and will prevent plants from wasting energy setting seed. Delphiniums can be forced to reblossom if cut back severely after the first bloom.

Disbudding. To gain large blooms from perennials, as opposed to more numerous but smaller blooms, disbud them. In disbudding, small side buds are removed, which allows the plant to concentrate its energy to produce one or a few large blooms. Peonies and chrysanthemums are examples of plants that are often disbudded.

Staking. Most erect perennials are top-heavy, and all of the taller ones need staking. If plants fall over, the stem will function poorly where it has been bent. If the stem is cracked, disease organisms can penetrate the break. Stake plants when you set them out so they will grow to cover the stakes. Once staked, tall perennials can better withstand hard, driving rain and wind.

Use stakes made of any material. Select stakes that will be 6 to 12 inches shorter than the height of the grown plant. Place stakes behind the plants and sink them into the ground far enough to be firm. Loosely tie plants to the

stakes, using paper covered wire, plastic, or other soft material. Tie the plant by making a double loop of the wire with one loop around the plant and the other around the stake. Never loop the tie around both stake and plant. The plant will hang to one side and the wire may girdle the stem. Add ties as the stem lengthens.

Fall Care. In the fall, after the foliage of perennials has died down, remove dead leaves, stems and spent flowers. These materials often harbor insects and disease-causing organisms. Apply winter mulch after the soil temperature has dropped.

Controlling Insects and Diseases

Although perennials in general are healthy plants, there are occasionally some problems. It is advisable to select resistant varieties. Plant perennials in conditions of light, wind, spacing and soil textures that are suited to them. Remove spent flowers, dead leaves and other plant litter that serve as a source of reinfestation. It is advisable to know the major insect and disease pests (if any) of each specific plant type grown, so problems can be correctly diagnosed and treated as they arise.

Asexual Propagation of Perennials

Division. Most perennials left in the same place for more than three years are likely to be overgrown, overcrowded, have dead or unsightly centers and in need of basic feeding and soil amendment. The center of the clump will grow poorly, if at all and the flowers will be sparse. The clump will deplete the fertility of the soil as the plant crowds itself. To divide mature clumps of perennials, select only vigorous side shoots from the outer part of the clump. Discard the center of the clump. Divide the plant into clumps of three to five shoots each. Be careful not to over-divide; too small a clump will not give much color the first year after replanting. Divide perennials when the plants are dormant, just before a new season of growth, or in the fall so they can become established before the ground freezes.

Stagger plant divisions so the whole garden will not be redone at the same time and good rotation will yield a display of flowers each year. Do not put all the divisions back into the same space that contained the original plant. That would place too many plants in a given area. Give extra plants to friends, plant them elsewhere in the yard, or discard them.

Cuttings. Many plants can be propagated from tip or root cuttings. Generally, tip cuttings are easier to propagate than root cuttings.

Select second growth of dianthus, candytuft and phlox for cuttings. Make tip cuttings 3 to 6 inches long. Treat the base of the cutting with a root stimulant. Leave all foliage on the cutting except the part that will be below the soil line. Insert one cutting per peat pot. Place peat pots of tip cuttings in a lightly shaded place. Cover with a sheet of clear plastic. Check regularly to make sure cuttings do not dry out.

When cuttings do not easily pull out of the soil, they have begun to root. Make holes in the plastic sheet to increase the air exposure to the cuttings. This will harden the cuttings. Every few days enlarge the holes or make new holes.

Make root cuttings of phlox, baby's breath and oriental poppy. Dig the plants in late summer after they have bloomed. Select pencil-sized roots; cut them into 4-inch sections. Put each piece in a peat pot. Prepare a tray of peat pots as for seeds, except the soil mix should be 2 parts sand, 1 part soil and 1 part peat moss. Water thoroughly.

The perennials described here were chosen to provide a continuous bloom from April through October, an assortment of plant heights, forms and suitability for the average garden site in the state. These are the most commonly and easily grown perennials. They are presented in approximate bloom sequence; blooming period is given in parentheses after the scientific name.

Recommended Perennials for Kansas

Basket-of-Gold, *Aurinia saxatilis*, or *Alyssum saxatile* (April–May). Basket-of-gold is commonly used in rock gardens or on the edge of the perennial border due to its short height (9 to 12 inches) and spreading growth habit (up to 15 inches across). The flowers form tight clusters on the ends of the flowering stems. The golden-yellow flowers complement the purples and blues of many of the other spring-flowering perennials. Once seed is set, the stem begins to grow longer and should be removed to encourage low branching. This plant is easily propagated by seed, stem cuttings or division. Division should be done after flowering; stem cuttings should be taken in June.

Creeping or **Moss Phlox,** *Phlox subulata* (April to May). Another spring-flowering perennial, moss phlox bears flowers in shades of lavender, lilac, purple, rose, red and white. The plant will form a dense mat (3 to 6 inches tall, up to 2 feet across) of needle-like foliage that is covered with blooms in the early spring. It is commonly used in rock gardens, as a ground cover or in the perennial border. It is easily propagated by layering or stem cutting after flowering. This plant tends to be evergreen in protected sites.

Garden or **Chinese Peony,** *Paeonia lactiflora* (May to June). The garden peony, a Memorial Day tradition, was commonly sold as cut flowers to place at gravesites. The plant is usually 3 feet tall and has a shrublike growth habit. The large flowers (up to 6 inches across) can be single, Japanese, anemone, semi-double or double in form. The double form, the most commonly grown, is available in a wide selection of colors. The key to successful peony culture is proper planting; the eyes or young buds should be set 1 inch below the soil surface. Peonies need at least six hours of sunlight each day. Most peony cultivars require three years before full blooming can be expected. Peonies rarely need division.

Bearded or **German Iris,** *Iris germanica* (May to June). The bearded or German iris is easy to grow and maintain. It comes in a wide selection of colors ranging from white to shades of yellows, oranges, golds and browns and to reds, pinks, lavenders, purples and blues; many bicolor cultivars are available. Iris range in height from 2 to 4 feet and require a sunny location for best growth.

Some newer dwarf-bearded iris can be used in a rock garden. The rhizomes (thick, fleshy roots) should be planted just barely below the soil surface and should be kept moist. When flower production or flower size decreases, it is a good indication that the rhizomes need to be dug and divided. This should be done in late August through September to allow plenty of time for establishment before winter.

Coral Bells, *Heuchera sanguinea*, (June to July). A very compact perennial, coral bells forms mounds of foliage 8 inches high. Mature plants can reach 12 to 15 inches in diameter. The tiny (¼ to ½ inch) flowers are borne on flowering stems 10 to 20 inches above the foliage. The attractiveness of the plant is due to the heart-shaped leaves and tiny bell-shaped flowers in shades of pink and red — a favorite of hummingbirds. The flowering season may be extended by removing the faded flowering stems and by watering during dry periods. Coral bells can be effective in a partially shaded rock garden or perennial border. It should be mulched to help keep the shallow roots moist and is easily propagated by seed or division.

Tickseed, *Coreopsis lanceolata*, (June to September). Tickseed, also known as coreopsis, has brilliant yellow flowers, making it a showy addition to the perennial borders after many other perennials have finished blooming. The plant grows 18 to 24 inches tall and forms a large mound up to 24 inches across. It prefers full sun and does best in a naturalized setting since it readily reseeds. To prevent reseeding, remove old blooms after flowering; this also encourages flower production. An added advantage to coreopsis is its ability to survive under harsh conditions.

Blanket Flower, *Gaillardia grandiflora*, (June to October). Blanket flower gets its name from the colors of its flowers which are reminiscent of those in blankets woven by the Native Americans. The rich shades of yellow, red and burgundy make this a welcome addition to the perennial border. A benefit is the wide variety of butterflies that visit this plant. The plant does well in a full sun location with light soil; heavy clay soil can cause root rots. Many improved cultivars are available today, ranging in height from 8 inches to 3 feet. All cultivars require removal of old flowers. This is important with the dwarf cultivars since many of the resulting seedlings will not be dwarfs. The plant can be propagated from seed, root cuttings or division.

Fernleaf Yarrow, *Achillea filipendulina*, *A. eupatorium*, (June to August). A 3- to 4-foot-tall perennial with blue-gray foliage, fernleaf yarrow is an excellent choice for the back of a perennial border. The plant bears large, golden flowers (up to 5 inches across) that can be used in dried flower arrangements. Removing the heads will prolong the blooming season, prevent seed set and increase the plant's vigor. The species prefers full sun and dry sites; fertilization with bonemeal will encourage healthy growth. The plant is most easily propagated from seed or division in the spring on a four-year cycle. Several other species of Achillea offer a range of plant height and flower color. All do very well in Kansas.

Daylily, *Hemerocallis hybrids*, (June to October with proper variety selection). The daylily is one of the most commonly grown perennials. The orange daylily (*H. fulva*) and the yellow daylily (*H. flava*) are found on many old farmsteads. Through hybridization, many varieties have been introduced that bear flowers in shades of red, yellow, pink, gold and blends of color. There are also doubles and reflowering cultivars available through specialty catalogs. The tuberous roots of the daylily can be planted in naturalized settings along ponds and streams, on banks, woodlands or in an open area provided the soil is well drained. The plants do best in full sun; the pastel-colored cultivars do best with some shade to prevent fading of the colors. With proper cultivar selection, daylilies can be seen in the garden all summer long. The plants are best propagated by division in mid-August to early September on a four- to six-year cycle.

Shasta Daisy, *Chrysanthemum superbum* or *C. maximum*, (July to October). Shasta daisy is an excellent perennial for Kansas. Its large daisy flowers can be used in flower arrangements. Alaska, the most commonly grown variety, bears large 2-inch flowers on 2-foot stems. Shasta daisy will flower profusely throughout the summer if grown in full sun conditions; partial shade is desirable for the weaker doubles. It is a vigorous plant that, under proper conditions, will need division every two years.

Summer or **Garden Phlox,** *Phlox paniculata*, (July to September). The traditional lavender summer phlox has been improved recently with the introduction of varieties with much larger flower heads bearing attractive purple, red, pink or white flowers. This tall perennial (2 to 4 feet) serves in the middle to back of the perennial border to display shorter species against its dark green foliage. The plant flowers best in full sun; partial shade will reduce the head size. Care should be taken to locate this plant where there is good air circulation to prevent powdery mildew from occurring on the foliage. Phlox is a high-maintenance perennial needing staking, irrigation during drought and flower cluster removal to prolong the season of bloom and to prevent reseeding. The plants can be readily propagated by lifting the clumps in the fall and dividing them.

Hardy or **Garden Chrysanthemum,** *Chrysanthemum morifolium*, (August to October). The last perennial to flower in autumn, the chrysanthemum symbolizes the end of the growing season. Chrysanthemums come in a broad range of colors and types. They grow best in full sun and when given plenty of fertilizer and water. The cushion-type growth forms mounds of flowers on plants 1½ feet tall and 2½ feet across. The flowers can be cut and used in flower arrangements. The plant is easily propagated by division in the early spring. Chrysanthemums are available in the spring or autumn at garden centers and retail florists. The florist chrysanthemum, commonly grown in a 6-inch pot for indoor use, is generally not winter hardy and should not be transplanted to the garden. Always choose garden cultivars.

Other perennials for Kansas

Adam's Needle, *Yucca filamentosa*
Baby's Breath, *Gypsophila paniculata*
Balloon Flower, *Platycodon grandiflorus*
Bee Balm, *Monarda didyma*
Black-eyed Susan, *Rudbeckia hirta pulcherrima*
Bleeding Heart, *Dicentra spectabilis*
Butterfly weed, *Asclepias tuberosa*
Blue Flax, *Linum perenne*
Cardinal Flower, *Lobelia cardinalis*
Coneflower, *Echinacea purpurea*
Columbine, *Aquilegia species*
Evening Primrose, *Oenothera missouriensis*
Fleabane, *Erigeron hybrids*
Gayfeather, *Liatris species*
Golden Marguerite, *Anthemis tinctoria*
Goldenrod, *Soladigo hybrids*
Hens and Chickens, *Sempervivum tectorum*
Lamb's Ear, *Stachys byzantina*
Loosestrife, *Lythrum salicaria*
Oriental Poppy, *Papaver orientalis*
Plantain Lily, *Hosta hybrids*
Plume Poppy, *Macleaya cordata*
Sedum, *Sedum spectabile*
Silver Mound, *Artemisia schmidtiana*
Sneezeweed, *Helenium autumnale*
Spiderwort, *Tradescantia virginiana*
Spurge, *Euphorbia epithymoides*
Torch Lily, *Kniphofia uvaria*

Shade-tolerant perennials

Bee Balm, *Monarda*
Bleeding Heart, *Dicentra*
Cardinal Flower, *Lobelia*
Columbine, *Aquilegia*
Coral Bells, *Heuchera*
Foxglove, *Digitalis*
Harebell, *Campanula*
Loosestrife, *Lysimachia*
Plantain Lily, *Hosta*
Solomon's Seal, *Polygonatum*
Virginia Bluebells, *Mertensia*

Drought-tolerant perennials

Basket-of-Gold, *Aurinia*
Black-eyed Susan, *Rudbeckia*
Blanket Flower, *Gaillardia*
Butterfly Flower, *Asclepias*
Daylily, *Hemerocallis*
False Indigo, *Baptisia*
Fleabane, *Erigeron*
Gayfeather, *Liatris*
Goldenrod, *Solidago*
Iris, *Iris*
Sage, *Salvia*
Sedum, *Sedum*
Silver Mound, *Artemisia*
Spanish Bayonet, *Yucca*
Spurge, *Euphorbia*
Stonecrop, *Sedum*
Tickseed, *Coreopsis*
Torch Lily, *Kniphofia*
Yarrow, *Achillea*

Perennials for cut flowers

Anemone, *Anemone*
Aster, *Aster*
Baby's Breath, *Gypsophila*
Black-eyed Susan, *Rudbeckia*
Blanket Flower, *Gaillardia*
Chrysanthemum, *Chrysanthemum*
Coneflower, *Echinacea*
Coral Bells, *Heuchera*
Daylily, *Hemerocallis*
Foxglove, *Digitalis*
Gayfeather, *Liatris*
Goldenrod, *Solidago*
Iris, *Iris*
Peony, *Paeonia*
Pincushion Flower, *Scabiosa*
Pinks, *Dianthus*
Plantain Lily, *Hosta*
Poppy, *Papaver*
Sneezeweed, *Helenium*
Sunflower, *Helianthus*
Tickseed, *Coreopsis*
Torch Lily, *Kniphofia*

Bloom Calendar for Perennials

Scientific Name	Common Name	Height (inches)	Color
Perennials for Late Winter			
Heleborus niger	Christmas Rose	12	White
Iberis sempervirens	Edging Candytuft	12	White
Sanguinaria canadensis	Bloodroot	8	White
Galanthus nivalis	Common Snowdrop	6	White
Scilla siberica	Siberian Squill	6	Blue
Chionodoxa Luciliae	Glory-of-the-snow	4	Blue
Claytonia virginica	Spring beauty	4	Blue
Crocus vernus	Dutch Crocus	4	Various
Eranthis hyemalis	Winter Aconite	3	Yellow
Perennials for Early Spring			
Cheiranthus cheirii	Common Wallflower	24	Yellow
Iberis gibraltarica	Gibraltar Candytuft	18	White
Aquilegia canadensis	American Columbine	18	Red-Yellow
Dodecatheon meadia	Common Shootingstar	15	Lilac
Bergenia cardifolia	Heartleaf Saxifrage	12	Purple
Pulmonaria angustifolia	Cowslip Lungwort	12	Blue
Mitella diphylla	Coolwort	12	White
Arabis alpina	Alpine Rock-cress	12	White
Adonis amurensis	Amur Adonis	12	Yellow
Tulipa (early)	Tulip	12	Various
Narcissus (various)	Narcissus	12	Yellow
Leucojum vernum	Spring Snowflake	12	White
Dicentra cucullaria	Dutchman's Breeches	10	White
Primula elatior	Oxlip Primula	9	Various
Primula veris	Cowslip	9	Yellow
Anemone pulsatilla	Pasqueflower	9	Purple
Viola cornuta	Horned Violet	8	Various
Viola odorata	Sweet Violet	8	Violet
Muscari botryoides	Common Grape Hyacinth	8	Blue
Hyacinthus orientalis	Hyacinth	8	Various
Hepatica americana	Roundleaf Hepatica	6	Blue
Aubrietia deltoidea	Common Aubrietia	6	Purple
Trollius europaeus	Globe Flower	24	Yellow
Perennials for Late Spring			
Dicentra spectabilis	Bleedingheart	36	Pink
Iris germanica	Iris	18–36	Various
Thalictrum aquilegifolium	Columbine Meadowrue	36	Purple
Hemerocallis	Lemon Daylily	36	Yellow
Paeonia officinalis	Common Peony	30	Various

Bloom Calendar for Perennials

Scientific Name	Common Name	Height (inches)	Color
Perennials for Late Spring (continued)			
Aquilegia chrysantha	Golden Columbine	24	Yellow
Doronicum cordatum	Caucasian Leopardbane	24	Yellow
Euphorbia epithymoides	Cushion Spurge	24	Yellow
Chrysanthemum coccineum	Painted Lady	24	Various
Trollius europaeus	Common Globeflower	24	Yellow
Aurinia saxatilis	Goldentuft	18	Yellow
Tulipa gesnerana	Darwin Tulip	18	Various
Gaillardia aristata	Common Peren. Gaillardia	15	Red–Orange
Brunnera macrophylla	Siberian Bugloss	12	Blue
Convallaria majalis	Lily-of-the-valley	12	White
Nepeta mussinii	Mussini Mint	12	Blue
Phlox divaricata	Blue Phlox	12	Lavender
Galium odoratum	Sweet Woodruff	8	Yellow
Ajuga reptans	Carpet Bugle	6	Purple
Phlox subulata	Moss Phlox	6	Pink
Primula	Primrose	6	Various
Polemonium reptans	Creeping Polemonium	6	Blue
Ranunculus repens	Creeping Buttercup	6	Yellow
Silene quadrifida	Alpine Catchfly	6	White
Cerastium tomentosum	Snow-in-summer	6	White
Veronica prostrata	Rock Speedwell	4	Blue
Pulmonaria officinalis	Pulmonuria	6–12	Purple
Perennials for Early Summer			
Althea rosea	Hollyhock	72	Various
Astilbe 'Davidii'	David Astilbe	60	Rose
Delphinium hybrids	Larkspur	24–60	Various
Digitalis purpurea	Common Foxglove	48	Purple
Anchusa azurea	Italian Bugloss	36	Blue
Gypsophila Bristol Fairy	Babysbreath	36	White
Lupinus polyphyllus	Washington Lupinus	36	Various
Pentstemon barbatus torreyi	Torrey Pentstemon	36	Scarlet
Papaver orientale	Oriental Poppy	36	Red–Pink
Lilium candidum	Madonna Lily	36	White
Aconitum napellus	Aconite	24	Blue–White
Baptisia australis	Blue Wild-Indigo	24	Blue
Campanula medium	Canterbury bells	24	Blue
Chrysanthemum maximum	Shasta Daisy	24	White
Platycodon grandiflorus	Balloonflower	24	Blue– Violet
Achillea ptarmica	Sneezewort	24	White
Lilium pumilum	Coral Lily	23	Red

Bloom Calendar for Perennials

Scientific Name	Common Name	Height (inches)	Color
Perennials for Early Summer (continued)			
Achillea millefolium	Common Yarrow	18	Rose
Dianthus barbatus	Sweet William	18	Various
Linum perenne	Perennial Flax	18	Blue
Oenothera fruticosa	Common Sundrops	18	Yellow
Dianthus plumarius	Grass Pink	12	Various
Lychnis viscaria	German catchfly	12	Purple
Papaver nudicaule	Iceland Poppy	12	Various
Thalictrum minus	Maidenhair MeadowRue	12	Yellow
Veronica spicata	Spike Speedwell	12	Purple
Astilbe japonica	Japanese Astilbe	12	White
Dianthus deltoides	Maiden Pink	9	Pink
Campanula carpatica	Tussock Bellflower	8	Blue
Perennials for Mid-Summer			
Macleaya cordata	Pink Plum Poppy	72–96	Cream
Lilium tigrinum	Tiger Lily	24–60	Orange
Cimicifuga racemosa	Cohosh Bugbane	48	White
Hemerocallis thunbergi	Japanese Daylily	48	Yellow
Lythrum salicaria	Purple Loosestrife	48	Rose–Purple
Heliopsis helianthoides	Pitcher Heliopsis	36	Orange
Physostegia virginiana	Obedience	36	Pink
Monarda didyma	Oswego Beebalm	36	Scarlet
Echinops ritro	Steel Globe Thistle	36	Blue
Phlox paniculata	Perennial Phlox	24	Various
Asclepias tuberosa	Butterflyweed	24	Orange
Lychnis chalcedonica	Maltese Cross	24	Scarlet
Lychnis x haageana	Haage Campion	12	Orange-Scarlet
Heuchera sanguinea	Coralbells	18	Crimson
Veronica incana	Woolly Speedwell	12	Rosy– purple
Perennials for Late Summer and Early Fall			
Eupatorium purpureum	Joe-Pye-weed	72	Purple
Campanula pyramidalis	Chimney Bellflower	72	Blue
Lilium henryi	Henry Lily	60–72	Orange
Artemisia vulgaris	White Mugwort	48	White
Liatris pycnostachya	Cattail Gayfeather	48	Purple
Lilium speciosum	Speciosum Lily	24–48	Pink
Solidago canadensis	Canada Goldenrod	36	Yellow
Rudbeckia fulgida	Showy Coneflower	36	Golden
Lilium superbum	American Turk's Cap Lily	24–36	Orange-Red
Veronica longifolia subsessilis	Clump Speedwell	24–36	Blue– Purple
Aster spectabilis	Seaside Aster	24	Purple

Bloom Calendar for Perennials

Scientific Name	Common Name	Height (inches)	Color
Perennials for Late Summer and Early Fall (continued)			
Liatris spicata	Spike Gayfeather	24	Purple
Stokesia laevis	Stokesia	12–24	White–Lavender
Limonium latifolium	Bigleaf Sea-Lavender	20	Lavender
Hosta plantaginea	White Plantain-Lily	12–18	White
Colchicum autumnale	Common Autumn Crocus	3–4	Purple
Aster tataricus	Tartarian Aster	60–72	Violet–Blue
Chrysanthemum serotinum	Giant Daisy	60	???
Aconitum carmichaelii	Monkshood	48-60	Violet
Aster novibelgii	New York Aster	36–60	Blue
Salvia azurea grandiflora	Great Azure	48	Sage
Aster novae-angliae	New England Aster	36–48	Various
Helenium autumnale	Common Sneezeweed	36–48	Yellow
Kniphofia uvaria	Common Torchfly	36	Orange
Echinacea purpurea	Purple Coneflower	36	Purple–Rose
Anemone x hybrida	Japanese Anemone	24–36	Various
Chelone lyonii	Pink Turtlehead	24–36	Pink
Aconitum fischeri	Azure Monkshood	24–36	Blue
Salvia patens	Gentian Sage	12–24	Blue
Sedum spectabile	Showy Stonecrop	18	Crimson
Anemone hupehensis	Japanese Anemone	12	Rose

Bulbs

This is a term loosely used to include corms, tubers, tuberous roots and rhizomes as well as true bulbs. This section of the chapter will refer to all of the above as bulbs. However, a true bulb is a complete or nearly complete miniature of a plant encased in fleshy modified leaves called scales that contain food reserves. Corms are the base of a stem that becomes swollen and solid with nutrients. It has no fleshy scales. The tuber, which is an underground stem that stores food, differs from the true bulb or corm in that it has no covering of dry leaves and no basal plant from which the roots grow. Usually short, fat and rounded, it has a knobby surface with growth buds, or eyes, from which the shoots of the new plant emerge. Tuberous roots are the only ones from this group that are real roots; their food supply is kept in root tissue, not in stem or leaf tissue as in other bulbs. Rhizomes, which are sometimes called rootstocks, are thickened stems that grow horizontally, weaving their way along or below the surface of the soil and at intervals sending stems above ground. Many vegetables are propagated from or produce edible organs of these types (e.g., tuber, Irish potato; tuberous root, sweet potato; rhizome, Jerusalem artichoke; bulb, onion).

Bulbs are broadly grouped into spring-flowering (January to May) and summer-flowering (June to September). Spring bulbs provide early color before most annuals and perennials. One of the most popular spring bulbs is tulip. These are sold by type and variety. Tulips come in all colors except blue. Some of the most common types are:

Breeder:	Bronzed, not clear colors
Cottage:	Late-blooming
Darwin:	Tallest
Lily flowered:	Petals recurve — bell-shape
Parrot:	Twisted, ruffled petals
Double:	Two or more rows of petals

Narcissus, daffodils and jonquils are classed by length of corolla in relation to perianth segments. They come in the colors of white, yellow, red and peach, but not blue. Many have naturalized in places. Hyacinths produce a large single spike of many small, fragrant flowers and come in a complete color range. Crocuses are usually grown for early bloom (in snow). There are no red crocuses.

Selecting quality spring bulbs is very important, because the flower bud has already developed before the bulb is sold. Size is also important; look for plump, firm bulbs. Select on a basis of color and size for intended purposes; for example, small ones for naturalizing and large ones to stand out as specimen plants. Keep cool (60˚ to 65˚F.) until planting.

The summer-flowering bulbs include amaryllis, tuberous begonia, caladium, daylily, dahlia, gladiolus, lily and spider lily.

Culture and Maintenance of Bulbs

Storage. If bulbs are bought before planting time, keep them in a cool, dry place. A temperature of 60˚ to 65˚F is cool enough to prevent bulbs from drying out until time for planting. Temperatures higher than 70˚F will damage the flower inside spring-flowering bulbs. Rhizomes, tubers and tuberous roots are more easily desiccated than bulbs and corms and should be stored in peat, perlite, or vermiculite.

Site Selection. In selecting a site for planting, consider light, temperature, soil texture and function. Most bulbs need full sun. Select a planting site that will provide at least five to six hours of direct sunlight a day. Bulbs left in the ground year after year should have eight to 10 hours of daily sunlight for good flowering. Bulbs planted in a southern exposure near a building or wall will bloom earlier than bulbs planted in a northern exposure. Adequate drainage is an important consideration. Most bulbs and bulb-like plants will not tolerate poor drainage and rot easily if planted in wet areas. Function must also be kept in mind. If bulbs are being used to naturalize an area, toss the bulbs then plant them where they fall to create a scattered effect. Spanish squills will do beautifully along with daffodils to achieve a natural effect.

Site Preparation. Good drainage is the most important single factor for successful bulb growing. Bulb beds should be dug when the soil is fairly dry. Wet soil packs tightly and retards plant growth. Spade the soil 8 to 12 inches deep. As you dig, remove large stones and building trash, but turn under all leaves, grass, stems, roots and anything else that will decay. Add fertilizer and organic matter to the soil. Use 1 pound of 5-10-10 fertilizer for a 5- by 10-foot area, or a small handful for a cluster of bulbs. Place a 1- to 2-inch layer of organic

matter over the bed. Thoroughly mix the fertilizer and organic matter with the soil. For individual planting holes, loosen the soil below the depth the bulb is to be planted. Add fertilizer and cover with a layer of soil (bulbs should not contact fertilizers directly). Set bulb upright in planting hole and cover with amended soil. In wet, hot summers, organic fertilizer can hinder blooming and promote disease, especially among gladiolus that are not dormant.

Time of Planting. Hardy, spring-flowering bulbs are planted in late summer or early fall. Hardy, fall flowering bulbs, such as colchicum, are planted in August. Tender, summer-flowering bulbs are planted in the spring after danger of frost. Lilies are best planted in late fall.

Depth of Planting. It is best to check correct planting depth for each bulb with a successful local grower or other good local source. Bulb catalog and reference book recommendations for planting may be either too shallow or too deep depending on soil condition. As a general rule of thumb, bulbs should be planted two and a half to three times the diameter of the bulb in depth. It is important not to plant bulbs too shallow, as this will encourage frost heaving.

Watering. Normal rainfall usually provides enough moisture for bulbs. But during dry weather, water plants at weekly intervals, soaking the ground thoroughly. Be especially careful not to neglect bulbs after blooming.

Mulching. In the winter, mulch bulbs 2 to 4 inches deep with organic material such as straw, pine bark, hay, or ground leaves. Do not use large leaves, as they may mat too tightly on the ground. A winter mulch prevents alternate freezing and thawing, which damages bulbs and plant roots. Apply mulch after cold weather arrives. You may damage the bulbs if you mulch while soil temperature is still high. Remove mulch as soon as danger of severe freezing has passed, in early spring. If mulch is left on the ground after new growth starts, tops of new shoots will be pale green or colorless and new stems and foliage may be broken.

Fertilizing. The best time to fertilize spring-flowering bulbs is when foliage emerges in the spring rather than at flowering. Traditionally, gardeners applied fertilizer during bloom or a bit after, but because bulb roots start to die at flowering, fertilizer applied at bloom is wasted.

Roots are active when the foliage first pokes through the ground. Nutrients applied then help the plant produce flowers the following year. If bulbs have been fertilized in the past, there is often plenty of phosphorus and potassium in the soil. Use a soil test to be certain. If the soil needs phosphorus and potassium, use a complete fertilizer (such as 10-10-10, 9-9-6, etc.) at the rate of 2.5 pounds per 100 square feet. This would equal 1 rounded teaspoon per square foot. If phosphorus and potassium are not needed, blood meal makes an excellent fertilizer. It should be applied at the rate of 2 lbs. per 100 square feet or 1 teaspoon per square foot. Turf fertilizers such as a 27-3-3 or 30-3-3 can be used, but cut the rate by a third.

Staking. Some tall, heavy-flowered bulbs may require staking. Stake plants when they are emerging, but be careful not to damage the bulb with the stake. For flowers that face one direction, use the stake to orient the face to the front of the bed.

Deadheading. When flowers fade, cut them off to prevent seed formation. Seeds take stored food from the bulbs.

Moving. If leaving bulbs in place for bloom next year, do not cut the leaves after flowering until they start to wither. Green leaves produce food for plant growth next year. After leaves turn yellow, cut and destroy the stems and foliage of the plants. Dead foliage left on the ground may carry disease to new growth the next year. If moving bulbs from one place to another, or if a planting has become crowded and ceased blooming, move only after the foliage has faded. Bulbs dug and moved before foliage fades are useless.

Digging and Storing. Many summer-flowering bulbs should be dug and stored, as they are tender. This is done when the leaves on the plants turn yellow. Use a spading fork to lift the bulbs from the ground. Wash off any soil that clings to the bulbs, except those that are stored in pots or with the soil around them. Spread the washed bulbs in a shaded place to dry. When dry, store them away from sunlight in a cool, dry basement, cellar, garage or shed at 60 to 65°F. Avoid temperatures below 50 or above 70°F. Be sure that air circulates around stored bulbs. Never store bulbs more than two or three layers deep, as they generate heat and cause decay. Leave the soil on achimenes, begonia, canna, caladium, dahlia and ismene bulbs. Store these bulbs in clumps on a slightly moistened

layer of peat moss or sawdust in a cool place. Rinse, clean and separate them just before planting.

Daylilies

The classic look of daylilies has been around for years with the common Tawny daylily adorning our roadsides with orange flowers. Recently the hybridization of this rugged perennial has improved size, color and flowering ability. The botanical name for daylily is *hemerocallis*, meaning "beautiful for a day." Although the dayliliy, according to its name blooms for only one day, new buds open each day and blooming is continuous for weeks.

Daylilies can be used for massing along borders, on banks to hold the ground, or as specimen plants exhibiting special qualities of color and size. Daylily plants have several to an abundance of long slender bright green leaves that arch to the ground. The flowers form at the tip of flower stalks called scapes, which arise from the center of the foliage. Each stalk has numerous buds that open at different times. One daylily can produce as many as 200 to 400 flowers per season and remain in bloom for about 30 days.

Plants will range from 1 to 4 feet in height. Flower size, shape and color varies with variety. Flowers come in many colors and may have overlapping petals, petals bent backwards, ruffled petals, crinkled edges, or be shaped like trumpets or bells. Some varieties are self-cleaning but most will benefit from deadheading. Bloom time can vary from June to August. Other varieties are considered re-bloomers and bloom repetitively throughout summer. The tetraploid type is a thick petaled daylily that produces a large flower suited for a specimen plant.

One of the reasons daylilies have persisted in gardens across the country is their ease in growing. These plants can survive adverse conditions and are trouble free, lasting many years if undisturbed.

Site Selection. Daylilies grow best in full sun or in a location with 6 hours of sun. The daylily is adaptable to most Kansas soils and is not too particular about soil type. It is best not to plant daylilies too close to trees where they will compete for moisture or nutrients.

Daylilies have the reputation for surviving anywhere but are also responsive to fertile, loamy soils amended with organic matter. Fertilize daylilies annually with a light application of nitrogen after the plants enter dormancy in the fall or early spring when new growth emerges. Excessive fertilization may result in over-growth of foliage and sparse blooming.

Time of Planting. Fall is an ideal time for planting daylilies. September works well. Roots remain active and flowers for the next year begin to form. Daylilies can also be planted in the spring.

Before planting, prepare the bed by working the soil 6 to 8 inches deep and incorporating 2 inches of organic matter such as compost or well rotted manure. Fertilize the bed as needed based on recommendations from a soil test. Dig the planting hole deep enough to accommodate the roots without bending or breaking them. Cut the foliage back to 5 or 6 inches. Place the plant so the crown (where the stem and roots meet) is no deeper than 1 inch below the soil line. Firm the soil around the base of the plant and water thoroughly.

Large varieties of daylilies should be spaced at least 30 inches apart. Smaller varieties can be around 2 feet apart. Planting several plants of each variety in the same area will create visual impact.

Care. Insect control is usually not necessary. Occasionally aphids may infest plants in the whorl of leaves at the base, or thrips may feed on the flower buds. These pests can be controlled with insecticidal soap or other labeled insecticide. Remove seed pods after blooming to prevent seed production and insure good flowering the following year. Removing seed pods will also prevent seedling plants from coming up in the bed. Remove the stalks (scapes) at the end of the growing season. In early spring, remove the previous year's dead foliage and clean the bed. Summer mulching will help prevent weeds and conserve moisture. Leafspot is a fungal disease that affects daylilies, causing unsightly blotches that appear to look as if the leaf is dying. This disease is most common in hot humid weather and spores overwinter in garden debris. The disease can be treated with a fungicide to prevent it from spreading. Good garden clean up each fall and spring will also aid in prevention.

Division. Daylilies should be divided every 2 to 5 years. They reach their prime flower production about the third year. When flowering declines, divide and re-set the plants to

rejuvenate them. The longer a plant grows in the same location without division, the more difficult it will be to separate the clumps. Cut around the entire plant with a sharp flat shovel and lift the clumps out of the ground with a gardening fork. Using a garden fork will cause less damage to the roots and leave much of the excess soil. Wash off any soil left on the roots and cut the plant into sections. Each division or section should have about three strong fans or crowns. Cut tops back to 6 inches on large growing plants and 3 inches on dwarf plants. Trim broken or damaged roots or tops and reset plants as described in the planting section. Dividing plants in the fall, around September, or early spring as new growth emerges.

Hostas

Hostas are the No. 1 shade plant grown in Kansas. There is a tremendous selection in hostas with 4,200 hybrid varieties. These varieties include an array of heights and widths ranging from 12 inches up to 48 inches with multiple leaf shapes and many shades of green, blue, gold and variegated. The plants are native to woodland areas in Asia.

By and large, hostas are shade lovers, preferring dappled light or morning sun. They prefer a well drained soil amended with organic matter. Organic matter will improve soil drainage. Most hostas will do fine with an annual feeding of organic fertilizer in the spring. Composted manure makes an excellent spring top dressing. The blue hosta responds better to more frequent feedings.

Hostas are hardy in zones 3 to 8. The plant will take three to four years to reach mature growth. Hostas can be divided by root division. Dig the plant when it emerges in the spring and with a sharp spade; divide the clump into quarters with three to four eyes per clump. This division size and time of year will allow the hosta to re-establish quickly. Water the newly planted hosta frequently during the first two weeks and weekly for the remainder of the first year. Established hosta will require additional watering during the summer months when it is hot or dry. Hostas generally have one flush of foliage each year and are spread by rhizomes.

It is important to know the variety characteristics of the hosta planted, so not to crowd the growth. Hostas should be mulched in the winter after planting to prevent the soil from heaving and to protect plant buds. Mulching the perennial garden is a good idea every year to prevent drying, freezing and thawing, and to help control weeds.

In the fall, remove spent foliage to deter slugs and voles. The thicker leaved hosta, like the blue hosta, is not as susceptible to slugs. Hostas are a favorite of deer and may also be bothered by slugs. Vine weevils damage hosta by chewing along the margins of the leaves but can be controlled by using insecticide.

Hostas may be used as specimen plants and make beautiful gardens used in combination with harmonious shades of green, gold and blues. Placing hosta next to plants with bright colored flowers will bring out the hues in the nicely textured hosta and make glowing accents. Dwarf varieties make great borders and mix well with plants of similar size.

When carefree gardening is the goal, hostas are the perfect plant. Easy to grow and minimal care, this plant is perfect for shade and partial shade gardens.

Popular varieties of blue hosta are 'Big Daddy' and 'Blue Boy'. 'Frances Williams' is a favorite bi-color hosta having blue-green leaves with a wide cream margin. 'Francee' has crisp white margins on dark green leaves and is relatively sun tolerant. 'Gold Standard' has light green leaves with dark green margins. There are many varieties of hostas to select from, all with outstanding variations in size and color.

Iris

Iris are centuries old and still popular in gardens. There are many varieties, distinguished by flower appearance and growing habit.

Bearded Iris. This species of iris is known for growing in tough conditions. For two weeks in mid-May it produces glorious, fragrant flowers in an array of colors. The flowers of the bearded iris are borne on strong vertical stems, usually with several blooms per stem. The flower has six segments. The inner three, called standards, are erect and arching. The outer three are the falls, which arch downward. The beard is the furry strip that runs down the center of the fall, hence the name bearded iris. Newer varieties of this iris have broader, flared falls with edges that are ruffled or laced.

Bearded irises are the largest of the iris varieties, growing to 3 feet. Dwarf varieties have the same flower appearance and bloom earlier

than the taller varieties, some reaching only 6 to 8 inches.

Care. Iris prefers a sunny location with moderate fertility. Iris grows well in drier conditions with the rhizome partially exposed to sun and air. A yearly spring application of general minerals with a 6-10-10 formulation works well. Another application approximately one month after the iris flowers is recommended.

Iris should be planted or moved in late July through mid-August. If the foliage has not been trimmed, cut the foliage back at least halfway to prevent moisture loss while the plants get established. Dig the iris with a potato fork, being careful not to damage the rhizome. With a sterile knife, cut the rhizome vertically. Each division should be approximately 2 inches long with two to three fans. Dig a shallow hole mounded in the middle and spread the roots around the mound. Set the plant with fans facing the outside of the garden to make room for expanded growth. Fill the hole with soil, being careful to leave rhizomes partially exposed and water well. Water the newly planted iris regularly if weather is hot and dry, but avoid overwatering. Dead heading spent blooms will promote lateral flowering and extend the bloom period.

Common Concerns. The main pest of iris is the iris bore – the larvae of a small moth that eats the edges of the leaves during May and June, leaving them ragged. Larvae move to the base of the iris and tunnel into the flesh of the rhizome, eating out the inside, leaving only the shell of the rhizome. The iris bore larva has a brown head and a whitish pink dorsal. Pinholes made at the base of the plant indicate where eggs have been laid. The best prevention for iris bore is to remove and destroy debris and dead foliage from the iris to prevent the eggs from hatching in the garden. Running your finger or a wire down the tunnel of the rhizome will allow the larvae to be pinched out or destroyed.

Aquatic and Wetland

Iris Siberian, Yellow Flag, Japanese and Louisiana iris add exotic flowers to bog areas or water gardens. The Siberian bloom first in mid to late spring followed by Japanese and Louisiana iris. The Louisiana iris is a great bog plant that does well in the garden with a little additional watering. These irises tend to sprawl with vigorous rhizomes. Most hybrids are 3 to 5 feet tall with open, narrow petals going in all directions. This group comes in a wide range of colors and will spread by seed as well as from the rhizome.

The Siberian, Yellow Flag and Japanese iris are part of a group called *Laevigatae.* These plants remain in clumps. All but the Japanese iris are water lovers, which flourish better on pond banks or edges.

Care. Division is the best means of propagation and irises can be divided in early spring. Cut the tubers into individual fans and plant just below the soil line with the growing tips pointed upward.

If iris is to be used as an aquatic plant, pot in a gallon container and press fertilizer tabs into the mud. Set the iris in water 3 to 4 inches below the water surface.

Common Concerns. Bores are a pest on water iris as well as bearded types. Submerged iris will not be affected, but those used as bog plants may be more susceptible.

Grow iris in full to partial sun. Even after the blooms of the iris fade, the stately sword-blade foliage is attractive in the garden or pool area. Cut the foliage back halfway in late August and enjoy carefree iris for years to come.

Peonies

Herbaceous peonies are a favorite for Kansas gardens. Colorful flowers are borne on bushes of deep green leaves in May and June. The fragrant flowers may be single, semi-double, double, or Anemone, which have broad outer petals surrounding a mound of shorter central petals.

Peonies grow from underground crowns with bud eyes. The root network develops in the fall before the ground freezes. Peonies need approximately six weeks of freezing temperatures to produce new shoots in the spring. The eyes emerge in the spring and grow rapidly to complete terminal growth by the end of May. The plants remain after blooming to store reserves for the next year's growth.

Care. Peony foliage can be cut back at the end of August and plants divided or moved from September until the ground freezes. Peonies rarely need dividing, but if necessary, cut the foliage to the ground and lift the crown with a potato fork, digging around and under the plant. Wash off the excess soil and use a sharp, sterile knife to cut the fleshy root. Each division needs three to five strong bud eyes.

Trim the roots to 4 to 6 inches and reset the plant. It will take up to three years for the plant to establish and return to full size. The earlier the crown is set, the more time the plant has to establish its root system before winter.

Plant the crown so that the bud eye is barely below the soil surface, no more than 1 inch deep. Firm the soil and add water at planting time to prevent the soil from settling after planting and burying the eyes too deep. Planting the crown too deep will prevent flowering. Crowns may be planted in the fall or purchased in containers in the spring. Peonies should be spaced 3 to 4 feet apart, allowing plenty of room for growth. This long-lived plant does best when left undisturbed in the garden. Peonies prefer full sun away from competition. The soil bed for peony crowns should be deep and fertile with plenty of organic matter. Planting in groups adds mass to the planting, making for a more dynamic flower display.

Watering and fertilizing is most critical during spring growth and flowering and again in the fall when new roots establish. Water the plants slowly and deeply for penetration into the root zone. Feed peonies twice a year in the spring and fall with a 1-1-1 ratio fertilizer. Take care not to put fertilizer directly on the plant crown as it may burn the eyes. Band the fertilizer around the crown 8 inches away and extend the fertilizer up to 18 inches from the center. A soil test is recommended before fertilizing to determine the specific soil needs of the garden. Continual application of balanced fertilizers may cause a build up of phosphorus and potassium in the soil.

Common Concerns. Contrary to old gardening stories, ants do not feed on peonies, nor is their presence required for blooming. Ants are commonly found on peony blooms because they are attracted to the sweet excretion emitted when the sepals begin to separate.

If peonies fail to flower, the problem may be that the bud eye is planted too deep, or decaying organic matter has accumulated over the years, burying the bud eye below the recommended depth. Peonies like full sun and if the location is too shaded, it will not bloom. Old age of the plant also can cause blooming to dwindle.

A common disease of peonies is peony wilt, a fungal disease that lies dormant in the soil. During periods of cool or prolonged wet weather, the disease appears as gray mold on the stems or brown/black rot at the stem base. The affected stems should be removed and commercial fungicide applied. Red spots or measles is another disease that causes small, dark red, circular spots on the leaves, eventually merging to form purple blotches on the lower leaf surface. Botrytis is a fungal disease that affects the flower, causing dark distorted flower buds that will not open properly.

Harvest

The peony flower is a favorite on Memorial Day and should be cut when the buds show color and petals begin to separate. Cut flowers in the morning when the plant tissue is cool and turgid. Cut the stems long, leaving at least two leaves on the plant below the cut. Allow the flowers to set out 20 minutes before recutting the stem and putting into water. This process will hold the peonies in tight bud for Memorial Day.

Varieties

Some suggested varieties of peonies for Kansas are 'Dr. Felix Crousse', a ruby red double; 'Festiva Maxima', a large, fragrant double white; 'James R. Mann', a double rose-pink peony often streaked with crimson in the center; 'Kansas', one of the best red double peonies; and 'Red Anemone', a single-bloom red peony with lacy red flowers.