



Annuals: Culture and Maintenance

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Annual flowers live only for one growing season, during which they grow, flower, and produce seed, thereby completing their life cycle. Annuals must be set out or seeded every year since they don't persist. Some varieties will self-sow, or naturally reseed themselves. This may be undesirable in many flowers because the parents of this seed are unknown and hybrid characteristics will be lost. Plants will scatter everywhere instead of growing in their designated spot. Examples are alyssum, petunias, and impatiens. Some perennials, which are 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. Many annuals are able to thrive without the need of grooming due to their "self-cleaning" ability.

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. For some annuals, removal of spent flower heads, on a weekly basis, is necessary to "clean" the plant and promote continuous bloom. If they are not removed, the plants will produce seed, complete their life cycle, and die. Some annuals, such as petunias and snapdragons, 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 is 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.

Typically, we think of annuals as loving the heat of summer, but there are some popular annual plants that prefer the cool of spring and fall. Such plants include pansies, johnny-jump ups, snapdragons, and ornamental cabbage and kale. These plants actually grow more lush and vigorous when the weather is cool, not hot and dry; therefore, they are often offered for sale in early spring and in the fall.

To obtain details on particular plants or groups of plants: search the Internet; consult plant societies, specialty books, nurseries which specialize in herbaceous perennials; and local botanical gardens.

Location and Establishment of Annual Beds

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. There is no "stressless" environment, and no totally stress-resistant bedding plant. However, there are steps that can be taken to reduce or avoid stress in the landscape. Before selecting plants to use, the site should be accurately analyzed and characterized, and preparations should be made to minimize stress conditions that may occur.

Characterization of the Landscape Site. A site analysis for bedding plants should include: 1) temperature averages for the flowering season, 2) amount of sunlight received daily, 3) rainfall averages and average intervals between rains, and 4) soil characteristics such as drainage and moisture retention. Each of these components should be further defined prior to plant selection.

Temperature. Very few species look attractive and flower profusely from early spring through late fall, so rotational

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planting for continuous color should be considered. Cool-season flowers such as dianthus, snapdragons, and pansies can be used early in the season. It is possible to extend the flowering season of cool-season annuals by placing them in a protected location, shaded from direct sunlight from about 12:00 noon-4:00 pm. Heat-loving flowers such as vinca, gaillardias, portulaca, and garden verbenas do not begin to flower until early summer and should be used for summer color and high temperature situations. Heat tolerance is an advantageous characteristic, and bedding plant trials can offer cultivar suggestions to landscapers interested in plant performance in high temperatures. Another temperature consideration is frost tolerance. Avoid early planting of tender plants to prevent frost damage. Tender species also will be the first to be killed from frosts in the fall.

Light. Light and temperature are closely related, and plants listed as preferring lower light may tolerate more sun if temperatures are moderate. When evaluating light exposure, note the duration and intensity of light the site receives. Four hours of full sun during the morning is much different than four hours of afternoon sun. Also, in a shaded location, the degree of light filtration can vary. In general, if the site receives more than 3 hours of unfiltered mid-day sun, it should be treated as a “full sun” site, with respect to plant selection. “Partial shade” can be defined as receiving unfiltered morning sun with either shade during the afternoon hours or moderate shading throughout the entire day. A “heavily shaded” site would receive very little direct mid-day light and less than 60% of the sun’s intensity during the remainder of the day. A mismatch of plant and light can lead to reduced flowering, leggy growth habit, burning of plants, or stunting of growth.

Water. Water stress covers both extremities of the spectrum, even for the same landscape site. Bed preparation is essential for avoiding both moisture excess and drought conditions. For most situations, supplemental irrigation will be required at some point during the growing season. For minimal irrigation sites, select species that are drought tolerant. The best insurance against excessive moisture is proper bed preparation and sufficient drainage. Keep in mind that the majority of watering problems, assuming a well-prepared site, occur from too frequent irrigations rather than too much water applied at any one time. If supplemental irrigation is in place, apply enough water at each watering to assure complete bed coverage and deep penetration (6 to 8”). Also, an irrigation schedule should take rainfall into account and be adjusted appropriately to be most effective.

Soil Characteristics. Plants depend on the soil for water, anchorage, and nutrients. Frequent heavy rains in combination with poorly drained beds will reduce plant performance and increase the chances of root rot problems. On the other hand, beds with excellent drainage combined with little water holding capacity could require irrigation as frequently as every other day. Nutrient deficiencies and toxicities are common in the landscape, although they are easily avoided if proper steps are taken. Do not guess at fertility levels - take a soil test and send it in for analysis. Again, stress prevention and avoidance is much easier than relying on stress tolerance.

An important issue concerning irrigation is how long it takes for the water to drain from the soil, allowing oxygen to return. Without adequate drainage between irrigations, there will be little oxygen in the soil. A clay soil will take longer to drain and re-aerate than a sandy soil. Bedding plants grown in a clay soil that has been properly watered may not have to be watered more than once a week. This will vary with time of year, amount of sun or shade, plant growth, and other environmental factors. However, bedding plants grown in a sandy soil may have to be watered 2 to 3 times a week. Subsoil compaction or the presence of a hard pan beneath the bed can also affect water drainage and soil aeration. It may be necessary to deep till beds to break up the subsoil and increase drainage rate.

Air Pollutants. Some landscape sites, especially those in highly urbanized areas, are subjected to significant levels of air pollution. The most damaging of these pollutants are sulfur dioxide (SO₂), ozone (O₃), and peroxyacetyl nitrate (PAN). Symptoms of SO₂ injury include necrotic (dead) spots between the major veins, where the tissue turns light tan and papery in texture. The most common symptom of exposure to O₃ is the formation of tiny, light-colored flecks or spots on the upper surfaces of affected leaves, similar to spider mite damage. PAN injury is expressed as silvery, glazing, bronzing, and sometimes death of the lower leaf surfaces. Bedding plants do exhibit relative sensitivity and tolerance to these materials and, if pollutants are a problem, plants should be selected accordingly.

Site Preparation. Preparation is best done in the fall. Proper preparation of soil will enhance success in growing annuals. First, have the soil tested. The results will indicate how much lime or acidifier needs to be added during preparation, how much fertilizer needs to be added in the spring, and the pH level - which should be adjusted 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 8 hours). If drainage is poor, plan to plant in raised beds. The next step is to dig the bed. Add 4 to 6 inches organic matter (OM) to heavy clay to improve soil texture. Dig to a depth of 12 or 18 inches and leave “rough” in fall or early spring. (Note: 2 to 3” of OM should be applied if bed can only be turned 6 to 8” deep.) Finally, in spring, add fertilizer, spade again, and rake the surface smooth.

Culture

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 something absorbent 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 are usually more vigorous and produce more flowers.

Seed starting 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 2/3 full with potting medium. Level the medium and moisten it evenly throughout. It should be damp but not soggy. Make a furrow 1/4 inch deep. Sow large seed directly in the bottom of the furrow. Before sowing small seed, fill the furrow with vermiculite; 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 for germination. 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, since 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 1 1/2 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 such seeds will not germinate well in soils below 60°F. If the soil is too cold when seed is sown, seeds will remain dormant until the 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 1/2 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 evaporation of water. 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 sits at the same level. Irrigate each hole with a starter solution of high phosphate fertilizer which is water-soluble. 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 that 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, it may produce a wick effect, pulling water 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 the 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.

Maintenance

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. Soil structure may be destroyed by the 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 over the bed.

Mulching. Mulches help keep the soil surface from crusting and aid in preventing growth of weeds. Organic mulches can also add humus to the soil. More common mulches:

Pine needles - baled pine needles can usually be found in garden centers for use as a mulch. They make an excellent mulch around shrubs, trees, and in other areas where a long-lasting mulch is desired and are readily available in most areas. Bark- readily available in bags or bulk. Usually made from pine, cypress, or hardwood trees, it is resistant to decomposition. Research indicates that pine chips last longer than hardwood, but most bark mulches must be reapplied annually. Windblown seeds often germinate in bark mulches and necessitate cultivation or herbicide application. Wood chips are often available from local sources. Chips larger than 3" are least likely to compact. Caution must be used, as chips that have not been composted or "aged" can be toxic to tender plants during the decomposition process. Wood shavings can also be used for mulching.

Weeding (cultivating). 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. Mulching is preferred for weed control, since it makes conditions unfavorable for germination of weed seeds and provides a physical barrier for emerging weeds. A good mulch layer can save many hours of laborious weeding.

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, like 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 1/3 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 the soil test results indicate it is necessary. 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 2 to 3 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. Apply fertilizers to damp soil.

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

Diseases. Since annuals only grow in the garden for one season, diseases are not as serious a problem as they are for perennials. Select varieties of plants that are resistant to disease, 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.

When using a pesticide, be certain that the pest (insect or disease) and the flower or shrub are indicated on the label. Read and follow all directions for use shown on the label, including all precautions. 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.

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(Some sections adapted from NC State University's Master Gardener Handbook)