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Choosing, Growing & Harvesting Cut Flowers

– Orin Martin

Reasons for Growing Cut Flowers

The first, last and deciding reason for growing cut flowers is for the sheer beauty of it. They are uplifting—both literally and figuratively, high-energy plants. I once read a psychology Master's thesis documenting that a bouquet in the vicinity is a mood enhancer. Twenty something pages later, my response: "Really, now what are the odds of that?" In addition to the visuals, scented flowers seem to activate nostalgia and memory and by and large, good ones at that. It is not uncommon for someone to remark upon smelling a sweet pea, sweet william, stock or mignonette, "Oh my Uncle Bart or Aunt Dorothy used to garden and grew these flowers...".

Gardening is both an art and a science. Science is to be understood, mastered, respected and applied (soil science, plant nutrient needs, entomology, pathology, etc). But art or aesthetics (the philosophy of the beautiful) informs and enhances our existence. Just as vegetables are food for the body, flowers can be thought of as food for the soul.

In a more perfunctory vein, cut flowers offer gardeners the ability to have flowers in the garden and in the vase throughout the year (think endless grey days in February and an antidote) at affordable prices. Even in the best of times the cost of cut flowers lies somewhere between a luxury and prohibitive. You can grow your own for pennies per plant with annuals. For the small, diversified grower, cut flowers offer endless niche marketing possibilities, limited only by the bounds of imagination and self-promotion: a CSA flower share, farmers' market or roadside stand, special events, direct marketing to offices, restaurants, etc.

Cut flowers in the garden also make biological sense. A vegetable garden is a system somewhat out of balance. Most of the vegetables we grow don't feature flowers prominently, if at all. Showy flowers attract crop pollinators (often winged insects).

Additionally, the concept of using flowers to attract and maintain populations of beneficial insects that in turn aid in controlling detrimental insects (aphids, mites, thrips, moth larvae, scale, mealy bugs, etc.) is now a well-documented sector of entomology. Terms like farmscaping, provision of resources to natural enemies, habitat management to enhance biological control of arthropod pests and the like speak to the confluence of age-old folk wisdom as well as the research-based studies showing that fewer crop pests are found as the diversity of an agroecological system increases (see page 10 for information on plants that attract beneficial insects).

Criteria for Selection: What are you looking for in a cut flower?

Longevity (vase life): Simply put, some species of flowers last longer than others. Much of this has to do with the plant's physiology and anatomy. In general, flowers with waxy parts (leaf cuticle, stems and petals) have longer keeping power. The waxy surfaces reduce moisture loss via transpiration and thus wilting is delayed. Species such as alstromeria, lilies and orchids last as long or longer than three weeks.

Some flowers feature low moisture content and minimal leaf surfaces to lose that moisture. Often referred to as dried flowers or everlastings, they include statice, helichrysum, xeranthemum, yarrow, and acroclinium. Other species that are longlasting as cut flowers: asters and chrysanthemums (10–21 days). Vase life can be extended with some simple practices, outlined on pages 9–11.

Long, strong stems: Sometimes this is simply a genetic characteristic (sunflowers, stock, ornamental grasses, statice). Adequate potassium fertilizers promote strong stems.

Fragrance: Again, scent activates memory. Just a few sweet peas, carnations or a fruity scented rose or two can enhance the effect of a bouquet, making it more appealing.

Beauty: Well of course. But it's oh so subjective. I'm drawn to the silver and grey foliage of stachys (lamb's ear); the soft pastels of sweet peas, nigella, larkspurs and delphiniums; carnations, as a lesson in shades of pink; just about any shade of aster, but only the pure white and velour shades of snapdragons; soft pink and the ma-

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roon Arabian Knight decorative dahlias; and of course anything blue. But don't let others define your aesthetics—grow what appeals to you.

Factors that Influence Plant Quality and Vase Life

Long before flowers are cut, their lasting power is influenced by selection and growing conditions in the garden. While it seems a “no-brainer,” growing the right species at the right time of year influences both the quantity and quality of cutting stems, but more specifically the appearance, vibrancy and lasting time in the vase. For instance, cynoglossum (Chinese forget-me-nots), sweet peas, larkspur, nigella and agrostemma prosper fall through spring but burnout, crash and die with warm (>80°) summer temperatures. Similarly, warm season annuals such as sunflowers, tithonia, asters, and zinnias struggle with soil temperatures below 60° (see page 8).

Longevity of cut flowers is also influenced by both anatomy and physiology. In a nutshell, some flowers just last longer than others. Poppies exude a latex liquid that clogs conductive stem pores and causes almost immediate wilt. Lupines and some hideously large dinner-plate dahlias don't have the “hydraulics” to hold stem water and thus can be difficult. Verbascum (mullein) petals drop within minutes of cutting.

On the other side of the ledger, flowers with bigger, longer, thicker stems are stronger and bend or snap less readily. These species also contain larger conductive vessels (xylem cells) that contribute to greater water uptake and staying power. Stocks, sunflowers, well-behaved decorative dahlias, ornamental grasses and alstroemeria come to mind. Slightly less ideal, but still good in the vase: tithonia, carnations, and snapdragons. These amped-up stems also contain more starches and sugars, which help prolong post-harvest metabolism.

A plant-positive, healthy plant approach also yields good cut flower results. Anything that induces stress—heat, cold, nutrient, water, pest, disease, poor soil drainage—affects plant performance and adversely affects the number and quality of blooms.

The general goal is to establish a large vegetative plant early in the growth cycle. This is done primarily with water and nitrogen (sunshine is assumed). A bigger vegetative plant gives rise to more and bigger flowers. However, this doesn't mean that the lushest plants, grown under the warmest conditions, yield the highest-quality cutting stems. Sometimes it's good to remember the difference between maximum and optimum, or as rock idol John Meyer intones in his hit song Gravity, “Twice as much ain't twice as good and can't sustain what one half could.” Although he was intoning about matters of the heart, it is still a good guide when it comes to sustainability.

Thus, after initial plant establishment, growing flowers under a “leaner, meaner” regime yields the best cut

flowers. Too much nitrogen and water, coupled with too warm temperatures too long into the growth cycle yields plant that are too succulent and prone to pest and disease damage, as well as easily bruised leaves and stems. These flowers also wilt more quickly after cutting.

Many annual cut flowers are precocious, that is they tend to bloom before full vegetative establishment, giving rise to a few small, short-stemmed flowers. A technique called “pinching and pumping” that we use in the Chadwick Garden works to deter this trait. The plants are pinched back 2–3 nodes at about the 6–8 leaf stage and then “pumped up” with a shot of quickly soluble nitrogen (e.g., fish emulsion, manure tea, etc.). The pinched stem will throw a number of basal or lateral shoots, each of which will give rise to one or more cuttable stems/flowers, the net result being a snapdragon, zinnia, etc. that gives rise to 6–8 or more moderately long-stemmed flowers. The “pumping” part promotes further vegetative growth and delays premature blooming. Note: several species do not respond to “pinching and pumping,” namely asters, larkspurs, and sunflowers.

The nutrient potassium also contributes to long, strong stems and thus vase life. Beyond compost, two organic products that aid in cut flower production (used pre-planting) are Sustane (4-6-4) and Dr. Earth Flower Fertilizer (5-7-3). Phosphorus contributes to flower production in plants as well as to early root growth.

A Thumbnail Sketch of Annual Flowers

For many gardeners, annuals equals flowers, and lots of them in every conceivable shape, color and size. Annuals are plants that complete their life cycle in one season, or portions of two. They are, as a class of plants, extremely willing to grow, quick to mature (10–16 weeks) and easy to cultivate. Seed is relatively cheap and germinates both at a high percentage (>80%) and quickly (14–21 days, and many in 7–14 days).

Annuals generally offer a profusion of blossoms. Some are ephemeral in length of bloom—agrostemma, asters, stock, *Ammi majus* (false Queen Anne's lace), cynoglossum; while most are yeoman-like regarding both the number of blossoms and longevity of the bloom period—dahlias, zinnias, mignonette and venidium.

As a class, annuals produce more flowers over a longer period than either biannuals or perennials. One of the principal reasons for their demise at season's end has to do with their exuberance and freedom of blooming, as producing flowers is a calorically exhaustive expenditure for plants and thus “expensive” in terms of energy use. The showy nature of flowers is primarily an advertisement to pollinators, which are rewarded for a visit with food: protein (in the form of pollen) and carbohydrates (in the form of nectar), the two basic building blocks of any diet. In return, the flower gets pollinated and sets seed to scatter on the ground and perpetuate the species.

By harvesting the flowers, the gardener is thwarting a plant's effort to set seed; the plant's response is to produce more flowers and try again. Your dividend is an extended harvest period. Conversely, if flowers are not cut, the plant tends to slow its flower production (mission accomplished) and pump energy into seed production.

What Grows When?

The British, a nation of gardeners, have formulated an annual flower classification system based on cold tolerance. It consists of three classes: hardy, half hardy, and tender.

Hardy (H) annals are species that can tolerate a reasonable degree of cold (10–20°F) when young. Even the seeds of some species can survive moderate winters outside and germinate early in the spring, a scatter garden approach.

Half hardy (HH) annuals are usually damaged or killed by continued exposure to cold temperatures (<40°F) and light frosts. However, like hardy annuals they tolerate and grow well vegetatively during those interminable, endless (or so it has seemed during the last two years) cool, wet, gray days of spring. And along with hardy annuals they catapult forward in size and then bloom best late spring through early summer, with daytime temperatures in the 60–80° range and nights 50–60°.

Tender (T) annuals usually hail from tropical and semi/subtropical origins. Thus, the mention of the word frost will cause seeds to rot and foliage to blacken and shrivel. They are to the flower garden as corn and beans are to field production and should not be seeded or transplanted before daily soil temperatures average >60° during a good portion of the day. This usually occurs May 1–June 1 in Santa Cruz.

In the Santa Cruz area, any hardy annuals and some half hardy annual flowers can be sown in late summer into early fall, transplanted and overwintered, and will reward the gardener with early spring–early summer bloom, from March–early June. These same species can also be sown (under cover) in late January–March, transplanted in late March–April and offer a succession of bloom June–July.

Tender annuals are best seeded in the greenhouse in March and early April and transplanted in May, give rise to blooms June–August. Successive sowing in July of tender annuals and some hardy and half hardy annuals can carry bloom into the fall, even until Thanksgiving.

Herbaceous perennial flowers are any non-woody plant living for 3 or more years. To the degree perennial implies permanence without effort it is a misnomer. Perennials are not magic plants that come up unbidden year to year. However, this class of plants, often no more than

Useful Hardy (H) and Half Hardy (HH) Annual Cut Flowers

Hardy

- Calendula
- Centaurea (Cornflower)
- Clarkia
- Cynoglossum (Chinese Forget Me Not)
- Dianthus barbatus** (Sweet William)
- Godetia
- Larkspur
- Nigella
- Scabiosa (Pincushion Flower)
- Snapdragon
- Statice
- Sweetpeas
- Sweet mignonette

Half Hardy

- Canterbury Bells*
- Didiscus
- Gypsophila elegans* (Annual Baby's Breath)
- Iberis (Candytuft)
- Linaria
- Saponaria (a bigger Gypsophila)
- Stocks

*biannual species

Tender Annual Cut Flowers

- Ageratum
- Amaranthus
- Asters
- Calliopsis
- Carthamus (Safflower)
- Celosia
- Cosmos
- Dahlias
- Gomphrena
- Marigold
- Phlox
- Rudbeckia (perennial treated as annual)
- Salpiglossis
- Salvia coccinea*
- Salvia farinacea* (tender perennial often treated as annual)
- Salvia horminum/viridis* (annual Clary sage)
- Sunflowers
- Tithonia
- Venidium
- Zinnias

Easy to Grow, Florific Perennial Cut Flowers

- Alstromeria
- Asters (Michaelmas Daisies, *Aster novi-belgii*)
- Aster alpinus*
- Aquilegia* spp. (Columbines)
- Campanula persicifolia*
- Caryopteris clandonensis*
- Catanache caerulea* (Cupid's Dart)
- Centaurea montana*, *C.dealbata*, *C. macrocephala*
- Chrysanthemum* spp.
- Coreopsis
- Delphiniums
- Dianthus* spp. (Carnations)
- Echinacea
- Echinops ritro* (Globe Thistle)
- Erigeron (Fleabane)
- Eryngium planum* (Sea Holly)
- Helenium
- Heliopsis
- Heuchera rubescens* (Coral Bells)
- Lilium* spp.
- Limonium caspia* and *L. tatarica* (Statice species)
- Nicotiana sylvestris*
- Physostegia virginiana* (basically a perennial snapdragon)
- Stachys lanata* (Lamb's Ear)
- Perennial cornflowers

the selected and reselected wildflowers of the meadows, mountains, marshes and woodlands of the temperate and Mediterranean climates of the world, offer ease of care once established. With a few well-timed inputs, a spring weeding or two, a top dressing of compost, and average garden watering, these plants will reward you with intriguing architectural form and foliage as well as more sophisticated flower shapes and more subtle hues of color than their annual counterparts. Compare the delphinium to the marigold, the tiger lily or columbine to the petunia. I rest my case ...

Perennials expend part of their resources developing a crown (a fleshy storage organ), bulb, corm, tuber or rhizome. These are organs that allow them to go dormant, overwinter and issue forth new roots and shoots each spring. In most cases, these organs can be divided/separated every few years, offering the bonus of new and free plants. Because of this partitioning of resources, perennials usually offer fewer flowers over a shorter bloom period.

Ideal Time to Cut

The time of day flowers are cut is critical. Basically, heat, sun and wind are anathema (Greek for: thing devoted to evil) and ensure quick wilting. Cutting early in the morning or late afternoon (dusk) contributes to a long vase life. The cut flower industry has invested mega millions of dollars and research into which time period is optimal. Essentially, they both work as they are times of minimum transpiration, when plants are not losing moisture at a high rate.



Advantages of Morning Cutting

The plants are most turgid, or supplied with water, having had all night to recover from the moisture losses of the previous day. They also have cooler core temperature in the morning. All other factors being equal, vegetables, fruit and flowers with a cool (<50°) core temperature have greater post-harvest keeping power. Plant tissues are approximately 90% water (think of plants as merely supported columns of water). Taking flowers when they are well supplied with water keeping them supplied with water and helping them to continue to absorb more water is imperative to keeping them fresh and extending vase life.

The only disadvantage of early morning cutting is the presence of dew or fog on flower petals. This can lead to both injury and loss of true color. That assumes that you, as a gardener, are servants of the seasons and the morning's early light and early rising is not an issue. If not, perhaps a career change ...

Advantages of Late Afternoon/Evening Cutting

Cutting at dusk or early evening takes advantage of high sugar levels in the plant, a byproduct of a day's worth of photosynthesis. These sugars keep the flower's metabolism going and contribute to vase life. The main disadvantage of afternoon or evening cutting is a high core temperature and low turgidity. These can be overcome by refrigerating the flowers (34°–50°F) and/or "pulsing" them. Pulsing involves placing the stems in deep, warm, tepid (90–100°F) water for one hour and then plunging them into cold water (40°F). In phase one (warm water) the stems rapidly absorb water and achieve maximum turgidity. This is based on the age-old precept: biological and chemical reactions happen more quickly at higher temperatures (up to a certain threshold). During phase two (cold water plunge) core temperature is reduced and thus transpiration (water loss) slows. There are those who say having a cut flower operation without a refrigeration unit is like having a restaurant without a kitchen. And yet we here at the Farm & Garden persist and push onward. Direct marketing has its perks, garden to kitchen table in less than 8 hours.

How to Cut

Cutting is best done with high quality, bypass (not anvil) hand shears. Or as Mr. Chadwick used to intone, *secateurs* (hey it's just French for scissors, but it does have a certain cachet and thus some "old timers" still persist with it). The best of the lot are the Felco brand. They come in assorted shapes, sizes and configurations. I'm partial to the old #2 or the slimmer, longer nosed #11.

It's important to use a sharp blade to minimize the crushing of stem cells. The lasting power of flowers in the vase is predicated on continued uptake of water from the vase up through the stem, to the bloom, and out into the atmosphere via transpiration from leaves and petal—a

pressure gradient that keeps the flowers turgid. It is the xylem cells in the stem that create the sieve-tubes to facilitate this flow. Don't crush them!

What to cut

Vase life is aided by cutting flowers before pollination occurs. Usually at, as the floral technicians say, "full petal color differentiation" and at some degree of opening, shy of full. If cut too early, flowers tend to wilt quickly or fade before they can open fully in water. A pet peeve in this regard is dutch iris as sold in flower shops. They are cut in tight bud revealing only a hint of color and they wilt in the vase 5–7 days later before full opening, never given the opportunity to let their full fleur-de-lis flag fly. But generally, the less fully open a flower is at cutting, the longer the vase life. Note: using the same species of flower at varying degrees of openness in the same bouquet will give you a substantially varied silhouette/look: today, tomorrow and 4–5 days down the line. That is, some of the flowers are perfect today, some will open fully in 1–2 and then in 3–5 days.

It is also critical to distinguish between flowers that are at pre- and post-pollination stages. Plants are all about resource allocation, that is, putting resources where it is profitable until it isn't and then putting them somewhere else that is now profitable. Profitable equals toward perpetuation of the species. Because flowering is a calorically exhaustive event, within hours of pollination, resource allocation shifts from alluring, shiny petals to plumping up the seed embryo. It's all about the next generation. Thus pollinated flowers quickly lose their sheen and petals drop within a few days. This is an important search pattern for cut flower gardeners to master.

While it is incredibly species specific, here is a general guide regarding stages of development or degree of opening at which to cut flowers. When in doubt, earlier is better than later (piles of petals on that good table cloth) and when in serious doubt, about half open wins the day.

Development stage/degree of opening

- Spike or raceme flowers (larkspurs, snapdragon, delphinium, stock, mignonette, etc)—Cut with approximately 1/3–1/2 florets* open. They open base to tip.
- Composite/daisy flowers (calendula, cornflowers, sunflowers)—Cut just as the petals are "lifting off the face" or half to fully open. Petals should be above horizontal.
- Sweet peas—1/2 florets open
- Alstromeria—4–5 florets open
- Carnations, cornflowers—At paint brush stage (a cool image – check 'em out!)
- Scabiosa—Tight bud (it's called the pin cushion flower) to half petal open
- Yarrow—An exception to the daisy rule. Cut only when all florets are fully open and pollen is visible or they tend to wilt badly.

- Anemones and ranunculus—Showing good color but in tight bud
- Roses—Full color, tight bud, sepals at least horizontal.

*Floret = an individual flower on a spike or stem.

Floral Preservatives

Floral preservatives can aid in prolonging vase life. Unfortunately most commercial preservatives are laced with heavy metals (aluminum, copper, silver, etc) and nasty but effective germicides. They also contain a sugar source. As such they are serious environmental pollutants. The theory behind their trade secret formulae is simple:

- A sugar source to feed and prolong flower metabolism in the vase.
- The metals and germicides alter pH and kill yeasts, molds, bacteria and fungi that clog the stem's conductive tissues and cause wilting.

A safe, simple organic, home floral preservative:

- 1/4 tablespoon sugar per quart of water
- 1/4 tablespoon bleach (eco-bleach works as well)

per gallon of water

Probably the highest and best use of citric acid-based "soda pop" (7-Up, Sprite, Fresca, etc.) is as a floral preservative. It contains plenty of sugar and some citric acid (to modify pH). Put it in your vases, not your kids.

Factors/conditions that promote & prolong vase life

- A clean cut on the stem bottom at a 45° angle. This keeps the bottom of the stem up off the bottom of the vase and the conductive pores open and clean.
- Start with clean containers; every 2–3 days change the water, clean the container, and re-cut the stems
- Keep bouquet in moderate light with cool temperatures and high relative humidity
- Strip off any leaves below the water line
- Condition flowers in cool and dark for 1-2 hours before arranging
- Cut flowers in cool time of day and place immediately in cool water and shade. The deeper the water (6-8") the cooler the core temperature.
- Do not jam a high number of flowers into the cutting bucket in the garden
- Use an organic floral preservative (see above)
- Cut flowers partially open (see list at left)

Flowers That Attract Beneficial Insects

As mentioned in the introduction, flowers can attract a variety of beneficial insects to the garden. Flowering plants provide shelter, habitat, moisture and nutrition to various predators and parasitoids. Predators tend to chew pests with their mandibles (jaws) or pierce with tube-like mouth parts and suck their innards. Common garden predators that can be "farmed" with flowering plants include minute pirate bugs, big eyed bugs, assassin bugs,

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soldier beetles, ladybugs, lacewings, and some syrphid flies. Parasitoids include some species of flies, such as tachnids, and tiny, non-stinging wasps, including *Trichogamma* spp. Parasitoids tend to lay their eggs in or on other insects. When the eggs hatch, the resulting larvae become predators of their egg hosts.

Members of certain plant families (some of which are excellent cut flowers) provide easily accessed food for beneficials via pollen and nectar:

Apiaceae family (carrot, dill family)

Ammi majus – white lace flower

Angelica

Dill/ Anise/ Coriander

Didiscus – blue lace flower

Asteraceae family (sunflower family)

Calliopsis

Coreopsis

Cornflowers

Cosmos

Mexican sunflower (*Tithonia*)

Sunflowers (*Helianthus*)

Yarrow (*Achillea*)

Brassicaceae family (cabbage family)

Alyssum

Iberis (candytuft)

Stock

Dipsaceae family (scabiosa family)

Dipsacus (Teasel)

Scabiosa

Also the flowers of *Sambucus* spp. (Elderberry), which are attractive on the plant, in the vase, and attract winged beneficials. The same is true of species of *Eriogonum* (Buckwheat) of which there are many California natives, as well as the annual cover crop species.