



Redwood Barn Nursery

1607 Fifth Street Davis, California

The Most Fragrant Flower.

“What’s the most fragrant flower? Can we grow them? Why do plants have fragrant flowers?”
-- e-mail from Ethan, 12.

Sure, Ethan, I’ll help you with your homework. Be sure to credit the Davis Enterprise, and please spell my name correctly.

Walking down my driveway the other evening, I suddenly caught an aroma that I remember from my very first week here in Davis. With the strong interconnection of scent to memory, I visualized two mixed hedges on campus from more than four decades ago.

I arrived in September and settled in to my assigned dorm room in the old Primero complex along Russell Blvd. It was a warm autumn, as usual, and as I headed in to class each day I kept encountering a strong, sweet scent, especially in late afternoon when the air was still.

Walking through the MU I smelled it again. As a budding (ha!) horticulture student, I was determined to find the source. I stopped, then moved toward the scent and examined the nearest shrubs. No flowers. Finally, I noticed, a dozen or more yards away, the tiny flowers of *Osmanthus fragrans*, the so-called sweet olive, casting their powerful fragrance to the air in the hopes of luring something more effective at pollination than me.

How far can flower fragrances drift from the plant? This time I paced it off, and found I first detected the scent of sweet olive over 100 feet away! *Osmanthus fragrans* may be a candidate for “most fragrant flower.”

Why do plants have fragrant flowers?

To attract pollinators. Or, as one scientist put it: “Plants use volatiles to solve fundamental problems that result from their immobility: dispersing offspring and gametes, and attracting mates.” [Ian T. Baldwin, *Current Biology*, Vol. 20, Issue 9, 11 May 2010.]

Plants are often at their peak scent when the flower is receptive to pollination, and when their specific pollinators are most active: daytime for butterflies and bees, nighttime for moths and bats.

What makes them fragrant?

Most people know (I hope) that plants take in carbon dioxide and release oxygen, for which we should all be grateful. They build carbon-based molecules that they use to store energy, and then make some specialized compounds used for communication internally and with other organisms. Fragrance is the plant’s way of communicating.

The molecules we’re interested in are tiny with very low molecular weight, so lightweight that they can float in the air and drift distances of anywhere from a few inches to, as noted, hundreds of feet away. They evaporate easily (volatilize) and are made of carbon, so they are organic, so we call them volatile organic compounds (VOC’s), or volatiles. These are serious business for plants! “Almost one-fifth of the atmospheric CO₂ fixed by land plants is released back into the air each day as volatiles.”



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Fragrances are just some of the specialized volatiles. Others are antimicrobial, repel insects to protect the plants, attract beneficial insects or seed dispersers, or even act to suppress nearby plants.

Hundreds of VOC's make up the scents of flowers: more than 1700 compounds have been identified to date. Some are released from pores in the flower petals, others from specialized glands in the flowers, and others from the leaves.

Not all of the scents are pleasant to us. Sulfur is part of the fragrance compound of flowers that attract flies or beetles, and makes the flower smell like rotten meat.

Fragrance factors

Environmental factors affect VOC emission: air temperature, sunlight, soil and air moisture levels, and the foraging habits of the pollinators. The other part of the equation is *our* ability to smell them. Humans are more sensitive to some scents than others, and individuals vary as to how sensitive they are overall to fragrance, and to particular ones.

We seem to have a special affinity for roses. A couple of the compounds that contribute to the fragrance of roses, rose oxide and beta damascenone, are detectable to us at very low concentrations: 5 parts per billion and 0.009 ppb, respectively.

But we can speculate that the most fragrant flowers are those that attract pollinators at night, over long distances. Lacking the ability to use pigment or flower patterns, as many bee- and butterfly-pollinated flowers do, night flowers make up for it with scent. So my candidates for the most fragrant flowers would be those that bloom in the late afternoon, evening, and night time. These are mostly pollinated by moths, and sometimes by bats and beetles.

Some examples of night-blooming flowers:

- Night-blooming jessamines (*Cestrum nocturnum* and *C. parqui*)
- Angel's trumpet (*Brugmansia species*).
- night-blooming cereus cactus (name refers to several species)
- summer phlox (*Phlox paniculata*)
- evening-scented stock (*Matthiola longipetala bicornis*)

The night-blooming jessamine is probably the most fragrant of all. One reference tells us that it can be smelled at distances of 300 to 500 yards.

Garden books like to refer to these night bloomers as having "intoxicating" aromas, and they may be literally right in some cases. I recently put two blooming phlox plants in the back of my car at the end of the day, then went away for a couple of hours. When I returned I was quite startled by how powerful the fragrance was. By the time I got to the freeway I realized I was getting dizzy and needed to vent the car quickly for safety reasons. It's also worth noting the word root of 'intoxicating': *Cestrum* and *Brugmansia* are both toxic.



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Night-blooming jessamine is not a true jasmine. Those are plants in the genus *Jasminum*, and nearly all have strongly scented blossoms, though not so overpowering as the cestrums. Likewise, star jasmine (*Trachelospermum jasminoides*, also not a true jasmine) is powerfully fragrant and casts those VOC's far and wide. Some love it, some hate it. I'm very fond of Star jasmine in reasonable doses, but sympathize with those who find it overpowering and do agree it probably shouldn't be used so heavily in public places.

Do they grow here?

Osmanthus are easy shrubs for sun or light shade. The night-blooming jessamines get frosted back each winter here, but re-grow to bloom in late summer and fall. You can also expect frost damage on Brugmansia. Cereus should be against a warm protected wall. Phlox is very hardy and easy to grow, and the evening-scented stock is a winter annual you start from seed in fall; both are best in full winter sun.

Roses

Humans have been selecting rose variants and hybridizing rose varieties to increase fragrance for many hundreds of years. Over a thousand years ago fragrance was first distilled from rose blossoms into aromatic oils. The simplest method simply heated the flowers in a humid chamber, then allowed the volatiles to settle onto a solution of oil. Most of these compounds are lipophilic ("fat-loving") and readily absorb into oils. Nowadays they soak them in solvents. Most roses have greatest fragrance in the daytime, but there are exceptions: Lady Banks and Persian musk roses have only slight scent during the daytime, but are powerfully fragrant at night. The scent of the single and yellow forms of Lady Banks roses is noticeable hundreds of feet away.

Many old garden roses, sometimes called heirloom roses, are very fragrant. These 19th century Hybrid Perpetuals, Bourbons, and Damasks can still be found, the varieties having been preserved by gardeners for their fragrance, even though modern roses have better growth habit and greater range of colors. There are plenty of highly scented modern roses as well. Look for Hybrid Tea varieties such as Fragrant Cloud, Perfume Delight – you get the idea.

Roses are easy to grow in full sun and aren't fussy about soil. They like plenty of water, but can tolerate some drought. Prune to control size and manage disease problems.

Here's a quick list of garden flowers with exceptional fragrance.

Annual flowers:

- Sweet alyssum. Annual flower you can plant any season. Draws bees, beneficial insects. Reseeds.
- Sweet peas. Cool-season flowering vine. Plant now for winter and spring blooms.

Bulbs to plant in fall:

- Freesia. Plant now for early spring blooms. White variety is most fragrant. Bulbs multiply.
- Hyacinth. Sweet-scented flowers mark the start of spring.



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- Lilies. Plant in fall or spring for summer bloom. Powerfully fragrant. Toxic to pets.
- Paperwhite narcissus. Plant now for bloom in 8 to 12 weeks. Will bloom indoors. Fragrance can be overwhelming.

Perennials:

- Dianthus (Pinks, carnations). Very easy to grow in full sun, dry-ish soil. Sweet William, a biennial (blooms second year from seed), is especially fragrant.
- Scented geraniums (including "citrosa" plant touted to repel mosquitoes). Semi-tender perennials grown for the fragrant leaves.

Shrubs:

- Winter daphne (*Daphne odora*). Amazing spicy, lemon-scented flowers keep people trying it, despite how easy it is to kill. Water sparingly.
- Gardenia. Easier to grow now that we have river water, but still benefit from having sulfur added to the soil to adjust pH.
- Lavender. Easy plants for full sun and low-water landscapes. Bloom from late spring through summer.
- Lemon verbena. Tall shrub, open habit. Leaves powerfully scented by citronella. Easy to grow in full sun. Drought tolerant.
- Lilacs (*Syringa*). Best in full sun, moderately drought tolerant.
- Sweet box (*Sarcococca ruscifolia*). Winter-blooming shrub for moderate to total shade.

Large shrubs or small trees:

- Citrus. Most flower in spring; kumquats flower in summer. "Self-incompatible" types have more VOC's, meaning pummelos, Clementine mandarins, tangelos are arguably more fragrant.

Vines: plant with caution! Some can take over your yard.

- Honeysuckles (*Lonicera*). The Japanese honeysuckle has the most fragrant flowers. Rampant.
- Jasmines. *Jasminum sambac* (Arabian jasmine, pikake) has the sweetest scent, but the vine is too tender to overwinter here. Other species such as *Jasminum polyanthum* are hardy and very pungent.
- Wisteria. Very large, woody vine needs strong support structure. Bees and butterflies love the spring flowers. Cooke's Purple variety will give scattered flowers through the summer as well.

Also-rans:

- annuals, bulbs, and perennials: heliotrope, mignonette, Nicotiana, jonquil (*Narcissus jonquilla*), tuberose.
- shrubs: California lilacs (*Ceanothus*), banana bush (*Michelia figo*), mock oranges (*Pittosporum*, *Philadelphus*, *Choisya*), ornamental sages (*Salvia*), Jerusalem sage (*Phlomis fruticosa*).



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One extra-fragrant rose is Crimson Glory, usually only available in the climbing form. You won't find this at nurseries, only from specialty growers that sell online. Introduced in 1935, it was the first winner of the American Rose Society's prestigious James Alexander Gamble Medal for Best Fragrant New Rose.



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Osmanthus fragrans, commonly called sweet olive, can bloom in fall or spring. Fragrance is strongest in late afternoon and evening and into the early morning hours.



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Cestrum nocturnum (shown here) and *Cestrum parqui* are two closely related jessamines that bloom at night. Their aroma is extremely powerful and drifts far and wide. The plants are damaged by frost here, but re-sprout reliably. They become large shrubs in the Bay Area and Southern California. They are poisonous.



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Brugmansia, or Angel's Trumpet, gets quite large and in full bloom can have dozens of flowers. The fragrance begins at dusk and continues through the night. Frost will cause leaf damage, and a hard freeze can cause them to die back, but they resprout. There are large specimens in the Shields White Garden at the west end of the arboretum. They are poisonous.