



News & Notes of the UCSC Farm & Garden

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For the Home Orchardist

Home Grown: Musings from the Citrus Terraces

– *Orin Martin*

There are not many climates worldwide that allow the growing of citrus (an evergreen fruit) within “spittin’ distance” of apples (a deciduous fruit). Ours is one. Central coastal California, from the salt-spray zones along West Cliff Drive in Santa Cruz to the Upper Marine Terraces (800’–1000’ elevation) at UC Santa Cruz and beyond, have the shared climate characteristics of the world’s five Mediterranean climates.

California, central Chile, south and southwestern Australia, the western cape of South Africa, and of course, the Mediterranean basin cumulatively comprise the 2% of the world’s landmass with a climate classified as Mediterranean. Such climates feature –

- Dry summers: Some foggy and cool as is ours, some with moderate temperatures (average < 72°F) such as Santa Barbara and Santa Rosa, and some hot, e.g., L.A., Stockton, Sacramento (average > 75°F)
- Rainfall: Concentrated in the winter months, and variable as per the annual amount (as we are increasingly well aware), e.g.—

1998: 82” of rainfall at the Chadwick garden, UC Santa Cruz (800’ elevation)

2014: 19” of rainfall at the Chadwick Garden

Lately, it seems our weather is nothing if not erratic. The precipitation comes in periodic pulses, often in low pressure systems of 3–5 days duration, and often punctuated with episodes of both light/moderate rain to bouts of almost monsoonal downpours. These weather systems move in alternatively out of the Gulf of Alaska with associated colder temperatures and moderate rainfall totals, or sweep up from the Hawaiian archipelago, often with excessively wet inundations. The pause between weather systems gives rise to “why we live in Santa Cruz weather”: clear, crisp, sunny days and correspondingly clear starry nights, and often with majestic, if somewhat threatening cumulo nimbus clouds skirting Mt. Loma Prieta and sliding off to the south.

We truly have a mild-ambient climate. It is a strong selling point for living here. But as is so often the case, our strengths are our weaknesses. Or as Tom Waits once intoned with his trademark growl, “What the big print giveth, the small print taketh away.”

Yeah, we catch a break from the interior’s summertime temperatures, consistently in the 90’s and more than occasionally topping the century mark (the big print). But, as climate—in this case our cool Mediterranean climate—has a profound effect on plant growth, the performance of warm-season, heat-loving crops can be a bit pedestrian, both lagging and lacking (the small print).

In the case of citrus, heat and its subtropical humidity yield not only higher sugar levels, but higher sugar:acid ratios that, in turn, make citrus not just sweeter and juicier (as if that’s not enough), but impart an overall richer, full flavor and bigger, more spherical fruit.

So, the big print says: Santa Cruz and environs are “comfortable” places to dwell and garden. But, the small print reminds us that sugar/sweetness in citrus can be problematic. Some suggested strategies for Central Coast citrus gardeners –

- Microclimates
- Varietal choices

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Siting Citrus

Realistically, you live in one climate, and yet there are often many microclimates on your property. Where you position your citrus is important.

Sunlight: Citrus needs a minimum of 10 hours of direct sunlight year round. More is better. Sunlight drives photosynthesis, arguably the most important reaction on the planet. It gives us the food chain, which in conjunction with fertile soil, organic matter, and trained growers, gives us the food system.

Wind: While wind can lessen the incidence of frost on cold nights, it is also tough on plant growth. It causes rapid water loss from both plants and the soil. And as a response to being constantly buffeted by winds, plants often thicken their leaves and stems/branches at the expense of extending shoot growth. Wind-free sites often have warmer spring and summer temperatures.

Aspect (compass direction of a slope—south, east, west, north): The top of a gently south-facing slope trumps all. Regarding the interactions of sun, heat, cold, and drainage: south slopes receive more direct sunlight* than north-, east-, or west-facing slopes, and even more than flat ground. Planting at the top of a gently south-facing slope and avoiding low spots will reduce the risk of frost damage. Remember that like water, cold air seeks its own level. It is heavier than warm air and will flow/sink to low-lying areas, creating “frost pockets.”

Planting against the south side of a building or wall can help boost the microclimate for citrus. The wall absorbs daytime heat and reradiates it slowly at night, warming the immediate microclimate. Light-colored surfaces reflect more heat and light during the day. Dark-colored surfaces absorb heat and light, and slowly release heat during the night.

Raised beds with good soil structure and high organic matter (OM) content warm more quickly after a winter rainstorm and similarly in the spring. Soils high in OM are also darker in color, and absorb and hold more heat.

Varietal Strategies for the Santa Cruz Region

Note, this information is based on almost four decades of direct observation and thought. At the present time, it has neither been proved nor refuted by scientific research—a disclaimer, of sorts.

Sweet Citrus

The closer the proximity to the coast, the more difficult it will be to set truly (drippin’ with sugar) sweet fruit. And yet...

Citrus reticulata (Mandarins and Tangerines)** – Mandarins/tangerines are very cold hardy, tolerating temperatures down into the low 20°Fs before frost damage

*Direct Sunlight – in the mid latitudes of the northern hemisphere, south-facing slopes are warmer because the sun strikes the ground at a more direct angle, leading to a higher intensity of the heat energy received at the surface.

starts. The issue is that not all (or even many) varieties will develop good sugar on the coast. Here are some that are reliable in that regard.

Encore Mandarin – If I were restricted to only one citrus variety, this would probably be the one. Its virtues and merits far outweigh its demerits. It is one of the few summer-ripe citrus. Because of its historically late maturation and long “hang-time,” its sugar development is “beyond category.” The tree grows vigorously, yet tops out at 7–9’ on dwarfing rootstock in fertile soils. It is a heavy yielder, 200–300 fruit on an 8’ x 8’ mature tree. Yes, it’s sweet and often a virtual “juice bomb,” but what seals the deal is its aromatic/oily aspect.

The harvest season is extremely long. While a few passable fruits can be “pinched” in June, sugar development begs waiting until July to begin harvesting. Fruit can hang on the tree until December without deterioration. I like to leave a few unharvested and on New Year’s Eve at sunset, ascend a ladder and pick and eat from on high; a good way to finish off the year.

OK – now for the demerits:

The skin develops green/brown spots. While this limits its commercial viability it is merely cosmetic. Don’t let it deter you. The rind (peel, skin) is moderately adherent, but still easily peelable. Encore, like most mandarins, is seriously alternate bearing—a heavy crop one year, and an often-light crop the next. There are no cultural remedies for this malaise, it’s genetic.

Owari Satsuma Mandarin – This mandarin is the earliest ripening sweet citrus I know of. It often commences at Thanksgiving and is in full swing by Christmas. Eat them quickly (shouldn’t be a problem) as they only keep their quality on the tree for 4–5 weeks. The tree is a natural dwarf with a weeping form:

- On the (Cuban/Shaddock) true dwarfing rootstock – a mere 3–4’, a suitable candidate for a ½ wine barrel.
- On semi-dwarfing (trifoliate) rootstock, 5–6’
- On standard rootstock (recommended choice) 6–8’

Owari is the classic slip-skin/zipper-skin citrus—a favorite with the kids in the crowd as it is easy to peel. It is seedless, sections easily, and brings a mildly acidic sweetness that is sprightly; it has a zingy vitality. The skins can be boiled and sugared, dried and kept indefinitely. The juice content is moderate. It is both “tried and true” down to the coastal strand.

Clementine/Algerian Tangerine – This variety was introduced as a seedling found and bred by French monk Clement Rodier. Recently, along with the Murcott Tangerine, it comprises highly successful branding—you may

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**Generally if a variety of *Citrus reticulata* came to the attention of southern Europeans by way of China, it is referred to as a mandarin orange. If it was shipped from North Africa out of the port of Tangier, it’s a tangerine.

Citrus, from page 2

know them as “Cuties.” The two varieties look and taste alike, and serve to extend the harvest season for this seriously trending product.

Clementines are intermediate between Owari and Encore in terms of vigor. The tree form is round-mounded, the foliage is a dark green, and as the fruit is held out towards the periphery, it makes an outstanding landscape tree. The season of ripening is on the heels of Owari in February–April. It is seedless (as a rule) and produces heavier crops with a pollinator: Dancy, Minneola tangelo, or Kinnow. And while it prefers inland, even desert heat (consider its North African roots) it does passably well in downtown Santa Cruz. It comes across as a relatively easy to peel, pretty sweet, very juicy, small but beautiful fruit.

My citrus mentor, friend, and Apprenticeship alum Daniel Paduano of Abounding Harvest Mountain Farm in the Santa Cruz Mountains also recommends the tangerines **Tango** and the new (UC Riverside) patented varieties **Shasta Gold**, **Yosemite Gold**, and **Gold Nugget**—if it’s good enough for Daniel, it’s good enough for you and me. And don’t miss the chance to learn directly from Daniel about choosing and growing citrus when we team up to teach the “Home Grown” workshop on February 28 (see page 3 for details).

Sweet Oranges

Skagg’s Bonanza is the “leader in the clubhouse” for a Santa Cruz sweet navel. The tree is more compact/dwarf, but the fruit is larger and despite the thick, bumpy rind, both sweeter and juicier than the standard Washington navel. Its season of ripening often begins early—sometimes January, definitely by February.

Blood Oranges

I have mixed feelings about recommending blood oranges. They are indeed unique, attractive, and tasty. Ah, the taste—now, “there’s the rub...” The taste is not that of a sweet orange. It’s not supposed to be; it is a bit musky, not unlike the flavor of raspberries. It’s certainly distinctive in its aromatic properties—a connoisseur’s citrus, if that’s not too “boug-zee” (slang for bourgeois) for you.

Tarocco needs more heat than we get in Santa Cruz, but both **Moro** and **Sanguinelli** are at least passable, sometimes downright righteous. Sanguinelli features small to medium, slightly oblong fruits with a red-blushed rind and red-streaked flesh. Moro fruits in clusters, yet the fruit is slightly larger than Sanguinelli. It is juicy with a distinctive aroma. With all blood oranges, coloring of both the rind and flesh is variable—and on the coast, variable, weak, and even erratic or unreliable. And while Moro is earlier ripening than Sanguinelli, I wouldn’t even think of harvesting either before late April–mid May. They say patience is a virtue and good “hang time” allows both sugar and aroma to express themselves.

As per planting on the coast: I would. Why not go out on a limb—after all, isn’t that where the fruit is?

A Note on Citrus Fertility

As citrus are evergreen, they grow continuously throughout the year, assuming soil temperatures are above 50°F. And as citrus often exhibit many phases of function (root and shoot growth, flowering, immature and mature fruit growth) simultaneously, they require frequent fertility inputs in quantity.

A suggested prescription for citrus fertilization: Every 4–6 weeks starting when new leaves appear in the spring, running through August –

- Skim weeds from trunk to out beyond the dripline
- Apply compost* over the skimmed area. With young trees, use 1–2 shovels full; with established trees, apply ½–2/3 of a 5 cubic-foot wheelbarrow
- Work the compost into the soil surface 3–4” deep with a tilthing fork
- Apply a concentrated, granular, OMRI-approved** high nitrogen fertilizer, >7%N.

Options include:

- Blood meal, 12%N
- Sustane, 8-2-4
- Fish meal, 7–10%N
- Soy meal, 7–10%N
- California Fertilizer, Avo-Citrus Mix, 8-5-4
- Dr. Earth (although organic, it is not certified as such; one advantage is that it includes microbial inoculation that “seeds” the soil with beneficial bacteria, fungi, and actinomycetes)

Irrigate to activate dry fertilizers. This should prevent any chronic problems.

If your citrus have acute problems due to low fertility, here’s a possible prescription:

Mix 12 oz. Alaska fish emulsion (OMRI-approved) and 2 oz. liquid kelp in 5 gallons of water and apply it evenly to root zone of tree. Follow with light watering.

*The old quip re: compost: “The good thing about compost is that it is slow acting; the bad thing about compost is that it is slow acting.” That is, compost alone, because of both amount of nutrients and their speed of availability, is not sufficient to meet all the demands of citrus. Even well-made compost only has a N content of 0.5–1%, but is teeming with beneficial microbes.

**OMRI = Organic Materials Review Institute, an independent program that evaluates materials for approval as certified organic inputs. See more at www.omri.org.

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Minneola Tangelo

A hybrid cross between *Citrus reticulata* (mandarin) and *Citrus paradisi* (grapefruit) with the mandarin predominating. It is a small tree (4–5' on dwarf rootstock, 6–8' on semidwarf) with large bottleneck-shaped, easy to peel fruit. The rind (epicarp) is a deep red-orange—a thing of beauty. As for taste, it has a firm texture and a tart (grapefruit parentage) semi-sweet tang to it. It also has a distinctive, aromatic aftertaste. The season of ripening is February–March.

Limes

The quest for a lime that performs well on the coast goes on. Short of moving to say, Havana, New Orleans, or Maracaibo, try the following:

Taveres Limequat – Distinctive, small, oblong yellow fruit that are as good as a Mexican lime in margaritas. The tree is allegedly a dwarf (mine now runs to 12'—on dwarf rootstock!) and is perpetually loaded with fruit. The fruit can also be cut in half, boiled for 15 minutes in a simple syrup, and then dried in a food dehydrator, and is a divine blend of sweet/tart. But in the end, any lime or lemon is simply best squeezed into a tall glass of ice water.

Bearss Lime (*Citrus latifolia*) – While not a true lime, the Bearss is an outstanding specimen. The full, round-headed tree with dark green foliage can serve as a focal point in any landscape. It is a heavy and regular bearer, with fruit from October–April. Used green, it's more limelike; at maturation (yellow) it is more lemon-y. But in truth it is unique—not a lemon, not a lime. Its juice and aroma are unsurpassed, and I find it superior to either a lemon or a lime.

Other Sure to Reasonable Bets for the Santa Cruz Area

Valencia Orange – The most prominent commercial orange in the world, accounting for >50% of Florida's orange crop. This is the quintessential juicing orange, although cut into wedges and eaten out of hand it is sweet, refreshing, and certainly juicy. While Valencias don't peel as easily as Navels, both sugar/acid ratio and amount of juice is greater. Valencia is a late-ripening variety, from spring into early summer. As such it benefits from a long "hang time" on the tree. Not only does fruit not deteriorate, it continues to get sweeter. Sometimes if left on the tree into summer, the fruit will manufacture chlorophyll and re-green. This is not really a problem as it is also an indicator of increasing sugar. I like to leave them on the tree until June, even July.

Lemons, *Citrus limon*

Lemons have the lowest heat index of any citrus. As such they are grown commercially in coastal areas. They are, however, among the most cold-sensitive of citrus, and can be killed if temperatures drop to 28–30°F or below (but see Meyer lemons, below).

One big advantage of lemons is that they often have at least some fruit on them year round. Again, the backyard/back door grower has the dual advantages of pick-



Graduates of the 6-month and advanced Apprenticeship training programs at UCSC's Farm & Garden are making their mark both near and far as they manage farms, work for food justice programs, and expand campus farming efforts. Here's an update on what some of the Apprenticeship graduates are doing with their training; you can see more examples at www.growafarmer.org

After several seasons of farming on the East coast, **Kasey Butler**, a 2011 graduate of the Apprenticeship, will be running the flower operation at Blue House Farm in Pescadero, California starting in the 2015 season. Also returning to California from the East coast is **Mary Hillemeier** (2012), who will be working as Blue House's harvest manager. Blue House is owned by **Ryan Casey**, a graduate of the 2001 Apprenticeship. Read more about the farm at www.bluehouseorganicfarm.com.

Vanya Goldberg (2008) is now working with the Agricultural Justice Project (agriculturaljusticeproject.org), which has developed the "Food Justice Certified" label based on high-bar social justice standards for farms, processors, and retailers, including every link in the food chain from farm to table. According to the program's website, "Our approach is holistic; we ensure fair treatment of workers, fair pricing for farmers, and fair business practices."

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ing lemons fully ripe and using them fresh; beyond taste, there is a certain vitality that comes along with fresh-picked fruit, and note: no citrus will increase its sugar content past harvest.

Eureka and Lisbon – Classic lemons and very similar in appearance and taste. However, while the Lisbon is a little more shapely a tree, it has big, sharp, numerous thorns.

Genoa/Italian – Similar looking to Eureka, but a bit more cold hardy and an excellent-tasting variety. Plus it's Italian, so it has a certain cachet associated with it.

Meyer Lemon – A cross, probably between a lemon and either a mandarin or sweet orange from China. And while most adore it, I'm lukewarm at best. Nonetheless, it is a natural dwarf tree, 3–4' on dwarfing rootstock and only 6–8' on standard rootstock, although it is commonly produced from cuttings rather than being grafted onto rootstock. It is highly productive, and along with kumquats, among the most cold hardy of citrus, reportedly tolerating temperatures down to the low 20°s.