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For the Home Orchardist Tending Fruit Trees— A Template for Success

— Orin Martin

So much of fruit tree growing is about learning a tree's patterns: knowing what happens when and where in the tree leads to timely care, optimal growth and annual heavy cropping. This precept can serve as a useful basis for examining the annual cycle of fruit tree growth (see chart) and the associated activities and inputs. Here I'll discuss the periods when it's critical to have nutrients available to fruit trees, and some approaches for meeting those nutrient needs.

Fruit tree roots have two distinct growth periods. The first wave of growth begins in January or February, as much as 3–5 weeks prior to any visible bud swell.* Actually, "surge" better describes this initial phase of the first growth period: the early-season rate of root growth is rapid, steep, and straight up the curve. Thus it is critical to have nutrients available to nourish this initial growth phase: at planting for new trees, and in January–early March for established trees. Root growth peaks in late April–May and tapers off abruptly just after the summer

solstice, then remains at a low ebb through late summer.

During mid summer, shoot growth is also slowing down and most of a tree's resources are allocated to the rapid enlargement and maturation of the fruit load.** Remember, as much as 70% of a tree's annual carbohydrate reserves go into fruit production, more than into all other activities in a tree: shoot, root, leaf and flower growth combined. Thus fruit is a huge nutrient sink—and you must replenish those nutrients in a timely way for fruit trees to thrive.

Around late summer (August–September) there is a second significant, if less explosive, wave of root growth. This second wave presents another window when trees can be fertilized again. At this juncture, the tree absorbs nutrients and stores them in roots and the tree trunk for quick mobilization the next spring. Then all growth slows and reaches a yearly low coincident with leaf fall and dormancy.

Making Nutrients Available

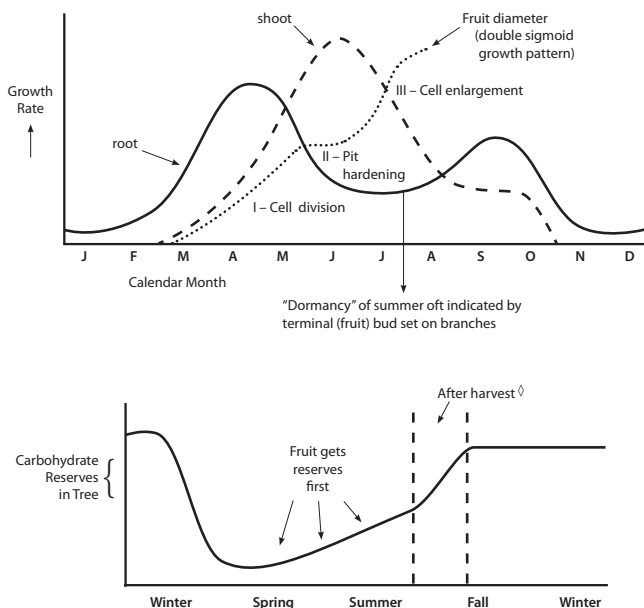
The two periods of root growth described above are times of year when the tree is metabolically active, nay frantic. Roots facilitate nutrient uptake and thus stoke

*Most soil microbial activity and root metabolism decline precipitously when temperatures reach 40°F or lower; in contrast, deciduous fruit tree root growth commences with soil temperatures in the low 40's.

**In years featuring a low fruit load, trees make more vegetative branch growth and grow longer into the summer. With trees, it's all about resource partitioning.

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Fruit Tree Growth*



In Santa Cruz, late February–March through mid-late June = "Grand Period of Growth":

1. Roots are actively growing – especially in the early portion of this period
2. Shoots (branches) make almost all their yearly growth April–July
3. Flowering, fruit set and initial fruit development and enlargement
4. Internally – undifferentiated cells are (hopefully) differentiating into next year's fruit buds

All this is happening at once in a compressed time period.

* Stone fruit specifically, and California central coast, very specifically, but overall reflective of pattern with all deciduous fruits.

◇ This is a critical time period to provision for water and nutrients. It is often coincident with second root upsurge.

the fire of componential aerial growth (leaf, branch, fruit, flower). By having a rapidly available nutrient source in the soil, yearly growth goals can be met if not exceeded.

As to how you can respond to these growth pulses: the earlier you can get out into the orchard and fertilize, the better the trees' enormous early-season componential growth needs will be met. Pomologists of the early 20th century coined the term "Grand period of growth" for the wild tumult of development taking place in spring. Not only are all components of a tree growing actively, but nutrients are also needed to manufacture (internally) next year's flowers/fruit buds. While not as respectable or erudite, the 1950s rocker Jerry Lee Lewis might have said, "Whole lotta shakin' going on" in those trees. So, if you care about growing the tree—and the assumption here is that you do—fertilize early.

Perhaps the following "prescription" can be helpful. It has worked well for me.

Apply the following amendments as early in the season as possible: at planting for new trees, or in January–March (weather dependent) for 1–2-year old trees—

1. 2–3 spadefuls of compost in a 2–3 feet-wide circle around the trunk.

2. An organic source of soluble nitrogen. One of the following:

- ½ lb. bloodmeal (12% N)
 - ¾ lb. Sustane (8% N formulation)
 - 1 lb. Dr. Earth (6% N)
 - 1-1/2 lb. Sustane (4% N formulation)
- on top of the compost.

Work both of these amendments into the top 3–4" of the soil with a tilting fork.

3. Mulch with 3–6" of ramial wood chips (ramial = a fancy word for "fresh"). Straw or leaves can be used in place of the wood chips, but the fresh wood chips activate basidiomycete fungi, which are white rot organisms—very efficient at colonizing the chips and liberating energy (carbon) for soil organisms as well as some nutrients for tree growth. Wood chips also raise the organic matter content of the soil, creating a dynamic storage reservoir for nutrients, particularly nitrogen, phosphorus and sulfur.

4. Water thoroughly and immediately. Water activates dry fertilizer by dissolving it into the soil solution (soil water), where it can be actively taken up by the tree roots.

With young trees, it is also critical to provide and replenish nutrients throughout the season in order to establish the tree as quickly as possible. A tree will not fruit until its structural needs (sufficient root and shoot growth) have been satisfied.

To make sure your young trees are getting the nutrients they need, monitor shoot/branch extension growth. If it is not proceeding apace (apace = >1 foot by late May), repeat the above prescription. And consider doing it yet again if warranted in July. Note, I always base any



Abby Huetter

Bell beans grown around the base of the tree in the fall, then chopped and used as a mulch in the spring, provide nutrients and build the soil's organic matter content.

additional, supplemental fertilization on a perceived real need, not so much a strict calendar schedule.

An alternative to the above mid-season supplemental fertilization is to use a fast-acting liquid fertilizer:

- 6–8 oz. fish emulsion (2% N)
- 1–2 oz. liquid kelp (loaded with trace minerals and plant growth stimulators)

Mix these into a 5-gallon bucket of water and gently apply to the base of the tree in a 2–3-foot wide circle.

Maintaining Established Trees

The above recipe is a sound approach to fertilizing 1–2-year-old trees. Thereafter, if the tree is growing well, it is feasible to meet yearly fertility needs simply by growing a bell bean cover crop as a green manure. That is, you can harness soil microbe and plant biology to grow all the fertilizer you will need with a cover crop and some mulch (see *Fall 2012 News & Notes* for additional details). This approach is simple, sustainable and elegant. Here's the technique we use:

In September–October, broadcast sow (scatter) bell bean seeds from the trunk out well beyond the dripline* of the tree. For the backyard gardener, a seeding rate of 8–10 seeds/square foot should suffice. On a farm/orchard scale up to 200 lbs/acre is used in the area covered by the trees. Work the seeds into the top inch of soil using a bow rake. If fall rains are scant, irrigate the seed up. Once the rains begin, you can coil your hoses for the winter.

In late February–mid March, the bell beans will be 4–8 feet tall (they're amazing biomass producers as well as nitrogen fixers), their specific height being a function of winter weather and your soil's fertility. When the beans are approximately ¼ to ½ in bloom, take a well-honed spade or a machete and chop the bell beans down

* Dripline = outer extent of the tree canopy; envision an imaginary circle around the periphery/circumference of the tree. This is where water, be it rain or sprinkler generated, would drip off the foliage. It is somewhat coincident with the outer extent of the root system.

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at their base. The nitrogen fixed via bacteria and root nodules will slough off into the soil for the tree to absorb via its roots.

Next, spread the chopped bell beans evenly over the soil surface. They can be chopped up slightly or finely, as you wish. Remember though, that when it comes to decomposition, the finer the particle size of the material, the quicker and more thorough the decomposition. The reasoning being:

- Smaller particle sizes translate to a greater surface area for the microbes to “feast” on.
- In breaking apart plant structure, the material is “softened up” and more susceptible to microbial enzymatic decomposition.

Then apply a thick layer of mulch:

- 3–4” ramial wood chips, or
- 4–6” clean straw, or
- 3–4” tree leaves (broad leaf, not conifer)

If feasible, add a thin layer of good soil sandwiched between the chopped-up bell beans and the mulch. This is essentially a low-heat, long-term sheet composting system, featuring virtually no tillage.*

Finally, go listen to a Giant’s spring training ballgame and (if you’re so inclined) enjoy an adult beverage, confident in the knowledge that your trees are well nourished for the coming year.

Learn more about fruit tree care and get hands-on practice in fruit tree selection, planting, and pruning at the upcoming “From Planting to Harvest” 3-day short course taught by Orin Martin, Zoe Hitchner and Sky DeMuro. The workshops takes place February 8–10 at UCSC’s Alan Chadwick Garden. See details, page 3.

*It is interesting to peel away the mulch occasionally and monitor the rate of rot down. Within 7–14 days, most of the succulent green material will be unrecognizable as bell beans. And within another 4–5 weeks, the mix begins to resemble quality compost, if it is recognizable as distinct from the soil at all.