Selecting and Planting Bare Root Fruit Trees

– Orin Martin

Tree Sources

There are four primary sources of trees: Graft or bud your own; local retail nurseries; mail order nurseries, including small-scale and large "industrial strength"-scale nurseries; buy an orchard! Here I'll address the retail and mail order options.

Unless you are buying fruit trees in quantity or looking for either rare heirloom varieties or unusual scion/rootstock combinations, buying retail has some advantages over mail order. Retail shopping allows you to inspect and accept or reject individual trees (see below for Selecting Quality Trees). Quite often, retail prices are on a par with or even cheaper than mail order costs. This is especially true if purchasing either a few trees or one or a few trees within a variety/rootstock combination.

Mail order tree nurseries fall into two large categories: Large-scale conventional nurseries, e.g., Vanwell, C & O, Columbia Basin, Dave Wilson; and small-/medium-scale nurseries, some—lamentably only a few—organic, some conventional, e.g., Raintree Nursery, Trees of Antiquity (organic), Sandy Bar Nursery (organic).

The large-scale nurseries offer several "perks" –

- Economies of scale, with hundreds of thousands of trees.
- A good range of size-controlling rootstocks for each species of fruit (apple, pear, peach, etc.) from mini dwarf to standard or full size.
- Cheap prices meshed with superlative tree quality. These companies will usually sell the backyard orchardist as few as 1 or 2 trees, $12–14/tree. If you buy 25 of one kind you can bring the per-tree price down to $6–9.

On the flip side, large nurseries often carry a limited varietal selection—usually the varieties are those currently in vogue for large-scale commercial production and include very few if any heirloom varieties

In contrast, small-/medium-scale nurseries usually offer a diversity of varieties, essentially the best of the modern production varieties and a wealth of heirlooms. However, they usually have an extremely limited selection of rootstock types. The tree quality is variable, nursery to nursery, species to species, and year to year. The prices usually make you say "ouch!"; with no discount for volume, expect to pay $25–35/tree.

Selecting Quality Trees

A primary tenet of success is to plant a large "quality tree" and then to grow it aggressively. A bigger tree has greater leaf surface, thus more photosynthetic grow power, and will establish more quickly than a smaller tree. The old adage was, plant a whip (a whip is an unbranched tree) not a branched tree, but no more —plant a big, branched tree. It'll get you out of the chute and down the road quicker.

When choosing a tree, things to select for include –

- A root system that is proportional to the branch system. Keep in mind that good proportions, in that regard, have the appearance of being way out of balance (in favor of branches) to the novice.
- A good number of and good length of branches (5–9 over 2' long)
- A tall tree (4–7')
- Good branch distribution—both vertically and horizontally. Branches with a minimum of 5–6" vertical spacing are ideal. Such spacing achieves two aims –
    - Sunlight distribution within the tree canopy, both in the early years but especially at maturity. Fruit trees require 50–80% direct sunlight striking a branch to manufacture fruit buds and good quality (taste and nutrition), good-sized, well-colored fruit. You can easily move or train a young branch up to 180°.
    - Branch strength and vigor. If two or more branches emanate from the same vertical point on the trunk, one tends to be strong and one weak. The strong one is dubbed a choker branch—big pig, little pig syndrome. Good spacing of branches, coupled with moderately wide crotch angles (point of attachment to trunk) yields mechanically strong, vigorously growing branches. The ideal branch angle is 30–60° (above flat). Narrow angles beget overly vigorous growth at the expense of fruit and a tendency to snap and break at maturity. Conversely, flat-angled branches tend to be weak and become serious saggers that crowd and shade branches below.
- A thick caliper trunk over 1/2—7/8"

Caliper refers to the girth or circumference of the trunk at or about the bud union at the base of the tree. Trees over 1/2" up to 7/8" caliper are recommended. The notion of saving a few dollars by planting a small caliper tree is a mistake. Studies by Dr. Bruce Barritt of Washington State University have shown that by the fifth year (fifth leaf as the grower jargon goes) a 7/8" caliper tree produces 30% more fruit than a 1/2" caliper tree and almost 50% more fruit than a 3/8" caliper tree. While a larger caliper tree may cost slightly more at purchase time, the cost difference is soon recouped via early and efficient cropping.

The law of diminishing returns kicks in with tree caliper over 7/8", that is, there's nothing wrong with it, it just doesn't pay the dividend of more fruit sooner.

The same yardstick can be applied to the addition of compost to your soil. More is better up to a certain point. The "teen idol" musician John Meyer sums it up succinctly and poetically with the lines, "Twice as much ain't twice as good and can't sustain what one half could . . ." from the song *Gravity*. Although he was probably intoning about matters of the heart and not sustainable agricultural practices, good education and learning are really about transference after all.

Digging and Prepping the Planting Hole or "The Almighty Hole"

The old gardening quip, "Don't put a five dollar tree in a fifty cent hole," needs to be adjusted for inflation: "Don't put a $20 tree in a $2 hole." Use common sense, or activate your "horticultural sensibilities." What is the native soil like? Ask and answer the question, "Should I be planting fruit trees in this ground now?" If the soil is not fertile enough –

Get a soil test. It provides a quantifiable base line as per what is and what isn't in your soil, organic matter content, macro, micro nutrients, pH, C.E.C., etc. With the exception of nitrogen, if a nutrient is deficient you need to add it to your soil to counteract deficiencies. There is no alchemy in soil science; you can't make somethin' from nothin'. Nitrogen, of course, can be fixed via the symbiotic (actually it's been reclassified as a "facultative, parasitic" relationship—sounds yucky; symbiotic has a much more positive, poetic ring to it) relationship between certain soil bacteria (*Rhizobium* spp.) and nodules (housing) formed on legume roots (bell beans, vetches, clovers, etc.). Hey it's free nitrogen from the earth's atmosphere (79% Nitrogen).

Engage in a rigorous soil building program (1–3 years; but see the "multi-year hole," page 3, for ways to speed the process), components of which should include but not be limited to –

- deep or double digging
- a legume, grass cover crop that is green manured into the soil. It is possible to do this 3–5 times in one calendar year.

Jeff Rosendale

Orin Martin describes the attributes of a quality bareroot tree to a workshop audience at Sierra Azul Nursery & Gardens.

- liberal application of compost with each digging of the soil
- the addition of mineral fertilizers to correct nutrient deficiencies, i.e. colloidal rock phosphate for phosphorous, green sand or granite dust for potassium, lime-calcium carbonate ($CaCO_3$) for calcium and to raise the pH or reduce acidity, etc.

Even with the most wretched of soils, an intractable adobe-like clay or a sieve-like, lifeless sand, 2–3 years of intensive soil building will catapult soil fertility and structure forward and yield a plantable soil.

The Planting Hole–Various Approaches

It is arguable as to whether even moderately fertile soil needs to be augmented with compost/fertilizer. If this is the case (determined by both a lab soil test and physical inspection and evaluation), simply digging a hole slightly wider and deeper than the (spread) root system (24–36" x 24–36") should suffice. Fertilization can be accomplished by simply top dressing with a 1–2" layer of compost worked lightly into the surface soil; 1/2–1 pound of concentrated organic granular fertilizer (Sustane 4-6-4 or Dr. Earth 7-4-2 applied with the compost in year 1 and year 2) will ensure meeting growth goals.

A slightly more aggressive approach would be to supplement the fill soil, excavated from the hole, with no more than 25–30% (by volume) compost. The fill soil and compost should be thoroughly mixed (homogenized) prior to refilling the hole. This approach will both improve soil structure and boost growth in years 1 and 2. Additional top dressing is optional. Note: If native soil has a heavy clay texture, slightly fracturing the sides

of the planting hole as well as the bottom of the hole is advised.

An even more aggressive or radical "over the top" approach to hole preparation could be entitled "prepping the multi-year hole." This approach is time, labor and materials consumptive but has proved to work quite well over the years at the Alan Chadwick Garden at UC Santa Cruz.

This approach, which is for the impatient, salivating-to-eat-fruit-now crowd, is a way to take undeveloped soil, plant trees today (or tomorrow depending on the soil and your physical stamina or lack thereof) and simultaneously start using intensive techniques (referred to in rigorous soil building section, above) to improve soil outside the planting hole.

The multi-year hole approach is predicated on 1 foot per year extension of the tree roots beyond the planting hole (2′ x 3′). For every year you think it will take to improve the native soil outside of the planting hole to accommodate good growth, then expand the hole by one foot. Thus if you project it will take 3 years to upgrade the native soil, expand the width of the hole excavated from 2′ to 5.′ It probably makes little sense to dig any hole deeper than 3′. Most deciduous fruit trees (standard or dwarf) have a high percentage of their effective feeding roots in the top 1–2′ of the soil. While they have "anchor" roots that go deeper, these roots are adept at "double digging" for themselves.

To prepare a "multi-year" hole –

- Dig a 3- or 4-year hole, literally 1 foot/year (beyond 2′x 3′).
- Excavate the poor quality subsoil; discard 40%, and blend the remaining 60% with good garden soil (20%), and compost (20%).
- The top soil should be a blend of 60–70% native soil and 30–40% compost (premixed).
- Plant the tree, filling the hole with the improved subsoil, then finishing with the improved topsoil.
- Top dress with 1-2" compost and 1/2–1 lb. concentrated granular organic fertilizer.

Immediately start intensive double digging, adding of amendments and a cover crop-green manure program between trees. The goal is to diminish the differential between the improved hole soil and the unimproved native soil by the time the tree roots "arrive." This approach works well if you are a fruit tree zealot working on a garden scale, an endurance athlete looking for cross-training opportunities, or are in possession of a backhoe.

It is worth noting that the "by the book," conventional wisdom (these days) is that you should do nothing to enrich the soil in the planting hole. As general advice this is plausible. However I often find that in general, life is specific. That is to say most of the studies done are on ornamental trees planted in the southeast U.S.

With fruit trees, one of the tenets of success is to rapidly (3–5 years) establish the height and spread of the tree. With dwarfing rootstocks this is paramount. Dwarf trees become physiologically mature at 5 years (+ or -) and begin to fruit heavily. Fruit is an extreme nutrient sink and will virtually curtail vegetative extension growth. So an enriched planting hole, coupled with aggressive annual growth goals achieves aims. The goal is to double or even triple the canopy of the tree in each of the first 3 years. That is, to extend the leader 2-5′ and the primary scaffold branches 2-4′ in each year. Sunshine, water and fertilizer are your tools! It's pedal to the metal, judiciously of course.

Jeff Rosendale

Orin Martin (left) and Matthew Sutton fill in the soil around a newly planted fruit tree at a "Fruit Trees 101" workshop.

Positioning and Planting the Tree

Soil Cone

A soil cone can be constructed at the bottom of the hole to facilitate draping and spreading the roots evenly. This is not absolutely necessary and probably not feasible if planting more than a few trees (sure looks cool though, both in real life and in the diagrams). Similarly, the soil at the bottom of the hold can be fractured (12") with a digging fork. This improves both drainage and root penetration. These two techniques are probably requisite on shallow soils (minimum A horizon less than 2 feet) and on heavy clay soils in wet climates.

Planting Board

A planting board or stick (shovel, pool cue, hockey stick, bamboo, etc.) 4–5 feet long placed across the top of the hole indicates true level ground. This is important because the bud union (swollen portion of the trunk at the base) should be planted 2–4" above the true soil level. (Bud union just above soil level is recommended for cold winter climates.) If the bud union is buried –

- There is a propensity for the trunk to rot. This is the weakest, most vulnerable portion of the tree.

- The buried portion of the trunk above the bud union may sprout adventitious (defined as springing from an unexpected and unusual place) roots. The vigor of these roots is such that they will produce a full-size tree 20–30 feet tall.

Soaking Roots

Upon examination, if the tree roots are dry, soak them in water for 2–6 hours, not longer.

Planting

The tree should be held with the trunk perpendicular to the ground at the proper planting depth (referencing the planting stick) by one person. A second person slowly fills the hold with the excavated back fill soil (improved or not). Initially about 1/3 of the soil should be filled in and then the soil gently tamped in by foot. At this point the tree should stand straight unaided. This should be repeated twice more. At this point the depth of planting (bud union) should be rechecked and appropriately adjusted.

Positioning the Tree

In addition to the planting depth, the bud union should be placed with the stem scar (from trunk of rootstock that was lopped off after the bud or graft took) facing north to protect it from sunscald.

The hook on the trunk (just above the bud union) should be positioned into the prevailing wind. This is probably only critical in very windy districts. Additionally the trunk can be protected by whitewashing it with a water-based indoor or exterior Latex paint that is diluted 50% with water. Again this is only critical in high light level, hot interior climates. After 2–3 years the shade afforded to the trunk by the canopy should obviate the need to repeat this whitewashing annually.

Much of the above minutiae (planting board, soaking roots, positioning the tree, etc.) falls into a category Elliot Coleman (New England farmer, systems thinker, farm tool fashioner) refers to as 1% solutions; or things that don't really matter. My take on this is "A whole lot of doesn't matter(s) do."

Watering In

As always in gardening, planting is immediately followed by watering in. This is an axiom—ironclad. When watering in fruit trees you can channel your "inner kid" and mud it up. It's not like a delicate trickling in around the roots of a young Delphinium or lettuce seedling. A thorough soaking of the entire root zone will "get the tree off" and remove any undue air pockets.

Time of Planting

Ideally, deciduous fruit trees are planted as dormant bareroot stock at the outset of the planting season (December–January in coastal California). Although the window for planting extends into March, even early April, the earlier the better. Fruit tree roots begin to grow (and therefore can take up water and nutrients) about 3–5 weeks before any above-ground activity is visible. Thus, the earlier the tree is planted, the quicker it will begin to grow and the greater the first year's growth.

Prepping the planting hole the previous (dry season) summer nets the advantage of easy, quick planting when bare root trees arrive in January/February, especially if the soil is wet as it often is endlessly in January–March.

Also, the earlier in the season that a tree is planted, the quicker it will take root and the stronger will be the first season's growth. That is to say the difference between January planting versus April planting can be as radical as 2–3' of growth. Keep in mind that fruit tree (temperate zone deciduous) roots can and do start to grow at much lower soil temperatures (low 40ºs F) than do vegetable/flower crops (low to mid 50°s F). In essence a fruit tree's roots will start growing and taking up nutrients as much as 3–5 weeks before any visible above-ground activity (bud swell, flowering, leafing out) occurs.

Fruit tree (vegetative) growth usually shuts down from sometime in mid–late June into July. This is largely because the photosynthetic capability of the leaf is compromised and degraded by the physical environment—wind, UV sunlight rays, water, insect damage, etc., thus, the sooner the tree is planted and leafs out, the more growth will occur before physical degradation shuts down the tree for the year.

While trees can be obtained in containers later in the season, there are problems associated with container-grown specimens –

- Price is often 3–5 times greater than bareroot.
- Container-grown trees offer an extremely limited selection of varieties and rootstocks.
- Container-grown trees do not respond to the root restriction of pots.
- It is extremely dicey to successfully transplant during the active growing season.

Orin Martin is the Garden Manager at the Alan Chadwick Garden at UC Santa Cruz. This article originally appeared in the Winter 2009 issue of the News & Notes of the UCSC Farm & Garden.