



“Acts of creation are ordinarily reserved for gods and poets, but humbler folk may circumvent this restriction if they know how. To plant a pine, for example, one need be neither god nor poet; one need only own a shovel. By virtue of this curious loophole in the rules, any clodhopper may say: Let there be a tree - and there will be one.”

Aldo Leopold, *A Sand County Almanac*, 1949

An Addendum to “Trees!”

Here is some detailed information about selecting, planting, and caring for trees that I hope will you find useful and encouraging. Trees are remarkably tough plants so even if you have succeeded in killing houseplants, odds are the tree you plant out in the sun and rain will do fine. Case in point, about 50 years ago my parents planted a hemlock hedge along their property line. It was comprised of seedlings my father brought home in his small metal lunch box (when he worked outside as a lineman for the N.Y. Telephone Company). They all survived and grew into a privacy hedge the size of a railroad tank car in about 20 years.

Tree sizes

Seedlings are usually 2- to 4-year old trees that have recently been dug or lifted from the nursery bed where they were planted. Evergreens tend to look like a large bottle brush, perhaps with a few side branches. Deciduous trees are about as thick as a pencil and only 1 or 2 feet tall. Don't be deceived by their diminutive size. If seedlings are healthy and were well-tended, they will steadily grow in strength and stature. Think of them as pre-K to 4th grader trees (...depending upon their size and vigor). But also know that you will need to work (e.g., weeding and watering) and wait for them to be larger than your tomato plants. They may be bare root (packed in wet wood shavings and wrapped in plastic for shipment), containerized “tubelings” (similar to the plastic flats of annual plants at garden centers), or in very small pots.

Transplants have been lifted from a nursery bed then replanted at a wider spacing in a transplant bed. This process is roughly analogous to starting seedlings indoors then planting them out in your garden. A 2-2 transplant in tree nursery jargon spent two years in the original seed bed and two years (full growing seasons) in a transplant bed (or a pot) before being shipped to you just before the beginning of its fifth growing season. The nursery workers picking the trees for the transplant bed have already selected the healthiest, most vigorous ones. Transplants are tough and resilient even though they may only be 18” to 24” tall. They typically have more root mass, more foliage (in the case of evergreens), more branches and dormant buds (if deciduous), and the potential to adapt quickly to their new home than most seedlings. Think of them as 5th and 6th graders. Both the kids and the transplant trees have lots of pent-up energy, voracious appetites, and great potential for a major growth spurt.

Saplings (small, medium, large ...in pots) Small saplings in half- or one-gallon pots are sometimes called whips (from horse and buggy days). In general terms, a small sapling and large transplant are about equally matched in growth potential. If anything, the transplant has the advantage of more *Sisu*. Small saplings vary in age (depending on the species) but are poised to start growing noticeably during their second season (more about this later: **root-to-shoot ratio** and **sleep, creep, leap**). Medium saplings in 5-gallon pots are older trees about the size of your finger. Large saplings (an inch or more in diameter and 6 to 10 feet in height in 10- or 20-gallon pots may or may not have growth potential to match (again ...more about this later). Think of large

saplings in pots as teenagers who've never had the opportunity to realize their full potential. Deprived teenagers and stunted saplings can, however, adapt to and thrive in an optimal new environment.

Wildings are small trees on your property (or on a neighbor's land with their permission) that you can dig up and move in a large bucket or a wheelbarrow. Carefully dig them up—do not pull them up, leaving 90% of the fine feeding roots in the soil and giving the poor thing little chance of survival. Even if it lives, you've wasted the potential of two or three future growing seasons by not taking 10 minutes to dig and carefully lift the tree. I have two wildling apple trees in my orchard and a row of sugar maples that all were broom handle sized when I moved them in a wheelbarrow 20 years ago. Now the apple trees are the largest and most vigorous trees in the orchard (bearing a dark red, spicy-sweet apple) and the sugar maple trees are ~8" in diameter and 40 feet tall. Look around on your property or nearby areas for wildings. Take as much soil as you can safely lift to keep the fine feeding roots intact.

Root-ball trees ("ball and burlap") Unless you have a truck and a tractor and can safely manage a 300 or 400 pound tree and root ball, call a commercial nursery or arborist if you want you want to plant (and stake) the biggest tree possible. Once again, it's worth noting that some of these trees don't have the growth potential you might assume from their diameter and height. In some cases, their root system has been bound in burlap and crammed into a wire cage (try wearing shoes that are 4 sizes too small) or substantially pruned and reduced in volume by the hydraulic tree spade that cut and lifted them out of the ground.

Recommendation: Go with large bare root seedlings or transplants or saplings in medium pots ...and plant more trees! These smaller trees require a little more care but, as with raising a child, you learn and grow too.

How can you tell if a tree is healthy?

The **foliage** on an evergreen tree, regardless of size, should be a bright, uniform shade of green that is characteristic of the species. How is a non-forester or non-arborist supposed to know what the characteristic color for the species should be? Good point. Let's start over. Look for yellowing, mottling, and/or dry brown tips on the needles or leaves of any tree. Other things being equal, pick the tree with the greenest foliage and the minimal signs of water stress or potential insect or disease problems. Use your Farmer's Market, grocery store produce section, flowers at the Garden Center common sense to decide which trees to buy, or decline. Healthy evergreen foliage will feel slightly cool between the palms of your hands. Dead or dying (yet still green) needles will feel slightly warm and brittle (e.g., a 2-week old Christmas wreath).

The **bark** on a healthy tree should be free of obvious damage (e.g., scraps, gashes, splitting that reveals the green cambium or wood, many resinous or gelatinous excretions, etc.). It doesn't need to be flawless or pristine but should pass the intuitive test noted earlier. The **branches** should be reasonably symmetrical (i.e., not lopsided) and for larger trees, show some evidence of pruning and shaping. Gangling, scraggly branches indicate the tree was poorly tended, if at all.



The **roots** of a healthy tree should be moist and flexible. They typically vary in color from almost white (once you brush the soil off the newest fine roots) to a golden or orange hue for the larger, older roots. The root ball on the right is ideal. The root ball on the left is typical of a pot-bound or spiral-rooted tree. The roots are reasonably healthy for their size but need substantial pruning before the tree is planted. To do so, pull the spiraling roots off the outside of the root ball, hold them out straight (radially) and cut them off. Briskly raking the outside of

the root ball with 3-tine hand cultivator is an effective way to start. If the tree is planted without root pruning, they will continue to spiral around the planting hole and largely fail to spread laterally (i.e., radially, like the ribs of an umbrella) to anchor the tree and reach the water and nutrients beyond the planting hole. A garden knife or a sharp trowel was used to cut sections of the fine roots on the righthand root ball. In both cases,

cutting the roots (just as pruning a shrub or houseplant) will encourage new growth and better long-term establishment. While you're at it, prune off the rough mass of roots on the bottom too.

The **root-to-shoot ratio** for seedlings and transplants should be roughly 50:50 or 40:60. If it is, for example, 20% roots and 80% foliage, the tree will not be able to absorb adequate amounts of water for photosynthesis and respiration. Prune some side branches (not the uppermost or primary shoot) to bring the ratio into better balance. If it is 70 or 80% roots and 20 or 30% foliage, prune the roots back to about 60% ...so the foliage can make enough food for the whole plant. Either way, a lop-sided root-to-shoot ratio is stressful for the tree and can stifle its establishment and growth for several years. If the root mass is (intuitively) too small for the aboveground portion of the tree, contact customer service and ask for a replacement. It's more difficult to assess the root-to-shoot ratio of large saplings and ball and burlap trees but in general—although it may seem counterintuitive—pruning the above ground portion of the tree can enhance establishment and early growth. Simply put, too few roots for too much foliage means the young tree is always struggling to extract enough water from the soil. In the worst case, on a hot, dry, windy day that can bring the tree to “permanent wilting point” which is, quite literally, as bad as it sounds.

Be patient ...and expect the new tree to **sleep, creep, leap**

I often look at a tree I've planted and, because of its impressive size and vibrant health, have to stop and think carefully about how long it's been. I am often pleasantly surprised at how much they've grown in 5 or 10 years and how well they're doing. When I happen across an old (date certain) photograph, that really drives the point home.

I often look at trees I planted a year or two ago, I wonder when they are going get moving and earn their ecological keep! Then I remember sleep (year 1), creep (year 2, perhaps 3), and leap (year 3 or 4) as a helpful way to manage my expectations and gauge the tree's success and needs (e.g., fertilization). “Sleep” refers to the tree's efforts to acclimate to its new site and circumstances and get by or (at least break-even) physiologically for the first year. In the worst case, when the tree barely survives, “transplant shock” is the term that applies. Watering the tree properly is the most essential help we can offer. Just as for turfgrass, vegetables, and most flowers, periodic deep watering (a substantial soaking about once a week, in the absence of a major rain event) is *much* more effective than spraying them for a few minutes each day with the garden hose. A soaking rain is the model for watering that encourages root growth and ensure a substantial amount of water is available to the tree across (and below) its entire root zone (not just an inch to two of moist soil at the surface). For a tree, deep watering versus a perfunctory daily spritz is the difference between “a perfect day on the [photosynthesis] beach” with plenty of water *or* severe physiological stress that damages or kills fragile leaves and roots. Leaves with yellowing or brown edges are evidence of recent water stress.

As the tree's root system develops and reaches into a larger and larger volume of soil its dependence on supplemental watering declines substantially. This is not to say that deep watering during hot, dry conditions is not very helpful—for the same reasons noted earlier—but it's no longer a matter of life or death. Think of it more as a missed opportunity to realize excellent growth while avoiding chronic water stress (see “electric water” in essay #4). Although the rate (“creep”) of shoot growth and increase in foliage volume may appear to be limited or at least unimpressive, the unseen rate and volume of root growth sets the stage for the tree to “leap” during the next, and subsequent, growing seasons.

By year 3 or 4 the root system should be expanding beyond the planting hole. The tree has grown new branches with more buds to yield more leaves or needles. It has stored carbohydrates from photosynthesis in its roots to fuel early growth (e.g., most evident in the sweet sap that rises in sugar maple trees in late-winter and very early spring). In a figurative sense it is ready to leap into year 3 and beyond. If you study the picture of Aldo Leopold (at the top of page 1) standing by a large red pine sapling on his Sand County, Wisconsin farm, you can readily see the change in growth rate recorded by the distance between the whorls of branches. My best forensic guesses would be: (1) this was one of the most impressive young trees in that cohort (he and his family planted about ~3,000 per year); (2) it started as one of the most robust seedlings of the batch; (3) it happened to be planted in a particularly fertile pocket of soil; (4) its early growth

was above average until about year 5 when; (5) an optimal mix of sun and rain caused its growth rate to double or “leap” (...and to be chosen for this photograph).

Other Information and Technical Guidance

As noted in the first paragraph, most trees will survive if you simply cram them in the ground, walk away and hope for rain. That said, careful preparation and work will help the trees you plant to thrive and reward your efforts in many ways.

1. Here are the two websites with exceptionally good (concise, jargon-free) information about the fine points of tree planting: www.fcgov.com/forestry/planting-trees.php (Fort Collins, Colorado) and www.intelligentliving.co/planting-trees-in-square-holes/ (...to avoid spiral rooting and foster growth)
2. If you or a contractor are planting a large tree, be sure to **Call Before You Dig**. Nothing spoils an Arbor Day or Mother’s Day tree planting event quite like a natural gas explosion or an electrocution.
3. Take the time to improve the soil used to backfill the planting hole (which, as the websites above emphasize, should be three times the diameter of the pot or root ball). Add compost and/or composted manure to the native soil to enhance its water holding capacity and fertility.
4. Don’t torture the tree on your way home from the garden center. I get the strong urge to make a Citizen’s Arrest when I see this but don’t want to end up on Eyewitness News (“Crazed Forestry Professor Arrested in Silvicultural Road Rage Incident”). If the tree does fit in your vehicle and must hang out the window or tailgate, carefully wrap the crown (i.e., leaves and branches) in plastic. Tape or tie the covering around the stem and leave a small opening at the top (i.e., don’t strangle or suffocate the poor thing). This will prevent it from being desiccated by the 50-70 mph winds it will have to endure on the highway. If you are using a pickup truck or a trailer, tilt the trees over, protect the bark from damage (with an old towel where the stem rests on the tailgate), secure them, and cover them with a tarp securely enough that it won’t flail around on the road, but still provides enough breathing room for the trees. However, you transport them, go straight home with the trees. If you cook them in closed vehicle or bake them in the bed of your pickup truck while making other stops, you will stress them severely. So much so, they may reach permanent wilting point (and are more dead, than alive). As soon as you get home, place the tree in the shade and water it very thoroughly.
5. Shop for larger trees (e.g., medium and large pot) at local nursery or garden center where all the plants are well-tended by “plant people.” You may find the same tree species at lower price at a big box store—baking in the sun on blacktop, with indifferent watering—and you will get what you pay for.



6. Here are two old line mail-order sources for high quality seedlings, transplants, and small saplings (including fruit trees) that I recommend to you: www.musserforests.com (est. 1928) and www.starkbros.com (est. 1816). Studying both websites will make you a better person. And, by the way, order a bag of fertilizer tablets along with the trees. **Happy planting and tending.**

Paul Barten, with his son, Mike, and grandson, Rowan (with a Cree hunter’s bag, a gift from my dear friend Anna Bosum) and a mountain ash [rowan] tree we planted in their front yard in Thunder Bay, Ontario.