Building a Loving, Healthy Home for a Tree

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May 2018

While nearly all of us are sympathetic to the idea that we plant trees in areas where we work, live, play, and pray, for many our principle concern is to plant the largest we can afford that is unlikely to die in the foreseeable future. Here I would like to present reasons why there may be a more interesting relationship between planted trees and people, one that might be congenial to us as individuals and perhaps stimulate a broader conversation concerning our relationship with the earth itself and our posterity.

Of the 1879 plants native to the Chicago Region, only 110 (6%) can be classified as trees. Yet, most of us have a visceral affinity to trees that is significantly out of proportion to other groups such as shrubs, grasses, sedges, and wild flowers. People spend academic careers studying the matter. Bards wax poetically about them. Artists depict trees with special characteristics and moods in paintings. We like to sit under them and be near them. The "greening" of a landscape generally connotes planting them. Irrespective of the biome, peoples of the world generally cleave to trees—for whatever reason. So, how does our culture, here in the Midwest, manifest its love of trees? How might this love be more fulfilling for both us and the tree?

Today, the planting of a tree usually proceeds as follows. A hole is carved out of compacted clay, which is the prevailing "habitat" today in most suburban and urban areas. The tree is placed in the hole, often too deep, and the hole back-filled. A load of wood-chip mulch is unceremoniously dumped, often with the surface of the mulch positioned well up above the root collar. Even with a 4-inch caliper tree the hole is not to be so large as to diminish the area of mowed, fertilized, and herbicided turf, but large enough to discourage mowing crews from jigging the mower against the bark to mow around the tree—there is an active competition between trees and lawns insofar as our infrastructural aesthetic. We seem to favor both.

There are some better recommendations for planting, to be fair, which can improve establishment and survivability. The sides and bottom of the hole may be scarified in hopes that the balled and burlap or container-bound root mass has some chance of penetrating beyond the hole's initial excavation. Root hair development can be enhanced with the inoculation of a broad spectrum of beneficial bacteria and fungi. A compost of shredded leaves may be mixed in with the back-fill around the root ball and tamped down, though this organic matter will eventually burn down and is nearly impossible to replace once the trees woody roots have occupied the area. Best practices generally caution that the mulch be raked away from the base of the tree.

The ring of wood mulch around the tree's base, it is said, will help hold "soil" moisture and allow for some nutrients to leach downward into the hole. If the hole is in clay, it can fill up with water when it rains and it is deprived of any surface groundwater during rainless periods. Virtually all the rain that falls on the ambient lawn runs off to detention basins—laden with the fertilizers and biocides recently applied to keep it pure, growing, and in constant need of mowing.

The tree's fine roots, always in search of water and oxygen, finding the hole itself often wanting of one or the other or both, are seduced up into the sometimes moist interface between the mulch and the backfill. As the wood mulch oxidizes, as it inevitably does—decomposed by nitrogen-hungry bacteria—these fine roots become stranded at the mulch surface, but they are poorly adapted organs morphologically for dealing with desiccation and the vagaries of above-ground living. Tree planting protocol prescribe the regular replacement of mulch, but this rarely happens or it happens to disparate degrees.

It is a wonder that any tree lives to an advanced age under such circumstances. This struggle with life goes on 24 hours a day, 365.25 days a year, whether or not we are aware of the tree's plight. Generally, the land owner is happy that it does not die, but wishes it would grow larger more quickly to provide the shade a tree is supposed to provide, after all.

Some communities insist that the trees planted in their jurisdiction be "native" to the area, this on the assumption that plants native to the area are the better adapted to local conditions such as climate and soils. How one defines "native" is grist for another mill, but while some can survive better than others, none of our native trees are innately

adapted to the holes commonly provided for them by tree spades. In fact there really are no trees "native" to such circumstances.

To many people today, size matters when it comes to the lovability of a tree. It is generally believed that the larger the tree when planted, the sooner it will grow to a greater size. Larger trees, those with trunk diameters of four inches or better, can experience very little shoot elongation and bole expansion because it can take years for the pruned root system to reestablish a relationship to the substrate around it. A "whip" or sapling, on the other hand, experiences little or no root growth retardation, so it can actually overtake the larger, root-pruned trees and suffer much less transplant shock.

I recall that, as a pack master for a coterie of Cub Scouts, I once gave each boy a small whip of an elm—one of the three-way Asian hybrids that Dr. George Ware, with whom I worked, bred at the Morton Arboretum. The kids loved them, but a few of the parents accosted me rather ungratefully for having "cheaped out." Why, as a factor at the Morton Arboretum, could I not have secured for each boy a 4-inch tree of some kind? I guess they must have heard somewhere that a sapling or whip costs about 10 times less than a larger, say 4-inch tree, but I was not thinking in terms of dollars. I tried to explain that the idea here was that, as the Cub Scout grows, so does his tree grow—a pleasure for parents to observe, I fantasized. Rejoined by resentful stares, I concluded that they would have preferred to have given birth to teenagers. I really hoped that these raucous young boys, whom I adored and in whom I saw such potential, would not grow into people like their parents.

I also recall that, when my son was in the 8th grade, he noted that all the trees in our standard suburban neighborhood were "not really alive, but not exactly dead." He complained that they were more like prisoners of war or concentration camp victims, growing there until they died and the warden replaced them. He asserted that the only "free tree" in the neighborhood, as he put it, was an old cottonwood tree down by the grammar school, around which he and his buddies liked to play and just be close to. Every so often it would have "children trees," but then the "adults would mow them down and kill them." Finally, the adults cut down the tree "because maybe a limb would fall on somebody." In his young, obviously traumatized mind, that was the "last of life in our neighborhood." As a father, I was stunned. As a practicing botanist and ecologist, such thoughts had never formed in my mind. I had been given a lot to think about with regard to our culture's relationship to trees.

A tree needs what a child needs—a good home and regular nurturing. The planting of a tree in a place where it is expected to thrive day in and day out, irrespective of the sensitivity or knowledge of the planter, is an altogether different plant/person

relationship than that associated with planting annual vegetables, where organic matter can be refurbished after each season. A tree has a very long-term relationship with the place from which it springs or is planted, often one that long exceeds the life-span of the horticulturalist or landscape architect who committed it to its spot on the earth. Organic matter cannot be tilled in every year, so the planted tree must go it alone, hostage to the root environment to which it has been assigned.

A tree's home includes the sun and stars, wind and rain which the above ground organs experience. It also includes the soil wherein the roots live in critical relationships with other organisms and nutrients. It is commonly understood that plants grow in the soil, but what is not commonly understood is that soil is not simply dirt. Soil is the medium that provides the roots with a stable environment. If properly constituted the soil provides access to the necessary nutrients of plant life, which are available at C HOPKINS CaFe (carbon, hydrogen, oxygen, phosphorous, potassium, iodine, nitrogen, sulfur, calcium, and iron), the partaking of which is Mg (mighty good). Without getting too deep into the weeds, as it were, it must be appreciated that, not only are nutrients essential for healthy plant growth, they each have their own unique relationship to each other and with the sands, silts, and clays that make up the structural environment for all soils. For a soil to be healthy it must have the physical structure and relationship with living tissues, decomposed and otherwise, to sustain itself, sufficient pore spaces for water and oxygen in a sublimely intricate array, and the physicochemical attributes that enable the retention and availability of nutrients.

Dirt, which includes the leavings of detritus that accumulates around most landscapes, is soil that has been damaged either through compaction, leaching, excessive nutrients, loss of organic matter, or a combination of the lot and then some, all of which render dirt an unstable living environment for most long-lived plants and animals. Attempts to ameliorate its instability and provide organic matter commonly include the application of some kind of wood mulch. Again, there are serious issues with mulch—even when prescribed levels are sustained—most of them are borne out of the fact that the bits of wood are out of scale with respect to the physics, chemistry and biology of a stable soil. Although mulch is organic in structure, its application does not satisfy the need for soil organic matter.

In most circumstances, soil organic matter properly disposed and amalgamated within a soil is very important. Below the surface, in perennial systems, soil organic matter is formed largely from the decay of the fibrous roots of sedges and grasses. Soil organic matter serves as a depot for nutrients, a mediator of pH, and a number of other critical roles. Also, soil organic matter is in a constant state of decomposition, which requires a constant source of water and oxygen. When a soil is well watered, it dampens

temperature changes through its physical connection to the cooler, more stable, temperature that lies just a few inches below the surface. While the above-ground plant parts have specialized features for adjusting to temperature changes over the days and seasons, the roots, which are simpler organs anatomically and physiologically, rely mostly on the stability of their ambient environment. Plants need sunshine for their stems, leaves, and flowers. They need soil for their roots. Soil is the happy interface between heaven and earth. Soil is not dirt!

The abundant sedges and grasses of healthy, properly lit woodlands generate new soil organic matter each year. Most woodland habitat is fairly well drained, so the organic matter in the upper soil horizons can and does oxidize. Oxidation is the ineffable decomposition process that provides soil moisture and makes available critical nutrients. If not replaced, soil organic matter burns down the same as wood or leaf mulch, but in most Midwestern woodlands, it is produced each year at a rate that approximates the oxidation rate. Woodland sedge roots generally do not produce net amounts of soil organic matter, in contrast with loamy prairies that grow in full sun, where bunch grass root production can exceed the oxidation rate.

Sustained, healthy soil is the medium within which so many things salubrious to tree growth thrive. Sustained soil moisture not only mediates growing-season temperature changes, it is an environment ideal for the growth of mycorrhizal fungi, many of which optimize a tree's capacity to take up nutrients. Soil organic matter, whether in sand or clayey loam, provides a stable reservoir and retainer of nutrients. In a healthy soil, rainwater neither leaches nutrients nor runs off downstream with them.

In the case of many deciduous forest trees, such as those of oak and hickory, fine roots begin to grow a month or so before the leaves emerge in the canopy branches. In many Midwestern forests, the snows of winter have soaked into the soil, causing them to be so wet that the fine roots can have difficulty finding sufficient oxygen. In a natural system, in addition to the sedges and grasses, the ground layer is replete with many perennial wildflowers that emerge at about this time; their vernal growth begins a dewatering process, through transpiration, that allows the tree roots better access to oxygen and facilitates their growth and the growth of fungi. When the trees begin to leaf out they have a strong fine-root system and CHOPKINS CaFe is fully stocked with mighty good food. By the time the periods of rain-free days come along in July, the soil is so enervated with moisture-laden soil organic matter that the tree's growth scarcely misses a beat—as though it were fertilized and drip-irrigated. The soil nesting insects, as they carry their pupae and larvae about in small tunnels for the purpose incubation and thermoregulation, are often the same ones that distribute the seeds of the very wildflower and sedge species upon which the soil and the trees are so dependent.

As is demonstrated in the Flora of the Chicago Region, by G. Wilhelm & L. Rericha, plants and animals do not grow alone in nature. Given that the only living associates of trees planted in holes in contemporary landscapes are the nitrogen-thieving bacteria in the zone where the mulch meets the dirt over the burlap and balled root mass, however, we might take a lesson from nature and consider an alternative approach to the tree planting of forest trees. Perhaps we can see that most parkway or campus trees are not only lonely but unlikely to live to become fully grown shade trees.

For those landscapes in which the people have a long-term commitment to seeing it grow healthy trees, the following approach might be worth considering.

- Cut out an area of turf two or three feet in diameter and about 2 feet deep. Fill it with a potting soil or a mixture of potting soil and backfill, depending upon the quality of the backfill. The root collar should be about the same elevation as the ambient landscape. Prepare it as though vegetables were to be planted there.
- Plant a whip no more than an inch in diameter in the spring. Plant around it a matrix of sedge species in the genus *Carex*, specifically *Carex pensylvanica*, and interplant among them a few plugs of Wild Geranium, Shooting Star, Jacob's Ladder, and the like.
- Water it in and continue to water for the next few weeks until all have healed in. Step away and feel a kind of hope and love for these plants as they embark on a new life together—with you.
- The next spring, carve out the ring another 4-6 inches, prepare a soil as before, and plant with the same ground layer species, perhaps adding another species or two of both sedges and grass, perhaps *Carex gracillima, Carex sprengelii*, and *Carex cephalophora*, along with May Apple and Woodland Phlox.
- The next spring do it again, and so on, more or less making sure that the drip line of the growing crown is shading the ground-layer that is growing just ahead of its spread.
- Start to run a fire through it after the second or third year, the black ash from which exposes the surface soil to the warm, vernal rays of sun and starts a new growing season.
- Later, as the crown of the tree lifts higher and broader, one may wish to add some woodland goldenrods, asters, ferns, taller woodland grasses, and the like.
- By degrees, over time, the tree will become the centerpiece of a nascent forest.

If there are trees planted similarly nearby, perhaps twenty-five or thirty feet away or so, eventually their crowns will meet. This could be done in community with residents along a shared parkway or tree bank or in larger venues such as corporate or church campuses that one day really would like to be embedded in a genuine woodland setting. For every acre of healthy soil created, that amounts to about a million gallons of water that will infiltrate into the soil—not to run as a warm filth to districts downstream. The down side, of course, is that it requires the landscape owner to commit to a long-term relationship with his land, to come to see that land is not just a decorative, high-maintenance surrounding of drug-dependent rug, lollipop trees, and poodle shrubs. It is a land that receives the sun and dark, the wind and the rain, and the love of human stewards—as it has been written.

The stewardship of land is inextricably related to the stewardship of the attendant human community. Primary and secondary schools may want to establish such tree plantings class by class, year by year, so that each tree is nurtured by a coterie of children who watch their trees grow as they themselves grow, caring for them, loving both them and their woodland friends. Upon graduation from the school they can be assured that a next generation is caring for them. As in the movie, Goodbye Mr. Chips, there will always be children. If so, there will always by healthy trees.

So long as there are children who can come to see that the health and well-being of a community is eternally dependent upon committed community members, perhaps the idea of community commitment in general will follow. The school landscape, once an open, hot, lawn with trees here and there planted in rings of decaying mulch, will become a cool forest, a sweet warp and weft of living beauty and place for the awe-inspiring wonder of nature. The school ground trees, thus planted and cared for, will one day produce children of their own, happy in their place and harbingers of a healthy tomorrow.