The Minnesota Shade Tree Advisory Committee’s mission is to advance Minnesota’s commitment to the health, care and future of all community forests.

COMMUNITY FOREST PROFILE

CHANHASSEN’S Tree Coupon Program

By Jill Sinclair

Since my goal as a city forester is to put as many trees on the map (literally and figuratively) as possible, I’m always trying to think of new ways to tempt homeowners into planting just one more tree in their yard. (Yes, yes, right tree in the right place, of course!) Giving trees away usually does the trick, but my forestry budget needs to do more than to give the Smiths or the Johnsons a new sugar maple. I also find that ‘free’ usually gets translated as ‘cheap’ or ‘valueless’ in many minds. I worry at the sight of free seedlings being shoved into a tote bag or pocket after being picked up only to be forgotten until they have thoroughly dried out. Or even free classes on tree care where only a handful of people show up compared to that same class with a price tag of $20 and all the seats are filled. Anyway, everyone loves a bargain and we’ve all got a soft spot for a valuable coupon. So I got the bright idea to combine planting trees with getting a discount coupon. And it has actually worked pretty well over the years.

In Chanhassen, as in many cities, springtime is tree time. There are three tree programs offered annually for city residents. First, we do an annual tree sale during our Arbor Day celebration that may include potted trees or bareroot trees. We sell varieties and smaller sizes generally not carried by the local garden centers in order to eliminate any direct competition with them. Secondly, we offer residents the opportunity to have a tree planted along their boulevard through our Boulevard Tree Planting Program. Our third city tree planting program is the Tree Coupon Program. I found that while some people were

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After three years and numerous meetings, the first hurdle towards a state tree care license has been crossed. As you may have heard, the state task force has recommended to state legislators that the tree care industry in Minnesota be regulated. The task force was made up of tree care company owners, state, municipal, and university tree professionals.

Last I heard, the politicians gave the go-ahead for the Minnesota Department of Agriculture to form a board of industry professionals to draft a statewide tree care license. That was in February of this year.

I believe the initiative has now stalled, as industry leaders look at other states with existing tree care licenses for examples of what works and what doesn’t. In the interest of creating a uniform license, The Tree Care Industry Association (TCIA) is also looking at possibly drafting a model for state or even nationwide license standards. No use reinventing the wheel.

Licensure of our industry will not be an easy task. Insurance requirements, safety programs, state and city tax compliance, DOT compliance, are fairly straightforward. Setting an Arboricultural competency baseline and enforcement will no doubt be the hardest part of this puzzle. People I have spoken to, around the country, who have tree care licenses, all agree that without stringent enforcement, the license will not accomplish what it set out to achieve.

So what is it that we are trying to achieve? Increased safety all around for the public, their trees, “tree guys” and their employees.

This industry is one of the most rewarding, challenging, and dangerous professions a person can get himself into. But all it takes is a pickup and a chainsaw, and you can get into it and call yourself a “tree expert”. I know this, as this is how I started in the tree business. No PPE, no training, no knowledge, and no insurance, pure dumb luck is the only excuse for me surviving many a close call in my early tree cutting years. Fortunately for me, I met a lot of good folk that helped me to become a professional arborist. Too many other “tree guys” or their young employees have not been so fortunate or ignore change.

Twenty five years ago, I don’t think I helped the trees too much. My topping, flush cuts, rips and tears undoubtedly caused premature decay, rot, and death and setting up trees for future hazardous and dangerous situations. Again I was lucky enough to escape liability or lawsuit, as these harmful practices were more the norm than the exception back then. Not surprising is that in this day and age, a lot of harmful tree cutting still goes on. Some of these so-called tree experts only seem to be in it for the money with little or no regard for their actions and practices. I think anybody that knowingly harms a tree should be fined and sent back to their high school guidance counselor for a job re-evaluation.

Trees are magnificent living organisms and they should be cared for by someone who understands their biology and truly cares for their long-term viability.

Professional arborists and all passionate tree care professionals need to do a better job of...
his desirable tree is native to almost all of Minnesota except a narrow band along the North Shore. This is a full sized, long lived, sturdy tree. This tree has a reputation for slow growth, but once established, has at least a medium growth rate. When kids draw a deciduous tree, this is one of the classic shapes they will end up putting on the paper. The leaves are large with rounded lobes and at least one deep sinus that almost reaches to the central vein of the leaf.

The tree can tolerate a relatively high pH and a wide range of soil textures. It can be difficult to establish and fall planting should be avoided. The fruit is nut like with a mossy cap. This tree grows in areas from prairie savannahs to forests and is good for wildlife.

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thrilled to get a free tree through our boulevard tree planting program, others wanted to be able to choose their own site in their yard. By using the tree coupon, residents can choose the tree they want and plant it in the spot they want.

With so many new subdivisions in town, there was a real need for trees. While some developments are located in wooded areas, many subdivisions were built on agricultural lands that lacked tree cover before and after development. Chanhassen has a requirement that at least one tree needs to be planted in the front yard of each new home, but that doesn’t really cut it. The majority of homeowners see the value of good trees and understand that a little work in the spring will bring rewards for many years. Buying and planting trees is a rite of spring in many yards and the city wanted to encourage that as much as possible.

Over the years, the tree coupons have ranged in value from $75 to $100 off a tree bought at a local garden center. The coupon parameters include a minimum tree size, the coupon is valid only during a certain period of time and in some years the trees must be a native species. Generally, the coupons are good on one-inch diameter trees or larger from a selected list of species. The nurseries are consulted prior to the start of the program each year to ask for their participation and gauge the availability of some of the species and sizes. It’s a great deal for homeowners, since the frugally minded can find a small tree that’s free with the coupon.

The coupon program always runs during the month of May, Minnesota’s Arbor Month. During that time, the participating garden centers honor the coupons for whatever tree is selected by the resident. The center subtracts the discount and saves the coupon. At the end of the month, each garden center gathers their coupons and sends them to the city. We reimburse the centers the total value of the coupons. Generally, the program costs around $3000 each year.

The program started way back in 1995 when the city received MN ReLeaf funding. The city offered 100 coupons good for $100 off a tree. The focus was planting for energy conservation. The catch was that residents had to attend a workshop about tree care. That first year, I invited the garden center owners to come and share in the presentations. We covered the topics of tree selection, planting, care and maintenance. The homeowners left with great information and a valuable coupon. Sixty-seven coupons were handed out and at the end of the month there were 38 redeemed.

In the following years, we’ve tweaked the program here and there ever so slightly, experimenting with the discount amount, species selection, and workshop topics. The return rate has remained at about 50%. We’ve settled into an ongoing coupon amount of a $75 discount.

This year, feeling the need not be bound by any restrictions, the coupons were distributed to any resident who wanted one, no workshop attendance required (we still offered a class) and no list of selected species or preferred types of trees purchased. Other than the minimum size, we let residents pick whatever they wanted. Willows, crabapples, maples, hawthorns, and blue spruce (gasp) were carried out of the nurseries and into yards. The interest in the coupons surged as neighbors told neighbors about the program. I was taking calls for coupons well into August.
I hope that the clamor for the coupons returns next spring and they fly out of city hall again. It would be great if the redemption rate increased too. I’m not sure if it’s possible to expect a 100% redemption. People misplace or lose them, never get around to visiting the garden centers, can’t quite decide on the tree they want, decide not to plant a tree at all, or who knows. I’ll keep trying to figure the best ways to promote the program, increase the return rate and make sure homeowners have the best information on trees and their care. From the city’s standpoint, you can’t beat paying $75 for a planted tree. From a homeowner’s standpoint, give them a good deal on a good tree and they’ll see that it gets into the ground. I strongly believe that a well thought out, carefully crafted, strongly enforced tree care license could help all the professionals practicing correct arboriculture. With the experience of other state licenses, and the help of the Tree Care Industry Association, Minnesota can create a license that could transform the industry here and across the nation.

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spreading the knowledge of proper arboriculture to other tree people so that this profession can be highly respected in the community. We, the professional arborists, need to work together to raise the standard to which we are all held accountable. We need to band together to police our industry and ban those individuals that do not and will not act professionally.

Unfortunately, without consequences, unscrupulous tree cutters will continue to give our industry a bad rap, and if the professionals don’t stand up and protect our industry, nobody else will. Or worse yet, unsafe practices, causing injuries and death, will spur the government to mandate regulations that may or may not be in our industry’s best interest. Better we get involved before the feds do.

Dave Nordgaard, ISA Certified Arborist MN #107, is the President of TopNotch Tree Care.
“Diversity” tends to be a hot-button topic in many circles. Urban Foresters have discussed diversity of street tree populations for decades. But, what does diversity bring to the urban forest and more importantly does diversity protect trees?

First, take a step back and look at the other end of the spectrum – if it is not diversity that we have – is it more a monoculture with a single species dominating the landscape? And, if a monoculture, what have we learned watching scenarios like Dutch elm disease (DED, Ophiostoma ulmi, O. novo-ulmi) unfold in communities around the world? In the United States alone, losses have been estimated at 40 million to 77 million trees depending on time frame and geographical scope of the studies.

Most communities in Minnesota continue to manage Dutch elm disease effectively. Yet, Minnesota’s tree stewards look to the horizon and see emerald ash borer or EAB (Agrilus planipennis Fairmaire), U.S. Forest Service webs report that emerald ash borer has resulted in more than 20 million ash trees in Michigan, Ohio and Indiana being removed. Whether the culprit is DED, EAB or any other threat, the difficulty of treating insect populations or disease outbreaks of these magnitudes with pesticides (if a pesticide is available) becomes obvious. And, with pesticide use limited or even out of the arsenal on these large scale attacks, what then, is the best defense?

Diversity:
The answer is likely found in “Diversity” of tree species. The American Heritage Dictionary defines diversity as: “1. the fact or quality of being diverse; difference. 2. variety.” “Variety” is the word to extract from these definitions for application in the urban forest.

Why variety? Forest stewards are lucky in the sense that most tree pests are specialists, they often show a preference for a single genus and in many cases a single species. Consider the specificity of butternut canker (Sirococcus clavigignenti-juglandacearum) to butternut (Juglans cinerea) while not affecting the closely related black walnut (J. nigra). Dutch elm disease has found American elm (Ulmus americana) to be a very susceptible host, yet; there are several closely related species of Ulmus that have characteristics which make them less susceptible to DED. And, look at our native oak species that are split along subgenus lines in terms of susceptibility to oak wilt with species in the red oak subgenus being very susceptible.

Bronze birch borer (Agrilus anxius) and emerald ash borer (A. planipennis Fairmaire) are also good examples; both demonstrate a preference to individual genera. Bronze birch borer utilizes the genus Betula from the family Betulaceae and within that genus it shows preference for individual species such as paper birch (B. papyrifera). EAB has been found in the United States to select only members of the genus Fraxinus of the family Oleaceae. Minnesota’s green ash (F. pennsylvanica), white ash (F. americana), and black ash (F. nigra) are all potential hosts.

Since forest pests tend to be selective, a landscape with a variety of species will typically suffer fewer losses when a pest outbreak does occur. Frank Santamour of the United States Arboretum, without taking ownership, described in 1990 the 10-20-30 formula to develop a diverse tree population within a community or landscape. The rule-of-thumb is straightforward and is as follows:

**PLANT:**

1) no more than 10% of any species,
2) no more than 20% of any genus,
3) no more than 30% of any family.
Developing Diversity:

Helen Stone writes that some cities have designed ordinances in an attempt to push diversity. For instance; Lansing, Michigan, with the help of consulting urban forester Robert A. Cool wrote into ordinance that new development blocks must have at least five different genera of trees with the further restriction that no two adjacent trees can be of the same genus. Michael Conner, ASLA, is the landscape architect for the city of Cooper City, Florida. Cooper City’s ordinance is closer to the traditional thinking of uniformity and allows uniform street plantings. However, the ordinance states that if twenty trees are planted in a development there must be three different species represented and if fifty trees are planted there must be four species represented.

Don’t think of these ordinances as an attempt to protect individual species in a population of trees, but think of them as means of protecting a landscape if an individual species is devastated. Unfortunately, many landscapes or municipalities don’t fit the 10-20-30 rule-of-thumb. Thus, when a disease or insect outbreak occurs within a species comprising 35% of a population for example, losses can be devastating to the landscape aesthetically and to financial budgets.

Diversity: First Steps...

It should be noted at this point that a key to developing a diverse urban forest is an inventory. Depending on the geographical scope, the inventory may be as simple as a paper map or as complex as spreadsheets and computer systems. Once the existing population mix is understood, only then can planting and replacement strategies be formulated and/or adjusted.

Several of the sources found at the end of this article offer first step approaches to developing a diverse urban forest. After the inventory is complete, then turn to the planting lists to ensure over-utilized species are removed for a period of time and replaced with under-utilized species. And, don’t ignore strong recommendations from these sources to choose the correct species for the site.

James Calkins was the MnSTAC forum speaker in July and spoke on what he has termed ‘phytobigotry.’ His message is that there are many good, suitable trees for the urban environment that have been blacklisted for one reason or another – often the reasons are based on perceived bad qualities. To wrap up, I am going to leave you with a quote from Frank Santamour that highlights a few of these blacklisted species:

“For the education of the next generation, plant a catalpa, a hickory, a horse-chestnut, a sassafras and even a thorny honeylocust in park areas that can and should be used to stimulate an interest in the diversity of nature.”

For More Information:


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In a perfect landscape world, shrubs would rarely if ever need to be pruned.

After all, no one pokes through the forest understory or lakeshores, inspecting shrubs for height, form, flowering and health issues. Shrubs seem to get along just fine without our guiding hands and loppers. So why bother to prune them?

Other than removing dead wood, shrubs are usually pruned for one (or more) of three reasons:
1. They’re too large for the space.
2. They’re not the desired shape for the landscape.
3. The production of flowers or colored stems has declined.

Unlike trees, shrubs are much more forgiving of hasty pruning decisions, but there are some general “principles” that can guide your bypass shears to produce more beautiful, healthy and functional shrubs.

Principle One: Count on canes. Most shrubs are multiple-stemmed as opposed to trees that generally have one trunk. These stems are technically called “canes” and are essentially just “suckers,” that is, very fast growing vegetative shoots that arise from near the ground line or just below. There are a few single-stemmed shrubs, for instance witch-hazel (Hamamelis species) and some viburnums, but most shrubs have several canes growing from the “crown” (the base) of the plant.

Most pruning techniques should encourage the production of young canes. They have the most foliage from top to bottom, are usually the healthiest parts of the plant, have the brightest color for those plants with showy stem color (for instance, redosier dogwood – Cornus sericea), and produce the most flowers for many species.

Principle Two: Broader is better. Regardless of whether you are shearing a shrub to a particular shape or pruning it to retain a natural shape, the bottom of the shrub should be broader than the top. This makes sense in light of principle three.
Principle Three: Light good, darkness bad. Most shrubs that have lost their lower foliage (termed “leggy”) or lost the interior foliage (barren) are the victims of pruning techniques that encourage darkness. With few exceptions [e.g., viburnums, yews, hemlocks], darkness results in the death of most leaf buds. If shrubs are pruned in a manner that excludes light from reaching the bottom or interior branches, eventually those areas become void of foliage. So, that hedge that you planted to screen the view of the highway from your deck soon becomes a bunch of sticks (that you can see through) with foliage at the top where it does little good.

Pruning Techniques for Controlling Size:

Renewal pruning. This technique is very safe and almost “unnoticeable” to the average eye. Periodically (every 1-3 years) remove the oldest canes by pruning them back as close to the crown as possible. This will naturally allow more sunlight into the center of the plant, encouraging new and obviously shorter cane production. Coupled with the removal of the older and larger canes, the size of the plant can be reduced either slightly (1 or 2 canes removed every 3 years) or significantly (several canes every 1 to 2 years). In addition, the new cane production is usually brighter in color (for those shrubs with colored bark) and eventually produces more and better flowers.

Rejuvenation pruning. This technique takes a little more trust in botany and tolerance for recovery. For hopelessly overgrown shrubs or for size maintenance of aggressively growing shrubs, rejuvenation is a perfect solution. Prune all (yes, all) canes back as close as possible to the crown of the shrub. For shrubs that have many

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What can you say about an arborist conference in paradise? Aside from the obvious stereotypes about Hawaii, the Hawaiian people love their trees! The people of Honolulu have learned many of the secrets behind growing and caring for an urban forest. With over 800,000 people living on a small island, they need to protect any green space they can. The 2007 International Society of Arboriculture (ISA) conference started with two full days of the international tree climbing championships together with other festivities such as wooden bowl turning, pineapple eating, kid’s tree climbing and coconut utilization. To say that the work climb tree was enormous was an understatement. The giant Baobab tree nestled within the University of Hawaii’s classroom buildings was awesome. The smooth bark made for some exciting moments for the spectators and nerve racking moments for the climbers. The final day of the climbing competition was completed with the master’s challenge. The winner was Bernd Strasser from Germany – who became a seven time champion, the most in the history of the competition. The honor was well deserved; if you’ve never seen him climb, it is worth the admission price.

The conference wasn’t all about sandy beaches and tree climbing, there was an equally exciting time inside with educational sessions that hosted an array of scientific and arboricultural superstars. One of the highlights for me personally was meeting Dr. Ed Gilman, from the University of Florida, who is currently studying the effects of wind loads on trees using giant wind machines to measure stem and crown damage in a variety of landscape trees. Paul Reis, from the Oregon Department of Forestry, spoke about the new DVD that he created involving science based tree preservation techniques and what it really
takes to save trees before, during and after construction. There were other speakers who discussed the newer decay-in-trees detection device, called the Picus Sonic Tomograph, which is a mouthful to say, but is an instrument that can produce an image of decay in trees using sound waves and resistance, without drilling in the tree. The information presented was superb and the facilities were as close to perfect as they get.

As many ISA conference veterans know, the most important feature of the conference is the networking that you do with your peers. I spoke with people from around the world including Australia, New Zealand, Japan, England, Germany, Denmark and even Wisconsin. I actually saw a current member of the Minnesota Society of Arboriculture at a luau attempting to hula dance. I think I’ve seen it all!

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THE MINNESOTA SHADE TREE ADVISORY COMMITTEE MONTHLY FORUMS

NOVEMBER 2007

• Guest Speaker: Jill Sinclair, “City Forester” for Chanhassen, Minnesota.

• Topic: The Changing Role of the Municipal Forester. To survive and thrive and be effective as a municipal forester in the 21st century, the traditional urban forester must be more professionally flexible and know a heck of a lot more about natural resources that just trees. This is a “must-hear” session for every urban forestry student or entry level professional.

• Location: The Minneapolis Park and Recreation Board headquarters at 2117 W. River Road in Minneapolis.

• Time: Forums begin at 10:00 am and conclude by 11:00 am.

ISA CEU’s AVAILABLE FOR MOST SESSIONS.

CHECK www.mnstac.org FOR A SCHEDULE OF FUTURE FORUMS.
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canes (e.g., forsythia, spirea, potentilla, arrowwood viburnum, and honeysuckle to name only a few), this is probably the best technique to control size yet maintain a natural shape.

Most shrubs will recover to half normal size within a few months to a year, will reform the natural shape of the plant, and will be covered with foliage from top to bottom. As with renewal pruning, these new canes will be more brightly colored and flowering will be enhanced for most shrub species. For aggressively growing shrubs, rejuvenate once every three years or so. For slower growing ones, as necessary.

Selective pruning. For those shrubs that are single stemmed or perhaps only 2-3 canes and slow growing (e.g., start magnolia – Magnolia stellata, or witchhazel), pruning branches back to a “node” (growing point: bud or branch) that is lower down on the plant or further to the interior is the best technique to control size and avoid barren interiors. This is essentially pruning a shrub as you would a tree.

Shaping (shearing). Shaping is a technique used to alter or control the shape of a shrub, either for ornamental reasons (e.g., topiary) or for hedges. Shaping can be rectilinear (hard, geometric shapes) or curvilinear (more softened edges). For hedges, most structural shaping is done in the winter or early spring, with a goal of creating the broad-based (for more even sunlight distribution to the bottom of the shrub), leafless structure that will fill in with foliage during the spring and early summer months.

Shaping is usually accomplished with a hedge shears, but should be accompanied by selective pruning with a bypass shears to open up the hedge interior to sunlight, avoiding a barren interior in the future. Once new foliage has emerged in the spring and summer, a light trimming and selective thinning may be done to “neaten-up” the appearance of the hedge.

Timing:
There are three rules of thumb for timing of pruning, depending on whether or not the shrub is intended to provide flowers. For those shrubs that flower before mid-June (e.g., forsythia, many lilacs – Syringa sp., redosier dogwood), prune immediately after the shrub flowers. For those shrubs that flower after mid-June (e.g., summersweet – Clethra alnifolia, common witchhazel, buttonbush – Cephalanthus occidentalis), prune in late winter to early spring. For the rowdy shrubs in the landscape (potentilla, most spireas), prune anytime that the weather is not miserably cold or hot and dry.

Disease Control:
If the shrub has been declining due to a fungal stem canker or to fireblight (bacterial) stem canker, clean the pruning equipment after removing the infected canes. Spray rubbing alcohol on the pruning blades and then “flame” them by lighting it immediately with a match. Dipping in alcohol alone is often not enough. Soaking in bleach only makes your whites brighter and whiter.

Gary Johnson is a Professor of Urban and Community Forestry, Department of Forest Resources, University of Minnesota.
Growing trees and associated woody plants can be difficult in urbanized settings and built environments. Compacted soils, extreme alkaline soils, moisture stress, interrupted natural cycles, air pollutants and so forth are challenges urban foresters, arborists, horticulturists, landscape designers, landscape architects, and landscapers encounter on a regular basis. We can select plants that tolerate these extremes, but sometimes this is easier to say than do. An alternative method to meet the biological requirements of plants is to design a planting site with amended soils or use structural soils and systems to support loads. Regardless of whether a strategy of creating a planting site design suitable for desired plants or selecting plants tolerant of tough sites, an important first step to grow trees is to know trees and the biological and environmental systems they are adapted to. Some of the most important tree lessons are learned in the natural settings where trees grow. Silvics is the study of where and why trees species and other woody plants grow. Environmental factors are an important silvical basis with plant distributions, abundance, and growth. (An excellent reference on the Silvics of North American Hardwoods and Conifers can be found by googling Silvics of North America or using the link http://www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm.)

Ingredients for Plant Growth:
Plants require several important factors in order to grow. Dr. Alex Shigo liked to frame this discussion around eight themes: Energy, Genetic Programming, Space to Grow, Water, Essential Elements, Temperature, Time, and Concentrations of Factors. If the site presents challenges for the plant within any of these eight themes, such as limiting or excessive quantities of essential elements, sunlight, or water, the plant responds by growing at a proportionally lesser rate. We see this manifested in premature plant death and also in plants smaller than their potential size. Smaller, however, does not necessarily mean lesser. Observe trees by taking a day trip to rock ledges along the Saint Croix River, through a week of canoeing near exposed granite and shallow soil sites of the Boundary Waters, or from a lifetime of cultivating bonsai plants; you will encounter that plants in these resource limiting situations can be surprisingly old for their small size. Plants that survive and grow in limiting environments adjust to survive. If they do not, they die. Slower growth rates and smaller size are two adjustments.

Energy, the first of Dr. Shigo’s eight important factors, is required to keep plant metabolic processes in motion. Plants store kinetic energy from the sun in potential energy forms initially through carbon-based structures fixed through photosynthesis. If a plant produces more energy than it respires, it has the potential to grow at a rate dependent on the net amount of carbon fixed above that lost through normal respiration. This energy transforming process is under genetic control. The efficiency of carbon gain and loss, tolerance of soil water content (i.e., too much or too little), nutrient levels, soil pH, and other factors are also under genetic control. Many plants do very well in moist-well-drained soils. Excess or limiting amounts of water reduce the plants potential to photosynthesis. Excess water can depress root respiration and too little water results in stomates on leaves to close and this effectively impedes the absorption of new carbon needed as a base ingredient for potential energy fixed in carbon chemical bonds.

Space to grow is also very important. Above ground, space to grow conflicts arise through common urban infrastructure such as roads, buildings and utilities. Below ground, the volume of soil strongly regulates the availability of water, nutrients, and physical support for a tree. As an example, a conventional downtown planting site created through a sidewalk cutout may contain as little 30 to 40 cubic feet (3 or 4 feet wide by 2 to 3 feet deep) of soil that is capable of growing small trees (i.e., four inches or less in diameter). Trees in these confined plantings sites sometimes do get larger if the root system,
through exploration, finds greater soil resources such as a lawn area adjoining the sidewalk.

Ironically, small trees in restrictive settings (e.g., the boundary waters and bonsai tree examples) may live for many decades and centuries if regular water and nutrient additions are supplied. Unfortunately, at below-ground limiting sites in urbanized settings, regular additions of water, nutrients, and oxygen are often lacking. De-icing salts in northern climates exacerbate problems at these sites. These plant growth limiting factors are often manifested in trees not surviving many years past planting. One solution is frequent additions of dose appropriate plant resources. This is easier said than done. Even something as simple as watering will likely not happen if not in the budget. Another solution is planting smaller stature trees. For example, planting ironwood, blue beech, Japanese tree lilac, Amur maackia, and service berry might be better choices for below-ground-space limiting environments. Genetically, they need fewer resources to attain their potential maximum size. The downside is if a goal exists for a 50 foot or taller tree, these species will not provide it. On the positive side, small stature trees can at least provide partial shading of sidewalk and street surfaces and are an alternative for these sites.

Soil Volume and Tree Growth:
Take a walk in the woods and ponder, what soil volume is required for trees? Using work from researchers including James Urban and Dr. Nelda Matheny, approximately every one cubic foot of soil supports approximately 0.015 inches of diameter on a tree. Expressed another way, if you desire a 15 inch diameter tree approximately 1,000 cubic feet of soil is needed. Put in perspective, this is a 10 foot wide by 50 foot long planting space with two feet of effective rooting depth that would support our example tree. There are other factors that ultimately play in the soil volume to tree diameter relationship, but the 0.015 coefficient is a good basis to start the planning discussion.

Creating an open profile needed to support the desired plant size might not be possible if hardscape surface is needed. An alternative is creating a load bearing surface to support hardscape structures such as concrete, asphalt, or pavers but still provide soil volumes to support desired tree sizes. Two recent technologies are structural soils, initially experimentally developed in the mid 1990’s, and recently, structural support through structural cells or modular building blocks commercially marketed as the Silva Cell.

Structural Soils:
By design, structural soils support load bearing surfaces and a soil quantity to support tree growth (Figure 1). This is accomplished by a lattice of rock mixed with soil that when compacted to 95% of dry density can support both tree root growth and support paving applications (Figure 2). Angular rock with a ¾ to 1½ inch uniform grading provides the load-bearing component and comprises approximately 80% by volume of the mix. Ballast rock along a railroad track is an example of this rock. Ideally, an inert rock such as granite is used. Limestone rock is used sometimes; however, it will raise the soil pH and
About MnSTAC

The Minnesota Shade Tree Advisory Committee (MnSTAC) was established in 1974 by a group of concerned citizens to address the health and well-being of community forests. MnSTAC is recognized throughout Minnesota and the country for its expertise, advice, coordination and support for community trees. It is an organization of diverse individuals who represent a broad spectrum of tree-related interests. It fosters and supports local community tree programs across the state so healthy community forests are fully integrated into community development, infrastructure, education and management.

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Northeast STAC
Chair: Kelly Morris, City Forester, City of Grand Rapids—218/326-7481
Secretary/Treasurer/Technical Advisor: Dan Jordan, IRRRA Mineland Reclamation—218/254-7481

Calendar

Events


January 9-11, 2008, Minnesota Green Expo, Minneapolis, Minnesota www.minnesotagreen-expo.com


February 3-5, 2008, Wisconsin Urban Forestry Conference, Middleton, Wisconsin. Contact Cory Gritzmaker at cagritz@netwurx.net


March 25-26, 2008, Minnesota Shade Tree Short Course, Bethel University, Saint Paul, Minnesota www.cce.umn.edu/shadetree

April 7-9, 2008, Trees and Utilities National Conference, Orlando, Florida. Contact: www.arborday.org

New Publications


Groundwater in Fractured Rocks. Dr. Jiri Krasny. 2007. Taylor & Francis


Websites

Alliance for Community Trees www.actrees.org

International Society of Arboriculture www.isa-arbor.com

Minnesota Erosion Control www.mnerosion.org

Minnesota Tree Care Advisors www.mntca.org

Minnesota Trees www.mntrees.org

North American Weed Management www.nawma.org

Purdue University Virtual Plant & Pest Diagnostic Laboratory www.ppdl.purdue.edu/PPDL/index.html

Sustainable Urban Forests Coalition www.urbanforestcoalition.com

Tree Canada www.treecanada.ca

Tree Link www.treelink.org

Tree Trust www.treetrust.org

University of Minnesota Forest Resources Extension http://fr.cfans.umn.edu/extension

For handy up-to-date links to Web sites of interest, be sure to visit www.mnstac.org
restricts plant choices to those tolerant of alkaline sites. A clay-loam or loam soil with 2 to 5% organic matter is an ideal soil to use within structural soils. These soil types provide a necessary cation exchange for soil nutrient adsorption and by volume comprise approximately 20% of the structural soil mix. A polymer gel (hydrogel) is added to the mix of rock and soil and helps keep the mix from separating prior to installation and further minimizes overfilling of void areas between rocks. Structural soils increase soil volumes by approximately 20% compared to conventional engineering specifications compacting fill to a 95% standard that is a poor medium for tree root growth. A significant limitation of structural soils is the 80% by mix volume rock. Approximately five cubic feet of structural soil is needed for every one cubic feet of soil to support tree size.

**Structural Cells:**

Another approach to provide suitable soil to support tree growth involves suspending sidewalk structures over a support structure. One approach involves pouring a reinforced concrete over support columns. Site specific engineering is required and this approach can be labor intensive. A recent advance involves structural cells that are pre-engineered cells that can stack together as a modular system. Soil is placed within the cells. The soil is not compacted and approximately 95% of the cubic volume can contain soil. The modular system comprises approximately 5% of the area. A deck designed to exceed H-20 loading is installed on top of the cells. A base course of 4 inches for concrete and 12 inches for modular pavers is then placed on top of the deck. Infiltration of water through pervious sites, when incorporated with this system, can also serve as a design to handle rainwater. This application serves to solve an important built environment issue, water runoff management, and adds a green infrastructure to boot!

**Conclusion:**

Growing trees in urbanized settings poses challenges to plant selection and site design. Ideally, matching trees to the site increases the odds for successful tree plantings. Difficult sites, however, limit plants choices, and in some locations, few if any trees will prosper without site modifications. Structural soils and structural cells offer two opportunities for site designs that provides for pedestrian traffic (and also traffic if designed appropriately) above a below ground environment suitable for plant growth. Regardless of how you proceed with planting trees in difficult sites, assessments of sites made in advance of decisions for tree selection is preferred to experiential education of tree failures that a lesson in silvics would predict.

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