The Seed

Why Plant Trees?
Collective Efforts at Tree-planting
The Future of Our Trees

Nebraska Statewide Arboretum
Sustainable Landscapes for Healthy Homes & Communities
Fall 2014

Why We Love Trees

Justin Evertson, Green Infrastructure Coordinator

It doesn't take a genius to understand why people who live in the middle of the country hold trees in high regard. Simply put, they make our existence here so much more comfortable. Let's face it, the Great Plains climate can be brutal and trees do so much good protecting us from extreme heat, bitter cold and frequent high winds. Even prairie-loving people who lament the encroachment of trees into native grasslands and sometimes suggest that trees don't belong here, almost certainly desire trees around their own homes and in their communities. There are curmudgeons of course, so there may actually be a few people who genuinely don't like trees. They probably don't like puppies or sunshine either. Ultimately this issue of ***The Seed*** isn't for them, but rather for the vast majority of us who really like trees.

It's not just those of us in the middle of the country that love trees. Humans in general seem to have a natural affinity for trees. Some scientists speculate that since our species evolved with trees, often utilizing them for food and protection, our affinity for them is likely programmed into our DNA. There is probably some truth to that, but there are many other reasons that we love trees: they protect us from the wind, they give us shade, they help conserve energy, they attract beautiful birds, they give us food and lumber, they make our communities more viable, and they're amazing in all their differing shapes, colors and textures. Who doesn't like the majestic grandeur of an old bur oak, or the bright orange hues of a fall-colored sugar maple, or the peeling bark of a river birch, or the ancient mystery of a ginkgo or the rugged adaptability of a hackberry. Even the often-cursed redcedar is an incredible tree with age and in the right context.

Most often our love for trees likely rests in something very personal to each one of us. Through trees we carry strong memories and emotional ties to people, places and events. We love trees like we love our friends and family. For many of us they are friends and family. Unfortunately, modern living has tied us more and more to an indoor existence and moved us further away from the natural connections that used to be so important to our survival.

This issue of ***The Seed*** takes a closer look at why trees are so important to us, discusses some of the challenges we face in keeping trees healthy and suggests reasons why we should work even harder at keeping them in our lives. Any love affair takes work to keep the fires burning for the long haul. We hope this publication helps stoke the flames a bit for our love of trees.

Planting it forward in Waverly.

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Why plant trees?

health & beauty

Trees are restorative for all ages and in almost every setting. Even just having trees visible through a window helps reduce fatigue and stress:

> A study of children with attention deficit disorders found that the effect of a walk through a park is equal to peak dosages of two typical medications for ADHD.

They create a sense of place, serving as both public and private landmarks and memory-markers.

People are more likely to spend time outdoors for exercise, relaxation and restoration in areas with trees:

> Residents of areas with lots of nearby greenspace were three times as likely to be physically active and 40 percent less likely to be overweight or obese than residents in less green settings.

Some trees offer edible fruits for humans, as well as much of the foliage, nectar, pollen, berries, seeds and nuts many wildlife species need to survive.

Trees can block undesirable views and create smaller, more intimate outdoor spaces.

Shade from trees reduces ultra-violet rays by about 50 percent, and thereby the risk of skin cancer:

> It takes 20 minutes to get a sunburn standing in direct sunlight; under a tree with 50 percent coverage, 50 minutes; and under full shade, 100 minutes.

Trees reduce the incidence of violence and also the fear of it:

> Public housing residents with nearby trees and natural landscapes reported 25 percent fewer acts of domestic aggression and violence.

They provide year-round beauty (see pages 12-13).

* Many of these statistics were taken from “Benefits of Trees and Urban Forests: A Research List.” Statistics and footnotes at: *www.actrees.org/files/Research/benefits_of_trees.pdf*

savings & income

Trees save energy in both cold and hot weather by reducing winds and providing shade and shelter:

- Carefully-placed trees can reduce the need for air conditioning by 30 percent or more. Simply shading an air conditioning unit can increase its efficiency by 10 percent.

The cost of repaving is reduced as much as 60 percent in areas shaded by trees.

Wood for mulch and for lumber:

- Mulch can be readily chipped and utilized on-site with the right equipment and, in Nebraska, forestry and logging sales total more than $3 million in business annually.

Reduce the need for costly and expanded stormwater systems:

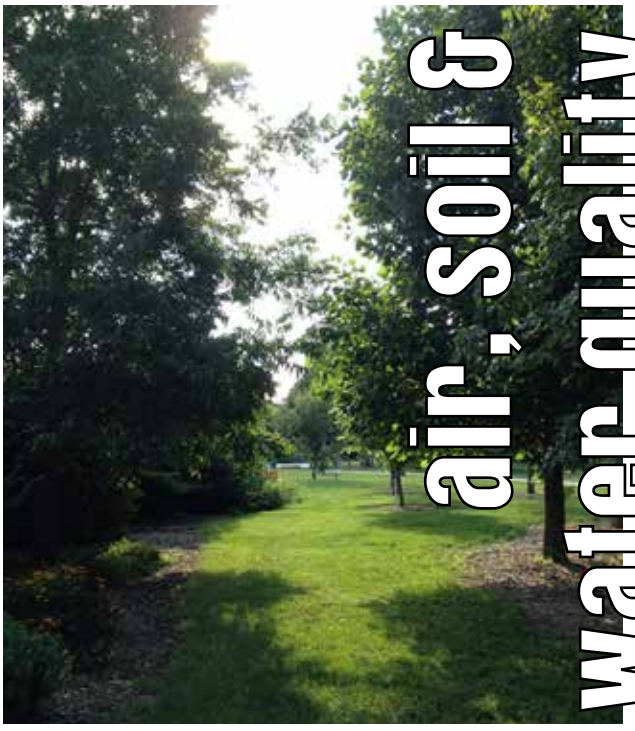
- Urban forests can reduce annual stormwater runoff by up to 7 percent, and a mature tree can store 50-500 gallons of water during large storms.

Trees can greatly increase property values:

- Residential properties with trees and vegetation can increase real estate values by as much as 37 percent.

In business districts, trees increase sales, desirability and property and rental value:

- Shoppers travel further to visit a district with trees, spend more time there once they arrive 45 and spend 9 to 12 percent more for products.



air, soil & water quality

Trees absorb carbon dioxide and release oxygen:

- One acre of forest absorbs six tons of carbon dioxide and releases four tons of oxygen, enough to meet the annual needs of 18 people.

Trees reduce noise, air and water pollution by reducing and filtering noise, air particles and rainwater through their leaves and roots:

- Planting “noise buffers” of trees and shrubs can reduce noise by half, and particularly high frequency noise, which is the most distressing to humans.

They filter polluted runoff from parking lots and hard surfaces:

- Urban forests can reduce annual stormwater runoff by 2–7 percent, thereby safeguarding soil and water quality.

Trees help prevent soil erosion on slopes by slowing the reate of runoff and holding soil in place.

Trees We Love... and Why

"Thank goodness for hackberry. It grows well across the state doing great service casting shade, softening winds, feeding birds and generally tolerating a part of the world that is hard on trees. Many streets in central and western Nebraska communities have been green for generations because of hackberry."

Justin Evertson, Waverly

"I never met an arborist I didn't like or a tree I didn't want to hug."

Kem Cavanah, Schuyler

"A friend and I realized we always liked trees but never really appreciated them until we knew Harlan Hamernik. I would say I love trees because some can be so majestic and yet some are small and just full of so much character. They bring about a certain calm, peacefulness."

Tammy Melcher, Clarkson

"Ponderosa pine will grow on a rocky outcropping in poor soil in the Wildcat Hills or tower above a stream among riparian plants in northern Sioux County. It's well-adapted to the high plains, tolerating intense heat in the summer, frequent hail and wind and drought, and in winter it endures extreme cold temperatures, wind and heavy snows with little complaint. It's useful for rural and urban areas, windbreaks, screening, shade and habitat."

Amy Seiler, Scottsbluff

"I look up to trees; they have their heads in the clouds, but remain footed in the earth." *Richard Sutton, Lincoln*

"I like trees because...
1. My parents couldn't even come close to climbing to the top of the sugar maple in our front yard in Iowa—and I could. Perfect escape.
2. I love birds (except for the ones that poop on my car and patio furniture) and my birds love my trees.
3. Two little boys grew up swinging in them, climbing them, building tree houses in them (with the help of their dad): which means THEIR two little boys will likely do the same, and that means more trees for more generations." *Kim Todd, Lincoln*

"I like trees for the feeling of comfort they bring." *Todd Faller, York*

"I like trees because they soften all landscapes, and provide habitat for wildlife. They also remind me of places where it actually rains. Trees are so soothing and important to us that they will be a top consideration when we retire."

Bruce Hoffman, McCook

"I like trees because they keep things cool." *John Lauber, Brownville*

"I like trees because they provide an income to support my family. So money really does grow on trees!"

Jeremy Koch, Cozad

"I especially like cottonwood trees out in the country; in the heat of a prairie summer, nothing beats the shade of an old cottonwood." *Lucinda Mays*

"For Nebraska, the large, spreading and enduring bur oak epitomizes to me the toughness and beauty of life in the Plains." *Scott Josiah, Lincoln*

"I like trees because they are a connection to my grandfather who taught me the importance of trees in Nebraska and the love he had for trees." *Gary Carlson, Fremont*

"Trees symbolize vitality, growth, strength, endurance, fruitfulness, and even eternal life." *Lyle Minshull*

"Sustainability green. Throughout the ages and spaces of our earth, men, women, children, squirrels and others have planted seeds of trees. These acts of giving have provided improved beauty, comfort and worth to the spaces of our occupation. This motivation we may not understand but we should rather appreciate as a gift to our existence." *Bud Dasenbrock*

"Trees have great longevity, survivability and a natural ability to benefit and repair the environment. I am in awe of the great range of height and spread, leaves and needles, flowers, fruit and nuts, bark and branching angles. To put the height of the tallest tree in the world in perspective, the champion California Coast Redwood is the same height as the Nebraska State Capitol tower at the base of the sower atop the gold dome, 379 feet. So amazing!" *Jo Seiler*

Fun Facts about Trees

- Botanists recently reclassified hackberry, moving it from the elm family to the same family as Cannabis. This might explain why it has become so popular in Colorado.
- Botanists have also reclassified maples, moving them out of their own family and into the broader soapberry family (*Sapindaceae*) which includes soapberry, buckeyes, yellowhorns and goldenraintree.
- The tallest tree known in Nebraska is a black walnut 101 feet high. (photo opposite)
- Some ponderosa pines and Rocky Mountain junipers in the Wildcat Hills of Scottsbluff County have been dated to over 800 years old.
- Pawpaw is a tough little tree that can take the heat and wind of the Plains. It is known for its very unique, fleshy fruits that ripen in late summer. The fruits can be eaten raw or added into baked goods, but beware: if harvested too early or too late, or if much of the skin is included, they can become one of nature's best laxatives. Lewis and Clark found this out the hard way.
- Scientific study is revealing that chromosomal numbers in elms may play a role in a given tree's resistance to Dutch elm disease. Most elms are polyploidal (4 sets of chromosomes) but a few wild types that are diploids (two sets) may have built-in disease resistance.
- Paper birch are often associated with the north woods, considered by many to be one of the most beautiful of all boreal forest trees. The paper birch's natural range extends south to the northern edge of the state in the Niobrara Valley where it has managed to hold on in protected pockets since the retreat of the last ice age about 10,000 years ago. In fact, the Niobrara Valley is a very unique place where several landscape ecotypes come together including boreal forest, eastern hardwood forest and western pinelands. Unfortunately, the birch trees are declining quickly in the valley, possibly due to human encroachment and a warming climate.
- Nut trees and squirrels go together. Scientists speculate that the eastern gray squirrel has been especially important in the survival and spread of most oaks and hickories, going back hundreds of thousands of years. In the fall, gray squirrels gather nuts and bury them individually in the ground, often forgetting about many of them that eventually sprout and grow new trees. However, Eastern red squirrels, which are much more adapted to human activity, are becoming more abundant. Red squirrels also gather the nuts, but instead of burying them, they put them in piles or hidden caches above ground. Very few of these nuts ever germinate, so over time, oaks and hickories may be displaced by other trees where the red squirrel dominates.
- The large seed pods of the Kentucky coffeetree (opposite) evolved millions of years ago when large creatures such as mastadons, mammoths, gomphotheres and rhinos roamed the North American continent. The seed pods contain a somewhat sweet and nutritious pulp and were an important late winter and early spring food source to many of these animals. In order to survive being eaten, the seeds inside the pods evolved to be almost rock hard so that they could pass through the digestive track and plop out in a ready-made pile of fertilizer.

Collective Efforts at Tree-planting

Increasing Tree Diversity in Western Nebraska

Amy Seiler, Community Forestry Specialist for Western Nebraska

Horse chestnut, yellowwood, baldcypress, English oak. They're breathtaking trees. Their form, stature and beauty captivate us and draw us in, inviting us to touch, climb, photograph. We lament in the western half of Nebraska that we do not have these beauties to admire. But wait! These regal beauties do exist in our western community forests, plus many more unique species that are doing quite well considering western Nebraska's challenging soil pH (7.5-8.3), low organic matter and unpredictable climate.

My travels through the western half of the state have shown me that we have some tree enthusiasts pushing the envelope when it comes to species selection. To my astonishment Imperial, Nebraska has a tuliptree and baldcypress graces the ponds of Cody Park in North Platte, along with goldenrain tree and cork tree. In a drive through Gothenburg, you'll want to stop every few blocks to check out the unique species they are incorporating into their landscapes. Yellowwood (**photo opposite**), horse chestnut, Shantung maple, Turkish filbert, John Pair maple, baldcypress, the list could go on and on. In Ehmen park (one of the newest affiliates in the Nebraska Statewide Arboretum network) the diversity of oaks alone are amazing. Scarlet, chinkapin, emporer, bur, shumard, swamp white oak and several more. Drive the streets and you will see shingle oak, sawtooth oak, elm cultivars like Frontier and Princeton, and a lacebark elm at the hospital.

The Dawson County Fairgrounds in Lexington is a showcase of diversity. My favorite attraction at the fairgrounds is the oak and elm trials that have been set up by Retree Ambassador and UNL extension educator emeritus Dave Stenberg. The growing conditions are less than desirable but elms like Emerald Sunshine, Accolade and Frontier are thriving thanks to Dave's good care. The oak trial has bur oaks from different collection sites around Nebraska, along with swamp white, Heritage and chinkapin oak. Dave also has many other treasures on site, too many to highlight in this short article.

Heading west to the panhandle, the communities of Rushville and Gordon have filled their cemeteries with Douglasfir and concolor fir. They are impressive in size and stand guard over beloved family members who have been laid to rest there.

As I travel through the far west communities I am amazed at the large bur oaks I have found. Gering has a beautiful bur oak with many of its lower branches still attached. It's a grand sight in a neighborhood that is almost 100 years old. Creighton Valley Cemetery, south of the small town of Melbeta, has numerous oaks as well. Possibly my favorite oaks out west are in the village of Morrill which is six miles from the Wyoming/Nebraska border. Two large oaks have welcomed travelers passing through town on Highway 26 for more than 100 years. It's rumored that the oaks were brought into town in a coffee can from back east.

Ohio buckeye is another tree that I have frequently noticed in Gering and Scottsbluff. They are abundantly producing seed and with the help of good people like Dr. Don Gentry in Gering we are collecting buckeyes for NSA's Bob Henrickson to grow. Listen, if they can grow in Gering, they can grow anywhere.

I no longer lament the lack of trees out here in the west. I am convinced that with careful siting, knowing the seed source location and proper planting practices we can grow some pretty cool stuff out west.

What inspires me...

Western nurserymen like Bruce Hoffman of McCook, Dick Meyer of Scottsbluff, Jeff Kennedy of Gothenburg and many others are blazing a trail in regard to plant selection. They have encouraged their communities to step outside the comfort zone of hackberry, ash and honeylocust to diversify their public landscapes. They do this, I am certain, not only because of their love of trees but also for love of their communities. Thanks to people like them, our community forests will be more diverse, healthier and certainly more beautiful places to live.

"Survivor" Street Tree Style in Omaha

Graham Herbst, Community Forestry Specialist for Eastern Nebraska

There are many workable metaphors for urban trees I've considered in the past but one that I find particularly fitting is that of a deserted island reality show contestant. Contestants on shows like "Survivor" are portrayed as your average American, happy in the life they lead, being plucked out of a life of comfort, companionship and opportunity to scrape out an existence far away from the civilization they are accustomed to, along with a handful of strangers (all for our viewing pleasure). For our benefit, trees are also taken far outside the context in which we find them, and the degree to which we understand this disparity has a direct impact on how successfully we can integrate trees into our heavily populated areas.

Last summer, working with the City of Omaha to evaluate different factors affecting the health and longevity of street trees, the biggest lesson we learned was how much impact surrounding buildings and roads had on the trees. Heavy equipment compresses the soil to provide a stable base for pouring concrete but also cuts air and water space in the soil in half. This compaction limits tree root growth and suppresses the buildup of organic matter. Add a few other stress factors like low water infiltration, de-icing salts, reflected heat, poor air quality and it's easy to see how different these street corridors are from the forests these trees come from.

The street median is particularly challenging for trees but it's an ideal place to experiment with providing trees with what they need to thrive. In our study, trees that were given an "excellent" or "good" rating were half as likely to occur in the median as along the side of the street. It was no surprise to find that nearly all of the healthy median trees were provided with supplemental drip irrigation, amended soils with higher organic matter and no turfgrass, which requires equipment that can damage trees and further compact the soil.

When the traditional planting sites are compared with alternative planting strategies utilizing supplemental watering, soil preparation, minimal turf/tree interface and other practices, the picture becomes very clear. Trees planted too deep are less common, mechanical damage virtually disappears and the number of trees in fair/poor/dead condition is cut in half. Furthermore, a third site category we referred to as a legacy planting (described as an undisturbed park setting with excellent diversity of age in the trees) showed even less deep-planting due to proper care and planting by volunteers, rather than contractors on a time schedule.

Mechanical damage from mowing equipment is still common in these sites, but improved soil quality and existing canopy cover keeps the number of fair/poor/dead trees similar to that of an alternative planting.

All this data confirms notions about tree health in urban settings that we've had for awhile and which have been verified before. The further trees are taken from the context in which they are found, the more difficult it is for them to establish and thrive, and in Omaha an estimated 4 million trees have been planted into this "artificial" green infrastructure.

Even in such difficult circumstances, these trees do much more than provide character and a sense of place to Omahans. They store over 700,000 tons of carbon in their trunks and branches, remove more than 500 tons of air pollutants each year, provide energy savings by shading buildings and diminish the amount of water we have to pay to filter before discharging it into rivers and streams. These are tangible, real-world benefits that we would all do well to protect and improve on by planting and caring for urban trees as best we can.

The more closely our "planted" landscapes mimic a tree's natural environment, the healthier they will be.

What inspires me...

Trees in nature show us the ideal planting context while urban trees show us what they are capable of tolerating.

Community Grant Projects, Lessons Learned

Kendall Weyers, Sustainable Communities Coordinator

Through our multiple tree planting grant programs (Sustainable Community Forests, Greener Nebraska Towns, Trees for Nebraska Towns, etc.), we've encountered a wide range of situations and challenges with community forestry projects. From the small community, where the mayor might also be the coach and park groundskeeper, to the large city with multiple departments that may not be working in harmony, the projects are amazingly diverse. Although challenging, we've learned a great deal about what makes a project successful.

This diversity helps us realize that EVERY project is unique in some way, that a formula that works for one might not for another. Site conditions, partners and community dynamics are just a few of the many variables that affect the path the project follows. However, we've also noticed some characteristics that most successful projects have in common.

Communicating with all stakeholders. A great project starts with great communication. Involving and clearly communicating with all affected parties is a huge first step. What is the purpose of the project? Who will seriously commit to which responsibilities? What's the realistic timeline? Discussing these and other issues early, and clearly keeping everyone in the loop along the way, helps create a smoother and more rewarding process.

Building interest and support. The bottom line is that the more interest and support, the more likely a project will be well-received and a long-term success. It takes time and effort to engage multiple parties, but the investment definitely pays off.

Planning and attention to detail. It's surprising how a seemingly minor detail, if neglected, can disrupt an entire project or event. Every step—from contacting Digger's Hotline and getting property owner's permission to following the timeline and coordinating volunteers—is important. The best approach is to mentally walk through the project and create a clear checklist to guide you through the necessary steps of the process. High on the list should be a carefully thought-out landscape design. For anyone who hasn't been through the process before, it's best to ask someone who has. Something obvious to the experienced might be totally overlooked by the novice.

Being flexible and adaptable. Although a clear plan and strategy may be in place, it's not realistic to expect everything to go perfectly. Adjustments, like adapting to tree availability, weather conditions or partners de-committing, are often necessary. Being ready and able to adapt on the run can significantly reduce stress levels and make for a more enjoyable effort.

Quality materials. Many communities or project leaders focus only on the price, thinking the lowest cost equates to the highest value. Often this just is not true. A cheap tree that has circling, pot-bound roots may cost less up front, but likely will have a shortened life, leading to early removal and replacement costs, as well as potential liability issues. The better value is buying quality products. With trees, that means starting with a great root system which significantly increases the odds of a long-lived, healthy tree.

Proper placement and planting methods. A common misconception is that all trees are the same and to plant them, you just stick them in the ground however you want. It's amazing how many trees get planted 6 inches or more too deep and/or in a horrible location. A successful planting (page 15) requires proper depth and placement in an appropriate site for that particular tree.

Omaha tree-planting; natural diversity of tree species and age.

Conscientious follow-up care. All the previous effort is pointless and wasted without conscientious follow-up care, yet this critical component is often overlooked. The best tree in the perfect location has little chance of good health and long-term survival if it is neglected after planting. Appropriate watering (not too much, not too little), early structural pruning and avoiding mower/trimmer damage are a few of the essential steps to assure a healthy, high-quality tree.

Building on the momentum. We always preach the importance of species diversity in the community forest, but diversity of age is also critical so that decline doesn't occur all at one time. A truly successful project is not a "once and done" effort, but an ongoing momentum made possible by the success of earlier events. Once partnerships are created, experience is gained and good methods are developed, they are too valuable to allow them to fade away. Ideally they should be used over and over in a continuing effort to keep expanding and improving that community's landscapes.

What inspires me...

I am continually amazed at how well some communities come together to implement a successful project. Their levels of cooperation, coordination, effort and enthusiasm are truly inspiring. The dedicated teamwork they display creates hope, not only for their landscapes, but also for all aspects of the community.

What Our Forests Can Teach Us

Christina Hoyt, Community Landscape Specialist

To design well with trees we first need to understand the ecosystem that they naturally grow in. There are many different types of forest and savanna ecosystems across the world, all having distinct environments, climates, species and even aesthetic qualities. Nebraska is not exactly known for its forests but we have some interesting forest pockets, primarily made up of deciduous trees.

Forest composition is determined by climate, terrain and availability of light (forest interior vs. forest edge) and of water (upland or lowland). In our region of the world, these elements play a significant factor in both the diversity of species and the aesthetics. Terrain influences moisture availability and microclimates, so different plant communities inhabit the low areas (linden, pawpaw, birch, etc.) and north and eastern slopes than the more drought-tolerant species, like bur and black oak, which tend to grow on ridge tops and on south- and west-

facing slopes. Proximity to forest edge also influences plant communities. Forest edges occur along areas of disruption such as rivers, creeks, prairie edges, roads and paths. Light is plentiful in these edge environments, which allows for a greater diversity of plant life. Some of the most fascinating elements of the forests that stretch through the Midwest occur along forest edges where prairie plants intermingle. My favorite juxtapositions are where prairie grasses like Indiangrass and little bluestem, and perennials like the sharp yucca, grow right up to the forest edge, at times weaving their way in between trunks if the light is sufficient.

Forests are comprised of layers—including the canopy, understory trees, shrub layer and herbaceous layer. Trees characteristically grow in community with other trees and plants. Biologically, forest layers allow many plants to share a small amount of space, while still receiving the amount of space, sun, water and light each species requires. Layering also makes forests incredibly interesting. Rick Darke, in his book ***The American Woodland Gardens***, says "The layered look is the hallmark of the deciduous forest. From an aesthetic perspective, layering packs a maximum amount of visual interest into any one view: an incredible array of lines, forms, textures and scales from the majestic to the minute."

Above: Christina heads out to do a landscape project... "have plants, will travel."
Opposite: Though this property is deep within the city, it's surrounded by many layers of woody plants for a forested feel and environment.

Applying Forest Lessons to Design

Lesson 1: Forests teach us "Right tree, right place." While we can't re-create the forest in our landscapes, we can apply lessons learned from the forest ecosystem to them. Our landscape composition should be influenced by terrain, climate, light and water availability, just as it is in the forest. We have all heard the phrase "Right tree, right place," but have you thought about that phrase through a biological lens? There are questions we can ask to help guide us. What is your climate like? What kind of site do you have? Is it protected? Is it wide open? Are there terrain variations which make sloped areas drier and low areas wet? Are there existing trees or other features? How you answer these questions will help guide species selection and overall design.

Lesson 2: Forests teach us to design and plant in layers. Using the concept of forest layers to drive our design helps us create aesthetically pleasing and ecologically functional landscapes. Consider using a mixture of large-growing trees, understory trees, shrubs and herbaceous material.

Lesson 3: Forests teach us the importance of canopy. The forest canopy is comprised of large-growing trees. Regionally it is comprised predominantly of oak (*Quercus*); hickory (*Carya*); linden (*Tilia*); ash (*Fraxinus*); sycamore (*Platanus*); hackberry (*Celtis*;); and of course our mighty cottonwood (*Populus*). Heading west, diversity of these species diminishes and gives way to ponderosa pine forest. Heading east into Iowa and southeastern Nebraska, maples become part of the mix.

What Our Forests Can Teach Us continued on page 19

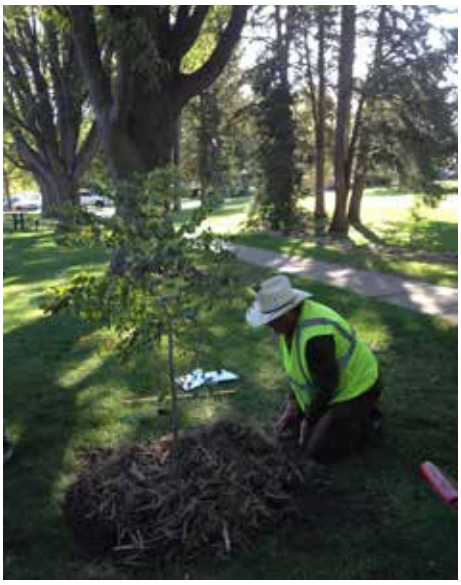
Plant it Forward

We are nearly seven years into the 10-year ReTree Nebraska initiative, an effort to plant and properly care for a million trees by 2014. It's also making great steps toward reconnecting people to trees. Through funding from the Trees for Nebraska Towns grant provided by the Nebraska Environmental Trust, a beneficiary of the Nebraska Lottery, more than 2,000 trees have been planted through mini-grants to communities and organizations. These grants promote tree-planting in fall to encourage good root growth during a time of cooler temperatures. The success of the program is due to strong partnerships and enthusiastic tree advocates and volunteers. The grants promote tree diversity with a mix of species like oaks, Kentucky coffeetree, hackberry, elms and many other natives. The trees are in smaller nursery stock with high quality root systems that can be easily distributed across the state and planted by volunteers.

A oak was planted on the State Capitol grounds as part of ReTree Week 2013.

American sycamore canopy shades streets in Omaha's Bemis Neighborhood after decades of growth. These street trees also help to slow traffic and protect pedestrians.

ReTree Nebraska



ReTree ambassador and Kearney city forester Alan Roesler plants a new Kentucky coffeetree near to a 70+ year-old specimen in Harmon Park, an NSA affiliate arboretum.

First Lady and ReTree chair Sally Ganem talks to students in Minden.

Neighbors plant a bur oak in Lincoln's Irvingdale Neighborhood.

Trees provided by the ReTree fall mini-grants are easily planted by volunteers, even these Head Start students in ScottsBluff.

t's all in the roots. Fibrous root systems give trees a good start.

Graham Herbst examines excavated roots with Root Health Workshop participants in O'Neill.

For Future Generations!

Even with more than 100 Tree City USA communities, 95+ Nebraska Statewide Arboretum affiliate sites and at least 240 ReTree ambassadors in 89 communities, you can still make a difference right in your own community to make it a healthier, greener, more beautiful place to live.

ReTree Fall recipients organize events and work with local media to help promote fall tree-planting across the state.

Kimball high school students plant trees as part of ReTree Week 2014 organized in partnership with the South Platte Natural Resource District and Kimball Public Schools.

Become a Tree Advocate in These Simple Ways!

- Protect and properly care for existing trees through proper care such as watering (turf and trees have different needs) and mulching–no volcano mulching.
- Learn to plant the right tree, in the right place, in the right way.
- Help others appreciate the value of trees in our communities by getting outdoors!

Trees through the Year

SPRING BLOSSOMS

Black cherry, *Prunus serotina*
Corneliancherry dogwood, *Cornus mas*
Crabapple, *Malus*
Dogwood, Kousa and pagoda, *Cornus kousa and alternifolia*
Fringetree, *Chionanthus virginicus*
Hawthorn, *Crataegus*
Japanese tree lilac, *Syringa reticulata*
Magnolia, Loebner and saucer, *Magnolia x loebneri and x soulangiana*
Shantung maple, *Acer truncatum*
Redbud, *Cercis canadensis*
Serviceberry, *Amelanchier x grandiflora*
Smoketree, *Cotinus obovatus*
Viburnum, blackhaw and nannyberry, *Viburnum prunifolium*
Yellowhorn, *Xanthoceras sorbifolium*

SUMMER SHADE

Bitternut Hickory, *Carya cordiformis*
Elm or *Ulmus*, newer resistant species
Honeylocust for filtered shade, *Gleditsia*
Kentucky coffeetree, *Gymnocladus dioicus*
Oak, overcup and burgambel, *Quercus lyrata* and *macrocarpa* x *gambelii*
Tuliptree, *Liriodendron tulipifera*
Turkish Filbert, *Corylus colurna*

From top: black cherry; magnolia; yellowhorn; redbud; Kentucy coffeetree; tuliptree.

FALL COLOR

Baldcypress, *Taxodium distichum*
Black gum, *Nyssa*
Chokeberry, *Aronia*
Aspen, *Populus tremuloides*
Ironwood, *Ostrya virginiana*
Maple, *Acer*
Oak, red, Hills and white, *Quercus*
Redbud, *Cercis canadensis*
Serviceberry, *Amelanchier*
Tuliptree, *Liriodendron*
Viburnum
Zelkova

From top:
black gum;
aspen;
serviceberry;
Ironwood;
hornbeam;
shingle oak.

WINTER INTEREST

Hornbeam, *Carpinus caroliniana*
Black, white and shingle oak, *Quercus*, have foliage that holds through winter (marcescence)
Shagbark hickory, *Carya ovata*
Sycamore or planetree, *Platanus occidentalis*
Viburnum

The Future of Our Trees

Looking ahead to the Future of Our Trees

Justin Evertson, Green Infrastructure Coordinator

As we look into the crystal ball and try to gauge the future of our trees, it's hard not to be a little pessimistic. Just look at the challenges our trees face—disease and insect threats, a changing climate that will likely bring even more extreme weather, an aging forest canopy in many communities, growing disconnect of people and the environment, and the many socio-economic issues across society that tend to trump tree issues. There's just no way to sugarcoat these issues. If we want good, healthy trees that continue to give us all the benefits we've come to expect, then we're going to have to work even harder at it.

The two biggest challenges that have us scratching our heads right now are climate change and biotic threats (insects and diseases). In recent decades we've seen major die-offs of planted trees from such things as Dutch elm disease, which was especially hard on American elms, and pine wilt disease which has killed hundreds of thousands of introduced pines (especially Scotch pine). Another major die-off is happening right now as Emerald Ash borer (EAB) spreads across the country killing native ash trees. EAB is getting closer to us every day with established infestations having been found in central Iowa, central Colorado and, more recently, in the Kansas City area. It's only a matter of time before it starts killing trees in our state (see EAB article on page 18).

The most common thread for die-offs of planted trees is that the disease or insect causing the problem was a foreign invader brought here unintentionally. Humans are now globally connected and it is a sure bet that new insects and diseases will arrive and threaten even more of our trees in the relatively near future. A few that have forest health experts especially concerned include thousand cankers disease of walnut, oak wilt (very hard on red oaks), Asian longhorned beetle and now something called bur oak blight which has been hard on bur oaks in Iowa. Who knows how many more pathogens are lurking, ready to be brought here by wide-traveling humans?

What should we say about climate change? Let's start by saying that we believe what science is telling us about human-caused climate change. It is VERY real and it will no doubt have a serious impact on all manner of living organisms, including people and trees. Climate experts think that the Great Plains will experience greater extremes in both temperature and moisture patterns. Summers will likely be hotter, but the bigger problem will likely be even wider sudden temperature swings and sharp cold-snaps in spring and summer when trees and other perennial plants are most susceptible to sudden freeze damage. Moisture patterns are harder to predict but it is anticipated that much of the Great Plains will be even more prone to drought and the entire region will likely see more torrential downpour events that can cause severe flooding. Ironically, we'll likely become hotter, colder, wetter and drier—depending on the year.

So although we can't say for certain what the future holds for our trees, we can almost certainly say that things aren't going to get easier for them around here. With more extreme weather and ever-increasing biotic threats likely, it will be more important than ever that we do the best we can in selecting, planting and caring for trees. The good thing is that we now know more than ever what it takes to grow good trees and to keep them healthy:

Root quality. We must pay greater attention to root quality of nursery stock.

Nursery plant size is also important. It doesn't really matter what size nursery tree is planted as long as it has a high-quality and proportionally-sized root system to go along with it. Generally, smaller nursery stock is easier to handle and more likely to have most of its roots intact at planting time.

Plant properly. This sounds so simple—green side up, roots in the ground. Anyone can do that, right? And yet many trees struggle in the landscape because they were not planted properly.

Think about design, including site context and placement in the landscape. We often don't do a good job of matching the right trees to the planting site. It is especially important that we try to group trees with each other and with associated landscape plants so that they can share a common growing space.

Provide better follow-up care. Providing good tree care doesn't mean asking an arborist to spray, prune and fertilize a tree. Rather, it means seeing the tree in its broader context and trying to maintain the best possible conditions for the tree to thrive in. In the home landscape and across the community, the first thing we need to do is quit harming our trees. Seriously, the larger threat to community trees is not diseases, insects or weather events but the actions of people. Both knowingly and unknowingly, people do bad things to trees: we gouge them with mowers and trimmers, we overwater them in the lawn, we damage them with lawn herbicides, we damage their roots from soil compaction, we often over-prune them, some get their jollies by vandalizing them, we tie dogs to them and we occasionally hit them with cars. If a tree could talk it would say: "Look man, my needs are simple. Just give me a good organic soil to grow in, don't make me compete with turfgrass all the time, give me a little water in a drought period and quit damaging my roots and trunk with your tools and I'll grow fast and tall and give you the shade you always wanted."

Perhaps the most important thing we've learned to help keep our community forests healthy and resilient is to plant and maintain a wider variety of tree species. An over-reliance on American elm made Dutch elm disease a bigger problem than it needed to be in the 60s and 70s. We'll soon learn that lesson over again when EAB comes through and kills many of our ash trees, which have been planted in great numbers across the state. In fact

Galen Wittrock and Amy Seiler plant trees near Sidney.
Nebraska Forest Service staff add new plants every year at Horning Farm near Plattsmouth.

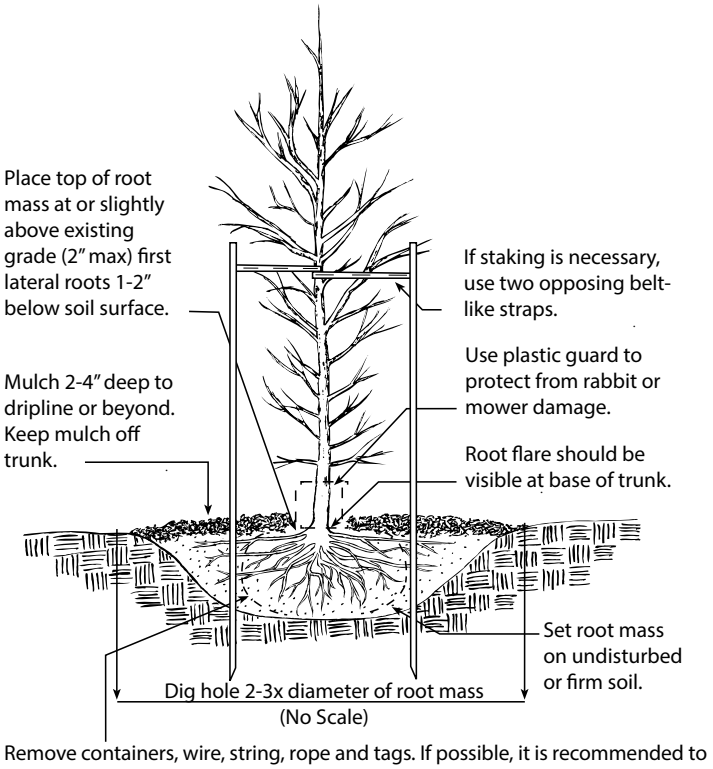
ash makes up more than 30 percent of the trees in many of our communities. Most Nebraska communities rely on just a handful of species for their tree canopy, even though we know that many more will grow quite well there. We need to find a way to make more species commercially available and get more of them planted.

In addition to species diversity, it will be important that we pursue greater genetic diversity of those species. Many of the most popular trees planted today are clones produced from cuttings, grafting or tissue culture. Tree growers and buyers all seem to want uniformity. We seem to be smitten by certain shapes and colors and we all seem to want what our neighbor has. Unfortunately, disease and insect resistance across a species almost always drops when genetic diversity is low. We're not buying toasters here, people. We're buying living organisms! Much like we wouldn't want all humans to look alike, we shouldn't want all our trees to look alike. We need to plant more trees grown from seed and we need to start appreciating genetic variability. Variety truly is the spice of life.

What inspires me...

Chocolate frosted donuts. And one of the great inspirations for me in life is to watch a tree that I have planted grow and change over time. Many of these were started as small seedlings or even from seeds. To stand under a 40 foot tall tree that I watered as a sapling just 15 or 20 years ago is truly amazing. Another thing that greatly inspires me is all the selfless tree planters that have come before me. Many of our best community and farmstead trees were planted by people that are no longer here. What a gift they gave to us.

Tree-Planting for Success



Remove containers, wire, string, rope and tags. If possible, it is recommended to remove burlap & wire basket.

TIMING: The best months to plant trees are April-May or September-November, when temperatures are cool but the ground is workable.

SPECIES SELECTION & PLACEMENT: Pick the right tree for the right place. Buy healthy trees with good root systems from reputable nurseries. Group trees, shrubs and groundcovers separate from turf.

DIGGING: Dig a hole wider than the root system but no deeper than the root mass, usually about 1 foot deep. The bottom should be firm to prevent settling but it's good to loosen soil on the sides of the hole.

PLANTING: The base of the trunk should be at original ground level or slightly higher, with lateral roots 1-2" under the soil and the trunk flaring visibly at ground level. Remove pots, wire or burlap before planting and remove any excess soil at the top of the root ball before planting. Reject plants with severely pot-bound or girdled root systems. Backfill with the original soil dug from the hole; break up large clods and soil chunks; and add water during backfilling to remove air pockets and moisten roots.

MULCHING: Mulch with 2-4" of wood mulch from (but not touching) the trunk, to the drip line. Don't mulch with rock or use weed barriers under mulch.

STAKING AND BRACING: Brace the tree if it might dislodge or blow over in wind with broad, belt-like materials but not wire, rope or wire through hose. Remove within one year.

WATERING: Keep root zone moist but not waterlogged, giving it about 1" of moisture per week and checking the root zone for moistness. Many trees are lost to either under- or over-watering.

PRUNING: At planting, prune only to remove dead or damaged branches and correct structural defects. New trees benefit from having as many food-producing branches and leaves as possible. Leave lower branches for several years after planting if possible.

PROTECT: Keep mowers and string trimmers away from trunk; use herbicides sparingly or not at all. Treat perennial lawn weeds in fall when trees are going dormant.

New Trees for Nebraska and the Great Plains

Justin Evertson, Green Infrastructure Coordinator

With disease, insect and climate threats mounting against our trees, the Nebraska Forest Service recently partnered with the Kansas Forest Service to undertake an initiative called "Environmentally Adapted Trees" (EAT for short). The primary goal of EAT is to form a unique partnership of nursery professionals, foresters and other tree experts to identify, prioritize and propagate the best environmentally-adapted tree survivors across the region and then actively promote and plant progeny of those survivors to help expand the diversity and resiliency of planted forests across the region.

A key activity of the initiative is to plant at least 15 demonstration plantings throughout the region. These will be sites where promising but rare trees are trialed to determine their adaptability to a given area. An important part of evaluation will be to make sure that foreign species don't become invasive. We don't want to unleash the next Siberian elm, mulberry or Tree-of-heaven on the environment. Just a few of the uncommon species we are trialing include:

- Post oak (*Quercus stellata*) is a lower, slower-growing cousin of bur oak native to the southern plains from southeast Kansas to southern Texas. It is extremely drought-tolerant.
- Buckley oak (*Quercus buckleyi*), photo below, is a red oak cousin that shows greater heat- and drought-tolerance and

is likely more adapted to higher pH soils, which are common around here.

- Downy oak (*Quercus pubescens*) is a shorter-growing oak from the more arid and higher-elevation regions of southeast Europe and western Asia. It will likely be better adapted to the western part of our region.
- Soapberry (*Sapindus saponaria*) grows natively from central Kansas to Texas. It is a medium-sized tree, typically growing in clumps or thickets reaching to about 20 feet. It will likely be a good choice for southern Nebraska.
- Various elms, including many Asian varieties and new hybrid crosses developed in the United States. David elm (Ulmus davidiana), chalkbark elm (*Ulmus propinqua*), Triumph elm (*Ulmus* x 'Triumph) and Lamellosa elm (*Ulmus lamellosa*) are just a few we have our eyes on.
- Meyer Spruce (*Picea meyeri*) is native to China and appears very similar to Colorado spruce but with possibly better heat- and wet-tolerance.

Soapberry in fall; inset of fruits that were used in the past to make soap.

Although an important objective of EAT is to identify new tree species for trialing in the region, the reality is that we already know more than 200 different species that grow at least somewhere across the central Great Plains, including at least 60 that are native to the region (see page 23). Our communities, arboretums and native woodlands offer a treasure trove of unique trees that deserve greater planting. These include oak species such as black, blackjack, gambel, chinkapin, overcup and Northern pin oak, little walnut, bigtooth aspen, black cherry, cucumber magnolia, bigtooth and miyabe maple, persimmon, evodia and *Amur maackia* to name a few. We really don't suffer from a lack of trees that will likely be suitable to a changing climate. We just need to get more of these proven trees planted. They are the "low-hanging fruit" for increasing the diversity of our community forests.

Mistakes of Tree-planting

Eric Berg, Nebraska Forest Service Program Leader for Community Forestry & Sustainable Landscapes

Properly planting trees is not rocket science—it is in fact a lot more difficult and challenging, given the potential complex mixture of tree selection, site characteristics as well as environmental, biological and social variables. But successfully selecting, planting and caring for a tree until it's established is quite doable, especially if you escape the challenge of what I commonly refer to as "loving your tree to death." There is a plethora of great information on the web (see references below) on how to properly plant and grow your tree, but I wanted to take the opportunity to identify some of the common mistakes that I see occurring; mistakes which have led to the untimely death of far too many trees.

1. **Poor selection**. The tree you select must match the site characteristics you have to work with, and soil quality is one of the biggest drivers. Quality of nursery stock is also a big factor, "once a poor quality tree—always a poor quality tree." Trees do not heal from defects and root quality problems, they either seal them over with wound wood, or the defect continues to worsen over time. Many a tree death can be traced back to poor quality stock and initial defects.

2. **Inadequate root systems**. We tend to buy trees based on the stem and canopy and completely overlook the root system. The root system is the driver in getting your tree off to a healthy start in the landscape, and all too often the root system is too small to support the canopy. A good rule of thumb to follow is that, for every inch of tree diameter, you should have 12-14 inches of root ball.

3. **Poor planting site**. This relates primarily to soil type and drainage pattern. Sites with high clay or sand contents will limit species selection and adaptability. Regardless of the site, there is almost certainly a tree that will thrive in it, but you may need to do a little research to see what is currently growing well in the area.

4. **Girdling roots**. A majority of nursery stock is being grown and sold in round plastic pots or containers. While it is possible to find high quality stock in containers, a high percentage of root systems from round pots have container- and stem-girdling roots, roots that spiral around the container and/or stem of the tree. Left as is, they may lead to the death or failure of the tree.

5. **Planting hole**. There is a tendency to dig a hole that is either too small or too deep or, even worse, both too small and too deep as in the case of soil augers. Take the time to dig and create a planting site which is a shallow hole no deeper than the root ball and much wider—two or three times wider than the root ball if possible. Breaking up the soil outside the rootball will allow tree roots to more quickly grow out into native soil and get established.

6. **Planted too deep**. The planting hole should be no deeper than the root ball itself. Planting the tree too deep, even just 2-3 inches too deep with many tree species, can greatly reduce vigor and lead to the slow death of the tree. Before planting the tree in the planting site, locate the first level of primary lateral roots and keep them at or near the soil surface. It is always much better to plant too shallow rather than too deep.

7. **Mulched volcanoes or no mulch.** This is a tree killer either way—too much mulch or not enough. Too much mulch, the mulch volcano effect, can trap moisture around the tree and greatly reduce oxygen levels in the soil, a leading cause for tree decline. Not enough or no mulch creates a situation where tree roots are competing for water and nutrients with turf grasses and/or are exposed to weed-whackers and mowers next to the bark. Mulch should be shaped like a crater, with very little (less than 1 inch) next to the stem and tapering outward to approximately 4 inches deep at the edge. This will keep equipment away from the tree, improve soil moisture and oxygen levels and the organic matter in the mulch will create better growing conditions.

8. **Improper watering**. More trees are killed annually from too much water than not enough. This is particularly common in heavy clay soils or in over-irrigated fescue lawns. Too much water can suffocate tree roots and lead to a slow decline or the eventual loss of the tree. How much to water is based on soil type and the type of tree you are trying to grow, as some trees require much more water than others. The quick and dirty way to tell if there is enough soil moisture is to test if you can easily push a long handled screwdriver or similar probe down into the soil 10-12 inches. If you can, there is probably adequate water.

To plant a tree is easy. To properly select and plant a tree that's right for the site requires careful review, thought and planning. But it can be successfully done and, by avoiding some of the common mishaps listed above, you should be able to plant and grow a tree that will benefit many generations to come.

More resources at: www.nfs.unl.edu/documents/communityforestry/toptenmistakes.pdf; retreenebraska.unl.edu/Documents/ProperTreePlantingMay182k12.pdf; and arboretum.unl.edu/nsa-publications.

Misinformation on Emerald Ash Borer Treatments

Laurie Stepanek, Forest Health Specialist

There is a great deal of misinformation surrounding emerald ash borer, particularly in regard to treatments. Here is some clarification on commonly asked questions and issues.

"I thought I heard that EAB is here in Nebraska."

As of November 2014, EAB has not been found in Nebraska. We do have other types of borers that attack ash, such as the similarly named "ash borer" (aka lilac borer or lilac-ash borer), which is unrelated to the emerald ash borer and not as damaging. It is possible that EAB is present somewhere in the state but has not been detected. When EAB is discovered, an announcement will be made by the Nebraska Department of Agriculture, the media will spread the news and workshops will be held to provide guidance to homeowners.

"I want to treat now, so I don't have to worry about EAB later."

Treatments are not a one-time occurrence. They do not immunize the tree for life. Ash trees to be saved will likely need to be treated every one to three years, depending on the type of treatment. Less frequent treatments may be possible after most of the ash trees in an area have been killed and the EAB population has decreased, but this serious pest will always be with us and valuable ash trees will always need periodic protection.

"When should I begin treatments?"

Treatments for EAB should be considered only when EAB is known to be present within 15 miles of your tree. This 15-mile recommendation tries to strike a balance between protecting valuable trees and limiting the negative effects of unnecessary treatments. Treating trees outside of the 15-mile zone provides little or no benefit to the trees, yet exposes humans and the environment to pesticides, wastes money and, in the case of trunk injections, causes unjustified tree damage.

"Isn't it too late to treat after a tree is attacked?"

EAB usually requires a minimum of several years to kill an otherwise healthy tree. Infested trees may be successfully treated, even those with a fair amount of canopy decline. Beyond about 50 percent decline, however, recovery is less likely.

"Can I treat my trees myself?"

Homeowner-applied treatments are somewhat limited. The most available method involves a soil drench around the trunk, which might not adequately protect large ash trees. In addition, flowering plants growing near the tree can easily pick up the chemical, exposing bees, butterflies and other pollinators to the toxic material. Professional arborists have more options available to them, such as trunk injections, which help limit the effects on non-target organisms.

"What should I know about trunk injections?"

Trunk injections can effectively control pests, but they do have drawbacks. Most are applied by drilling holes into the trunk, which opens up the trunk to insect pests and decay fungi. The drilling may also break through internal barriers within the trunk, which the tree has built to wall off internal decay that may be present deep within the tree. This decay may then spread from the inside out through these injection wounds.

In addition, the pesticide itself can cause internal damage that may accumulate over years of repeated injections and potentially kill the tree, even if the pest is controlled.

If injections are used, trees should not be re-treated until the injection wounds seal over with new tissue. Injection treatments that use small, shallow holes and smaller amounts of product are less damaging.

"Maybe I shouldn't treat at all."

The many benefits of trees are well-known: shade, stormwater control, improved air quality, beauty, etc. A well-placed tree may be extremely valuable, and some trees may have great historical or sentimental value. If you do not treat, any benefits the ash tree is providing will likely be lost, and the cost of removal could in some cases be very high.

But knowing the cost, potential damage and varying effectiveness of treatments, it is wise to take a critical look at your ash trees to decide which trees to save, if any. The best candidates for treatment are high value trees that are properly sited and in good health. If you decide not to treat, you may want to plant replacement trees nearby to minimize potential loss.

The Nebraska Forest Service EAB website, nfs.unl.edu/EAB, provides more information, including: "Emerald Ash Borer Treatment Options" and "Emerald Ash Borer Guidelines for Nebraska Homeowners."

The Nebraska Environmental Trust

preserving NATURAL NEBRASKA™ for future generations

NET Funding Grows Communities

With funding assistance from the Nebraska Environmental Trust, NSA programs such as Trees for Nebraska Towns and the Nebraska Green Space Stewardship Initiative have enabled the planting of over 8,000 trees in more than 250 communities across Nebraska. Within these projects, thousands of people have come together to help make their communities better. NET funds also help with the cost of this publication.

What Our Forests Can Teach Us continued from page 9

Canopy trees provide protection for the plants growing beneath their branches. Forests are cool environments as a result of the shade and evapotranspiration of leaves. The tall, strong trunks and filtered light are visually interesting. In our landscapes, canopy trees act as a ceiling, give scale to structures, frame views and even act as a screen, depending on the size of the property. Large trees also provide a myriad of other benefits. Placing a large-growing tree on the west and south side of a house provides substantial cooling benefits. Large trees, both evergreen and deciduous, protect from the wind—an especially important function on open and rural properties. When large trees are used in more urban settings, such as street trees, their leaves also capture a substantial amount of stormwater.

Lesson 4: Forests reveal that most understory trees need protection. Smaller statured trees, growing 15-30 feet high, make up the understory of the forest. Here the smaller trees such as redbud, serviceberry and pawpaw thrive in protected, partially-shaded conditions in and among larger trees. Their interesting leaf textures, form and bloom make these spaces change through the seasons. Many ornamental landscape trees, such as magnolia and dogwood that are native to the United States but not to Nebraska, grow in these understory environments. Looking at how understory trees naturally grow, it makes sense that they should be used in more protected environments. Their smaller stature visually connects the canopy trees and gives us a more comfortable sense of scale. There are more practical benefits as well. Understory trees, especially those with rounded canopies, low-branching and/or multi-stems, provide visual screening. It is important to note that some of our smaller-growing trees, such as crabapple and hawthorn, prefer more light and are naturally found in more scrub or edge conditions where light is plentiful.

Lesson 5: Forests teach us that trees grow in plant communities. The forest is made up of plant communities that include shrubs and herbaceous material. Coralberry (*Symphoricarpos*) and currant (*Ribes*) are common shrubs in Nebraska woods. One of my favorite understory shrubs, creeping mahonia, grows natively in our ponderosa pine forests, making a dense, deep green mat below the towering straight pine trunks. Sun-loving species such as American plum are found on the forest edge.

Lesson 6: Forests teach us that the landscape is dynamic through the seasons. From spring ephemerals to the deep rust, yellow and crimson foliage of fall, forests are always changing. A walk through the early spring woods takes careful stepping not to tread on the delicate green foliage rising from the leaf duff. It is here, in the early spring months, when the herbaceous layer of the forest does its magic. Spring ephemerals like Jack-in–the-pulpit, Virginia bluebells and others come to life before the forest layers above them set leaf. They grow, bloom, fruit and go dormant before the dry summer months and dense shade sets in. The same spot a few months later can be a cool and shady refuge in the dog days of summer and by fall long shadows, pools of light and fall foliage will light up the woods. Landscapes change and we need to embrace these seasonal changes and biological cycles of plants.

Lesson 7: Forests teach us that the landscape changes over time. Tree growth and disturbance influence the plant communities that can grow underneath them. In nature there are successional plants that over time give way to a more mature and established forest. In the same way, we have to anticipate the

future growth of our landscapes as well as current conditions. For example, a common mistake is to plant woodland plants in and among new trees, where the current site conditions are sunny and hot. Instead, we need to plant sun-loving plants and transition them over time to more shade-tolerant plants. In the same vein, perhaps you have very mature shade trees. Are you planting for the future? What happens when there is a "forest disturbance"? Will there be trees to replace these trees or will the plant community need to change?

Lesson 8: Forests teach us that… there is no cool-season turfgrass in sight. Once again, we can't re-create the forest, but we can take some steps that help with the long-term survivability of our trees. None of the trees in forests are surrounded by carefully-clipped cool season grasses. Landscapes are always more successful when you can incorporate trees into larger landscape beds. This gives separation from turfgrass and also allows you to manage the bed differently. Allowing leaf litter to decompose adds organic matter and gives a place for beneficial insects to overwinter.

Lesson 9: Forests give us a rich palette of plants. Not everything in our landscapes needs to be native, but our native forests and prairies give us a rich palette of plants that are adapted to Nebraska's climate so consider buying trees grown from regionally native seed sources whenever possible.

What inspires me...

Some of my strongest memories involve trees, specifically, forests. I grew up in a state that was rich in forested land. There are specific components of those memories I can recall vividly—the smell of autumn leaves; the dampness of wood and leaf duff after a rain; the quietness; the coolness; the sense of mystery; at times the sense of awe; and the forest opening onto something else. Ecosystems constantly collide: forest opening onto wetland or prairie, prairie against wetland. It was aesthetically stimulating, ecologically rich and full of discovery. While I have come to appreciate the wide open skies of the Nebraska landscape, there is still something wholly mystical and otherworldly to me about the forest. Nowadays, driving down Nebraska highways I am pulled by the image of pasture meeting tree line, where the trees give scale to the infinite sky. The trees themselves become a sculptural form. Your experiences with trees, as mine do, heavily influence how you design and create spaces with trees. *Christina Hoyt*

A Few Trees that Deserve More Love

Some trees just don't get the respect they deserve. They're probably too messy, or maybe they're hard to propagate or perhaps they're hard to sell. Here are a few that offer special benefits and that we think deserve greater love and planting:

Bur Oak—perhaps the most majestic of our native hardwoods. It helps sustain hundreds of important wildlife species—birds, insects and mammals.

Chinkapin Oak—tough as nails and proven tolerant of high pH soils.

Boxelder Maple—hugely important as a wildlife plant. Can be tapped for sugar and supports very tasty mushrooms.

Walnut—very hardy and has a beautiful natural shape. So what if it drops a few nuts.

Rock Elm—has proven itself a great street tree in the western Great Plains.

Sycamore—easy to grow, tall and majestic and a very unique mottled bark.

Ponderosa Pine—our most common native pine deserves greater attention.

Cottonwood—our state tree most certainly should be planted where it has plenty of room to grow.

Catalpa—plant it for all its strangeness like big tropical leaves, showy flowers and the cigar pods.

American Linden—our native linden is one of the easiest trees to grow and offers the sweetest of fragrance in late spring.

Black Cherry—an eastern Nebraska native that feeds a wide variety of important birds and butterflies.

American Smoketree is nowhere near native to Nebraska, but it is one tough tree with a very unique shape and those funky smoky flowers.

Osage Orange—few trees can handle the heat, drought and tough planting conditions this one can. Little to no insect and disease problems.

Pawpaw—shade-tolerant but performs best in full sun. This is a tough little tree that takes the heat and wind of the Plains. as a forest-edge and understory tree. It looks very similar to the closely-related Ohio buckeye but is a bit smaller growing up to 25 feet. This subspecies is native to the central and southern Great Plains where it has evolved the survival mechanism of dropping leaves early in hot and droughty summers.

Rocky Mountain Birch—is a western species of birch that grows along streams in mountain canyons throughout the Rocky Mountains.

Eastern Redcedar—Love it or hate it, it's one of the best backbones for evergreen screens and windbreaks.

Hickory—is great for wildlife habitat with its strong branch structure, edible fruits and longevity.

From top: sycamore; chinkapin oak; rock elm; osage orange.

The Importance of Wildness

Karma Larsen, Communications Associate

Few of us have areas of true wilderness nearby. Many of us travel great distances to national parks and forests just to see it and to enter into it, if only for a few days. But as homeowners and landowners we all have the option for less-managed areas within our landscapes.

Why is wildness important? The answers are both objective and subjective and, for many of us, highly personal. From a scientific point of view, wild areas serve as a kind of canary in the coal mine:

- They offer clues about our natural systems that may be less evident in more managed landscapes. Through them we can more clearly see the impact of human intervention.
- They filter our air and help remove pollutants from it.
- Besides providing shelter for wildlife, wild areas provide migration routes and breeding spaces. Large areas of wilderness are important for this, but even small areas can provide needed stops between long distances.
- By hosting plant and animal life, they contribute to more diverse gene pools.
- They're important to pollinators, offering valuable "insectaries" that non-native landscapes often fail to support.
- Though we may not live close to areas of actual wilderness, many of us are connected to them every time we take a drink of water because they often function as watersheds in areas that bring drinking water to towns and cities.
- The hardiest species of any plant can be found on the extreme edges of their natural occurrence, so wild native areas may be able to provide seed source for species more tolerant of drought, cold or other challenges.

> "When people connect with nature, it happens somewhere. Almost everyone who cares deeply about the outdoors can identify a particular place where contact occurred. This may have been a wilderness, a national park, or a stretch of unbounded countryside, but more often the place that makes a difference is unspectacular: a vacant lot, a scruffy patch of woods, a weedy field, a stream, a green ravine or a ditch."
> The Thunder Tree, Robert Michael Pyle

From a more personal angle, wild areas offer respite and renewal for everyone from serious hikers and explorers, to occasional visitors, to people who never visit wilderness but take comfort from the fact that it exists. They offer a unique and appropriate sense of place and, in a way that is not easily put into words, rough edges in a landscape make room and space for our own rough edges. They foster freedom and creativity, a reality that is perhaps nowhere more evident than with young children. Given a highly-manicured landscape, imagination and play become similarly managed and constrained. Allowed some loose soil, rough plantings and the freedom to experiment, imaginative play soon follows.

The value of wild areas is commonly documented in personal memoirs and essays. Edwin Way Teale wrote, "I have come to believe that for most of us some lonely spot, some private nook, some glen or streamside-scene has impressed us so deeply that even today its memory recalls a mood of lost enchantment."

Teale wrote that memories of a woodland hilltop near the childhood home of John Merriam, President of the Carnegie Institution, influenced him all his life: "As the years of [Merriam's] life passed, this eminent scientist wrote, the thing that led him on was the endless challenge of the unknown—a challenge that appeared to him first in the form of this dark and distant woods of his boyhood."

And Howard Zahniser, author of the Wilderness Act, wrote: "Without the gadgets, the inventions, the contrivances whereby men have seemed to establish among themselves an independence of nature, without these distractions, to know the wilderness is to know profound humility, to recognize one's littleness, to sense dependence and interdependence, indebtedness, and responsibility."

Areas of wildness are fragile. The benefits they offer extend far beyond their boundaries, but their wellbeing is threatened by things well beyond their edges as well. So let's take it easy on ourselves and loosen up a bit on our too-careful management of the landscapes we oversee. Though few of us manage landscapes that have truly wild areas with forests or wetlands, all of us have small places where we can plant natives, allow habitat to develop and let natural processes have their way. By protecting and preserving wild areas in the small ways we're able, we may well be insuring our own well-being.

Native Populations Worth Saving

Nebraska is fortunate to have some existing populations of native trees that Nebraska Statewide Arboretum and Nebraska Forest Service are working hard to preserve, safeguard and potentially use as seed source.

- Bur Oak Canyon in southern Hitchcock County, Nebraska, has sheltered a remnant bur oak population for thousands of years. Of the 300-400 bur oaks in the canyon today, some individuals may be 200 years old. They are the only known native bur oaks within 200 miles.

- Tucked away near the Kansas-Nebraska border, in Richardson County, stands a rare native population of dwarf chinkapin oaks that grows in shallow soil over limestone. This small population is the far western limit of this tree species natural range. Preserving this native habitat is essential; the tree is listed as threatened in eight states. A consortium of volunteers, including NSA and Nebraska Forest Service staff, have worked in recent years to clear cedars out and help protect this native population. A prescribed burn was undertaken recently and the prairie plants rebounded with incredible beauty and diversity in 2014.

- If you take I-80 west out of Nebraska, you will pass the state's only population of limber pine in the bluffs south of the interstate, right on the state line. A rest stop offers easy access to explore the trees and the associated short-grass prairie. It is worth a stop.

- Check out Nebraska's other unique tree places—where species reach their geographical limits or exist far away from other populations such as paper birch along the Niobrara River, blackjack oaks at Table Rock, ponderosa pine in theWildcat Hills and bitternut hickory at Basswood Ridge near Homer.

Bur oaks at Bur Oak Canyon near McCook and ponderosa pines in the Wildcat Hills near Scottsbluff.

This Issue of *The Seed* is Dedicated to Michael Forsberg—Presenter for the 2014 Joseph and Dorothy Young Memorial Lecture

One of the recurring themes we noticed as we put this publication together was the idea of looking to the natural world for models to better care for our plants and landscapes.

Michael Forsberg struck the same note in his 2014 Young Memorial Lecture. We'd like to dedicate this issue of ***The Seed*** to him. Thank you, Michael, for showing us the beauty and fragility of the landscapes, both natural and planted, that we love and steward.

"I have spent a good share of my time trying to make pretty pictures, because I think pretty pictures are important. They're particularly important here on the Great Plains, where most people on the outside looking in still think this holds nothing but flat land and a monoculture of corn, and where progress and value too often have been measured by how much can be extracted from the land rather than by the enduring value of the land itself. If I can capture the wonder and beauty of a prairie landscape or a prairie creature through my photographs, my hope is that you, too, will be moved by it and more likely to protect and preserve it."

Michael Forsberg

Regionally Native trees for Nebraska

Justin Evertson, Green Infrastructure Coordinator

Although the Great Plains and Midwest are not generally considered to be a tree-friendly part of the world, there are well over 60 species of trees that grow here naturally. Most native species have proven to be climate-adapted and they do the best job providing food and cover to wildlife, thus increasing biodiversity. This is due to the fact that our native flora and fauna evolved together, typically finding a symbiotic balance. Consider the fact that native oaks can support hundreds of species of insects, including many important butterflies and moths, while the introduced ornamental pear feeds almost none. Yet it is the pears that are being planted in great numbers. It is our opinion that across any landscape, native plants should be emphasized whenever possible, including our trees.

Large Maturing Trees (growing over 40' tall at maturity)
Acer nigrum—black maple
Acer saccharinum—silver maple
Acer saccharum—sugar maple
Carya cordiformis—bitternut hickory
Carya illinoinensis—pecan
Carya laciniosa—shellbark hickory
Carya ovata—shagbark hickory
Catalpa speciosa—northern catalpa
Celtis occidentalis—hackberry
**Fraxinus americana*—white ash
**Fraxinus pennsylvanica*—green ash
Gleditsia triacanthos—honeylocust
Gymnocladus dioicus—Kentucky coffeetree
Juglans nigra—black walnut
Picea glauca var. densata—Black Hills spruce
Picea pungens—Colorado spruce
Pinus ponderosa—ponderosa pine
Platanus occidentalis—sycamore
Populus × *acuminata*—lanceleaf cottonwood
Populus angustifolia—narrowleaf cottonwood
Populus deltoides—eastern cottonwood
Quercus alba—white oak
Quercus bicolor—swamp white oak
Quercus imbricaria—shingle oak
Quercus macrocarpa—bur oak
Quercus muehlenbergii—chinkapin oak
Quercus rubra—red oak
Quercus shumardii—shumard oak
Quercus velutina—black oak
Salix nigra—black willow
Tilia americana—American linden (basswood)
Ulmus americana—American elm
Ulmus thomasi—rock elm
*Note: Ash species are not recommended for planting due to the threat of Emerald Ash Borer.

Medium Trees (growing up to 40' tall)
Acer negundo—boxelder maple
Aesculus glabra—Ohio buckeye
Betula papyrifera—paper birch
Carya glabra—pignut hickory
Carya tomentosa—mockernut hickory
Diospyros virginiana—persimmon
Juniperus scopulorum—Rocky Mountain juniper
Juniperus virginiana—eastern redcedar
Morus rubra—red mulberry
Ostrya virginiana—hophornbeam (ironwood)
Pinus flexilis—limber pine
Populus tremuloides—quaking aspen
Prunus serotina—black cherry
Quercus ellipsoidalis—northern pin oak
Quercus macrocarpa X *gambelli*—Bur-Gambel Oak
Quercus marilandica—blackjack oak
Quercus stellata—post oak
Robinia pseudoacacia—black locust
Salix amygdaloides—peachleaf willow
Ulmus rubra—slippery elm

Small Trees (growing up to 20' tall)
Acer glabrum—Rocky Mountain maple
Amelanchier arborea—shadblow serviceberry (juneberry)
Asimina triloba—pawpaw
Betula occidentalis—water birch
Cercis canadensis—eastern redbud
Crataegus mollis—downy hawthorn
Crataegus succulenta—succulent hawthorn
Malus ioensis—wild crabapple
Prunus americana—American (wild) plum
Prunus mexicana—big-tree (Mexican) plum
Prunus virginiana—chokecherry
Quercus prinoides—dwarf chinkapin oak
Salix eriocephala—Missouri River (diamond) willow
Viburnum lentago—nannyberry viburnum

Photos from top:
State Champion pecan tree in Brownville;
Ponderosa pines at Merritt Reservoir in western Nebraska;
Shumard oak in Blair's Ralph Steyer Park.

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This newsletter is a benefit of membership and published by the Nebraska Statewide Arboretum Inc. Funding for this issue of *The Seed* was provided in part by the Nebraska Environmental Trust and through the generous support of Jacob North.

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