



The Seed

FUTURE LANDSCAPES

home landscapes, stewardship, cities,
plant selection, green infrastructure

Nebraska Statewide Arboretum

Sustainable Landscapes for Healthy Homes & Communities

Summer 2017

The Future of Our Landscapes

Justin Evertson, Green Infrastructure Coordinator

"All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. The land ethic simply enlarges the boundaries of the community to include soils, waters, plants and animals, or collectively the land." Aldo Leopold

The human species is at a crossroads. Although we're an amazingly smart and adaptable animal, our consumptive nature threatens to be our undoing. The evidence is clear—people have had a tremendous impact on the globe and we are now rapidly changing the very biosphere that sustains us all. We no longer see that we are "members of a community of interdependent parts." In thinking about the future of our planted landscapes, we must be willing to confront some of the big environmental challenges facing us. Consider these facts:

Most scientists agree that climate change will generally lead to hotter and drier conditions for Nebraska and the surrounding Great Plains with more extreme weather events. It's hard to imagine that our already tough climate could get worse.

According to the World Wildlife Fund, populations of vertebrate animals—such as mammals, birds, and fish—have declined by almost 60 percent since 1970. Many scientists also believe that rapidly increasing extinction rates signal that we're entering the world's sixth mass extinction event, this one caused primarily by humans.

More than 98 percent of the mixed and tallgrass prairie in the eastern half of Nebraska has disappeared since settlement, greatly reducing associated animal species. In fact the tallgrass prairie is one of the most threatened ecosystems on the planet.

Our global travel and trade keeps stirring the species pot and we'll almost certainly unleash many new invasive plants and insects in the coming years that will displace more of our natives.

The human population is expected to grow from 7 billion now to nearly 10 billion by 2100, putting tremendous pressure on our remaining natural areas as we seek more crop ground and areas for energy production.

It's also important to remember that the air we all breathe, the water we all drink and the soil that sustains our landscapes and plant communities are finite resources. They can seem unlimited, but clearly the things we do—including



INSIDE

Landscapes to Live In	2
Kids are the Future	5
Purposeful Green Infrastructure	6
Future of Community Forestry	8
Trees for the Future	10
Future Perspectives	12
Challenges for Design	16
Medians	17
Shelter of Each Other	18
The Will to Plant	19
2016 Climate Report	
Weeds & Management	



"The Future" continued on page 23

Landscapes to Live in

FUTURE LANDSCAPES

HOME LANDSCAPES

Bob Henrickson, Nebraska Statewide
Arboretum Horticulture Program Coordinator

I bought my house and property here in Lincoln 24 years ago, inheriting a nice assortment of shade trees, including mature size pin oak, red oak and silver maples. The yard was mostly made up of turfgrass and a line of lilac shrubs. The goal I set for myself was to create a

species that could out-compete some native varieties.

Pesticides and herbicides tend to kill many more creatures than the one or two bugs you're trying to get rid of. I am proud to report that I have never sprayed pesticides to control pests... not because I didn't need to, but because I didn't have to. Lastly, I wanted my garden to give back. By creating wildlife habitat I provide food and shelter for song birds, butterflies, bees, beetles, etc. By including wild edible plants in my garden, I can grow delicious fruits and herbs for me, my family and friends—or simply grow them for the critters to enjoy. Making native fruits a part of my landscape has certainly enriched my life as well as the environment I live in.

Using water wisely does not mean having less greenery, it just means putting more thought into plant selection and garden design. My desire to reduce water usage has led to some fabulous plant combinations, year-round interest and a yard that I want to live in, not just look at. A good place to start was to evaluate my lawn. Pets and kids might need their turf grass, but I quickly created new garden beds to reduce the size of the lawn anyway. My four boys rarely played sports in the lawn, they often played catch in the park and ball in the street. My little dog likes to do her business in the leafy mulch beds under my shade trees; she mostly avoids going in the lawn since she likes to kick up leaves to "hide" her work.

I'm convinced kids are just as entertained in a garden of wonder, full of fabulous plants and places of discovery. The lawn area I inherited when I bought the property used to take around an hour to mow, now the remaining lawn takes only around 10 minutes and is confined to areas for entertainment and mowed paths to get me from one area to the next. Because of my plant choices I have no overhead sprinklers or drip irrigation. There is no need to... my only supplemental irrigation is now confined to the vegetable garden and potted containers.

I grow a wide variety of plants, especially native plants—from the existing shade trees to understory trees and shrubs, perennials, grasses and



Was your landscape designed for outdoor living? Bob Henrickson's was. The backyard is full of both edible and ornamental plants with plenty of space for sitting, eating and meandering... even in a smallish standard lot. There's a minimum of turfgrass, even in the front yard shown opposite.

landscape that was not only aesthetically pleasing but also environmentally beneficial.

For me, gardening is all about working with nature, not against it. I feel like being green is really about not being wasteful. In the garden, that means conserving water and recycling yard trimmings and plant-based scraps into compost. The next important rule for me is to do no harm, like avoiding chemical fertilizers and not planting invasive

groundcovers. They all add beauty and important habitat for wildlife, especially for pollinators. Even my small backyard garden can make a big difference.

Why use native plants in my garden? Pollinators have evolved with native plants, which are best adapted to the local growing season, climate and soils. Most pollinators feed on specific plant species and non-native plants may not provide enough nectar or pollen, or may be inedible to butterfly or moth caterpillars. I made it a priority to plant a diversity of flowering species to bloom throughout the growing season, with abundant pollen and nectar and specific plants for feeding caterpillars.

We humans often tend to simplify the landscape by creating large areas of monocultures that contain just a single species. These landscapes are far more vulnerable to environmental problems. By increasing the number of plant species used in the landscape I have increased the ecological stability of my property. With living plants, complexity in the garden brings more stability and the ability to withstand change.

Plant choice is an essential component of a waterwise garden. Plants that are native to your region, or native to a place with similar climate conditions, will be more likely to thrive with minimal irrigation or other inputs. More and more gardeners are bombarded with new introductions that feature lush cottage garden plants that require frequent watering just to keep them alive. Without irrigation, these plants struggle in the difficult soils, relentless wind and variable climate extremes of the Great Plains.

Many perennials have developed specialized features that allow them to survive extreme climatic and environmental conditions. Some have adapted to survive hot and dry conditions or cold temperatures. These “investment” plants tend to put a lot of resources into their adaptations and often do not flower until after a few years of growth. In our instant gratification society these slow to mature perennials often don’t get planted in landscapes because we want something to bloom now, not three years down the road.

It can be overwhelming to choose native plants since there are more than 300 species native to the Great Plains. Some native wildflowers spread by aggressive rhizomes, which serves them



well in the wild, but it can be difficult in home gardens. But in my experience there are plenty of places these garden “thugs” can be planted, as long as it’s between a rock and a hard place to keep them confined.

The lists below are regionally native plants that provide seasonal beauty to any garden setting. These “Best of” native plants were chosen the good old-fashioned way, they earned it.

Best for Shade

False solomon’s seal, *Smilacina racemosa*
Solomon’s seal, *Polygonatum biflorum*
Sweet cicely, *Osmorhiza claytonia*
Wild geranium, *Geranium maculatum*
Wild ginger, *Asarum canadense*
Woodland phlox, *Phlox divaricata*

Best for part shade

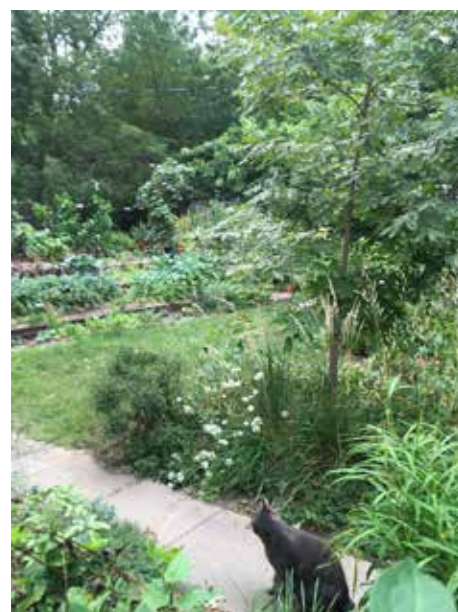
Culver’s root, *Veronicastrum virginicum*
Prairie alumroot, *Heuchera richardsonii*
Turtlehead, *Chelone glabra*
Wild columbine, *Aquilegia canadensis*
Zigzag goldenrod, *Solidago flexicaulis*

Best for Sun

Aromatic aster, *Aster oblongifolius*
Dotted gayfeather, *Liatris punctata*
Gray-headed coneflower, *Ratibida pinnata*
Pale purple coneflower, *Echinacea pallida*
Pasque flower, *Pulsatilla patens*
Purple poppy mallow, *Callirhoe involucrata*

Best Oldie but Goodie

Black-eyed Susan, *Rudbeckia fulgida* var. *speciosa*
Brown-eyed Susan, *Rudbeckia triloba*



Lanceleaf coreopsis, *Coreopsis lanceolata*
Purple coneflower, *Echinacea purpurea*
Virginia bluebells, *Mertensia virginiana*
Yarrow, *Achillea millefolium*

Best Plant It and Forget It

Dwarf spiderwort, *Tradescantia tharpaii*
Pitcher sage, *Salvia azurea*
Rosinweed, *Silphium integrifolium*
Shining bluestar, *Amsonia illustris*
Virginia mountain mint, *Pycnanthemum virginianum*
Wild quinine, *Parthenium integrifolium*

Best pollinator

Blue giant hyssop, *Agastache foeniculum*

“Landscapes to Live in” continued on next page

Joe-pye plant, *Eupatorium purpureum*
 Meadow gayfeather, *Liatris ligulistylus*
 Purple prairie clover, *Dalea purpurea*
 Stiff goldenrod, *Solidago rigida*
 Wild beebalm, *Monarda fistulosa*



Henrickson's side yard is also filled with lots of plants, minimal area to mow and lots of interest, even with heavy shade from mature trees.
 Meadow gayfeather is in the top 10 of almost every pollinator plant list.



Best Annual or Short-lived Wildflower for Naturalizing

Black-eyed Susan, *Rudbeckia hirta*
 Blue flax, *Linum perenne*
 Golden Alexander, *Zizia aurea*
 Plains coreopsis, *Coreopsis tinctoria*
 Rocky mountain bee plant, *Cleome serrulata*
 Upright prairie coneflower, *Ratibida columnifera*

Best Slow to Grow, Long to Live

Blue false indigo, *Baptisia minor*
 Compass plant, *Silphium laciniatum*
 Dwarf leadplant, *Amorpha nana*
 Prairie bushclover, *Lespedeza capitata*
 Rattlesnake master, *Eryngium yuccifolium*
 White prairie clover, *Dalea candida*
 White wild indigo, *Baptisia lactea*

Best for Wet Areas

Great blue lobelia, *Lobelia siphilitica*
 Purple meadow rue, *Thalictrum dasycarpum*
 Sneezeweed, *Helenium autumnale*
 Southern blue flag iris, *Iris virginica* var. *Shevei*
 Swamp milkweed, *Asclepias incarnata*
 Sweet coneflower, *Rudbeckia subtomentosa*

Best Partners

(plants that like similar conditions and overlap in bloom time)
 Butterfly milkweed with leadplant
 Joe-pye plant with Fireworks goldenrod
 Prairie dropseed with nodding pink onion
 Purple poppy mallow with Missouri primrose
 Scarlet beebalm with meadowsweet
 Thickspike gayfeather with rattlesnake master

To Plant or not to Plant

(weedy and aggressive; best in confined spaces and in mass)
 American bellflower, *Campanula americana*
 Canada goldenrod, *Solidago canadensis*
 Illinois bundleflower, *Desmanthus illinoensis*
 Jerusalem artichoke, *Helianthus tuberosus*
 Maximillian sunflower, *Helianthus maximilliana*
 Meadow anemone, *Anemone canadensis*
 Northern sea oats, *Chasmanthium latifolium*
 Western wheat grass, *Pascopyrum smithii*
 White snakeroot, *Eupatorium rugosum*

Kids Are the Future— passing on a love for nature

Sarah Buckley, Community Landscape Specialist

We work hard to create landscapes that protect the resources we need, but one day all the landscapes we've planted and cared for will be handed on to the next generation. Making sure they are prepared for that responsibility is an important job. Children are the true future of our landscapes; they will be the ones to

FUTURE STEWARDS

plant the acorns that become the oaks of the future, choose the trees that line our city streets and make the decisions about both our native and planted landscapes. Unfortunately, we know that many children feel little connection with nature; a seven-year-old was recently asked what he liked about nature and he said, "I don't know, there isn't any around here."

It's easy for children to think of nature as awe-inspiring scenic views they see in movies or on vacation. But the ability to connect with everyday nature needs to be cultivated. A lack of time outdoors has prevented many children from making a personal connection with the nature that surrounds them in schoolyards, city parks and home landscapes. Without this connection, how will they choose to take an active role in the future of our landscapes?

Children have a natural sense of wonder and a desire to learn through hands-on interaction. It's our job to help that innate sense of wonder develop further into creativity, discovery and inspiration. Love for nature and empathy for the environment is not something that can be taught in the classroom. No number of lessons on recycling or renewable resources will sink in without personal experience to back them up.

Take a moment and remember a time when you felt connected to the outdoors. We are not connected to nature by accident; it happens through personal contact and experience. We want to make sure today's children are given time and opportunities to connect to the natural world. It is through personal connections



that we insure the future health of our natural and planted landscapes.

Unfortunately, children are spending an average of 7-8 hours a day with electronic devices; and those statistics continue to rise as laptop programs become more common in schools and smartphones become more affordable and accessible. Screens in a whole range of forms—television, video games, phones, computers—were designed to get and gratify attention. Time outdoors has a very different pace but the reward for getting children outside is well worth the fight.

As adults we recognize the therapeutic effects of being outdoors in nature, but we forget that children experience it too. Time spent outdoors in unstructured play helps relieve symptoms of Attention Deficit Disorder and Directed Attention Fatigue along with improving a child's overall health, learning abilities, self-confidence and helping them develop critical thinking skills and a sense of place and of belonging.

Pre-school children tend to learn primarily through hands-on sensory experiences, so limiting screen time and increasing outdoor playtime is essential. There are a wealth of ideas available online and at the library, but anything that gets them interested and active outdoors—soil, plants, twigs, sand, rocks—can spark their imagination and curiosity.

Elementary and middle school children are eager to take on roles of ownership and responsibility. They can help select plants for the flower and



Photos above: If you give a kid a tree...

vegetable garden as well as weed and water it and plant pollinator gardens that will offer new plants, flowers and insects to explore.

Most teens are constantly connected to the digital world. But there are ways to tie their interests to the outdoors with apps for birdwatching and other wildlife-related activities, plant and insect identification, garden and edible food ideas on social media. They can be given ownership of a garden—giving them the chance to research, plant and care for their own vegetables and other plants.

Purposeful Green Infrastructure as the Standard for Our Landscapes

FUTURE LANDSCAPES

GREEN INFRASTRUCTURE

Andy Szatko, Environmental Quality Control Technician for the City of Omaha

Do you know what green infrastructure is? Do you think it's just a trendy term? Maybe you think it has something to do with plants because it's in this publication. Simply put, green infrastructure is the preservation,



Large cities like Omaha have been experimenting with green infrastructure for more than a decade, and are impressed with the results. Above: Metro Community College Fort Omaha Campus.

connecting and mimicking of natural processes to manage rain where it lands.

It can be thought of generally at three levels or scales: watershed, neighborhood and site. In terms of watersheds, it can be the preservation of large natural landscapes or corridors along waterways. At the neighborhood scale, it can be a wetland or the planting of street trees. At the site level, it can be a rain garden in the front yard, a rain barrel in the backyard or a green roof on top of your home.

Successfully implemented green infrastructure practices slow down and clean water, support biodiversity, reduce the heat island effect, improve air quality, recharge groundwater and are visually appealing. At this point, you might be thinking, that's all great, but why are we even talking about managing runoff with green infrastructure?

The answer is obvious once you see it, but in order to see it you need to understand the problem first. Our homes, sidewalks, streets and much more of our built structures are impervious surfaces, meaning that they cover land and prevent rain from soaking in. One inch of rain on 1,000 square feet of an impermeable surface generates about 600 gallons of stormwater runoff. That is a lot of water considering the amount of impermeable surfaces that surround us. Those 1,000 square feet in Omaha, with 30 inches of annual rain, would create 18,000 gallons of runoff. In Scottsbluff, with 15 inches of annual rain, it would create 9,000 gallons of runoff. When that uncontrolled runoff reaches our streams and rivers, they can't handle water moving at that speed and they degrade.

Imagine shooting a fire hose at your lawn instead of using a sprinkler... what do you think is going to happen? It's going to erode because it wasn't intended to handle that blast of water. That is the quantity part of the problem; there is also a quality part. As the rain lands and runs off, it can pick up a lot of stuff along the way—fertilizer, pet waste, oil, soil, coffee, etc. Storm sewers efficiently carry this runoff from our communities and discharge it into our streams, rivers and lakes without any treatment. Now go out to a nearby stream or look at runoff coming from a parking lot and see what you think. Once you see the problem, it's easy to understand why we're talking green infrastructure.

Mother Nature has been managing stormwater for a very long time; we should take note and adapt natural processes to our own landscapes. We typically build and manage our landscapes so they are aesthetically pleasing and productive for our given use, not necessarily to manage runoff. There is no reason why it shouldn't be both. We need to move beyond kidney bean front yard beds, 3 foot wide foundation plantings, river rock parking lot islands, compacted lawns and trying to get rid of water as quickly as possible—only to turn around and irrigate a few days later because it's

too dry. Our landscapes should utilize the three S's of green infrastructure: Slow water down, Soak it into the ground and Spread it out.

We also need to move beyond the notion that green infrastructure is new and unproven. It may be a new concept or term to some, but it has been around for awhile and has proven successful here in Nebraska. In Omaha there are some great green infrastructure projects at Dundee Elementary, Adams Park and Spring Lake Park where you can see how green infrastructure is managing runoff while providing an incredible amenity to the community.

Resources for how to design, build and maintain green infrastructure practices are getting better all the time, including the *Sustainable Landscapes Manual*, the *Bioretention Garden Manual* (available for free download at omahastormwater.org), NebGuides on rain gardens and resources at omahaplants.org, to name just a few. Can using green infrastructure principles and practices solve all of the problems associated with stormwater runoff? No, but it will help. To learn more about stormwater and green infrastructure



Above: Saddle Hills Rain Garden.

practices, go to water.unl.edu/stormwater or OmahaStormwater.org.

One final thought on green infrastructure is that we shouldn't treat it as a feature in the landscape. Features like fire pits and pondless waterfalls can

easily be added or removed from the landscape. Green infrastructure principles and practices, on the other hand, should be the standard by which we plan, design and manage our landscape. Water is too valuable to waste.

Green Infrastructure is purposeful even when it isn't "green."

It retains its ability to absorb water, filter impurities and reduce runoff while continuing to provide interest, physical structure and beauty all winter long.

It's important for wildlife as well...

"Perennials in the winter landscape are important resources for birds and butterflies.

Butterflies such as the viceroy pupate in a sheltered spot for the winter; and other species of butterflies and moths lay eggs in the leaves of perennials for overwinter. If we cut down and compost these plants, we may be composting next year's generation of butterflies."

Tracy DiSabato-Aust



The Future of Community Forests—Diversity and Involvement

FUTURE LANDSCAPES

COMMUNITY TREES

Eric North, UNL Assistant Professor of Regional and Community Forestry (North was hired in April 2017 to lead the development of a new degree program at UNL and teach courses in community forestry and arboriculture.)

In the 19th and early 20th century, the American elm—with its graceful form, arching branch structure and seeming



ability to grow anywhere, under nearly any conditions—made it a “perfect” tree for cities and shelterbelts alike. Cities were planting elms by the thousands and this single species (*Ulmus americana*) made up 90 percent or more of some community forests. The heavy reliance on a single species would prove devastating in the 1930s when a new disease began killing the elms. Dutch elm disease spread across North America and significantly changed our landscapes. Many of the current shade tree conferences, tree

ordinances, arboricultural practices and the science of managing rural and urban trees began as a result of Dutch elm disease.

Move forward to 2002 when a new pest discovered in Michigan began terrorizing ash trees. Emerald ash borer or EAB is currently moving through North America and decimating our native ash species (*Fraxinus*). We seem not to have learned our lesson about over-reliance on a single species. Though once cities may have had as much as 90 percent elm trees, many cities today have 30-60 percent ash. We are learning, but there is always room for improvement. Emerald ash borer is not the first, and will certainly not be our last, tree pest. In many of our Nebraska communities and across the U.S., maples are significantly over-planted and a potential future pest—the Asian long-horned beetle or ALB—loves maples. The future of our landscapes will depend on our ability to diversify.

Similar to the decline seen in pollinator populations, our community forests are diminished due to a variety of factors: lack of diversity, invasive pests, storms and aging trees, to name a few. In the same way that awareness of pollinator issues has helped increase pollinator habitat and policies, we can and should advocate as vigorously for our community trees.

Tree diversity is an important part of creating healthy and sustainable forests and communities. Several guidelines for diversity exist, most commonly the 30-20-10 rule (no more than 30 percent of trees from a plant family, 20 percent from a genus and 10 percent from a species). Dr. John Ball, Professor of Forestry at South Dakota State University, suggests even more diversity—no more than 5 percent from any genus. Diversity on the level of genus is likely to be the most important as many pests tend to impact a genus rather than a family or a single species. For example, EAB affects all ash native to North America, but is not much of an issue for lilac, which is in the same family. Whatever goal you adhere to, diversity is essential to both our native and managed landscapes.

Funding is an ongoing and increasing challenge for community forests.

Unlike traditional forestry, where timber harvesting serves as straightforward economic incentive for management, our community forests are more complicated. We talk about the benefits of trees—from improved human health to increased property values, from energy reduction to creating more livable communities—but there is no single market, no single paycheck. While we all benefit, any individual benefit is likely to be small in the grand scheme. The benefits to an entire community, on the other hand, can be thousands to millions of dollars annually.

With EAB and more frequent and severe droughts, our community trees and forests need as much help as ever. In the 2017 federal budget, funding for Community Forestry was initially set to zero. Thanks to fast action by advocates the most recent budget does include funding for Urban and Community Forestry, although the money allocated to individual communities is still relatively small compared to the need. That means the future of our community forests and landscapes will depend on the direct involvement of community members as advocates, ambassadors, volunteers and business owners to help diversify and maintain trees as assets in our communities.

Diversity Considerations

Nursery production: In order to diversify our forests, we need nurseries to produce a diverse palette of species. Growing trees is expensive, so that means we also need to support nursery efforts by requesting and purchasing a variety of species. Communities may also want to consider contracting with nurseries to grow the unique species they want, and to think well beyond maples and oaks.

Spatial diversity—spread the love: Some communities as a whole have great diversity, while individual neighborhoods within the city might consist of just one species. The more widespread the diversity, the less damage future issues are likely to pose. Private lands can make up 75 percent or more of the trees in a community forest so our home landscapes are important as well. So if a particular species is common in your neighborhood, plant something different.

Pollinator habitat: Planting a variety of trees and shrubs also improves habitat for birds and other pollinators. Examples include basswood, linden and black



chokeberry for spring flowers; willows as early season food source for bees; buttonbush to attract pollinators of all kinds; cottonwood, aspen and some of the pines for their resins which have antimicrobial properties used by bees to make propolis, an aid in colony health.

Energy savings:

Consider planting different species at specific locations around buildings to reduce energy costs. Conifers planted along the north side will block winds, and deciduous trees planted south and west of buildings will block the hot summer sun while still allowing sunlight during winter months.

Management: Greater diversity can reduce management costs over time. It costs the same to plant a diverse community forest as it does to plant only a few species. However, if only 5 percent instead of 20 percent of your community trees are impacted by the next pest (and it *will* come), that is an enormous savings to your community.



As challenges grow, the need for diversity is made even more dramatic. In Chadron, decades-old redbuds are providing seed source for trees that can withstand tough conditions in northwest Nebraska. Buttonbush offers food for a great variety of pollinators.

Trees to Consider

Justin Evertson, Green Infrastructure Coordinator



Potential “Trees for the future” include:
Bitternut hickory, a southeast Nebraska native (opposite);
Meyer spruce, potentially more tolerant of high temperatures and humidity (opposite bottom);
Buckley oak (above), which handles both spring and fall freezes better than other oaks.

FUTURE LANDSCAPES

ADAPTABLE TREES

Nebraska and the surrounding Great Plains is rightly thought of as farm and prairie country and not as an easy place to grow trees. And yet, if we take a closer look at both our native and planted trees we discover that over 150 species are growing here, including more than 40 native species. Our communities and woodlands are loaded with proven survivors that help inform what we should be planting more of. This includes many unusual species that didn’t read the books on hardiness and thus don’t realize they’re not supposed to be growing here.

A great place to start with tree selection is with our native species, which generally possess a strong genetic adaptability to a widely variable climate. They’ve been challenged by weather extremes for millennia and many of them have evolved incredible tolerance to heat, cold, wind and drought. Native trees are also extremely important ecologically. They are the species that many of our native birds, beneficial insects and other wildlife have evolved with and are dependent on. Our native oaks, for example, help support hundreds of important insect and bird

species. The introduced ornamental pear (*Pyrus calleryana*), on the other hand, supports very few. You just can’t go wrong planting regionally native species such as oak (bur, red, chinkapin, white, swamp white), walnut, sycamore, American linden, cottonwood, hackberry, honeylocust, boxelder, bitternut hickory, Ohio buckeye, black cherry, Ponderosa pine and even red cedar. They have stood the test of time and should be able to tolerate our changing climate into the foreseeable future.

Beyond our natives, we’re also trialing and keeping an eye on several trees that have proven worthy of greater planting or that hold at least some potential for our region and should be tried. Here are just a few of those:

🌿 Southern Oaks (*Quercus*): There are several oaks native to the south or southeast of us that likely hold genetic tolerance to both a hotter future but also spring and fall freeze events. Many of these are already growing in local arboreta including post oak (*Q. stellata*), cherrybark oak (*Q. pagoda*), chestnut oak (*Q. montana*), overcup oak (*Q. lyrata*), buckley oak (*Q. buckleyi*), Nuttall’s oak (*Q. texana*) and willow oak (*Q. phellos*).

🌿 Western Oaks (*Quercus*): Other than bur oak, the eastern US oaks generally are not recommended for western Nebraska where drought and high pH soils limit their adaptability. However, gambel oak (*Quercus gambelii*) from the Rocky Mountains is proving to be a great choice for the area. It is shrubby when young but grows into a nice medium-size tree in time and is VERY drought tolerant. Also, the bur oak (*Q. macrocarpa*) has been hybridized with both gambel oak and the southwest US native shrub live oak (*Q.*



turbinella) to create some very promising hybrids for the region.

🌿 **Hickories (Carya):** Two hickories that should be planted more often in our communities include pecan (*C. illinoensis*) and bitternut hickory (*C. cordiformis*). Both have been proven across eastern Nebraska, but are still rarely planted. Some specimens of pecan have been in our communities for over 80 years and have grown to 80 feet tall or more.

🌿 **Sweetgum (Liquidambar styraciflua)** has been a marginally-hardy species across southeast Nebraska for a few decades now. However it grows quite well across Missouri and eastern Kansas and might prove more reliable as we warm up. Because of its spiny seed balls it's often cursed in the south, but we'll take it up here.

🌿 **The Tuliptree (Liriodendron tulipifera)** has been growing in communities across eastern Nebraska for many decades and there are large specimens from Norfolk to Falls City. It won't tolerate severe drought but it will tolerate a hotter future.

🌿 **Magnolias (Magnolia):** Nebraska doesn't sound like magnolia country but several species and hybrids have proven to be quite adaptable to at least the southeast third of the state. Cucumber magnolia (*Magnolia acuminata*) and saucer magnolia (*M. x soulangiana*) are the most proven. Others that are now being trialed include bigleaf magnolia (*M. macrophylla*), umbrella magnolia (*M. tripetala*) and several hybrids. Let's cross our fingers.

🌿 **Soapberry (Sapindus drummondii)** is a heat and drought-tolerant southern native tree growing from Texas into central Kansas. A few specimens exist in Nebraska arboretums including an impressive one on the Doane College campus in Crete. This medium-sized tree gets a nice yellow fall color and is named for its grape-like fruits that are sometimes used for lathering soaps.

🌿 **New Elms (Ulmus):** Several hybrid elms have been developed in recent decades that are tough and disease resistant. Proven cultivars for our area include 'Triumph', 'Accolade', 'Frontier', 'Vanguard' and 'New Horizon'. David elm, also called Japanese elm (*Ulmus davidiana* var. *japonica*), is an attractive, glossy-leaved, medium-sized elm that is showing great promise across the region.

🌿 Several American elm (*Ulmus americana*) cultivars have been selected for Dutch-elm disease (DED) resistance

including 'Princeton', 'Jefferson' and 'Prairie Expedition'. We can and should continue to plant a few American elms.

🌿 **A few evergreens.** A generally warming and drying climate will likely make it harder to grow evergreens in our region. However, a few species look promising: Meyer spruce (*Picea meyeri*) which is thought to be more heat and humidity tolerant than most spruces; Swiss stone pine (*Pinus cembra*) which is doing well across the state; and Korean pine (*Pinus koraiensis*) which is similar to Swiss stone pine. As we warm up, southeast U.S. natives such as loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus taeda*) and scrub pine (*Pinus virginiana*) will also be worthy of trialing.

For more comprehensive lists of recommended trees, go to plantnebraska.org.

Invasive Trees

When it comes to tree selection for community planting, caution should be given to non-native species that could potentially become invasive into native woodlands and natural areas. Our history is replete with many trees brought here for planting in our communities or on our farms but which are now invasive pests in many contexts: common mulberry (*Morus alba*), tree of heaven (*Ailanthus altissima*), Siberian elm (*Ulmus pumila*), Russian olive (*Elaeagnus angustifolia*), common buckthorn (*Rhamnus cathartica*) and salt cedar (*Tamarix ramosissima*). Other commonly planted species which show potential to become invasive include goldenrain tree (*Koeleruteria paniculata*), Amur corktree (*Phellodendron amurense*), Amur maple (*Acer ginnala*) and callery pear (*Pyrus calleryana*) including the cultivars 'Bradford', 'Redspire', 'Aristocrat' and 'Chanticleer'—which is starting to come up wild in many locations in eastern Nebraska. Aggressive, non-native species should not be planted near important native woodlands, prairies or other wild areas where they could escape.

Keeping in mind that over 150 tree species can be found growing in Nebraska; we really don't suffer from a lack of species to consider for planting. The primary limitation is availability. Many of the best trees for our region just aren't being grown by the nationally-oriented wholesale growers. Thankfully there are several great nurseries in Nebraska working hard to improve not only the availability but also the quality of nursery



Above: Soapberry fall foliage and fruits.

trees better suited for our region. Some of these nurseries are collecting seeds and other propagules from trees growing here already, including both native trees and planted trees. A few nurseries are also researching better growing methods that emphasize root-quality along with canopy-quality. When it comes to buying our trees, shopping from our locally owned nurseries not only helps to support the local economy but also leads to better, longer-lived trees being planted.

The Future of Our Landscapes

Perspectives from horticulturists, writers, educators, community activists...

"Landscapes of the future will be built on the past, as are so many trends, whether good or bad. Past generations lived in homes that were often on smallish lots or farmsteads. The focus was on growing their own food for their own consumption; shading their streets and homes with trees (no air conditioning); walkable communities with front porches (know your neighbors); lawns that were essentially whatever would grow with minimal inputs; and management techniques that were simple (albeit chemical-centric in some cases).

Fast forward to landscapes in major urban centers: small lots, tighter spaces—and the timeless desire to know the source of the food being eaten. Edible landscapes, especially those that include trees and shrubs, will become the norm, not the exception—and encouraged by governing entities. All aspects of politics, design, construction and management will result in landscapes that are diverse, manageable and, above all else, respectful of soils, water and the creatures of the earth. Landscapes will no longer be considered disposable or 'finished,' but will be as carefully nurtured as the people who manage and use them. All who are responsible for ensuring the long-term contribution of landscapes to health and welfare will be highly revered.

A variety of plant material, including but not limited to natives, will attract beneficials and exclude invasive aliens. Clean slate, crisp-edged landscapes with a few plant types may exist where it is important to emphasize the architecture, but will celebrate the unique characteristics of each place and transition rapidly into a more natural style. The predominant private landscapes will be as unique as the individuals responsible for them, and as timeless as our most revered national parks. Visualize majestic tree-lined streets, medians and edges that capture and release water, shrubs and herbaceous plants in masses to create edges and sense of space and place in public spaces, and a world in which the line between the natural and built environments no longer exists."

Kim Todd, UNL Professor of Agronomy & Horticulture

"Our homes and the landscapes around our homes are vital nests of security and comfort to us. As world populations rise, we will value our home spaces more and more. They will allow our continued well-being as the world becomes more and more chaotic.

We expect research and development to provide answers to our needs of the future. Will this be enough? I expect we will be given opportunities to better sustain life right at home. We know lawns can easily be converted to food gardens. We know captured rainwater will reduce our need for imported water. We know wind and solar will provide more sustainable energy for home use. We know there are other ways to make our homes more energy efficient. Enjoy the challenge!"

Bud Dasenbrock, former director of UNL Landscape Services



"Somehow, those of us who live in the city have gotten the notion that we're just supposed to be 'eaters.' Someone else, off in the countryside somewhere, is presumably growing all the food needed to feed us. So in the little space for horticulture we do have in the urban environment we accordingly plant grass and ornamentals.

As often as we all like to eat, though, there's a lot to be said for trying to grow at least some of our own food. Take lettuce, for instance. There's no good reason we in Nebraska should be relying on California's water-scarce Central Valley for our fresh greens, particularly as they can be grown here pretty much year-round—and inside our city limits. Grown in season, the same goes for crops like spinach, radishes, cabbage, spring peas, scallions, green beans, cucumbers, new potatoes, tomatoes, peppers and zucchini. Even apartment dwellers can grow tomatoes in containers for harvest in July, August and September that will taste way better than ones trucked in from California or Florida during those months.

In the urban environment, we're never going to be able to feed ourselves. We don't have the room to grow corn and wheat; we can't keep the animals we need for dairy and meat; and our climate doesn't permit us to grow citrus, olives, coffee and cocoa. But as the old adage goes: Just because we can't do everything doesn't mean we shouldn't do something... And what we can grow in the city we can grow better than anyone else. We can grow the perishable items that are the hardest to keep on the grocery store shelf—and because they're grown right here, right where we live, they're fresher and more nutritious.

Edible landscapes—in addition to producing food for our tables—also make far more efficient use of our limited natural resources. You're not wasting water and fertilizer on a lawn you can't eat; you're reducing packaging and transportation costs; and you're doing your part to augment our local food supply.

So plant a fruit tree. Garden in containers. And for goodness sake, let's at least put some of that largely useless lawn into garden and grow something edible. Because, eaters that we are, we're always going to be wanting something to eat."

Tim Rinne, co-founder of the Hawley Hamlet, a neighborhood garden in Lincoln



"Multifunctionality will be the rule of the day in the coming years. Plants that fill many niches will be a major influence in landscaping as well as tolerance to tough environments. Plants that are only aesthetically pleasing but that can't take our extremely variable weather conditions will fall out of favor. Trees that provide windbreak benefits, wildlife food and, perhaps, unusual growth character will rule the scene. Drought-tolerance will also be a significant requirement as water will continue to be a limiting factor. And I think we'll see more and more dependence on plants that are native to the area. Plants chosen for attractive foliage will be much more valued than ones selected for short-term flowering. Insect invaders will also cause some susceptible plants to lose favor."

Bob Feurer, retired science educator and arboretum curator

"I think collecting and retaining water in our landscapes will be especially important in future years. I don't think we concern ourselves about water conservation nearly as much as we should."

Blair Brennan, Construction Project Coordinator at Chadron State College



"I see a renewal of the back-to-the-land movement of the '70s but with a new twist. Instead of moving to suburban acreages, families will pack their small urban plots with a diverse array of multifunctional plants. For example, instead of woody plants that are strictly ornamental, the most desirable landscapes will emphasize plants that provide food as well, like aronia and honeyberry (*Lonicera caerulea*, non-invasive relative of honeysuckle with nutritious sweet-tart fruits shown opposite). Native wildflowers such as purple prairie clover and sticky skullcap will be tucked among the vegetables not just for their beauty but also to attract pollinators. Ecological pest controls such as a dependence on beneficial insects will be the norm, since people won't want their harvest contaminated with systemic pesticides. Wood mulch, if used at all, will be only for new landscapes not yet established, with green living mulches providing the preferred look."

Jan Riggenschach, syndicated garden columnist



"With the projected world population growth of the next 30 years, agricultural lands will likely be exploited more than ever. Natural lands will become more precious with each passing year as more acres are needed to feed the world. Private landowners in the urban setting will be left responsible for maintaining native species of both plants and animals through establishing wildlife habitats. At the same time, it will become more critical that we produce as much of our own food as possible. I realize that this sounds an awful lot like fear-mongering, but unfortunately, it's the reality we are facing.

Why not grow diverse gardens that can be significant food sources for us and nature? Mixing your food crops into a flower bed with many plant species reduces plant diseases and creates a healthy home for the beneficial insects that keep down pest populations. Allowing food crops to self-sow* lets nature do the planting plan for you! This increases the chance that crops will actually rotate so you aren't depleting the soil in one area of certain nutrients (be honest, we've all saved the best space for our favorite produce, in my case tomatoes) and it gets your garden back into the ebb and flow rhythm of nature. The best gardens are constantly changing.

*My favorite veggie to let go to seed and spread on its own is the radish. They have beautiful flower stalks up to 3 feet high, range in color from red to pink to white, and are incredible food sources for a myriad of pollinators. They can be aggressive seeders and could be considered weedy, but I'll weed something that I can rinse and throw in a salad any day."

Aaron Sedivy, UNL Horticulturist and Doctor of Plant Health Student

"I believe the single factor that will most influence future Nebraska landscapes is the broadening complexity of growing conditions, especially in urban areas of our state. When I started teaching at NU and working as a landscape architect in Nebraska 23 years ago, there seemed to be a wide variety of plants that were time-tested and dependable—properly placed and used in a particular landscape setting. Today, and in the future, all bets are off. We have more cultivars and 'new' plants than ever before, but even with the additional diversity and choice, trusted plants are dying and plants I never would have trusted in certain growing conditions seem to be thriving. Urban conditions (microclimates, poor soils, chemical use, unmanaged irrigation...), coupled with



unprecedented temperature and precipitation fluctuations/extremes over back-to-back seasons and years, add a layer of plant health stress that accentuates ongoing disease and insect problems and a continual list of growing plant health and survival challenges. Successful landscapes that become more beautiful, functional and manageable over time will be possible in the future—as they are now—but only if they are valued enough for the inevitable additional design and management expertise they are likely to require."

Steven N. Rodie, UNO Professor of Biology and Environmental Studies



"Negative comments proliferate regarding turfgrass. The turfgrass industry, however, wishes to be part of the solution rather than the problem. Turfgrass should and will continue to be an integral part of a landscape plan. Extensive work in turfgrass improvement via plant breeding and science-based best management practices will be critical in future landscapes. Equally critical is public adoption and acceptance of resource efficient, science-based turfgrass management practices."

Roch Gaussoin, USDA National Agricultural Research, Extension, Education, and Economics Advisory Board

"Thoughts on recreation and drought: It might seem like a stretch to connect outdoor recreation with drought, but there is an opportunity for a culture shift. Proactive water conservation policy is a critical component of successfully weathering any drought, and outdoor recreation on public lands may hold the key to reducing residential water usage.

Going into a future where hot, dry spells may become more frequent and severe, communities would be wise to prioritize the elements of community life that they want to preserve. Letting individual lawns go brown while continuing to water around shared buildings is one way to retain a sense of normalcy during a drought. Smaller communities, state parks, and recreation areas in Nebraska are already engaging in this practice. Individual campsites are often not watered, while the spaces around the visitors' center or marina are kept green and inviting. Shower timers are common in recreation center locker rooms, and pool equipment backfills and reuses water. Skate parks, play structures, and artificial turf mini-golf courses are water-efficient. Canoes, rafts, and paddleboards make it possible to enjoy recreating in smaller reservoirs, ponds, and creeks. Campers and paddlers do not complain about a brown campsite or a wider beach area, since these things do not affect the fun memories and the adventures.



In publicly managed areas, we are good at making smart choices, but water conservation at home remains a challenge. In order to shift this pattern, it might be time to let go of the big green lawn, and instead embrace the big green park."

Theresa Jedd, Environmental Policy Specialist and Post-Doctoral Research Associate,
UNL National Drought Mitigation Center

Challenges for Landscape Design

FUTURE LANDSCAPES

LANDSCAPE DESIGN

John Royster, Professional Landscape Architect, President & CEO of Big Muddy, Inc.

Landscape design is always challenging. Landscape architects and designers work with living elements that respond to conditions on a project site, local climate and the level of care after installation. Typically landscape designs

expectations of what a resilient landscape looks like, both for designers and the general public, may be a greater challenge than the technical issues associated with developing them. NSA has been a leader in this and needs to continue this critical educational effort.

Embracing soil quality restoration will be important to long-term success.

Drought is something we'll be experiencing more frequently and possibly with greater severity—in extent, duration and extreme. Precipitation patterns are changing to be less frequent with storms of shorter duration and greater intensity. Both factors create the need to manage our soils for landscapes and agriculture, to better absorb water when it arrives and hold it until plants can use it. To have this happen, we need to ensure that our construction and maintenance activities don't compact soil, leaving space for air and water. To improve our soil's ability to retain water, we need to dramatically increase the amount of organic matter in soil from the current average of 1-2 percent to 5-7 percent. Soils with higher organic matter hold water better, have higher levels of soil biotic activity and provide the chemistry and raw materials necessary for healthy plant communities. The good thing about this is that even if climate change didn't occur, our landscapes would still benefit from taking these actions.

We need to keep rainwater from becoming stormwater.

Within Nebraska's urban areas we seem to get too much rain in the east that results in flooding, and not enough in the west, which results in increasingly arid conditions. We need to begin by managing rainwater before it becomes stormwater. In both areas, natural precipitation is what our landscapes need to use to be sustainable. Landscape soils need to drink up water when it rains and hold moisture in the soil for dry times between storms. Urban landscape design needs to focus as much on what is happening below ground as above. We need to de-compact soils; create aesthetically pleasant depressions in landscapes to hold water; and increase soil organic matter to improve infiltration and water absorption. In short, we need to treat rainwater like a resource and not a nuisance.



Omaha is working hard to slow down and capture rainwater.
Above: UNO Welcome Center
Bioretention Garden.

mature over time. Good designs are flexible and accommodate nearly constant change. The extreme weather events we have experienced over the last decade or so, however, make plant selection and flexible design even more complex. Three areas I see as being critical in the near future are:

It may require all of us to change our aesthetic expectations for landscapes.

Resilience is a term that is being used more and more in relation to landscapes. Natural landscapes, by definition, are resilient. Our Nebraska grasslands are adapted to drought, heat, bitter cold and fire. Our forests and woodlands are as well. Nebraska-style landscape designs attempt to replicate that natural resilience through use of native and well-adapted plant species. The quandary that each landscape designer and landscape architect faces is to create a visual appearance that fits within the public's perception of a designed landscape while retaining the natural resilience of native landscapes. In some cases our

Extreme Challenge—Median Style

Mark Canney, Park Planner/Designer for Lincoln Parks & Recreation

If the worst of a homeowner's landscape challenges is the curb "hell strip" adjacent to the street, add a whole series of other problems and you get a sense of what it's like to design and manage street medians.

- ❏ Dramatic safety hazards due to the close proximity of traffic that may be going 55mph or more.
- ❏ Either accidentally or on purpose, drivers frequently drive through the medians, further compacting the soil, destroying plants and damaging irrigation systems.
- ❏ No overhead canopy or protection from severe rainfall, wind, snow or other extremes.
- ❏ Any mulch, compost or other protective covering is likely to be washed out or blown away.
- ❏ Though some organic matter is added to the soil during preparation, the existing soil is poor and compacted from street construction, and contains debris in the form of concrete, oil and other emissions from vehicles.
- ❏ The narrow ribbons of planting beds have heat-transmitting concrete on all sides.
- ❏ Salt or other materials that further damage the soil are applied for safety after snowfall or ice events.
- ❏ Limited access to water.
- ❏ Constraints on plant height and width.
- ❏ Full exposure to the sun and all other elements of the weather.

Within the limitations there are opportunities to try new approaches to design, expand the traditional plant palette to include more natives and implement a different approach to maintenance. All this while keeping in mind the impact not only to public health and safety but to stormwater run-off and city budgets as well.



FUTURE LANDSCAPES CITY STREETS

As designers, we continue to explore options that are ecologically beneficial yet aesthetically pleasing. In some locations the implementation of these landscapes has been quiet, while in others the explosion of natives has had a profound impact—creating conversations, inquiries and precedents for what is possible when resources are available. Most notable has been the Airport Entry Corridor—including West Adams and Cornhusker Highway.

The argument could be made that planted medians are an extravagance, only adding dollars on to taxpayers. This is mostly false when consideration is given to the ecological, economic and psychological impacts. Planted medians help with stormwater runoff—reducing the impact on older, undersized systems. Shade from plants, including trees, may add additional life to asphalt. Creating habitat for pollinators has become the objective of many communities, and using native plants helps accomplish this. Research shows that plant material also may create a calming effect on roadways that are highly travelled and congested.

The success of particular plants varies widely. Even within medians, smaller microclimates occur due to variations in moisture, temperature and activity, which ultimately impact plant growth. Little bluestem, for instance, may thrive in one median but be patchy in the next one. After two growing seasons, the plants that performed most consistently include: amsonia; aster; baptisia; blazing star; coneflower; goldenrod; leadplant; little bluestem; milkweed; prairie dropseed; sand lovegrass; and sidecoats grama.



The Shelter of Each Other— Plants as Living Mulch

Rachel Anderson, Community Landscape Specialist

If your garden resembles a mulch bed more than a flowerbed—with one plant here, one plant there, and stretches of wood chips in between—it might be time for a change.

FUTURE LANDSCAPES

LIVING MULCH

A good alternative is the use of garden weavers. Garden weavers are short, spreading plants that hug the ground to prevent erosion and suppress weeds. Think of them as *living mulch, weaving between showy plants like threads in a tapestry. They may not have striking forms or pretty flowers, but that's okay because their purpose is functional: to fill the nooks and crannies of your garden so weeds do not. Optimal species are shade-tolerant and have evergreen or semi-evergreen foliage, which is true of many of our native sedges and groundcovers.

Why not mulch?

Mulch costs money and needs to be reapplied every few years. It also has a habit of choking out perennials, prairie plants in particular, which might be why so many landscapes are dominated by it. Moreover, mulch falls short from a conservation perspective. It takes the place of plants that could serve as critical food sources for beneficial insects and does little to help clean water or prevent runoff.

Garden weavers can do what mulch can't by connecting individual plants to make a functioning, stable community. If you let them, garden weavers multiply to become more effective over time. As these plants grow together, their root systems improve the soil's capacity to slow and filter water, which helps prevent flooding and stream pollution. Furthermore, many species provide quality habitat. Violets,



Plants don't have to be low groundcovers to serve as mulch. Anything that doesn't shade taller plants will crowd out weeds and cover bare spots.

for example, are the sole food of fritillary butterflies in caterpillar stage.

How do I use garden weavers?

Place them where you would normally put mulch, between showy plants as an understory layer. Arrange your showy plants first; close enough so that they will touch when they reach full size. Then fill the remaining bare spots with garden weavers set 10-12 inches apart. The goal is complete soil coverage once they mature.

Such close spacing requires many plants, which can mean more money up front, but don't skimp since this is your primary system of long-term weed control. Try purchasing plants in small sizes, using seed to reduce costs or planting in phases so you can divide them for new areas.

What about weeds, especially the first year?

As with any garden, keeping weeds in check is important early on while plants get established. One method is to pull them by hand and sow seeds over the disturbed soil left behind. Another option is to carefully spot-spray weeds with a foliar herbicide, risking damage to your plants. Applying a temporary mulch or pre-emergent herbicide during the first season prevents weed seeds from

sprouting, but is incompatible with using seeds to plant. It may take some time to see what works best.

Since garden weavers hide from view below taller foliage, you can use several kinds without compromising the look you want. Maximizing diversity also benefits wildlife and ensures better coverage.

For sunny areas in the Midwest, some of the best weaving groundcovers are:

Purple poppy mallow, *Callirhoe involucrata*

Snow Flurries heath aster,

Symphyotrichum ericoides

Prairie ragwort, *Packera plattensis*

Prairie alumroot *Heuchera richardsonii*

Common blue violet, *Viola sororia*

For shadier areas:

Sedge, *Carex pensylvanica*, *texensis* or *appalachica*

Barren strawberry, *Geum fragarioides*

Spotted cranesbill, *Geranium maculatum*

Foam flower, *Tiarella cordifolia*

Wild ginger, *Asarum canadense*

* An excellent reference on living mulch is ***Planting in a Post-Wild World*** by Thomas Rainer and Claudia West.

The Will to Plant

Justin Evertson, Green Infrastructure Coordinator

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

For deeply rooted tree lovers, it can be hard to stay optimistic about the future of our trees, especially the trees we plant in our communities and on our farms. The list of challenges facing them is quite alarming ranging from a changing climate to an ever-expanding list of insect and disease threats (exacerbated by a changing climate). Emerald Ash Borer (EAB) is just the latest pathogen to wreak havoc on our trees and many more are certainly headed our way.

As has been the case since humans first started planting trees, our own actions will continue to take a serious toll on them as well. The threat from human activity is almost certainly going to grow. We humans can be hard on our planted trees as we constantly build, change and repave our communities and as we remove windbreaks for new farm ground. And we’re good at causing harm in the way we practice landscape care. Mower and trimmer damage, overwatering and drift from weed spraying causes significant harm to many community trees. A relatively new threat is herbicide drift from farm applications. The last several years have seen a significant increase in damage to community trees from herbicides sprayed on crop ground but which gets carried into rural communities by winds and other atmospheric processes.

Human apathy also plays a roll. Declining community tree inventories across the state and region reveal that the planting of trees is not the priority it used to be for many people. The advent of air conditioning and other modern creature comforts helps drive the apathy as people spend more time inside and no longer feel as personally connected to trees as we used to. People also move around more often and understandably don’t want to invest in tree-planting when they rent or

don’t plan to stay long. And many people that do own their homes value a well-kept lawn more than trees and don’t want to deal with the “mess” of trees. It’s a strange dichotomy that most people put high value in trees and yet not nearly enough people find time to plant them.

Of course an important part of sustaining our tree canopy is to know what species we should be planting. Species diversity is the cornerstone of making our community forests more ecologically-sound and resilient. And yet a changing climate and numerous insect and disease threats are going to make it ever more challenging to sustain good diversity.

Recognizing that Nebraska’s climate is shifting to be more like Kansas, the Nebraska Forest Service (NFS) recently initiated a program called the Environmentally Adapted Trees Initiative (EAT) with the goal of identifying trees that hold the best promise for our future. Two primary activities have been undertaken with the initiative. First we’re documenting proven survivor trees in our region that will be good seed sources for nursery stock going forward. Secondly, the initiative has identified several trees that are rare or absent in our region now, but which hold at least some promise at being adaptable to our warming climate. A thousand of these trees representing 40 different types have now been planted in 17 trial sites across the state and NFS will work with local site coordinators to document the survival of these species over the coming years (see “A Few Trees to Recommend”).

Ultimately the greatest challenge to our trees isn’t a lack of good species to plant, but rather finding the will to plant them. If we truly want a future that includes abundant, appropriate and well-placed trees helping to make our farms and communities more comfortable, attractive and economically viable, then we’re going to have to expand our



Photos above of inviting, shady areas in Omaha and Waverly. Even briefly walking or parking under shade trees on a hot day makes the appeal obvious, but “Ultimately the greatest challenge to our trees isn’t a lack of good species to plant, but rather finding the will to plant them.”

planting efforts. Like the proverbial turtle on a fence post that didn’t get there by accident, the best of our farm and community trees don’t get there by accident either. They require our committed and ongoing action.

Weed Management

Justin Evertson, Green Infrastructure Coordinator

“If dandelions were hard to grow, they’d be welcome on most any lawn.” Andrew Mason

When it comes to managing the landscape, weed control is one of the most costly and time-consuming endeavors we undertake. It gets old. I’ve been active in public-scale landscape planting and care for over 30 years now and in that time I’m guessing I’ve spent about 5,000 hours hoeing, digging, pulling, spraying, mowing, trimming and mulching in an effort to keep weeds at bay. I’ve pulled or dug tens of thousands of weeds (including at least 6,437 mulberry, silver maple and cedar seedlings), sprayed over 400 gallons of herbicide, burned through at least 50 gallons of gasoline running mowers and trimmers, used up nearly 2 miles of trimmer string, and spread at least 600 yards of wood mulch—mostly by hand.

FUTURE LANDSCAPES

WEED MANAGEMENT

I’m tired and my back hurts—along with my elbows and shoulders. Although I certainly wouldn’t call it wasted time, I can’t help but look back now and think about how I could have saved myself some time and consternation.

In many ways, the aesthetics we strive for in the planted landscape put us at odds with Mother Nature, especially around the types of plants that we prefer. We’ve come to expect plants with certain colors, shapes and textures—and that look neat and tidy when combined together. We especially like to space them far apart so we can see them in all their glory. Mother Nature, on the other hand, “thinks” in more ecological terms and works with plants that are part of a mutually beneficial system between insects, other wildlife and the plants that sustain them. They’re often the plants that have evolved to tolerate this place, but which aren’t gaudy in flower. And she likes to put them close together. Indeed, where there is open



When life gives you lemons... turn it into a flower bed. Common milkweeds above and smartweed opposite.

ground, Mother Nature will put a plant to fill the void.

In this day and age when people move plants all over the globe and as we work to keep our community landscapes and farms functional, weed control is an important and necessary activity. And it’s a good thing that we have many modern tools including mechanized equipment and herbicides to help us control weeds. Unfortunately, we’ve gone a bit overboard and many of our methods are taking a serious toll on our trees and other non-target plants.

It also seems clear that we’re disrupting important ecological and green infrastructure functions in our communities as we spray an ever-expanding arsenal of herbicides. Tree professionals across the region are now documenting the serious herbicide damage to trees from both lawn and crop spraying. Many trees are declining before our eyes (some are dying) and the problem is almost certainly going to get worse. And the harder we work at weed control, the more we reduce biodiversity, including the abundance of pollinators and other beneficial insects.

This article is an attempt to sow some appreciation for weeds, or at least suggest

that we should relax about some of them. Simply put, it’s just not worth damaging trees and other non-target plants in an effort to kill things like dandelions that do little harm other than disrupting our aesthetic ideals. However, I’m the first to admit that many weeds are problematic. Curly dock, pigweed and marestail are ugly and they do look out of place in most landscapes. Others like bindweed, Canada thistle and garlic mustard are invasive and ecologically disruptive. In no way am I advocating that our landscapes be turned over to whatever will grow. However, the vast majority of plants we call weeds are primarily only an aesthetic concern. If you’re like me, and your back hurts and you’re getting older and tired and a little crabby and you’re looking to save some time and money, consider this an endorsement to embrace your lazy side and to start practicing some benign neglect.

In general there are three basic reasons to appreciate certain weeds. First, some species are visually attractive (or at least not ugly) and they can help cover the ground and fill space, thus outcompeting more problematic weeds. Hoary vervain, pink smartweed, Pennsylvania pellitory and burnweed come to mind in this



Pellitory and burnweed.
Common milkweed with painted lady.

regard. Secondly, many uninvited plants are ecologically important and help sustain pollinators, birds and other beneficial wildlife. Milkweed, violet, nettle, native thistles and smartweed are important in this regard. Finally, quite a few weeds are edible to humans or useful in other ways. Lambsquarters, purslane and dandelion can all be blended into a tasty salad. Check out the article that follows for a closer look at the various ecological benefits of several “weeds.”

As we look ahead to the future, I hope that we can strike a better balance between how we perceive weeds and how we try to manage them in the landscape. This will likely require a fairly radical change in defining beauty and attractiveness to be more than just color, shape and texture but to also include ecological function. We can do it!



Seven Tips for Living with Weeds

Justin Evertson, Green Infrastructure Coordinator

1. Learn about some of our weeds. Know their names, where they originate and how they spread. Their natural histories can be quite fascinating. Good online resources for weed identification include “Common Weed Seedlings of the North Central States” by Michigan State University and “The Weed ID Guide” by University of Missouri Plant Sciences.

Concentrate on the truly problematic weeds such as those listed as noxious or invasive and relax about weeds that are primarily an aesthetic issue, especially native species (the Nebraska Invasive Species Program does a good job identifying the most problematic weeds across the state: neinvasives.com/species/plants/). Things like dandelions and henbit really aren’t a big problem and they quickly fade as spring moves into summer. Be accepting of other species that have aesthetic or ecological benefits like smartweed, milkweed, pellitory, toothed spurge and tall thistle—and just about any desirable garden plant that spreads itself around (I’m talking about you, purple coneflower).

2. Keep in mind that many weeds are cyclical in nature. They can burst onto the scene almost overnight (often in the mulch we spread) and can be quite a challenge for a while, but then fade over time as insect pests, diseases and other plants displace them.

“Seven Tips” continued on next page



Top: A bed of smartweed offers color near a basketball court.

While Canada, musk and plumeless thistle are noxious weeds in Nebraska, natives including tall thistle are valuable pollinator plants, not overly aggressive and included in many state wildflower lists.

3. Whenever possible, hand pull or dig weeds instead of spraying them. It can be cathartic and a good physical activity. I fully admit this can get old in a hurry so bring along some jazzy tunes or listen to a good podcast.

4. Don't broadly spray for lawn weeds in the spring when trees are actively growing and herbicide drift will cause greater problems. Wait until fall to work harder at weed control when trees and other non-target plants are much less prone to damage. Only spot-spray in the spring.

5. Rethink mulching practices and reduce bare/open ground. Maintaining large open areas with wood mulch or rock mulch is nearly impossible without the frequent use of herbicides and without frequent remulching. Mother Nature has a strong desire to fill such voids with plants of some kind. Instead of working against that natural process, embrace it and cover the ground with more desirable plants (see page 18).

6. Relax about the lawn. Unfortunately, too many people have fallen into the trap of desiring a lush and perfectly weed-free lawn—now seen as an American status symbol. Let's push back on that. It's important to remember that most trees and other landscape plants do not coexist well with a lush lawn. Also, there is no law that requires a lawn to be comprised only of turfgrass (although there may be neighborhood covenants that require it). Before the advent of broadleaf herbicides, white clover was often included in lawn mixes to help fix nitrogen and give the lawn more resilience. We can return to that mindset and start including a variety of plants that tolerate mowing, including things like clover, trefoil, violet, yarrow and other groundcovers. And we can turn at least some of our lawns into prairie meadows, emphasizing our wonderful native plants and allowing a few benign or beneficial weeds to easily blend in. Relaxing about the lawn is one of the easiest ways for people to become better environmental stewards.

Beneficial Weeds

Patrick Murphy, Nebraska Statewide Arboretum Landscape Design Intern

What is a weed? A basic definition that most people can agree on is “an unwanted plant.” Many of the plants that we call weeds are often misunderstood, their potential values going unnoticed. Of the plants described as weeds, many are native plants that support a great number of native wildlife species, most notably bees, beetles, butterflies and other pollinators. Throughout their lifecycle these weeds provide food and shelter to many species whose innumerable benefits can be seen when our gardens bloom, crops set seeds and wild game populations increase.


Habitats impacted by humans—roadsides, cleared garden beds, field edges—are the areas where weeds grow best. The impact of extensive removal or wholesale spraying of weedy species immeasurably harms the environment (soil erosion, reduced biodiversity, etc.) which eventually take its toll on our yards and gardens, whereas not harming the environment can be as simple as leaving some weeds for wildlife.

The following common garden weeds are actually North American natives that support many important insects and other wildlife. Many of them have several different common names, which are listed at the beginning.

Burnweed, fireweed or pilewort

(*Erechtites hieracifolia*) is similar in form and flower to thistles and wild lettuce, though lacking the spines. Growing 2-4' tall, it is highly adaptable and often the first to colonize an area affected by wildfires. Associated wildlife: various bees, paper wasps, hornets and tachinid flies.




 **Toothed spurge or green poinsettia** (*Euphorbia dentata*) is actually related to poinsettias; if you look closely you can



see a clear similarity between the two. It tends to live underneath other plants and is not worth spraying. Associated wildlife: small bees, syrphid flies, wasps, flea beetles, aphids, mourning dove, greater prairie chicken, bobwhite quail, and horned lark.

Pennsylvania or pink smartweed

(*Polygonum pensylvanicum*), like burnweed, is quick to colonize open ground and disturbed areas. Though it prefers moist ground, it can take drier conditions and part shade. Growing 1-4' high on knotty, trailing stems, it becomes bushy over time. Associated wildlife: various bees and wasps, syrphid and tachinid flies, moths, butterflies (bronze copper) and leaf beetles.

 **Curlycup Gumweed** (*Grindelia squarrosa*) is named for the sticky resin that exudes from the distinctive curling



bracts surrounding the base of the yellow, daisy-like flowers. This biennial is prolific

in the western U.S. and can be a problem on over-grazed pastures since livestock don't eat it. Native Americans used the dried flowers in tinctures to treat poison ivy and to relieve coughs and congestion. It's an attractive, easy-to-grow plant for more western landscapes. Associated wildlife: a wide variety of bees, wasps, flies, beetles, moths and butterflies.

🍷 **Tall or roadside thistle** (*Cirsium altissimum*), as its name suggests, can grow to 6' high in its second year (its first year is spent as a ground-hugging rosette). The flowers are a distinct pink or purple, rarely white, and oriented toward the sky. This valuable thistle is well-adapted to various environments of the eastern Great Plains, thriving in prairies, open woodlands, roadsides and disturbed areas. **Associated wildlife:** a wide variety of important insects and birds including various bees, halictid bees, syrphid flies, moths, butterflies (fritillary, swallowtail, painted lady), leaf beetles, thistle tortoise beetle, bumble flower beetle, grasshoppers, American goldfinch, sparrows, pine siskin, juncos and indigo bunting.

🍷 **Common milkweed** (*Asclepias syriaca*) is an important host plant for the monarch butterfly, the leaves of which feed the caterpillars. It used to be common throughout the region, but has been greatly reduced due to the use of herbicides in both landscape and farming practices, leading to a marked decline in monarch population. Unfortunately, it can look forlorn and ragged in late summer from aphid feeding and it likes to move around in the landscape, making it undesirable to many gardeners. Associated wildlife: monarchs, milkweed beetles, bugs and tussock moth, as well as a variety of bees, wasps, flies, sphinx moths, butterflies and oleander aphids.

🍷 **Honeyvine or climbing milkweed** (*Cynanchum laeve*) is loosely related to true milkweeds, and it also attracts and supports monarchs. This fast-growing perennial can climb to 15' above the ground simply by twining around other plants. It does not use tendrils or adhesive discs so removing is less damaging than removing other vines, and it's herbaceous so it doesn't strangle the plants it grows on. Associated wildlife is the same as for other milkweeds (previous bullet).



🍷 **Wild or common blue violet** (*Viola sororia*) is a tough, aggressive wildflower that can tolerate mowing, making it a scourge to people who fuss over their lawn. Besides the attractive flowers, other reasons to spare them is that they're a critical host plant for fritillary butterflies, including the endangered regal fritillary and, except for the roots, the entire plant is edible (add some of their colorful flowers to your salad tonight). Associated wildlife: a variety of bees, butterflies, syrphid flies, wild turkey, bobwhite,

mourning dove, white-footed mouse, white-tailed deer and cottontail rabbit.

🍷 Unlike all the "beneficial" weeds listed previously, stinging or common nettle (*Urtica dioica*) is not native but was introduced from Europe and is now ubiquitous across the U.S. It is seen as a



menace since the glassy hairs on its stems and leaves can cause such discomfort to bare skin. But the fresh young leaves of most nettles are very nutritious and safe when cooked. Nettles are also an important host plant for a variety of butterflies including the red admiral, tortoiseshell, comma, question mark and painted lady.

"The Future" continued from cover

the way we plant and manage our landscapes—can have significant impacts on the quality of those resources.

As we look forward it's also informative to look back and see what course we've taken to get here. Before World War II, most people across the U.S. maintained home landscapes that emphasized their usefulness for comfort and survival. They planted gardens and fruiting shrubs and trees for food and they planted larger-growing trees for shade and wind protection. A few ornamental plants did get planted, but there just wasn't as much time for that. And outside of a few rich folks, most people didn't fuss over the lawn but rather just tolerated and occasionally mowed whatever they could get to grow.

After World War II and with the rapid modernization of the country, including in food production, the home landscape changed dramatically. People no longer planted as many vegetable gardens or food plants and the advent of air conditioning kept us comfortable without as much need for trees to soften the climate. Perhaps most importantly, our landscapes shifted to exist primarily for aesthetic purposes. The lush lawn became the norm and our trees, shrubs and flowers

were selected primarily for their color or shape, with little regard for ecological concerns. As a society, we quickly became disconnected from the natural world around us.

Fortunately more people are becoming aware of the environmental concerns facing us and are looking for ways to strike a better ecological balance with their own landscapes. This gives us hope that, in the future, we'll return to planting and managing multi-purpose landscapes that are not only aesthetically pleasing but which also help achieve important environmental and ecological goals such as sustaining native biodiversity, conserving drinking water, slowing and filtering stormwater, providing food for people and wildlife, and providing shade and wind protection for our collective comfort. This issue of **The SEED** takes a closer look at the future of our planted landscapes covering topics such as sustainable design, plant selection, green infrastructure, landscapes to live in, the future of our trees and kids in the landscape. Believe it or not, we even sing the praises of a few weeds. Please let us know what you think about these issues by sending a note to arboretum@unl.edu, subject line "future of our landscapes."

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Lots of Ways to Connect!

You are part of the NSA community and there are many ways to get involved:

- JOIN US for events, including talks, tours, plant sales and free brown-bags the first Thursday of every month in UNL Keim 150
- BUY PLANTS, either online or at plant sales, from our wide selection of regional recommendations, many with local seed source
- RECOMMEND our organization and resources to friends, family and co-workers
- VOLUNTEER at our greenhouse, office or at statewide events
- GIVE—donations are essential to NSA since we are a grassroots membership-based nonprofit.
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