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The Mighty Bur Oak: Sentinel Tree of the Prairie Peninsula

Mike Leahy, Natural Community Ecologist, MDC

The acorn is what I noticed first. On a hike with my family last winter to a favorite bottomland forest in central Missouri, at my feet was an enormous acorn with a fringed cap—the unmistakable touchstone of the majestic bur oak. When I approached the solid tree, with its enormous limbs and a trunk armored with deeply furrowed bark, I was in the presence of a solemn living marker of tree time.

In our distracted human world of tweets and live streams, in front of me was a being marking the ages. In my own time on earth, bur oaks have been a steadfast component of my knowledge of the natural world. Beginning with early childhood visits to the Morton Arboretum outside of Chicago, and continuing to the present—both as a natural community ecologist and as an adherent of nature—I have always been humbled by this sentinel tree of both bottomland forests and prairies.

Bur Oak Geography

Bur oak is the signature tree species of the tallgrass prairie peninsula. This historic vegetative region stretches from the Flint Hills of Kansas east to Ohio and north into Wisconsin. Of the 90 species of oak in the United States, bur oak is the most widely distributed and ranges farthest north (Nixon, Flora of North America Editorial Committee 1993+; McWilliams et al. 2002). Occurring from Saskatchewan south to Texas and east to New Brunswick, bur oak persists across an annual precipitation gradient from as low as 15 inches to more than 50 inches (Johnson 1990). It is the most cold tolerant of oak species (McPhee and Loo 2009) and one of the most drought-tolerant oaks as well (Abrams 1990).

In Missouri, bur oak occurs across the state but is never very common. It is more frequently found in the adjacent states of Illinois, Iowa, Nebraska, and Kansas. In Missouri, bur oak occurs in both upland and bottomland habitats in the northern half of the state, whereas it usually occurs only in bottomland habitats in the southern half.

In 1949, the great American conservationist Aldo Leopold wrote "…he who owns a veteran bur oak owns more than a tree. He owns a historical library, and a reserved seat in the theater of evolution." With both respect to Leopold and deference to women, the author adds that female owners of bur oaks are equally fortunate. With its armor-like bark and majestic branches, the bur oak—like this famous one in McBaine, Missouri—is one of America's most stately tree species

Life History

Bur oaks are monoecious, having male flowers (catkins) and female flowers (inconspicuous, in leaf axils)

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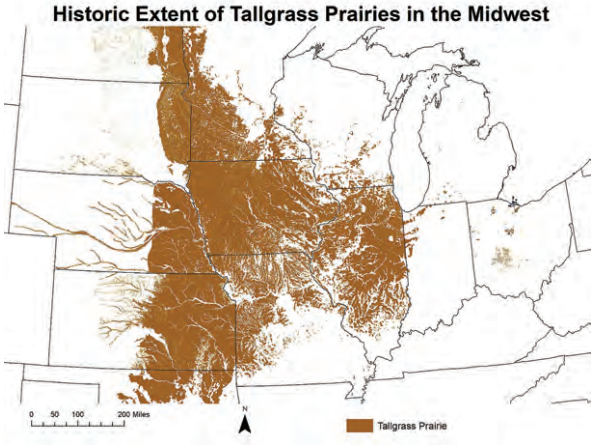
on the same tree. Bur oaks also are dichogamous, meaning that male oak flowers of individual trees release pollen before female flowers are receptive, to prevent self–pollination (Great Plains Flora Association 1986). In Illinois, researchers have found that bur oak populations—despite being dispersed and fragmented—appear to comprise a single genetic population (Craft and Ashley 2007) likely due to high levels of gene flow from long dis-tance pollen dispersal.

The typical age trees being acorn production is 35 years with optimal acorn production from trees that are be-tween 75 and 150 years old (Young and Young 2009), but trees in ideal conditions have been known to produce in as little as 7 to 9 years. Bur oaks produce the largest acorns of any oak species north of the Rio Grande River. Bur oak acorns are mature around four months after pollination, and they drop in autumn. Bur oak does not always germinate in the autumn. Rather, it requires a period of 30-60 days for root emergence, then additional chilling for the shoot (or epicotyl) to emerge. In general, germination appears to decrease with desiccation and likely acorn age (Johnson 1990). Little research has occurred on the best substrate for germination; one study in Iowa found germination was best for acorns buried one inch in mineral soil with no leaf litter (Krajicek 1960).

Good seed crops occur every two to three years. Acorns are dispersed by gravity, rodents, and to a lesser extent, water. Acorn predation by weevils (Curculionidae) can be significant (Kearby et al. 1986). Bur oak acorns are a food source for a variety of birds and mammals, and high levels of predation are common in bur oak habitats (Briggs and Smith 1989). In the Flint Hills of Kansas, bur oaks form savanna/woodland communities in riparian areas, termed locally as "gallery forests" surrounded by upland tallgrass prairie. Fox squirrels here have been documented caching bur oak acorns upslope as much as 169 feet into the prairie (Stapanian and Smith 1986).

Bur oak seedlings rapidly develop deep taproots (Danner and Knapp 2001) and produce extensive root systems with wide-spreading laterals. For example, a 12-year old, 14-foot tall bur oak in southeastern Nebraska on silt loam soil had a 13-foot deep taproot and lateral roots extending 11.5 feet (Sprackling and Read 1979).

Despite their rapid root growth, overall, bur oaks are slow growing. On mesic soils of floodplain terraces and footslopes, mature trees generally grow 80 to 100 feet tall, with a diameter of 36 to 48 inches (at 4.5 feet above the ground) and can live 200 to 300 years (Johnson 1990). The oldest living documented Missouri bur oak was 408 years old (Stambaugh 2020). Mature trees grown under good conditions have a large trunk, broad crown, and large branches.



This map of the tallgrass prairie peninsula—where the bur oak is most abundant—was obtained from pre-Euro-American settlement vegetation layers for each state, except North and South Dakota, which are from the LANDFIRE Biophysical Settings layer.

Bur oak (Quercus macrocarpa) belongs to the Fagaceae plant family and the oak genus Quercus. It is in the subgenus Leucobalanus, lacking bristles on the leaf lobes or apex. Its alternate leaves include 3 to 8 lobes per side with at least one pair of deep sinuses at or below the midpoint. Leaf blades are 5 to 9 inches long and 3.5 to 5 inches wide. Major veins on the leaf undersurface lack conspicuous tufts of hairs. Twigs are usually pubescent. It has the largest acorns of all North American oaks, with the nut being 1 to 2 inches long (Yatskievych 2013). With durable, high quality wood, bur oak lumber is used for cabinetry, barrels, hardwood flooring and fence posts. Its ecological value is extremely important, as a host plant for caterpillars of many butterfly and moth species, and as a producer of acorns that feed wildlife.

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As Aldo Leopold wrote in 1949, "Bur oak is the only tree that can stand up to a prairie fire and live." Younger bur oaks, if top killed by fire or cutting, readily resprout. As bur oaks mature they develop one of the thickest barks of North American deciduous trees, which serves as a protective insulation from fire (Peterson and Reich 2001). Bur oak "grubs" are burl-like woody structures that develop on the soil surface as young bur oak stems or sprouts are repeatedly top-killed by fire. These "grubs" have been noted as a common feature of bur oak savannas in southern Wisconsin and northern Illinois (Curtis 1959). With cessation of fire, these bur oak savannas with their "grubs" quickly formed dense thickets of bur oak and lost their prairie vegetation (Bowles and McBride 1998).

In his book, The Story of my Boyhood and Youth, John Muir recalls every detail of growing up in Marquette County, Wisconsin: "As soon as the oak openings were settled, and the farmers had prevented running grass-fires, the grubs grew up into trees and formed tall thickets…and every trace of the sunny 'openings' vanished." In the loess hills of northwestern Missouri, remnant prairies cling to the steep west- and south-facing slopes. These loess hill prairies harbor unique assemblages of plants and animals more similar to Great Plains mid- and short-grass prairies than to other Missouri ones.

On the protected north- and east-facing slopes of some sites, such as at Brickyard Hill Conservation Area's Loess Mound Natural Area, are groves of old-growth bur oaks that historically supported oak savannas. Here researchers Mike Stambaugh and Rich Guyette with the University of Missouri's tree ring lab sampled live and dead trees to extract cross sections of their wood (Stambaugh et al. 2006). They were able to recon-struct a 334-year tree-ring record span-ning the period 1671 to 2004. Pre-1820, the mean fire interval was 6.6 years—that is on average a fire hot enough to scar a sample tree once every 6.6 years. For a period after Euro-American settle-ment of the area, the mean fire interval dropped to 2.5. Then, with the advent of fire suppression, only one fire scar was found after the mid-1950s. Although the loess hill prairies here have been treated with prescribed fire and thinning, efforts to restore the bur oak savannas on the protected slopes are just beginning.

At top, Rich Guyette and George Hartman with the University of Missouri's tree ring lab in front of an old-growth bur oak at the Missouri Department of Conservation's Brickyard Hill Loess Mound Natural Area in northwestern Missouri.

Above, the east slope of Brickyard Hill Loess Mound Natural Area, circa 1912, with bur oaks.

Habitats

Bur oaks typically occur on more calcareous soils and are associated with the Alfisol and Mollisol soil orders. In Missouri bur oak is rarely a dominant overstory tree as it is in states to the north, east, and west (notably Minnesota, Wisconsin, Ohio, Indiana, Illinois, Iowa, Nebraska, and Kansas). Here, according to U.S. Forest Service Forest Inventory and Analysis data, bur oak occurs most commonly in the Central Dissected Till Plains or Glaciated Plains ecoregion of northern Missouri and in the Osage Plains ecoregion. In these ecoregions, bur oak occurs in uplands as well as on terraces and higher elevations in bottomlands.

Scattered bur oak stands in Missouri occur along larger Ozark rivers such as the Current on higher terraces and foot slopes. Many of the mature bur oaks along the Current River date back to the 1860s (Stambaugh 2020). Remnant bur oaks also occur in higher elevation bottomland forests of the Missouri and Mississippi river floodplains. Examples range from the now lone old growth bur oak near McBaine to scattered stands ranging from Westport Island Natural Area near Elsberry to Big Oak Tree State Park in the Bootheel.

Cultural History

Although not a major component of Missouri's timber supply, bur oak is often grouped with white oak (Quercus alba) in lumber manufacture. Bur oak is used for railroad ties, cabinets, flooring, and fuel (Kurz 2003). Bur oak groves in the prairie landscape of the Midwest were often highly valued by European American settlers as they provided wood for homes and fuel, and acorn forage for livestock (Nuzzo 1986). Native Americans utilized bur oak as a food source (acorn meal) and for some medicinal properties (e.g., the inner bark was used as an astringent). Undoubtedly, they would have used bur oak groves for shade and wind protection for encampments, and for fuel wood and tools.

There are historic photos from the 19th century taken by European Americans of bur oak "burial trees" used for aboveground burial by some Native Americans from the Great Plains (Stein et al. 2003). Certain large bur oaks were also used as "council trees." The Council Oak at Sioux City, Iowa, was a bur oak. Here during the week of August 13 to 20 in 1804, the tree shaded a meeting between the Lewis and Clark expedition and Native Americans.

Conservation with Land Use Changes

In many parts of the Midwest, bur oak has decreased in abundance and extent over the last century. Many prairie bur oak groves were converted to settlements, non-native pasture grasslands, or row crops. In the bottomlands, bur oak occupied some of the choicest lands for row crop agriculture, and these areas were rapidly converted. Fire suppression led to prairies and savannas becoming bur oak thickets, which then became too shaded for bur oak regeneration and recruitment and changed to mixed stands of elm, ash, hickory, and maple.

Pest Problems of Concern

In Iowa, a bur oak blight has been noted that led to significant leaf and then branch mortality of upland bur oaks. Researchers at Iowa State University (Harrington and McNew 2016) determined that the cause of this disease is a fungus, *Tubakia iowensis.*

The host specificity and genetic variation in the pathogen and apparent variation in susceptibility in the host (bur oak) suggest that this fungus is native. Consecutive springs of high rainfall in Iowa during bud break and shoot expansion are believed to increase severity of the disease in individual trees, and led to the recent recognition of the disease. In Iowa a marked increase in spring rainfall during the last two decades coincided with this disease's recognition by science.

Tree mortality typically doesn't occur due to infection by *T. iowensis* alone. Usually it is a combination of the fungal infection and then an infestation of a native beetle—the two-lined chestnut borer (*Agrilus bilineatus)*. The larvae of the borer construct feeding galleries in oak tree xylem that can lead to dead crown branches and tree death over a two- to four-year period (Haack and Pretrice 2020). Also, trees stressed by previous droughts, late spring frosts, and hail and ice storms are susceptible to borer infestations.

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Improved black walnut cultivars for nut production in Missouri

J. Bryan Webber, Nicholas Meier, Mark V. Coggeshall, Ronald Revord

Black walnuts produce a highly sought-after nut with a robust flavor. Markets are well-established for their kernels and nutshells throughout the State of Missouri. However, nearly all black walnut nut production comes from foraging wild trees – improved cultivars are not yet widely in production. Annual nut harvests from wild trees are highly variable in both yield and quality. Missouri's crop ranges from 12 to 16 million pounds (about 65% of the total supply in the U.S.) and brings about $2.6 to $3.5 million to harvesters annually,

UMCA black walnut selection 'C7' showing the ideal spur-bearing branch habit loaded with nuts.

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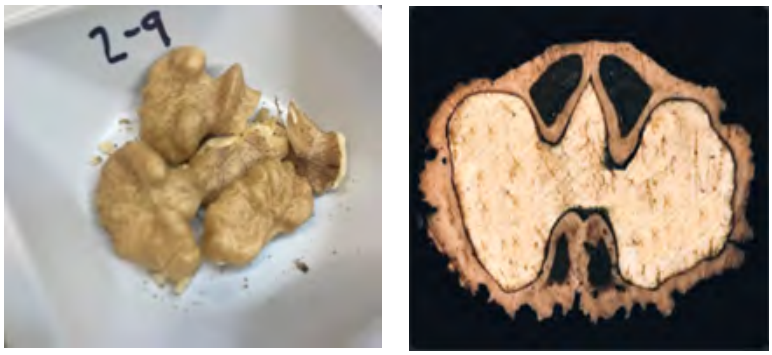
although biennial bearing can cause steep declines in production. Wild trees also garner a low price of $0.16/lb hulled due to consistently low kernel percentages (6-14%) and mixed quality, with many nuts possessing a dark kernel color and an acrid floral or fermented aroma and flavor. Improved cultivars with a consistent kernel percent (>30%) and other preferred attributes, are currently purchased at prices that are 5-6x higher by Hammons Products Company (Stockton, MO). Two-thousand acres of cultivar orchards are estimated to produce an equivalent volume of nuts currently harvested from wild trees. These improved orchards are needed to stabilize nut supply and quality, both of which would then give the industry opportunity for growth. The current scarcity of cultivated black walnut orchards results from a limited availability of improved selections and cultivars, not from a lack of grower interest.

The University of Missouri Center for Agroforestry (UMCA) established a black walnut improvement program in 2000. The goal was to use its germplasm repository, representing 66 cultivars, to develop improved nut cultivars for use in agroforestry-based planting systems. Components of the program focused on 1) cultivar and germplasm acquisition and evaluation, 2) development and evaluation of seedling breeding populations produced through controlled pollinations, and 3) establishing field trials across multiple sites in Missouri that focus on the performance of the collection for key traits. High priority traits and selection criteria include high kernel percentage, high kernel mass, spur bearing habit, and yield efficiency.

The time required to select improved offspring (and cull undesirable seedlings) of most tree fruit and nut crops is long, up to 8-12 years. However, the UMCA has made significant gains in breeding high-quality, high-yielding black walnut cultivars within the first generation of the breeding program. In 2010, nine black walnut selections were transitioned to replicated performance trials, where they are under ongoing evaluation as candidate new cultivar releases. As a transition to full release, our program expects to make a preliminary release of these materials starting in 2023. This limited release is intended to position us for an eventual full release, while we finalize our complete cultivar characterization, build up scion supplies for nursery propagation, establish on-farm trials for testing across environments, and educate growers on performance benefits and cultural practices for black walnut in an orchard setting. The Missouri black walnut industry has long awaited the opportunity to cultivate elite UMCA cultivar releases in new orchards, and we are excited to begin rolling out these materials.



UMCA black walnut selection 'A3' with large, light-colored kernels and a nut cross section with high kernel percentage.

Black walnut controlled crosses require elevation high into the canopy using boom lifts where abundant flowers can be reached and pollinated. Once pollination is complete the flowers are covered with specialized pollen exclusion bags to protect the flowers from unwanted cross-pollination.

If you are interested in cultivating UMCA's preliminary black walnut cultivar releases, please contact the Revord lab for more details: Dr. Ron Revord (r.revord@missouri.edu) and/or J. Bryan Webber (jbwebber@missouri.edu).

Natives, Cultivars, and "Nativars"

The natural world supports tremendous genetic diversity within and among plant species. This genetic diversity developed over millions of years in response to growing conditions in ecosystems and natural habitats including geology, soil types, climate, and rainfall, as well as animal/insect herbivory and plant diseases.

Straight native plant species are plants that occur in the wild—as described above—and reproduce without intervention from people. Their diversity of genes gives them more adaptability (or survival insurance) in the face of disease, growing conditions, climate change, or other factors. Also, because insects and other invertebrates—as well as other animals—have co-evolved with native plants for thousands of years, the nutritional value of foliage, pollen, nectar, fruits, and seeds of straight native species is known.

The Grow Native! program recognizes that some or perhaps many "nativars" (a cultivar or genetic variant of a straight native species) may have as high an ecological value as native species, but in many cases this is conjecture, and is not absolute. In fact, there are few studies comparing the nutritional value of straight native species to cultivars/nativars. Whether studied or not, human-based selection of plant and animal species can have unintended negative consequences. Therefore, the Grow Native! program promotes native species for their known and documented ecological value.

Please see the Grow Native! Native Plant Database for a searchable database of 300+ native plants and other Grow Native! native plant resources. All plants referenced on Grow Native! website pages are native plants, not cultivars or nativars.

Many plants in the mainstream horticulture trade are promoted and labeled as "native" when in many cases, these plants are not straight native species, but rather "nativars." Be sure to check the websites of such brands of plant products and ask questions before you purchase plants.

The Grow Native! program offers Grow Native! plant tags for more than 200 species to its professional members who propagate and/or sell native plants. These tags indicate that these plants are straight native species, not cultivars or nativars.

It is important to note that—without protected original habitats where native plants reproduce in the wild—there would be no genetically diverse, native seed available for the native plant industry. Grow Native! encourages native landscaping enthusiasts to support efforts to protect original native plant habitats, including original prairie remnants, glades, wetlands, riparian areas, woodlands, and forests.

What are native plants, cultivars, and nativars?

Native plant: A plant that originally occurs within a region as the result of natural processes rather than human intervention. In the lower Midwest (Missouri and surrounding states), native plants have existed since prior to the time of widespread Euro-American settlement a little more than 200 years ago.

Cultivar: A plant selected for a certain trait, for example, flower color, foliage color, fruit color, shape, size, pest resistance, growth habit, disease resistance, longer bloom times, or stronger stems. Cultivars can be derived from non-native plants or native ones. Cultivars derived from native plants are often called "nativars." Cultivars can have sterile flowers and produce no seeds. Most cultivars are created by cloning (asexual reproduction, such as with plant cuttings), in which clones of the parent plant are produced. Types of cultivars include seedlings within one species (most common), strains, and hybrids (see definitions in glossary below) as well as via genetic manipulation at the cellular level in a laboratory, such as Roundup-ready corn and soybeans.

Some nativars bred for speficic traits such as the '"Summer Wine" ninebark nativar with dark foliage (top), may not be as nutritious as the foliage of the straight species of ninebark, Physocarpus opulifolius (green foliage). Photo of nativar by Sue Leahy. Photo of straight species by Carol Davit

For example, within a population of a straight native plant species in the wild, there may be some individuals that are more compact in stature than others. A cutting might be made of one of those compact individuals, and that plant propagated asexually to preserve the compact structure gene. However, individuals in that same population with a taller structure might also have produced more nectar for butteries than the compact individuals, but cuttings are not taken of those individuals. Having some "compact structure" cultivars on the marketplace may not be a problem. However, if that cultivar becomes dominant in the marketplace and in landscaping, the "higher nectar" genetic traits of this plant disappear from plants in cultivation.

Photo of native species by Mervin Wallace.

Some cultivars, however, are named strains of native plants found in nature and are seed grown. For example, eastern redbud (*Cercis canadensis*) 'Columbus strain', is a cultivar valued for its cold hardiness.

Nativar: A cultivar of a native plant, the result of human selection for a specfic plant trait(s). Some nativars can have sterile fowers and seeds.

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Why are native plants important?

In the lower Midwest (Missouri and surrounding states), all plants were native prior to the time of widespread Euro-American settlement a little more than 200 years ago. While the activities of indigenous people did affect the region's ecosystems, it wasn't until the mid-1800s that large-scale habitat alteration and the introduction of non-native plants began to significantly change the natural landscape of the lower Midwest.

Native plant species in the lower Midwest have evolved here over millennia and are best adapted to the region's climate and soil conditions. Even more importantly, native plants have co-evolved with native insect species and provide food resources for thousands of species of insects and invertebrates that in turn provide food for native birds and other animals. For example, native plants provide nectar, pollen, foliage, and seeds to feed native insects and other wildlife. Most insects that eat plants can develop only on specific native plant species (called host plants). Almost all native birds (including turkey and quail)—regardless of what they eat as an adult—feed their young insects for protein. Native bees and other pollinating insects provide pollination services for agricultural crops such as fruits and vegetables and thus, they are a vital link in providing food for human consumption. They also pollinate 90% of all fowering plants and thus are essential to diverse ecosystems.

Native plants are adapted to the climate and soil conditions where they naturally occur. They do not require fertilizers or pesticides and need considerably less water than many non-native plants. Native plants have functioning reproductive structures and viable seed. Non-natives, including nativars and cultivars, are typically bred for specic desired traits. In the process of selecting for specific traits, other traits can be deselected and disappear from a plant in the nursery trade, which can lead to the loss of genetic diversity in plants available for purchase for landscaping or other purposes.

The complex root systems of native plants contribute to healthy soil, and reduce and filter water runoff, which protects streams. Choosing native plants for landscaping beauties yards and other spaces, supports nature's web of life, manages storm water, and stores carbon. Prairie grasses and wildflowers store carbon in their roots (and in surrounding soil), and in many situations do so much more effectively than trees and wooded landscapes.
It is important to note that, without protected original habitats where native plants reproduce without interference from people, there would be no genetically diverse, native seed available for the native plant industry. Grow Native! encourages native landscaping enthusiasts to support efforts to protect original native plant habitats, including original prairie remnants, glades, wetlands, woodlands and forests.

Glossary

Biodiversity: The variety of life forms found within an ecosystem. Biodiversity is increased by genetic change and evolutionary

Dioecious: Describes a plant species in which male and female flowers are on separate individuals (e.g., hollies, persimmons)

Exotic: A plant not native to the continent on which it is now found. "Alien" and "non-native" are synonyms.

Genetic diversity: Variety of genetic characteristics within a species and is a factor enabling natural selection to occur; allows populations to adapt to environmental changes.

Noxious weed: A plant that directly or indirectly causes damage to crops, livestock,poultry, irrigation, navigation, natural resources, public health or the environment. I.

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Are cultivars/nativars good or bad for pollinators and wildlife?

The short answer, in the words of entomologist Dr. Doug Tallamy, who wrote *Bringing Nature Home*, and *Nature's Best Hope*, is "It depends."

This is a complex question and, as Tallamy notes, there is not a straightforward answer. With cultivars/nativars, humans select for certain plant traits over others; the traits that are selected against (that are therefore absent in the plant) may or may not have ecological consequences.

In some cases, cultivars/nativars do not provide food sources for leaf-eating and pollinating insects, as their native counterparts do. Tallamy has noted that nativars bred for brown or other dark foliage may not provide the same nutritive value for leaf-eating insects that depend on specific native plants for food. If a gardening goal is to support specific insects that depend on specific host plants to survive, these cultivars should be avoided.

Many nativars have been bred to have more petals and much reduced oral reproductive structures than their native counterparts, with less or perhaps no nectar or pollen for pollinating insects, or seeds for songbirds. Insects may be attracted to plants such as this, and use energy traveling to alight on the flowers of this cultivar, when in fact its flowers may offer little or no food sources. Other nativars are bred for petal color that is widely divergent from the color of the flower in the native species and may confuse the insects and other wildlife that depend on them.

'Sombrero Hot Coral' (left) and 'PowWow Wild Berry' (right) purple cone ower nativars. Photos by Sue Leahy

These nativars of purple cone flower have different petal colors than the native species (*Echinaea purpurea*), the effects of which are unknown to pollinating insects. See earlier photo of native species by Mervin Wallace.

In other cases, nativars may provide as much food and nutrition to insects and other wildlife as native species do or more. For example, a local ecotype of redbud from Wisconsin became a named cultivar called the "Columbus strain" redbud. It is cold hardy and has been planted beyond redbud's typical range in Illinois, Wisconsin, and Minnesota. This redbud provides nectar and pollen to pollinating insects, and its foliage is likely food for insects as well. However, it is also true that the proliferation of the use of nativars like this—throughout the native range of the native species of redbud—can result in a loss of genetic diversity of redbuds on the landscape, which may have negative consequences for nature's food web. This is underscored by Tallamy again as he asserts, "It's not the presence of cultivars, but the absence of natives that's a problem."

Research and observational studies on the nutritional value of cultivars/nativars to pollinating and foliage-eating insects is scant but ongoing, and as more results of research become available, the Grow Native! program will share the information on this web page. Please see the Grow Native! Native Plant Database for a searchable database of 300+ native plants and other Grow Native! native plant resources. The Grow Native! program promotes the use of native plants. All plants referenced on other Grow Native! website pages are native plants, not cultivars or nativars.

The FINCA Project at Lincoln University in Missouri.

Dr. Nadia Navarrete-Tindall, Native Plants Specialist
Specialty Crops and Native Plants Program
Lincoln University Cooperative Extension

A finca is a small farm in Latin America where native plants, fruits, flowers, and vegetables are produced for consumption and income.

The FINCA Project - Families Integrating Nature, Conservation and Agriculture - was created with funds from a NIFA-Capacity Building Grant from 2012 to 2017. Three pilot finca farms, one on campus and two in the Bootheel, were established. These served to accomplish the main goal of creating demonstration areas to showcase multipurpose native plants as specialty crops for education and research in backyards or small farms. The fincas are examples of diversifying small tracts of land such as non-productive urban spaces with useless, resource demanding turfgrass into productive, environmentally friendly and beautiful areas. Fincas can be vibrant corridors that can feed people and protect pollinators and other wildlife.

The fully established finca at Lincoln University, known as Finca EcoFarm, is maintained and used regularly for training and field days and is located on campus. Visitors can see more than 50 native species, 20 or more of them edible, including mature productive fruits like wild plum and persimmon;

FINCA Ecofarm tour

flowers for pollinators like butterfly milkweed and partridge pea; and host plants for butterflies, like milkweeds and spicebush. This Finca EcoFarm is about 1 acre in size and is located in grounds around the LU-Teaching Greenhouse. The raised beds in the greenhouse are used to grow native and non-native crops for demonstration and seed production. A plant nursery is also located in the greenhouse. A detailed description of all aspects of the Finca EcoFarm is included on the next page. There is also a small hoophouse that is used to protect figs in the winter.

Below: A view of the FINCA farm

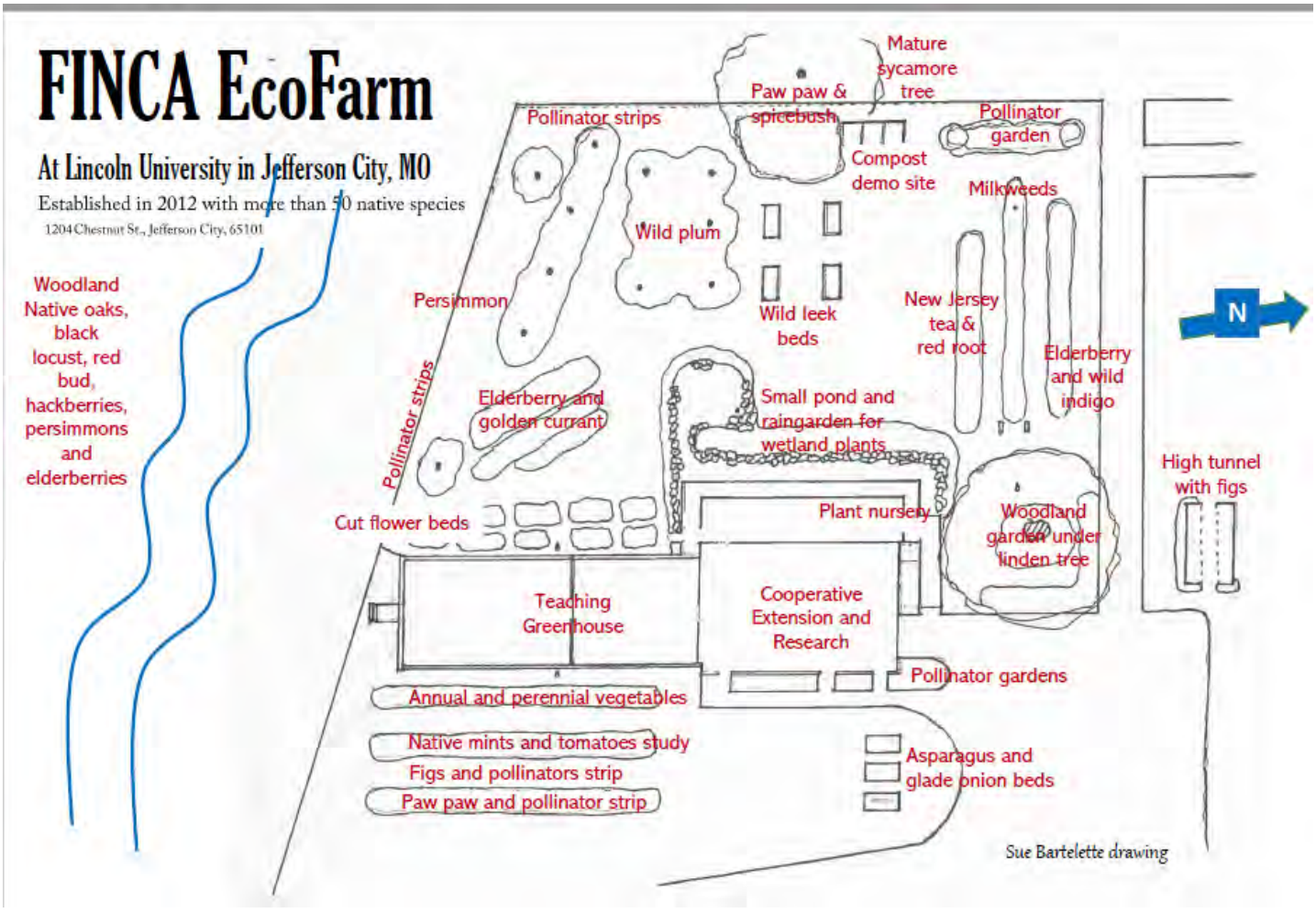
Teaching Greenhouse at FINCA farm

Continued on page 12.....

Management of the Finca EcoFarm was suspended for funding reasons for 3 years, which allowed invasive species to reestablish. Maintenance was re-initiated in November 2019. After a plant inventory done in spring 2020 and proper management that included fruit tree pruning and control of invasive species, we found that all wild plum trees were in production. In 2020, we collected about 100 lb. of fruits from 8 trees. Harvest is going strong this year again and we hope to increase yields. Wild leeks (ramps) were planted in 2015 as part of an MDA specialty crops grant. Edible arrowhead or Wapato is established in the rain garden and is being grow under different shade levels to determine the effect on tuber production.

More than 10 edible plants were included in food tasting trials in 2016 and 2017 with positive results. Workshops and seminars, as in the past, are providing hands-on training about growing, maintaining, identifying, and preparing native edibles. The finca EcoFarm on campus is a place for everyone to learn, not only about specialty crops, but the pollinators and other wildlife that depend on them.

The Specialty Crops and Native Plants Program also maintains a Native Plant Outdoor Laboratory on campus and a demonstration plot with native fruits established at the Busby Farm where a pollinator strip will be added at the end of 2021.



Detailed plan of the FINCA EcoFarm

A Taste of native Missouri

Beans with Hickory Nuts and Feta

Serves 2-4

- 2 cups canned or freshly cooked brown, navy, or cannelloni beans
- 2 tablespoons finely chopped parsley
- 2 tablespoons finely chopped sweet yellow or red pepper
- 2-3 tablespoons finely chopped red onion
- 3 tablespoons crumbled feta cheese
- 1-2 garlic cloves, minced
- 2 tablespoons coarsely chopped hickory nuts or pecans
- Salt and fresh ground pepper to taste
- Extra-virgin olive oil and vinegar or lemon juice to taste

Rinse and drain beans. Toss with the rest of the ingredients.

Pawpaw Cookies with Black Walnuts

Makes ~ 16 cookies

- 3/4 cup pureed pawpaw pulp
- 1 cup all-purpose flour
- 1.2 teaspoon baking powder
- 1/4 cup butter
- 1/2 cup brown sugar
- 1 egg
- 1/2 cup black walnuts

Preheat the oven to 350 degrees F and grease one large cookie sheet. Peel and seed fresh pawpaws and process in a food processor until pureed. Sift together flour and baking powder, and set aside. Cream butter and sugar. Add egg. Add flour mixture and then add pawpaw pulp. Chop half the nuts (reserve 16 pieces) and blend in. Drop by teaspoonfuls onto the prepared cookie sheet and press a piece of black walnut onto the top of each cookie. Bake 12 minutes or until brown across the top.

Recipe from Kentucky State University

Make it from Missouri - Cooking and Baking Swaps
- Use black walnuts in quick breads, cookies, and over ice cream
- Pawpaw can be used as fruit puree when baking, frozen pulp adds sweetness and a tropical flavor to smoothies

Chestnut Parsnip Hummus

- 1.5 cups raw, shelled chestnut meats
- 1.5 cups parsnips, peeled and chopped
- 1 clove garlic
- 1/4 cup fresh squeezed lemon juice
- 4 tablespoons butter
- 1/4 cup olive oil
- 4 teaspoons cumin
- 2 tablespoons tahini (ground seasame butter)
- Salt and pepper to taste
- 4 tablespoons chopped fresh parsley

Place chestnuts and parsnips in medium saucepan and cover with water. Bring to a boil and simmer until very tender, about 20 minutes. Drain, reserving 1 Tbsp. cooking liquid. Transfer to food processor and puree along with reserved cooking liquid, garlic, lemon juice, butter, olive oil and cumin until smooth and creamy, about 3 minutes. Season with salt and pepper. Transfer to bowl and cool to room temperature. Before serving, drizzle with tahini and garnish with parsley.

Recipe from Executive Chef Eric Cartwright, University of Missouri

Roadway to the Tree-of-Heaven: Surveying for the Invasive Spotted Lanternfly

Sarah Phipps, Missouri Department of Agriculture

Scanning the roadways, fencerows, wood margins and vacant lots – Missouri Department of Agriculture, Plant Pest Control team members are on the look-out for the invasive tree-of-heaven (*Ailanthus altissima*). Tree-of-heaven is a fast-growing tree that can average three feet of height growth per year. It can easily take over large tracts of disturbed land due to its clonal nature of sending up root suckers as far as 50 feet from the parent tree.

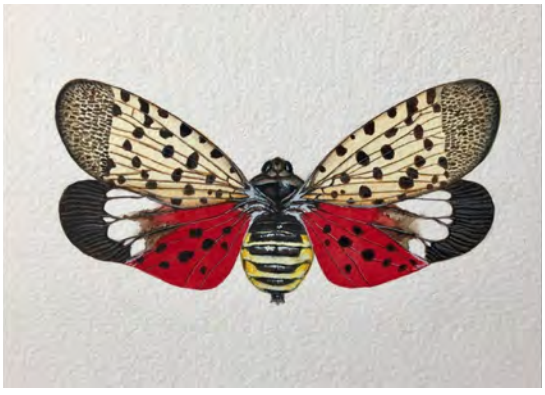
The tree-of-heaven is a favored host to a pesky insect that is on our radar- the spotted lanternfly!

The spotted lanternfly (*Lycorma delicatula*) is a large planthopper native to Asia. Its appetite is not limited solely to the tree-of-heaven though. It feeds on the sap of more than 70 plant species, including grape, apple, hops, oak, walnut, maple and ornamental plants. This bad bug has the potential to damage our forests and food supply by feeding on trees and crops. If allowed to spread, the pest could seriously impact the nation's grape, orchard and logging industries.

Spotted lanternfly was first detected in the United States in Pennsylvania in 2014 and is suspected to have hitchhiked there on stone slab shipments from South Korea. Additional detections have been reported in a growing list of states, with the most recent find in Indiana. New infestations are being found hundreds of miles away from the next nearest known infestation, indicating that the pest is hitchhiking with humans. They lay their egg masses on any hard, smooth surface, including firewood, landscape materials, outdoor furniture, vehicles and more. Fortunately, we haven't found any spotted lanternfly populations in Missouri, but the MDA Plant Pest Control team remains on the look-out for this pest!

Cole Kiczenski surveying a stand of tree-of-heaven looking for the invasive spotted lanternfly. Photo credit: Sarah Phipps

Spotted lanternfly feeding on grapevines. Photo credit: Erica Smyers, Penn State



Watercolor painting of spotted lanterfly, 2019 Credit: Carrie Garrott

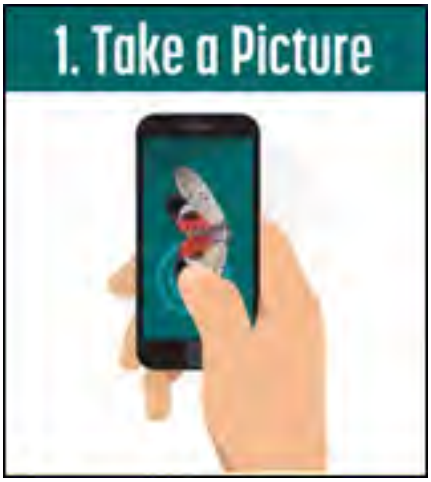
Continued on page 15....

Lifecycle Description:

Spotted lanternflies go through five stages of growth after hatching from eggs. The first four stages are called nymphs. The tiny nymphs are initially black with white spots, but eventually develop red areas on their bodies. Adults are about an inch long, are gray and black, and have hind wings with bright red patches. Adult spotted lanternflies are present from July through December. Egg masses of 30-50 eggs overwinter and hatch in the spring.

How can you help?

Early detection is key. Inspect your trees and plants for signs of this pest, particularly at dusk and at night when the insects tend to gather in large groups on the trunks or stems of plants. Inspect trees (in particular, tree of heaven), bricks, stone or other smooth surfaces for egg masses.
If you think you have found spotted lanternfly, follow these steps:



Additional Resources:

Spotted Lanternfly Brochure and Poster: https://agriculture.mo.gov/plants/pests/spotted-lanternfly-brochure.pdf
USDA Hungry Pest Website https://www.aphis.usda.gov/aphis/resources/pests-diseases/hungry-pests/slf/spotted-lanternfly
Penn State Tree of Heaven Website https://extension.psu.edu/tree-of-heaven

Species Spotlight: Pin Oak

Mark Halpin, Forestry Manager, Forest ReLeaf of Missouri

Pin Oak, *Quercus palustris* was formerly the go-to landscape oak and fine specimens still abound in our region. Although it commonly grows to 60-70' in height by 40-50' in spread, it can exceed 100' in ideal conditions. It reaches maturity swiftly for an oak, as over 2' of growth per year is possible. Palustris means "of the swamp" and like many bottomland species it can tolerate compacted soil, the arch nemesis of urban trees. These traits, combined with its ease of propagation, made it hugely popular in the nursery industry for much of the 20th century.

Unfortunately, pin oak has a weakness: It is highly susceptible to iron chlorosis, a condition aggravated by the high-pH soils common to urban areas, resulting in sickly yellow leaves. Pin oaks have always been susceptible to galls as well, particularly gouty and horned oak gall. In recent years the combined stressors of poor soil conditions, pollution, and "miscellaneous" (car accidents, sidewalk repair, etc. etc.) have caused these galls to move from the "aesthetic nuisance" category to "nail in the coffin". The pin oak is now often a shadow of its former self. Its distinctive branching habit - upper branches ascending, middle branches reaching straight out and lower branches hanging down to form a "skirt" - is reduced to a prematurely defoliating outline, bristling with gnarly galls. The dull brown of the dying limbs is offset by the sickly yellow pallor of the few leaves and (if you're really unlucky) the white patches of Hypoxylon fungi feeding on the decaying wood.

Heavily infested trees should be removed in many cases; chemical treatments are ineffective and once the feedback loop of environmental stress and opportunistic pathogens begins it is almost impossible to reverse (although please, consult an ISA Certified Arborist before making these decisions). Reducing the populations of the wasps that produce the galls, and removing hazardous trees is of paramount importance. As for lightly or uninfected pin oaks, good ol' Plant Health Care has never been more important. Healthy trees resist pathogens much more effectively, so if you have a mature pin oak and don't feel like spending thousands of dollars on a removal and waiting another half-century to recoup your shade, spend

A sad sight to behold….badly infected with gouty oak gall, this pin oak has little hope for long-term survival.

a few hundred on making that tree happy instead. Eliminate turf grass around it and provide it with a nice mulch bed. Keep vehicles off its root system at all costs, and if the soil is compacted (it probably is) consider having some aeration done with an air tool (again, consult an arborist). In extreme cases of chlorosis, iron treatments can provide fast relief for a growing season while you work on more long-term solutions.

If you are planting an oak (please do!), consider a Nuttall or Shumard instead. For the time being, let's let the pin oak retire from landscape service and take some well-deserved rest at its home in the bottomland forests.

Good Fences Make Good Neighbors Part 2: Missouri's Optional Fence Law Counties

Hank Stelzer, MU Extension

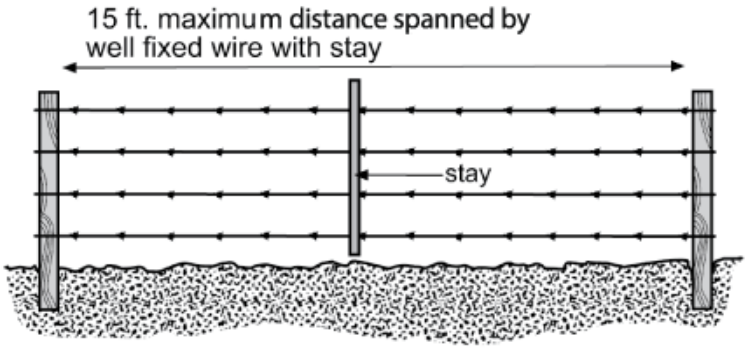
In Part 1 of this series, we covered Missouri's "general" fence law. As of May 2021, 19 counties have opted into the "optional county fencing statute" (Chapter 272.210 of the state's fencing statute). These counties are Bates, Cedar, Clinton, Daviess, Gentry, Grundy, Harrison, Knox, Linn, Macon, Mercer, Newton, Putnam, Schuyler, Scotland, Shelby, Sullivan, St. Clair and Worth. So, what are the basic differences between the "general" and "optional" fencing statutes?

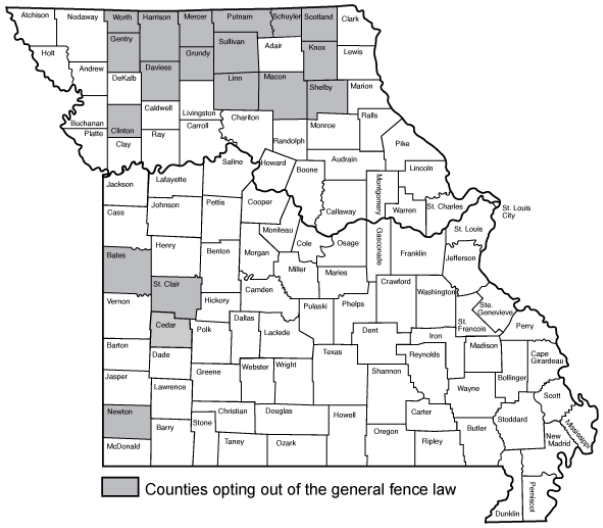
Forced Contribution and Maintenance

If either neighboring landowner needs a division fence, the other adjoining neighbor(s) have to pay for half the cost of the "lawful fence" (different definition in optional counties) and maintain half (Missouri statute 272.235). In order to do this, you must first give the neighbor a 90-day written notice before taking any legal proceedings. Current Associate Circuit Judges are not very willing to get into the middle of a disagreement over fence boundaries and maintenance.

Lawful Fence

A lawful fence is defined as the equivalent of four barbed wires supported by posts not more than 12 feet apart, or 15 feet apart with one stay. A stay (very uncommon today) is a vertical wire placed half-way between the 15 feet that holds the wires together. If either neighbor wants a more costly fence, then they will have to build and pay for it (Missouri statute 272.210.1).





No Right-Hand Rule

The optional county fence statutes make no mention of any right-hand rule. Each neighbor is to build and to maintain "half." Disputes are to be taken to the associate circuit court, which appoints three individuals to visit the site and report back to the court (Missouri statute 272.240). While the right-hand rule is tradition in most local option counties, it is not the law.

Actual Damages

If your livestock trespass through your portion of the division fence and it is in need of repair, then you may be liable for the actual damages (not double damages) caused to your neighbor's crops or livestock (Missouri statute 272.230).

It is important to note that neighbors are still free to make a fencing agreement that is different from these statutory provisions. Just be sure it is in writing, signed, and recorded properly (Missouri statute 272.235). If you do deviate from these statutory provisions, it is best to have an attorney draw up a legal document.

More information can be found in MU Guide G810: Missouri Fencing and Boundary Laws. Do not rely upon this series or G810 or G811 for legal advice. This information is a general statement of the law. Direct your questions to an attorney to get relevant facts and act on them in your best interest.

The Other Hardwood: Hickories are not Oaks

By Lauren Pile Knapp, Research Ecologist, US Forest Service

Hickories – the ever present, common, but rarely dominant genus of the oak-hickory forest. Although ecologically and economically important, the species in the hickory genera are often overshadowed in the popular and scientific literature by the oaks. Further, what we know about their biology and ecology and subsequently their management is often lumped with the oaks. This paradigm has led to the belief that if we manage for oaks, hickories will surely follow. But is this true?

Perhaps because we all have a bit of underdog in us, a group of us thought this under-appreciated member of the oak-hickory forest type deserved more attention. Most of what we know about the oak-hickory forests of today is that they are primarily derived from environmental conditions and disturbances that favor their establishment and growth over other species. Both oaks and hickories are favored with disturbance, such as fire, and are most competitive on sites that are warmer and drier making them likely candidates to do well in a warming climate.

However, the path that two genera take to reach the forest canopy is markedly different. Oaks (Quercus spp.) tend to respond to forest openings all at once, with most individuals occupying relatively similar heights and sizes, often being dominant or codominant in the forest canopy. Hickories (Carya spp.), on the other hand, take a slower approach to the race for the top, and this strategy starts at the earliest stage of the hickory's life, the seedling.

The seedlings of oaks and hickories are well-adapted to waiting out the tough times by investing more in roots than in stems and leaves. Like having a savings account for unexpected life events, investment in roots allows both oaks and hickories to readily regrow if top-killed by fire, browsing, or severe drought. This also allows them to persist in partial shade until there is a canopy opening. When a canopy opening occurs, they capitalize on their earlier investment by using the stored carbohydrates for stem and leaf growth and initiate rapid upward ascent to the canopy. Although oaks are well-known for this adaptive mechanism, hickories invest even more in their roots than oaks, allowing them to persist longer while waiting for a canopy opening. This conservative growth strategy can be seen in midstory hickories that are 140 years old.

This black hickory (Carya texana) stretches into the canopy at the Baskett Wildlife Research and Education Center in Ashland, MO

As forest stands continue to mature and age, oaks perform best when they occupy the upper canopy of the forest, in dominant or codominant canopy positions. In more suppressed canopy positions, where light from above is limited, their greater shade tolerance allows hickories to fare well, growing more and dying less than the oaks. Although less abundant, over time a few hickories will find themselves among the oaks in the upper reaches of the canopy.

Why do we care if hickories, although broadly similar, are distinct from oaks? Oaks are incredibly important economically, and with the fall of the American chestnut, both oaks and hickories are unmatched in their production of hard mast for wildlife. With increasing stressors from land use change, climate warming, nonnative invasive pests, pathogens, and plants, promoting compositional and structural diversity in our forests will become even more critical. The more we understand 'every cog and wheel' the better it will aid our 'intelligent tinkering' needed for managing resilient forests for the future.

To learn more, visit: https://www.fs.usda.gov/treesearch/pubs/62769

If I Was a Carpenter and You Were My Client …

Lynn Barnickol,

Early European carpenters encountering hickory for the first time, would learn it is among the hardest and heaviest hardwoods found in the Colonies. Hickory has unique properties that makes it very useful for daily living. The historical uses for hickory included cabin floors that withstood wear. Hickory was also used for chair and bed frames that were pinned together depending the shrinkage of wood to make strong joints. Hickory could be split, using a froe that resulted in long, thin, narrow trips of wood that were woven to make chair and bed webbing. Hickory is resistant to shock making it ideal for handles for striking tools such as axes, hammers, mauls, and picks, and wagon wheel spokes. The flexibility of hickory made it suitable for hoops for binding staves together for slack and tight cooperage. Carpenters also noticed their hand tools, including saws, planes, draw knives, froes, axes, hammers, and mauls, were suitable for working the wood and creating less splinters only if their tools were kept sharp.

Hickory and pecan, hickory's close relative, are in the Carya genus that is native to the United States. On average, hickory and pecan are denser, stiffer, and harder than either white oak and sugar maple. Hickory is ring-porous, meaning there is a distinct earlywood and latewood bands forming the growth rings. Pecan is slightly less dense, not quite as strong, and is semi-ring porous, giving it a slightly more uniform texture than hickory and aides in identifying hickories from pecan. Carya species are suitable woods for charcoal and used in smoking and grilling meat.

Carpenters learned that hickory is responsive to adhesives, so is suitable for table tops and cutting boards and is pliable, so can be bent for recurve bows and chair backs by steaming. Hickory has been made into baseball bats, poles for vaulting, golf club shafts, and knife handles. Upper grades of hickory and pecan lumber are sold for furniture parts, and flooring, while the lower grades go into pallets, and blocking. Pricing of hickory and pecan is similar to red oak.

Because the woods are very dense, it is more difficult to nail flooring in place and the woods are subject to more warping, shrinking, and swelling as compared to oaks. When using these woods for finished flooring, cabinet and furniture parts there are considerations: Sharp bits are a must for machining as the wood is subject to splintering of the grain. Dull tools generate heat causing the wood scorch turning it black.

Contrasting appearance of hickory and pecan flooring comes from their cream-colored sapwood and brown heartwood. Craft distillers, seeking a unique flavor, may even be finishing their bourbon in pecan barrels. However, pecan does not contain enough lignin to plug the pores of the wood a situation causing barrels to leak.

If you were my client, in light of the history and ambiance of the Carya genus, we might consider it as the wood that you are seeking for your home or business.

References: A Splintered History of Wood; The Wood Database; W.W. Wood Products Inc., Dudley, MO

Hickory

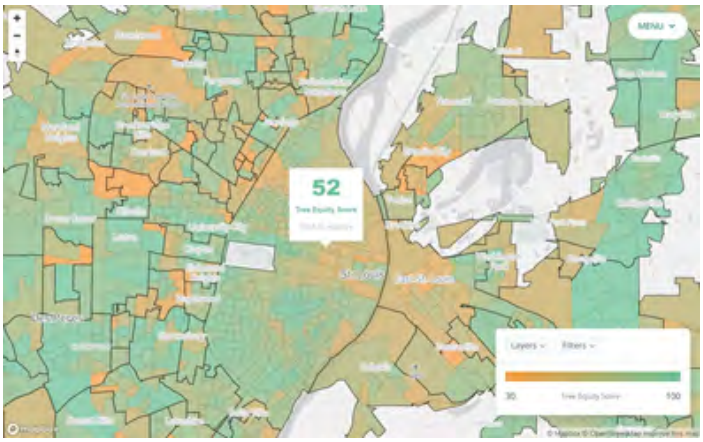
A very high-density and heavy wood known for its extremely bold and distinct open graining and color variations. A single board of hickory lumber can have several color variations from almost white to dark brown and black. Dark mineral deposits are common. Extreme color variation is expected in hickory and that is what gives hickory its charm. Natural and lighter stains will show the most variation.

Image and text is from W.W. Wood Products Inc. Dudley, MO

Tree Equity: Fancy Concept or For Real?

By Rebecca Hankins, Partnership Coordinator at Forest ReLeaf

Among the headlines that dominate the environmental conversation these days, a new one is emerging called Tree Equity. It may seem like some newly-contrived concept to sound important and relevant, yet it engulfed the front cover of National Geographic's July issue with a simple headline entitled "Beating the Heat". Simultaneously, National Geographic's podcast Overheard continued the conversation in an episode titled "Cooling Cities By Throwing Shade", which debuted on August 3. Articles from major cities around the nation are cropping up talking about Tree Equity. So what is it?



Screenshot of St. Louis City
Photo Credit: Tree Equity Score Tool by American Forests

Tree Equity specifically focuses on the urban tree canopy (trees in our cities versus our forests). On the surface it is a conversation about where trees are in cities and why. More deeply, it is a compilation of layers of data that essentially point to one thing: urban trees are not equally distributed. American Forests, the nation's oldest national conservation organization, is the originator of this new buzz word with the launch of their nationwide Tree Equity Scores on June 22, 2021.

Tree Equity Scores combine existing tree cover stats with other data such as population density, poverty and unemployment rates. More information can be found at www.americanforests.org. This data determines whether there are enough trees in a location to provide optimal human health, as well as climate benefits. According to Jad Daley's press release statement, president and chief executive officer of American Forests, "It shows us exactly where the problems exist, where we need to concentrate investment to solve them, and where we need to bring people together — all different types of people and organizations." That doesn't sound like a concept at all, but a real solution to green infrastructure problems that are plaguing urban centers.

Forest ReLeaf of Missouri, the state-wide nonprofit tree nursery located in Creve Coeur, Missouri, is excited that Tree Equity is being talked about and taken seriously. For years, Forest ReLeaf has known that Missouri's urban tree canopies are not equally distributed and implemented a Priority ReLeaf program for those areas defined by low tree canopy. Now, with this new Tree Equity Score tool and local tree inventories, Forest ReLeaf can make further impact in these neighborhoods by using data to engage the communities and garner greater support from partners.

Every person deserves to experience trees. As we have seen through the Covid-19 pandemic, access to green spaces can make a huge difference to how people handle stress. If you are fortunate enough to live in a highly forested area, you may not even

2017 Priority ReLeaf tree planting in Old North St. Louis
Photo Credit: Forest ReLeaf

Continued on page 21.....

notice the soothing embrace trees wrap around you. Visit a highly urbanized city, where impervious surfaces and buildings abound, and you quickly notice the lack of green canopy. Tree Equity Scores begin to address this problem with the goal to help everyone, no matter who they are, receive the many benefits that trees provide.

As always, Forest ReLeaf is here to provide anyone in Missouri access to free trees who have a planting project on public land. Our Project CommuniTree is now accepting applications for Fall. To apply, visit moreleaf.org/plant/project-communitree/.

To learn more about Tree Equity check out https://www.treeequityscore.org/. Be sure to click on their interactive map to find your hometown.

Native Gardens of Excellence

Created in 2021, the Grow Native! Native Gardens of Excellence program features plantings of native plants in designed, well-maintained gardens and in other native landscape plantings in the lower Midwest. The gardens and landscape plantings selected and showcased in this program are not limited by size, scope, or professional involvement. Some have been designed by landscape architects or designers while others are informal, seeded landscapes, and some are professionally maintained while others are maintained by volunteers. The Grow Native! Native Gardens of Excellence are located in a variety of settings ranging from multi-acre plantings associated with commercial properties; formal, urban gardens; and even small community plots.

All sites in this program share two attributes: each has been carefully planned and is regularly maintained. Both of these attributes are fundamental to ensure the long-term functioning and appearance of any native planting. The three goals of this program are to inspire and motivate the use of native plants in plantings—both formal and informal; to educate about their many benefits—ecological function, beauty, and contribution to sense of well-being; and to promote widespread use of native landscaping for aesthetic appeal and environmental benefits.

All Grow Native! Native Gardens of Excellence sites are open to the public (many are free; some charge an admission fee), consist of at least 90% native plants (excluding cultivars and nativars), and are at least three years old with an established maintenance schedule.

We encourage homeowners, native plant enthusiasts, land managers, gardening groups, and landscape professionals to visit the sites included in this program in person and to learn more about their maintenance from their caretakers. Contact information is included for each site.

If you would like to nominate a native garden or landscape in the lower Midwest for inclusion in this program, please fill out the this form https://docs.google.com/forms/d/e/1FAIpQLSerSrClCMF9eTOZSIW-POvl8PgEl4JIp1PwUGFS6lJiTj8Lzw/viewform?vc=0&c=0&w=1&flr=0

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www.grownative.org
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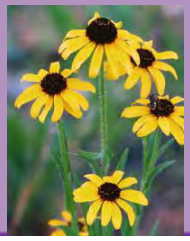

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The Center for Agroforestry
University of Missouri
A Global Center for Agroforestry, Entrepreneurship and the Environment

Calendar of Events

Annual Missouri Chestnut Roast Festival

October 2nd| 10:00 am - 3:00 pm CST | Horticulture & Agroforestry Research Center, New Franklin, MO

This year's Missouri Chestnut Roast Festival at the Horticulture & Agroforestry Research Center farm will take place both in-person with safety precautions for our community and guests AND online with a newly released set of recorded presentations available on the Mizzou Agroforestry YouTube channel and other UMCA social media platforms. Those who join in-person at the New Franklin farm site will have the opportunity to taste fresh-roasted chestnuts, see the farm on a hay wagon ride, tour the Historic Hickman House, and attend live demonstrations of traditional folk skills, including...

- Cotton carding and rag doll making, with Sarah Tucker Poff
- Knitting with homespun wool, with Lane Recker
- Turning wood bowls on a lathe, with Ernest Hilderbrand
- Flint knapping, with Earnest Jones
- Presentations and field workshops will take place throughout the day in a big open outdoor space in the beautiful Missouri River Hills at the Horticulture & Agroforestry Research Center farm, just 30 minutes drive from Columbia, MO.

Chestnut Field Workshop

October 2nd| 11:00 am - 1:00 pm CST | Horticulture & Agroforestry Research Center, New Franklin, MO

This workshop will coincide with the annual Missouri Chestnut Roast Festival at the MU Horticulture and Agroforestry Research Center in New Franklin, MO. Supported by the USDA Natural Resources Conservation Service Environmental Quality Incentives Program Conservation Technical Assistance, this workshop is intended for prospective, new, and beginning chestnut growers, natural resources and agriculture technical assistance providers. Spend dedicated time with experienced and expert chestnut producers and research faculty to review chestnut cultivation practices to ensure early and abundant harvests, check out equipment for manual and mechanical chestnut harvest, walk about the repository orchard with Dr. Mike Gold and Dr. Ron Revord, and share feedback about your favorite chestnut cultivars with a taste test and producer Q&A. Info and Register here: https://centerforagroforestry.org/event/chestnut-field-workshop/

Black Walnut Field Day

October 7th, 2021 | 1:00 pm - 5:00 pm | Southwest Research Center, Mt Vernon, MO

We will demonstrate the use of a new walk-behind black walnut harvester, and our new tree shaker that shakes from higher in the tree to prevent damage. We will also demonstrate larger scale harvesters and hullers for this year's nut crop and share research presentations from faculty and associated graduate students who are working with black walnut. Value-added black walnut products will be available for tasting. Register here: https://centerforagroforestry.org/event/black-walnut-field-day/

Advanced Natural Beekeeping with Dr. Leo & Kirk Webster

October 30th , 2021 | 9:00 am - 4:00 pm | West Plains, MO

Learn from Kirk Webster, the legend of natural beekeeping, and Dr. Leo Sharashkin, Editor of Keeping Bees with a Smile. This full-day program will inspire you with the limitless opportunities of natural beekeeping, and will show practical time-tested ways to achieve BIG success whether you have a few hives or a thousand. Register at https://horizontalhive.com/natural-beekeeping-conference/kirk-webster-advanced.shtml

Calendar of Events Continued

Southern Iowa Agroforestry Field Tour

October 2nd, 2021 | 10:00 am - 4:00 pm | Unionville, IA

Join Trees Forever, the Iowa Nut Growers Association, Iowa Woodland Owners Association, Indian Hills Community College, IA DNR Forestry, and partners for an exciting Fall Field Tour of several agroforestry sites in Southern Iowa. Learn about forest management, invasive species, nut production and tour the IA Nut Growers Association research plot at Indian Hills Community College where varieties of chestnut, pecan, hickory, hazelnut, black walnut and more are growing. Plans include a visit to a large chestnut operation in production that also sells seedlings. Don't miss out on your chance to learn more about agroforestry opportunities from those that are engaged in the business growing trees and shrubs. Jeff Jensen will present on the IA Hazelnut Project, and how folks can get involved growing some cutting edge plant varieties being tested for commercial production. Additional information and registration: https://treesforever.org/event/southern-iowa-agroforestry-field-tour/

Agroforestry Walk and Talk

October 16th, 2021 | 10:00 am -12:00 pm | Sun Dappled Farm| Peoria, IL

Join Illinois Community Agroforestry Kaitie Adams and the Savanna Institute Demonstration Farm Field Crew for a walk & talk at Sun Dappled Farm, just outside of Peoria. Learn the history of the landscape, its soil health challenges, and opportunities for revitalization through restorations, tree crops, and agroforestry practices. Register here: https://www.savannainstitute.org/event/agroforestry-walk-talk-at-sun-dappled-farm/

Join NCR-SARE for Farmer Rancher Grant Webinar

October 6th, 2021 | 4:00 pm - 5:30 pm CDT | NCR-SARE | Online

This webinar will help guide participants through submitting a grant proposal to NCR-SARE's Farmer Rancher grant program. Join Joan Benjamin, NCR-SARE Farmer Rancher Grant Program Coordinator, to learn how to write a strong proposal and project budget and where to get help. Registration is not required. Join the webinar here: https://umn.zoom.us/j/91714725738

Hunger and Emergency Food Assistance During Covid: Preliminary Results from the 2021 Missouri and Kansas Hunger Studies

October 20th, 2021 | 10:00 am - 10:30 am | Division of Applied Social Sciences at MU| Online

The Engaging 4 MO webinar series, presented by the Division of Applied Social Sciences, will offer research-based insights that leaders like you can apply in your own work to benefit and strengthen the state's agriculture and food system, hospitality sector and communities. This presentation features Bill McKelvey, senior project coordinator, and Darren Chapman, project coordinator, with the Interdisciplinary Center for Food Security, MU Division of Applied Social Sciences. Register here: https://umsystem.zoom.us/webinar/register/WN_9LPHG_9DSoii2Tj0dOfNaQ

5th World Agroforestry Conference

July 17th-20th, 2022 | Quebec City, Canada

The 5th World Congress on Agroforestry: Transitioning to a Viable World will be held over July 17th through the 20th. This congress will be an opportunity to stimulate an open and inclusive dialogue between various stakeholders from around the world including farmers, researchers, advisors, policy makers, and representatives from the government, the civil society and the private sector. Considering agroforestry participates in enhancing soil health, protecting water quality, increasing biodiversity, mitigating and adapting to climate change, and providing food security, health and revenues, it is an essential component of the needed ecological, energetic, social and economic transition. This critical transition can and must be achieved through a participatory collaboration process that helps building bridges between research, policy decisions and field work. The 5th World Congress on Agroforestry will help creating or strengthening those connections by promoting knowledge sharing for a transition to a unified and healthy world.

The call for abstracts to participate in the 5th World Congress on Agroforestry 2022: Transitioning to a Viable World is now open! https://agroforestry2022.org/en/participate/abstract-submission