

Volume 6 Issue 1
April 2011

Kentucky Woodlands Magazine

Bugs That Bore Us
Kentucky Pecans
American Chestnut Update

Kentucky Woodlands

Volume 6 Issue 1 Magazine

Promoting stewardship and sustainable management of Kentucky's non-industrial private forests.

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From the Editors of the Kentucky Woodlands Magazine:

The picture on the front cover about sums up the beginning of 2011 for many woodland owners particularly those in western Kentucky. The one ray of sunshine is that woodlands that are not flooded started the growing season with abundant soil moisture.

As with most issues of the magazine we have a wide range of subjects, hopefully everyone will find something of value. We have started a new department "Research In Brief" with summaries of cutting edge research that impacts woodlands and woodland owners from forest researchers here in Kentucky. In this issue, Dr. Andrew Stainback from the University of Kentucky, Department of Forestry and his work on forest taxation. Interest in American chestnut remains high and we have an update on the progress of research and breeding by a number of experts with a special note on efforts here in Kentucky. Two articles deal with issues of forest health including an article on three borers common to Kentucky and one on native plants that often misbehave causing us problems.

We also call your attention to the Woodlands News to Use section that contains information on a number of upcoming events of importance. We also have articles on pecan production, a primer on how to identify wood, and a look at the Kentucky state champion baldcypress. We hope that you enjoy this issue of the magazine and as always we appreciate your interest, care, and management of Kentucky's woodlands.


Jeff Stringer,
 University of Kentucky
 Department of Forestry



Diana Olszowy,
 Kentucky Division of Forestry

Photo courtesy: Renee' Williams



Participants of last year's Woodland Owners Short Course learn how to apply crop tree management techniques. See the 2011 Woodland Owners Short Course announcement in this issue and register now by visiting www.ukforestry.org or calling 859.257.7597.

About the Cover:

The cover photo, from Oldham County, of a flooded woodland near the Ohio river was provided by Cary Perkins. Cary is the current Chairman of the Kentucky Tree Farm Committee and operates Bluegrass Consulting Forestry after retiring from the Division of Forestry with over 30 years of service. The spring of 2011 has been one of the wettest on record and has caused problems to numerous stream banks. If your stream banks were damaged make sure to check out the Flood and Stream Bank Damage Information section in the Kentucky Woodland News To Use section of this issue as some repair work requires permits.

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Bugs That Bore Us



Emerald ash borer



Two-lined chestnut borer



Southern pine beetle

Damage from the southern pine beetle.

by Lee Townsend and Lynne Rieske-Kinney

Kentucky's woodlands are under constant pressure from both native and exotic invaders that threaten forest health and forest sustainability. While we typically think of an "invasive species" as being a non-native exotic, it can be simply and broadly defined as one that is likely to cause economic or environmental harm. To further complicate matters, not all exotic species are invasive! Under the right conditions or circumstances, a number of native species can act as aggressively and destructively as any exotic invasive.

Several invasive insects (see Table 1) have recently caused particular concern for Kentucky's natural resources, either because they're new to our area and/or because they're capable of having a significant detrimental impact on the environment. Borers may very well top the list of invasive species in terms of their potential for destruction. These insects feed hidden from view for much of their life cycle. In the immature (larval) stage, they tunnel beneath the bark to feed on vascular tissues, disrupt water and nutrient flow, and bore into the tree stem, where they can cause extensive, irreparable structural damage before signs of their presence become obvious. Initial symptoms include wilted or fading foliage and branch dieback that may be attributed to drought stress or injury. Significant limb dieback or tree death may occur before landowners notice increased bird activity around infested trees, which occurs because the immature insects are an excellent food source.

Discovery and diagnosis may identify the culprit, but there may be few practical measures to take beyond assessment and salvage because there is no quick, viable means of managing the pest population. Initial efforts generally involve a survey to determine the boundaries of the infestation area and taking steps to limit the spread. While a

Photos courtesy above: Southern pine beetle damage: Ronald F. Billings, Texas Forest Service, Bugwood.org; Two-lined chestnut borer: USDA Forest Service - Northeastern Area Archive, USDA Forest Service, Bugwood.org; EAB: David Cappaert, Michigan State University, Bugwood.org; Southern pine beetle: David T. Almquist, University of Florida, Bugwood.org

preventive insecticide application may be an alternative in landscape settings or for specimen trees, it is rarely possible in woodlands. In the long term, biological control may provide a sustainable and economical approach. However, it is not a strategy that can be implemented quickly, even if native beneficial insects or pathogens are available.

Some of these points can be illustrated by three borer species that have or are currently impacting Kentucky woodlands and forests—the emerald ash borer, an exotic invasive insect, and two native species—the two-lined chestnut borer and the southern pine beetle.

Emerald Ash Borer

The emerald ash borer (EAB), *Agrilus planipennis*, is a native of China that was first reported in North America in Michigan in 1997 and was discovered in Kentucky in 2009. Infestations have been found in 15 states, primarily in the upper Midwest. EAB aggressively attacks all species of ash, *Fraxinus* spp. Since North American ash have no resistance to EAB, attacks are normally fatal. Blue ash, the signature species of Kentucky's Bluegrass region, is particularly at risk.

The EAB has been found in 14 Kentucky counties since 2009.

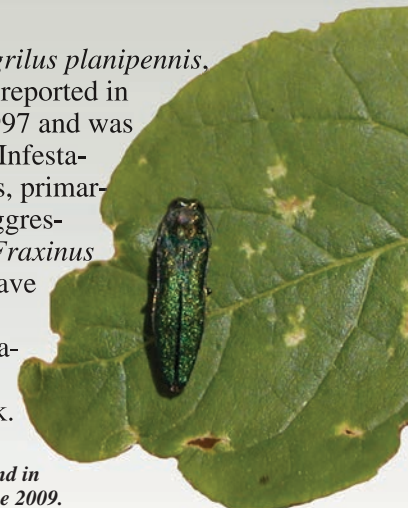


Photo courtesy: Lee Townsend

EAB produces one brood per year. Adults are ¾" long, metallic green beetles that are present May through June. Beetles are most active on warm, sunny days, and they feed on ash leaves, making irregular notches along leaf margins. Each female lays approximately 75 eggs in bark crevices. These eggs hatch, and larvae bore through the bark and into the inner bark. Larvae form extensive "switchback" galleries beneath the bark as they feed, destroying the tissues that transports sugars produced by the leaves. Development occurs slowly over the year. Adults emerge the following summer by chewing through the bark, leaving a characteristic D-shaped exit hole visible on the bark.

EAB populations in a newly invaded area appear to peak within five to seven years after initial infestations are discovered. The peak lasts for about four years, and then borer numbers begin to decline as host trees die.

Some EAB mortality by native beneficial insects (about 1%) and pathogens (2%) has been documented, but the

level is too low to suppress borer populations. Three species of beneficial wasps that attack EAB larvae have been discovered in the natural range of the pest. This discovery is encouraging, but before releases can be made, much work must be done to develop efficient rearing methods and to assess potential impacts of these species on native borers and natural enemies.

EAB traps are placed around the state to monitor where the insect is located. Robert Arrington, a certified arborist, is shown hanging a EAB trap last year.

In the meantime, widespread ash mortality continues to occur wherever EAB has become established. Efforts in Kentucky have focused on monitoring the spread of the population through surveys with the now-familiar purple prism traps and slowing the spread through education and quarantines.

Salvage operations associated with EAB mortality generate infested logs that are easily transported to uninfested areas. Inadvertent movement of infested firewood and unprocessed ash logs has contributed substantially to new infestations. The most current information on EAB in Kentucky is available at <http://pest.ca.uky.edu/EXT/EAB/welcome.html> along with links to quarantine and compliance documents.

Two-lined Chestnut Borer

Closely related to EAB, the two-lined chestnut borer (TLCB), *Agrilus bilineatus*, is a native species found throughout eastern North America. American chestnut was its main host until it was ravaged by the chestnut blight fungus. With the decline of American chestnut, the TLCB shifted its attack to oaks, *Quercus* spp., in both the red and white oak groups. The insect produces one generation each

year, with timing similar to that of EAB.

Unlike the exotic EAB, the TLCB only attacks declining trees that are under stress from drought or other factors; however, females may lay eggs on broken branches of healthy trees. Urban trees are particularly at risk, since they're often suffering from soil compaction, root or trunk injury, or chemical exposure. Trees that have been defoliated by other insects are also at risk. Because much of our standing oak is stressed due to recurring drought, ice storms, and defoliation events, the TLCB is a frequent problem in Kentucky's forests and may be a major mortality factor for oaks.

The first recognizable signs of TLCB infestation appear around mid-July as foliage on infested branches turns reddish-brown while the remaining foliage remains a healthy green. Leaves on infested branches often remain attached beyond normal fall leaf drop. Surrounding adjacent trees are often attacked by the borer and *Armillaria* root rot, producing pockets of dead trees.

As it is a native insect, there are native beneficial wasps that, along with woodpeckers, cause TLCB mortality and provide some natural control. Felling infested trees prior to July will cause many borer larvae to die before they can complete their development. However, transporting infested felled logs can contribute to spreading infestations.

Southern Pine Beetle

The southern pine beetle (SPB), *Dendroctonus frontalis*, is an aggressive phloem-feeding bark beetle that attacks mature and over-mature pine, *Pinus* spp., primarily loblolly, *P. taeda*, and shortleaf, *P. echinata*. SPB is the most serious native insect pest of southern pines. Infestations are characterized by trees with reddish brown crowns surrounded by trees with green needles. Obvious signs of infestation include pitch tubes, running pitch, sawdust at the base of the tree, numerous small emergence holes in the bark, and increased woodpecker activity.

Although the adult insect itself is very small, it occurs in large numbers and attacks the host plant *en masse*. Because it must kill its host to successfully reproduce, SPB kills thousands of pines each year. SPB-caused mortality causes billions of dollars in economic loss, catastrophically alters forest structure, and drastically alters the trajectory of forest succession. Poorly managed pine stands and abiotic factors, such as weather, enhance destruction. Lack of proactive forest management creates stressed, dense stands that are

Photo courtesy: Steven Katovich, USDA Forest Service, Bugwood.org



The two-lined chestnut borer is a common pest of stressed oak trees.

Photo courtesy: Joe Collins





The southern pine beetle does its damage under the bark of mature and over mature pine trees.

Photo courtesy: David T. Almquist, University of Florida, Bugwood.org

primed for beetle outbreaks. Drought, lightning strikes, ice, and physical damage can further increase the susceptibility of a tree or stand to SPB attacks.

In the Deep South, SPB outbreaks typically occur every 8 to 12 years and persist for two to three years. During outbreak years, complete pine mortality is not uncommon, and extensive economic losses occur. Secondary effects include hydrologic changes; shifts in wildlife distribution patterns, including loss of habitat for pine-dependent wildlife; and reduced aesthetics and recreational use. In Kentucky our outbreak frequency is 25-30 years, primarily because it takes that long for replacement forests to mature. While the SPB outbreak of 1999-2002 did not kill all of the southern pine trees in Kentucky, it did cause almost complete loss of the shortleaf pine forest type. Pine-dependent wildlife was threatened, and the endangered red cockaded woodpecker was lost from the state.

Invasive borers can and do change the landscape. Occasionally, native species can overwhelm tree defenses weakened by stress, while exotics devastate trees that are not equipped to ward off their attack. Research helps us to predict how woodlands may respond, to evaluate options that may mitigate the damage or the pest's spread, and to identify silviculture practices that aid in recovery. Healthy, diverse forests are much less susceptible to borer damage. Proactive management approaches, including appropriate site and species selection, thinning, and monitoring, help reduce losses. Boring bugs are not boring; they are formidable challenges to forest health.

Pitch tubes are a defensive mechanism of pine trees. When pine trees are attacked by bark beetles they will force pitch (or pine sap) out of the hole made by the attacking beetle. The central American pine tree shown in this image is under serious attack from southern pine beetle. Please note that southern pine beetle is not the only bark beetle to induce this response in pine trees.



Photo courtesy: Ronald F. Billings, Texas Forest Service, Bugwood.org

Table 1 – A comparison of important Kentucky borers

Borer	Hosts	Adult Flight Period	Galleries	Emergence Holes	Generations per year
Emerald ash borer	Ash (<i>Fraxinus</i>) Healthy and stressed	Early May – June	Back and forth, switchback appearance	D-shaped ~ 1/8" diameter	1
Two-lined chestnut borer	Red and white oaks <i>Quercus</i> spp Usually stressed	Early May – June	Zigzag or wandering	D-shaped ~1/5" wide	1
Southern pine beetle	Southern pines (<i>Pinus</i>) > 15 yrs	Late spring through fall	Curved or S-shaped	Round ~1/16" diameter	3+

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FORESTRY 101

The Basics of Wood Identification

by Terry Conners

Photos courtesy: Terry Conners

Introduction

Wood identification can be a useful skill. Think of those racks of wood at the local home center: what is the difference between oak, cherry, and maple? Is it just color, or are there other differences? Perhaps you might have experienced a timber theft: how can a forester tell what kind of tree was growing if he/she only has a stump to look at? There are other times when one has to rely upon someone else's questionable expertise: does that antique dealer really know the difference between oak and ash or chestnut? This brief article will describe some of the differences between wood species, and hopefully you'll end up feeling more comfortable identifying a few species that are common to Kentucky.

First Things To Look At

All trees in North America go into dormancy during the winter months and begin to grow again only when warmth and moisture are available in the spring. These growing cycles are reflected in the wood structure; growth cycles create the familiar growth rings that we've all probably used to determine the age of a tree.

Some familiar species can be separated by their color differences. For example, you probably could tell the difference between maple, cherry, and walnut furniture just from the color. The colors of cherry and walnut are especially characteristic and helpful in identifying an unknown piece of wood, but there are many other woods with a pale color (such as aspen or yellow-poplar).

Some of the familiar colors referred to above are characteristic of the center of the tree (called the heartwood). The part of the wood that is immediately beneath the bark (called the sapwood) generally lacks a characteristic color, so color isn't of much use in helping to identify the wood if

the piece you're looking at is entirely made from sapwood. Heartwood only begins to form once a tree reaches a certain age, and that age differs from species to species. In persimmon, for example, even a fairly large tree might only have a heartwood that is a couple of inches in diameter. In other species the sapwood is much wider. (See Figure 1.)

Color often changes with age; freshly-cut yellow-poplar has a distinct light green hue, but as it ages it turns a light honey-brown color. This change in color happens to other woods too. (Cherry is a great example of a species that gets darker with age.)

The bottom line is that color may or may not be helpful in determining the species, depending on the age of the tree. (In furniture, of course, color can also be affected by the use of stains.) Ultimately, you have to know something about wood structure to be sure that the color isn't part of a disguise making you think that one piece of wood is really another species altogether.

Eastern redcedar is a great example of a species that has a characteristic odor that can be helpful in identifying a piece of wood (see Figure 2). Some other species have distinct odors as well.

In addition to differences in color, different species also have different densities (see Figure 3). This means that the weight of a seasoned piece of wood can be helpful in figuring out what species you might be



Figure 1. This cross-section of a southern pine crosscut clearly shows the annual growth rings. The heartwood, shown in the center of this piece, is a slightly darker pumpkin color than the sapwood.

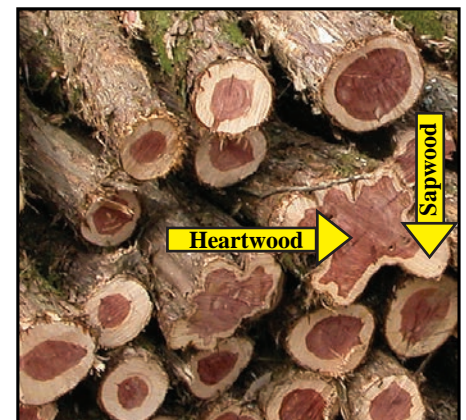
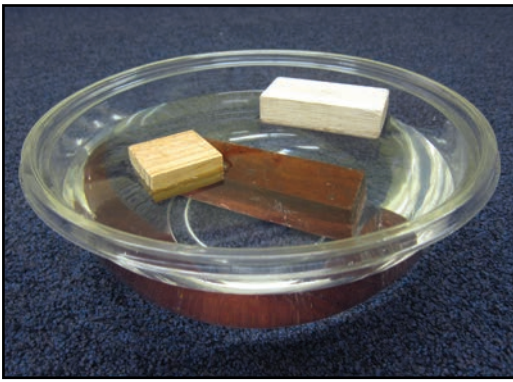


Figure 2. Eastern redcedar logs showing the reddish heartwood and the light-colored sapwood.



looking at. Regardless of color, you should not confuse a light wood such as yellow-poplar with a much heavier species such as hard maple.

Figure 3. Balsa wood has a very low density, so it doesn't sink as much as the piece of white pine (nor does it sink like the piece of cocobolo, a tropical hardwood from Central America).

Different Species Look ... Well, Different!

There are two broad classes of trees, softwoods (with cones and needles) and hardwoods (broad-leaved trees that lose their leaves in the fall). Softwoods are further divided into species that contain resin (pitch), such as the pines, and those species that are non-resinous, like hemlock. Most of the cells in these tree species are commonly called fibers. The cells (fibers) that grow first each year are called earlywood, and in softwoods these cells have thinner cell walls than the latewood cells near the end of the growth ring. Thin cell walls mean less wood substance (and more air), and this explains why earlywood is less dense than latewood. The less-dense earlywood also has a lighter color than the latewood, and this difference helps make the boundaries between growth rings quite pronounced in most softwood species (as in the southern pine shown in Figure 1, for example).

Hardwood trees are different from softwoods in one special way: in addition to fibers, hardwoods contain large tube-like cells that appear as pores on the tree cross-section, which is another name given to the surface on the top of the stump. Sometimes these pores are a lot larger in diameter in the earlywood than in the latewood, and sometimes the pores are all about the same size throughout the growth ring. The size of the pores and whether or not they have a uniform size affects the visual texture of the wood; if the pores are all about the same size, it also makes it harder to distinguish growth rings. Recognizing which of these patterns is present in an unknown piece of hardwood is the first step in figuring out the kind of wood you're looking at (see Figure 4 & 5).

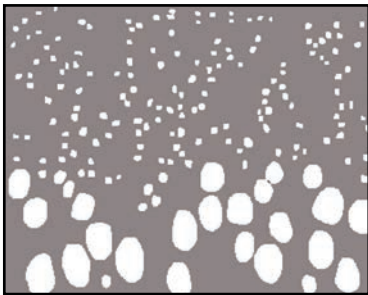


Figure 4. Sketch of the pores in one growth ring of American chestnut; the large pores near the bottom of the illustration are earlywood; the small pores indicate where the latewood is.

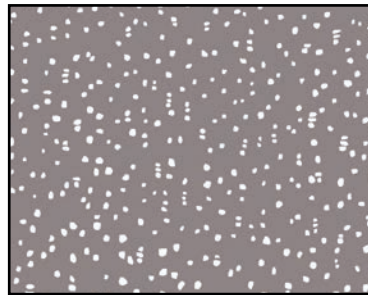


Figure 5. Sketch of the pores in one growth ring of red maple. All of the pores are roughly the same size, making it difficult to define earlywood or latewood zones.

Species that have a band of large, easily-seen pores in the earlywood are called **ring-porous** species, and if you decide to learn more about identifying wood you'll run into this term in every reference book and key you turn to. Some of the ring-porous species you might commonly run into include the oaks, ash, black locust, elm, and chestnut (see Figure 4). Usually the large pores help make the growth rings visible even in a rough, chain saw-cut stump. The oaks are a ring-porous species, but they're easy to distinguish from all the others because only they have bands of tissue called rays running perpendicular to the growth rings that are very broad and easy-

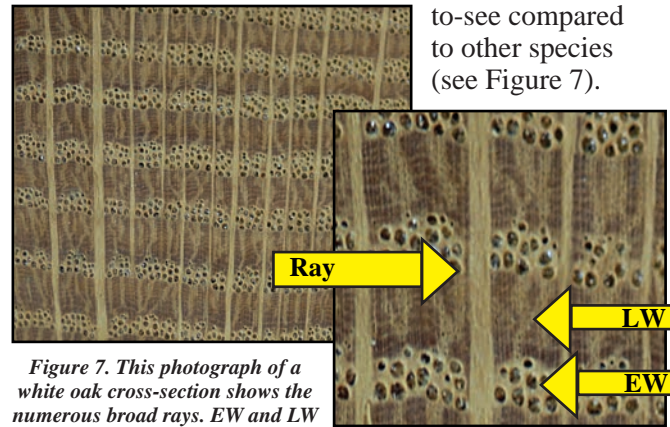


Figure 7. This photograph of a white oak cross-section shows the numerous broad rays. EW and LW stand for earlywood and latewood. Note the ring-porous nature of the earlywood.

to-see compared to other species (see Figure 7).

If the pores are all about the same size throughout the growth ring the species is classified as a **diffuse-porous** species. You might have a difficult time seeing the pores in these species unless you make a cut on the end grain with a sharp knife. Sometimes, you even have to look at the wood with a 10–15X hand lens to make sure of what you're looking at. Another way to think about it is that, if you can't see the pores and you're pretty sure it's a hardwood, the pores are probably all about the same size and you have a piece of diffuse-porous wood. Examples of diffuse porous species include hard and soft maple, birch, beech, sycamore, and yellow-poplar (see Figure 8).

Every piece of wood looks a little bit different, even within a single species, but notice the color, hardness, and even how smoothly the edges of a piece of wood look after it has been cut with a saw.

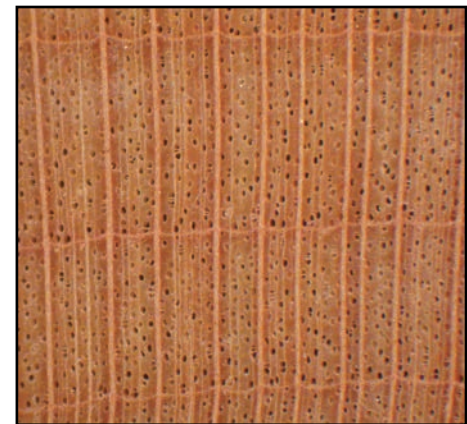


Figure 8. Hard maple is a diffuse-porous wood. See how most of the pores are the same size throughout the growth ring.

All these things will help you determine what you're looking at.

As it happens, both black walnut and black cherry are exceptional species that don't neatly fit either the ring-porous or diffuse-porous category. Fortunately, both of these species are usually recognizable by color, hardness, and density. Walnut, especially, has a characteristic odor when it's machined.

Summary

At the end of the day, it's important to remember that no two pieces of wood, even of the same species, will look exactly alike. Do your best to examine characteristics such as color, hardness, odor, and density, and look closely at the end grain, even if you have to use a hand lens (see Table 1). If you would like additional information about wood identification, please visit the following link to view a recent prerecorded wood identification webinar: www.ca.uky.edu/forestryextension/audio_video.php

Table 1. Distinguishing characteristics can be useful in identifying different wood species.				
Distinguishing Characteristics		Possible Species		
Non-porous? (softwood)	Pale brown or pinkish	Pine	Spruce	Hemlock
	Odor, red color?	Eastern redcedar		
Ring-Porous? (hardwood)	Broad rays	Oaks		
	No broad rays	Ash	Hickory	Chestnut
Diffuse-Porous? (hardwood)	Fairly heavy	Maple	Sycamore	Beech
	Light, green, cuts easily	Yellow-poplar		
Notable color?	Chocolate brown heartwood, light sapwood	Black walnut		
	Pale pink to reddish brown, fairly hard	Black cherry		

About the Author:

Terry Conners, Ph.D. is an associate extension professor at the University of Kentucky Department of Forestry and has experience working with the pulp, paper, and wood industries as well as youth education. Current interests include assisting the Kentucky forest industry, youth education, and assisting homeowners with wood identification and wood related problems.

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Advertisement:

New Leaders, Old Friends, and Moving Forward Together

www.kwoa.net

I feel humbled and yet proud that the Kentucky Woodland Owners Association (KWOA) membership has given me the honor as serving as KWOA/Kentucky Woodland Owners Foundation (KWOFF) president for 2011. I will try to uphold the tradition and reputation that Past President Betty Williamson and other leaders with and before her have established. Other officers for 2011 include Felix Taylor, vice president; Doug McLaren, secretary; Pete McNeill, treasurer; Jack Rentz, assistant treasurer; and Betty Williamson, past president.

This year's annual KWOA/KWOFF meeting at Carter Caves State Park was just great. The Kentucky Division of Forestry went out of its way in directing us through a variety of educational opportunities in the woods, fields, and caves in and around the park. The cool weather just added to the setting, and the bat cave demonstration was unique and educational.

Our in-house sessions included recognition of the Service Forester of the Year, Steve Gray, Elizabethtown, and Pete McNeill, Fleming County, who is one of the KWOA/KWOFF founders and former National Tree Farmer of the Year. Dr Terrell "Red" Baker, UK Forestry Department chair, brought a refreshed interest in woodlands from the UK Forestry Department. His presentation led to in-depth discussion and questions that brought many woodland concerns and opportunities to the forefront for our direction and efforts.

The advancement in woodland certification opportunities, presented by Ken Negray, New Page Corporation, pointed toward a new day in managing and marketing timber; USDA support for woodland farmers was presented by Jerry Adams, Natural Resources Conservation Service; and the latest on invasive species was covered by Carl Harper, UK Entomology Department. The unraveling of the com-

plex timber tax concerns by Dr. Andrew Stainback, UK Forestry Department, resulted in a Timberland Tax Task Force being formed to study the opportunities for woodland owners to achieve an equitable tax structure.

But to me, the most appealing aspect about the KWOA/KWOFF annual meetings is getting to meet and associate with fellow woodland enthusiasts from across the state and share our common interests. One woodland owner in attendance was an 80-year-old retired minister who owns 400 acres of woodland in Lewis County and 20 acres in Jessamine County and has hand-planted trees for decades. He reports that his greatest return is that his granddaughter

is interested in the trees and plans to move to the farm to continue his legacy in the woods. Another woodland owner, now living in Florida, who was so enamored of the opportunities offered by KWOFF that his family has agreed to fund the balance of the KWOFF forestry scholarship fund!

There also were commercial timber farmers with 2,000 - 3,000 acres to smaller 10-acre plot farm-

ers in attendance; there was even a couple from Holland, across the seas, in attendance! We all had a common interest...the value of trees in so many ways.

These are just some of the good reasons to become a member of KWOA/KWOFF and participate in the quarterly board meetings, when possible. And, for sure, attend the annual membership meetings. These annual meetings are usually held at a state park in the springtime and offer something for all woodland enthusiasts. Please access our website, www.KWOA.com for information about joining.

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*Board members and officers of the Kentucky Woodland Owners Association.
From left: Perry Sebaugh, Bob Bauer, J. Henry Duncan (president), Doug McLaren (secretary),
Karen Marshall, Jack Rentz (asst. treasurer), Felix Taylor (vice-president),
J.R. Roth, Cliff Taylor, Joe Ball, Pat Cleary, Tim Freibert, and Greg Kuhns.*

Forest Health

Native But Naughty

by Diana Olszowy and Jody Thompson



You may have noticed that we often discuss how to identify and control non-native, invasive exotic plant species in this forest health section. Though these “exotics” possess the potential to create havoc in our natural systems, we also have a handful of “native” plants that have the capability to cause quite a few problems themselves. While these select native plants don’t usually approach the severity of the problem caused by the many exotic plants, certain management practices and levels of disturbance can assist them in becoming a problem. This article will highlight three of the more common “natives” that have become masterful in adapting to different sites. Even though these species are from different taxonomic families, they all share one specific characteristic – they are all heavy seed producers. Whether the seed is transported by wind, water, or animal, these species have become very efficient in increasing their numbers in order to occupy a given site.

Red Maple:

Known as one of the most beautiful trees for fall color, red maple is also one of the most aggressive colonizers. It can easily adapt to a variety of sites and soil conditions. Like the rest of the maples, it is shade tolerant, which allows it to survive and actually thrive in the forest understory waiting

for its chance in the sun. Once the opportunity presents itself, red maple can grow very quickly and can produce copious amounts of viable seed in less than 12 years. It can often out-compete oaks, hickory, and other hardwood species on many sites. It grows in the understory and can shade out newly established seedlings of oaks and other species. If it obtains dominance in the stand, it can live so long that most other species growing

in the understory will give up and die.

Red maple isn’t usually seen as a pest in the urban landscape, but its popularity in these areas has led to its overuse in the landscape. This overuse results in red maple being present and important in urban areas and the urban rural interface; it is also a concern in woodlands. According to 2008 Kentucky Forest Inventory and Analysis data, red

maple is now more numerous in population (more individual trees) than all oak species combined. (See the Kentucky Forest Inventory and Analysis Update article, *Kentucky Woodlands Magazine*, volume 5, issue 3).

Management: As a result of red maple's abundance and its negative impact on regeneration of other native species, considerable time and effort is spent to reduce its numbers in the woods. This reduction is typically accomplished through forest stand improvement work. This work often focuses on treating individual red maple trees growing in the understory of the woodlands with herbicides before or directly after a timber harvest. This treatment does not eliminate red maple but reduces its numbers to allow room for more preferable species to regenerate. Because red maple is so abundant and can take over a stand, it is labeled as an invasive tree in many parts of Kentucky.

Eastern Redcedar:

Although eastern redcedar can be found in every Kentucky county, it is most abundant in limestone soils. It is one of the chief trees to invade worn-out fields and overgrazed, eroded slopes. Redcedar is classified as a pioneer species; its primary role is to occupy a site in order to build up the soil and hold moisture to the extent that other trees can later come in and survive. In other words, redcedar “stabilizes” the site in order to make it better for the next generation of trees – usually hardwoods. As the hardwoods grow, they will eventually overshadow the redcedar, and because redcedar is shade intolerant, the species will fade from the site

over a period of years. This transition period from redcedar dominated to hardwood dominated can take many years, often decades, and if the redcedar has a good hold on the site, this time period can be extended even to 100+ years.

Depending upon where you live in Kentucky, landowners can have a negative view of eastern redcedar, perceiv-



Red maple leaves. Woodland owners should be familiar with this tree because it is very abundant.



Eastern redcedar produces a berry that birds enjoy as well as beautiful wood. In many parts of the state, it is one of the first trees to invade abandoned agricultural land.

Photos courtesy: Paul Wray, Iowa State University, Bugwood.org

ing it as an invasive weed species, which it certainly can be if given an opportunity. Redcedar produces a berry that birds relish, and the berry serves as the main avenue of dissemination. In several states, redcedar is a significant fire threat and is listed as a noxious weed. States such as Oklahoma and Texas have declared all-out war on the species, and Kansas and Nebraska have labeled redcedar as a noxious weed due to its ability to occupy prime pasture or rangeland. Eastern redcedar is marketable, and markets in Kentucky have historically existed and remain viable in the Commonwealth.

Management: The majority of the management of redcedar stands is devoted to encouraging the eventual change to hardwoods. This transition often occurs through using a commercially viable harvest to remove merchantable eastern redcedar from the stands and leaving the young developing hardwood trees. Because of this dual nature – a native merchantable species that is also invasive – eastern redcedar occupies a unique place in the discussion of invasive species. You can label eastern redcedar as something to get rid of or something to manage, and you would be correct either way.

Wild Grape:

Kentucky is host to many native varieties of wild grapes.

Though these grapes provide excellent wildlife food, the vines can greatly damage the trees on which they grow. In contrast to some other native vines that cling to the trunk of the tree, such as Virginia creeper, the tendrils of grapes twist around in the branches, and the grape leaves cover the tops of the trees. The resulting shading of the tree's leaves curtails the growth of the tree, and the extra weight of the vines in the crown can make the trees susceptible to wind or ice storm damage. These situations typically develop where there is ample light for young trees and grape vines

to begin growing together, which typically occurs after a timber harvest opens gaps in the woods or along edges of woods. Wild grape does not actually climb the host tree; it usually grows up with the tree as the tree grows taller, so it is not uncommon for the tree and the vine to be close to the same age. When wild grape is present in high numbers in a woodland with productive soils, the grape can actually inhibit the development of regenerating trees, sometimes creating areas of bent, deformed, and dying trees. If not ruining trees initially, wild grape can often be found in

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growing and maturing trees, such as black cherry and black walnut, that have relatively thin crowns, leading to damage to these potentially valuable species.

Management: To manage this situation of, on one hand, wild grape being a viable and valuable wildlife food, and on the other hand, being a problem for the development of trees, foresters and wildlife biologists recommend leaving grapevines in the woods when they are in low numbers or on less productive sites. Both generally agree that controlling grapevines is warranted on sites where wild grape's numbers and the soils indicate it will be a problem. Still, in such cases, not all the grapevines are controlled; some are left for wildlife. Control is generally accomplished by cutting the vines at least four years ahead of a timber harvest and allowing the vines to resprout and die in the shade. Alternatively, an herbicide can be used, but it must be used on treated vines at or near the time of a harvest. Waiting to kill vines after a harvest is extremely difficult and time consuming.

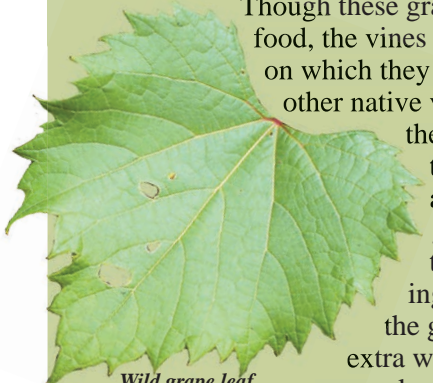
Though the native plants listed in this article can become overly aggressive, they do not compare to the many exotic, invasive plants plaguing Kentucky's landscapes. Red maple, for instance, is more often a pest in a woodland site that is being managed for timber production. Redcedar, while serving in its ecological role, is perceived as a pest when its function conflicts with a different land-use objective. The invasiveness of wild grape is influenced by the management activities you have initiated in your own woods.

In summary, please realize that many of our native plant species have the ability to become overly aggressive in the right growing conditions. Understanding and utilizing the mechanisms that Mother Nature has put in place to keep these plants in check will allow you to continue in your management endeavors without shooting yourself in the foot.

Photo courtesy: Kentucky Division of Forestry



Wild grape is an important wildlife food, but the vines can be very damaging to timber trees.



Wild grape leaf.

Photo courtesy: Theodore Webster, USDA Agricultural Research Service, Bugwood.org

www.kyForestHealth.org



Photo courtesy: Mike French

American chestnuts in bur.

American chestnut:

an Update for Kentucky Woodland Owners

by Lynn Garrison, Chris Barton, Fred Hebard, Anne Meyers Bobigian, and Scott Freidhof

Introduction

The American chestnut (*Castanea dentata*) was a dominant canopy tree species in eastern North America before populations were devastated by the introduction of the fungal pathogen *Cryphonectria parasitica*, which causes chestnut blight. The blight is believed to have come to North America on nursery stock from Asia in the late 1800s. By the 1950s the American chestnut had been devastated throughout its native range by the chestnut blight and was reduced to a shrub layer, seldom reaching canopy level. Some living roots remain, and these sprout suckers usually live long enough to produce a crop of seed, but the seedlings are often killed back to ground level before bearing seed.

In some areas, American chestnut comprised approximately 25% of the eastern deciduous forest within its native range, which included more than 200 million acres of forest (www.acf.org/range_close.php). It occurred in 71 counties in Kentucky. It was an integral component of a forest ecosystem that provided habitat and abundant food sources for animals and people. A late-flowering tree unaffected by seasonal frosts, it produced fruit annually with little variation from year to year, so chestnuts were a reliable food source for birds such as wild turkey and blue jays and for mammals such as squir-



The Shelton family poses for a picture in front of a large American chestnut tree. American chestnut trees were an important part of early mountain life in Kentucky providing food, fuel, and wood for construction.

Photo courtesy: The American Chestnut Foundation

rels, deer, and bears. The nuts were used to fatten livestock and were stored for food over the winter months. They were also an important cash crop for many rural families, and nuts were sent to major cities over the Christmas season to be roasted and sold by street vendors.

The American chestnut was also an excellent timber tree. Forest-grown trees were straight and were often free of branches for 50 feet. The wood was straight-grained, easy to work, and rot-resistant. The wood was used for telegraph poles, railroad ties, shingles, paneling, fencing, ship masts, coffins, fine furniture, musical instruments, pulp, and plywood. Production of American chestnut lumber in the United States reached a maximum of 663.9 million board feet in 1909. Maximum production in Kentucky was 42.8 million board feet in 1907, 5% of Kentucky's total hardwood production. In 1924, the volume of standing chestnut sawtimber in the United States was estimated to be 19.3 billion board feet.

In 1983 The American Chestnut Foundation (TACF) was founded by a group of scientists who recognized the severe impact the demise of the American chestnut had on the local economies of rural communities and upon forest ecosystems. They believed there was a strong chance of reviving the American chestnut by breeding for resistance using a backcross method. The goal of TACF is to restore the American chestnut tree to its native range within the woodlands of the eastern United States.

TACF Research

American chestnut restoration is entering several exciting new phases. First, after 25 years of work, 15/16th-American, 1/16th-Chinese 'Restoration' chestnuts are now being planted in the forest throughout the country. These test plantings will determine whether the 'Restoration' chestnut trees can grow like the American chestnut of old. Although it will take 50 years or more for the 'Restoration' chestnut to prove it can grow 100 feet tall, it should be apparent in 10 to 15 years whether or not it will be suitable for general planting in the forest.

Along with work to establish a blight-resistant tree, the TACF is starting to develop enough baseline data to incorporate



KDF Stewardship Forester Kevin Galloway is shown mud-packing a canker 20 feet up an Elliott County American chestnut tree. The life of infected American chestnut trees can be extended by mud-packing cankers.

resistance to *Phytophthora* root rot into 'Restoration' chestnuts. *Phytophthora* root rot struck American chestnut trees in Kentucky toward the end of the Civil War and prevents it from growing in many sites where it formerly grew. Resistance to the disease will enable more Kentuckians and residents of other states to enjoy the 'Restoration' chestnut.

Another exciting phase, perhaps in this case more exciting for biologists than for the general public, is that detailed DNA sequence information is becoming available for chestnut. These data will enable breeders to incorporate disease resistance into American chestnut with greater

precision. The data also might help clarify the mysterious factors that made American chestnut a dominant forest tree, in contrast to Chinese chestnut.

Looking into the future, it is helpful to remember the basic goal of the TACF breeding program, which is to give American chestnut an opportunity to resume evolving on its own. It is difficult to predict with much accuracy whether *Phytophthora* root rot will become a worse problem than it is now or whether gall wasp or Ambrosia beetle, other pests of chestnut, will become even more destructive. And additional pests may come forth to threaten chestnut. It needs to have the genetic resources to cope with these threats by itself.

TACF helps the tree assemble those resources by capturing most of the American chestnut's existing genetic diversity in our breeding programs. That is why the state chapters are so important, including the Kentucky chapter. Some genes in Kentucky chestnut trees are different from genes of chestnut trees anywhere else in its range. We do not know what they do, but we suspect very strongly that they are critical to the long-term survival of chestnut. It is the chapter's job to bring those genes into the breeding program.

Kentucky Chapter of TACF

TACF currently has 16 chapters, including the Kentucky TACF Chapter (KY-TACF). KY-TACF volunteers contrib-

Photo courtesy: Scott Freidhof



The Kentucky Chapter of The American Chestnut Foundation plays an active role in the restoration of the American chestnut. One way they contribute is through pollinating efforts like this image of Mike French at the top of a 40-foot TV antenna tower pollinating a Letcher County American chestnut tree.

ute time and energy supporting regional breeding programs, research, local education programs, and member recruitment. The mission of the Kentucky Chapter is to restore the American chestnut to its natural ecological role in the woodlands of Kentucky within its native range.

The backcross breeding program started by TACF has produced blight-resistant trees that are now being tested in Kentucky and across the historic American chestnut range. The Kentucky chapter is participating by breeding local genotypes adaptable to ecosystems in Kentucky and has established three different types of chestnut orchards in the state. The most common is the breeding orchard. Pollen applied to Kentucky's pure American survivors is usually from the backcross 2 generation (B2). B2 trees are 7/8th American trees at TACF's research farm in Virginia. Once the B2 pollen is applied to a Kentucky American, the new generation of nuts is 15/16th American and is termed the backcross 3 generation (B3). Breeding orchards contain two different genetic lines of these B3 nuts. After seven to eight years of growth in the orchard, the B3 trees are purposely inoculated with the blight fungus. In 2011, the orchard at Robinson Forest

will be Kentucky's first trees to be inoculated. A small percentage of the B3 trees will have inherited blight resistance from the Chinese parent in the original cross. The blight-resistant B3 trees will be kept in the orchard to cross-pollinate and make the first intercross generation (B3F2).

A second type of orchard is the pure American "Mother Tree" orchard. Mother Tree orchards are established by digging chestnut stump sprouts from the forest and transplanting them into an orchard setting. Two of these Mother Tree orchards have been established, one at the Kentucky Division of Forestry's Morgan County Tree Nursery and one at the Grayson Lake Wildlife Management Area in Carter County. Mother trees at the Morgan County orchard were dug from high elevations on Pine Mountain. Those trees began producing flowers in 2010 and will be included in the breeding program during 2011.

A third type of chestnut orchard, termed "restoration orchard," will be established in 2011. Experimental orchards of this type will contain some potentially blight-resistant seedlings (B3F3). A grant from the U.S. Fish and Wildlife Service Partners in Wildlife Program made the restoration orchards possible on private lands. Restoration orchards will restore forest habitat for the long-term benefit of wildlife.



Photo courtesy: Scott Freidhof

A backcross 3 (B3) orchard was planted at the University of Kentucky's Robinson Forest in 2005. The trees are 15/16ths American/Chinese chestnut and will be inoculated with the chestnut blight this year to determine which trees have blight resistance. A small percentage of the B3 trees will have inherited blight resistance from the Chinese parent in the original cross. The blight-resistant B3 trees will be kept in the orchard to cross-pollinate and make the first intercross generation (B3F2).

American Chestnut and Mined Land Reforestation

The use of surface mines for American chestnut reestablishment is gaining acceptance, as many successful reforestation projects following the Forestry Reclamation Approach (FRA) have been demonstrated on mine lands across Appalachia (www.arri.osmre.gov). Numerous reasons exist for planting American chestnuts on fresh mine spoils. First, loose mine spoils reclaimed using FRA techniques have shown good growth and high survival

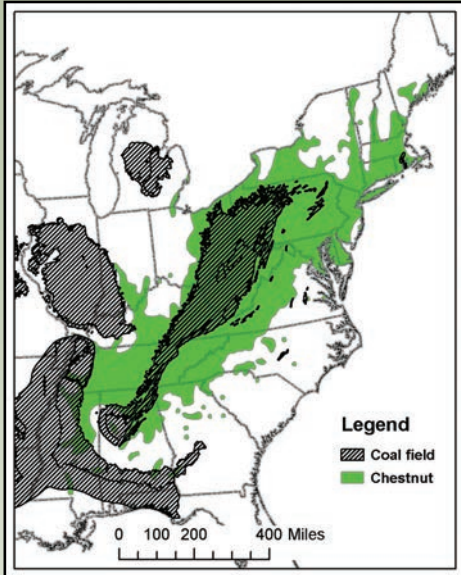


Figure 1. Overlay of the historic American chestnut range (green) with that of the Eastern United States coal field (black stripes).

Note that the Appalachian coal field is centrally located within the natural distribution range for American chestnut.

Appalachian coal region falls almost entirely within the natural distribution of American chestnut (Figure 1). If loose mine spoils prove conducive to chestnut survival and growth, the establishment and dispersal from founder populations of blight-resistant backcrosses throughout the range of the Appalachian coal region would aid TACF's goal of restoring the chestnut throughout its historic range.

In anticipation of the widespread release of the blight-resistant backcross American chestnuts, research efforts are under way to evaluate the suitability of mined sites for American chestnut establishment per the FRA in the Appalachian coal region. Pure American chestnuts and TACF backcross seedlings have been planted on mine lands to serve as proxies for the true-breeding, blight-resistant backcrosses. We are examining differing types of spoil to determine which parent material fosters the best growth and survival for American chestnut. In addition,

rates for other native Appalachian hardwood species and may also be suitable for American chestnuts. Second, many surface mines exhibit light and soil chemical characteristics that are similar to higher elevation and ridgetop positions where American chestnuts were dominant. Third, loose mine spoils are initially devoid of vegetative competition, a hindrance to many reforestation efforts. Fourth, fresh mine spoils may initially be devoid of pathogenic microbial communities such as *Phytophthora*, which have hindered TACF's breeding and restoration efforts elsewhere. Moreover, loose mine spoils are well-drained, which may hinder establishment of *Phytophthora*. Lastly, the

studies aimed at determining the best way to establish *Phytophthora*-free plantings are under way. Most operationally planted reclamation projects use dormant, bareroot nursery stock; however, *Phytophthora* are present in the soil at many nurseries and may be transported to planting sites on the roots of seedlings. American chestnuts can be established from seed on the mine site to avoid *Phytophthora* contamination, but rodent predation of the seeds can be as detrimental to survival as *Phytophthora* (Figure 2). As such, different planting techniques are being evaluated (e.g., direct-seeded versus bareroot stock, use of tree shelters versus no shelter, fertilized versus no fertilizer). Much has been learned from this research, and many successful plantings have been established. Not only is survival high in many mined locations, but *Phytophthora* has only been detected in one sample from a spoil that contained residual soil material from the pre-mined site. Soil samples tested from unmined forests in the region yielded high (80%) *Phytophthora* detection rates.

Appalachia is one of the most beautiful and culturally rich regions in America. The heritage of Appalachia has been rooted in the forest and coal industries for centuries. Appalachia has experienced many hardships related to environmental degradation from coal mining, but the loss of the American chestnut was particularly troublesome to its citizens. At one time, virtually all of the land mined in Appalachia was forested. Where once were forests, we now have abandoned grasslands that will take Mother Nature centuries to restore. Recently, TACF and the Appalachian Regional Reforestation Initiative (ARRI) developed a program to both promote the reforestation of mine lands in Appalachia and restore the American chestnut. This program, referred to as "Operation Springboard," has been embraced by the mining community, environmental groups, and Appalachian citizens alike. In 2009, 520 volunteers and nine separate non-profit watershed groups held tree-planting events on 36 acres of surface mine land and

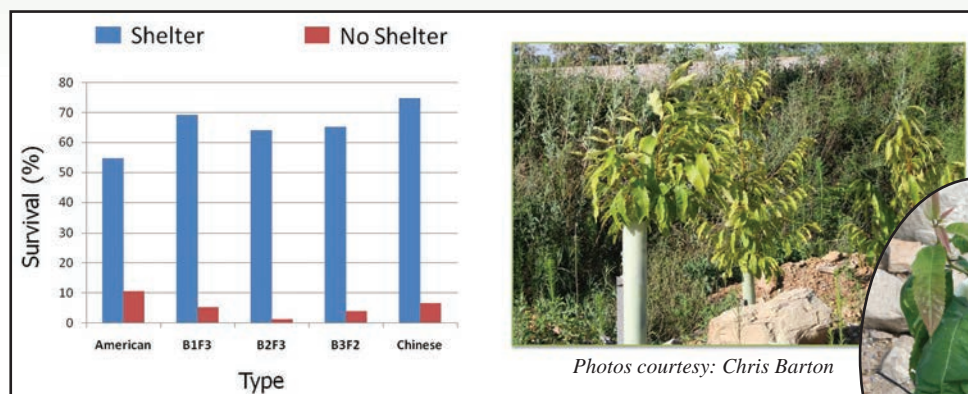


Figure 2. Influence of the use of tree shelters on chestnut survival on a surface mine in Pike County, KY. Tree shelters are plastic tubes placed over a seed or seedling to protect them from rodent predation and herbivory by browsing animals. American, Chinese, and backcross chestnut varieties (B1F3, B2F3, and B3F2) all benefited similarly from the protection provided by the shelter. Right: Recently germinated chestnut on a surface mine in Pike Co., KY.

planted 27,500 trees. In 2010, over 175 acres were used for volunteer planting events, and nearly 115,000 trees were planted.

American chestnuts were planted on each of these sites, and many times it provided the incentive for volunteers to join in the planting events. The act of planting American chestnuts within its native range is important, but using the chestnut to promote reforestation efforts (all forested species) on these mined lands may be more significant because it puts individuals with varying views on mining together to engage in conversations about conservation, sustainability, and the future well-being of the region. These conversations and outcomes produced from them are the true measures of success and progress. Ultimately, it is hoped that these efforts will lead to the restoration of the American chestnut and the forests it once inhabited.

What can you do to help?

One of the best ways to help the Kentucky chapter of The American Chestnut Foundation accomplish its mission is to become a member. This membership provides financial support, with \$15 of the \$40 membership fee coming back to the state chapter. Some members also volunteer for chapter planting projects by assisting with site preparation, weed control, and planting. Other members help with orchard maintenance at one of the chapter's orchards.

If you believe you have found an American chestnut, you can contact Lynn Garrison at (Lynn.Garrison@earthlink.net), as volunteers have found many surviving trees in Kentucky, several that can be used as mother trees that may be pollinated with pollen from TACF's Meadowview Research Farm or as pollen donors for Meadowview trees.

This American chestnut orchard was established in 2008. This breeding orchard in Oldham County has one of the highest survival rates thus far in Kentucky and has been used extensively for educational and outreach efforts.

Photo courtesy: Anne Meyers Bobigian

Can I get TACF blight-resistant seedlings/nuts?

"Restoration chestnut" seedlings/nuts are available to members through the TACF for a substantial sponsorship

(<http://shop.acf.org/annual-sponsor-seed-distribution.aspx>).

Blight-resistant American chestnut seedlings/nuts are not yet ready for full-scale distribution; they are still in the testing phase. These trees will

American chestnut trees bloom from mid-June to early July, depending on latitude and elevation. In this image of a rare mature American chestnut flowering, the male flowers (long white-yellowish catkins) are clearly visible along with the female flowers (the green burs at the base of the branches). American chestnut trees rarely self-pollinate so at least two chestnut trees need to be near each other for viable nut production.

Photo courtesy: Michael French

be distributed to cooperators who are assisting in a formal, rigorous testing program. When seeds that are not needed for formal, rigorous testing programs become available, they will be distributed principally to members of TACF for informal testing. TACF sponsor-level members now have access to some of these seeds for testing purposes.

Pure American chestnut seedlings can be purchased from the national TACF, and KY-TACF may occasionally have pure American seedlings. These seedlings are susceptible to the blight but may live long enough to produce seeds for a few years, helping preserve native germplasm. They may also be used for future breeding programs. With proper care one may be able to grow trees to a 5-6" diameter at breast height (4.5' above the ground) and 30 feet tall, depending on location and presence or absence of *Phytophthora cinnamomi*, before they die of blight infection.

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While pecans grow and thrive in most parts of Kentucky, that is not true for all varieties of pecans. Ensuring that the right variety is planted in the right place is critical to producing the highest quality nuts possible. An example would be when considering southern or northern varieties for planting. Woodland owners in many far western Kentucky counties are well aware that native pecan trees grow in abundance. The nuts that these trees produce are generally of excellent quality, but smaller than those produced in the southern states. There is a reason for

flowers (catkins) release their pollen. This keeps individual trees from pollinating themselves. Therefore, to ensure that all your planted trees will be pollinated, you need to have a mixture of varieties so that pollen is always being produced when needed. This can be accomplished by a technical understanding of pollination. A protogynous tree is a tree that has female flowers that are receptive before the catkins produce their pollen. A protandrous tree is a tree that produces pollen before the female flowers are receptive. While protogynous and protandrous are not words we commonly use, understanding them is important for developing

Non-Timber Forest Products

Kentucky Pecans

by John Strang



Greenriver pecan

Photo courtesy: John Strang

Photo courtesy: John Strang



Figure 1. Poor nut fill in pecan and Persian walnut due to a short growing season or tree leaf damage.

this, and it hinges on our growing season length. There just aren't enough days in our growing season for varieties that produce large nuts to fill the shells. As a result, these varieties do not fill, and nut meats produced by southern varieties (such as Stewart and Mahan) are disappointingly shriveled (Figure 1). Furthermore, southern pecan trees may not have enough time in the fall to harden off and avoid winter injury.

Pollination

Pecan trees are wind pollinated, and each tree produces both male and female flowers.

However, the female flowers (nutlet flowers) on a tree are not receptive for pollination when the male

flowers (catkins) release their pollen. This keeps individual trees from pollinating themselves. Therefore, to ensure that all your planted trees will be pollinated, you need to have a mixture of varieties so that pollen is always being produced when needed. This can be accomplished by a technical understanding of pollination. A protogynous tree is a tree that has female flowers that are receptive before the catkins produce their pollen. A protandrous tree is a tree that produces pollen before the female flowers are receptive. While protogynous and protandrous are not words we commonly use, understanding them is important for developing

a planting of pecan that sets nuts well. In order to get good nut set on all trees, a mixture of these two pollination types is necessary. It is important to make sure that the varieties planted have their pollination needs accounted for. This is particularly important in light of the fact that the first harvest usually takes 5-8 years after planting, and a mistake in meeting pollination requirements can substantially increase the years to production. It is also useful to understand that catkins are only found on 1-year-old branches, and nutlet flowers are found on the current year's growth at the ends of young shoots. Pecans are wind pollinated, and the pollen has been reported to travel and pollinate trees up to 1 mile away. In rainy seasons however, when pollen is washed from the air, it is

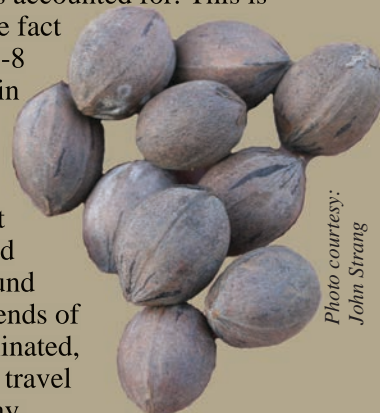


Photo courtesy: John Strang

Figure 2. Major pecan, small in size, but possesses excellent flavor, nut fill and yield characteristics.

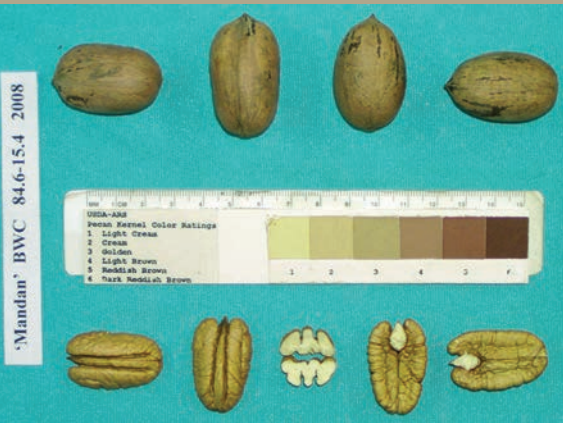


Figure 3. Mandan pecan

Photo courtesy: L. J. Grauke, USDA-ARS Pecan Genetics, Somerville, TX

best to have the pollinator trees in close proximity. Pecan variety recommendations can be found in Table 1 and are arranged by pollen shed period to help with variety selection. The

Major and Mandan varieties are shown in Figures 2 and 3.

Hicans

Pecans occasionally cross with shellbark, shagbark, or bitternut hickory to produce hicans. These are generally self-sterile and need to be pollinated by an early pollen-producing pecan such as Major. The Burton and Burlington (Figure 4) hican varieties are self-fertile. However, most hicans are not very productive and seem to be particularly attractive to pecan weevils. There is one exception - the variety known as T-92 - which produces large nuts (35-40/lb), has a light colored kernel, and has excellent quality.

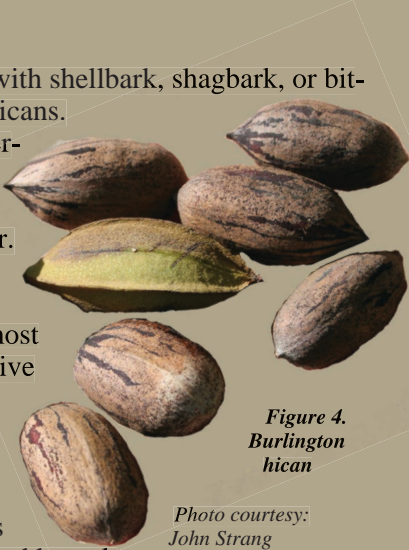


Figure 4. Burlington hican

Photo courtesy: John Strang

Culture

While growing pecans in Kentucky is not difficult, there are several important issues that are important for success, which are discussed below. However, as with any practice, there are lots of details. For those serious about growing pecans, additional recommendations and details on pecan culture, insect, disease, and weed control can be found in the Cooperative Extension publication Nut Tree Growing in Kentucky (ID-77) listed in the reference section of this article.

Planting

Early spring is the best time to plant pecan trees. A soil test is highly recommended so that you can adjust soil pH to 6.5, as well as adjust phosphorus, potassium, and magnesium levels. A soil test submitted through your county extension office will provide fertilizer recommendations. Needed amendments should be broadcast and plowed in prior to planting. Pecans grown for nuts are generally spaced 50' X 50'. When trees arrive, inspect them and keep as cool as possible to delay growth. Roots should be kept moist and not be allowed to dry out. Plant as soon as soil

conditions are dry enough to avoid soil compaction. Pecans have a long taproot, and it is best to leave it as long as possible to improve tree survival. Dig deep holes to accommodate the taproot with enough width to spread out lateral roots. Broken roots will need to be pruned off at the break. Set trees at the same level at which they grew in the nursery, firm the soil around the roots, and water well.

Early Tree Care

Care during the first year is critical for planting success. Trees should not be fertilized the first season, because excessive growth frequently leads to winter injury. One third of the top growth should be removed at planting to improve survival and assure strong growth. The leader should be cut back to a bud and lateral branches are removed. It is extremely important to water the trees weekly as needed throughout the first year. Good weed control around the bases of the trees is very important for establishment and can include use of herbicides, cultivation, and mulching or a combination of these methods. Growers should not expect much top growth the first season, since much of the growth takes place underground and involves increasing taproot size. Paint the lower 30-36 inches of trunk in late fall with a white indoor latex paint, or place a white plastic wraparound guard around the base of each tree to prevent sunscald injury during the winter. Sunscald produces a vertical split in the bark on the southwest sides of trees. If deer are a problem, a tree shelter may be necessary. Fertilization should begin the second season in late February with an application of 1 lb of 10-10-10 fertilizer for each inch of trunk diameter five inches above ground.

Pecan Disease and Insect Concerns Pecan scab

This is one of the most serious fungus diseases encountered by pecan growers in Kentucky. Infections begin shortly after bud break under wet growing conditions and young leaves, leaf petioles, and nut shucks (hull around the nut) become infected, resulting in small spots olive to black in color. This fungus leads to leaf drop, lack of nut fill, and nut drop. Since pecan trees eventually become very large and are difficult for most growers to spray, planting of resistant varieties is highly recommended. Pecan insect and disease samples may be sent through county extension offices to the UK Plant Disease Diagnostic Laboratories for identification and control recommendations.

Pecan weevil

In Kentucky, the female pecan weevil attacks pecan nuts in late August and early September as the nut kernels begin to harden. She chews a small hole through the nut shell and deposits eggs. Small white grubs hatch and feed on the nutmeat during the fall (Figure 5). At maturity, each grub chews a hole in the nut, drops to the ground, and burrows into the soil where it lives until the



Figure 5. Pecan weevil and nut damage.

Photo courtesy: John Strang

following August or where it may remain for an additional year. The grubs pupate prior to emergence, become adults, and the cycle starts over. Control involves applying an insecticide during early to mid-August to kill the females before they can lay their eggs—once eggs are deposited inside the nuts, insecticide controls do not work. Proper insecticide spray timing is essential to achieve control.

Stinkbug

Stinkbugs can cause serious nut losses (Figure 6). This insect has piercing-sucking mouthparts that are inserted into the nuts to extract food before the shell hardens. In the process, nut kernels are dramatically affected. Weed management can help reduce losses. With the introduction of the brown marmorated stink bug, control of these pests will be a challenge in coming years.



Figure 6. Characteristic stink bug damage on pecan.

Twig girdler

These beetles girdle twigs, causing them to drop in late summer. The female lays an egg in the portion of the twig that will fall. The larva then feeds on and overwinters in the twig. The result is loss of shoots that will bear nuts and additional tree branching. Control involves collecting the girdled twigs and burning them.

Pecan phylloxera

Pecan phylloxera, a small, soft-bodied insect, induces the development of galls on new leaf growth. Overwintering eggs in bark crevices hatch in the spring, and the nymphs begin feeding on new tissue. Galls are induced by a compound secreted by the phylloxera. There are several generations of this insect a season. A dormant oil spray will help control overwintering eggs, and an insecticide spray just before or at budbreak will help control crawlers.

Harvesting and Storing Pecans

At maturity, pecans drop from their husks to the ground and are picked or swept up. Nuts that do not have enough time to mature or have some problem typically remain stuck in the shucks and tend not to drop. A period of curing is needed to reduce nutmeat water content and enhance flavor. Unshelled nuts can be cured and kept for a period in mesh bags in a cool, dry well-ventilated area. Keep in mind that squirrels and chipmunks will happily make their way into an open garage or barn to help relieve you of your pecans. It is best to shell pecans and keep them in an airtight container in the freezer to maintain quality, as the oils in pecans will become rancid with time.

Pecan Crackers

There are several nut crackers that work particularly well on pecans. The Texas Inertia Cracker (Figure 7) shatters the shell, producing many kernel halves. The process can be speeded up considerably using the Mechanical Cracker (Figure 8).

Growing pecans is a satisfying and rewarding experience that requires patience for a number of years to attain significant production. The Kentucky Nut Growers Association (KNGA) is made up of many dedicated individuals with a strong interest in propagating and growing nuts who collec-



Figure 8. Mechanical Pecan Cracker from Stonemango
Design & Mfg. LLC
13528 Floyd Cir,
Dallas TX 75243

All photos courtesy:
John Strang



tively possess a wealth of practical information. The KNGA holds several meetings a year and members welcome anyone who share their interest. The meetings revolve around grafting, sharing information, and sampling nut varieties. Additional information can be found on association's website at: <http://www.pawpaw.kysu.edu/KNGA.htm>

Kentucky Grafted Pecan Tree Sources

England's Orchard and Nursery, 2338 Highway 2004, McKee, KY 40447. Phone: 606.965.2229; e-mail: nuttrees@prtcnet.org; website: www.nuttrees.net
Nolin River Nut Tree Nursery, 797 Port Wooden Rd., Upton, KY.
Phone: 270.369.8551;
e-mail: john.brittain@gte.net;
website: www.nolinnursery.com

References

Masabni, J., J. Strang, R. Jones, R. Bessin, and J. Hartman. 2007. Nut Tree Growing in Kentucky (ID-77)
<http://www.ca.uky.edu/agc/pubs/id/id77/id77.pdf>



Figure 7. Texas Inertia Cracker. Dowel rod attached to red plunger at left is pulled back which further stretches the rubber band and is then released. This shatters the nut shell without appreciable damage to the kernel.

Table 1. Recommended northern pecan varieties

Variety*	Pollen shed	Flowers receptive	Nuts/lb	Comments
Yates 68	early	late	60-70	Medium-sized nut, very thin shell, 59% kernel, excellent kernel quality
Fisher	early	late	74	Medium-sized nut, 48% kernel, productive, very hardy far northern pecan, matures early
Major	early	late-v. late	78	Medium-sized, round to oval nut, small, plump, sweet buttery, excellent flavored kernels, 49% kernel, ripens medium-early, vigorous tree
Mandan	early- mid	mid-late	46-52	2009 USDA release, 63-65% kernel, early nut maturity, high yield, high nut quality, shells out easily into halves, very new outstanding variety
Pawnee	early- mid	late	57	Large, soft-shelled excellent quality nut, 58% kernel, matures early, medium susceptibility to scab, may require fungicide sprays
Hirschi (Steuck)	early-mid	late	72	Kernels golden to light brown, 49% kernel, scab susceptible
Greenriver	mid	early-mid.	70	Medium-large thinned shelled nuts, 49% kernel, plump fine flavored kernels, ripens late
Yates 127	mid	late	65-70	Medium-sized nut, very thin shell, 55% kernel, probably self-pollinates
Colby	late	early	55-60	Medium to large nut, 50% kernel, good flavor, productive tree, needs 160-day season, some scab resistance
Posey	late	early	72	Medium to large nut, 54% kernel, excellent flavor, very good cracking quality, bears well, ripens medium-early
Kanza	late	early	77	High quality 54% kernel, cracks mostly in halves with no packing material, highly productive
Hickry's Major	unknown	unknown	57	Productive, normally 3 to 5 nuts per cluster, fills well, very good flavor, 53% kernel, cracks out similar to Major, seedling of Major, but nut is twice as large. Appears to be scab resistant, but this characteristic is still being evaluated, new upcoming variety.
*All varieties listed are scab resistant unless otherwise noted.				

About the Author:

John Strang, Ph.D., is an extension specialist in the University of Kentucky Department of Horticulture. He is responsible for continuing education and applied research in the areas of fruit and vegetable production. John also edits the Fruit Facts Newsletter, www.ca.uky.edu/fruitfacts

Cooperative Extension Service, Department of Horticulture, University of Kentucky, N-318 Ag North, Lexington, KY 40546-0091 E-mail: jstrang@uky.edu, Phone: 859.257.5685, Fax: 859.257.2859.

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Kentucky Tree Farm Committee Newsletter

Kentucky Tree Farm Committee Annual Awards

The Kentucky Tree Farm Committee (KTFC) oversees the American Tree Farm System program in Kentucky and promotes sound forest management through sustainable forestry. An important responsibility of the KTFC is to recognize those who represent and uphold the spirit of the program. The Kentucky Tree Farmer of the Year, the Kentucky Tree Farm Inspector of the Year, and the Kentucky Logger of the Year were recently recognized at the Kentucky Forest Industries Association 46th Annual Meeting in Lexington, KY. Choosing the winners was a challenge because of all of the outstanding nominations and finalists. Congratulations to all the winners and finalists for all of their hard work!

Kentucky Tree Farmer of the Year

Angus M. MacLean from Skylight in Oldham County was honored as the Kentucky Tree Farmer of the Year. Cary Perkins of Bluegrass Consulting Forestry in Shelbyville, KY, nominated MacLean for the award. Mr. MacLean's 100-acre Tree Farm is located adjacent to the Ohio River. It is managed for a wide range of benefits including timber



Tree Farmer of the Year: Angus MacLean (brown jacket)

production, wildlife and recreation. The farm has been certified as a Tree Farm since 1959 and is one of a handful of Kentucky properties that hold the distinction of Golden Tree Farm, having been in the program for over 50 years. Mr. MacLean,

and his father before him, Angus D. MacLean, have improved the woodland through a number of active management practices. Improvements on the farm have included seven timber harvests of various types over those 50 years and natural regeneration of woodland areas. The latest MacLean endeavor is an experimental American chestnut orchard with the American Chestnut Foundation.

Kentucky Tree Farm Inspector of the Year

Ron Taylor with R. L. Taylor Forestry was honored as the Kentucky Tree Farm Inspector of the Year. Taylor, from Morehead, completed five new inspections to

bring in an additional five landowners into the Tree Farm program and win the inspector of the year award. Taylor has helped advance forest management on private forestlands through his work with the tree farm system. Ron Taylor graduated from Iowa State University at Ames with a degree in



Tree Farm Inspector of the Year: Ron Taylor (purple shirt)

forestry and retired in 2008 from the U.S. Forest Service. He enjoys working with Kentucky woodland owners and promoting the Kentucky Tree Farm System. He is an active member in the Society of American Foresters, the Association of Consultant Foresters, the Kentucky Forest Industries Association, the Kentucky Chapter of the Association of Consulting Foresters, and the Kentucky Woodland Owners Association.

Kentucky Tree Farm Logger of the Year

Strader Bros, LLC of Elkton, KY was honored as the Kentucky Logger of the Year. David James with Domtar Paper Co., LLC nominated



Logger of the Year: Mervin Strader (plaid shirt)

Strader Bros. for the award. Strader Bros., LLC is owned by Mervin Strader and harvests timber throughout Central Kentucky and was selected from candidates submitted from around the state. The Strader's have an excellent professional relationship with landowners and the forest industry. They take every opportunity to promote the importance of the logging industry and sell logs to a wide range of markets to maximize financial returns to the landowner while serving industry demands. Strader Bros. LLC. are also members of the Kentucky Forest Industries Association and the Green River Loggers Council. Owner Mervin Strader diligently serves as the western region "Log A Load for Kids" coordinator raising donations for the Kentucky Children's Hospital in Lexington, Kentucky.

Contact Information

You can learn more about the Tree Farm program in Kentucky by visiting www.kytreefarm.org or calling 502.695.3979.

Kentucky Woodlands Tax Assessment Project

by Andrew Stainback

Because most woodland owners only harvest timber periodically, annual property taxes can potentially impose a significant burden on woodland owners. In Kentucky, as in most other states, agriculture land including woodlands is assessed based on its value in its current use (use value) as opposed to market value, which is typically used for other types of property. Further, because income from woodlands occurs once every several decades (as opposed to annually in most agricultural land) the profitability of woodlands can be particularly sensitive to this assessed use value.

Problem

In Kentucky, Property Value Administrators (PVAs) use broad discretion in assessing woodlands with little guidance in terms of how to conduct the assessment. This discretion can result in widely different assessments across the state. Many woodland owners, represented by the Kentucky Woodland Owners Association (KWOA), have expressed concern that their forested properties were being assessed at a higher value than the true use value that can be generated from forestry practices. If this is the case, then the tax burden on woodland owners would not only be unfair to woodland owners, it could impact the management and retention of woodlands and the valuable economic and environmental benefits that private forests provide to the Commonwealth.

Research Project

To assist woodland owners, PVAs and policymakers, the University of Kentucky conducted a research project sponsored by the Kentucky Division of Forestry with funding from the U.S. Forest Service to estimate the use value for typical woodlands in Kentucky in terms of timber production. To conduct the study, we obtained information on current woodland tax assessments from KWOA members and calculated actual use values for woodlands. To calculate the latter, the state was divided into three regions—east, central and west (see Figure 1). The goal was to estimate the value of typical woodlands in each region using data on timber productivity and recent market prices for timber. Timber and pulpwood volume growth for economically important tree species on low, medium, and high site qualities at typical harvest ages (60-80 years) for each region was determined using U.S. Forest Service data. Central Kentucky Forest Management, Inc. was contracted to help combine the volume growth data with sawlog and pulpwood price data from Sewall Forestry Consultants for each region over the past five years (2005-2010). We then calculated the return per acre from a typical forest



stand of each productivity class in each region, assuming that trees typically have to grow 60 to 80 years in Kentucky before being harvested.

Results

We found that woodland owners are typically being taxed on assessed values between \$100 and \$500 per acre. These results are consistent with previous studies. Further, our research found that the actual current-use values range from \$17 to \$60 (see Table 1). This range indicates a significant discrepancy between assessed value and the actual current-use value of woodlands in Kentucky. It is important to note that these values are representative of typical woodlands, which have not necessarily been managed specifically for timber or for improved growth (i.e. thinning). These practices could potentially increase use value compared to woodlands under the passive management typical of most ownerships. Regardless, as woodlands are a valuable asset to the economy and



Figure 1. Kentucky Forestland Assessment Tax Regions. In this study the state of Kentucky was divided into three regions to determine how current woodland tax assessments and calculated actual use values for woodlands differed.

environment in Kentucky, it is hoped that the results from this study will help develop policies in the Commonwealth that will protect and enhance our woodland resource.

Table 1. Eastern Region									
	Low Quality (Site Index 45-59)			Average Quality (Site Index 60-74)			High Quality (Site Index 75-90)		
Prices	High	Medium	Low	High	Medium	Low	High	Medium	Low
Land value (\$/acre)	\$32.19	\$24.32	\$16.71	\$53.06	\$40.19	\$27.83	\$59.84	\$45.13	\$31.30
Central Region									
	Low Quality (Site Index 45-59)			Average Quality (Site Index 60-74)			High Quality (Site Index 75-90)		
Prices	High	Medium	Low	High	Medium	Low	High	Medium	Low
Land value (\$/acre)	\$33.95	\$29.26	\$25.19	\$30.02	\$25.84	\$22.06	\$42.02	\$36.10	\$30.81
Western Region									
	Low Quality (Site Index 45-59)			Average Quality (Site Index 60-74)			High Quality (Site Index 75-90)		
Prices	High	Medium	Low	High	Medium	Low	High	Medium	Low
Land value (\$/acre)	\$23.62	\$21.61	\$19.72	\$23.62	\$21.61	\$19.72	\$44.28	\$40.62	\$37.01
<i>Table 1. Example land values calculated with data from different regions of Kentucky. These values represent typical hardwood stands and average sites cut every 70 years. Stumpage prices are based on data from 2005-2010 for each region, and a discount rate of 5% was used. Values change with different assumptions about discount rates, timber prices, site quality, and rotation age (time to harvest).</i>									



About the Author: *Andrew Stainback, PhD, is an assistant forestry policy professor at the University of Kentucky Department of Forestry. His academic interests include: policy and economics of ecosystem services such as carbon sequestration and biodiversity as well as environmental, land use, and international law as they relate to sustainable development.*

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Kentucky Champion Tree Program

by Diana Olszowy

Baldcypress - Kentucky's Only Native Deciduous Evergreen

Is that right -- deciduous evergreen? Isn't that an oxymoron? Actually, no. There are conifers (cone-bearing trees) that lose their needles. A good example is one of Kentucky's native conifers, the baldcypress. It is naturally found along large streams and swamps and will basically grow anywhere with slow-moving water. It is best known as the iconic species found in the Florida Everglades and is a resident of many bayous along the Gulf Coast Plains from Florida to Texas, along the estuaries of the Atlantic Coastal Plain to Delaware, and into the Mississippi River Valley. Baldcypress can be found as far north as southern Indiana and Illinois. In Kentucky, baldcypress is found in the extreme western region of the state-specifically in the swampy environments.

Kentucky's state champion baldcypress is located smack-dab in the middle of a Ballard County slough. It is a magnificent specimen measuring 302 inches in circumference (that's over 25 feet around) and towering to a whopping 128 feet in height. This ginormous tree also holds the crown for being the largest champion of all of Kentucky's 100 champion trees.

Since baldcypress often grows in standing water, it has developed a specialized rooting capability called a "knee." These knees vary from several inches to more than 10 feet in height, depending upon the average water level of the site. The knees anchor the tree in the soft, wet soil, and the buttressed roots develop into such an extensive mass of roots that even hurricane-force winds rarely overturn these trees. They grow best in full sun and acidic soil and can tolerate both wet and dry conditions. Young baldcypress grow very quickly, averaging 3-4 feet in height annually, but once the taproot reaches the water table, the tree will begin to slow down its growth rate. Baldcypress average 50-70 feet in height with a crown spread of 20-30 feet and is considered an extremely long-lived species, commonly reaching 400-600 years of age.

Baldcypress is a very attractive tree with a four-season appeal. It's soft-looking, bright green needles are stunning against its shaggy,

cinnamon-colored bark. In the fall, the fern-like foliage turns bright copper and drops from the tree to form a carpet of soft needles.

Baldcypress cones turn from green to brownish purple in late fall and are produced annually, with bumper crops every 3-5 years. The seeds are eaten by turkeys, squirrels, wood ducks and other waterfowl, and wading birds. The trees are often utilized by bald eagles, osprey, and several varieties of warblers as nesting sites, and catfish utilize the submerged roots as spawning sites.

Baldcypress wood has a multitude of uses and is highly valued for its decay resistance. It is sought out for construction of boats, docks, and bridges and is the source of the popular cypress mulch. Since baldcypress can thrive in low-oxygenated soils, it has become a popular tree in the home landscape. It tolerates compacted clay soils and will make an excellent street tree if given ample room to grow. If you have a site in your yard where water has a tendency to sit, consider planting a baldcypress there. You can tell your friends and neighbors about your own "deciduous evergreen" and let them scratch their heads and think about that for awhile.



This baldcypress, found in Ballard County, is the largest of all Kentucky champion trees. (Left) The foliage is similar to that of the redwoods.

Left photo courtesy: Chris Evans, River to River CWMA, Bugwood.org; Above: Kentucky Division of Forestry



These baldcypress are growing in Kentucky Ridge State Forest in Bell County. The "knees" shown help stabilize the tree in wet areas.

Photo courtesy: Diana Olszowy

About the Author:

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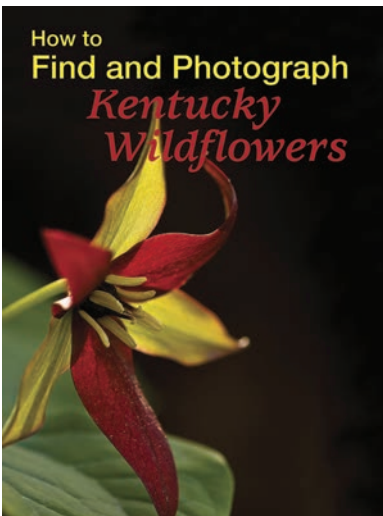
kentucky WOODLANDS

2011 Woodland Owners Short Course

Make plans now to attend the 2011 Kentucky Woodland Owners Short Course (WOSC). More than ten Kentucky forestry, wildlife, and natural resource agencies and organizations have teamed up to deliver the 2011 WOSC. There will be something for everyone at this year's WOSC with programming tracks for new (or inexperienced) woodland owners as well as seasoned woodland owners. Join us at one or more of the programs to get your questions answered and to help you get the most out of your woodland ownership experience. The programs are conducted from 9 a.m. to 4:30 p.m. local time:

- Central Region WOSC: Nelson County (8/20/11)
- West Region WOSC: Butler County (8/27/11)
- East Region WOSC: Bath County (9/24/11)

To register or for more information visit www.ca.uky.edu/forestryextension/WOSC.php or call 859.257.7597 (see insert for topic information).



How to Find and Photograph Kentucky Wildflowers

UK Forestry Extension wildlife professor, author, and photographer Tom Barnes has spent three decades honing his wildlife photography skills throughout Kentucky. In *How to Find and Photograph Kentucky Wildflowers* he shares his vast knowledge on creating beautiful wildflower portraits. This book is a great guide on finding, appreciating and photographing wildflowers, and the perfect book for those who want to elevate their photography from taking snapshots to making artistic flower portraits. In fact, it is the only book of its kind dedicated solely to Kentucky wildflower photography, covering the technical aspects of taking both landscape and close-up shots, processing images and creating a range of professional images and tones. To order your copy, call 573.472.9800 ext. 11 or visit www.acclaimpress.com/store.aspx?panel=3&productid=121&categoryid=1

Upcoming Dates To Remember:

Date:	Event:	Location:	Contact:
June 13-17, 2011	Kentucky Forest Leadership Program	Jabez, KY	859.257.7597
July 12-14, 2011	Biomass Harvesting in Kentucky (for Woodland Owners and Loggers)	Princeton, London, Morehead	859.257.7597
August 20, 2011	Woodland Owners Short Course	Nelson County, KY	859.257.7597
August 27, 2011	Woodland Owners Short Course	Butler County, KY	859.257.7597
Sept. 9-10, 2011	Third International Pawpaw Conference "Pawpaw: Its Past, Present, and Future"	Frankfort, Kentucky	www.pawpaw.kysu.edu/3rdinternationalpawpawconference.htm or 502.597.6174
Sept. 24, 2011	Woodland Owners Short Course	Bath County, KY	859.257.7597

For more information about these programs, visit www.ukforestry.org

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Woody biomass can be harvested to create many different energy products including gasoline. Do you know if woody biomass might be right for you and your woodland or business? Make plans to join us for a woody biomass program designed for woodland owners and Master Loggers (CEUs available). Programs will be held on July 12 in Princeton, July 13 in London, and July 14 in Morehead. Visit www.ukforestry.org to register or for more information. To learn more about wood biomass check out this U.S. Forest Service website www.fs.fed.us/woodybiomass/



Periodical Cicadas

Many Western Kentuckians have begun hearing the deafening sounds of periodical cicadas as Brood XIX is reemerging. The sap-feeding insects have black bodies, red eyes and red-orange veins running through clear wings. Once they emerge, they tend to stay in the upper canopy of trees. The loud buzzing or humming sound is the males singing to attract females. Brood XIX reemerges every 13 years in Western Kentucky, roughly west of the William H. Natcher Parkway. This brood returns sooner than 17-year cicadas, which many Kentuckians are familiar with as their emergence covers a much larger portion of the state. The cicadas are potential pests of woody plants in orchards, nurseries, vineyards and home and commercial landscapes. Damage occurs when the females slit twigs during egg laying. The twigs break, dangle, turn brown and die. Usually older, established trees are not seriously harmed. Most branches will recover the following year, but the insects do pose a threat to young trees. For more information visit <http://pest.ca.uky.edu/EXT/Cicada/kycic2011.html>



Flood and Stream Bank Damage Information

Did your stream banks get washed away this spring? Before beginning ANY stream or wetland work you must call the Kentucky Division of Water (DOW) Water Quality Certification Section at 502.564.3410 and notify your DOW Regional Office at www.water.ky.gov. Some activities are exempt from the water-quality certification process. If you adhere to the guidelines outlined by the DOW for the removal of stream flow obstructions, you are exempt from Water Quality Certification. These guidelines can be found by contacting the Division of Water, Water Quality Certification program at www.water.ky.gov/permitting/wqcert/Contact+Us.htm

Test Your Knowledge Answers from KWM Vol. 5 Issue 3

1. d)
2. b)
3. c)
4. d)
5. b)

Thank you Kentucky Woodland Owners Association for donating \$50 gift certificates for Test Your Knowledge for the 2011 issues!

Visit www.ukforestry.org to submit your answers to this issues quiz for a chance to win a \$50 gift certificate to Forestry Suppliers. The answers to this issue's questions will be provided in the next issue of the magazine.



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