THE UNIVERSITY of TENNESSEE Extension

Forestry, Wildlife & Fisheries Update Newsletter

Department of Forestry, Wildlife and Fisheries
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Website: http://fwf.ag.utk.edu

Calendar of Events

May 16-18 Regional Forestry/Wildlife Contest

June 6-10 4-H Wildlife Conference

June 16 4-H State Forestry/Wildlife Contest

In This Issue

Notes From the Web- Protecting Trees During Construction

Samuel Jackson, Web Coordinator

Just last week, I got a call from a local construction company that was preparing to build some townhouse units on a forested patch of land. Some of the trees on the property were white oaks 4-8 feet in diameter. The question was: What can we do to save these trees, but still build our townhouses?

The University of Minnesota has developed a guide publication for protecting trees during construction. The publication is available online and can be printed at http://www.extension.umn.edu/distribution/housingandclothing/DK6135.html. The publication reviews the characteristics of various species and their tolerance on compaction, root disturbance, and other potential construction-related impacts. It also addresses the critical need to plan ahead and establish a "landscape protection plan" prior to beginning construction. It offers suggestions on how to innovatively protect trees and how to treat damage after it has happened. In many cases, trees must be removed due to the proximity of the construction, however, protecting trees from equipment, excavation, and other disturbance will ultimately lead to a more valuable site, both economically and ecologically.

As for the townhouses and the big white oaks, I think they'll be able to save several of them, including the big one.

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# # #

Wildlife Management Calendar For June

Craig Harper, Associate Professor, Wildlife Management

Habitat Management

Finish planting native warm-season grasses and associated forbs

- plantings through mid-June will do fine with adequate rainfall later in the month
- existing sod should be killed before planting
- use pre-emergence herbicides (e.g., imazapic)
- plant seed **no deeper** than ¼ inch
- be patient!
- see *A Landowner's Guide to Native Warm-Season Grasses in the Mid-South*, PB 1746, for specific spraying, planting, and management recommendations

Plant firebreaks and other disced strips not left for natural vegetation

- iron-clay cowpeas, re-seeding soybeans, milo, Egyptian wheat, and various millets provide forage and/or seed for a variety of wildlife species

Plant warm-season food plots

- see *Growing and Managing Successful Food Plots for Wildlife in the Mid-South*, PB 1743, for specific planting recommendations

  Plant Japanese/browntop millet around beaver sloughs and other areas that will be flooded in fall for ducks

  Bushhog and spray perennial forage food plots for weed control if necessary
- see *Growing and Managing Successful Food Plots for Wildlife in the Mid-South*, PB 1743, for specific herbicide recommendations

Collect soil test samples from plots to be planted this fall and lime now as needed

Establish salt/mineral licks for white-tailed deer

- best if offered in a metal-lined trough that can be cleaned occasionally with bleach/water solution
  Spray woody competitors in native warm-season grasses and old-field habitats
- multiflora rose, privet, sericea lespedeza, sweetgum, elms, etc.
- Roundup, Garlon, Arsenal, Ally, and PastureGard should be considered

Wildlife Damage/Population Management

Leave young wildlife alone - let nature takes it's course; you'll do more harm than good by trying to save "orphans"

Put up chicken-wire fence 2 feet high around vegetable gardens to repel rabbits

Put up a 2- or 3-strand electric fence (one strand 6 inches above ground and the other 6 inches higher to keep groundhogs and raccoons out of vegetable gardens

To repel deer from vegetable gardens, erect a single-strand electric fence (2 ½ feet above ground) with aluminum tabs attached every 3 – 5 feet. Smear peanut butter on the aluminum tabs. Deer are attracted to the peanut butter, however, when they touch the aluminum tabs with their mouths, they learn to stay away.

Plant "alternative" forages for wildlife on the outside of fencing around a garden to satiate the appetite of deer, groundhogs, and rabbits, further helping to keep them out of the garden.

"Repel" snakes by cleaning up around the house – mow more often, remove piles of wood, brush, and trash. There is no reliable "repellent" for snakes; only "snake oil"

Refer to *Managing Nuisance Animals and Associated Damage Around the Home*, PB 1624, for additional wildlife damage management information.

Snake! Is it Venomous?

Craig A. Harper, Associate Professor, Wildlife Management

Warm weather brings snakes out of hibernation and into yards and other areas where they come into contact with people. The vast majority of snakes seen around yards and field are harmless—that is, they are not venomous!

Non-venomous snakes in Tennessee have round pupils and all the scales on the underside of the tail are divided in two. All naturally occurring venomous snakes in Tennessee are pit vipers. The pit (small hole), located between the nostril and the eye, are actually heat sensors used to detect warm-blooded prey in low-light conditions. Venomous snakes (pit vipers) that occur naturally in Tennessee include the copperhead (highland moccasin), cottonmouth (water moccasin), timber rattlesnake (including the canebreak rattlesnake), and pygmy rattlesnake. Only the copperhead and timber rattlesnake are found throughout Tennessee. The cottonmouth and pygmy rattlesnake are found only in west Tennessee. Contrary to popular belief in some areas, cottonmouths do not occur in east Tennessee, but the northern water snake, which is similar in appearance, is quite common.

Unless posing an immediate health threat, all snakes in Tennessee are protected and indiscriminate killing is illegal. Further, snakes play a vital role in our natural communities, helping keep rodent populations in check and providing food for other predators. If snakes are common around the house, it is probably because there is an abundance of rodents in the area. Snakes are typically found in areas that provide shelter for rodents, such as woodpiles, brush and rockpiles, and old shed and barns (especially where feed is stored). The best way to reduce the snake population around a house is to remove or clean up those areas that are attractive to rodents. Vegetation should be mowed closely and all brush and rockpiles near the house or other building should be removed to make the areas less attractive to rodents and snakes.

If you encounter a snake outside, the best thing to do is leave it alone! Snakes want to avoid people and usually try to escape if they can. If bitten by a snake, try to remain calm. Identify the snake if at all possible. Bites from venomous snakes are quite painful, but treatable, so seek medical attention immediately. Do not treat a snakebite wound with ice, tourniquets, or cutting an "X" over the wound, then trying to suck the venom out! These old wives' tales are not effective. Just go to the doctor—statistics suggest you will be fine.

Nationwide, approximately 50,000 people are bitten by snakes each year. Only 7,000 are from poisonous snakes. Of those 7,000, 1,200 do not seek medical attention yet recover fully. Only 10 – 12 people die from snakebites in the United States each year and half of these are bitten by western and eastern diamondback rattlesnakes—neither of which occur in Tennessee. More than twice as many people die from wasp stings and about 100 people die each year from being struck by lightning. In the past 40 years, there have been only seven recorded deaths from snakebites in Tennessee.

Hardwood Analysis and Trends (HAT)– May 2005

David Mercker, Extension Assistant, Forest Management

The May Hardwood Analysis and Trends (**HAT**) summary represents the second issue in what will become a regular part of our Department's monthly Update. **HAT** is designed to inform readers of recent changes in usage and demand of six of the more commonly sought-after hardwood species. There has been a fair amount of price movement for most species since the previous month. The spring season is typically an active time for the hardwood industry, as the log supplies that normally dwindle during the winter months are replenished, setting the direction for months to follow.

Red Oak – the disturbing trend of reduced prices, particularly on lower quality wood, continues, enough to warrant 4 percent reduction in lumber prices for average quality lumber last month; the trend could be long-term and is a function of shifts in consumer preference toward lighter colored woods for cabinets, flooring and other home furnishings; many sawmills in the region have slowed production of red oak lumber, but can't continue this shift because red oak is such a major component of the regions' forests.

White Oak – as with red oak, white oak lumber is experiencing strong price resistance in the average to below average grades, with demand held up slightly from the overseas market; Top quality lumber is difficult to locate and has kept prices firm in that category; however, average quality lumber experienced a 4 percent drop since last month.

Poplar – Of good news to the region is the strengthening price for poplar lumber; Buyers have interest in poplar as a light-colored wood, and demand is rising; After prolonged static prices, a 1 percent increase was observed in poplar over the past month; Poplar prices are approximately ½ that of red oak (in average quality lumber).

Black Cherry – Cherry lumber continues to have a very strong presence in the U. S. market; even with strong demand, recently inventories have filled, placing pressure on prices and causing a 2 percent reduction in common grade lumber; Even so, cherry lumber prices exceed all others, out-pricing poplar almost 4:1.

Sugar Maple – Sugar maple has become the wood of preference; not only is it (normally) white-colored, but it also has diffuse porous wood giving it very little visible grain pattern (unlike oak); The demand is very strong while the inventories are limited, allowing sugar maple lumber to enjoy a 2.5 percent price increase since last month.

Black Walnut – The popularity of walnut keeps supplies lean and prices firm; It is gaining favor with the flooring industry as a species to mix-in with white woods; Like maple, its wood is diffuse porous, giving it similar grain appearance; A 1 percent increase in lumber price occurred from last month.

Summarized with permission from Hardwood Market Report, Memphis, Tennessee.

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# # #

Why Do Trees Die?

David Mercker, Extension Assistant II, Forest Management

To understand why or how trees die, we must first understand the processes by which they live. Broadly, we call these processes tree physiology. Major physiological processes in trees include: photosynthesis, respiration, and translocation. The process of photosynthesis combines carbon dioxide with water in the presence of the sun's energy to produce simple sugars (known as carbohydrates) and oxygen. This is represented chemically as:

$$6CO_2 + 6H_20 + \text{Sunlight} \div C_6H_{12}O_6 + 6O_2.$$

Photosynthesis is the most essential and basic physiological process inasmuch as tree growth is dependent upon successful conversion of the sun's energy into carbohydrates. Carbohydrates are the substances by which all other organic compounds are synthesized, they are the chief constituents of cell walls, they form the starting point for synthesis of fats and proteins, they are oxidized in respiration, and any amount still remaining after all these processes, accumulate as food reserves. Carbohydrates are moved out of the leaves via the phloem. Leaves become filled, and through pumping action are unloaded into the phloem and distributed throughout the tree for use in respiration and other physiological processes. Carbohydrates are stored in roots, buds, stems, and cambium.

Respiration is the oxidization of carbohydrates. Respiration essentially works in reverse order of photosynthesis, whereby the synthesized carbohydrates react with oxygen to produce carbon dioxide, water and energy; e.g. food is oxidized and energy is released. Unlike photosynthesis, which is seasonal, respiration occurs at all times (even during the dormant season). This is why the production of carbohydrates through photosynthesis must exceed the oxidation of carbohydrates through respiration. Without a surplus of carbohydrates, tree vigor declines, and eventually death occurs. As trees age, the demand for carbohydrates increases because the volume of respiring tissue increases while the leaf surface area (photosynthesizing surface) remains fairly constant. Less carbohydrate is made available for root and stem elongation because more is demanded for life-sustaining respiration.

Translocation, the third major physiological process, allows photosynthesis and respiration to function properly. Without the "piping" system of translocation, soil moisture and nutrients would not reach the leaves, leaves would not produce carbohydrates, carbohydrates would not be transported to organs and respiration would cease.Through translocation, trees allocate carbohydrates to support five different physiological processes. Olivar and Larson (1996) identify these processes, placed in priority order for allocation of carbohydrates, as:

1. Maintenance of living tissue (respiration);
2. Production of fine roots;
3. Flower and seed production;
4. Primary growth (branch and root expansion);
5. Secondary growth (diameter growth - xylem)

When a tree is healthy and rapidly growing, each of these 5 processes receives ample supplies of carbohydrates. Because secondary growth is the last to receive carbohydrates, wide annual growth rings indicate that the needs of the other 4 processes are first being met and that excesses are being used for diameter growth. At such point, life for a tree is *plush*. If however, annual growth rings (secondary growth) begin to show a narrowing, this is a first indication that tree vigor is declining and that subsequent reductions in primary growth could also soon occur. As decline continues, carbohydrate allocations are gradually pulled up the physiological processes ladder. For instance, if a tree must allocate carbohydrates to either branch and root expansion, or to seed and flower production, it will choose the latter; likewise production of fine roots comes before seeds and flowers; lastly, respiration is a higher priority than fine root production. This reversal or *recall* of carbohydrates continues until there are essentially none left, at which point mortality occurs.

Tree mortality is not always a gradual energy-losing process. In *A New Tree Biology*, Shigo (1990) indicates that tree mortality can also occur rapidly through mechanical disruption. The affect of machines on tree growth can include:

- severing cambium - disrupts translocation;
- compacting soil - makes absorption of water and nutrients difficult, hindering gas exchange;
- damage or loss to larger limbs - reduces photosynthesis and carbohydrate production; if respiration rate does not decline proportionately, mortality results.

A tree growing in suitable climate and on suitable soils will continue increasing in size until one or more factors for growth are no longer available (Olivar and Larson, 1996). More often than not, environmental factors work concurrently or sequentially to weaken trees, predisposing them to other insect, mite, and disease agents, in turn, leading to mortality.

So why do trees die? Their death follows a reverse chronological sequence.

Trees die because respiration terminates.

Respiration terminates because carbohydrate production ceases.

Carbohydrate production ceases because photosynthesis discontinues.

Photosynthesis discontinues because the factors necessary for proper photosynthesis functioning are interrupted, obstructed, or disappear. Those factors include: sunlight, water, nutrients, temperature, CO_2, and O_2.

Factors for photosynthesis are interrupted because of seemingly unlimited reasons - humans, environment and/or are genetically induced. Many have been summarized above.

As you can see, the process by which trees grow – then die – is very complicated. The take home message is this: avoid stressing trees by altering their environment.

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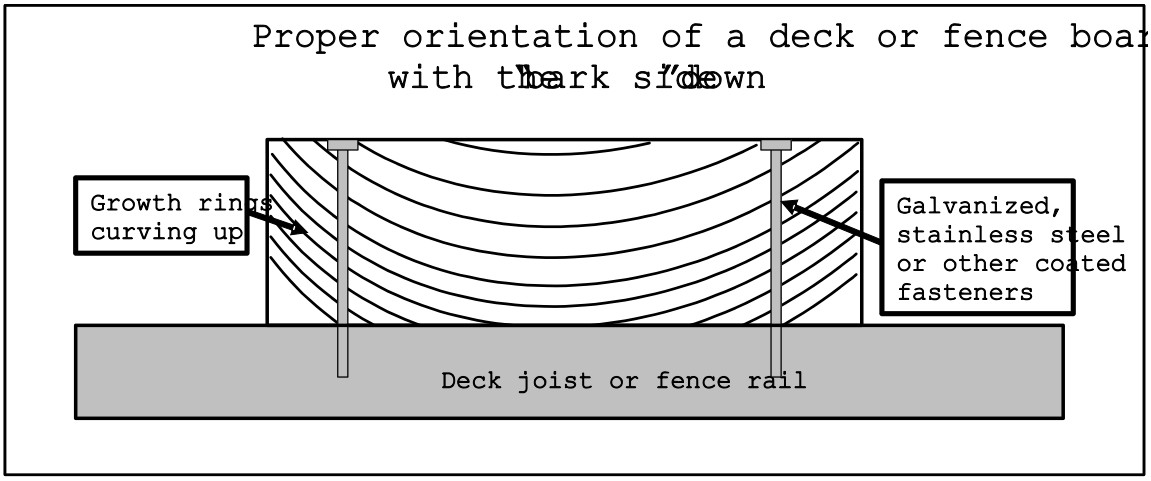
# # #

Installing and Maintaining Wood Deck and Fence Boards

Adam Taylor, Assistant Professor, Wood Products Management

Wood is a good choice for building decks or fences. Either preservative-treated wood (usually pine) or naturally durable woods such as cedar or redwood can provide years of performance, because they resist attack by insects and wood-rotting fungi. However, research shows that many decks are removed after only a few years; not because they are rotten but because they look bad. There are a couple of simple things that can help to preserve the good looks of wood exposed outdoors, and thus increase the longevity of a deck or fence.

Wood outside is exposed to periodic wetting and drying. This can result in surface checks that look bad to many people. A simple way to reduce the risk and severity of surface checking is to install the boards with the bark side down (see the picture). The natural tendency of wood to shrink and swell is uneven, and in "flat-sawn" lumber this makes boards cup towards the side that was closest to the bark side of the log. Orienting deck or fencing boards with the growth rings curving upward means that the board will try to cup towards the back. The result is less checking.



The use of the recommended nails or screws also can help maintain the good appearance of wood decks or fences. Hot-dip galvanized, stainless steel and other coated fasteners are available. This is especially important with the new wood preservative formulations, which can be very corrosive to some metals. The correct fastener will last for years and won't stain the wood.

Good maintenance also can do a lot to prevent checking and to maintain the good looks of outdoor wood. Regular application of a water repellent finish will help the deck or fence to shed rain, and this helps reduce the wetting and drying cycles that cause checking. Preservative treated wood often contains a built-in water repellent, but manufacturers still recommend applying a fresh water repellent finish every year or two.

Wood remains a popular and appropriate choice for building decks and fences. A little care when installing the boards, combined with regular maintenance, will help keep the wood looking good for years.

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# # #

Biomass and Bioenergy Terms (with a Forestry Perspective)

Wayne K. Clatterbuck, Associate Professor, Forest Management and Silviculture

Biomass: any organic matter available on a renewable basis. As it pertains to wood, biomass can be small-diameter trees and brush from forest thinning operations, wood residues (leftovers from processing lumber or pulp), short rotation woody crops planted to produce energy or waste wood from demolition or other sources.

Biobased product: a commercial or industrial product (other than food or feed) made of renewable biological products such as forestry materials.

Bioenergy: energy derived from organic matter, whether directly from plants or indirectly from plant-derived industrial, commercial, forestry or urban wastes.

Bioenergy crops: fast-growing crops grown to produce energy --- traditionally poplar, willow, sweetgum and cottonwood.

Biofuels: mostly liquid fuels for transportation produced from biomass and used instead of petroleum products. Examples include ethanol, methanol and biodiesel.

Biorefinery: an integrated processing plant envisioned to "biorefine" biomass from multiple sources into chemicals, fibers, biofuels, pharmaceuticals and other products.

Carbon sequestration: refers to the long-term storage of carbon on land (in trees and other plants), underground, or in oceans.

Gasification: the process of heating wood in an oxygen-starved chamber until the release of volatile gases than can then be combusted to produce heat and energy.

Renewable energy: any energy source that can be replenished continuously or within a moderate timeframe.

Source: Compass publication, Southern Forest Research Station, USDA Forest Service

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# # #

Biomass Opportunities in Forestry

Wayne K. Clatterbuck, Associate Professor, Forest Management and Silviculture

Biomass has gotten to be a "buzz-word" in the management of natural resources, particularly trees. Think about how much wood is grown, but not utilized because of economic constraints: residues (crowns, branches, crooked boles, degraded trees) left over from harvesting and the wood in building materials that is disposed in landfills during demolition activities. What happens to trees blown down and otherwise not being used for lumber or pulp during hurricanes and tornados? With the recent hurricanes in central Florida (Orange County –Orlando area), officials estimated that 1.5 million cubic yards of downed trees and limbs were transported away in 200,000 dump truck loads to remove the wood to incineration sites to be ground up and burned. Shouldn't we try to utilize some of this material? With the ongoing increases in costs of non-renewable fossil fuels, wood is receiving more attention as a possible source of biomass and energy.

Wood biomass from either wood wastes or from small diameter trees could be used to supplement fossil fuels in power plants to generate electricity. Although the burning of wood biomass does produce carbon dioxide emissions similar to fossil fuels, plants remove carbon dioxide from the atmosphere through photosynthesis. If the carbon removed by photosynthesis is balanced by the energy used, there is not a net increase in carbon dioxide. In contrast, burning coal, natural gas and oil adds carbon dioxide to the atmosphere with no balancing process to remove it.

Another advantage of using biomass as a fuel is the reduction in air pollution from the sulfur and nitrous dioxides that result from burning fossil fuel. Woody biomass has less than 50 percent the nitrogen content of coal (on a weight basis) and the sulfur content of wood is negligible.

Research is evaluating gasification processes that could convert biomass to gases that are often used to generate heat and electricity. However, the technology has not progressed enough for this to be a feasible process currently.

Transportation and costs associated with biomass cutting, handling and storage are barriers to the efficient use of biomass as energy. In the southern United States, fossil fuels (primarily natural gas and coal) are cheaper sources of energy for power plants than biomass. Generating electric power requires a large amount of biomass. There must be enough biomass available to run the plant all year and it must be close enough to the plant to be transported economically. At this time, transportation, storage and handling costs elevate the price of bioenergy production to the point where it is not competitive, though this will change as fossil fuel prices continue to increase and costs incurred to reduce air pollution become more substantial. Also, the efficiency of burning biomass is much less than burning fossil fuels. The biomass must be dried to increase efficiency of burning, i.e., another energy intensive process. Generally, the more moisture content of the biomass, the less efficiency and more energy it takes to burn to produce energy.

In the southern United States, biomass plantations have often been touted as a source of biofuels. However, current cost of land, site preparation, planting, management and harvesting ranges from $30 to $50 a dry ton, while power plants are willing to pay $12 to $15 per dry ton. There is a considerable difference between costs and revenues. However, in Minnesota where state government mandates the use of some biomass sources in power plants and are willing to subsidize the purchase of biomass resources, hybrid poplar plantations are yielding 3 to 6 dry tons of biomass per acre per year and power plants are purchasing the biomass for $55 to $75 per dry ton. As costs of fossil fuels continue to increase, arrangements such as those in Minnesota may become more common.

Because of the costs of fossil fuel in New England, wood chips and fiber have been used for many years to co-fire their power plants. In-woods chipping operations that utilize trees not marketable for other more high-valued products are common. The prices paid for these chips do pay for the cost of chipping, handling and transportation.

In Tennessee, we have plenty of fiber and wood that are left on the site from harvesting operations (crowns, branches, degraded trees) that could be utilized to help with our energy needs at a

fairly low cost. More than 250,000 acres of forest in Tennessee are harvested annually in some fashion ---- thinnings or regeneration cuts. The costs of establishing and maintaining a plantation for wood energy needs is cost prohibitive at this time when so much other left over "residue" wood from harvesting is available.

Many more silvicultural operations could be used in the management of our forests if markets for degraded trees are available and thinning of small diameter material were feasible and profitable. Landowners would have much more incentive to grow longer rotations if there were more intermediate income opportunities. However, the cost of handling, processing and transporting this leftover and thinned wood biomass is presently expensive and not cost-effective. As oil prices continue to rise, the prices that the power industry is willing to pay for biomass will become more competitive and biofuels will probably become more attractive.

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