



Purdue University Forestry and Natural Resources

Trees and Lightning

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- FACT:** Lightning kills more people than tornadoes and hurricanes.
- FACT:** Most deaths occur in open fields near or under trees or around water.
- FACT:** Lightning strikes the earth somewhere 100 times every second.
- FACT:** The temperature of a lightning flash can be 30,000 degrees Celsius- five times hotter than the sun.
- FACT:** Peak currents can be 20,000 amps.



A widely held myth that lightning only strikes good conductors like metal is not true. Lightning seeks the path of least resistance to the ground

Lightning occurs when strong negative charges in low clouds and strong positive charges on the ground meet in the air. The negative charges in the clouds move downward in a series of chain reaction steps called stepped leaders. The return stroke occurs when the positive charges in the ground are attracted by the negative charges in the air. This upward path is called a streamer. A lightning strike takes place when these paths meet in ionized air. We don't see these two parts of a lightning strike because the leader stroke takes about 20 milliseconds and the return stroke 70 microseconds.



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through the best available conductor in the area such as wood or metal. The difference between a good and bad conductor is that good conductors are not damaged as severely as bad conductors.

Trees, because of their height, are natural lightning rods. Damage can be minimal or quite literally explosive. Since water or sap is a better conductor than wood, lightning damage is often related to the concentration of moisture in and around a tree. For instance, if the moisture is concentrated in the phloem between the bark and the wood, then the lightning strike will follow this channel and create an explosive separation of the bark. If there is more moisture in the center of the tree, the explosion from within may blow the tree apart. Yet, rain soaked bark often shows little damage because the lightning may follow the outside of the bark and flow into the ground. Internal tree structure, such as spiral grains, can induce a spiral pattern on the outside of the bark as the lightning follows the moisture within the tree.

Death of a tree from a lightning strike per se, is not easily diagnosed. Some trees die immediately from seemingly small external damage while others will live for a number of years. One of the problems with a lightning scar (loss of the protective bark) is the inherent problem of exposing the tree to insects and diseases. If a tree survives a strike, it often succumbs to these secondary problems.

A tree struck by lightning has been stressed severely. The intense heat of the strike takes a great deal of energy from the tree. To deal with stress, trees need additional nutrients. Studies have indicated that additional water after a strike may assist

the tree in absorbing many nutrients from the soil. Preventing insect and disease problems also may help reduce future stresses, but painting the lightning crack with wound paint is not a recommended practice, in fact it may worsen the situation by providing a conducive environment for harboring insects and disease-causing organisms.

To prevent lightning damage to special trees in your yard or community, a lightning protection system may be installed. This is accomplished by attaching a series of copper cables to the tree's highest branches and then grounding them a safe distance from the tree. If lightning strikes the tree, the current flows down the cables and safely to ground. If interested in a lightning protection system, consult with an arborist.

To find a certified arborist in your area, visit The International Society of Arboriculture website at <http://www.isa-arbor.com/> or call(217) 355-9411



For more information contact:

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