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When Lightning Strikes Your Tree

There is no pattern or "norm" to be expected from the effects of lightning when it strikes a tree. Two classes of damage can and often do occur in a wide variety of combinations.

First, the mechanical and structural damage to a tree may be very slight to the point of being almost unnoticeable, or it may be extensive as though a bomb had exploded from inside the tree. A very common physical indicator of a lightning event is the classic vertical stripping where bark, and sometimes the wood underneath, is torn from the trunk or major scaffold limbs. This stripping may skip or it may be continuous most of the way up the tree. As well, it may rise straight up vertically or it may spiral around the trunk like a peppermint candycane. With some events, bark can be violently blown off the tree in circumferential sections partially or completely around the trunk or limb(s). This stripping may also physically interrupt the vascular tissues that conduct fluids up and down in the tree's living cambial structures under the bark.

The second kind of lightning damage is systemic and may not be easily or immediately observable. This is the functional interruption of the tree's vascular function due to burning and traumatization of root hairs and conductive tissues. Once again, this phenomena may be very slight or extensive to the extreme of complete vascular shut-down. Also, mechanical and systemic damage can combine in a struck tree in any number of ways. A badly (physically) damaged tree may continue to live while a tree that hardly appears touched may brown out quickly and die.

Large tall trees that carry high volumes of water during the hot summer seasons when electrical storms are common are most likely to be lightning victims. Mature old oaks are common classic examples of this kind of tree.

If your tree is struck by lightning, the immediate physical damage and safety considerations will need assessment. If the tree does not exhibit obvious safety concerns (structural or mechanical) and seems generally intact, the next step is likely to wait until the end of the summer or even until the following spring to evaluate the tree's ability to bud and produce functioning leaves. **A valid assessment of systemic function alone is difficult-to-impossible immediately after a strike.** If the root system is seriously damaged or destroyed, no amount of immediate fertilization or other treatment will help or turn it around. There can even be an economic advantage in "waiting to see". Little remedial advantage is usually lost in the interim.

If the tree is substantially green two to four months after the strike, it is advisable to bark trace the wounded areas, cutting away loose separated bark back to the point of solid attachment to the wood underneath. Then apply a good wood tissue insecticide such as dursban or lindane to all exposed wounded areas/surfaces. This will help to repel borers and other wood-inhabiting or wood damaging insects. Then, in the fall, a quality soluble root-builder fertilizer will help to restore root function. Soil texture and compaction tests may indicate that mycorrhizal inoculation and/or soil aeration (for clay soils) can also do much to restore vitality through restoration of a hospitable environment. Dead and damaged limbs and parts should then be removed. Premature deadwood removal may necessitate a second follow-up operation.

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Preventing Lightning Strikes

With the thunder storm season all around us, it may be worthwhile to install lightning conductors in susceptible trees judged to be of considerable value in the landscape.

Signs of Lightning Injury

Signs of lightning injury to trees can vary from no noticeable damage to total destruction of the tree. In many cases, minimal damage may be evident on the trunk, such as, cracking or peeling of bark, while the roots have suffered considerable damage. In such cases, the ground around the tree may show cracks that follow the roots of that tree. Small plants near the base (trunk) may be killed. Leaves may wilt immediately and die due to heat from the lightning bolt. At other times, branches may be sheared off, trunks may split down the middle, or the entire tree may explode or burn.

Lightning damage to trees depends on a variety of factors. The anatomy and physiology of the tree seems to have a direct influence on lightning effects. For example, lightning often follows the grain of the wood. The vascular tissue of pine and apple is arranged in a spiral fashion, and on such trees when lightning strikes, branches die in a spiral pattern up the tree. Elm and oak, with conducting tissue aligned vertically, may show branch damage on only one side of the tree. It has also been noted by some observers that trees with smooth bark seem to deflect lightning bolts better than rough-barked specimens. In some cases the lightning discharge follows the line of least resistance, example, the cambium layer, burning a small channel down the trunk which often results in the formation of a ridge on the bark.

The nature and action of the lightning bolt itself has a direct influence on resulting damage to trees. Obviously, the more current a bolt carries, the hotter it is and the more destructive potential it has. Sometimes lightning discharge may disperse so as to cause no visible injury to the tree, but portions of the cambium (cell tissue just under the bark layer) may be killed, resulting in girdling and eventual death of the tree.

Lightning Resistant Trees

Location of a tree and the surrounding environmental conditions may also influence susceptibility of trees to lightning strikes. The tallest tree in a group; ones near lakes, ponds or streams; and solitary trees seem to be more likely to be struck by lightning.

Trees with high resin content make better conductors of electricity than those with low resin content. Therefore, trees such as pines, spruce, hemlock and fir are more susceptible to internal heating and explosion. The same is also true for trees with a high starch content. That is why oak, maple, ash, poplar, and tulip trees act as good conductors of electricity. On the other hand, beech and birch are less affected by lightning because they have a high oil content, and oil is a poor conductor of electricity.