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SP683 Tree Wounds - Response of Trees and What You Can Do

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Tree Wounds: Response of Trees and What You Can Do

Wayne K. Clatterbuck
Associate Professor
Forestry, Wildlife & Fisheries

Trees are commonly wounded and the causes are many: broken branches; impacts, abrasions and scrapes; animal damage; insect attack; fire; etc. Wounds usually break the bark and damage the food- (phloem or inner bark) and water- (xylem or wood) conducting tissues. Wounds also expose the inside of the tree to organisms, primarily bacteria and fungi that may infect and cause discoloration and decay of the wood. Decay can result in structurally weakened tree stems and unsightly trees and can shorten the life of a tree. Decay in a tree cannot be cured. However, proper tree care can limit the progress of decay in an injured tree. This factsheet discusses tree responses to wounding and what can be done after wounding to keep the tree healthy.

Tree Response to Wounding

Tree response to wounding or injury involves two processes: compartmentalization and the development of barrier zones (Shigo 1986).

Compartmentalization

When a tree is wounded, the injured tissue is not repaired and does not heal. Trees do not heal; they seal. As Shigo (1982) eloquently describes, trees are generating organisms while animals are regenerating life forms. Animals repair, replace, restore and regenerate tissue from existing cells. Trees "wall off" injured and infected tissues and then continue generating new tissues.

If you look at an old wound, you will notice that it does not "heal" from the inside out, but eventually the tree covers the opening by forming specialized "callus" tissue around the edges of the wound. After wounding, new wood growing around the wound forms a protective boundary preventing the infection or decay from spreading into the new tissue. Thus, the tree responds to the injury by "compartmentalizing" or isolating the older, injured tissue with the gradual growth of new, healthy tissue.

Photo Credit: Wayne Clatterbuck

Callus tissue forming on the vertical axes of the tree wound on white oak, but the ragged bark on the horizontal axes has slowed the growth of callus tissue.

Barrier Zones

Not only do the trees try to close the damaged tissue from the outside, they also make the existing wood surrounding the wound unsuitable for spread of decay organisms. Although these processes are not well-understood, the tree tries to avoid further injury by setting chemical and physical boundaries around the infected cells, reacting to the pathogen and confining the damage. If the tree is fast and effective with its boundary-setting mechanisms, the infection remains localized and does not spread. However, if the boundary-setting mechanisms are not effective, the micro-organisms will successfully and rapidly spread. These are the extremes of deterioration due to tree wounding, and all gradations in between of boundary-setting and infection spread can occur. However, most vigorous or actively growing trees are fairly successful in coping with decay-spreading mechanisms.

Care for Tree Wounds

Proper care of tree wounds encourages callus growth and wound closure.

Physical Repair

Tree wounds often appear ragged where the bark is torn during the injury. This is common during branch breakage and when the trunk of the tree has been scraped. To repair this type of damage, cut off any ragged bark edges with a sharp knife. Take care not to remove any healthy bark and expose more live tissue than necessary. If possible, the wound should be shaped like an elongated oval, with the long axis running vertically along the trunk or limb. All bark around the wound should be tight.

Wound Dressings

Research indicates that wound dressings (materials such as tar or paint) do not prevent decay and may even interfere with wound closure. Wound dressings can have the following detrimental effects.

- Prevent drying and encourage fungal growth
- Interfere with formation of wound wood or callus tissue
- Inhibit compartmentalization
- Possibly serve as a food source for pathogens

Wound dressings do not stop decay or prevent entrance of decay mechanisms. Covering wounds with sealants inhibits oxidative processes, which in turn will reduce callus formation and compartmentalization. For these reasons, applying wound dressings is not recommended. Trees, like many organisms, have their own mechanisms to deter the spread of decay organisms, insects and disease.

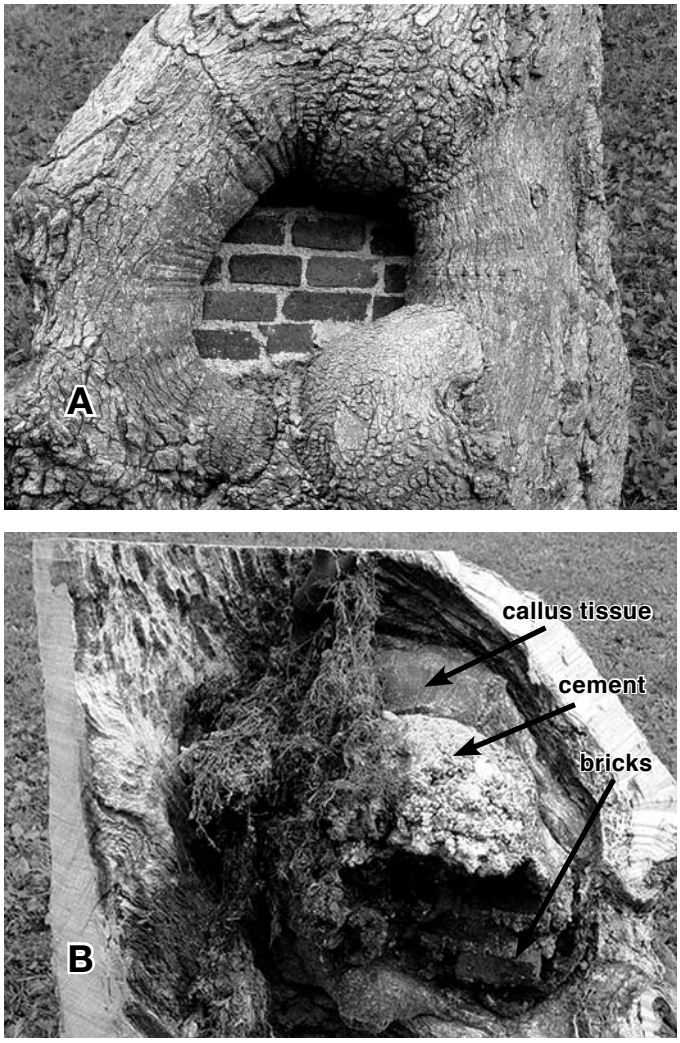

Photo Credit: Wayne Clatterbuck

Cement and bricks meticulously used in a tree cavity in boxelder (A). The inside of the same tree showing the tree response to the cement and bricks (B). Notice the callus tissue above the cement and below the bricks.

Cavity Filling

Filling of large holes or hollows in the tree is generally done for cosmetic reasons. There is little data to indicate that a filled tree has better mechanical stability. However, fillings may give the callus tissue a place to seat, thus stopping the in-roll (folding) of the callus (Shigo 1992). Almost any filling can be used as long as it does not abrade the inside of the tree.

The filling of a tree cavity is generally expensive and not recommended. The filling does not stop decay and often during the cleaning of the cavity, the boundary that separates the sound wood or the callus growth from the decayed wood is ruptured. Thus, this cleaning for cavity filling can have more detrimental effects on the tree than if it were left alone. Care must be taken not to damage the new callus tissue that has formed in response to the tree damage and subsequent decay.

Pruning Wounds

Proper pruning should be used to remove dead, dying and broken branches; to remove low, crossing or hazardous branches; and to control the size of the tree. However, pruning of any kind places some stress on the tree by removing food-producing leaves (if the branch is alive), creating wounds that require energy to seal and providing possible entry points for disease.

Pruning cuts should be made to maximize the tree's ability to close its wound and defend itself from infection. When pruning, make clean, smooth cuts. Do not leave branch stubs. Leave a small collar of wood at the base of the branch. The branch collar is a slightly swollen area where the branch attaches to the trunk. Cutting the limb flush with the trunk will leave a larger area to callus over and a greater chance of decay organisms entering the wound. The optimal pruning time is in the winter (dormant season) when temperatures and infection rates are lower and when trees are not actively growing. For more information on pruning, refer to UT Extension publication PB1619, Pruning Landscape Trees, Shrubs and Groundcovers.

Tree Health

Healthy trees usually recover from wounding quickly. Try to keep wounded trees growing vigorously by watering them during droughts and providing proper fertilization. This will increase the rate of wound closure, enhance callus growth and improve the resistance to decay mechanisms.

References

Shigo, A.L. 1982. Tree health. Journal of Arboriculture 8(12):311-316.

Shigo, A.L. 1986. A New Tree Biology. Shigo Trees & Associates, Durham, NH. 595 p.

Photo Credit: Wayne Clatterbuck

Callus tissue growth in response to a pruning wound on fringetree.

Photo Credit: Wayne Clatterbuck

Callus growth and correct pruning of a branch on pin oak without damaging the root collar

Photo Credit: Wayne Clatterbuck

Growth of callus tissue on a pruned branch of sugar maple

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