Decay Considerations In Pruning

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Arborists have long recognized the importance of proper pruning techniques in preventing wood decay in shade trees. A standard pruning practice intended to minimize decay has entailed removing branches flush with the parent stem to avoid leaving stubs that may provide an entrance for wood decay organisms. Recent research and observations have contradicted the practice of "flush cuts" and indicate that this practice is often detrimental. The purpose of this report is to present new information concerning pruning techniques that will help minimize internal decay and defect.

BRANCH FORMATION

Understanding proper pruning techniques first requires a basic knowledge of branch formation and development. Branches arise from lateral buds present in leaf axils. Initially lateral shoots (branches) grow in length and diameter at approximately the same rate as the parent stem. As branches become shaded, photosynthesis is reduced and growth slows to a lesser rate than the parent stem. A swollen area or collar then begins to form at the junction of branch and stem because of their differential growth rates (Figure 1). Although this swollen area is commonly referred to as a branch collar, it actually is composed of trunk (parent stem) wood. The branch collar contains a protective chemical zone that inhibits the movement of decay organisms from dead or dying branches into healthy tissues of the parent stem. As branches begin to die from shading or other reasons, they usually are walled off (compartmentalized) by tissues in the branch collar which prevents movement of decay organisms into the parent stem (Figure 2).

PRUNING CONSIDERATIONS

Traditional recommendations requiring final cuts to be made flush with the parent stem often removes or damages the branch collar. These flush cuts may break the protective chemical barrier and allow decay organisms to colonize stem tissue (Figure 3). On young, vigorous branches, flush cuts cause little internal decay because the branch collar and resulting wound is very small. On large, older branches, especially those which are dead and dying, flush cuts create a large trunk wound resulting in considerable internal decay.

Like all wounds, trunk wounds from flush cuts usually are compartmentalized. A barrier zone (wall 4) is formed by new cambial growth which prevents movement of decay organisms into wood formed after wounding (Figure 3). However, this barrier zone also represents a plane of structural weakness because the cells comprising it differ anatomically and chemically from normal wood. If the barrier zone is subjected to stress from a sudden temperature change, wind, etc., the wood may separate along the zone to form a ring shake. These ring shakes can lead to radial separations developing from the wood outward to the

bark resulting in a radial seam often referred to as a "frost crack" (Figure 4).

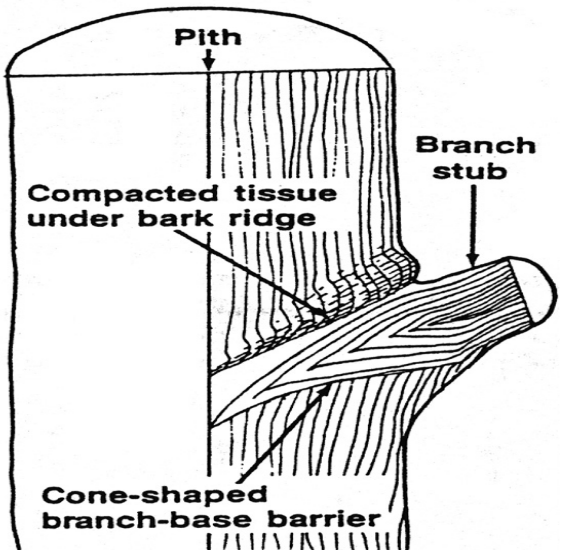

Figure 1 Branch collar (arrow) surrounding dead branch stub. Although branch collars occur at the base of living stems, they are most pronounced around dead stubs. This figure clearly illustrates that branch collars actually are composed of trunk wood.

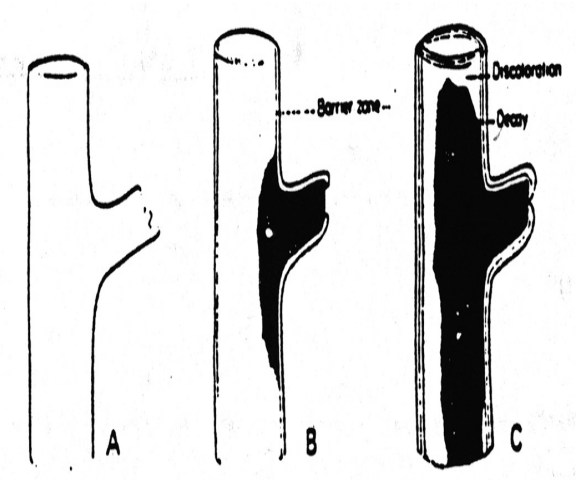

Figure 2 Internal view of branch stub (from a natural shed) within trunk. Note that the branch stub has been compartmentalized and decay is confined to the stub and has not progressed into trunk wood.

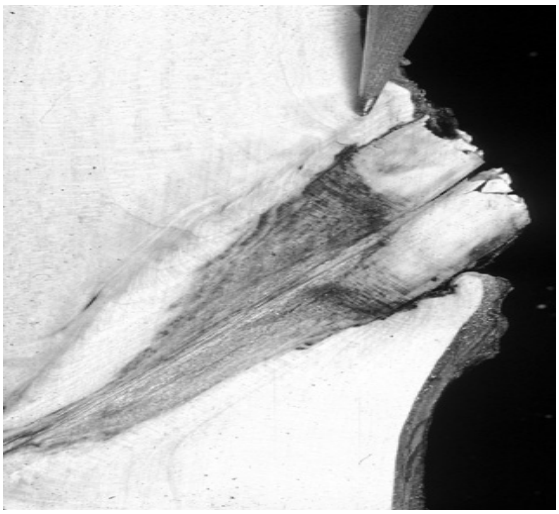

Figure 3 Internal view of trunk following a flush cut. Note, decay has progressed into the trunk wood (large arrows) due to the removal of the branch collar. This figure also illustrates compartmentalization of the flush cut. Decay has not progressed into trunk tissue formed after wounding (small arrows) due to the barrier zone formed by new cambial growth. Note the distinct boundary between the decayed wood and sound wood formed after wounding. The barrier zone differs anatomically and chemically from normal wood which may lead to ring shakes and radial separations (frost cracks).

Figure 4 Radial shake, often referred to as a "frost crack", which forms as a result of wounding. Improper pruning cuts may predispose trees to radial shakes.

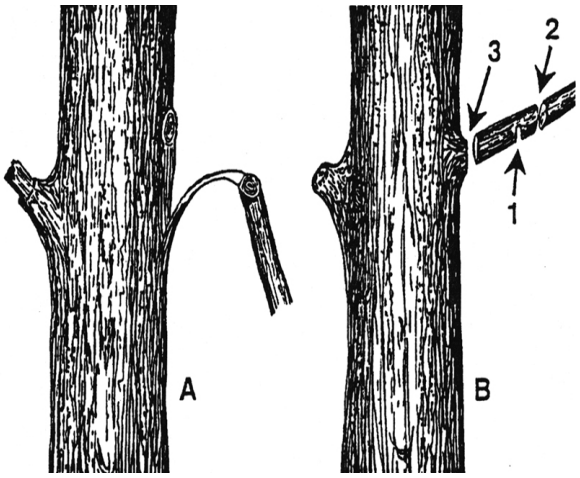

Figure 5 Diagram of improper (A) and proper pruning cut (B).

PRUNING RECOMMENDATIONS

Pruning cuts should be made immediately in front of, not through or behind, the branch collar. This is particularly important on large branches and those that are dead or dying back because these branches already have been compartmentalized (walled off) within the collar. On most tree species, the correct starting point for the final cut can be located by using the branch bark ridge as a guide (the branch bark ridge is a raised strip (ridge) of bark which transverses the parent stem and ends immediately in front of the branch collar: Figure 5, 6). Place the saw immediately in front of the branch bark ridge (Figure 6) and angle the cut slightly away from the parent stem (Figure 5). On young trees and certain species such as those with exfoliating bark, a branch bark ridge is not always apparent. In these instances, the cut should be started immediately in front of any swollen area (branch collar) where the branch joins the parent stem. On some trees, particularly conifers and young trees, the branch bark ridge is virtually flush with the parent stem. In these instances, the final cut must be made flush with the stem (Figure 7).

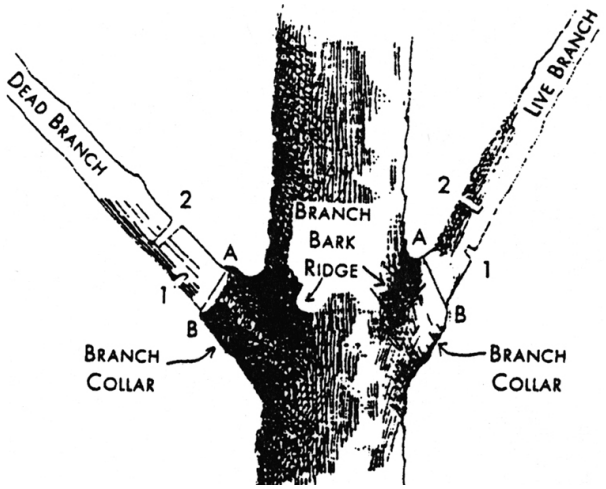

Figure 6 Branch bark ridge (arrow) and proper positioning of the saw in front of the ridge for the final cut. Branch bark ridge (arrow) and proper positioning of the saw in front of the ridge for the final cut. Proper final cut in front of the branch bark ridge. Note that final cut is angled slightly away form the stem. The branch collar is undamaged and the pruning cut will callus over rapidly.

On small branches and on certain species, such as conifers, branch collars are virtually non-existent and the branch bark ridge is flush with the parent stem. Subsequently, the resulting final cut is essentially a flush cut.

REFERENCES

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Figures 2 & 3 Courtesy of Dr. A. L. Shigo, U. S. Forest Service Durham, N. H.