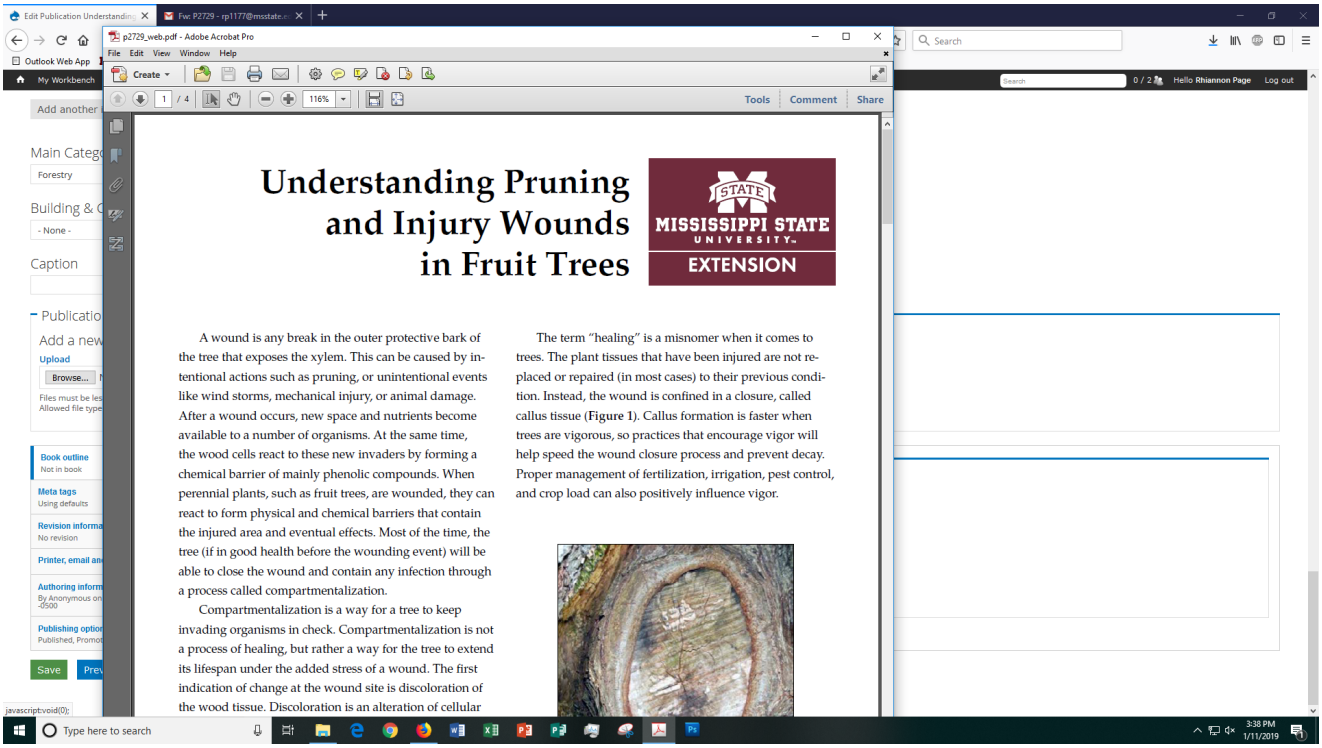
Understanding Pruning and Injury Wounds in Fruit Trees

extension.msstate.edu/publications/understanding-pruning-and-injury-wounds-fruit-trees



Understanding Pruning and Injury Wounds in Fruit Trees

MISSISSIPPI STATE UNIVERSITY EXTENSION

A wound is any break in the outer protective bark of the tree that exposes the xylem. This can be caused by intentional actions such as pruning, or unintentional events like wind storms, mechanical injury, or animal damage. After a wound occurs, new space and nutrients become available to a number of organisms. At the same time, the wood cells react to these new invaders by forming a chemical barrier of mainly phenolic compounds. When perennial plants, such as fruit trees, are wounded, they can react to form physical and chemical barriers that contain the injured area and eventual effects. Most of the time, the tree (if in good health before the wounding event) will be able to close the wound and contain any infection through a process called compartmentalization.

Compartmentalization is a way for a tree to keep invading organisms in check. Compartmentalization is not a process of healing, but rather a way for the tree to extend its lifespan under the added stress of a wound. The first indication of change at the wound site is discoloration of the wood tissue. Discoloration is an alteration of cellular content, but it does not represent a change in structural strength. Decay, which may follow discoloration, is an indication of compromised cellular integrity.

When a tree is wounded, xylem cells next to the wound form a compartment with four walls. Each wall performs a different function. The first wall plugs xylem cells above and below the wound to prevent a vertical progression of the injured area. The second wall has thickened cells that slow the inward spread of decay. The third wall is made up of radial xylem rays that

prevent the horizontal progression of symptoms. The fourth wall is the new xylem that is formed after wounding. Each of the walls differs in its ability to resist decay. The first wall is the least resistant to decay, whereas the fourth wall is the most resistant. However, the fourth wall is structurally the weakest and can lead to separations along the annual ring, also called ring shakes.

The term “healing” is a misnomer when it comes to trees. The plant tissues that have been injured are not replaced or repaired (in most cases) to their previous condition. Instead, the wound is confined in a closure, called callus tissue (**Figure 1**). Callus formation is faster when trees are vigorous, so practices that encourage vigor will help speed the wound closure process and prevent decay. Proper management of fertilization, irrigation, pest control, and crop load can also positively influence vigor.

The time it takes for a wound to close also depends on where the wound is located, when the injury occurred, and what was exposed by the wound. Callus formation is primarily observed from the sides of a wound and less so from the top or bottom (**Figure 2**). Research shows that the shape of the wound isn’t much of a factor when it comes to rate of closure, but size of the wound is important. Therefore, try to minimize wound size when pruning.

Figure 1. A relatively recent pruning wound on a pear tree. The callus tissue formation has begun and is well on its way to closing off the wounded area.

Wounds inflicted in the spring, summer, and winter close at similar rates, but wounds made in the fall close about 20 percent slower. Even though wounds made in spring or summer close at the same rate, they will not achieve the same amount of closure in the same season due to the length of the growing season. Callus around spring wounds will cover three to six times more area than around summer wounds at the end of the season.

Wounds that occur late in the growing season may be infected more rapidly because of coinciding sporulation of fungal populations. Any dry or loose bark in or immediately adjacent to the wound should be removed to eliminate protective cover for insects. It is also good to smooth out ragged breaks. Trim the area so that water will not sit on the wound area.

Wound dressings are unnecessary. They have not been proven to speed the closure process nor to reduce infection. A wound dressing is only used for aesthetic purposes. A wound dressing that cracks may result in moisture accumulation under the dressing and promote decay.

Figure 2. A nearly closed pruning wound on a pear tree. A vigorous, healthy tree can close wounds in a short amount of time.

In the case of storm damage, when a branch breaks off, it must be properly pruned to prevent potential decay at that location. Most cases of decay or discoloration of the wood will be confined to the branch stub (**Figure 3**) that remains. However, if the branch is improperly pruned (a flush cut; **Figure 4**), the trunk tissue will be exposed. This may lead to infection from disease or act as an entry point for insect pests. Pruning cuts should be done at the branch collar and not disturb the trunk wood. Most of all, keep the wound as small as possible, especially the width (from where most of the callus formation will be derived).

Figure 3. Improper pruning has left a branch stub. A stub like this usually decays, leads to disease infection, or becomes an entry point for insects.

Trees may also form cavities when, in an advanced stage of decay, wood is consumed by insects and fungi (**Figure 5**). When a tree has a cavity, tree vigor plays an important role in the development of new bark and wood formation, so it is paramount that tree vigor be encouraged. If the cavity is large and threatens structural stability of the tree or is a haven for pests, then the tree should be removed.

The tree will continue to be productive and have structural integrity up until the number of wounds and the advance of fungal and insect pests begins to compromise its health. As with all living organisms, this is a natural progression of life. All trees will eventually succumb to diseases, insects, and other disorders; however, effective management can delay the inevitable.

Figure 4. This pruning cut was done on an apple tree inside the branch collar. Although callus tissue formation can be seen, this wound may not properly close, leading to possible infection or infestation.

Figure 5. A pruning wound on an apple tree that did not close and is being broken down by fungi and insects.

Publication 2729 (POD-01-19)
By Eric Stafne, PhD, Associate Extension/Research Professor, Coastal Research and Extension Center.