

A couple months ago, I wrote about the Armistice Day blizzard of 1940 and the effects that it had on Nebraska farming at the time and the ways that it changed the course of Nebraska agriculture. Just as a review, there was a massive rainstorm after a long drought, and the trees took up as much moisture as they could. The next night, the temperatures plummeted to below freezing and the large amounts of water inside the trees expanded, as water tends to do when it freezes. It happened so suddenly that the trees basically shattered. The fruit tree industry was devastated, but didn't have the money or time to replant their orchards, so farmers started row cropping. Unfortunately, this is something that trees are still susceptible to today. It's called frost crack.

To understand what frost crack really is, let's talk about some plant biology for a minute. The outermost layer of the tree, the bark, protects the rest of the tree, and prevents other organisms from getting in, similar to the way our skin functions. The next layer in is the phloem. The phloem is similar to our blood vessels, but in plants the liquid and nutrients can only go one way. The phloem moves nutrients and sugars made in photosynthesis from the leaves down to the roots. As you move inward from the phloem, the next layer is the cambium. This is the actively growing green layer that produces both the xylem and the phloem. The cambium is always growing from both sides, so there are xylem getting pushed into the tree, and phloem getting pushed outward. As the phloem pushes outward, the outermost cells die. So the bark is actually dead phloem cells. On the inside of the cambium is the xylem, which moves water and nutrients from the roots to the leaves. The innermost layers are sapwood and heartwood. These layers are no longer alive or functioning inside of the tree. They are mostly used for support. So trees have dead cells, live cells that move nutrients and liquids, and then more dead cells.

Next, let's look at how plants and trees prepare for winter. Believe it or not, plants actually pay attention to how much day length they are receiving, and can adjust accordingly. For example, poinsettias, which flower at Christmas, have to have a certain number of days that have less than eight hours of daylight to flower. Anything above eight hours and the plant won't produce flowers. Plants also pay attention to how cold it is getting. Plants winterize themselves, similar to winterizing a house so that the pipes won't freeze. This is why when temperatures drop quickly instead of gradually, there is a higher likelihood of frost injury. The loud pops that you hear from your yard during the winter? That is most likely frost crack.

Let's get back to frost cracking. Essentially, it is when the water in the cambium layer freezes and expands, cracking the outer bark and causing a vertical crack in the bark. It can occur in a couple of different situations. One is when the temperatures drop faster than the plant can adapt to, causing there to be more liquid in the cambium than there would be if the plant would've had time to adjust. The second is on sunny winter days, the sun on the south side warms the bark enough to draw it out of its dormancy. Then the sun sets, and the temperatures drop to below freezing, causing the liquid to freeze.

Unfortunately, there isn't much you can do for older trees with frost crack. The tree will seal the wound itself. Frost crack itself is not usually fatal, but it can lead to other problems, such as bacterial and fungal diseases. If it is a very young tree, wraps can be used during the winter months, but they need to be removed early in spring so that they do not restrict the growth of the tree. If the growth is restricted for long enough, it will cut off the circulation and can kill the tree. Trees that have thinner bark are more susceptible to frost crack, such as maples, sycamores, and apples.

Frost crack occurs when there is too much water in the actively growing layers of the tree, and the water expands, cracking the bark. It is not usually fatal, but can lead to other issues. It is most likely on the south/southwest side of the tree. If you have any questions feel free to contact me at the Buffalo County Extension Office, at 308-236-1235, or [mearnest2@unl.edu](mailto:mearnest2@unl.edu)