

When trunks crack: What should you do?

The Symptom:

Under certain climatic conditions, a small percentage of Fraser fir Christmas trees will develop cracks vertically along their trunks. These cracks usually begin at the cut base and extend up one side of the trunk. All of these cracks develop in the wood. The bark may remain intact with small cracks, but will split with larger cracks. Split trunks can develop in the field after the trees are cut, in storage on the farm, during transportation, on the retail lot, or in a consumer's home.

Is it a Problem?

Most concerns about tree freshness related to trunk cracks can be put to rest. This is a problem of fresh trees that lose some of their moisture too rapidly. Given a fresh cut off the base of the trunk and placed in water, trees with cracks will take up water normally for the entire holiday season. Often, cracks will close up as trees take up water. If a tree is very dry or does not readily take up water, it is because the tree has been subjected to excessive drying after the crack developed. Cracks are not directly related to foliage freshness, a tree's ability to take up water, or fire safety (problems that occur after a tree has lost much of its water content).

A crack can be a problem with some tree stands. The pin-style tree stand that requires a pre-drilled hole in the center of the trunk may not be tight on a tree with a crack. Other stand types seldom have problems. Where the rare tree is split across the base, few stands may hold it firmly.

Some retailers have clamped or screwed cracks closed quite effectively. Since wood and not the bark of trees take up water, such techniques should not reduce a tree's ability to absorb water. While trunk splitting can clearly be a customer relations concern, it is seldom a functional problem for affected trees.

In the retail setting, excessive drying; needle loss; or sun scald are much more critical problems associated with tree freshness. If a tree exhibits these other freshness problems as well as a crack, its freshness may be in question. Care, handling, and exposure directly impact freshness problems. These do not impact the coincidental presence of a crack.

The Mechanism:

Trunk cracks occur in fresh trees that lose moisture rapidly over a short period of time. While the development of cracks is related to shrinkage of drying wood, the concept of shrinkage fails to capture the occurrence of cracks in fresh trees with high moisture content.

The capillary tension of water inside the wood is the force involved in split trunks. Capillary tension is the force that holds liquid in small tubes such as the liquid in a glass thermometer. As moisture evaporates from foliage of a cut tree, the remaining water in the wood is stretched across the entire volume originally filled — from foliage to trunk. This increases the inward pull of water in the tree trunk — much like the vacuum you would create when sucking on a straw if you were drinking a milkshake.

When the force of capillary tension exceeds the strength of the wood, cells rupture and a crack develops. The tensile strength of Fraser fir wood is only about 180 psi. The forces involved in capillary tension have been measured as high as 515 psi -- much greater than the strength of the wood. When the cell wall of a vessel collapses, integrity is lost, more cells collapse, and the crack splits open.

Trunk cracks are a problem of fresh trees. Research at NC State University has documented the formation of cracks at high moisture content in the wood of Fraser fir, but not after it has dried out. In fact, capillary tension is absent when air fills the vessels in the wood after the water has been lost.

Contributing Factors:

Trunk splitting is a function of rapid moisture loss from cut trees. Cut trees can lose some moisture from the cut end of their trunks, but lose most from the foliage as it respire or breathes. The rate at which tree foliage respire is closely linked to climatic conditions and tree dormancy.

Full sun, high temperatures, and dry winds can pull moisture from the foliage of cut trees. While drought prior to cutting may be a contributing factor to the stresses that initiate cracks, the primary factor is exposure to conditions that dry the tree out rapidly. Cracks can develop the day after rain if newly cut trees are subjected to sun and wind. Cracks have occurred in cold temperatures accompanied by dry winds, but exposure to bright sun and temperatures above 70 degrees are the conditions most likely to result in split trunks. Cracks will develop during a period of severe exposure whether it occurs in the field, in storage, during transportation, or on the retail lot. Since trunks can split during any period of exposure, all handlers must share in the responsibility for tree care.

Recommendations:

When a tree develops a crack follow these recommendations:

- Educate your customers. Give them a copy of this article. Explain that cracks develop in fresh trees that undergo rapid drying. Be sure to explain that most trees will still readily take up water.
- Keep a few alternative-style tree stands on hand to sell.
- Keep a few large hose clamps on supply to be able to clamp trees.
- Minimize drying conditions that initiate cracks. Manage for increased shade, humidity, and shelter from wind.
- Store and display all your trees in water.

Prepared by Jeffrey H. Owen, Area Extension Specialist, NC State University, April, 2005