Recovery from Stem Displacement

Longleaf pine saplings’ recovery from stem displacement depends on their root system architecture. It may take stem-displaced saplings 6 to 12 months to resume the upright position. Stem curvature or sinuosity is an evidence of recovery from the displacement.

Resilience of a 6-yr-old container longleaf pine sapling bent by wild horses in September, 2010. One month after stem displacement, the shoot tip had turned upward (1). It continued to do so through April (2) and June, 2011 (3). A large curve on the stem was observed from August (4) to December (5), 2011.

Will this stem curvature eventually straighten? Only time, and research, will tell.
PATHYSICAL STABILITY OF CONTAINER-GROWN LONGLEAF PINE SAPLINGS IN THE HURRICANE IMPACT ZONE
Much of the original longleaf pine range is within 150 miles of the Atlantic or Gulf coasts, regions frequented by tropical wind storms. Restoration of longleaf pine in its natural range relies mainly on artificial regeneration with container stock. However, stem displacement has been observed in young stands regenerated with container stock. Unit scientists are testing the effect of container cavity type and size on the root development and stem displacement of longleaf pine. Naturally and artificially regenerated longleaf pine trees were excavated to assess their root system architecture in relation to stem stability.

The Importance of Vertical Anchorage
In naturally established longleaf pine, the taproot is the main contributor to vertical anchorage and its depth is only limited by the water table, soil texture, and root-impeding soil horizons. In seedling nurseries, bareroot are undercut at 6 inches before lifting and the majority of container stock is grown in 6-inch-long cavities. Once planted, these seedlings grow new roots from the cut or air-dried ends of taproots. Properly planted, new roots extend downward as sinker roots to provide vertical anchorage. Bareroot longleaf pine, unlike container stock, has a lateral root configuration similar to that of naturally established trees.

The Causes of Stem Displacement
Wind storms, ice storms, or wild animals can cause longleaf pine saplings to lean, bend, or topple. Most stem-displaced saplings recover to the up-right position with curvature or sinuosity if they have sound root anchorage.

Saplings with displaced stems (arrow) in a 15-yr-old container longleaf pine stand were excavated to examine their root system architecture.

(L) Root system of a 22-yr-old bareroot longleaf pine tree with lateral roots radiating from the taproot without spiraling and two downward sinker roots (arrows). (C) A 24-yr-old container tree with one root (arrow) extending horizontally from the taproot end instead of vertically as a sinker root. (R) Spiraling, strangulating, or vertically extending lateral roots are the results of poor planting or poor container design as shown here in a 15-yr-old container tree.

(L) Root systems of 45- (L) and 7-yr-old (R) naturally established longleaf pine trees characterized by a deep, large-diameter taproot and evenly radiating lateral roots around the top 6 inches of the taproot circumference.

(1) A straight-stem sapling with vertical and horizontal root anchorage; (2) a sapling with five curves along the stem and a bent root (yellow flagging); (3) a toppled sapling with no vertical anchorage; (4) a sapling with a 45 degree lean and several upward lateral roots (arrows).