SILVICULTURAL TOOLBOX

Activities that conserve water and fertility reduce pressure on the root system for resource uptake, and actions that increase available light improve crown efficiency. Silvicultural practices yielding either of these ease the demand for carbohydrate to sustain tree vigor. Management activities that protect the forest floor, prevent soil erosion, and yield uniformly distributed, low-intensity fuels curb the belowground demand for energy. Furthermore, stand densities that maximize available light not only increase crown efficiency but also boost the amount of carbohydrate available to roots and mycorrhizae.

Belowground support—A large proportion of fixed carbon is sent belowground to support an expanding root system and mycorrhizal network. Activities that conserve the forest floor and topsoil indirectly reduce the need for energy belowground.

Evaporative water loss from bare mineral soil can be minimized by avoiding high fire intensities.

Crown support—Carbon fixation and allocation belowground may be disrupted by the crowding of crowns in the canopy as trees grow. Activities that increase available light help to maintain a constant flow of energy to the root system and mycorrhizal network.

Stand densities that maximize light and allow self-pruning and natural leaf area dynamics to occur, aid establishment of a carbon allocation pattern that sustains tree vigor.

For More Information Scan Here!

Website: *http://www.srs.fs.usda.gov/longleaf*

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SUSTAINING LONGLEAF PINE VIGOR

RESTORING AND MANAGING LONGLEAF PINE ECOSYSTEMS

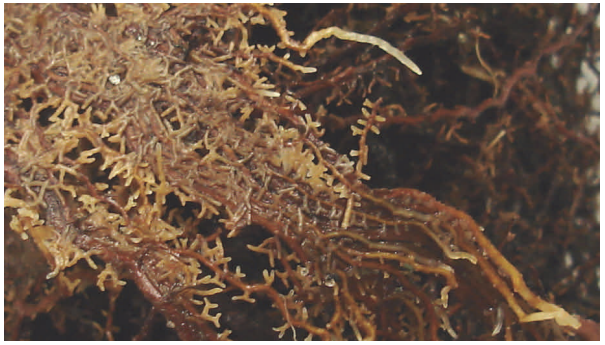
PHYSIOLOGICAL VENUE

Before the era of its harvest and replacement, longleaf pine was found on an array of sites from the rich soils now used to grow commercial loblolly and slash pines to the less fertile and often dry soils of many public lands. Today, most longleaf forests are found where other pines cannot be sustained. The ability of longleaf pine to thrive where other pine species fail attests to its tolerance of difficult conditions.

Sustained vigor requires crown and root system physiological processes that produce adequate carbohydrate for maintenance, defense, and growth. Stand conditions that support these processes promote tree vigor.

CHALLENGES TO LONGLEAF VIGOR

Longleaf pine relies on an expansive root system and mycorrhizal network. Mycorrhizae are a mutually beneficial relationship between certain fungi and plant roots. These belowground organs challenge the crown to provide a continuous supply of carbohydrate.



New roots and mycorrhizae forage through the soil absorbing the water and mineral nutrients needed to sustain tree vigor.

Expansion of the root system and mycorrhizal network with new growth assures a constant supply of water and mineral nutrients where soils are dry and infertile.

Prescribed fire—Repeated fire is vital to longleaf pine ecosystems. In some situations, however, fire can disrupt the flow of energy to roots and mycorrhizae.

Using carbohydrate reserves that are stored between fall and early spring as an energy source, foliage scorched in spring is re-grown by the next growing season and able to sustain the flow of energy to roots and mycorrhizae. Severe scorch at other times of the year risks inadequate energy to support the existing root system and mycorrhizal network as well as the growth of new roots and mycorrhizae.

Drought—Where soil resources are scarce, longleaf pine does not rely exclusively on its roots and mycorrhizae, but also on a crown that is large enough to meet the demand for carbohydrate and small enough to prevent the loss of water. When it is severe and prolonged, drought can hinder the supply of carbohydrate not only belowground but also to new foliage and defense.

A crown that is large enough to meet a tree's energy demands and small enough to minimize the loss of water during photosynthesis maintains an uninterrupted supply of carbohydrate not only belowground but also to new foliage and defense.

Climate change—Long-term reductions in rainfall and elevations in air temperature risk a persistent decrease in photosynthesis. Lengthy climatic extremes could reduce the amount of carbohydrate allocated belowground, and to new foliage and defense.