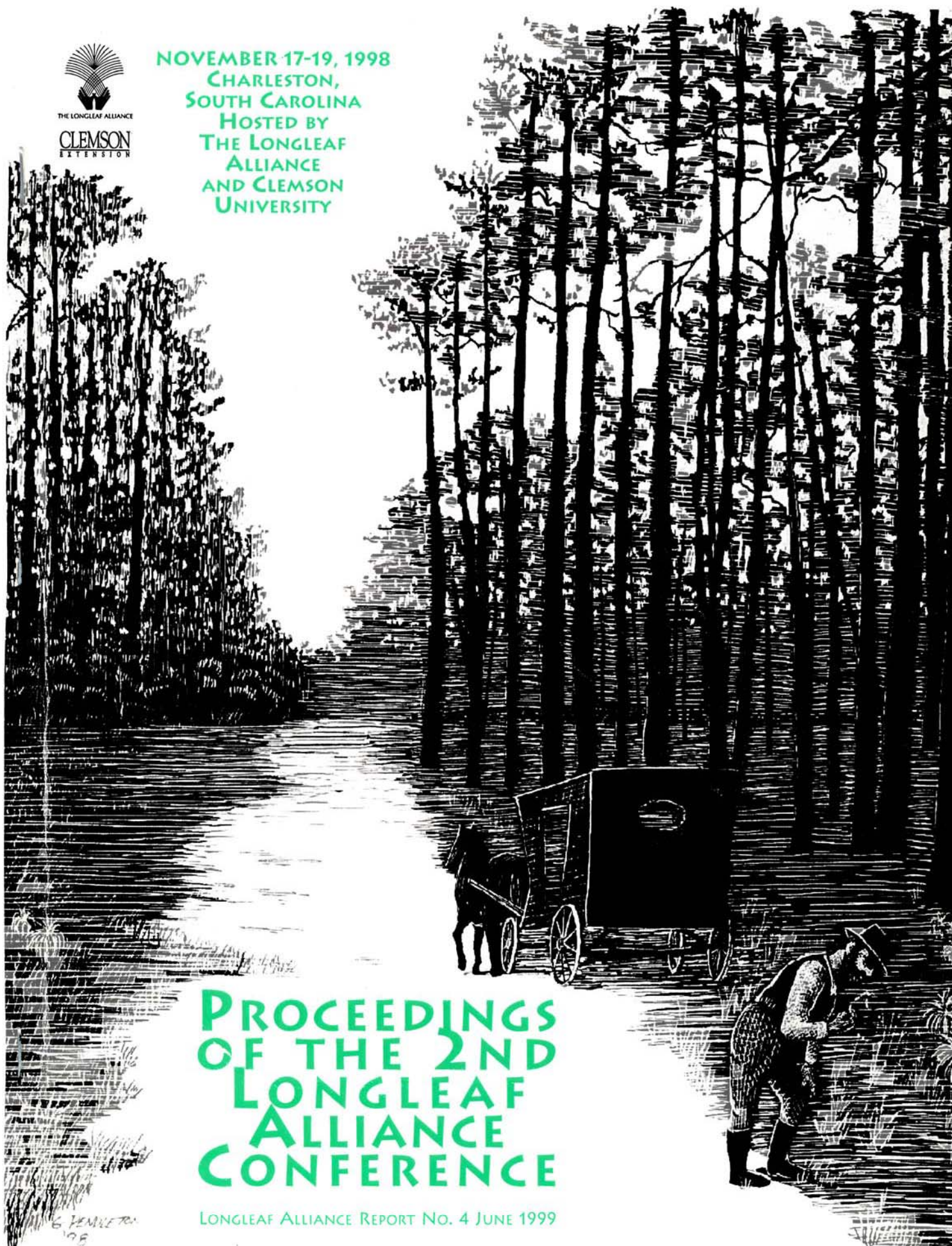




THE LONGLEAF ALLIANCE

CLEMSON
EXTENSION

NOVEMBER 17-19, 1998
CHARLESTON,
SOUTH CAROLINA
HOSTED BY
THE LONGLEAF
ALLIANCE
AND CLEMSON
UNIVERSITY



PROCEEDINGS OF THE 2ND LONGLEAF ALLIANCE CONFERENCE

LONGLEAF ALLIANCE REPORT NO. 4 JUNE 1999

6 JUNE 1999

Fine Root Production in Longleaf Pine-Wiregrass Ecosystems

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ABSTRACT: In June 1996, we initiated a study to assess the patterns and controls of fine root production and mortality in three community types (xeric, intermediate, and wet-mesic) along a complex resource availability and aboveground productivity gradient in longleaf pine-wiregrass forests. Assessments were made using the soil core, ingrowth core, minirhizotron, nitrogen budget, and carbon budget techniques. Fine root production and mortality estimates obtained using soil core were generally lower than other methods, and did not follow aboveground productivity patterns in any systematic way. Ingrowth core estimates were greater, and indicated that fine root production ranged from 1280 to 1456 kg C ha⁻¹ yr⁻¹ in the wet-mesic and xeric sites, respectively. Comparisons of these production estimates along with estimates of total carbon allocation to roots (obtained using the carbon budget method) suggests that approximately one-third of root carbon is bound in structural components, consistent with the results of other studies. In addition carbon allocated belowground, as determined by C budgeting approaches, appears to be relatively consistent throughout productivity gradients. N budgeting approaches resulted in unreliable results, particularly at sites with the greatest aboveground productivity. Perhaps in systems with inherently low N fertility, organic N sources are an important pool to balance N demands with supply. Minirhizotron estimates of productivity were greater than soil coring techniques due to the ability to separate production and mortality of individual roots in time and space. The results from minirhizotron compare most favorably with those of C balance, and also tend to indicate greater mortality of fine roots as productivity increases rather than differential allocation.

Legume function in longleaf pine-wiregrass savannas

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ABSTRACT: Frequently burned longleaf pine ecosystems support diverse and abundant populations of herbaceous legumes. In this habitat, fire regime exerts a dominant role in regulating both population dynamics of many species and N-cycling through the volatilization of large quantities of N. Legumes play two primary functional roles in longleaf pine savannas. First, they provide nutritious foliage and seeds for wildlife. Second, legumes help to replenish N that is volatilized by frequent fire through symbiotic N-fixation. Studies presented here provide an overview of legume population dynamics, N-fixation activity, and reproduction at the Jones Ecological Research Center in southwest Georgia. We found 43 species of legumes that were broadly distributed along a complex ecological gradient from dry to seasonally inundated sites; however, abundance tended to be uncoupled from edaphic variation. An average of more than 119,000 legume stems/ha (48,000 stems/ac) were recorded. Using both ¹⁵N natural abundance and isotope dilution techniques to estimate N-fixation, we have estimated that some legumes species fix in excess of 80% of their foliar N. Finally, studies of legume reproduction with respect to season of burn show a range of reproductive response to fire season. This result suggests that a fire regime of variable seasonality will benefit the maximum number of legume species.