

USING BIOLOGICALLY FIXED NITROGEN BY NATIVE PLANTS TO ENHANCE GROWTH OF HARDWOOD SAPLINGS

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ABSTRACT

Available soil nitrogen is frequently low in old-field plantings. Underplanting forage legumes and interplanting nitrogen-fixing shrubs can improve growth of hardwood saplings, especially black walnut and pecan. Most of the nitrogen-fixing shrubs and forbs have been introduced, and several are now considered invasive species.

Research trials have been established on old-field sites to evaluate the potential benefits of establishing native forbs, grasses, shrubs, and trees with seedlings of black walnut, pecan, chestnut, and five oak species. Four native legumes seeded individually or as a mix 8 years earlier had no effect on sprout height 2 years after a prescribed burn in a planting with walnut and four oak species. Growth of bur oak followed by white oak was greater than that of walnut, northern red, and Shumard oak. Mixes of native legumes, native grasses, or both had no effect on sixth-year sapling height or their sprouts 2 years after a prescribed burn on grafts of black walnut, pecan, and Chinese chestnut.

Four native and two introduced cool-season grasses seeded individually with and without native legumes had no impact on seedling survival of black walnut, pecan, bur oak, and swamp white oak; however, tall fescue, redtop, and Virginia wildrye did suppress growth of black walnut compared to walnut in control plots. Mid-season foliar nitrogen concentrations were not a good predictor of tree growth in this planting where birdsfoot trefoil and goldenrod initially dominated the living mulch ground cover.

Interplanting six native legume shrubs or trees failed to stimulate growth of pecan grafts and seedlings. Although black locust increased pecan foliar nitrogen, it rapidly overtopped and suppressed pecan growth. In our research, we continue to assess additional native plants (Figs. 1-4) established as ground covers or nurse crops that can stimulate the growth of hardwood saplings.

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Figure 1.—Dense stand of partridge pea (*Chamaecrista fasciculata* (Michx.) Greene) being evaluated as a native cover crop for hardwood plantings. (Photo by Nadia Navarrete-Tindall, Lincoln University)



Figure 2.—Closeup of the flowers of the partridge pea (*Chamaecrista fasciculata* (Michx.) Greene), a native nitrogen-fixing legume. (Photo by Nadia Navarrete-Tindall, Lincoln University)



Figure 3.—Closeup of the flowers of Illinois bundleflower (*Desmanthus illinoensis* (Michx.) MacM.), a native nitrogen-fixing legume. (Copyright photo by Randy Tindall, used with permission)



Figure 4.—False indigo (*Amorpha fruticosa* L.), a native nitrogen-fixing nurse crop species, in full flower. (Photo by Nadia Navarrete-Tindall, Lincoln University)

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