

## Soil resource dynamics of a loblolly pine-switchgrass intercropping system

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In the southeastern United States, loblolly pine (*Pinus taeda* L.) and switchgrass (*Panicum virgatum* L.) intercropping systems have been proposed for the simultaneous production of high-value sawtimber and bioenergy feedstocks. Considering the extensive resource utilization patterns of these species, interspecific competition presents a considerable threat to the success and longevity of such systems. Soil moisture and nitrogen are generally considered the two most limiting soil resources for both species. In this study, soil water and nitrogen dynamics were investigated at two sites across five intercropping scenarios. Specific treatments followed over three growing seasons were: switchgrass only (SG), pine only (PINE), pine planted directly into switchgrass (P+SG), pine planted into a 1.2 m vegetation exclusion zone (1.2), and pine planted into a 2.4 m vegetation exclusion zone (2.4). Soil moisture and inorganic N levels varied spatially and temporally and were generally increased where vegetation exclusion was performed. Switchgrass utilized greater soil moisture and nitrogen during the initial growing season, at a time when soil resource supply exceeded demand for loblolly pine seedlings. First-year results demonstrated an ecological and possible economic advantage of intercropping. However, decreased soil moisture and soil inorganic N levels beneath loblolly pines were observed in years 2 and 3. These findings suggest that increasing competitive pressures may occur as this system develops which may jeopardize the sustainability of this system. Results of this study could be utilized to develop management practices promoting the efficient long-term availability of soil resources within loblolly pine-switchgrass intercropping systems.