

# Henderson Site Productivity Study

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The Henderson Site Productivity Study is internationally recognized as one of just a few sites in the world where the effects of plantation management practices have been intensively studied for a whole rotation. The study was established in 1980 in a 22 year old loblolly pine plantation (the second stand since agricultural abandonment) on a Cecil soil, one of the most common soils in the southeastern United States. Twenty-four permanent plots were established and detailed assessments of stand growth, biomass and nutrient accumulation, and soil properties were undertaken prior to harvest. Following this pre-harvest assessment, eight regeneration treatments were imposed including two levels of harvest utilization (stem only and complete aboveground tree harvest), two levels of site preparation (chop, and shear pile and disk) and two levels of vegetation control (no further treatment and complete vegetation control for the first five years). Planted pines have been measured each winter within each of the 24 permanent plots for the last 21 years. In addition to stand growth, many characteristics and processes have also been assessed during this 3rd rotation including soil physical and chemical properties, N mineralization, forest floor dynamics, litterfall, non-pine vegetation biomass, and plant community dynamics. Several scientists and their graduate students have been involved with research at the site and over 30 publications have resulted. This work has not only focused on describing what has happen but more importantly has sought to provide a more complete understanding of the mechanisms underlying sustainable productivity.

## Key results to-date:

- \* Vegetation control (hardwood and herbaceous) has resulted in a doubling of pine production.
- \* Intensive complete tree harvest has not affected stand productivity.
- \* Twenty-three of the 24 permanent plots are exhibiting higher production rates now than in the previous rotation.
- \* The forest floor is a sink, not a source, for nitrogen and phosphorus in aggrading plantations.

- \* Soil N mineralization rates peaked immediately after harvest, dropped rapidly to low levels by age 5, and have maintained these low rates through age 22. Small but significant negative effects on N mineralization are only now (after 22 years) being observed with piling.
- \* Organic matter and nutrient losses associated with piling have not affected stand growth. Apparently, the beneficial effects of disking on pine survival and hardwood control have more than compensated for any negative effects of nutrient removals associated with piling.
- \* Partial recovery of soil physical conditions in the surface soil of skid trials was observed at age 12.
- \* Intensive site preparation and vegetation control treatments resulted in early differences in the species composition of the plant communities; however, by age 18 these differences were no longer evident. Although species numbers were not affected, strong differences in stand structure are still apparent.

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