

**HILL FARM RESEARCH STATION
OCTOBER 14, 2004
FIELD DAY SUMMARY REPORT**

COMMODITY: Forestry

TITLE: Mid-rotation fertilization and vegetation control increase sawtimber production and enhance wildlife browsing vegetation

CONTACT: Michael A. Blazier, Hill Farm Research Station, (318) 927-2578
MBlazier@agctr.lsu.edu

TAKE HOME MESSAGE:

Fertilizing and using herbicides after thinning pine stands growing on nutrient-poor soils can increase the value of the stand in terms of sawtimber production and wildlife habitat.

PROBLEM / TOPIC:

Many forests in the Ark-La-Tex region grow on soils that are low in nutrients due to either past land use practices or to the inherent geology of the soils. If landowners wish to increase the value of their timber, increasing nutrient availability to trees through modest investments in fertilizer, herbicides, and/or prescribed burning are viable management options. In addition, the value of loblolly pine plantations as wildlife habitat can be increased through understory control and fertilizer treatments.

ACTION:

A study site was established on a nutrient-poor soil to test the effects of fertilization and understory control treatments on the growth and development of pine and browsing vegetation. The stand was thinned in 1998 and has been burned every 3 years since thinning. In 1999 and 2002, two treatments were applied: (1) 250 lbs of diammonium phosphate (DAP) fertilizer per acre, and (2) 48 oz. of Chopper[®] per acre. Some plots were left untreated as a basis for comparison. Growth of loblolly pine trees has been measured biennially, and in August 2004 growth of herbaceous vegetation was measured.

IMPACT:

On this site, all herbicide and fertilizer treatments increased pine growth relative to a burning-only treatment (Figure 1). Fertilizer treatments increased pine growth by 25%, and the Chopper[®] treatments increased pine growth by 12%. The best increase in growth has been in response to the combination of DAP + Chopper[®], but this treatment cost twice as much as the DAP or Chopper[®] applied alone. The superior performance of DAP in promoting pine growth relative Chopper[®] is likely due to both prescribed burning and herbicide re-allocating existing nutrients of the soil to trees whereas fertilizer adds new nutrients to the soil. Nevertheless, it appears that Chopper[®] is more effective in promoting pine growth than prescribed burning. The timing of fertilization and herbicide treatments relative to thinning appears to be an important factor, since trees responded more quickly to the DAP and Chopper[®] applied 3 years after thinning vs. the same treatments applied 1 year after thinning. This is likely because trees can better take up nutrients after they have time to adjust to growing in less dense stands. Using Chopper[®], which targets hardwoods, increased the browsing vegetation in the understory of stands by 40 to 55% (Figure 2). By reducing the shading produced by hardwoods, more browsing vegetation flourished in the understory.

Figure 1. 5-year diameter growth responses to fertilizer and herbicide treatments applied to a mid-rotation forest in northwest Louisiana. Homer, LA. 1999-2004.

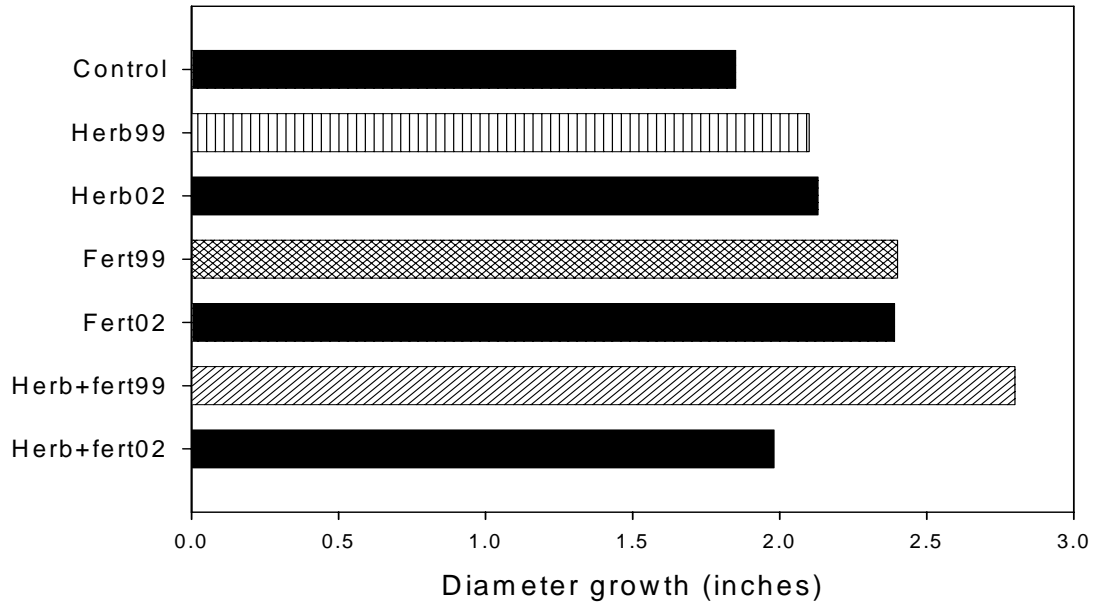
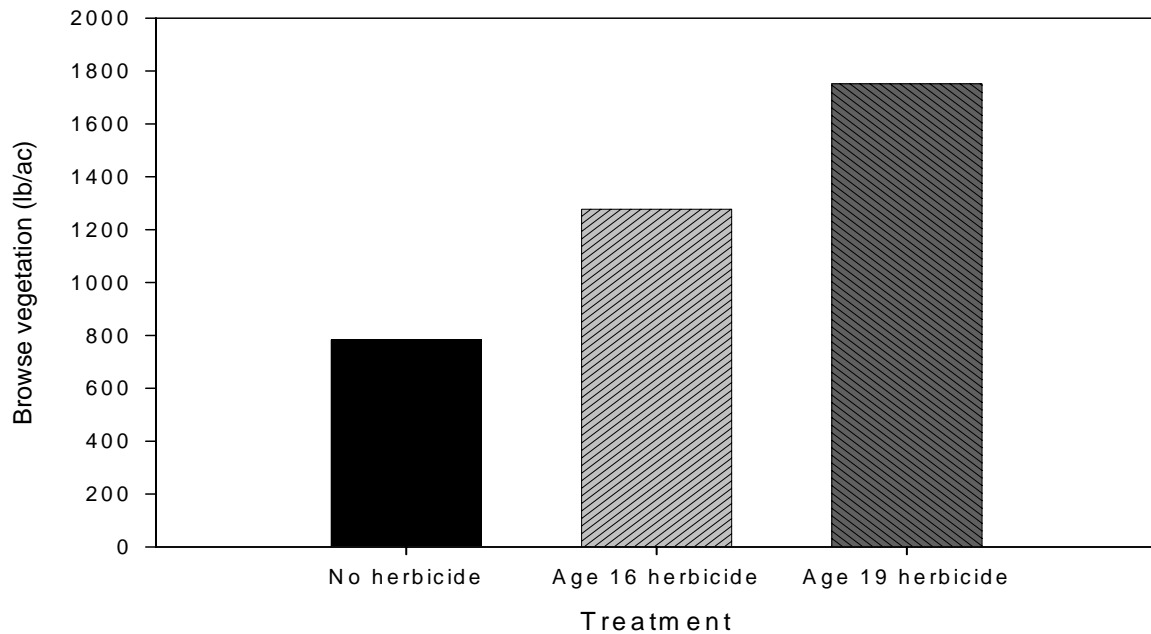


Figure 2. Browse vegetation biomass in response to Chopper herbicide treatments applied to a loblolly pine plantation at age 16 vs. age 19 vs. a no-herbicide treatment.



**HILL FARM RESEARCH STATION
OCTOBER 14, 2004
FIELD DAY SUMMARY REPORT**

COMMODITY: Forestry

TITLE: Good planting and thinning strategies optimize timber production potential of loblolly pine plantations

CONTACT: Michael A. Blazier, Hill Farm Research Station, (318) 927-2578
MBlazier@agctr.lsu.edu

TAKE HOME MESSAGE:

Preventing pine-on-pine growth competition by planting at wider spacings and periodically thinning stands optimizes the timber production potential of loblolly pine stands. A planting spacing of 10' x 10' (~400 trees/acre) followed by thinning to 200 trees per acre around age 15 and then either thinning to 50 trees per acre or clearcutting around age 25 provides high sawtimber production.

PROBLEM / TOPIC:

Allowing crop trees to compete for nutrients, water, and light reduces yields of loblolly pine stands. The most inexpensive way to reduce pine-on-pine competition and optimize sawtimber growth potential is by keeping stand densities low enough to allow trees to grow well. Planting fewer trees per acre allows trees to grow without competition until they reach a merchantable size. At that point, thinning stands provides revenue while maintaining enough growing space to produce quality sawtimber, which is the most valuable forest product. Knowledge of proper planting spacings and thinning targets increases the financial gains associated with loblolly pine forest management.

ACTION:

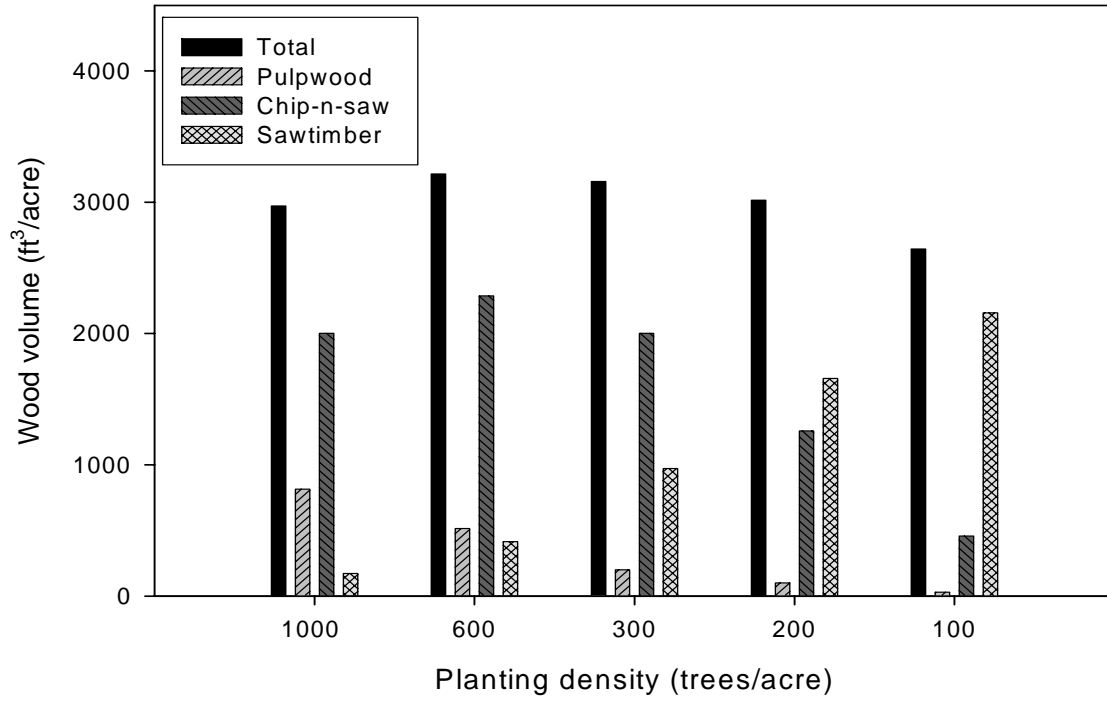
In 1958, a study site was established to observe the effects of planting spacings and thinning intensity on loblolly pine yields. The soil of study site is a common forest soil type throughout the Ark-La-Tex region. Planting spacings were 1000, 600, 300, 200, and 100 trees per acre. Starting at age 21, plots planted at those spacings were thinned by 30% every 5 years until a target density of 25 trees per acre was reached. Height and diameter of trees was measured every 2 to 5 years since the beginning of the study; tree volumes were estimated from those measurements.

IMPACT:

Measurable reductions in tree growth were detected by age 6 when trees were planted at 1000 trees per acre. Similarly, growth reductions were detected by ages 7, 8, or 9 when the trees were planted at 600, 300, or 200 trees per acre, respectively. By age 21, total stand volume and pulpwood volumes were highest in the plots planted at 600 and 300 trees per acre, but the greatest volumes of high-value sawtimber were observed in plots planted at 100 to 300 trees per acre (Figure 1).

Tree growth under the various thinning schedules revealed that keeping the stands between 100 to 200 trees per acre between the ages of 21 to 31 optimizes tree growth within the stand. The thinning schedule that provided the best sawtimber volumes and rates of return consisted of thinning the plots planted at 200 trees per acre down to 100 trees per acre at age 21 followed by thinnings at ages 26 and 31 down to 50 and 25 trees per acre.

Figure 1. Volume of wood products in a 21-year-old loblolly pine plantation in northwest Louisiana in response to five planting spacings.



**CALHOUN RESEARCH STATION
OCTOBER 21, 2004
FIELD DAY SUMMARY REPORT**

COMMODITY: Forestry

CONTACT: Michael A. Blazier, Hill Farm Research Station, (318) 927-2578

TITLE: Nutrient cycling in loblolly pine plantations: effects of fertilization and organic matter removals

TAKE HOME MESSAGE:

On nutrient-deficient soils, fertilization through inorganic and/or organic sources is a viable management option for forest owners. However, repeated applications may induce changes in the nutrient cycling processes of the soil. Likewise, pine straw raking can increase revenues from forests but alter nutrient cycling processes.

PROBLEM / TOPIC:

Many forests in the Ark-La-Tex region grow on soils that are low in nutrients due to either past land use practices or to the inherent geology of the soils. For landowners wishing to increase the value of their timber, increasing nutrient availability to trees through modest investments in fertilizer (either commercial fertilizer or animal wastes) is an important management strategy. Similarly, forest owners that wish to supplement their periodic timber harvest revenues may rake pine straw. However, both these management practices, if done annually, may alter the nutrient capital and cycling processes of soils.

ACTION:

The Calhoun Research Station has established a study observing the effects of annual applications of commercial fertilizer (diammonium phosphate), broiler chicken litter, and annual pine straw raking on pine growth, nutrient uptake, and soil nutrient cycling.

IMPACT:

Annual removals of organic matter by pine straw raking may reduce the nutrient capital of soils. The reason nutrient capital may be reduced by this practice is two-fold. First, pine straw and the other organic matter removed in pine straw harvests contain substantial amounts of nutrients. Secondly, removing organic matter deprives soil microorganisms of carbon sources they use as food, which may reduce their populations. Since soil microbes are the primary agents of releasing nutrients from organic matter, a reduction in microbial populations may reduce nutrient turnover in soils. Thus, annual pine straw raking may not be ecologically sustainable.

Adding nutrients through fertilization on annual basis may have negative ecological repercussions as well. Although fertilization remedies low nutrient levels and increase crop tree growth, repeated applications may cause nutrients to build up to toxic levels. This is particularly true of broiler litter, which contains many nutrients other than N and P. If nutrient levels exceed the capacity of pines, understory vegetation, soil microorganisms, and soil exchange sites to take up and hold nutrients, there is a risk of nutrients migrating to water sources through leaching and runoff.