Auburn University
Southern Forest
Nursery Management
Cooperative

RESEARCH REPORT 01-11

GROWTH OF SWEETGUM TWO YEARS AFTER PLANTING THREE SEEDLING SIZES ACROSS THREE HERBACEOUS WEED CONTROL TREATMENTS

by
Ken Mc Nabb

INTRODUCTION

Sweetgum grows on a variety of upland sites and a wide range of edaphic and climatic conditions. It is relatively fast growing, possesses good pulping properties, is suitable for low end solid wood products, and can be grown in plantations. As with most hardwood species, however, optimum seedling size is not well defined, particularly as it may relate to herbaceous weed control after planting. This research examines (1) the influence of sweetgum seedling size relative to the ability of the tree to be competitive with weeds, and (2) the potential growth gains available from weed control.

METHODS

This study was established on three locations (all within one mile of the other) in the lower Coastal Plain of Alabama. Soils are generally light textured but vary in percent sand and moisture holding capacity. The degree of weed competition also varies between site, with site 3 particularly severe because of climbing vines. All three sites were located on previous agriculture fields that were disked and bedded in preparation for planting. The experimental design was a split plot replicated four times on all three sites. Whole plots were weed control treatment and subplots were seedling size. Subplots were 10 tree rows at an operational spacing of 10'x10'. Total number of trees across all three sites was 1080 with 120 trees for each seedling size/weed control combination.

Seedlings were grown at a Coastal Plain nursery approximately 40 miles from the planting site. Seedlings were typical 1-0 bareroot stock, sown in May and hand lifted after wrenching in early February. Three seedling sizes were selected: Small; 3.0-5.9 mm, Medium; 8.0-10.9 mm, and Large; 13-15.9 mm root collar diameter (DRC). Height was not a factor in the grading process. Lateral roots of the large seedlings were pruned at between 10 to 15 cm from the taproot in order to facilitate planting. Seedlings were transported to the site and shovel planted within two days of lifting. All three seedling sizes were subjected to one of three weed control treatments; (1) a check plot, where weeds were not controlled, (2) operational weed control done by company personnel, and (3) a 4'x4' "brush blanket" weed control mat placed around the seedling immediately after planting. The operational weed control treatment consisted of an "over-the-top" application of an Oust®/atrazine tank mix applied in a 5' band in late February (at 1.5 oz and 1 quart product/ac, respectively) two weeks after planting, followed by one quart of Campaign® (glyphosate and 2,4-D) applied twice as a directed spray during the summer. The brush blanket treatment was kept weed free during the summer by hand removal of any vines and a directed application of glyphosate. All trees were measured for height and groundline diameter two years after planting. Individual tree volume index was determined using the volume formula for a cone.

RESULTS

Site 3, where the weed competition was the most intense, had the lowest survival at 68%, followed by site 1 with 75% (sandy soil), and site 2 with 86%. Site 2 was significantly higher than the other two. Survival was greater for medium sized seedlings (Table 1). Similar site differences are reflected in plot volumes which combine the effect of both survival and growth. Seedling size and weed control treatment behaved similarly across sites.

Table 1. Survival and plot volumes across sites for the three seedling sizes and weed control treatments. Values followed by different letters within a column separate at the 0.05 level.

	Site 1	Site 2	Site 3	Avg.
Survival (%)				
Small	72 a	84 a	58 b	71 b
Medium	81 a	88 a	82 a	83 a
Large	73 a	88 a	65 ab	75 ab
Plot Volume (cm^3)				
Blanket	7039 a	20021 a	7699 a	1583 a
Herbicide	3772 b	5312 b	2394 b	3826 b
Check	2212 b	3915 b	1250 b	2459 b

Survival was greater on the brush blanket treatment for all three seedling sizes. The decrease in survival for large seedlings was probably related to the root pruning done after lifting. If trees of this size are to be planted then planting procedures are needed that do not require lateral root pruning. Height was improved by weed control, with both the herbicide and blanket treatment producing greater tree height and groundline diameter. Treatment impacts upon growth were particularly noticeable for plot volumes which incorporate both survival and growth variables. The brush

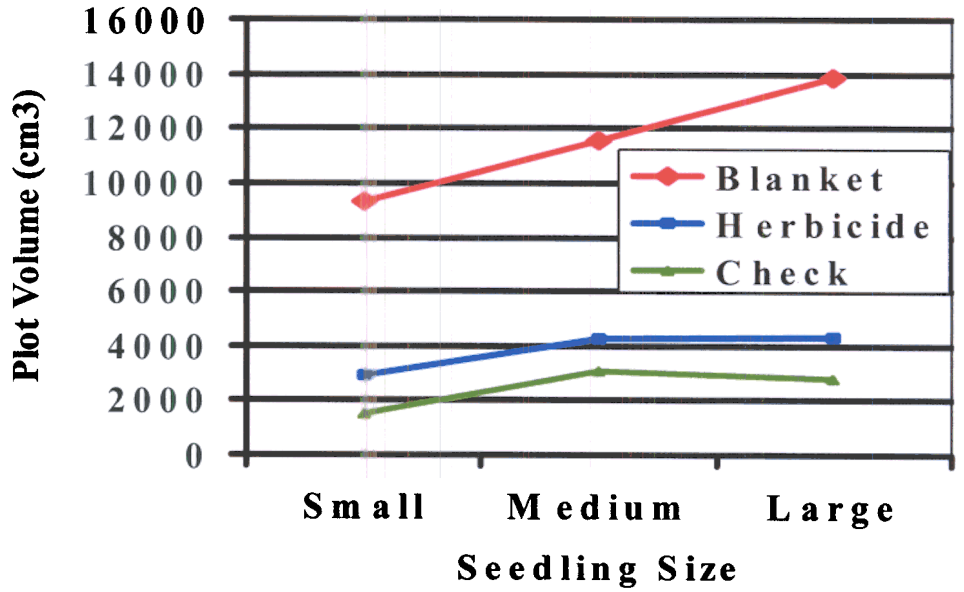

Figure 1. Sweetgum plot volumes at two years after planting by seedling size and weed control treatment. The largest standard error of the mean for any blanket, herbicide, and check treatment data point is 2421, 972, and 704 cm^3, respectively.

blanket produced plot volume increases of 522, 277, and 393% over the check for small, medium, and large seedlings, respectively. Large seedlings improved plot volumes by 87, 48, and 48% over small seedlings for the check, herbicide, and blanket treatment, respectively (Figure 1). The response of all three seedling sizes to the blanket treatment was impressive. Obviously, weed control is essential if maximum growth potential is to be achieved. The somewhat disappointing results produced by the operational herbicide treatment were probably related to the difficulty of using 2,4-D and glyphosate without damaging the crop trees. Even so, plot volumes were on average 55% greater than the check. Normally, this would seem a substantial improvement, but in this case, it is dwarfed by the 371% seedling volume increase of the blanket treatment

MANAGEMENT IMPLICATIONS

A 10 -12 mm (0.5 inches) DRC sweetgum seedling is probably the ideal size for plantation establishment systems based on hand planting. Larger seedling sizes are feasible if machine planting can get all of the root system into the ground without the requirement of root pruning.