Auburn University
Southern Forest
Nursery Management
Cooperative

RESEARCH REPORT 01-4

PINE SEEDLING PRODUCTION AND WEED CONTROL WITH COMBINATIONS OF METHAM SODIUM AND CHLOROPICRIN AT THE GLENNVILLE REGENERATION CENTER IN 2000

by
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INTRODUCTION

Cooperative trials between 1997 and 2000 at several nurseries demonstrated that fumigation with chloropicrin plus metham sodium (CMS) produced pine seedlings about as well as methyl bromide (MBr)(see Research Report 99-2). In those trials, the chloropicrin was applied at from 250 to 300 lbs/ac and metham sodium was applied at from 250 to 330 lbs ai/ac. The applications were not tarped, a technique that although cost effective from a seedling production standpoint, became unacceptable from a liability standpoint due to events late in 1999. The current study evaluated reduced quantities of chloropicrin and metham sodium at various rates and combinations using tarped applications.

METHODOLOGY

Four rates of metham sodium (20, 40, 60 and 80 gal/ac of 4.2 lbs ai/gal) were each applied at three rates of chloropicrin (100, 150 and 200 lbs/ac) to produced 12 treatment combinations. The study area was a riser line section divided into three three-bed-wide blocks. All nine beds were divided into five 80 foot long plots and one plot in each bed was randomly selected to be a not-treated control plot. Each of the three rates of chloropicrin was randomly assigned to a complete bed in each block, less the control plot, and four rates of Metham sodium were each randomly assigned to a plot within each bed. All treatments were applied on March 24, 2000 spraying the metham sodium on the surface then rotovating to a depth of approximately eight inches. The chloropicrin was then shank injected and the tarp applied to the entire bed less the control treatment.

Loblolly pine (*Pinus taeda*) was sown in beds 2, 5 and 8 and slash (*P. elliottii*) was sown in the other six beds on April 19, 2000. The study area was hand weeded on June 1 and the fresh weights of collected weeds were determined for each whole (80 ft long) treatment plot. Seedling development

was assessed October 18, 2000. Seedbed density was recorded for a 4 ft^2 subplot in the middle of each treatment plot. Seedling size and mass were determined for 25 seedlings from each sample plot and parameters were converted to units per square foot of bed for analysis. Seedling masses were determined after oven drying for five days at 50°C. All post fumigation seedling culture was on the same schedule as that for the rest of the nursery.

Data was analyzed using SAS GLM for differences between pine species, block and treatment and separately for the affects of metham sodium within each rate of chloropicrin. Since seedling species did not differ, the analysis combines species and only presents treatment differences.

RESULTS AND DISCUSSION

Treatment affects on seedlings through October and on weed mass on June 1st is presented in Table 1. Differences between treatments were not significant between treatment means nor when analyzed using rates of metham sodium to increase replication for assessing the three rates of chloropicrin (data not presented).

That this study did not indicate differences either among treatments or between treatments and controls seems more a function of the small differences between treatments (on the order of 2 to 3 seedlings/ft^2) and no consistent improvement for treated compared to not-treated plots, than to large difference between replicates within treatments. Least significant differences (lsd's) for most variables were only slightly larger than usual. The reason for the lack of response is not known, but plots were wetter than optimal when treated. Positional affects were stronger than treatment affects both for seedlings and for weed mass. The lack of differences between treatments and controls and the lack of a difference between pine species are surprising, based on previous studies at this and other nurseries.

MANAGEMENT IMPLICATIONS

Determining the optimal combinations and rates for tarped applications of CMS became important for liability concerns after this study was planned and about the time it was initiated. Research Reports 00-5 and 00-6, which address the affects of cost-equivalent tarped and non-tarped CMS treatments also contain pertinent information.

ACKNOWLEDGMENTS

Hendrix and Dail, Inc. supplied the fumigants and did the applications. The Glennville Regeneration Center personnel maintained the study area, sowing and maintaining the beds using standard management practices for the nursery.

Table 1. Seedling development by fumigant treatment for loblolly seedlings at the Glennville Regeneration Center in 2000.

Chloropicrin (lb/ac ai)	Metham (lb/ac ai)	rcd (mm)	Plants† (#/ft²)	Ones (#/ft²)	Seedling Root	Dry Weight(g) Shoot	Weeds g/plot
None	None	4.4	16.0	6.4	9.3	70.7	24
100	84	4.7	12.9	7.0	10.4	66.2	23
100	168	4.7	17.8	7.8	10.9	73.8	16
100	252	4.6	17.0	6.9	9.9	69.3	12
100	336	5.2	14.7	10.5	10.4	73.9	52
150	84	4.5	15.2	6.6	9.2	71.3	7
150	168	4.4	7.9	6.6	9.7	71.4	11
150	252	4.2	14.3	4.4	9.1	63.3	7
150	336	4.6	15.4	8.5	11.8	84.8	24
200	84	4.5	13.8	6.	10.9	64.5	7
200	168	4.1	14.3	4.0	9.5	58.9	21
200	252	4.5	13.5	6.5	9.4	64.7	12
200	336	4.3	13.5	5.0	9.	61.6	20
	lsd	*0.7*	*4.8*	*4.6*	*3.2*	*18.6*	*30*

†) "Plants" is the number of seedlings with rcd's greater than 3.2, and "Ones" is the number of seedlings with rcd's > 4.8