Auburn University
Southern Forest
Nursery Management
Cooperative

RESEARCH REPORT 00-3

SEEDLING PRODUCTION AND WEED CONTROL BY A POTENTIAL REPLACEMENT FOR METHYL BROMIDE AT THE FLINT RIVER NURSERY

by
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INTRODUCTION

When the superior efficacy of soil fumigation using Methyl bromide (MBr) became apparent, the registration and in some cases reregistration of several marginally less affective alternative fumigants became less attractive. Now, however, with the expected phaseout of MBr the revival of some of these products is likely. Sometimes, where the registration was never completed or subsequently allowed to expire, it is economically justified to reevaluate these chemicals. The present study is an example of this type of research, and the chemical evaluated is designated as MBR-300 which stands for Methyl Bromide Replacement compound number 300.

All the alternative fumigants evaluated by the Coop to date have less activity against at least some of the pests (weeds, nematodes and pathogens) controlled by MBr and probably vary more in suitability between nursery locations depending on what problems are endemic there. This report summarizes seedling production and weed control by MBR-300 and compares that to MBr plus chloropicrin at the Flint River Nursery near Montezuma, GA for the 1999 growing season.

METHODOLOGY

Four treatments, two fumigants with one applied using two methods and a not fumigated control were evaluated at the Flint River Nursery in 1999. The study area, a six-bed-wide riser-line section 740 feet long, was divided into three equal blocks (at right angles to the long axis). The treatments were randomly assigned to positions within each block creating a randomized complete block design. Fumigant plots were 115 ft long and control plots were 15 ft long. The standard fumigation treatment of 200 lbs/ac MBr plus 100 lbs/ac chloropicrin (MC33) was applied through standard straight shanks and plastic tarped. MBR-300 treatment was applied at 336 lbs/ac through special "winged" shanks, that maximized distribution through the soil, followed by a drum roller that compacted the soil surface after injection to decrease the escape of the fumigant. Half of each MBR-300 plot was plastic tarped. Fumigants were applied on March 31, 1999.

Four beds of loblolly (*Pinus taeda*) and two bed of slash (*P. elliottii*) pine seed were sown in the

study area on April 22, 1999. Seedling development and weed abundance was assessed May 19 and again Oct. 21, 1999. Seedbed densities were assessed within two 1-foot-wide counting frames across beds (4 ft^2) per fumigation treatment by pine species plot. Seedling parameters were converted to units per square foot of nursery bed before analysis. Seedling masses were determined after oven drying for five days at 50°C.

RESULTS

The affects of pre-sow soil treatments on seedling production is presented in Table 1. The MBr treatment and the tarped application of the MBR-300 but not the non-tarped MBR-300 produced significantly better seedling growth than the control. There were more (á = 0.05) plantable seedlings and more seedling biomass among the two tarped treatments. The significant improvements in many variables among tarped compared to non-tarped applications of MBR-300, demonstrate the importance of tarping in the efficacy of this compound. The similarity of efficacy between the tarped MBR-300 treatment and the MC33 treatment is very encouraging and suggests further research is justified for MBr-300 using these application techniques. As has been common in Nursery Coop research over the last seven years, there was no indication that seedling mortality varied between fumigation treatments and total numbers of seedlings (survival) did not differ between spring and the fall samples at the nursery.

Table 1. Seedling development by species and treatment at the Flint River Nursery in 1999.

1 a. Loblolly Pine Seedlings

Treatment		Seedlings/ft^2†		Number/ft^2 by Grade‡			Biomass§	
Fumigantɸ	Tarp	Apr	Oct	Ones	Plants	Cull	Shoot	Root
MBr	Yes	23	24	1.9	17.5 a	6.3 a	67 a	10 a
MBR-300	Yes	23	23	1.2	18.0 a	4.8 a	67 a	10 a
MBR-300	No	24	24	0.6	11.1 b	12.6 b	49 b	8 b
None	No	22	23	0.0	9.5 b	13.9 b	44 b	9 b
	lsd	3.5	3.5	1.9	4.3	4.8	15	1.2

1 b. Slash Pine Seedlings

Treatment		Seedling/ft^2†		Number/ft^2 by Grade‡			Biomass§	
Fumigantɸ	Tarp	Apr	Oct	Ones	Plants	Cull	Shoot	Root
MBr	Yes	16	20	4.2	14.1	5.9 a	69 a	9.7
MBR-300	Yes	15	19	4.1	15.4	3.6 b	63 ab	8.7
MBR-300	No	17	19	2.4	13.9	5.3 ab	55 b	8.6
None	No	17	20	2.2	14.8	5.3 ab	54 b	8.9
	lsd	2.7	2.4	2.4	2.9	1.9	15	1.7

† Number of seedling counted by date.
‡Grades one and cull, respectively, are RCD's > 4.8 and < 3.2 mm, Plants are all seedlings > 3.2 mm that is, grade ones plus grade twos.
§Biomass is in grams of oven dry seedling.
ɸMBr is 300 lbs/ac MC33, MBR-300 is 336 lbs/ac of an undocumented compound.

Weeds were not abundant in the study area at the May or October samples. In May, numbers of

nutsedge plus spurge differed significantly between blocks but not treatments and ranged from only 0.06 to 0.2 weeds/ft^2. Weed abundance was similarly low in October and since this was largely a product of post emergent herbicide applications this was not recorded.

MANAGEMENT IMPLICATIONS

The compounded tested as MBR-300 was a good candidate for further evaluation to replace Methyl Bromide in southern forest tree nurseries. The efficacy of MBR-300 was not different from the "standard practice control" of tarped MBr at the normal rate, when applied using state-of-the-art equipment that maximized its distribution through the soil followed by tarping. Although in the past this compound was generally found to be inferior to MBr, the application techniques used in the present study appear to have increased product efficiency.

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