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SEEDLING PRODUCTION AND WEED CONTROL BY ALTERNATIVE FUMIGANTS, APPLICATION TECHNIQUES AND EPTC AT THE PEARL RIVER NURSERY

by
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INTRODUCTION

Over the past several years, Coop trials evaluated several registered fumigants and combinations of fumigants as replacements for Methyl bromide (MBr) in southern forest tree nurseries. Beginning with a trial at the Flint River Nursery in Georgia (Research Report 98-7) and then similar trials at the Glenville Regeneration Center and the Beauregard nursery in Louisiana (Research Report 99-2) combinations of Chloropicrin plus Metham Sodium (CMS) were found to produce loblolly and slash pine seedlings of the same morphological quality as MBr treatments within the same nursery areas. In those three nursery trials, the CMS treatments were applied without tarps. With current application technology, CMS can not be applied and tarped in one operation. However, since tarping normally increases the efficacy of any fumigant, we decided to compare the previously tested rate of not tarped CMS (250 lbs of chloropicrin plus 250 lbs of Metham Sodium per acre) with a rate in which the cost of tarping could be off-set by reducing the amount of fumigant. Therefore, for the tarped applications, we reduced chloropicrin by 100 lbs to 150 lbs per acre. The tarped and not tarped CMS treatments should cost approximately the same once the technology to apply and tarp the treatments simultaneously is developed.

In addition to evaluating the effect of tarping on CMS, an unregistered fumigant treatment was tested for the first time in Coop trials. The compound is coded here as MBR-200 in accordance with the wishes of the potential registrant. Because the alternative fumigants evaluated by the Coop to date have not controlled nutsedge as well as MBr, the preemergent herbicide EPTC (Eptam) was reevaluated here in its fourth nursery trial in combination with fumigation treatments.

METHODOLOGY

Four fumigation treatments and a not fumigated control were evaluated at the Pearl River Nursery in 1999. The study area, 600 feet of a nine-bed-wide riser-line section, was divided into three, three-bed-wide blocks, one entire bed in each block was treated with EPTC (6 lbs ai/ac rotovated into the soil) before the fumigants were applied (Mar 26/99). Fumigation treatments were 120 feet long across all three beds and were randomly assigned to positions within each block.

The MC2 (Methyl Bromide plus 2% chloropicrin) treatment was applied at 400 lbs/ac using standard

shank injection and tarped. The MBR-200 (coded designation) was applied at 400 lbs/ac to the soil surface, rotovated into the soil and tarped. The CMS treatments were applied by shank injecting the chloropicrin and spraying and rotovating the Metham Sodium followed by drum roller compaction of the soil surface. The Metham Sodium was applied at 250 lbs/ac for both tarped and not tarped CMS treatments. Chloropicrin was applied at 150 lbs/ac for CMS treatments that were tarped and at 250 lbs/ac for CMS treatments that were not tarped.

Loblolly pine (*Pinus taeda*) seed were sown in the study area on Apr 17, 1999. Seedling development and weed abundance was assessed May 13 and again November 16, 1999 for 4 ft^2 plots near the center of one EPTC treated and one non-EPTC treated bed in each fumigation plot. Seedling 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 carried out by Pearl River management using the same schedule as that for the rest of the nursery.

RESULTS AND DISCUSSION

The affects of pre-sow soil treatments on seedling production is presented in Table 1. The single factor apparent from those data is that EPTC both effectively controlled nutsedge and severely stunted loblolly seedlings at the Pearl River Nursery. Differences in seedlings and weeds were significant by May 13 (data not presented) and remained so throughout the season for most measured variables across fumigation. We do not know why EPTC stunted seedlings more than at other tested nurseries (Glenville, Flint River and Beauregard). However, in a concurrent Stinger trial in beds a few hundred feet away, stunting was also more severe than experienced in other trials (personal communication David South). The nutsedge was largely controlled through post emergent herbicides in the non-EPTC beds that were fumigated so the use of EPTC at this nursery would not appear to be worth the risk.

Table 1. Seedling development by fumigant and EPTC treatment at the Pearl River Nursery in 1999.

1.a. For fumigation and by EPTC treatment (n=3)

Treatment†		Seedling Size			Seedling Counts			
Fumigant	EPTC	RCD (mm)	Root (gms/ft^2)	Shoot	Ones (seedlings/ft^2)	Twos	Cull	Nutsedge (plants/4 ft^2)
Mbr	No	4.6	12	78	7.7	7.0	0.3	00.0
MBR-200	No	4.2	13	76	3.6	19.6	1.8	00.3
CMS(Tarp)	No	4.5	14	86	9.1	14.9	1.0	0.0
CMS	No	4.7	13	90	7.9	16.6	0.5	00.2
None	No	4.4	14	82	6.0	17.7	1.3	11.8
lsd's for EPTC = No		0.4	2	34	6.8	6.8	2.2	10.5
Mbr	Yes	3.8	11	49	2.5	16.8	5.7	0.0
MBR-200	Yes	3.9	13	54	2.9	16.5	5.6	0.0
CMS(Tarp)	Yes	3.5	11	39	1.4	12.7	10.8	0.2
CMS	Yes	3.7	11	45	1.3	17.8	5.9	0.0
None	Yes	3.7	12	51	3.4	15.1	6.6	0.0
lsd's for EPTC=Yes		0.7	5.3	31	3.5	6.0	3.5	0.2

Table 1. Continued

1.b. For EPTC treatment averaged over fumigation (n=15)

Treatment† Fumigant	EPTC	Seedling Size RCD (mm)	Root (gms/ft^2)	Shoot	Seedling Counts Ones (seedlings/ft^2)	Twos	Cull	Nutsedge (plants/4 ft^2)
All	Yes	3.7 a	13	49 a	2.3 a	15.7	6.9 a	0.0
All	No	4.4 b	14	87 b	7.2 b	17.2	1.0 b	2.5
		0.2	1.6	11	2.0	2.4	2.3	3.0

† MBr = 400 lbs/ac of MC2 tarped, MBR-200 = coded product applied at 400 lbs/ac, CMS(Tarp) = 150 lbs/ac chloropicrin plus 250 lbs Metham Sodium under tarp, CMS = 250 lbs chloropicrin plus 250 lbs Metham Sodium not tarped.

Fumigation treatments did not differ significantly (P=0.05)from controls for seedlings variables either for data combined over or separated for EPTC treatments. Effective fumigation treatments, such as MBr, usually produce larger seedlings than controls in Coop trials. Although accepted standards of analysis mandate we accept that treatments did not differ, observations at the study site indicate that plot layout failed to properly assess real variability between treatments. Laid out as a RCB with blocks oriented along the beds, a low spot through the central part of the study produced variability in seedling growth that was not controlled by the block design. The low area confounded both application efficacy (too wet when fumigated) and contributed to differences in seedling growth through the season as a function soil moisture. Although it is tempting (based on the dangers now known for non-tarped applications of Metham Sodium) to accept that reducing chloropicrin and tarping made the CMS treatments equal. this is being further evaluated in another trial.

MANAGEMENT IMPLICATIONS

Only the inferences for EPTC seem unambiguous for the Pearl River data. Specifically, EPTC has risk for unacceptable stunting that was not indicated at other nursery trials. As is always recommended for herbicides, EPTC should be evaluated in trial plots before use at any nursery. Variability due to within the study plots obscured apparently real differences between fumigation treatments. The compound tested as MBR-200 and the tarped CMS with reduced chloropicrin, were visually simialr to local MBr treatments and better than adjacent control plots even though no statistical confidence was produced for this inference.

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