

2008 AREA-WIDE DEMONSTRATION OF ALTERNATIVES:  
FOREST NURSERIES IN THE SOUTHERN US

Marie Quicke\*, Tom Starkey, Scott Enebak  
Southern Forest Nursery Management Cooperative  
School of Forestry and Wildlife Sciences, Auburn AL 36849

The studies reported herein are part of the USDA – ARS Area-wide Pest Management Project for Methyl Bromide Alternatives – South Atlantic Region, and part of a long-term continuing effort by the Auburn University Southern Forest Nursery Management Cooperative to identify and evaluate alternatives for methyl bromide (MBr). Fumigation with methyl bromide has been the most commonly used method of producing high quality, pest-free forest tree seedlings in the Southeastern United States. This is a two year, large scale demonstration study, of seven fumigants managed under normal best management nursery practices. At the 2007 MBAO conference first year data from Glennville and Jesup, GA was reported. We are in the process of collecting the second year data from these locations. This paper will describe the 2008 study at two locations in South Carolina.

**Experiments and Measurements:** A five acre fumigation trial was established in forest tree nurseries at the South Carolina Forestry Commission nursery in Trenton, SC (fall 2007) and the Arborgen nursery in Blenheim, SC (spring 2008) to look at alternative fumigants for the production of forest tree seedlings over a typical two-year rotation. Methyl bromide and six alternatives were applied (Table 1) and covered with 1 ml High Density Polyethylene Tarp (Cadillac Plastics Inc.) as broadcast/flat tarp. At Trenton, SC a non-fumigated plot was included. The non-fumigated plot had been out of nursery production for 6 years under a cover crop of sorghum-sudan and pearl millet. The choices of fumigant alternatives to include in this study were determined from previous results of Area-wide and small plot studies conducted by the Nursery Cooperative. Each nursery sowed a single family of loblolly pine (*Pinus taeda*). The two levels of methyl bromide are to evaluate the hypothesis that nematodes increase with the decrease in methyl bromide usage.

At Trenton, SC, 5 acres out of a total 31 production acres were fumigated in November 2008 (Table 2). The experimental design is a randomized complete block replicated five times with each treatment being 400 linear bed feet. At

Blenheim, SC, 4.5 acres out of a total 77 production acres were fumigated in March 2008 (Table 2). The experimental design used a randomized complete block design replicated four times with each treatment 280 linear bed feet.

Soil samples were collected pre-sowing and midsummer, and divided into two sub-samples. One sample was plated onto *Trichoderma* selective media. The other sub-sample was examined for nematodes at the Auburn University Nematode Laboratory. Seedling counts were done within the beds at four weeks and midsummer and will be done again in the fall prior to lifting. Soil and seedling samples will be collected in the fall. Seedling quality, as measured by root collar diameter, height, dry weight and root morphology using WinRhizo software will be collected in the fall. Next growing season, pre- and post-sowing, midsummer and fall data will again be collected.

### **Results and Discussion:**

Seedling counts (trees/ft<sup>2</sup>) four weeks and midsummer are shown in Figure 2. At Trenton none of the fumigant treatments have seedling densities at the target level of 23 trees/ft<sup>2</sup>. The low seedling density at Trenton could be attributed to the seed being from a first generation source. At Blenheim all the fumigant treatments have seedling densities above their target level of 22 trees/ft<sup>2</sup>.

The soil data at four weeks post-sowing indicates higher levels of *Trichoderma* in the methyl bromide treatment at Blenheim, SC (Figure 1). This is consistent with previous Nursery Cooperative research showing *Trichoderma* is an important soil borne fungus necessary for proper growth of pine seedlings. Levels of *Trichoderma* in the DMDS + Chloropicrin treatment were encouraging since previous studies indicated that DMDS alone did not favor *Trichoderma* development. At Trenton, SC the fumigants containing higher levels of chloropicrin (Chloropicrin, Chlor 60, PIC+, DMDS+Chlor) have higher levels of *Trichoderma*. The *Trichoderma* levels in the non-fumigated treatment were the lowest. At the midsummer assessment although the seedling counts were similar to all the other treatments, the seedling quality was poor with weeds and nematodes present. The impact of the non-fumigated treatment will be evaluated after the fall data is collected.

Nematodes were not detected in any fumigated treatment at four weeks post-sowing. Low and trace levels of Stunt, Ring and Stubby root nematode were found in the non-fumigated treatment.

Table 1. Fumigants and rates used in 2008 Area-wide demonstration plots.

<b>Fumigant</b>	<b>Rate</b>	<b>Components</b>
MBr #1	400 lbs/a	98% MBr + 2% Chloropicrin
MBr #2*	235 lbs/a	98% MBr + 2% Chloropicrin
DMDS + Pic	74 gal/a (731 lb/a, Trenton, SC)	79% DMDS + 21% Chloropicrin
DMDS + Pic	70 gal/a (Blenheim, SC)	79% DMDS + 21% Chloropicrin
MBrC 70/30	400 lbs/a	70% MBr (98/2) +30% Solvent A
Pic+	300 lbs/a	85% Chloropicrin+15% Solvent A
Chloropicrin	300 lbs/a	100% Chloropicrin
Chlor 60	400 lbs/a	60% Chloropicrin + 40% 1,3-D
Non-fumigated	Trenton only	

Table 2. Trial Information for each location

	<b>Trenton, SC</b>	<b>Blenheim, SC</b>
Fumigation	2-Oct-07	3-Apr-08
Fumigation type	Shank injected Broadcast/flat tarp	Shank injected Broadcast/flat tarp
Area in trial	5 acres	4.5 acres
Air temperature range	61 to 82°F	44° to 48°F
Wind speed	3 – 11 mph	5 – 11 mph
Soil moisture	5%	7%
Soil series	Wagram sand	Autryville sand
Plastic in place	10 days	7 days

Figure 1. Percent *Trichoderma* 2008 pre-sowing

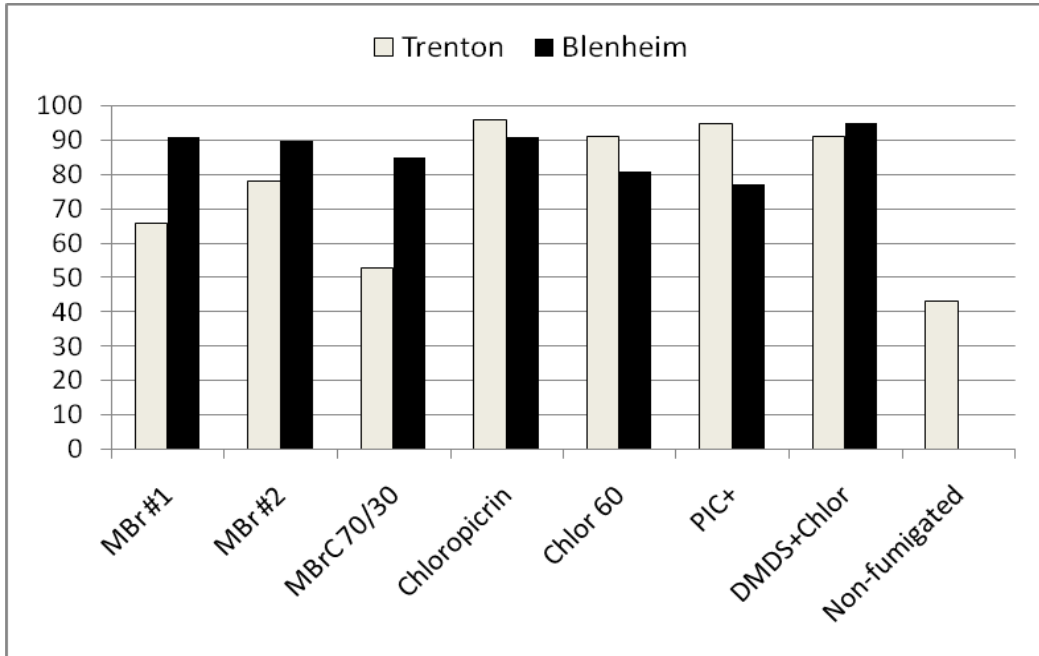


Figure 2. Seedling density (dashed line = target 22 trees/ft<sup>2</sup> Blenheim, SC  
black line = target 23 trees/ft<sup>2</sup> Trenton, SC)

