# 2009 METHYL BROMIDE ALTERNATIVES IN ALABAMA FOREST TREE SEEDLING NURSERIES

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). This is the third year of a five year project with each trial a two year, large-scale demonstration of MBr alternatives managed under standard nursery management practices. The trial for the 2007/2008 growing seasons conducted in Georgia is completed and data will be reported as an Auburn University SFNMC Research Report. During the 2008/2009 growing season nurseries in South Carolina were selected and data from those nurseries is in the midst of the second growing season. For the 2009/2010 growing seasons, two nurseries in Alabama were selected for the USDA Areawide demonstration plots.

**Experiments and Measurements:** A four acre trial was established at the Joshua Timberlands nursery in Elberta, AL, in October 2008 (Table 1) using a randomized complete block design with treatments replicated four times. Each of the seven treatments were 16 ft x 280 linear bed feet in size (Table 2). The other MBr study site was established on five acres at the Weyerhaeuser nursery in Camden, AL in March 2009 (Table 1). The soil fumigants at each nursery were shank injected (Table 2) and covered with 1 mm High Density Polyethylene Tarp (Cadillac Plastics Inc.) per label recommendations. Two nursery blocks were used at the Camden nursery of which, six treatments were replicated four times in a randomized complete block design (16 ft x 260 ft) over 3.6 acres. In the other nursery block (1.4 acres), two treatments of iodomethane (Midas™) were applied, replicated four times and covered with Virtually Impermeable Film (VIF - Ginegar) as broadcast/flat tarp. Each nursery sowed a single family of loblolly pine (*Pinus taeda*) in mid to late April, 2009. The trials installed at Elberta and Camden will be followed over a two-year rotation, which will include two pine seedling crops. Final seedling densities and seedling quality will be determined at the end of each cropping season.

In addition to seedling characteristics, the affect of these treatments on soil-borne fungi and nematodes will be determined. To that end, soil samples were collected pre-sowing and six weeks post-sowing, and divided into two sub-samples. Half the sample was plated onto media selective for *Trichoderma spp.*, and the remainder of the sample was examined for nematode populations at the Auburn University Nematode Laboratory. Seedling counts were done within the beds at six weeks post sowing and will be done midsummer and again in the fall prior to lifting of the seedlings. Soil and seedling quality data, as measured by root collar diameter, height, dry weight, grade and root morphology, will be collected in the fall 2009.

**Results and Discussion:**

Six weeks post sowing, seedling counts (trees/ft²) at both the Camden and Elberta nurseries indicate no significant difference between soil fumigants tested. Camden densities were within their target seeding numbers of 21 seedlings/ft². However, due to heavy rainfall at the Elberta nursery, the seedling densities were all below the nursery target of 17 seedlings/ft².

Analysis of the soil *Trichoderma spp*. levels indicates no significant difference in *Trichoderma spp.* levels among the soil fumigants applied at the Camden Nursery. Of the two iodomethane products tested, the Midas™ 50/50 had significantly higher levels of *Trichoderma spp.* than the Midas™ 98/2. This difference is probably attributed to the amount of chloropicrin in each product as previous Nursery Cooperative research showed 100% iodomethane inhibited *Trichoderma spp.* growth compared to methyl bromide. When the *Trichoderma spp.* levels were examined at the Elberta site, soils treated with DMDS + Chlor had *Trichoderma spp.* levels significantly higher than Chloropicrin. Methyl bromide treated soil fell among the two extremes. While soil samples were collected pre- and post-fumigation, nematodes were not detected in any fumigated treatment at six weeks post-sowing.

The use of iodomethane at Camden was one of the first large-scale broadcast trials using Midas™ under virtually impermeable films (VIF) and could go a long way in addressing new soil fumigation rules due out in 2011. However, the ability to glue VIF at Camden, AL presented logistical problems that still need to be addressed for broadcast fumigation. The two Midas™ treatments took five hours to glue 1.4 acres of VIF (0.28 acre/hr). At this rate, a normal 20-acre field would take 7-10 days to treat. In contrast, using high density plastic, the other six soil fumigation treatments on 3.6 acres took four hours (0.93 acre/hr) to apply.

Table 1. Trial Information for each location

| | **Elberta, AL** | **Camden, AL** |
|---|---|---|
| Fumigation | Oct 22, 2008 | Mar 21, 2009 |
| Fumigation type | Shank injected Broadcast/flat tarp | Shank injected Broadcast/flat tarp |
| Area in trial | 4 acres | 5 acres |
| Air temperature range | 67 - 75ºF | 61 - 77ºF |
| Wind speed | 3 – 10 mph | 5 – 9 mph |
| Soil moisture | 8.1% | 7.6% |
| Soil series | Eustis loamy fine sand<br>Red Bay fine sandy loam | Lenoir silt loam |
| Plastic in place | 9 days | 14 days |

Table 2. Fumigants and rates used in 2009 Area–wide demonstration plots.

| **Fumigant** | **Rate** | **Nursery*** | **Components** |
|---|---|---|---|
| MBr #1 | 400 | E | 98% MBr + 2% Chloropicrin |
| MBr #2 | 235 | E | 98% MBr + 2% Chloropicrin |
| DMDS + Chlor | 70 gal/acre | E,C | 79% DMDS + 21% Chloropicrin |
| MBrC 70/30 | 400 | E,C | 70% MBr (98/2) +30% Solvent A |
| Pic+ | 300 | E,C | 85% Chloropicrin+15% Solvent A |
| Chloropicrin | 300 | E,C | 100% Chloropicrin |
| Chlor 60 | 400 | E,C | 60% Chloropicrin + 40% 1,3-D |
| MBr | 350 | C | 67% MBr + 33% Chloropicrin |
| Midas™ | 160lbs/acre | C | 50% Iodomethane + 50% Chloropicrin |
| Midas™ 98/2 | 100 | C | 98% Iodomethane + 2% Chloropicrin |

*E = Elberta, AL;  C = Camden, AL

Table 3. Six weeks post sowing seedling count & *Trichoderma*.

| **Fumigant** | **Elberta** | | **Camden** | |
|---|---|---|---|---|
| | Seedling count | *Trichoderma*[1] | Seedling count | *Trichoderma* |
| MBr #1 | 12 a[3] | 10 bc | | |
| MBr #2 | 14 a | 22 ab | | |
| DMDS + Chlor | 11 a | 32 a | 21 a | 35 a |
| MBrC 70/30 | 14 a | 24 a | 22 a | 36 a |
| Pic+ | 12 a | 9 bc | 21 a | 22 a |
| Chloropicrin | 12 a | 5 c | 21 a | 59 a |
| Chlor 60 | 12 a | 6 c | 21 a | 26 a |
| MBr | | | 21 a | 82 a |
| | | | | |
| lsd (0.05) | 4 | 14 | 4 | 75 |
| | | | | |
| Midas™ 50/50[2] | | | 21 a | 123 a |
| Midas™ 98/2 | | | 22 a | 28 b |
| | | | | |
| lsd (0.05) | | | 10 | 52 |

[1] *Trichoderma* = colony fungal units/milligram soil

[2] Midas treatments were analyzed separately due to being physically separate from the other treatments

[3] Within column means followed by same letter do not differ at 0.05 level using Duncan's Multiple range Test