# Area-wide Demonstration of Methyl Bromide Alternatives:

# Forest Nurseries in the Southern US

Marie Quicke
Tom Starkey
Scott Enebak


School of Forestry & Wildlife Sciences, Auburn University
Southern Forest Nursery Management Cooperative

# Georgia Summary

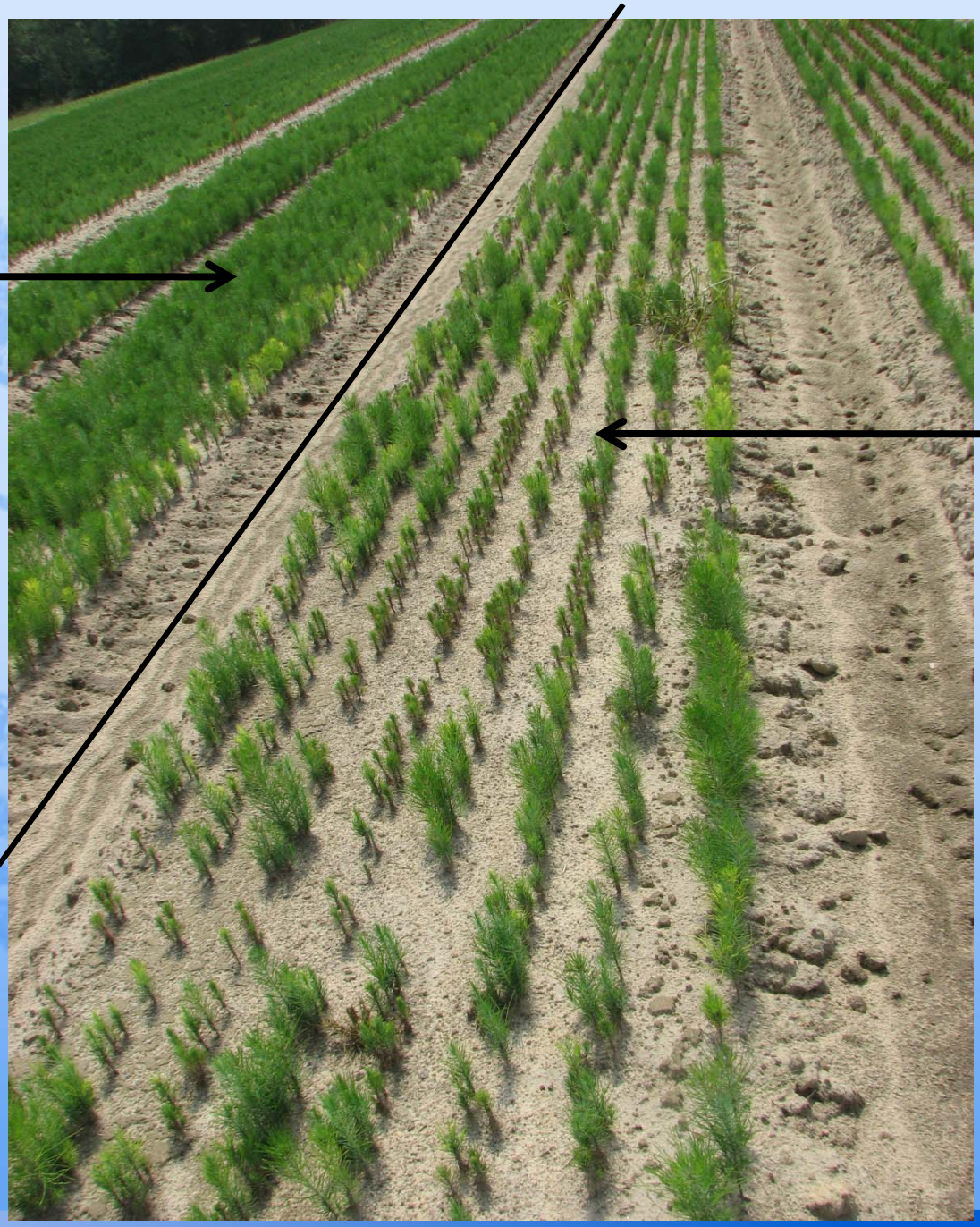
***Trichoderma*** **levels**: unaffected by fumigant by end of 2nd year.

**Seedling density**: all below target, increased between 1st & 2nd year
Chloropicrin greatest density.

**Root morphology**: decreased between 1st & 2nd year, due to increased density.

**Root collar diameter**: end of 2nd year significant differences
Glennville – DMDS+Chlor largest & Chloropicrin & Chlor 60 smallest
Jesup – Chloropicrin largest & NewPic+ smallest

**Seedling grade**: 1st year more Grade 1
2nd year less Grade 1 & more Grade 2




Trenton, SC

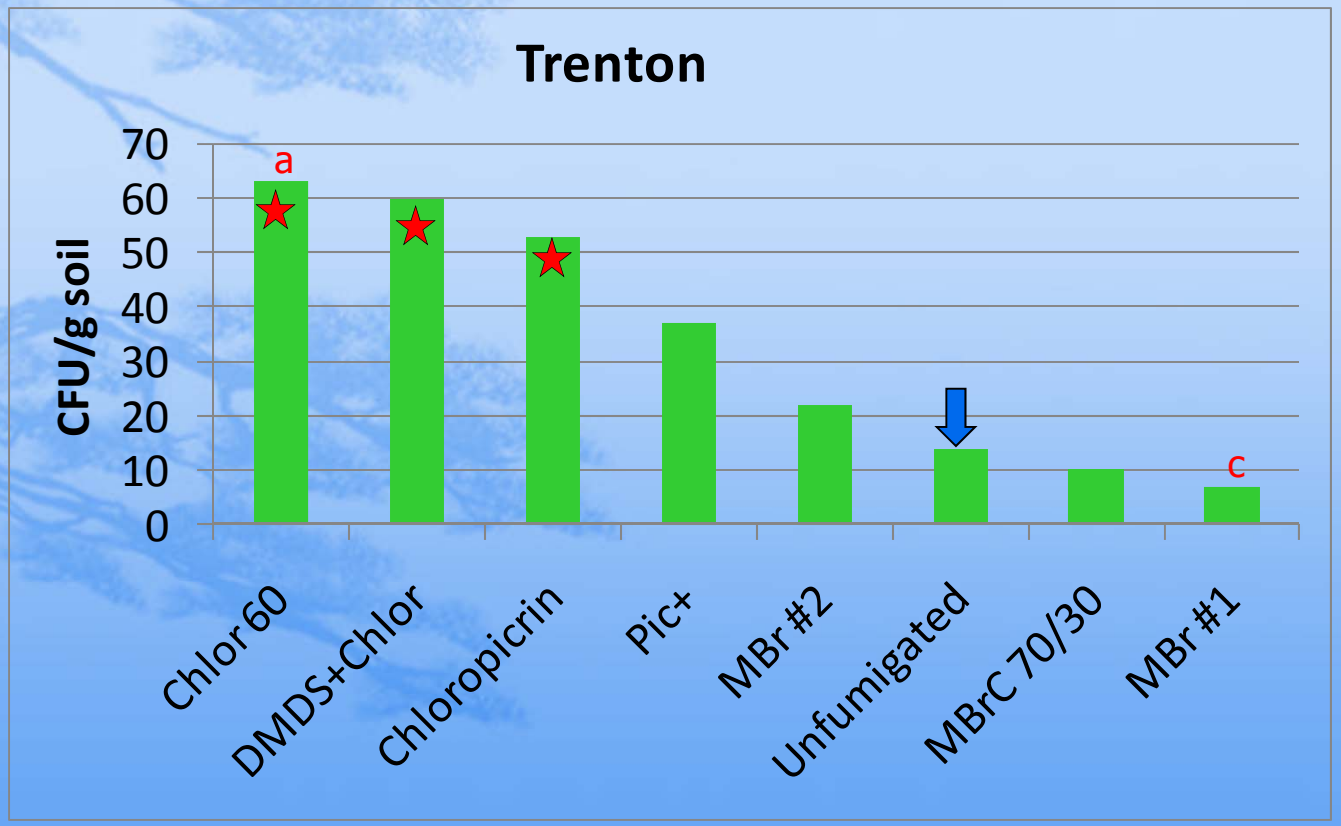
# Root Morphology, 2008
## Trenton, SC

| Treatment | Length (cm) | Surface area ($cm^2$) | Avg Dia (mm) | # Root tips |
|---|---|---|---|---|
| Pic+ | 296a | 64a | 0.70ab | 617a |
| Chlor 60 | 273ab | 59ab | 0.70ab | 567abc |
| MBrC 70/30 | 269abc | 58abc | 0.70b | 593ab |
| DMDS+Chlor | 258bc | 58abc | 0.71ab | 533bc |
| MBr #2 | 248bc | 54bc | 0.70ab | 527bc |
| MBr #1 | 239bc | 50c | 0.67b | 518bcd |
| Chloropicrin | 234c | 54bc | 0.73a | 490cd |
| Unfumigated | 189d | 37d | 0.62c | 446d |
| | | | | |
| lsd (0.05) | 39 | 9 | 0.05 | 83 |

Measured using WinRhizo by Regent Instruments Inc.

# *Trichoderma*

## First year post fumigation



# Root Morphology, 2008

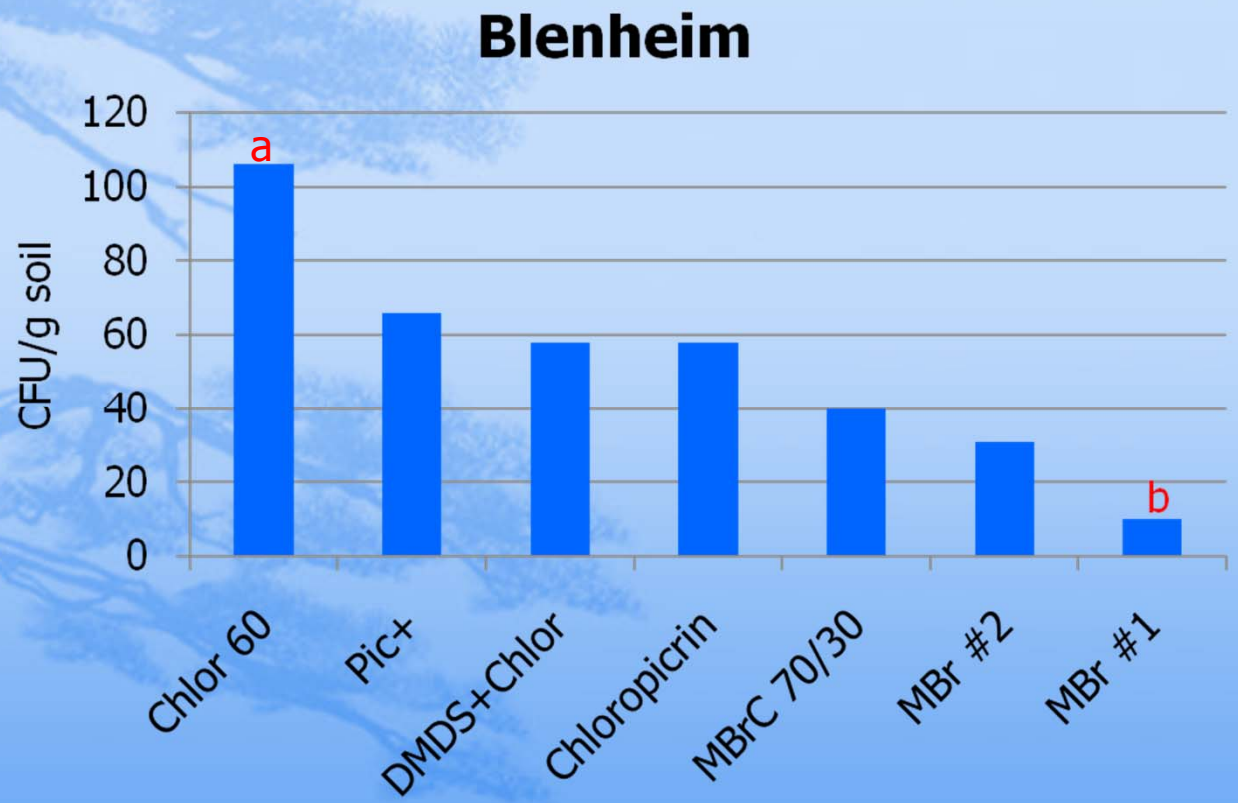
## Blenheim, SC

| Treatment | Length (cm) | Surface area ($cm^2$) | Avg Dia (mm) | # Root tips |
|---|---|---|---|---|
| DMDS+Chlor | 439a | 80a | 0.58a | 849a |
| MBr #1 | 420a | 78a | 0.59a | 826a |
| Chloropicrin | 419a | 76ab | 0.58a | 832a |
| Chlor 60 | 415a | 77ab | 0.59a | 838a |
| Pic+ | 411ab | 75ab | 0.58a | 801a |
| MBrC 70/30 | 408ab | 75ab | 0.59a | 832a |
| MBr #2 | 347b | 62b | 0.57a | 726a |
| | | | | |
| lsd (0.05) | 71 | 16 | 0.04 | 133 |

Measured using WinRhizo by Regent Instruments Inc.

# *Trichoderma*

## First year post fumigation



# Time Line of Area wide at Trenton & Blenheim, SC

# Cooperators in Research for 2009

Steve Godbehere, Hendrix & Dail, Tifton, GA

Sam Campbell, Joshua Timberlands, Elberta, AL

Ralph Bower, Weyerhaeuser, Camden, AL

Shan Brooks, Arysta LifeScience, Lake Worth, FL

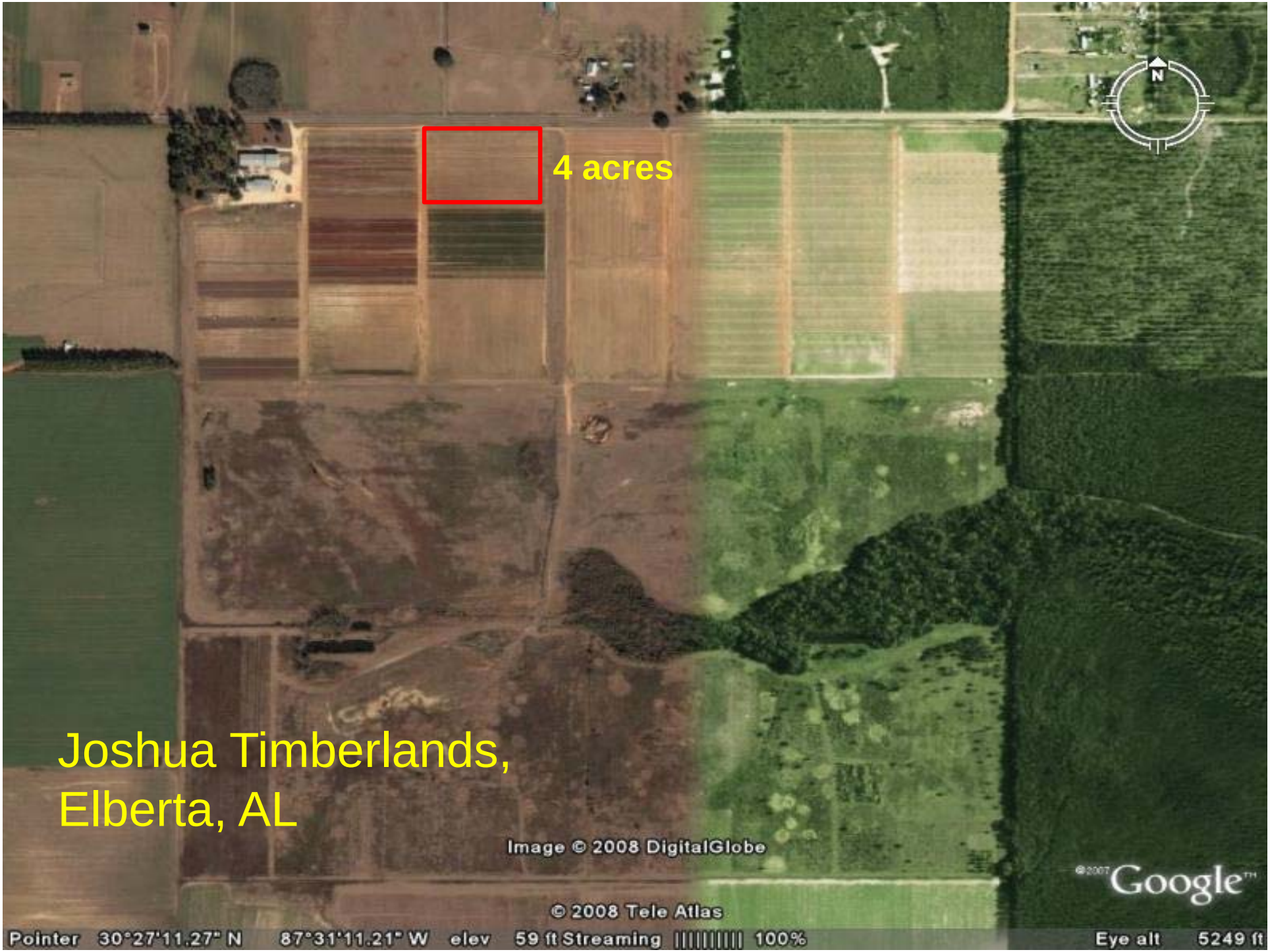
USDA-ARS Area-Wide Pest Mgt Project for Methyl Bromide Alternatives – South Atl Region

# Trial Information

| | **Elberta, AL** | **Camden, AL** |
|---|---|---|
| Fumigation | October 22, 2008 | March 23, 2009 |
| Fumigation type | Shank injected<br>Broadcast/flat tarp | Shank injected<br>Broadcast/flat tarp |
| Area in trial | 4 acres | 5 acres |
| Air temperature range | 67 – 75°F | 61 – 77°F |
| Wind speed | 3 – 10 mph | 5 – 9mph |
| 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 |

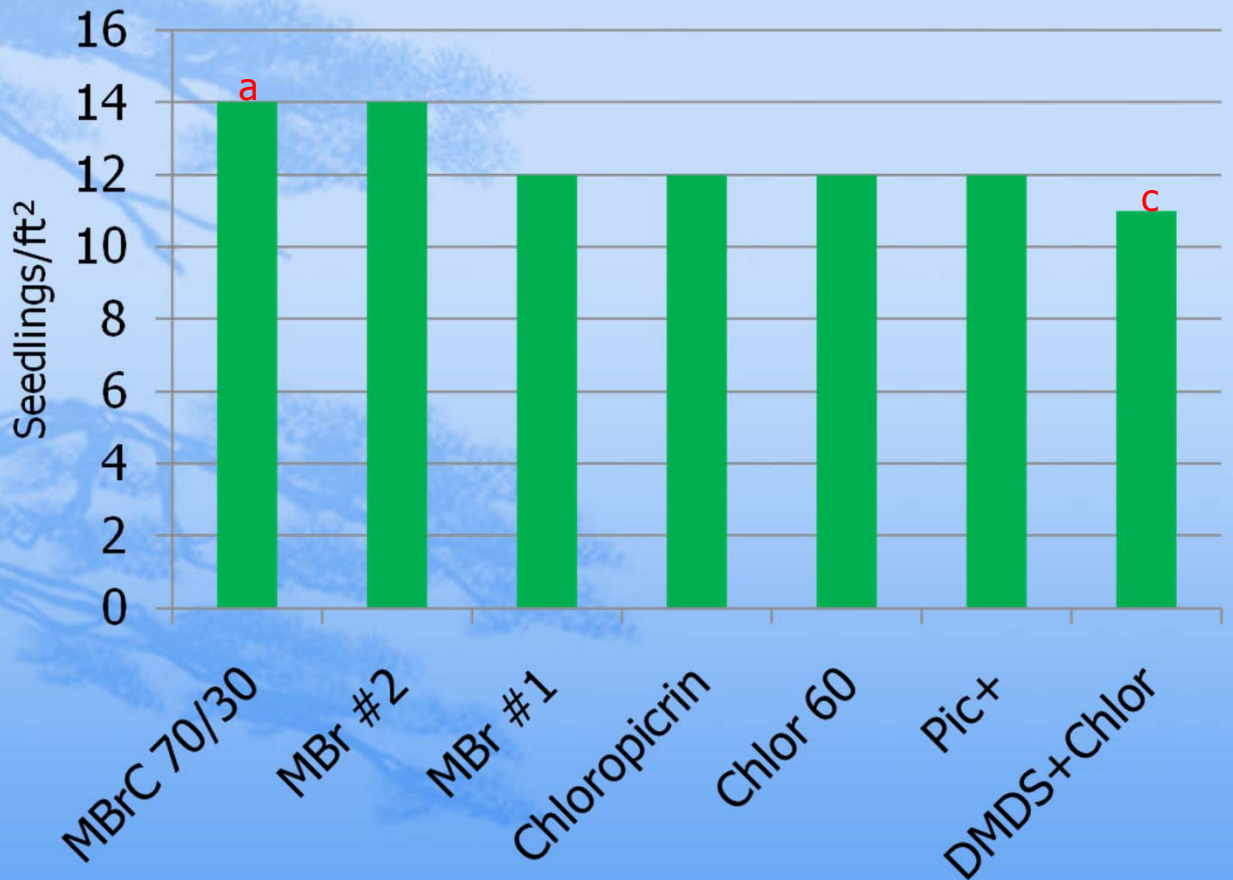
# 2009 Fumigants
# Elberta, AL

| Fumigant | Rate | Components |
|---|---|---|
| MBr #1 | 400 lbs/acre | 98% MBr + 2% Chloropicrin |
| MBr #2 | 235 lbs/acre | 98% MBr + 2% Chloropicrin |
| Chloropicrin | 300 lbs/acre | 100% Chloropicrin |
| MBrC 70/30 | 400 lbs/acre | 70% MBr (98/2) + 30% Solvent A |
| Chlor 60 | 400 lbs/acre | 60% Chloropicrin + 40% 1,3-D |
| Pic+ | 300 lbs/acre | 85% Chloropicrin + 15% Solvent A |
| DMDS + Chlor | 70 gal/acre | 79% DMDS + 21% Chloropicrin |


4 acres
N
Joshua Timberlands,
Elberta, AL
Image © 2008 DigitalGlobe
© 2008 Tele Atlas
©2007 Google™
Pointer 30°27'11.27" N 87°31'11.21" W elev 59 ft Streaming 100%
Eye alt 5249 ft

# Seedling count

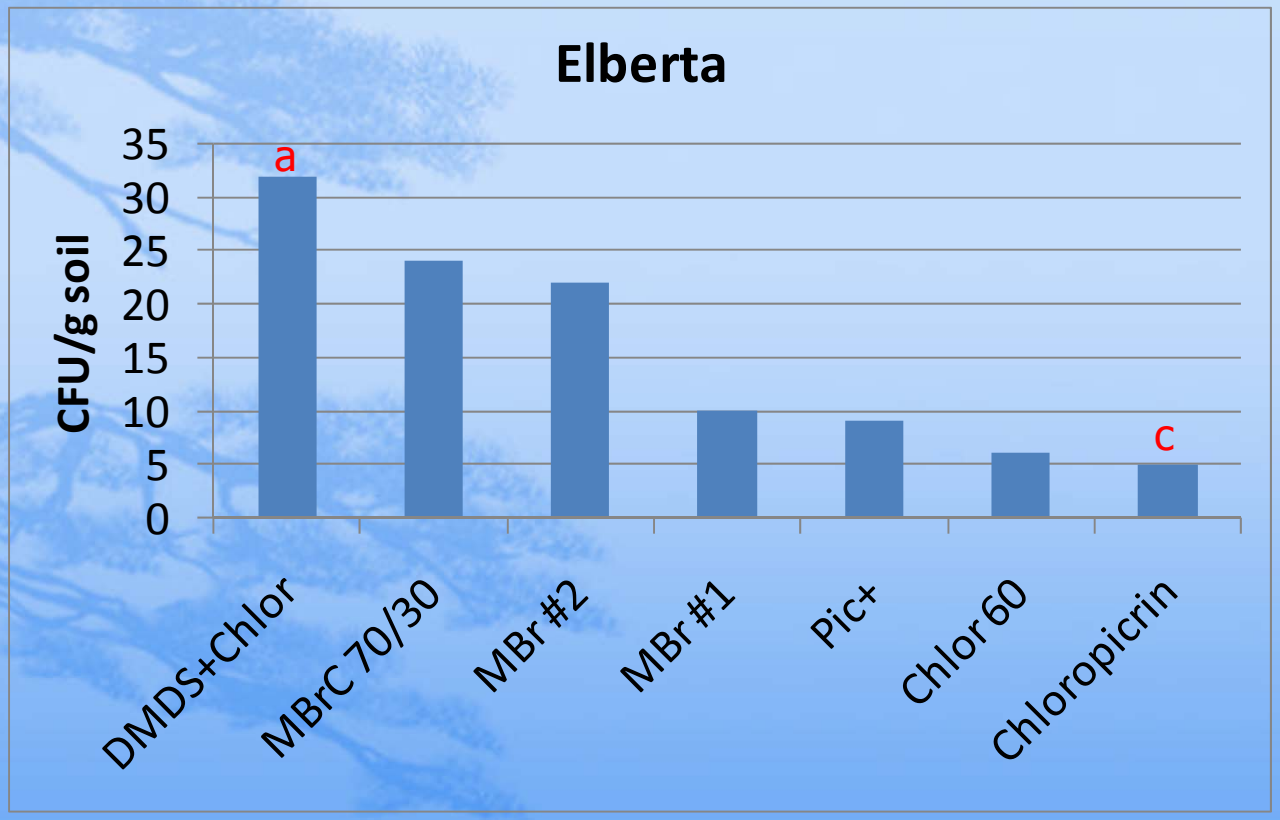
## Elberta, AL




S 7298A

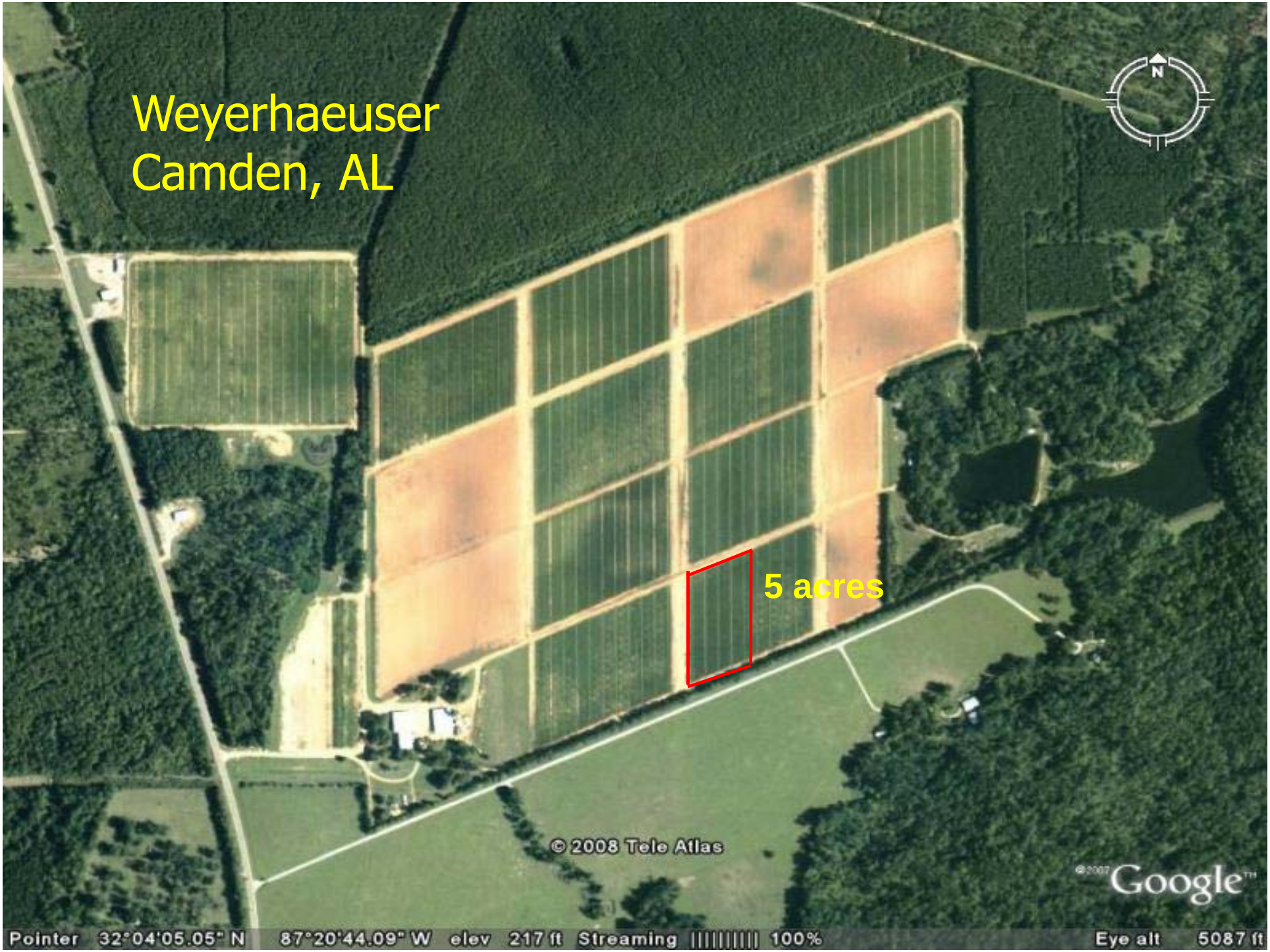
# *Trichoderma*

## 4 weeks after sowing



# 2009 Fumigants
# Camden, AL

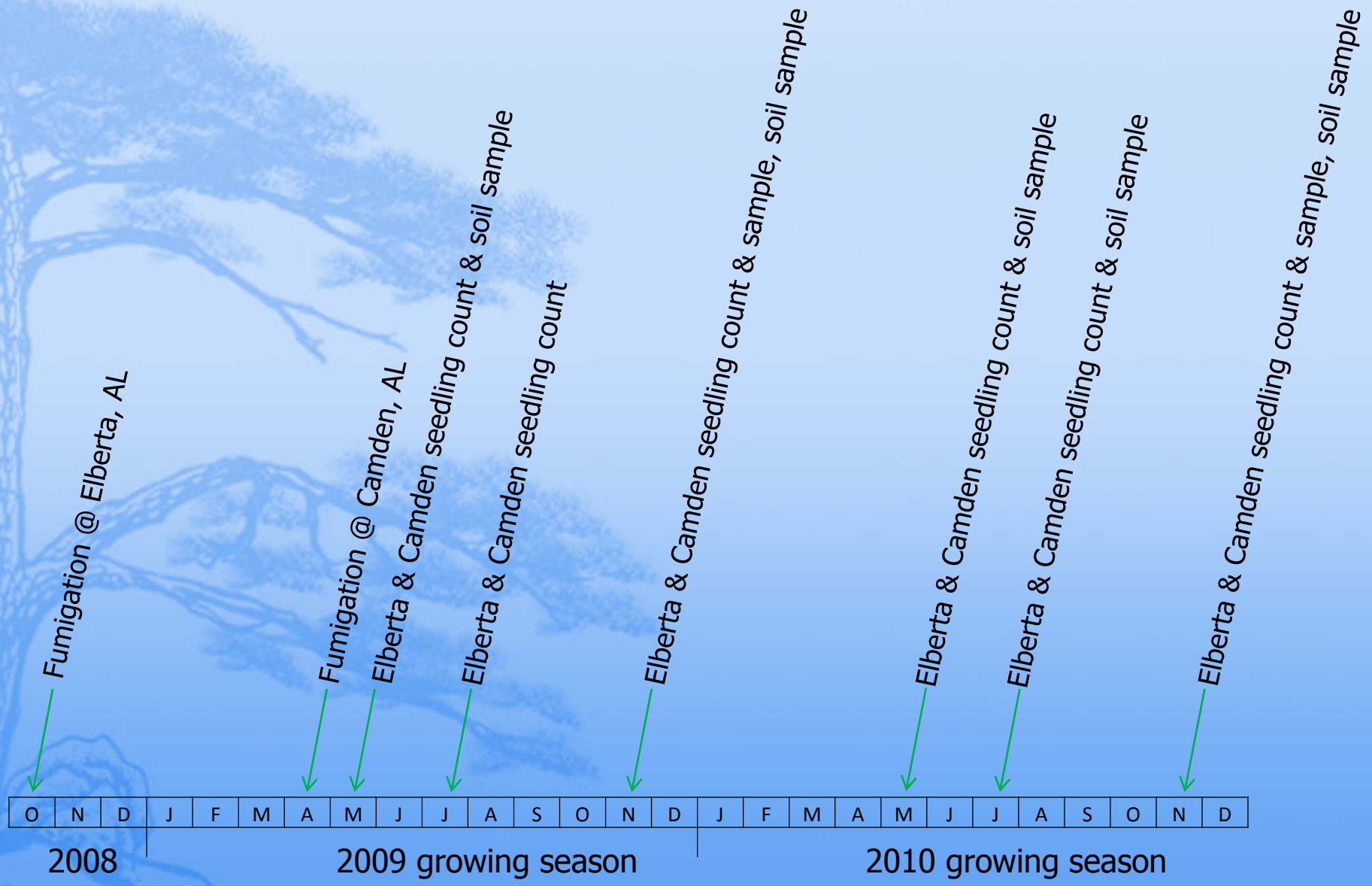
| Fumigant | Rate | Components |
|---|---|---|
| MBr | 350 lbs/acre | 67% MBr + 33% Chloropicrin |
| Chloropicrin | 300 lbs/acre | 100% Chloropicrin |
| MBrC 70/30 | 400 lbs/acre | 70% MBr (98/2) + 30% Solvent A |
| Chlor 60 | 400 lbs/acre | 60% Chloropicrin + 40% 1,3-D |
| Pic+ | 300 lbs/acre | 85%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


Weyerhaeuser
Camden, AL
5 acres
© 2008 Tele Atlas
Google
Pointer 32°04'05.05" N 87°20'44.09" W elev 217 ft Streaming 100%
Eye alt 5087 ft

# Seedling count

## Camden, AL

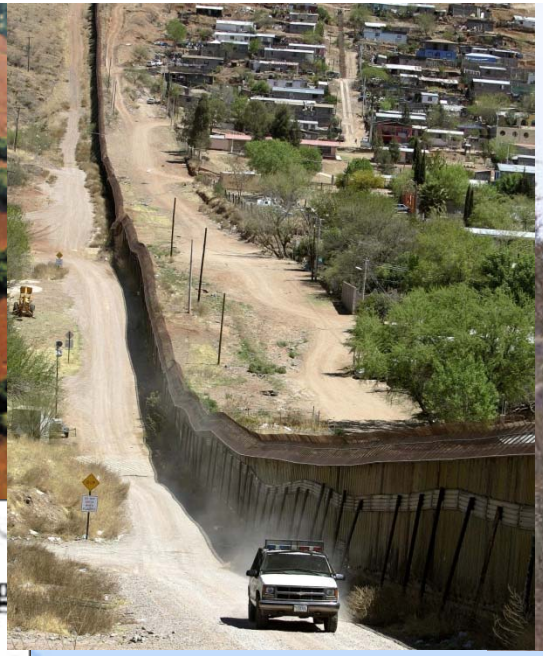
# Time Line of Area wide at Elberta & Camden, AL

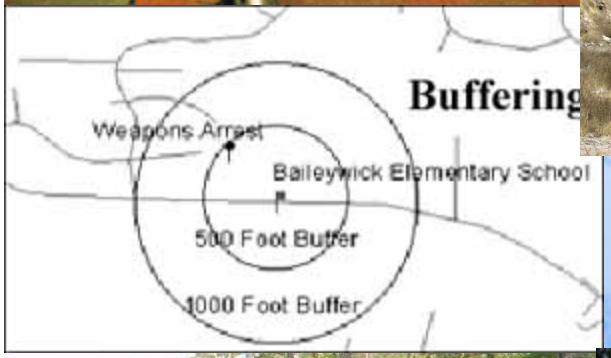


# Data to collect 2009

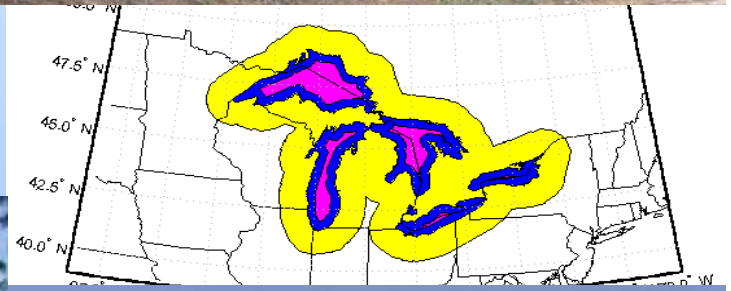
| Trenton, SC<br>Blenheim, SC<br>Elberta, AL<br>Camden, AL | 2009<br>Pre-sow | 2009<br>Post-sow | 2009<br>Summer | 2009<br>Fall |
|---|---|---|---|---|
| Nematode | √ | √ | √ | √ |
| Trichoderma | √ | √ | √ | √ |
| Seedling count | | √ | √ | √ |
| Seedling quality | | | | √ |
| Weed quantification | | √ | √ | |
| Root mass morphology | | | | √ |

**Red** = 2nd year data **Blue** = 1st year data




# What is a Buffer Zone?





# Buffer Zones
## (in feet for 10 acre field)

| | | Plastic – HD | | Plastic – VIF | |
|---|---|---|---|---|---|
| | | Soil Moisture | | Soil Moisture | |
| **Alternative** | **lbs ai** | **>75% FC** | **50-75% FC** | **> 75% FC** | **50-75% FC** |
| MBr 67/33 | 235 lbs/a | 359 | 359 | 144 | 144 |
| Chloropicrin | 300 lbs/a | 265 | 795 | 106 | 318 |
| Chlor 60 | 240 lbs/a | 194 | 583 | 78 | 233 |
| Pic+ | 255 lbs/a | 209 | 626 | 84 | 250 |
| DMDS+Chlor | 145 lbs/a | 34 | 10 | 14 | 40 |
| MI 98/2 | | --- | --- | 60 | 60 |
| MI 50/50 | | --- | --- | 50 | 50 |

# Methyl Iodide - Iodomethane

- **Midas: Two formulations and labels using 98/2 and 50/50 MI/Chloropicrin at 175 and 150 lbs/acre**
- **Licensed to ArystaLife Sciences, Cary NC.**
- **Sole distributor and applicator in the US.**
- **Attempted contacts over the years with ArystaLife Sciences have been unsuccessful.**
- **However, in November 2008:**
  - **Agreed to work with Forest Tree Nurseries to test material in Spring 2009.**
  - **Company re-organized and downsized in January 2009.**
  - **Nursery Cooperative tests in limbo; silence from ArystaLife Sciences**
  - **Two weeks prior to spring fumigation – Contact again was made.**
  - **A 1.2 acre trial at Weyerhaeuser's, Pine Hill Nursery in Camden, AL**
  - **2 Treatments, 98/2 and 50/50 under VIF**

# Methyl Iodide - Iodomethane

- Issues
  - Shipping – not licensed to transport fumigant
  - Application System – 11’ vs standard 13’ fumigation rig
  - Gluing VIF – can’t be too windy, too warm or too cold. A long-time fumigator told me that “plastic won’t stay down if it is hot and windy”.
  - Application Process – 5+ hrs to treat 1.2 acres
    - At this rate, 20 acres would take 80 hrs (10 days) to treat.
    - Application / injection issues.
    - Allow time for the glue to set before turning around.
    - Needed to “walk” the glue line.
    - Needed to seal areas with HD plastic by hand.
    - Tarp removal issues.
- First ever use of Iodomethane under VIF in a broadcast system in Forest Nurseries.


POLARIS

**Pine Hill, Alabama - Largest contiguous forest nursery use of Virtually Impervious Film (VIF) broadcast fumigation using Iodomethane (MI) in the World .**