

# Area-wide Demonstration of Methyl Bromide Alternatives: Forest Nurseries in the Southern US

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# South Carolina Summary

**Trichoderma levels:** unaffected by fumigant by end of 2<sup>nd</sup> year.

**Seedling density:** Trenton below target both years  
Blenheim - at or above target both years.

**Root morphology:** Trenton - increased between 1<sup>st</sup> & 2<sup>nd</sup> year, due to decreased density  
Blenheim - decreased between 1<sup>st</sup> & 2<sup>nd</sup> year.

**Root collar diameter:** end of 2<sup>nd</sup> year significant differences  
Trenton - unfumigated smallest & MBrC 70/30 largest  
Blenheim - MBr 235 lbs/acre smallest & DMDS+Chlor largest.

**Seedling grade:** more Grade 2 seedlings 1<sup>st</sup> & 2<sup>nd</sup> year.

# 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 Broadcast/flat tarp	Shank injected 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 Red Bay fine sandy loam	Lenoir silt loam
Plastic in place	9 days	14 days





4 acres

Joshua Timberlands,  
Elberta, AL

Image © 2008 DigitalGlobe

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Pointer 30°27'11.27" N 87°31'11.21" W elev 59 ft Streaming 100%

Eye alt 5249 ft

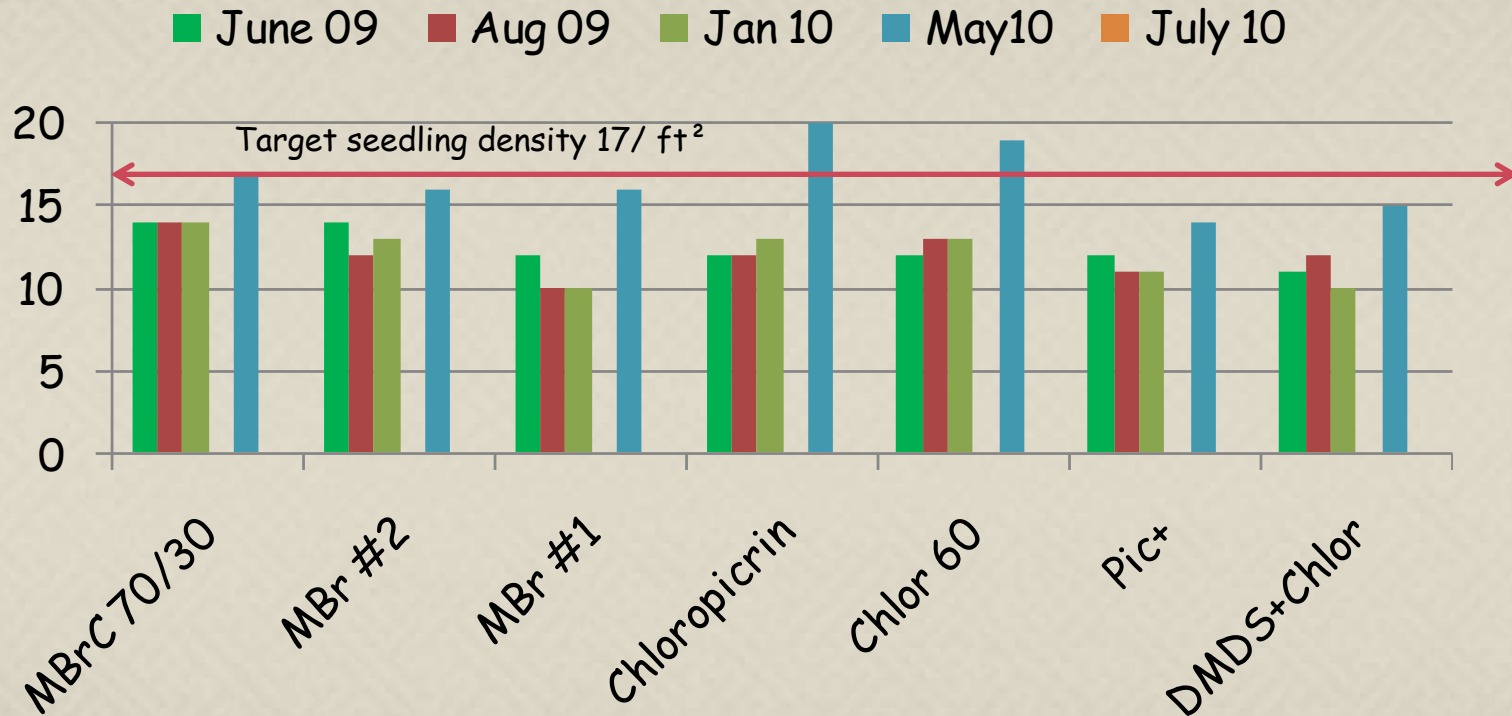
# 2009 Fumigants

## 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

# Seedling count

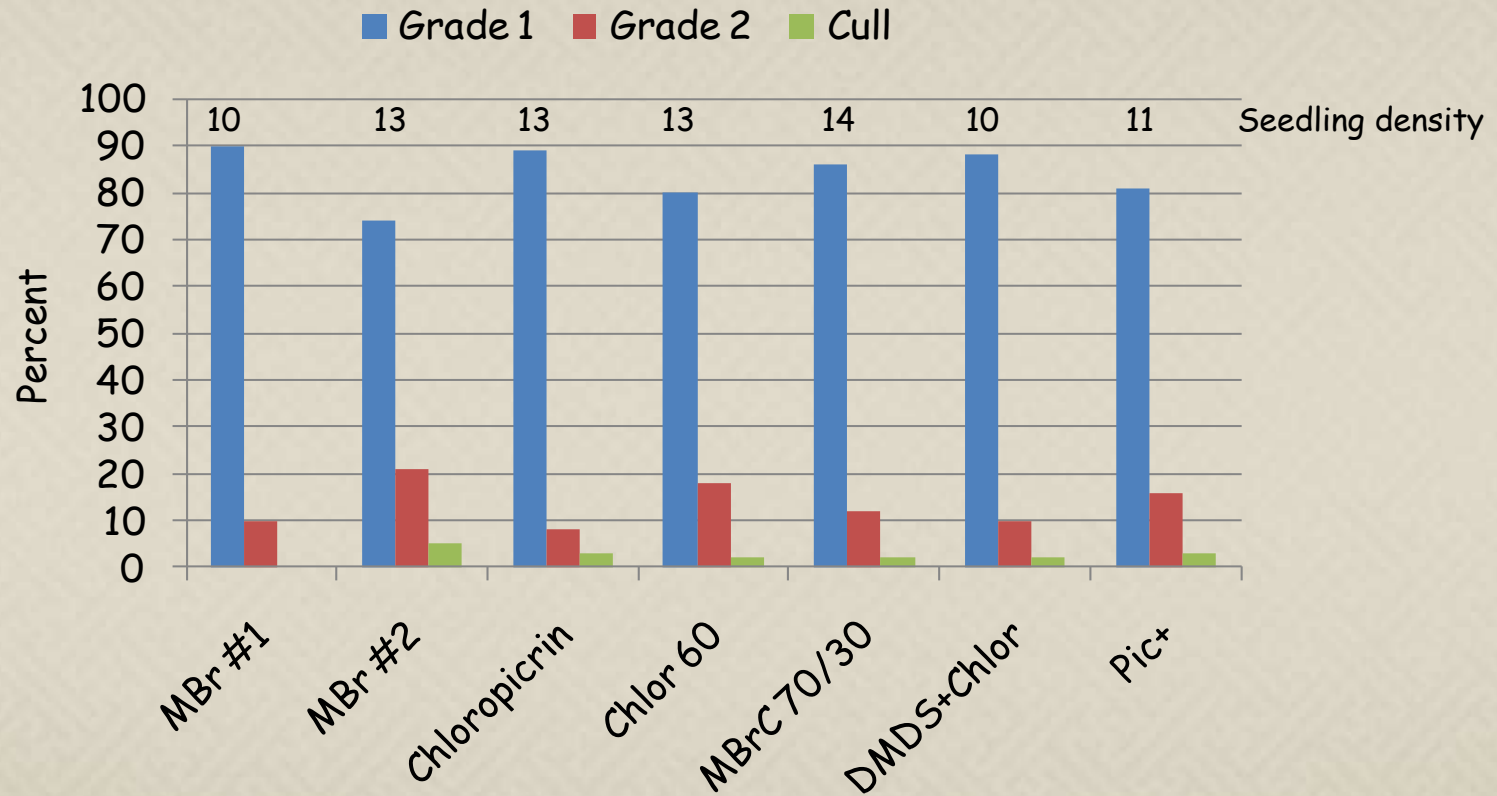
## Elberta, AL





# 2009 Seedling Grade

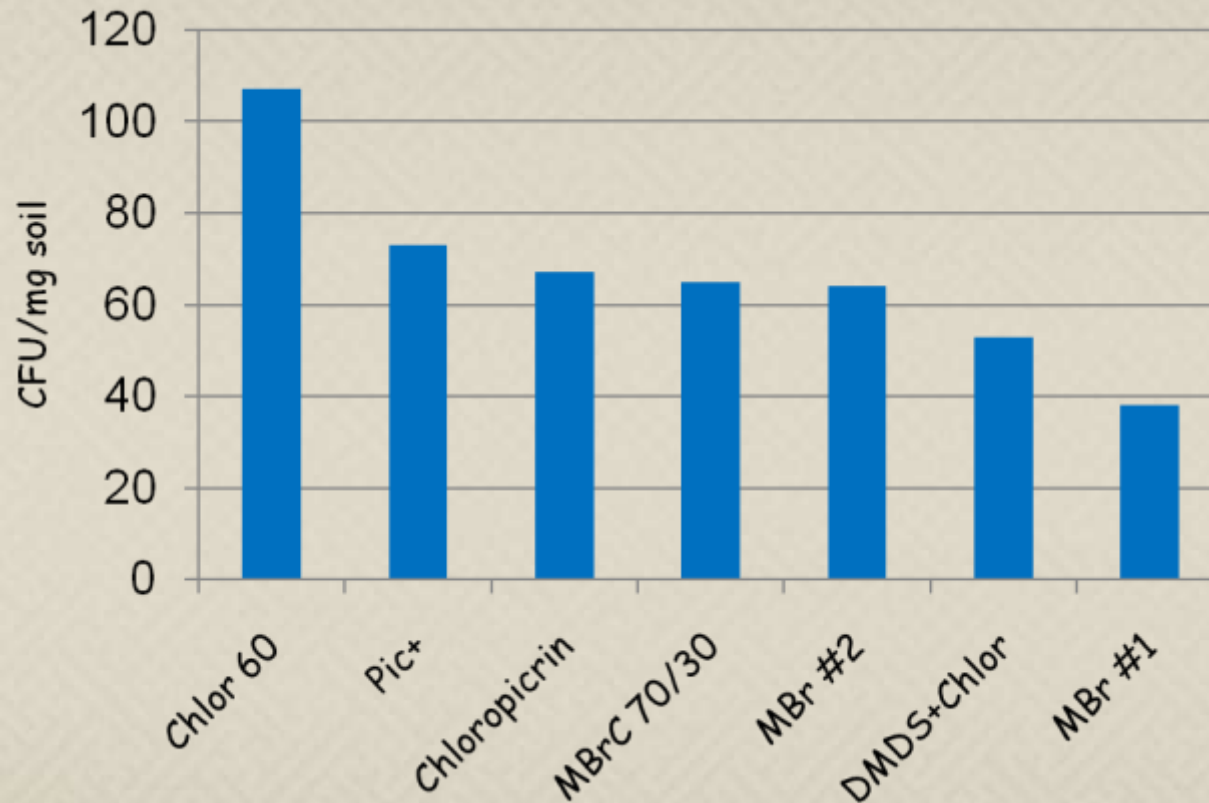
## Elberta, AL





# 2009 *Trichoderma*

Elberta, AL



# Weyerhaeuser Camden, AL



5 acres

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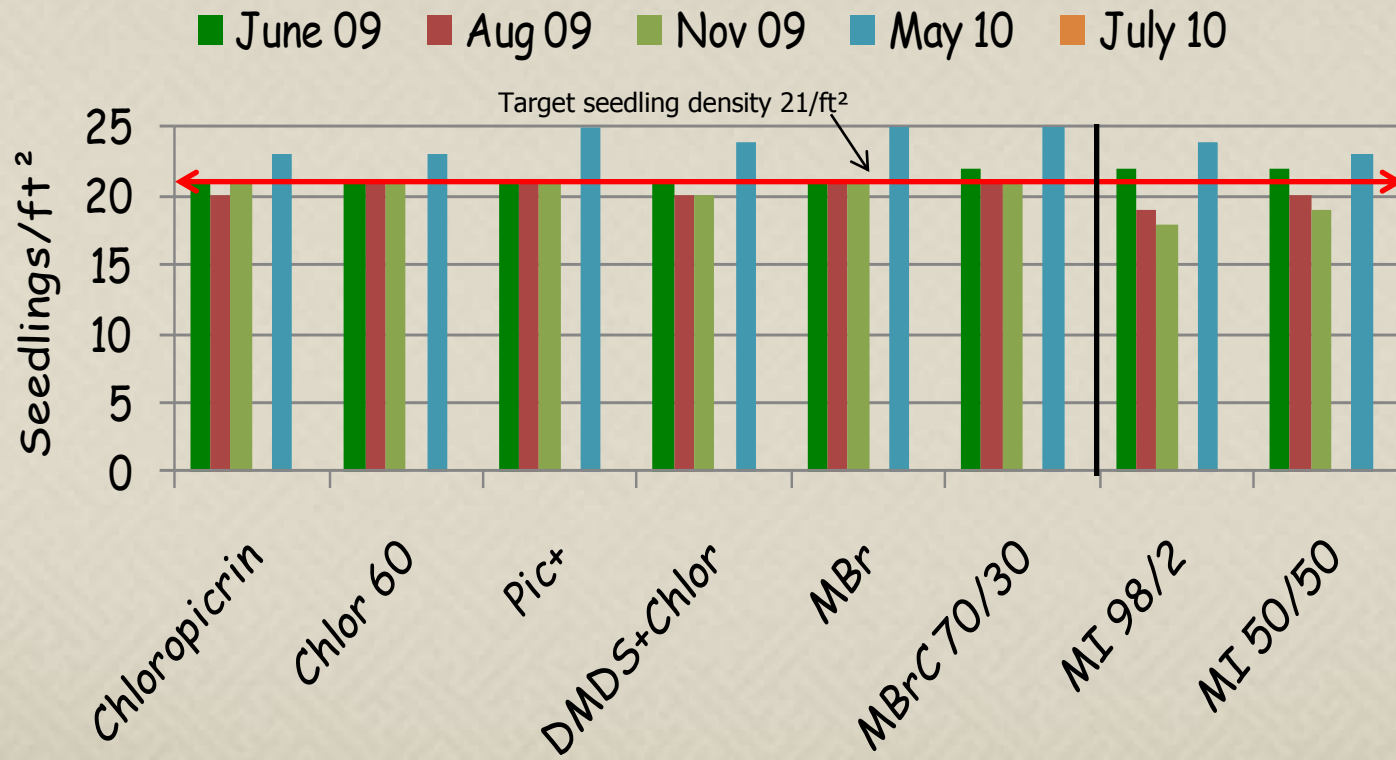
# 2009 Fumigants

## 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

# Seedling count

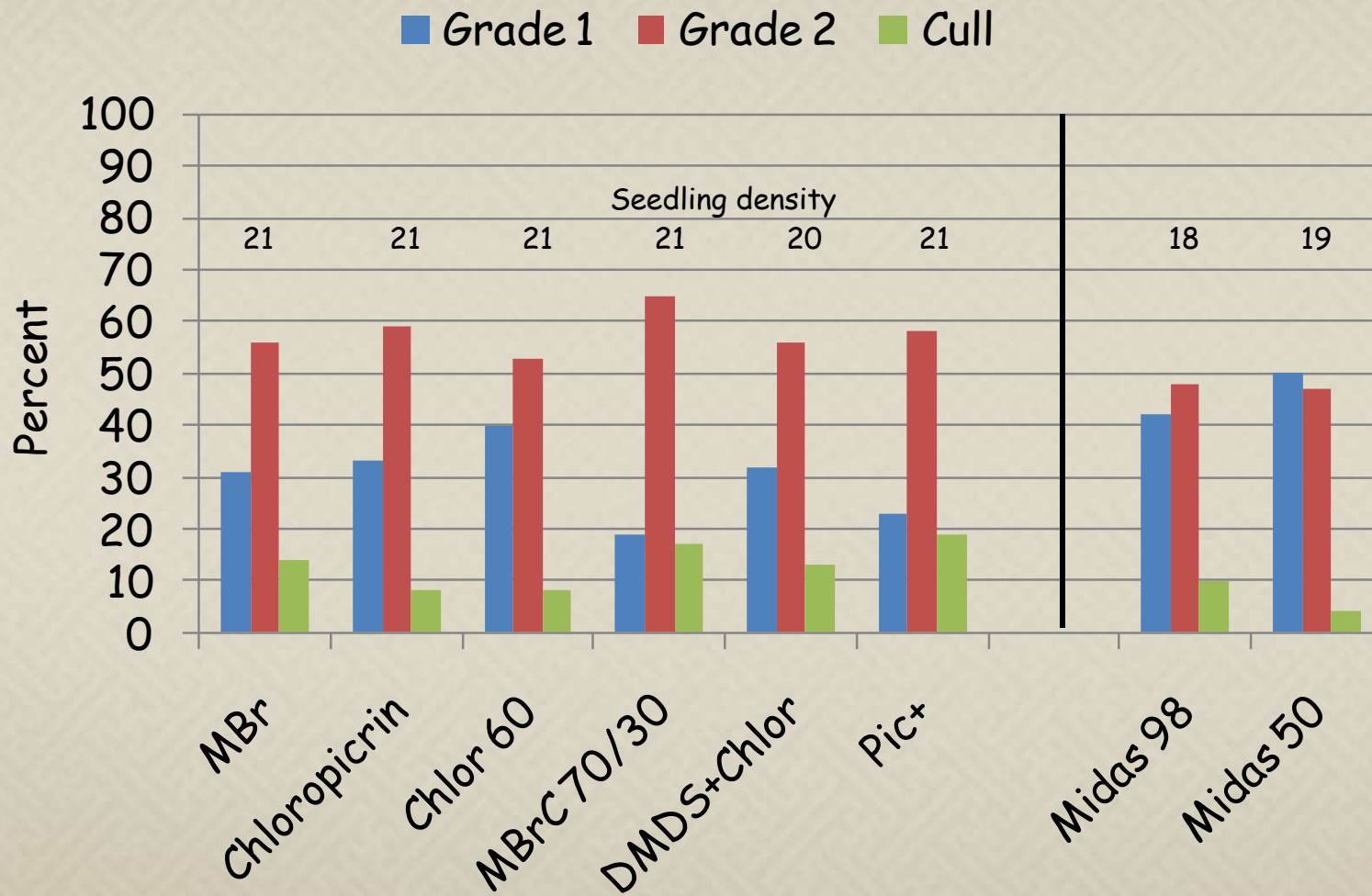
## Camden, AL





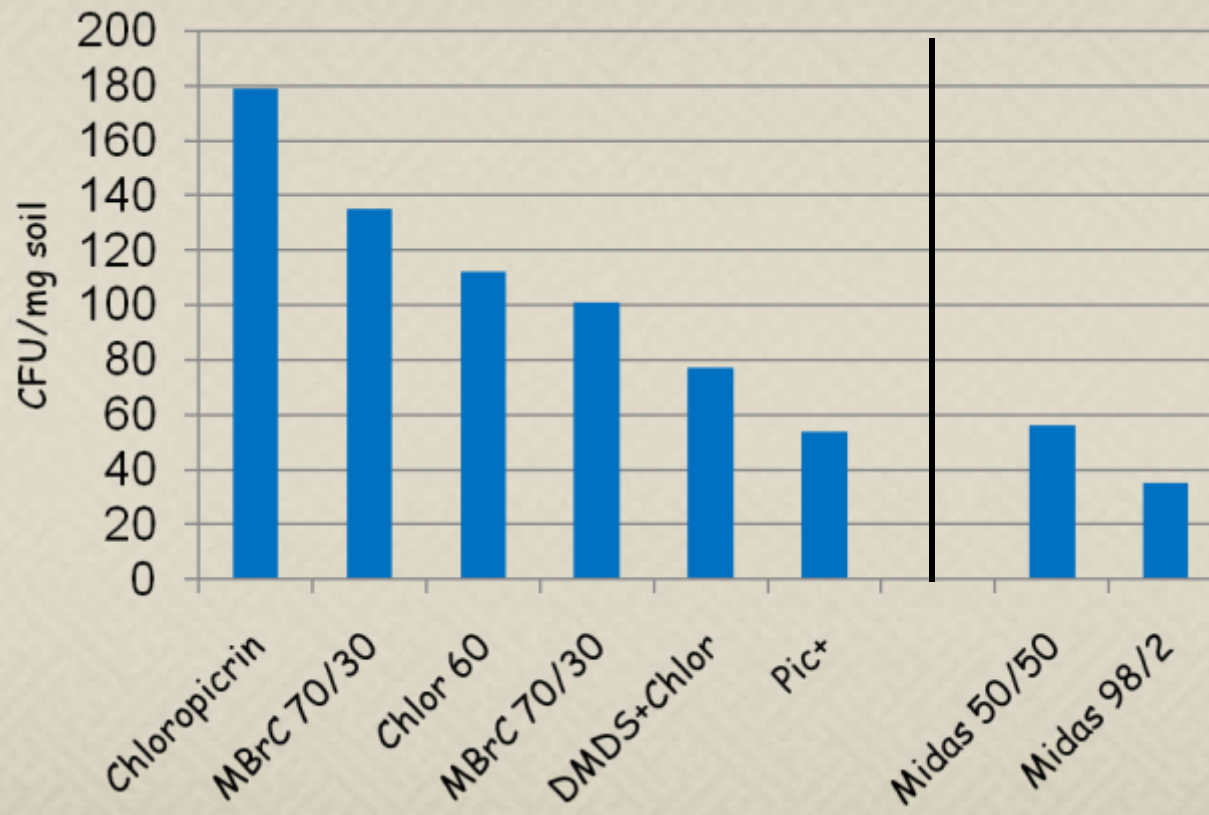
# 2009 Seedling Grade

## Camden, AL



# 2009 *Trichoderma*

## Camden, AL



# Research Cooperators for 2010

Steve Godbehere & Chad Hutchinson, Hendrix & Dail

Kelly Dougherty, Rayonier , Glennville, GA

Ralph Bower, Weyerhaeuser, Camden, AL

John Mirusso, Mirusso Enterprises Inc, Delray Bch, FL

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

# Trial information

	Glennville, GA	Camden, AL
Fumigation	October 22, 2009	March 23, 2010
Fumigation type	No-till coulter injected Broadcast/flat tarp	No-till coulter injected & shank injected with beaver tails & hot glue Broadcast/flat tarp
Area in trial	4.6 acres	8 acres
Air temperature range	62 - 81°F	55 - 73°F
Wind speed	0 - 9 mph	0 - 10 mph
Soil moisture	7.8%	7.8%
Soil series	Tifton loamy sand	Lenoir silt loam
Plastic in place	10 days	10 days
Plastic	LDPE & VIF	HDPE & TIF



Rayonier  
Glennville, GA

4.6 acres

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1368 ft

Pointer lat 31.905616° lon -81.943574° elev 154 ft Streaming 100%

Eye all 4874 ft











Cultivated (tilled) soil surface prep

Rolled soil surface prep



# 2010 Fumigants

## Glennville, GA

Fumigant	Rate	Component	Plastic
Chlor 60	200 lbs/acre	60% Chloropicrin + 40% 1,3-D	LDPE
	100 lbs/acre		VIF
Chloropicrin	200 lbs/acre	100% Chloropicrin	LDPE
	100 lbs/acre		VIF
Pic+	200 lbs/acre	85% Chloropicrin	LDPE
	100 lbs/acre		VIF

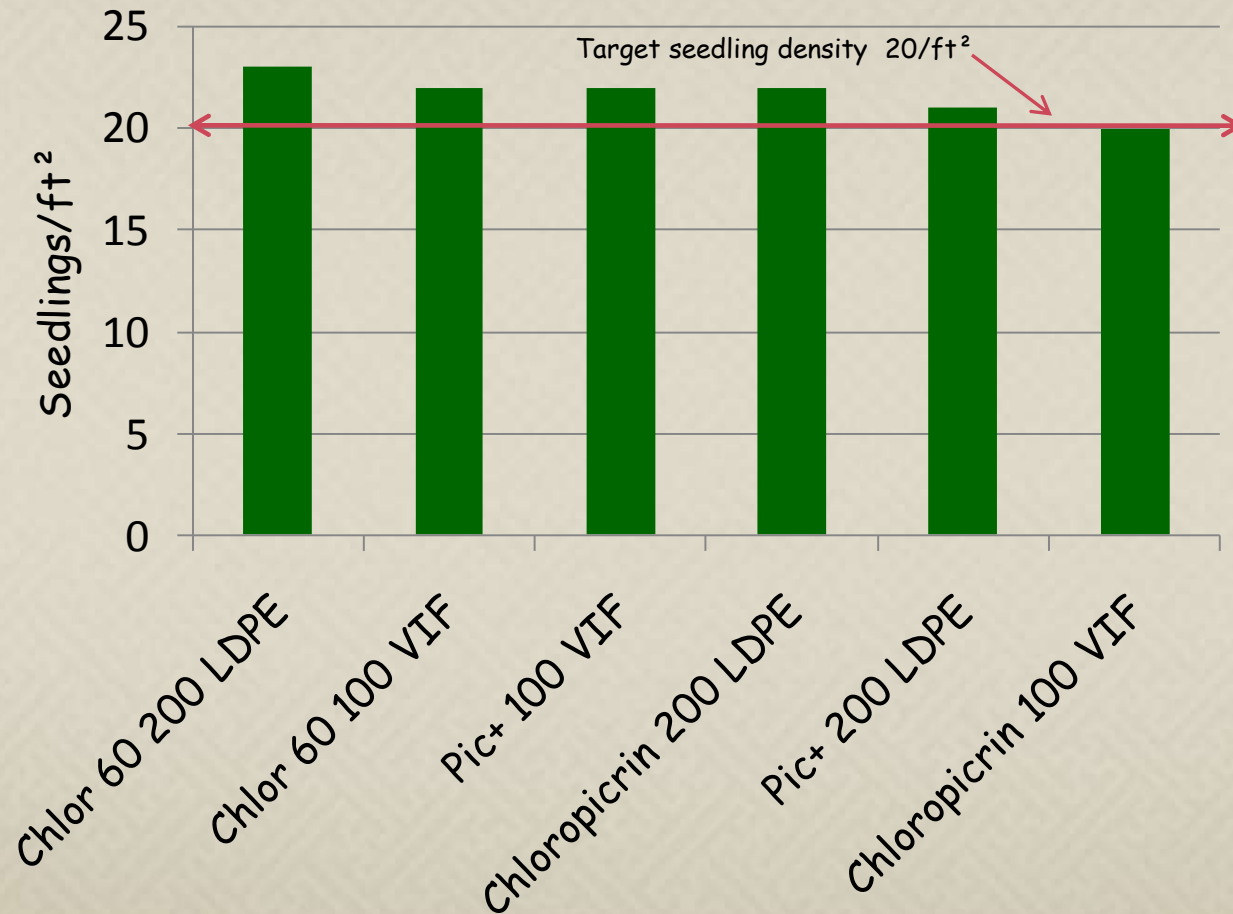
Office		cypruses		
Nursery road	REP 1	L	V	REP 3
		V	L	
		V	L	
		L	V	
		L	V	
		V	L	
	REP 2	L	V	REP 4
		V	L	
		V	L	
		L	V	
		L	V	
		V	L	

	Chlor 60 200 LDPE
	Pic+ 200 LDPE
	Chloropicrin 200 LDPE
	Chlor 60 100 VIF
	Pic+ 100 VIF
	Chloropicrin 100 VIF

# Seedling count

Glennville, GA

7 weeks post-sowing





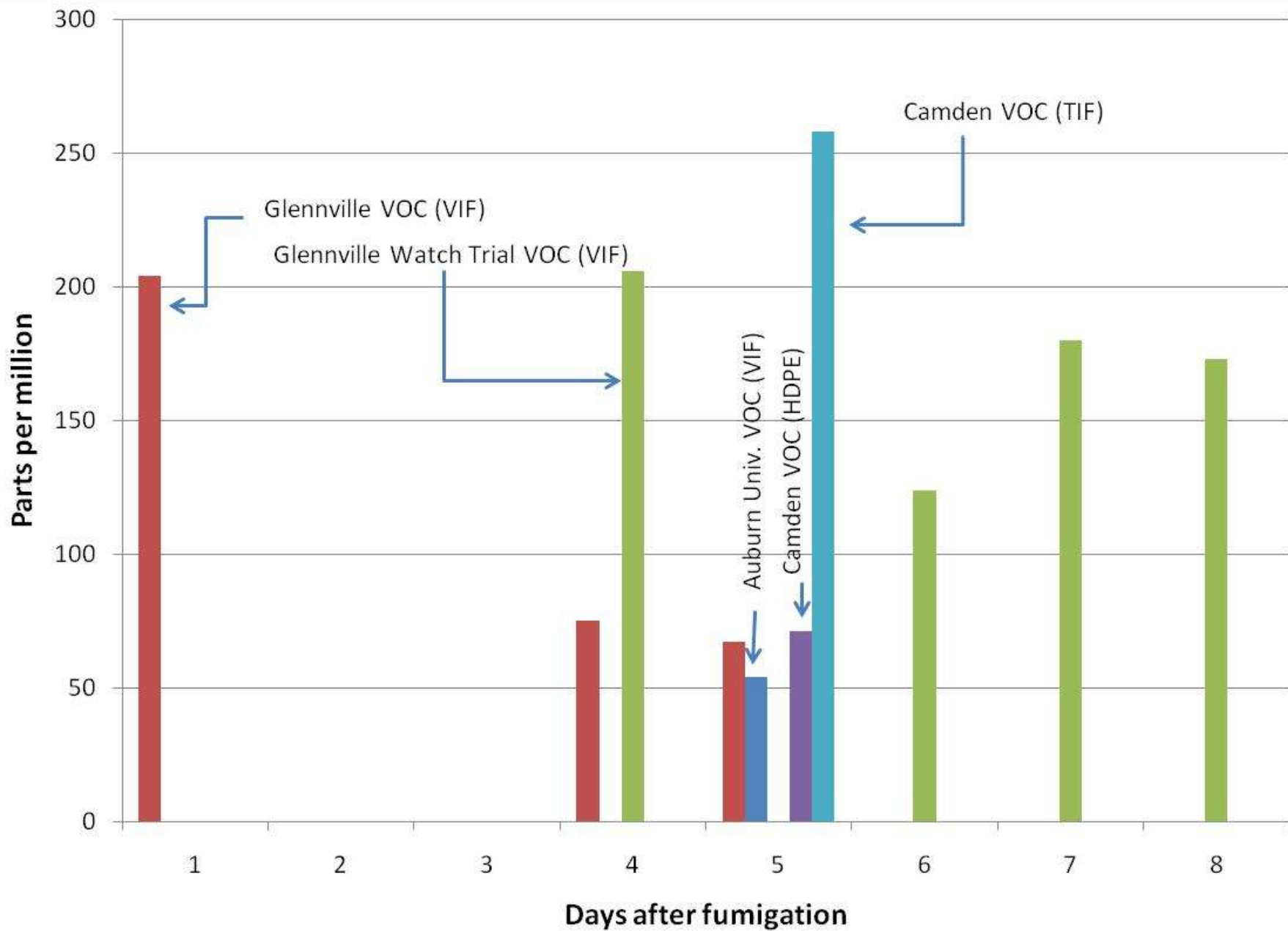
Houston,  
We've got  
a problem





# Nematodes @ Glennville following fumigation

Treatment	Plastic	Rep 1	Rep 2	Rep 3	Rep 4
Chlor 60 100	VIF	stunt 334 (VH)	stunt 88 (H)	stunt 172 (VH)	stunt 66 (M)
Chlor 60 200	LDPE	stunt 54 (M)	stunt 434 (VH)	stunt 24 (L)	stunt 242 (VH)
Chloropicrin 100	VIF	stunt 174 (VH)	0	stunt 112 (H)	stunt 136 (H)
Chloropicrin 200	LDPE	stunt 58 (M)	0	stunt 118 (H)	stunt 4 (T)
Pic+ 100	VIF	stunt 108 (H)	stunt 4 (T) stubby root 6 (T)	stunt 132 (H) stubby root 2 (T)	stunt 152 (VH)
Pic+ 200	LDPE	stunt 72 (M)	stunt 4 (T)	stunt 254 (VH)	stunt 394 (VH) stubby root 4 (T)



# Possible reasons for lack of efficacy using Low Impact Rig at Glennville

- Low rate of fumigant used (100 lbs/a)
- Fumigant not injected deep enough
- Soil moisture too high for Telone to allow movement through soil
- Compaction (rolling) of soil may have prevented gas movement



8 acres

Weyerhaeuser  
Camden, AL



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Pointer 32°04'04.39" N 87°20'41.01" W elev 227 ft

Streaming ||||| 100%

Eye alt 4600 ft









# 2010 Fumigants

## Camden, AL

Fumigant	Rate	Component	Plastic
Chlor 60	250 lbs/acre	60% Chloropicrin + 40% 1,3-D	TIF
	150 lbs/acre		
Chloropicrin	250 lbs/acre	100% Chloropicrin	TIF
	150 lbs/acre		
MBr	250 lbs/acre	80% MBr + 20% Chloropicrin	TIF
	150 lbs/acre		
Pic+	250 lbs/acre	85% Chloropicrin + 15% Solvent A	TIF
	150 lbs/acre		
Chlor 60	250 lbs/acre	60% Chloropicrin + 40% 1,3-D	HDPE
	150 lbs/acre		



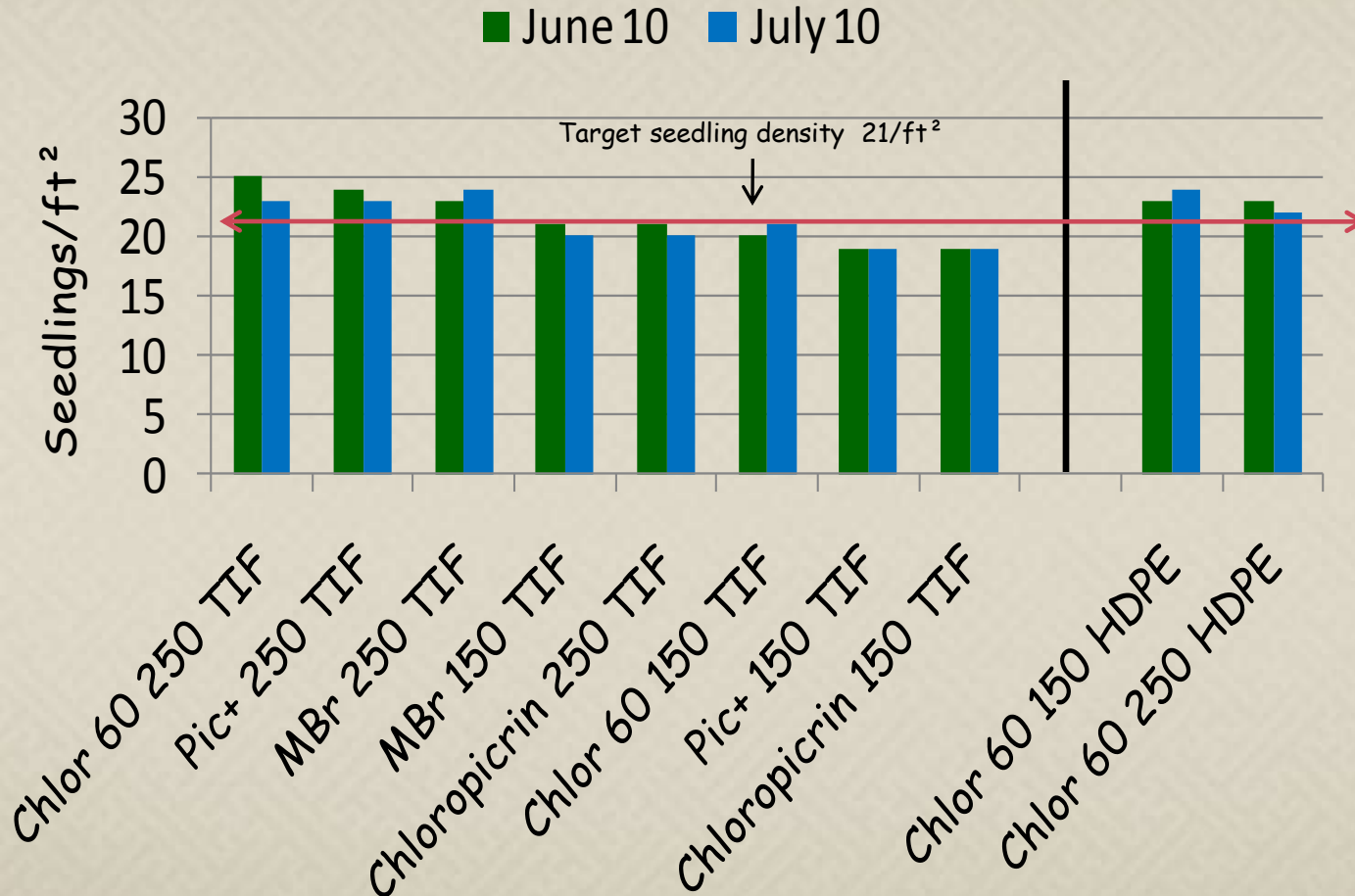
Office

Nursery road		350 MBr HDPE		350 MBr HDPE	HDPE	- TIF Tarps - Trees
	REP 1	250 Chlor 60		250 Pic +	REP 3	
		250 Chloropicrin		150 MBr		
		250 MBr		150 Chlor 60		
		250 Pic +		150 Chloropicrin		
		150 Chlor 60		150 Pic +		
		150 Chloropicrin		250 Chlor 60		
		150 MBr		250 MBr		
		150 Pic +		250 Chloropicrin		
		REP 2	150 Chlor 60			
	250 Chloropicrin			250 MBr		
	150 MBr			250 Chlor 60		
	250 Pic +			150 Pic +		
	250 Chlor 60			150 Chlor 60		
	150 Pic +			150 MBr		
	150 Chloropicrin			250 Chloropicrin		
	250 MBr			250 Pic +		
	REP 1	150 Chlor 60 HDPE		250 Chlor 60 HDPE	REP 3	
		250 Chlor 60 HDPE		150 Chlor 60 HDPE	REP 4 HDPE	
	REP 2	150 Chlor 60 HDPE		250 Chlor 60 HDPE		
		250 Chlor 60 HDPE		150 Chlor 60 HDPE		
			350 MBr HDPE		350 MBr HDPE	

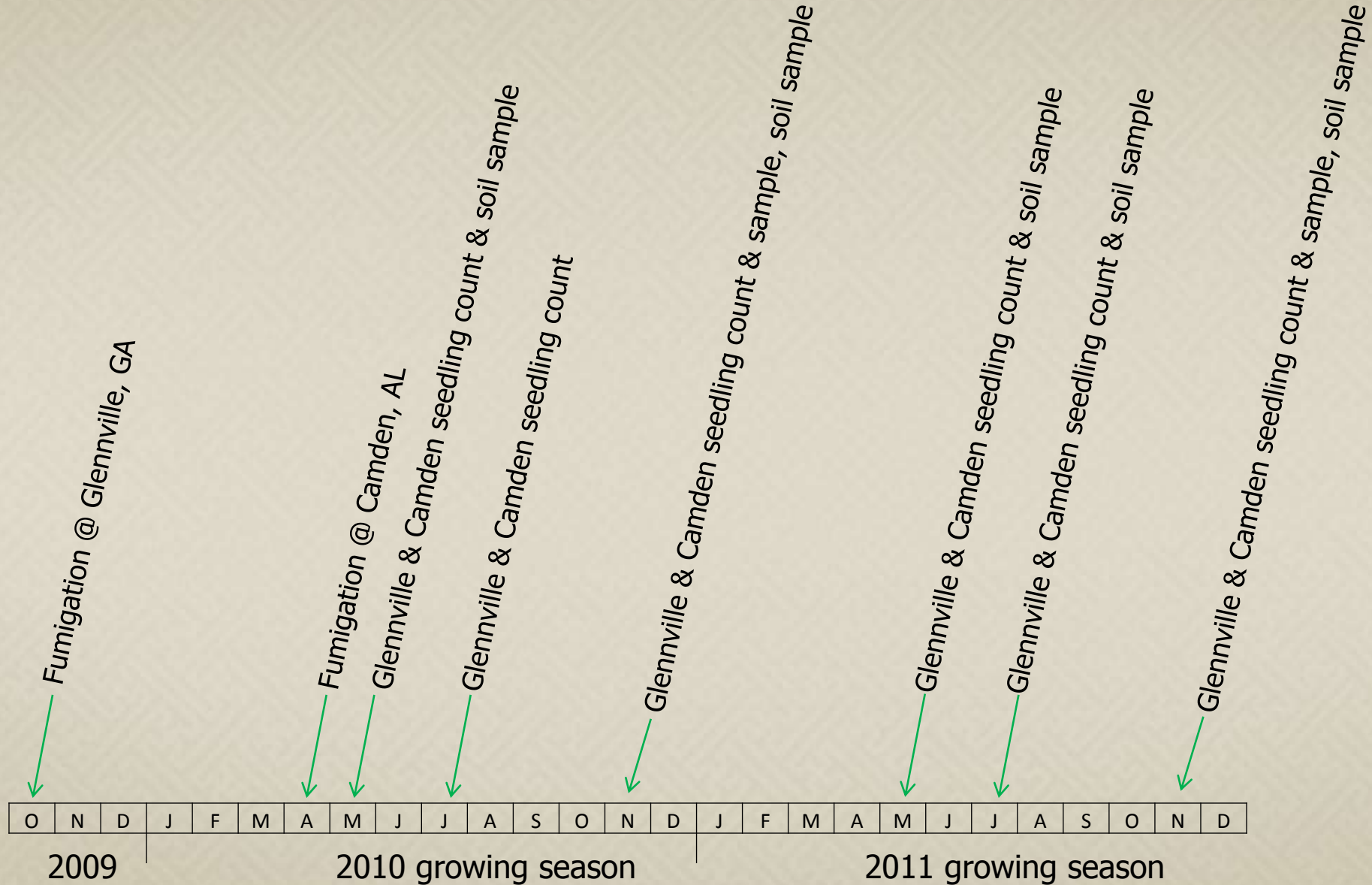


# Seedling count

## Camden, AL



# Time Line of Area wide at Glennville, GA & Camden, AL



# Data to collect 2010

Glennville, GA Camden, AL Elberta, AL Camden, AL	2009/10 Pre-sow	2010 Post-sow	2010 Summer	2010 Fall
Nematode	✓	✓	✓	✓
Trichoderma	✓	✓		✓
Seedling count		✓	✓	✓
Seedling quality				✓
Root mass morphology				✓

Red = 2<sup>nd</sup> year data    Blue = 1<sup>st</sup> year data



