Weed Control in Nurseries

Auburn University
Nursery Cooperative
July 13, 2013
Scott Enebak

http://www.foresthistory.org/ASPNET/Publications/region/8/stuart_nursery/contents.htm

2012 Herbicide Trials

- **Annual Sedge Trial**
  - Weyerhaeuser, Quail Ridge Nursery, Aiken, SC
- **Nutsedge Control with Matrix**
  - Georgia Forestry Commission, Flint River Nursery, Byromville, GA
- **Morningglory Trial**
  - East Tennessee State Nursery, Delano, TN
  - Native Forest Nursery, Chatsworth, GA
- **Pendulum Hardwood Seed Size Trial**
  - Arborgen, Supertree Nursery, Shellman, GA
  - Native Forest Nursery, Chatsworth, GA
- **Pendulum Loblolly Trial**
  - Native Forest Nursery, Chatsworth, GA
  - Arborgen, Supertree Nursery, Shellman, GA
  - Weyerhaeuser, Quail Ridge Nursery, Aiken, SC

Annual Sedge Trial

- 2012 growing season
- Quail Ridge Nursery, Aiken, SC
- Five Herbicides
  - Certainty®
    - (75% sulfosulfuron)
  - Cobra®
    - (24% lactofen)
  - Goal® 2XL
    - (22.3% oxyfluorfen)
  - Pendulum® AquaCap
    - (38.7% pendimethalin)
  - Ronstar® Flo
    - (34.1% oxadiazon)

Annual Sedge Trial

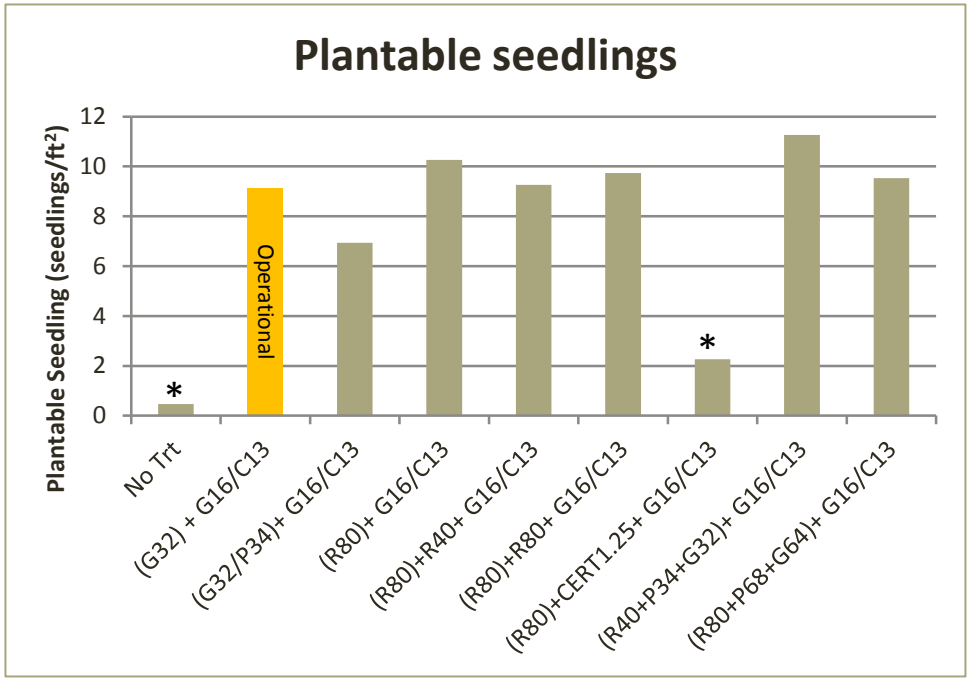
- Nine Treatments

1. Control – No treatment
2. (Goal 32) + Goal 16/Cobra 13
3. (Goal 32 + PAC 34) + Goal 16/Cobra 13
4. (Ronstar 80) + Goal 16/Cobra 13
5. (Ronstar 80) + Ronstar 40 + Goal 16/Cobra 13
6. (Ronstar 80) + Ronstar 80 + Goal 16/Cobra 13
7. (Ronstar 80) + Certainty 1.25 + Goal 16/Cobra 13
8. (Ronstar 40 + PAC 34 + Goal 32) + Goal 16/Cobra 13
9. (Ronstar 80 + PAC 68 + Goal 64) + Goal 16/Cobra 13

Note: (PRE) and POST

Annual Sedge Trial

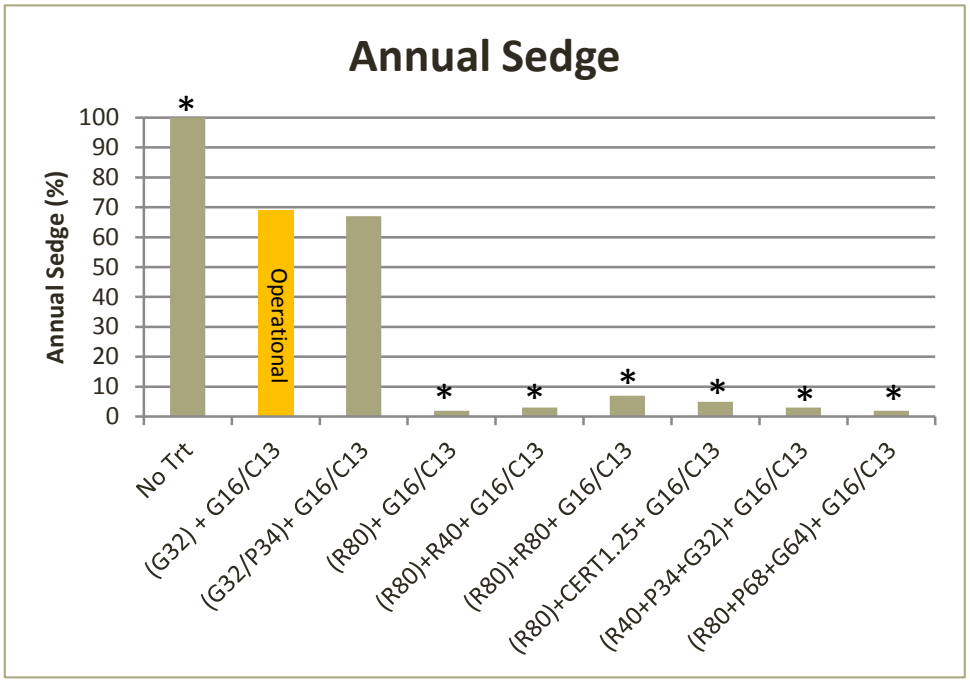
- RESULTS
  - Plantable seedlings compared to the Operational Treatment of Goal and Cobra



  - Example: **Operational** (G32) + G16/C13 means 32 oz. of Goal PRE and 16 oz. Goal, 13 oz. Cobra, 16 oz. Goal, 13 oz. Cobra POST throughout growing season
  - NOTE: All treatments are compared to the Operational treatment

Annual Sedge Trial

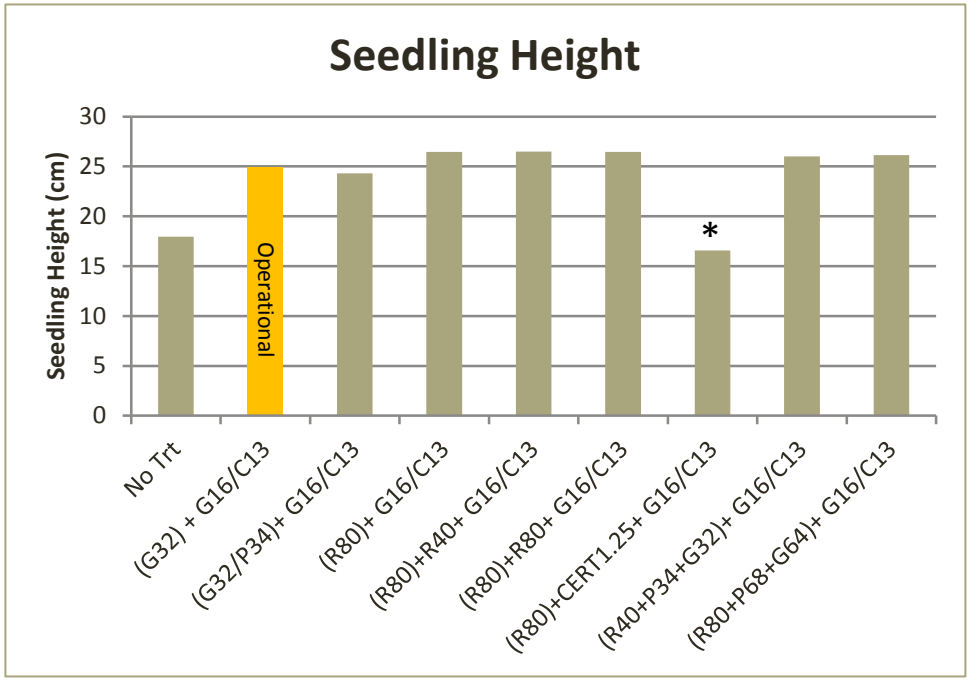
- Presence of annual sedge by treatment October 2012



- Preemergence herb. applied April 27,2012
- Photographs taken May 4, 2012

Annual Sedge Trial

- Seedlings Height by herbicide treatment



Annual Sedge Trial

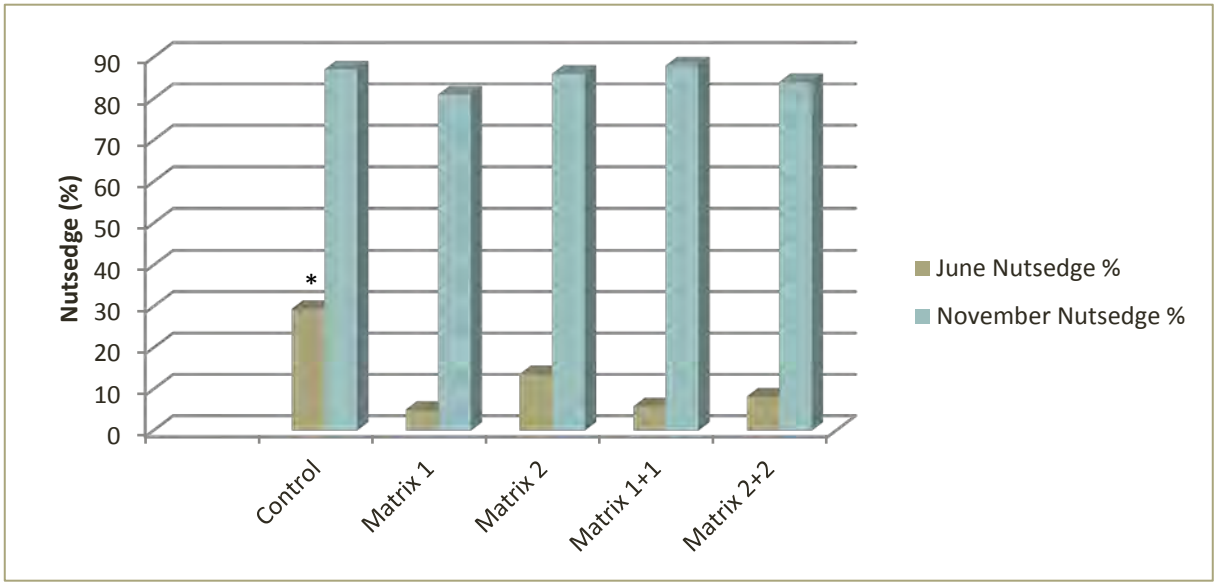
- Conclusions
  - All TRTS compared to Operational Trt
  - TRTS with Ronstar Flo PRE controlled annual sedge populations during growing season
  - Seedlings height and number of plantable seedlings were negatively influenced by postemergence applications of Certainty
  - Testing of Ronstar Flo continued into 2013…

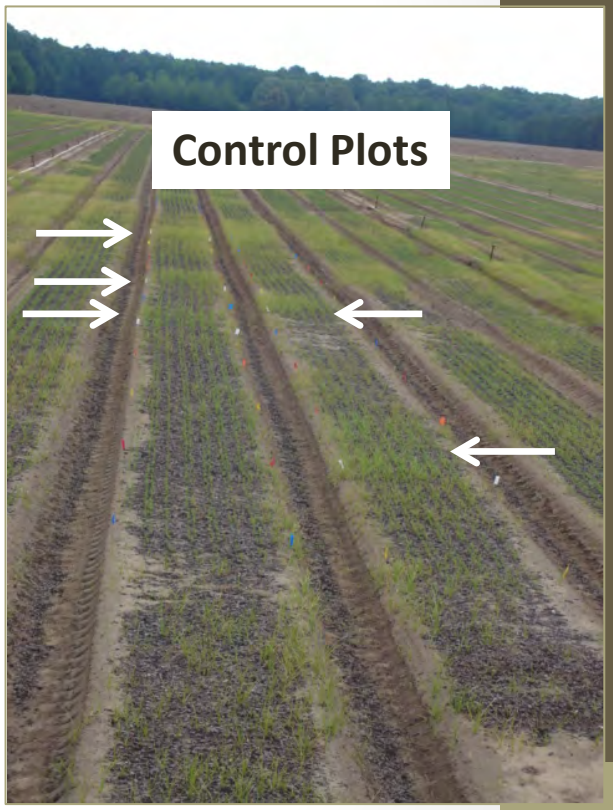
Nutsedge Control with Matrix

- 2012 growing season
- Georgia Forestry Commission, Flint River Nursery, Byromville, GA
- Matrix® (25% rimsulfuron)…4 postemergence treatments
  - May 22, 2012
    - 1.0 oz/ac
    - 2.0 oz/ac
  - May 22, 2012 + June 5, 2012
    - 1.0 oz/ac + 1.0 oz/ac (two weeks following first application)
    - 2.0 oz/ac + 2.0 oz/ac (two weeks following first application)
- The first application of Matrix occurred *before* nutsedge was greater than 4 inches tall

Nutsedge Control with Matrix

- Nutsedge presence in June and November 2012





- Note nutsedge presence in control plots (white flags/white arrows) in photo from June 5, 2012, two weeks after first Matrix application

Nutsedge Control with Matrix

- RESULTS and CONCLUSIONS
  - Matrix at 1, 2, and 1+1 oz/ac and was not detrimental to seedling quality as there was no difference in seedlings density, plantable seedlings, RCD, height, root weight, shoot weight, or root weight ratio
  - Matrix at 2+2 oz/ac did result in more culls and stunted seedlings
  - While there was some nutsedge control two weeks after the application of Matrix at 1 and 2 oz/ac rate, the control did not last for the entirety of the growing season
  - Nursery Cooperative does not recommend Matrix as a viable solution for nutsedge control when applied at 3 or 5 weeks post sow
  - South and Hill (2010) also observed Matrix to stunt seedlings at 6 and 12 weeks post sow

Morningglory Trial

- 2012 growing season
- East Tennessee State Nursery, Delano, TN
  - Swamp chestnut oak*, water oak, willow oak
- Native Forest Nursery, Chatsworth, GA
  - Hazelnut, common persimmon*, plum
- Postemergence Herbicide Applications
- 3 Herbicides, 6 rates
  - Pendulum® AquaCap (38.7% pendimethalin)
    - 34 and 68 oz/ac
  - Dismiss® (39.6% sulfentrazone)
    - 4 and 8 oz/ac
  - Broadstar® (0.25% flumioxazin)
    - 100 and 200 lbs/ac
    - *Applied to swamp chestnut oak and common persimmon

Morningglory Trial

- Species exhibiting tolerance to Pendulum® AquaCap, Dismiss®, and Broadstar®:
  - Common persimmon
  - Hazelnut
  - Swamp chestnut oak
  - Water oak

- Species not tolerant to Pendulum® AquaCap, Dismiss®, and Broadstar® :
  - Plum
  - Willow oak

Morningglory Trial

- No significant differences for:
  - Common persimmon
  - Hazelnut
  - Swamp chestnut oak
  - Water oak

Morningglory Trial

- BUT…Significant differences for
  - Plum
    - Dismiss® at 8 oz/ac reduced seedling density, increased culls, and decreased plantable seedlings in plum

Table 1a. Herbicide treatment effects on plum density, quality, and growth.													
Species	TRT	DENSITY		CULLS		PLANT		RCD		HT		SHOOT WT	
		seedlings/ft^2		seedlings/ft^2		seedlings/ft^2		mm		cm		grams	
Plum	Control	7.15	a	0.9	b	6.25	a	6.239	a	44.446	a	6.536	a
(Chat.)	PAC34	5.65	a b	0.65	b	5	a	6.6332	a	43.259	a	7.303	a
	PAC68	5.1	a b	0.45	b	4.65	a	6.5472	a	43.646	a	7.374	a
	DIS4	5.05	a b	0.75	b	4.3	a	6.7913	a	44.375	a	7.831	a
	DIS8	3	b	1.8	a	1.2	b	6.477	a	48.644	a	6.071	a
	(LSD)	(2.51)		(0.80)		(2.09)		(1.12)		(5.12)		(3.11)	
	----------P > F----------												
	Treatment	0.0429		0.0216		0.0016		0.8731		0.2211		0.7604	

Morningglory Trial

- AND…Significant differences for
  - Willow oak
    - Pendulum® AquaCap applied at 68 oz/ac increased plantable seedlings compared to the Control and Dismiss® at 8 oz/ac

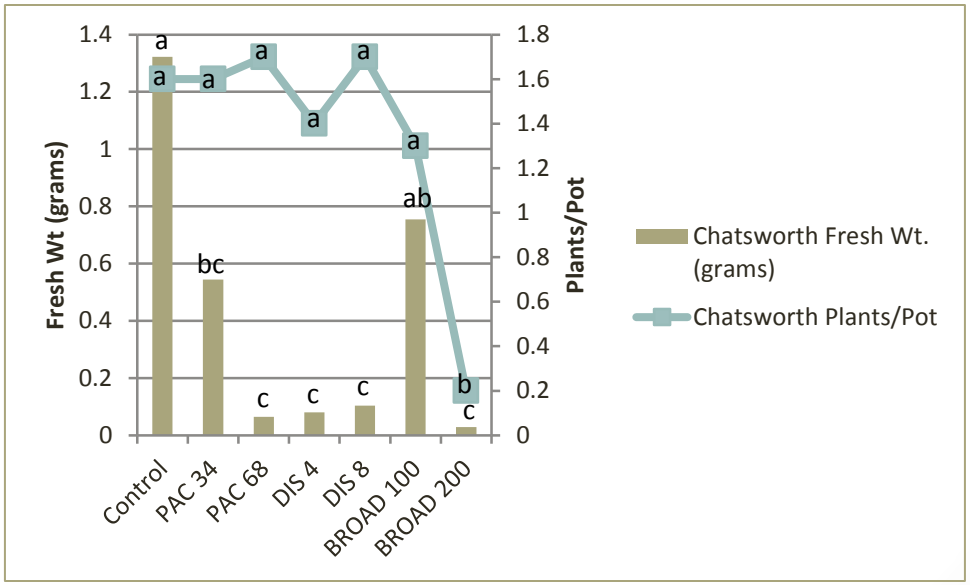
Table 1b. Herbicide treatment effects on willow oak density, quality, and growth.													
Species	TRT	DENSITY		CULLS		PLANT		RCD		HT		SHOOT WT	
		seedlings/ft^2		seedlings/ft^2		seedlings/ft^2		mm		cm		grams	
Willow	Control	14.85	a	6.4	a	8.45	c	5.6833	a	60.16	b	10.818	b
(Delano)	PAC34	13.75	a	4.5	a	9.25	bc	5.7846	a	63.139	ab	11.87	ab
	PAC68	15.25	a	4.25	a	11	a	6.111	a	65.952	a	13.47	a
	DIS4	15	a	4.7	a	10.3	ab	6.1339	a	68.213	a	14.177	a
	DIS8	15.1	a	6.6	a	8.5	c	6.0994	a	66.112	a	13.782	a
	(LSD)	(1.76)		(2.00)		(1.59)		(0.41)		(4.88)		(2.49)	
	----------P > F----------												
	Treatment	0.4134		0.0615		0.0128		0.0971		0.0262		0.0532	

Morningglory Trial

- Two soil types were tested in the greenhouse
  - Light soil from Shellman, GA
  - Heavy soil from Chatsworth, GA
- Greenhouse study showed:
  - All herbicide treatments resulted in significantly less morningglory fresh weight than control for both soils

Morningglory Trial

- Greenhouse Study with a heavy soil from Chatsworth, GA
  - Broadstar® at 200 lbs/ac significantly reduces plants/pot



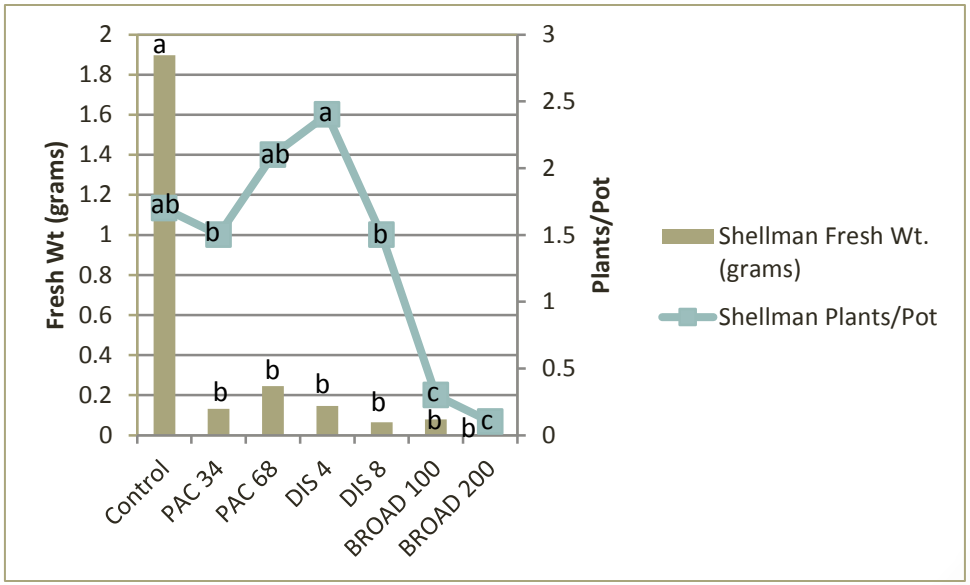
Morningglory Trial

- Control Broadstar 100 lbs/ac Broadstar 200 lbs/ac

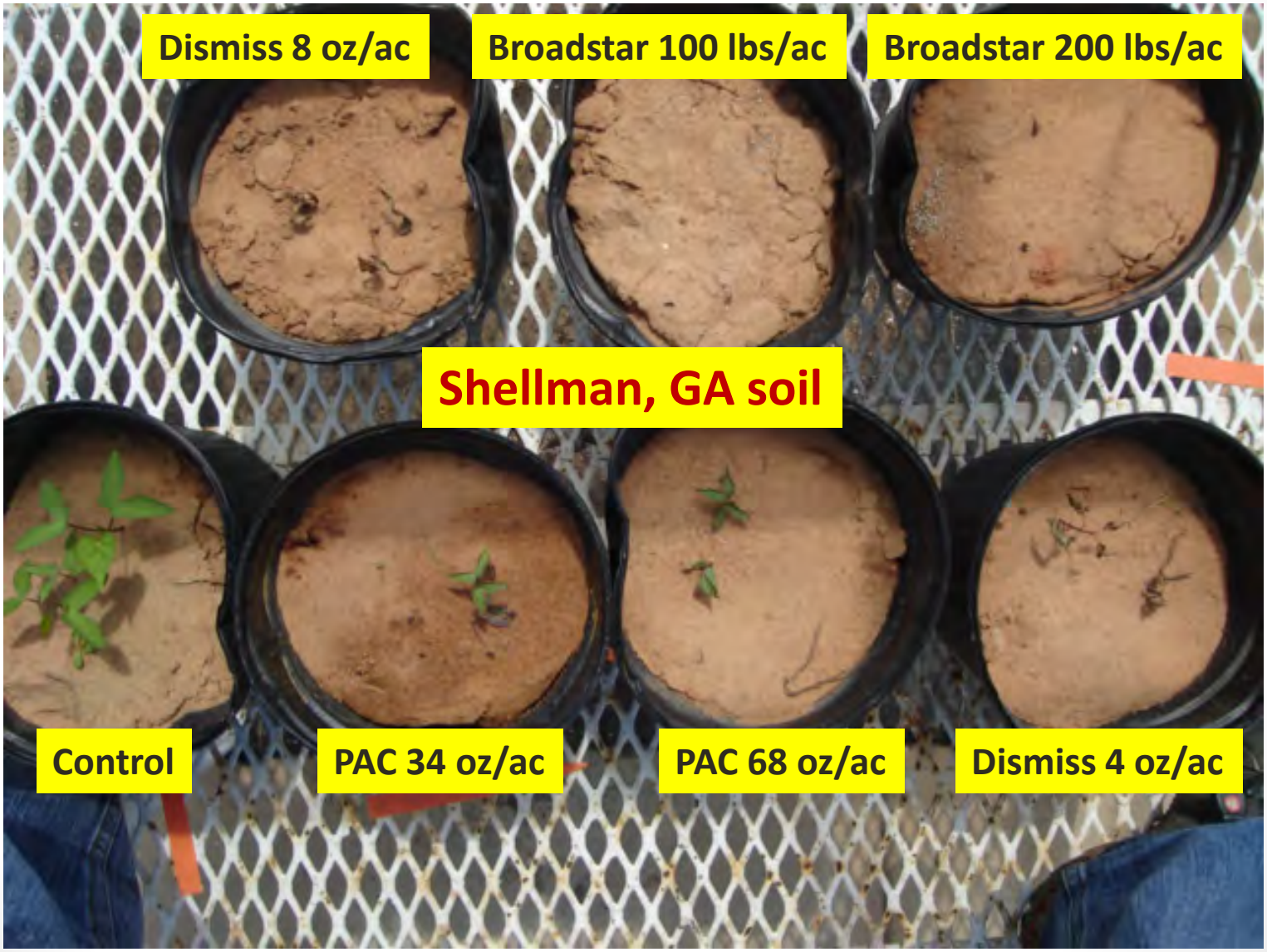
Chatsworth, GA Soil

Morningglory Trial

- Greenhouse Study with a light soil from Shellman, GA
  - Broadstar® at 100 and 200 lbs/ac significantly reduces plants/pot



Morningglory Trial



Morningglory Trial

- CONCLUSIONS
  - Dismiss® at 8 oz/ac in plum and willow oak will reduce plantable seedlings in heavy soils
  - Broadstar® did not appear to negatively influence:
    - common persimmon or swamp chestnut oak
  - Broadstar® controlled morningglory in the greenhouse study although better control was observed in the soils from Shellman, GA.

Pendulum Hardwood Seed Size Trial

- 2012 growing season
  - Arborgen, Supertree Nursery, Shellman, GA
  - Native Forest Nursery, Chatsworth, GA
- Preemergence application
- Pendulum® Aquacap at 34 and 68 oz/ac
- Seven species:

Species	Average number cleaned seed/lb
Silver Maple[C]	1,780
Blackgum[S]	3,300
Pear[S]	14,400
Green Ash[S]	20,950
Red Maple[S]	22,860
Sweetgum[C]	82,000
Sycamore[C]	149,900

[C] denotes species grown near Chatsworth, GA

[S] denotes species grown near Shellman, GA

- Data taken from *Seeds of Woody Plants in the United States,* Agricultural Handbook No. 450, USFS, Washington, D.C. 1974

Pendulum Hardwood Seed Size Trial

QUESTIONS?

- Will Pendulum® Aquacap cause herbicide galls on hardwoods?
- Will seed size influence hardwood tolerance to Pendulum® Aquacap?
- Will soil type influence Pendulum® Aquacap phytotoxicity to hardwood seedlings?

Pendulum Hardwood Seed Size Trial

- Arborgen, Supertree Nursery, Shellman, GA
  - No significant differences in seedling densities in blackgum, pear, green ash, and red maple
- Native Forest Nursery, Chatsworth, GA
  - Seedling density was significantly decreased by both rates of Pendulum® Aquacap in silver maple and sweetgum

Table 1a. Pendulum® Aquacap influence on silver maple at the Native Forest Nursery in 2012.

Species (Loc.)	Treatment	Density *seedlings/ft²*		Culls *seedlings/ft²*		Plantable *seedlings/ft²*		RCD *mm*		Ht *cm*		Shoot Wt *grams*	
Silver Maple	Control	15.35	a	4.40	a	10.95	a	5.16	b	40.03	a	2.50	a
(Chat.)	PAC 34	4.30	b	0.80	b	3.50	b	5.92	a	37.49	a	3.29	a
	PAC 68	1.90	b	0.50	b	1.40	c	6.45	a	36.02	a	3.41	a
	(LSD)	(3.25)		(2.49)		(1.76)		(0.56)		(3.30)		(1.00)	
	----------P > F----------												
	Treatment	**<0.0001**		**0.0121**		**<0.0001**		**0.0023**		0.0613		0.1352	

Table 1b. Pendulum® Aquacap influence on sweetgum at the Native Forest Nursery in 2012.

Species (Loc.)	Treatment	Density *seedlings/ft²*		Culls *seedlings/ft²*		Plantable *seedlings/ft²*		RCD *mm*		Ht *cm*		Shoot Wt *grams*	
Sweetgum	Control	20.80	a	10.40	a	10.40	a	5.31	b	65.13	a	5.57	b
(Chat.)	PAC 34	16.05	b	6.55	b	9.50	a	6.02	a	61.13	a	6.51	ab
	PAC 68	10.50	c	3.95	c	6.55	b	6.43	a	52.45	a	7.99	a
	(LSD)	(2.50)		(1.62)		(2.78)		(0.59)		(11.21)		(1.70)	
	----------P > F----------												
	Treatment	**<0.0001**		**<0.0001**		**0.0304**		**0.0069**		0.0786		**0.0323**	

Pendulum Hardwood Seed Size Trial

- CONCLUSIONS
  - Susceptibility to Pendulum® Aquacap is NOT dependent on seed size as seedlings densities for both silver maple, a large seeded species, and sweetgum, a small seeded species, were negatively influenced by both the 34 and 68 oz/ac rates of Pendulum® Aquacap

Species	Average number cleaned seed/lb
Silver Maple[C]	1,780
Blackgum[S]	3,300
Pear[S]	14,400
Green Ash[S]	20,950
Red Maple[S]	22,860
Sweetgum[C]	82,000
Sycamore[C*]	149,900
[C] denotes species grown near Chatsworth, GA	
[S] denotes species grown near Shellman, GA	
[*] denotes germination failure	

Pendulum Hardwood Seed Size Trial

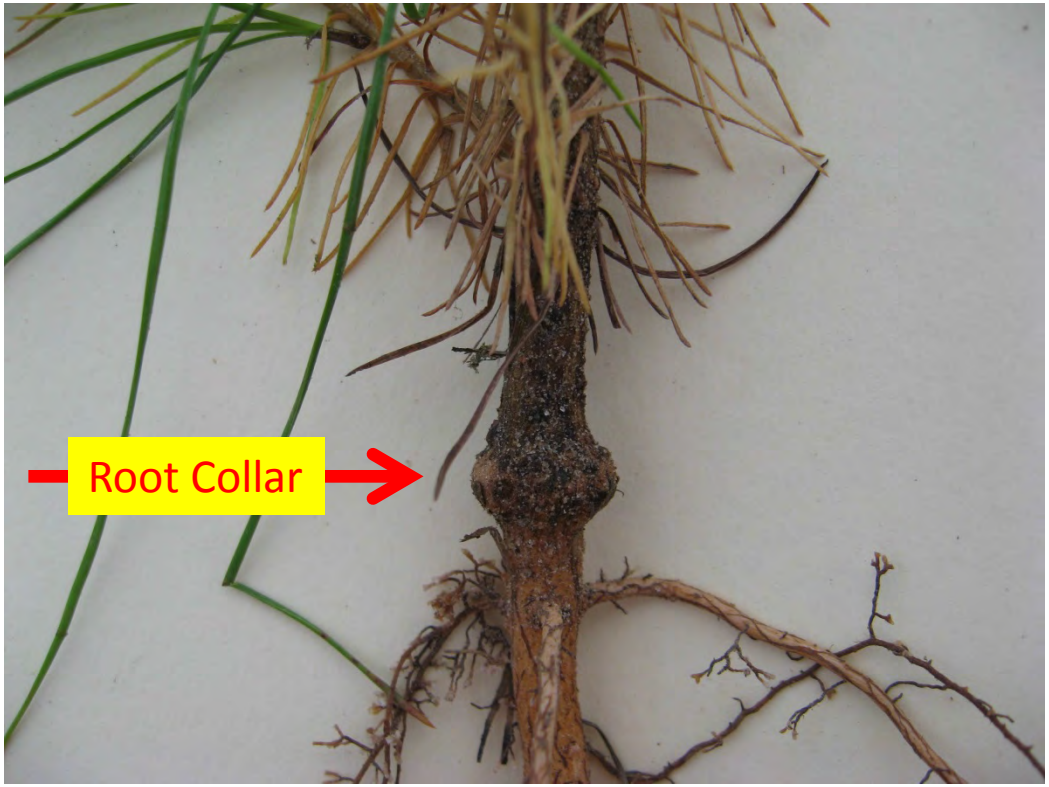
- CONCLUSIONS
  - Susceptibility to Pendulum® Aquacap may be dependent on soil type as more phytotoxicity influences appeared in the heavy soils of Chatsworth, GA in silver maple and sweetgum
  - There was a slight and insignificant reduction in seedling density with Pendulum® Aquacap at 34 oz/ac for green ash, pear, and red maple on a lighter soil from Shellman, GA
  - Gall formation was not observed on hardwood species

Pendulum Loblolly Trial

- 2012 growing season
- Nurseries
  - Weyerhaeuser, Quail Ridge Nursery, Aiken, SC
  - Native Forest Nursery, Chatsworth, GA
  - Arborgen, Supertree Nursery, Shellman, GA
- Pendulum® Aquacap
  - 3 Rates
    - 17 oz/ac
    - 34 oz/ac
    - 68 oz/ac
  - 2 Application Times
    - Preemergence
    - 8 Weeks Postemergence
- Objectives:
  - To determine when herbicide gall formation occurs in loblolly pine
  - Which rate of Pendulum® Aquacap forms herbicide galls?

Pendulum Loblolly Trial

- But first…the Pendulum® Aquacap herbicide gall



- Notice the location directly at the Root Collar…this is different from a fusiform rust swelling above the root collar

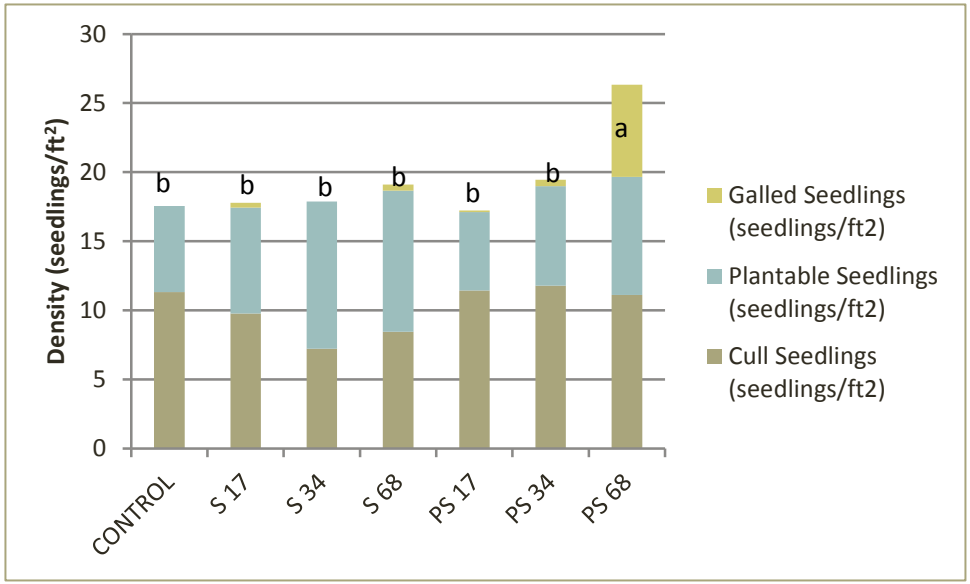
Pendulum Loblolly Trial

- Cross section of a galled seedlings vs Cross section of regular seedling

- Cork cambium is thicker on the seedling with herbicide gall…

Pendulum Loblolly Trial

- Cull, Plantable, and Galled seedlings at the Quail Ridge Nursery in Aiken, SC

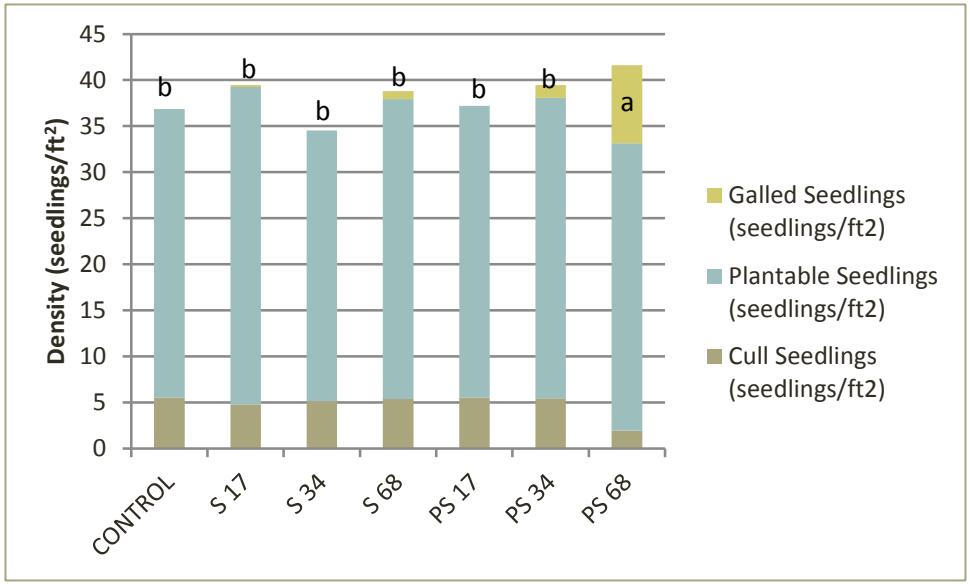


Control=no treatment, S 17= Pendulum® Aquacap 17 oz/ac at sow, S 34= Pendulum® Aquacap 34 oz/ac at sow, S 68= Pendulum® Aquacap 68 oz/ac at sow, PS 17= Pendulum® Aquacap 17 oz/ac post-sow, PS 34=Pendulum® Aquacap 34 oz/ac post-sow, PS 68=Pendulum® Aquacap 68 oz/ac post-sow

Letters denote significant differences between treatments

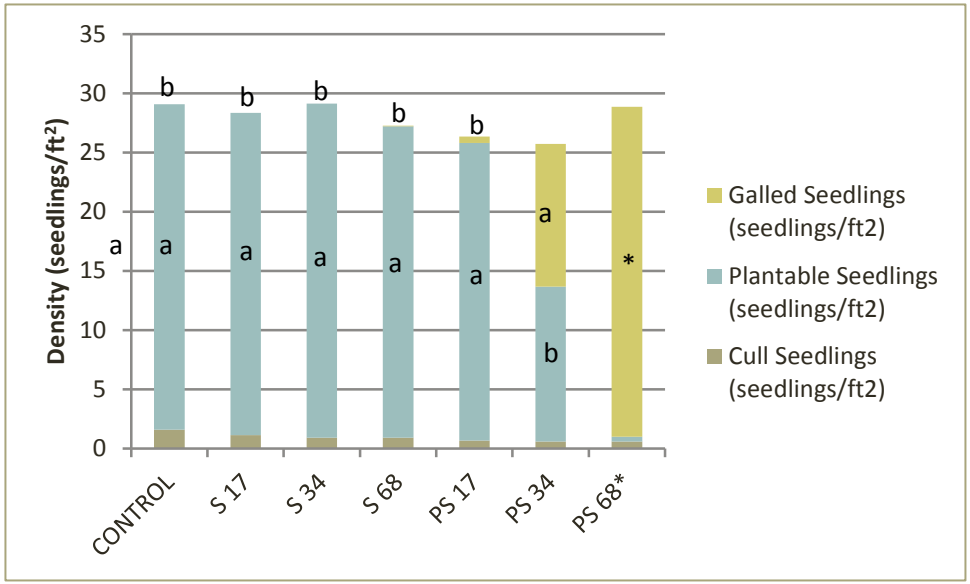
Pendulum Loblolly Trial

- Cull, Plantable, and Galled seedlings at the Native Forest Nursery in Chatsworth, GA



Pendulum Loblolly Trial

- Cull, Plantable, and Galled seedlings at the Arborgen Nursery in Shellman, GA



* Denotes that PS 68 was removed from analysis due to only having 6 plantable seedlings in all 5 replications

Pendulum Loblolly Trial

- CONCLUSIONS
  - Pendulum® Aquacap applied at 68 oz/ac eight weeks after seed sow produced a significant number of galled seedlings at all three nurseries
  - The application of 34 oz/ac resulted in a significant number of galled seedlings and the number of plantable seedlings was reduced at the Arborgen Nursery at Shellman, GA.
  - The Quail Ridge Nursery at Aiken, SC responded to the high rate of Pendulum® Aquacap eight weeks after sow with a significant increase in seedling density which is most likely explained by the heavy infestation of annual sedge that was occurring in the trial plots.

Pendulum Loblolly Trial

- CONCLUSIONS
  - There appears to be a significant soil type interaction between rate used and the formation of galls. Heavier soil types can tolerate higher rates of Pendulum® Aquacap than lighter soil types when used as a post-emergence application.
  - Applications 8 weeks post-sow significantly increased gall formation in all three nurseries where the trial was installed.
  - Because of the possibility of gall formation, the Nursery Cooperative recommends that Pendulum® Aquacap applications occur **immediately following seed sow in loblolly pine seedbeds**.

2013 Herbicide Trials

- Clearcast Screening Trial
  - Arborgen, Supertree Nursery, Shellman, GA
  - East Tennessee State Nursery, Delano, TN
  - Native Forest Nursery, Chatsworth, Ga
- Marengo Screening Trial
  - Arborgen, Supertree Nursery, Shellman, GA
- PAC Outplanting Trial
  - Arborgen, Supertree Nursery, Shellman, GA
- PAC Operational Trial
  - Weyerhaeuser, Pine Hill Nursery, Camden, AL
- PAC Timing Trial
  - Arborgen, Supertree Nursery, Shellman, GA
- Ronstar Screening Trial…Continued from 2012
  - GFC, Flint River Nursery, Byromville, GA
  - Native Forest Nursery, Chatsworth, GA
  - Plum Creek, Jesup Nursery, Jesup, GA
  - Rayonier, Elberta Nursery, Elberta, AL
  - Weyerhaeuser, Pine Hill Nursery, Camden, AL

Clearcast Screening Trial

- Clearcast® (12.1% ammonium salt of imazamox)
  - 2 Rates
    - 4 oz/ac
    - 6 oz/ac
  - Postemergence application

- Nursery Manager in MD recommended for morningglory control
- Test for:
  - Morningglory control
  - Phytotoxicity

- Nurseries and Species
  - East Tennessee State Nursery, Delano, TN
    - Plum and swamp chestnut oak
  - Native Forest Nursery, Chatsworth, GA
    - Northern red oak and white oak
  - Arborgen, Supertree Nursery, Shellman, GA*
    - Swamp chestnut oak, lespedeza, sweetgum, river birch, loblolly pine

*indicates non-replicated “watch plot” study

Clearcast Screening Trial

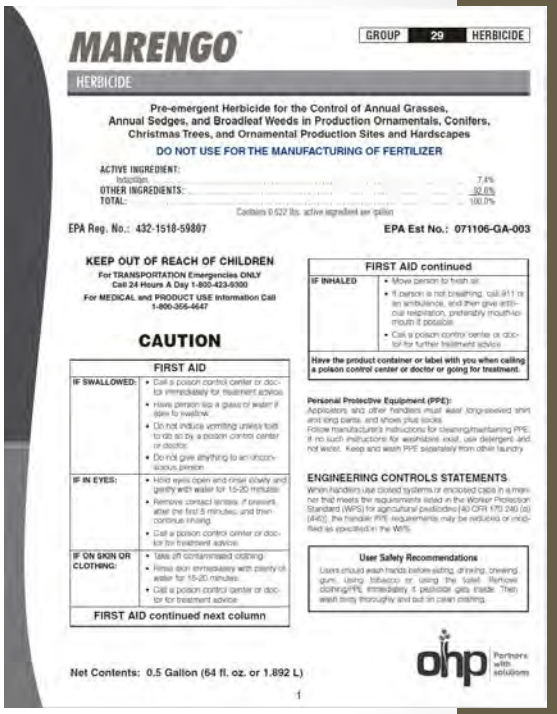
- Observations
  - Both 4 and 6 oz/ac rates stunt seedling growth, BUT:
    - Large seeded species such as oaks will outgrow stunting quickly
    - Small-seeded species such as plum, sweetgum, and riverbirch exhibit greater stunting and phytotoxic results
      - “Stairstep” results in seedlings height based on Clearcast application rate...4 oz/ac rates were not as severely stunted as 6 oz/ac rates

- Postemergence applications of Clearcast to morningglory result in stunting of the weed but not in weed mortality
    - 4 oz/ac reduced growth compared to the control
    - 6 oz/ac stopped all “runners”
    - Basically, Clearcast slows down morningglory growth long enough for seedlings to gain dominance

Marengo Screening Trial

- Marengo® (7.4% indaziflam)
  - New preemergence broadleaf and grass herbicide produced by OHP, Inc.
  - Group 29 Herbicide inhibits cellulose biosynthesis in root system
  - Forms up to a 4 inch barrier in soil
  - Highly active in light, sandy soils

- Tested at Arborgen's Shellman, GA Nursery in loblolly pine seedbeds and seedlings at 3 application rates
  - 3 Application Rates:
    - 3.75 oz/ac
    - 7.5 oz/ac
    - 11.25 oz/ac
  - 3 Times of Application:
    - Preemergence
    - 6 weeks postemergence
    - 12 weeks postemergence



MARENGO

GROUP 29 HERBICIDE

HERBICIDE

Pre-emergent Herbicide for the Control of Annual Grasses, Annual Sedges, and Broadleaf Weeds in Production Ornamentals, Conifers, Christmas Trees, and Ornamental Production Sites and Hardscapes

DO NOT USE FOR THE MANUFACTURING OF FERTILIZER

ACTIVE INGREDIENT:
Indaziflam 7.4%
OTHER INGREDIENTS: 92.6%
TOTAL: 100.0%

Contains 0.022 lbs. active ingredient per gallon

EPA Reg. No.: 432-1518-59807 EPA Est No.: 071106-GA-003

KEEP OUT OF REACH OF CHILDREN

For TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-423-9300

For MEDICAL and PRODUCT USE Information Call 1-800-356-4647

CAUTION

FIRST AID

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by a poison control center or doctor.
- Do not give anything to an unconscious person.

IF IN EYES:
- Hold eyes open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, and then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

FIRST AID continued next column

FIRST AID continued

IF INHALED
- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, and then give artificial respiration, preferably mouth-to-mouth if possible.
- Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment.

Personal Protective Equipment (PPE):
Applicators and other handlers must wear long-sleeved shirt and long pants, and shoes plus socks.
Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

ENGINEERING CONTROLS STATEMENTS
When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations
Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Net Contents: 0.5 Gallon (64 fl. oz. or 1.892 L)

ohp Partners with solutions

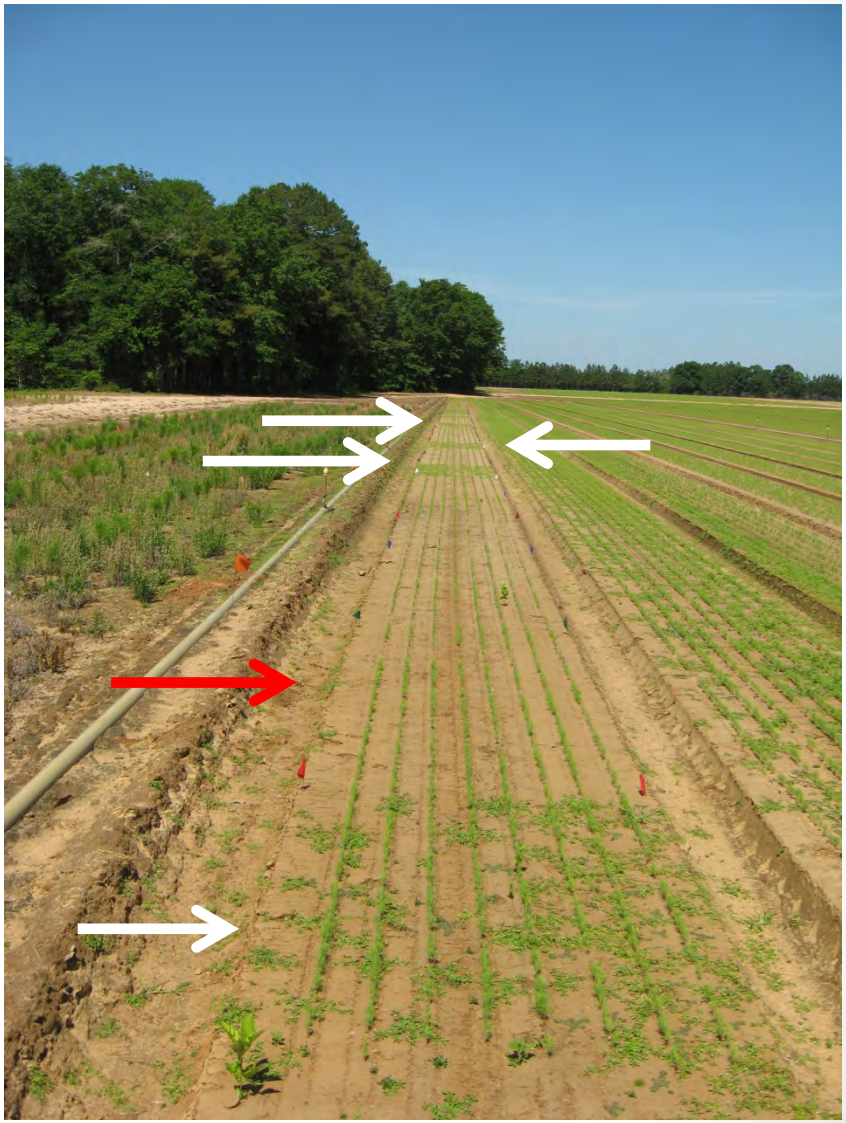
1

Marengo Screening Trial

- Marengo preemergence application…Barry is calibrated!

Marengo Screening Trial

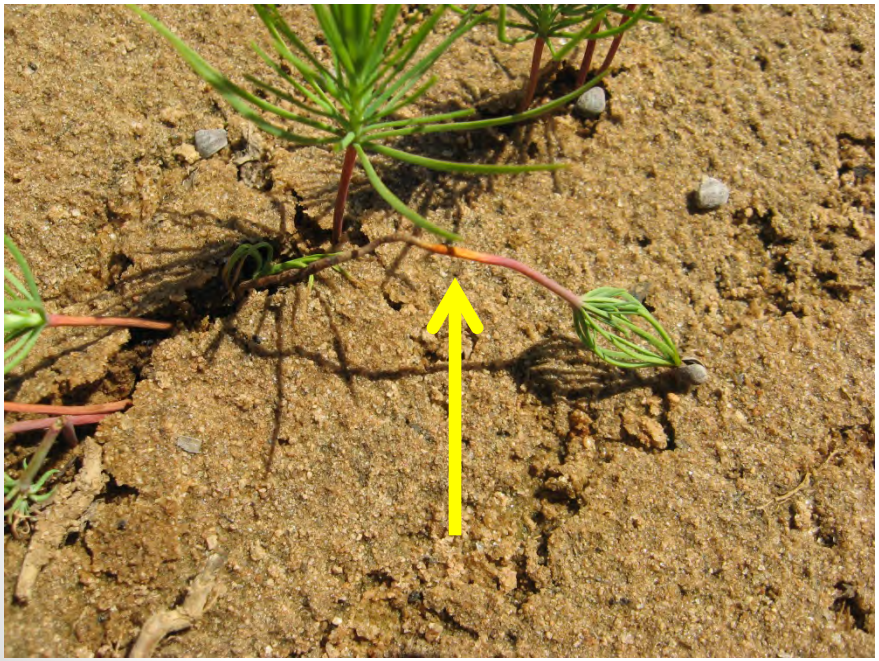
- **Excellent weed control 6 weeks after preemergence application (5-28-2013)!!**

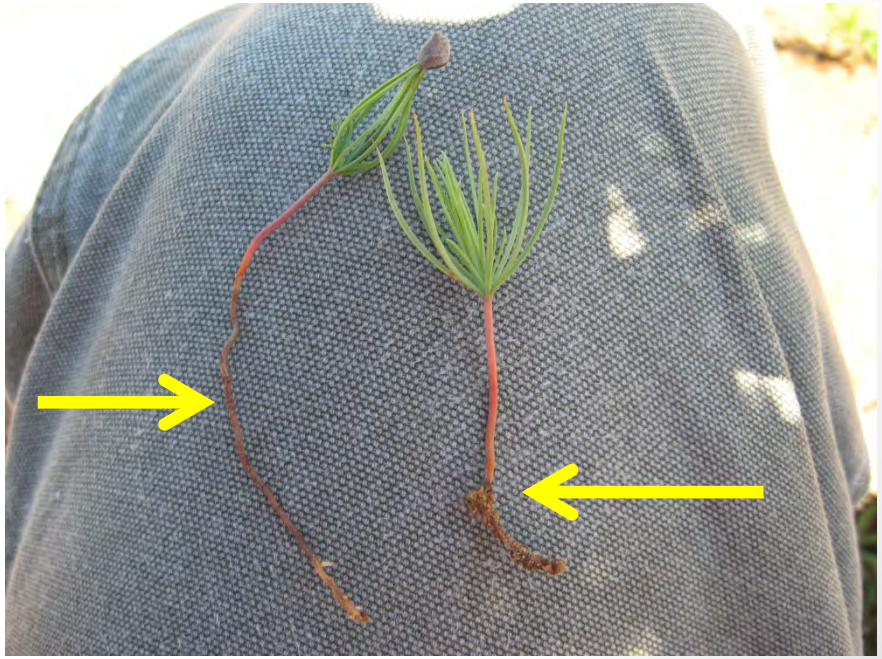


- Red arrow indicates lowest Marengo rate applied at 3.75 oz/ac with excellent weed control results at 6 weeks
- White arrows indicate Control or No Treatment Plots

Marengo Screening Trial

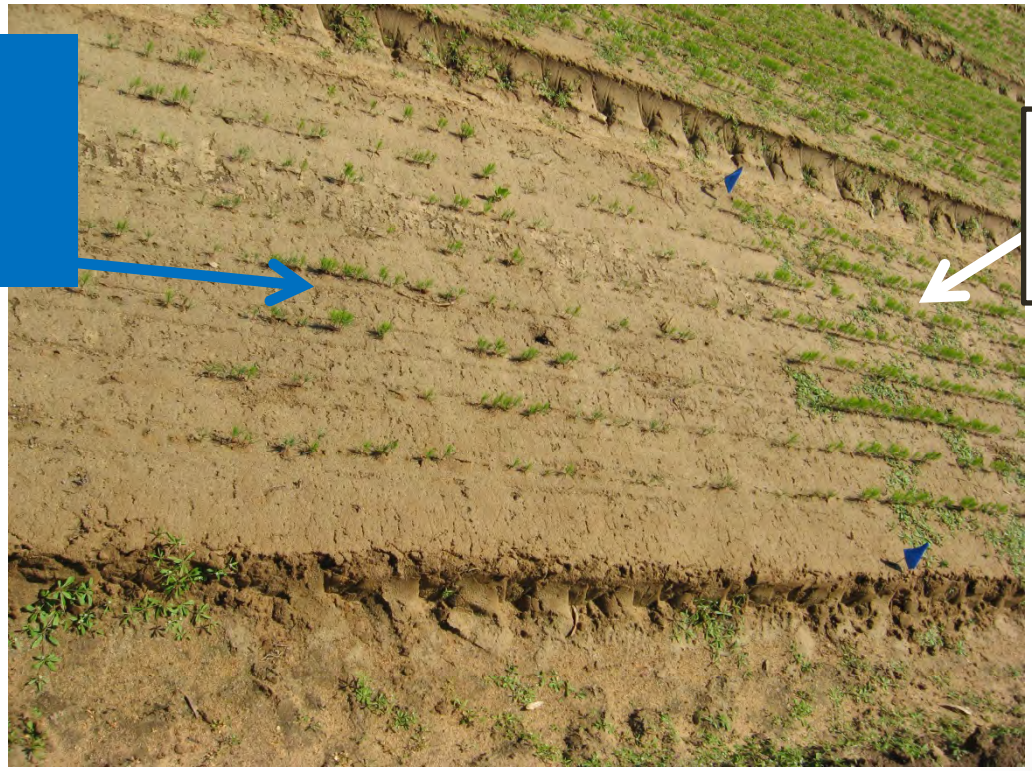
- However, phytotoxicity in increasing degrees was observed at all three rates:
  - 3.75 oz/ac
  - 7.5 oz/ac
  - 11.25 oz/ac





Marengo Screening Trial

- Marengo is not suitable for preemergence applications on loblolly pine at the tested rates on light soils
- Photograph shows severely reduced loblolly seedling density at the 11.25 oz/ac rate



PAC Outplanting Trial

- Arborgen, Supertree Nursery, Shellman, GA

- 4 Treatments:
  - 1. Deep planting, no PAC gall
  - 2. Deep planting, PAC gall
  - 3. Regular planting, no PAC gall
  - 4. Regular planting, PAC gall

- Two planting depths include:
  - Regular planting depth with root collar at ground line
  - Deep planting with root collar 2-3 inches below ground line

- All treatments replicated in irrigated and non-irrigated ground

PAC Outplanting Trial

- Do PAC herbicide galls present survival issues after outplanting?
- No observable differences to date…

PAC Operational Trial

- Weyerhaeuser, Pine Hill Nursery, Camden, AL
- Application of PAC and Goal 2XL with soil stabilizer in three treatments

Treatment No.	Description
TRT 1	Goal® 2XL (32 oz/ac) + polymer
TRT 2	Goal® 2XL (32 oz/ac) + Pendulum®AquaCap (34 oz/ac) + polymer
TRT 3	Goal® 2XL (32 oz/ac) + Pendulum®AquaCap (68 oz/ac) + polymer

- Questions?
  - Will PAC plus polymer increase the incident rate of PAC herbicide gall formation?
  - Which PAC rate is more efficient in spurge control?

PAC Operational Trial

Observations

- Treatment 1 contains prostrate spurge (PAC at 0)
- Treatment 2 has occasional small spurge plants (34 oz/ac)
- Treatment 3 does not contain spurge (PAC at 68 oz/ac) and has minimal weed pressure compared to Treatment 1.

Treatment No.	Description
TRT 1	Goal® 2XL (32 oz/ac) + polymer
TRT 2	Goal® 2XL (32 oz/ac) + Pendulum®AquaCap (34 oz/ac) + polymer
TRT 3	Goal® 2XL (32 oz/ac) + Pendulum®AquaCap (68 oz/ac) + polymer

- Is there a PAC rate between 34-68 oz/ac that is more efficient at spurge control?

PAC Timing Trial

- Arborgen, Supertree Nursery, Shellman, GA
- Pendulum® AquaCap (38.7% pendimethalin)
  - Postemergence applications at 3 application times:
    - 8 weeks
    - 12 weeks
    - 16 weeks
  - 2 application rates:
    - 34 oz/ac
    - 68 oz/ac
- Question?
  - When will postemergence PAC applications during the growing season not result in herbicide galls?
  - What is the tolerance to different PAC rates during the growing season?

Ronstar Flo Screening Trial…Continued from 2012

- Weyerhaeuser, Pine Hill Nursery, Camden, AL
- Native Forest Nursery, Chatsworth, GA
- Rayonier Nursery, Elberta, AL
- GFC, Flint River Nursery, Byromville, GA
- Plum Creek, Jesup Nursery, Jesup, GA

- Objectives
  - 1. To evaluate loblolly pine (*Pinus taeda*) seedling tolerance to preemergence applications of Ronstar® Flo (34.1% oxadiazon), Pendulum® AquaCap (38.7% pendimethalin), and Goal® 2XL (22.3% oxyfluorfen) in different combinations and at different application rates.

  - 2. To determine weed control following preemergence applications of Ronstar® Flo, Pendulum® AquaCap, and Goal® 2XL in different combinations and at different application rates.

Ronstar Flo Screening Trial…Continued from 2012

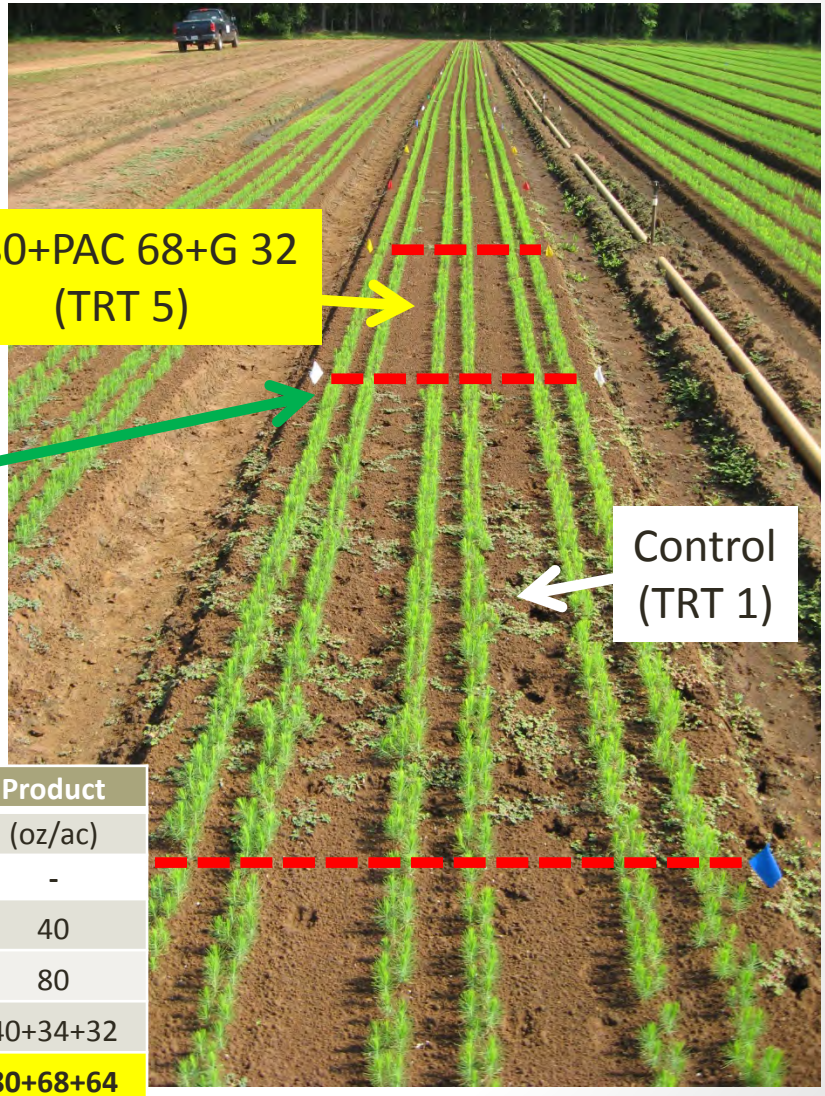
- Rates and Treatments

Treatment	Pre-emergent Herbicide	Product
(No.)	(Trade Name)	(oz/ac)
1	Control	-
2	Ronstar® Flo	40
3	Ronstar® Flo	80
4	Ronstar® Flo+Pendulum® AquaCap+Goal® 2XL	40+34+32
5	Ronstar® Flo+Pendulum® AquaCap+Goal® 2XL	80+68+64

- Observations
  - Ronstar Flo is more phytotoxic to pine seedlings at both 40 and 80 oz/ac in heavy soils, with lessening phytotoxicity in lighter, sandy soils
  - Ronstar Flo causes both seedling stunting and mortality, especially in heavy soils
  - Ronstar Flo does not control prostrate spurge at either rate
  - Seedlings stunted by Ronstar Flo do grow secondary needles…but will they outgrow the stunting by harvest?
  - Treatment 5 provides excellent weed control

Ronstar Flo Screening Trial…Continued from 2012

- Comparison between Control and tank mix (Trt 5) of Ronstar Flo, PAC, and Goal 2XL… notice the defined line between weed control and weed presence 8 weeks after the preemergence application



Treatment	Pre-emergent Herbicide	Product
(No.)	(Trade Name)	(oz/ac)
1	**Control**	-
2	Ronstar® Flo	40
3	Ronstar® Flo	80
4	Ronstar® Flo+Pendulum® AquaCap+Goal® 2XL	40+34+32
5	**Ronstar® Flo+Pendulum® AquaCap+Goal® 2XL**	**80+68+64**

Weed Control in Nurseries