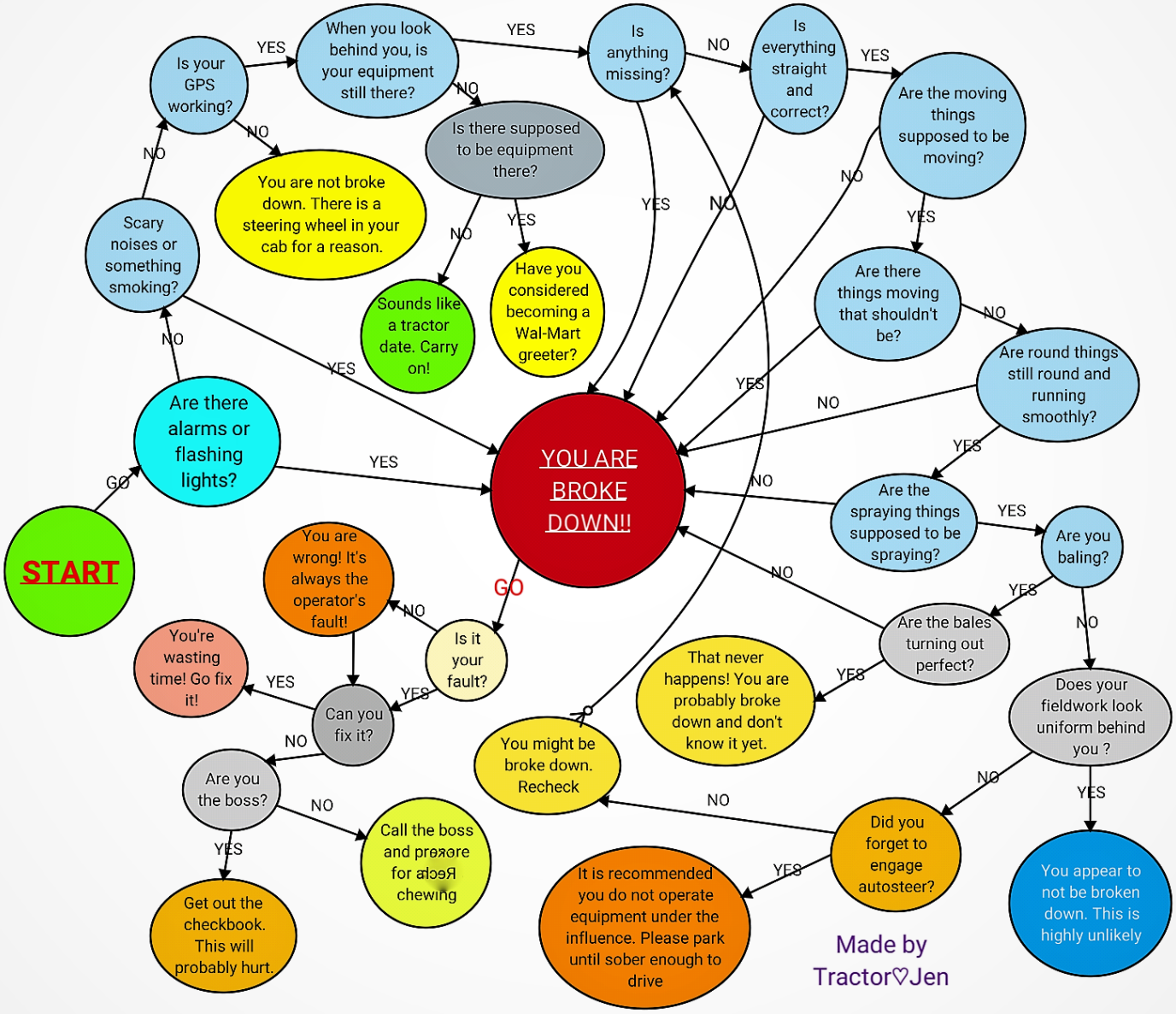
TractorJen's Handy Guide
Are You Broke Down?



SFNMC HERBICIDE TRIALS UPDATE

2018 SFNMC Contact Meeting
Pensacola, FL
July 16, 2017

Nina Dowling Payne
SFNMC
Auburn University

2018 Herbicide Trials Update

BAREROOT

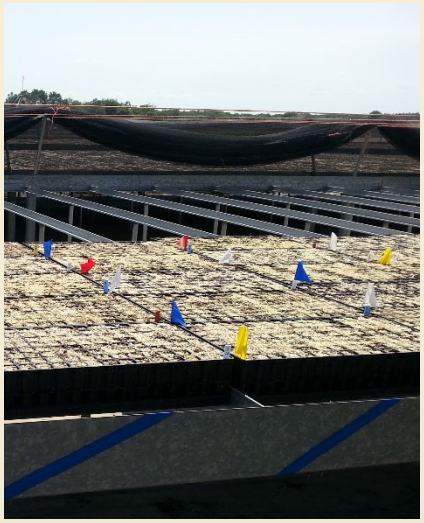
- *Pendulum® AquaCap™ High Rate study*
- *Ronstar®Flo High Rate study*
- *Marengo® on Eastern Redcedar study*
- *Post-emergent Herbicide Screening trial*

CONTAINER

- *Pendulum® AquaCap™ study*
- *Ronstar®Flo study*

Pendulum® AquaCap™ High Rate Study in BAREROOT and CONTAINER Nurseries

To determine seedling tolerance to and weed control by applications up to 136 oz/ac for 'long term (6 to 8 months) control' (on label page 10)



- **Bareroot** trials installed at ArborGen Blenheim, ArborGen Shellman, K & L and SCFC nurseries in loblolly pine
- **Container** trial installed at IFCO Moultrie, GA nursery in loblolly, slash, longleaf and shortleaf pine

Results of BAREROOT PAC high rate study

Table 1. Bareroot loblolly pine seedling characteristics treated with Pendulum® AquaCap™ at four nurseries.

Nursery	Rate	Density/ft^2	Shoot Height (cm)	RCD (mm)	Shoot Weight (g)	Root Weight (g)
A	34 oz./ac	25.9	23.0	4.55 a	2.58	0.64
	68 oz./ac	27.0	22.9	4.39 b	2.36	0.62
	136 oz./ac	25.7	23.2	4.60 a	2.58	0.66
B	34 oz./ac	24.7	30.3	4.80	3.21	0.56
	68 oz./ac	25.6	27.4	4.64	3.14	0.56
	136 oz./ac	25.2	27.5	4.73	3.12	0.51
C	32 oz./ac	16.2	30.8	4.27	3.11	0.38
	66 oz./ac	18.4	31.2	4.18	3.04	0.36
	134 oz./ac	19.1	31.0	4.37	3.02	0.39
D	68 oz./ac	29.8	26.5	4.06	2.67	0.35
	136 oz./ac	27.5	24.5	4.00	2.55	0.34

Page 6, RR 18-02

Herbicide galls observed in 4 seedlings out of 1175 seedlings measured, all from highest rate plots

Results of CONTAINER PAC high rate study

Table 2. Container pine seedling characteristics treated with Pendulum® AquaCap™ in four species, IFCO Nursery, Moultrie, GA.

Species	Rate	Survival[1] (% Fill)	Shoot Height (cm)	RCD (mm)	Shoot Weight (g)	Plug Weight[2] (g)
Loblolly	0.0 oz./ac	94.0	27.0	3.82	2.26	12.23 ab
	34 oz./ac	91.3	27.0	3.84	2.28	12.17 b
	68 oz./ac	90.4	27.1	3.90	2.34	12.35 ab
	136 oz./ac	89.2	27.2	3.93	2.40	12.52 a
Longleaf	0.0 oz./ac	85.0	25.7	8.21	3.03	14.14
	34 oz./ac	82.8	25.7	7.98	3.04	14.18
	68 oz./ac	82.8	26.2	8.31	2.94	14.10
	136 oz./ac	83.4	25.9	7.88	3.02	14.22
Shortleaf	0.0 oz./ac	87.8	20.9	3.99	1.90	11.67
	34 oz./ac	77.7	21.2	3.91	1.83	11.53
	68 oz./ac	81.3	20.9	3.93	1.92	11.73
	136 oz./ac	80.7	21.4	3.96	1.86	11.66
Slash	0.0 oz./ac	92.2	25.4	4.02	2.38	12.60
	34 oz./ac	90.9	26.0	4.03	2.45	12.58
	68 oz./ac	87.0	26.1	4.06	2.43	12.36
	136 oz./ac	85.0	26.0	4.04	2.45	12.67

Page 7, RR 18-02

Results of 3 years of CONTAINER PAC studies in loblolly, longleaf, shortleaf and slash pine

2015 results: loblolly - lower RCD at 68 oz./ac
slash - lower plug weight at 34 and 68 oz./ac

2016 results: loblolly - lower survival at 68 and 136 oz./ac
shortleaf - lower plug weight at 68 oz./ac

2017 results: loblolly - lower survival at 68 and 136 oz./ac

Results of willow and other weed control in CONTAINER PAC studies

Table 3. Percent likelihood of no willow or other weed populations in containers treated with Pendulum® AquaCap™ in four species, IFCO Nursery, Moultrie, GA.

Species	Rate	% likelihood of 0 willows present in 1 container tray	% likelihood of 0 other weeds present in 1 container tray
Loblolly	0.0 oz./ac	26.7	80.0
	34 oz./ac	73.3	73.3
	68 oz./ac	86.7	93.3
	136 oz./ac	100.0	93.3
Longleaf	0.0 oz./ac	78.6	92.9
	34 oz./ac	92.9	100.0
	68 oz./ac	100.0	92.3
	136 oz./ac	100.0	100.0
Shortleaf	0.0 oz./ac	*	80.0
	34 oz./ac	*	93.3
	68 oz./ac	*	100.0
	136 oz./ac	*	93.3
Slash	0.0 oz./ac	*	40.0
	34 oz./ac	*	80.0
	68 oz./ac	*	80.0
	136 oz./ac	*	73.3

Page 8, RR 18-02

What we've learned from Pendulum® AquaCap™ studies:

BAREROOT **ALWAYS APPLY AT SOWING**

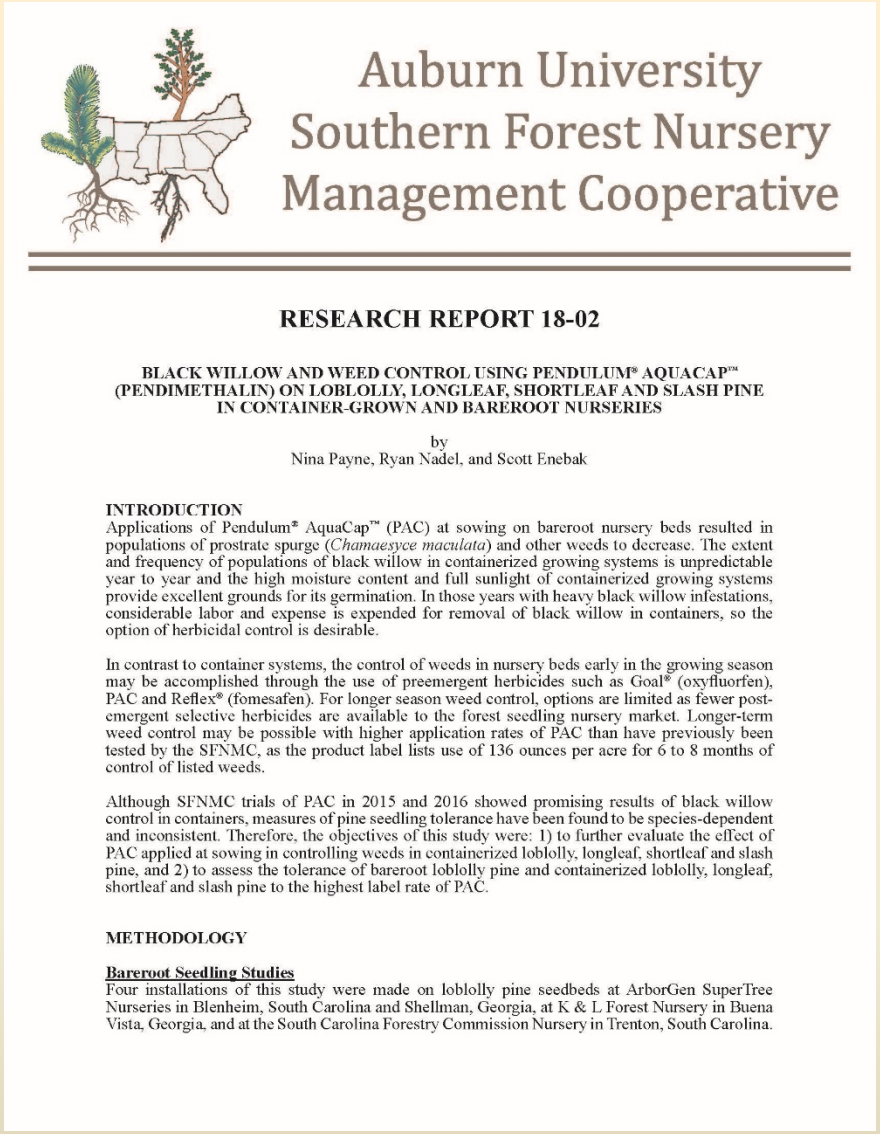
Rates of 34, 68 and 136 oz./ac tested
136 oz/.ac rate tested 1 year only
136 oz./ac rate had few negative effects
136 oz./ac gall production not statistically significant

CONTAINER 3 years of studies

APPLIED AT SOWING

Rates of 34, 68 and 136 oz./ac tested
Inconsistent results of seedling tolerance
Positive results of willow control

2017
Pendulum®AquaCap™
Study
results reported in
RR 18-02



Auburn University
Southern Forest Nursery
Management Cooperative

RESEARCH REPORT 18-02

BLACK WILLOW AND WEED CONTROL USING PENDULUM® AQUACAP™ (PENDIMETHALIN) ON LOBLOLLY, LONGLEAF, SHORTLEAF AND SLASH PINE IN CONTAINER-GROWN AND BAREROOT NURSERIES

by
Nina Payne, Ryan Nadel, and Scott Enebak

INTRODUCTION

Applications of Pendulum® AquaCap™ (PAC) at sowing on bareroot nursery beds resulted in populations of prostrate spurge (*Chamaesyce maculata*) and other weeds to decrease. The extent and frequency of populations of black willow in containerized growing systems is unpredictable year to year and the high moisture content and full sunlight of containerized growing systems provide excellent grounds for its germination. In those years with heavy black willow infestations, considerable labor and expense is expended for removal of black willow in containers, so the option of herbicidal control is desirable.

In contrast to container systems, the control of weeds in nursery beds early in the growing season may be accomplished through the use of preemergent herbicides such as Goal® (oxyfluorfen), PAC and Reflex® (fomesafen). For longer season weed control, options are limited as fewer post-emergent selective herbicides are available to the forest seedling nursery market. Longer-term weed control may be possible with higher application rates of PAC than have previously been tested by the SFNMC, as the product label lists use of 136 ounces per acre for 6 to 8 months of control of listed weeds.

Although SFNMC trials of PAC in 2015 and 2016 showed promising results of black willow control in containers, measures of pine seedling tolerance have been found to be species-dependent and inconsistent. Therefore, the objectives of this study were: 1) to further evaluate the effect of PAC applied at sowing in controlling weeds in containerized loblolly, longleaf, shortleaf and slash pine, and 2) to assess the tolerance of bareroot loblolly pine and containerized loblolly, longleaf, shortleaf and slash pine to the highest label rate of PAC.

METHODOLOGY

Bareroot Seedling Studies

Four installations of this study were made on loblolly pine seedbeds at ArborGen SuperTree Nurseries in Blenheim, South Carolina and Shellman, Georgia, at K & L Forest Nursery in Buena Vista, Georgia, and at the South Carolina Forestry Commission Nursery in Trenton, South Carolina.

ALWAYS TEST NEW RATES IN A SMALL AREA OF NURSERY PRIOR TO LARGER-SCALE USE!

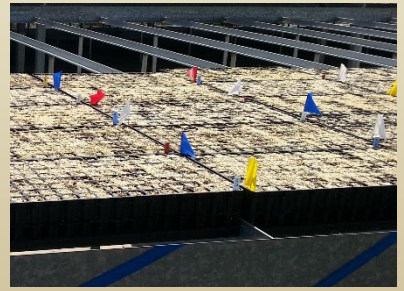
Questions/comments?

Ronstar®Flo (*oxadiazon*) Study in BAREROOT and CONTAINER Nurseries

Follow-up to 2012 and 2013 SFNMC bareroot trials reporting positive results on seedling tolerance and annual sedge control, added highest label rate of 122 oz./ac

- **Bareroot** trials installed at ArborGen Blenheim, ArborGen Shellman, K & L and SCFC nurseries in loblolly pine at sowing

- **Container** trial installed at IFCO Moultrie, GA nursery in loblolly, slash, longleaf and shortleaf pine at sowing



Results of BAREROOT Ronstar®Flo study

Table 1. Bareroot loblolly pine seedling characteristics treated with Ronstar®Flo at four nurseries.

Nursery	Rate	Density/ft^2	Shoot Height (cm)	RCD (mm)	Shoot Weight (g)	Root Weight (g)
A	0 oz./ac	26.0	23.2	4.11 a	2.53	0.60 a
	40 oz./ac	24.7	23.3	4.16 ab	2.57	0.59 a
	80 oz./ac	20.5	23.3	4.31 b	2.91	0.66 ab
	122 oz./ac	16.0	23.5	4.53 c	3.27	0.72 b
B	0 oz./ac	25.1	29.7	4.98	3.35	0.65
	40 oz./ac	25.2	29.0	4.92	3.20	0.61
	80 oz./ac	24.9	29.2	4.80	3.28	0.62
	122 oz./ac	23.8	29.9	4.90	3.39	0.59
C	0 oz./ac	17.3	31.0	4.62	4.13	0.46
	40 oz./ac	18.7	30.6	4.38	3.53	0.39
	80 oz./ac	16.7	30.9	4.46	3.59	0.41
	122 oz./ac	18.3	30.9	4.27	3.50	0.37
D	0 oz./ac	24.3 a	27.4	4.40	3.23	0.40
	40 oz./ac	24.3 a	24.3	3.90	2.51	0.39
	80 oz./ac	12.8 b	21.1	3.90	2.68	0.45
	122 oz./ac	11.1 b	17.4	3.90	2.24	0.44

Page 5, RR 18-01

Effects on seedling characteristics vary by SITE;
underscores Nina's DISCLAIMER:
ALWAYS TEST NEW PRODUCTS IN SMALL AREA OF NURSERY PRIOR TO LARGER-SCALE USE!

Results of CONTAINER Ronstar®Flo study

Table 2. Container pine seedling characteristics treated with Ronstar®Flo in four species, IFCO Nursery, Moultrie, GA.

Species	Rate	Survival[1] (% Fill)	Shoot Height (cm)	RCD (mm)	Shoot Weight (g)	Plug Weight[2] (g)
Loblolly	0 oz./ac	92.7 a	26.2	3.72	2.05	11.38
	40 oz./ac	93.2 a	26.6	3.75	2.09	11.52
	80 oz./ac	90.2 a	26.7	3.78	2.12	11.69
	122 oz./ac	86.5 b	26.1	3.78	2.07	11.81
Longleaf	0 oz./ac	83.4	26.6	8.10	3.12	13.73
	40 oz./ac	82.9	26.4	8.18	3.08	13.77
	80 oz./ac	83.7	26.1	8.18	3.10	13.69
	122 oz./ac	79.8	26.3	8.30	3.18	13.89
Shortleaf	0 oz./ac	88.0	21.5	3.99	1.86	11.22
	40 oz./ac	89.1	21.8	3.92	1.90	11.37
	80 oz./ac	86.7	21.9	3.98	1.92	11.38
	122 oz./ac	88.0	22.0	3.98	1.90	11.36
Slash	0 oz./ac	93.5	28.7	4.22	2.77	12.61
	40 oz./ac	92.5	28.4	4.21	2.66	12.77
	80 oz./ac	89.9	27.8	4.14	2.61	12.78
	122 oz./ac	90.2	27.6	4.18	2.64	12.62

Page 6, RR 18-01

First SFNMC trial of Ronstar®Flo in containers

Results of willow and other weed control in CONTAINER Ronstar®Flo studies

Table 3. Percent likelihood of no willow or other weed populations in containers treated with Ronstar®Flo in four species, IFCO Nursery, Moultrie, GA.

Species	Rate	% likelihood of 0 willows present in 1 container tray	% likelihood of 0 other weeds present in 1 container tray
Loblolly	0.0 oz./ac	20.0	80.0
	40 oz./ac	86.7	100.0
	80 oz./ac	100.0	86.7
	122 oz./ac	93.3	100.0
Longleaf	0.0 oz./ac	53.3	86.7
	40 oz./ac	100.0	100.0
	80 oz./ac	100.0	100.0
	122 oz./ac	100.0	100.0
Shortleaf	0.0 oz./ac	*	*
	40 oz./ac	*	*
	80 oz./ac	*	*
	122 oz./ac	*	*
Slash	0.0 oz./ac	*	66.7
	40 oz./ac	*	100.0
	80 oz./ac	*	100.0
	122 oz./ac	*	93.3

Page 7, RR 18-01

What we've learned from Ronstar®Flo studies:

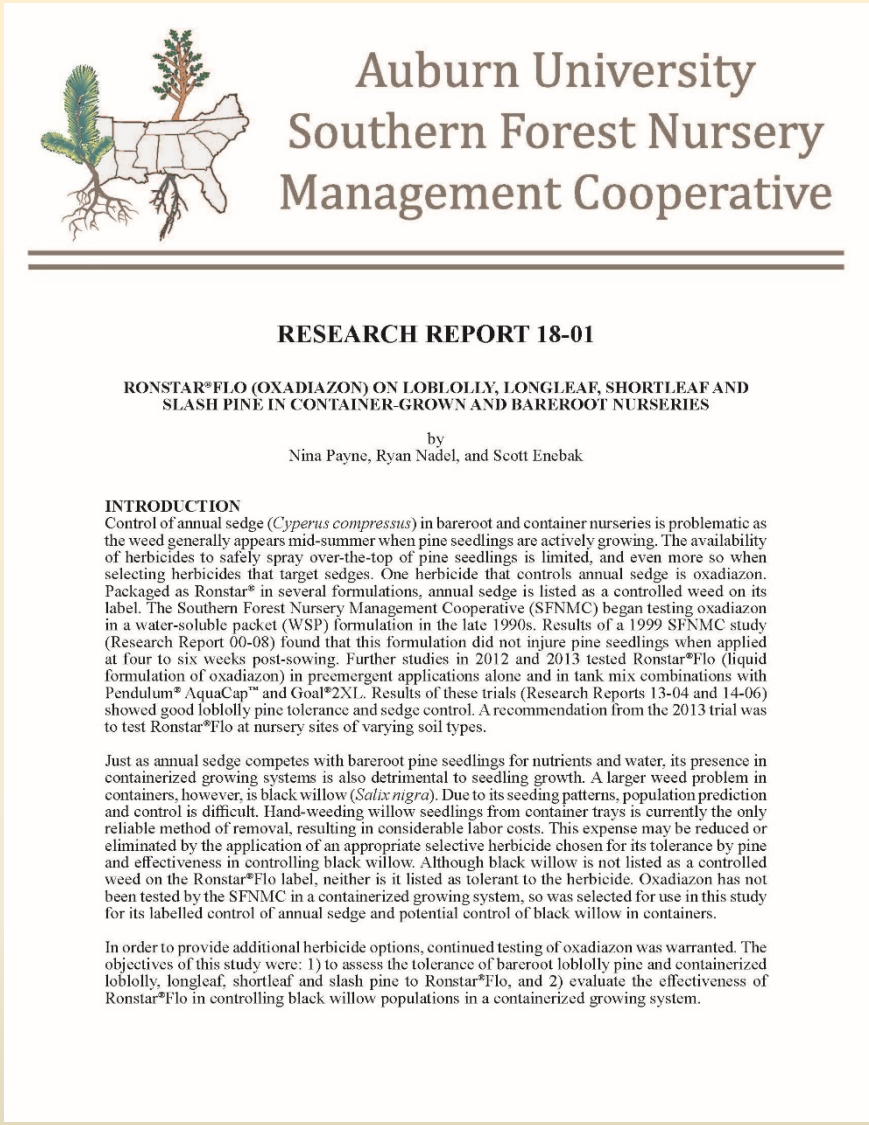
BAREROOT

Rates of 40, 80 and 122 oz./ac tested
Applied at sowing
122 oz/.ac rate tested 1 year only
Inconsistent results compared to 2012 and 2013 trials
Results of seedling tolerance varied by SITE

CONTAINER

First SFNMC trial
Applied at sowing
Rates of 40, 80 and 122 oz./ac tested
Negative results in 2 species at higher rates
Positive results of willow, other weed control

2017
Ronstar®Flo Study
results reported in
RR 18-01



Auburn University
Southern Forest Nursery
Management Cooperative

RESEARCH REPORT 18-01

RONSTAR®FLO (OXADIAZON) ON LOBLOLLY, LONGLEAF, SHORTLEAF AND SLASH PINE IN CONTAINER-GROWN AND BAREROOT NURSERIES

by
Nina Payne, Ryan Nadel, and Scott Enebak

INTRODUCTION

Control of annual sedge (*Cyperus compressus*) in bareroot and container nurseries is problematic as the weed generally appears mid-summer when pine seedlings are actively growing. The availability of herbicides to safely spray over-the-top of pine seedlings is limited, and even more so when selecting herbicides that target sedges. One herbicide that controls annual sedge is oxadiazon. Packaged as Ronstar® in several formulations, annual sedge is listed as a controlled weed on its label. The Southern Forest Nursery Management Cooperative (SFNMC) began testing oxadiazon in a water-soluble packet (WSP) formulation in the late 1990s. Results of a 1999 SFNMC study (Research Report 00-08) found that this formulation did not injure pine seedlings when applied at four to six weeks post-sowing. Further studies in 2012 and 2013 tested Ronstar®Flo (liquid formulation of oxadiazon) in preemergent applications alone and in tank mix combinations with Pendulum® AquaCap™ and Goal®2XL. Results of these trials (Research Reports 13-04 and 14-06) showed good loblolly pine tolerance and sedge control. A recommendation from the 2013 trial was to test Ronstar®Flo at nursery sites of varying soil types.

Just as annual sedge competes with bareroot pine seedlings for nutrients and water, its presence in containerized growing systems is also detrimental to seedling growth. A larger weed problem in containers, however, is black willow (*Salix nigra*). Due to its seeding patterns, population prediction and control is difficult. Hand-weeding willow seedlings from container trays is currently the only reliable method of removal, resulting in considerable labor costs. This expense may be reduced or eliminated by the application of an appropriate selective herbicide chosen for its tolerance by pine and effectiveness in controlling black willow. Although black willow is not listed as a controlled weed on the Ronstar®Flo label, neither is it listed as tolerant to the herbicide. Oxadiazon has not been tested by the SFNMC in a containerized growing system, so was selected for use in this study for its labelled control of annual sedge and potential control of black willow in containers.

In order to provide additional herbicide options, continued testing of oxadiazon was warranted. The objectives of this study were: 1) to assess the tolerance of bareroot loblolly pine and containerized loblolly, longleaf, shortleaf and slash pine to Ronstar®Flo, and 2) evaluate the effectiveness of Ronstar®Flo in controlling black willow populations in a containerized growing system.

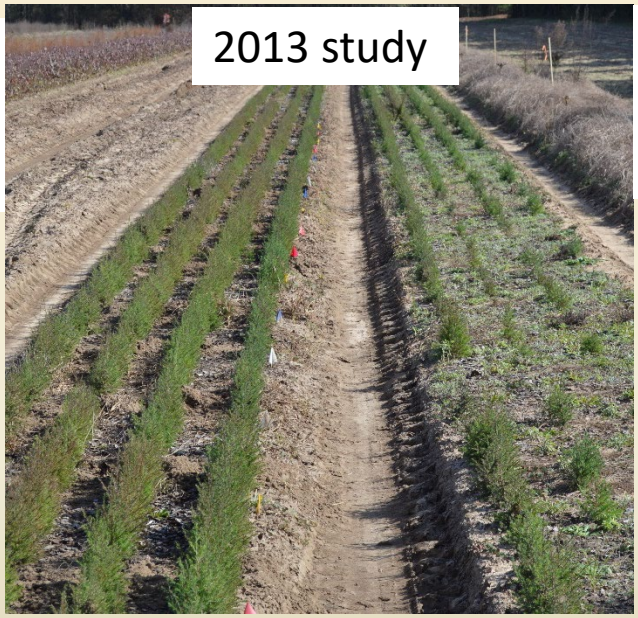
ALWAYS TEST NEW PRODUCTS IN A SMALL AREA OF NURSERY PRIOR TO LARGER-SCALE USE!

Questions/comments?

Marengo® (*indaziflam*) Study on Eastern Redcedar

Follow-up to first redcedar bareroot trial in 2013,
in which seedlings exhibited increased density, shoot height, shoot weight and root weight when treated with Marengo®

Marengo® sprayed at 20 weeks



untreated cedar same age

- Bareroot trial installed at Georgia Forestry Commission Nursery
- Application made at 20 weeks post-sowing with 3 rates of 3.75 oz./ac, 7.5 oz./ac and 11.25 oz./ac

Results of Marengo® on redcedar study

Table 1. Eastern redcedar seedling characteristics treated with Marengo®, Georgia Forestry Commission Nursery, Byromville, Georgia.

Rate	Oz./acre	Density/square foot	Shoot height (cm)	Root collar diameter (mm)	Root weight (g)	Shoot weight (g)
Control	0.00	10.4	13.6	2.04 a	0.27 a	0.85
Low	3.75	17.3	17.4	2.34 b	0.38 ab	1.22
Medium	7.50	12.4	18.2	2.45 b	0.53 bc	1.33
High	11.25	13.5	19.4	2.68 c	0.57 c	1.74

Page 4, RR 18-03

(L to R) nontreated control, 3.75 oz./ac, 7.5 oz./ac, 11.25 oz./ac

What we've learned from Marengo® on eastern redcedar studies:

Rates of 3.75, 7.5 and 11.25 oz./ac tested
Applied at 20 weeks post-sowing
Tested for 2 years at same site
Increased redcedar seedling density and size in treated plots

*Herbicides are generally not expected to *increase* seedling growth that is not attributed to less competition from weeds

2017 Marengo® on Eastern Redcedar Study results reported in RR 18-03

Auburn University
Southern Forest Nursery
Management Cooperative

RESEARCH REPORT 18-03

OVER-THE-TOP APPLICATIONS OF MARENGO® ON BAREROOT EASTERN REDCEDAR (*JUNIPERUS VIRGINIANA*)

by
Nina Payne, Ryan Nadel, and Scott Enebak

INTRODUCTION

When indaziflam was registered in 2010, it was the first of a new Mode of Action Group 29 herbicide. Marengo® (7.4% indaziflam) was introduced to the market in 2013 by OHP, Inc. and the product was subsequently purchased by Bayer CropScience. Its development was of interest as growers across the country recorded increased incidences of weed resistance to multiple modes of action herbicides. Indaziflam has been shown to control some glyphosate-resistant weed species and is marketed for ornamental nurseries, Christmas trees and under-bench greenhouse applications. Several brand names of indaziflam are currently marketed by Bayer. These include Specticle® for the turf and landscape ornamental markets, Alion® for citrus, grape, olive and tree nuts markets, Esplande® for industrial vegetation management, and DuraZone®, a combination of indaziflam, diquat and glyphosate for the home garden market.

As part of its continued mission in evaluating weed control options for member nurseries, the Southern Forest Nursery Management Cooperative (SFNMC) first tested Marengo® in 2013 to target commonly found weeds and to determine loblolly pine seedling tolerance to the herbicide. Management Implications from the original trial, published in Research Report 14-04, stated that Marengo® should not be applied at the time of sowing, but at a minimum of 6 weeks post-sowing to avoid damage to seedlings. Additional evaluation of Marengo® continued in 2014, 2015 and 2016 to include trials installed in both bareroot and container nurseries. These trials included over-the-top applications to loblolly, longleaf, shortleaf and slash pine and eastern redcedar, and a directed spray application to pin oak. Results of these trials are included in Research Reports 15-01, 16-04 and 17-01 and show that the effect on pine is species-dependent and caution growers of reduced plug weights and herbicide-induced stem swelling in containerized growing systems.

However, one aspect of the 2015 trial (Research Report 16-04) presented interesting results. When Marengo® was applied over-the-top of eastern redcedar at 20 weeks post-sowing (due to its winter sowing schedule), seedling densities and growth were significantly increased in treated plots when compared to non-treated plots. Eastern redcedar is listed as a tolerant ornamental on the Marengo® label, but most herbicides are not expected to increase growth in non-targeted plants. Auxin herbicides are an exception, as they are designed to increase plant growth to the extent that plants are lethally damaged by explosive cell growth. However, indaziflam is not an auxin herbicide.

Questions/comments?

Post-emergent Herbicide Screening Trial

Expansion of 2016 post-emergent herbicide trial to determine seedling tolerance to herbicides not currently labelled for conifer nursery use

- 9 herbicides applied at lowest labelled rate at 9 weeks post-sowing
- **Bareroot** trials installed at ArborGen Blenheim, ArborGen Shellman, K & L and SCFC nurseries in loblolly + slash at 1 nursery

- Accepted weeds listed as controlled or suppressed on label
- Groups 1, 2, 6, 14 and 27 herbicides (various modes of action, sites of action, target weeds and currently labelled crops)

Herbicides used

Trade Name	Common Name	Crops	Target Weeds	MOA Group # and action
Basagran®	***bentazon***	turf, ornamentals	annual sedge, yellow nutsedge, teaweed, ragweed, other broadleaf weeds	**6** ***Photosynthesis inhibitor***
Defendor™	***florasulam***	turf	catchweed, dandelion, groundsel, other broadleaf weeds	**2** ***ALS inhibitor***
Dismiss®	***sulfentrazone***	turf, ornamentals	beggarweed, eclipta, pigweed, red sorrel, spurge, purple & yellow nutsedge, globe sedge, green kylinga, goosegrass	**14** ***PPO inhibitor***
Envoke®	***trifloxysulfuron***	cotton, sugarcane	beggarweed, Johnsongrass, marestail, morning glory, purple & yellow nutsedge, pigweed, sicklepod	**2** ***ALS inhibitor***
Frequency®	***topramezone***	VM, conifer plantations (site prep and one year post planting)	Palmer amaranth, carpetweed, marestail, morning glory, pigweed, crabgrass, goosegrass	**27** ***Pigment Synthesis inhibitor***
Grasp®	***penoxsulam***	rice	eclipta, rice flatsedge, pigweed, ragweed, morning glory, yellow nutsedge, redstem	**2** ***ALS inhibitor***
TapOut®	***clethodim***	conifer trees, flax, cotton, food crops	grasses only	**1** ***ACCase inhibitor***
Valor®EZ	***flumioxazin***	cotton, corn, VM, soybeans, sugarcane, wheat	eclipta, marestail, pigweed, ragweed, morning glory, yellow nutsedge, redstem	**14** ***PPO inhibitor***
Velocity®	***bispyribac***	turf	yellow nutsedge, clover, dandelion, henbit, other broadleaf weeds	**2** ***ALS inhibitor***

Results
on BAREROOT Loblolly Pine

Little to no seedling damage by:

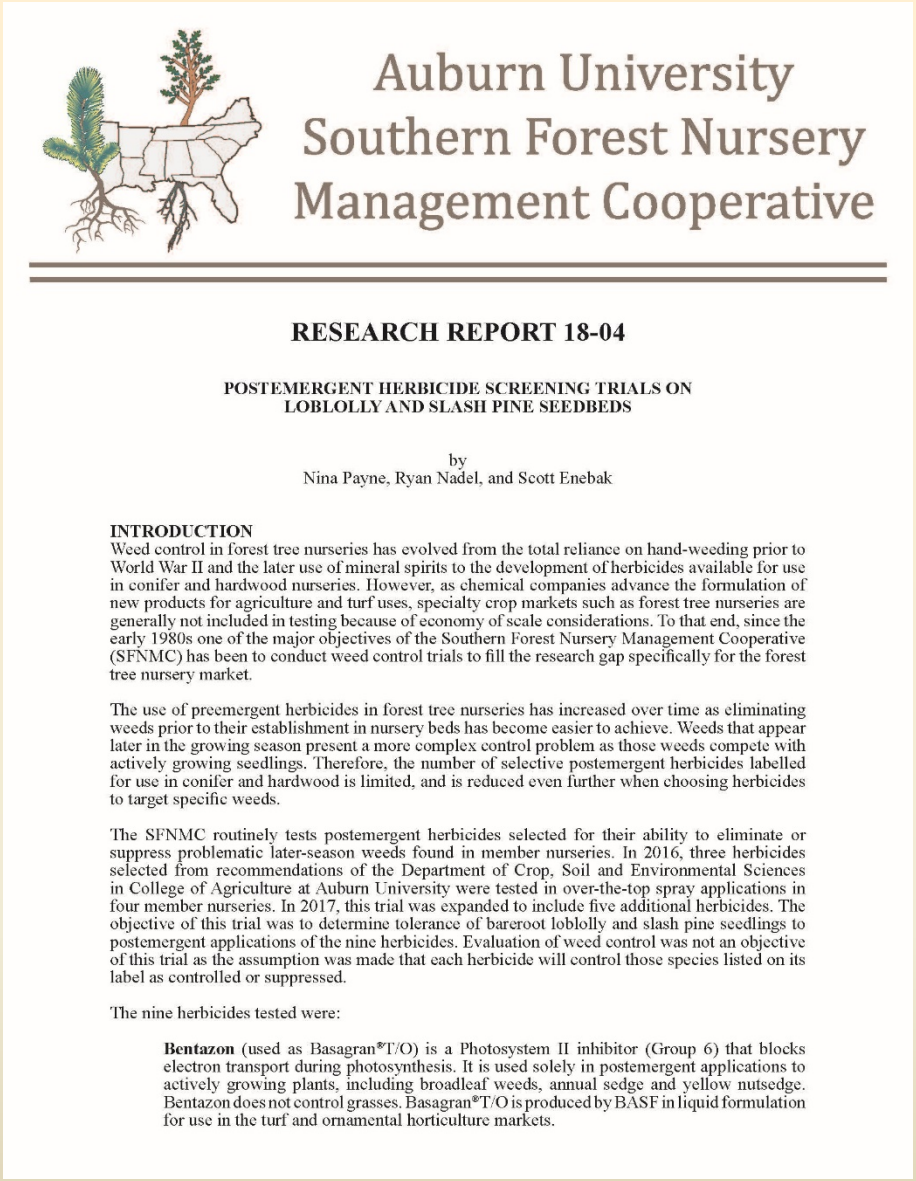
Velocity® *bispyribac*
TapOut® *clethodim*
Defendor™ *florasulam*
Frequency® *topramezone*
Envoke® *trifloxysulfuron*

Results
on BAREROOT Slash Pine
(1 site only)

Little to no seedling damage by:

Basagran®T/O *bentazon*
TapOut® *clethodim*
Defendor™ *florasulam*
Valor®EZ *flumioxazin*
Frequency® *topramezone*
Envoke® *trifloxysulfuron*

2017
Post-emergent Herbicide Screening Study results reported in RR 18-04



Auburn University
Southern Forest Nursery Management Cooperative

RESEARCH REPORT 18-04

POSTEMERGENT HERBICIDE SCREENING TRIALS ON LOBLOLLY AND SLASH PINE SEEDBEDS

by
Nina Payne, Ryan Nadel, and Scott Enebak

INTRODUCTION

Weed control in forest tree nurseries has evolved from the total reliance on hand-weeding prior to World War II and the later use of mineral spirits to the development of herbicides available for use in conifer and hardwood nurseries. However, as chemical companies advance the formulation of new products for agriculture and turf uses, specialty crop markets such as forest tree nurseries are generally not included in testing because of economy of scale considerations. To that end, since the early 1980s one of the major objectives of the Southern Forest Nursery Management Cooperative (SFNMC) has been to conduct weed control trials to fill the research gap specifically for the forest tree nursery market.

The use of preemergent herbicides in forest tree nurseries has increased over time as eliminating weeds prior to their establishment in nursery beds has become easier to achieve. Weeds that appear later in the growing season present a more complex control problem as those weeds compete with actively growing seedlings. Therefore, the number of selective postemergent herbicides labelled for use in conifer and hardwood is limited, and is reduced even further when choosing herbicides to target specific weeds.

The SFNMC routinely tests postemergent herbicides selected for their ability to eliminate or suppress problematic later-season weeds found in member nurseries. In 2016, three herbicides selected from recommendations of the Department of Crop, Soil and Environmental Sciences in College of Agriculture at Auburn University were tested in over-the-top spray applications in four member nurseries. In 2017, this trial was expanded to include five additional herbicides. The objective of this trial was to determine tolerance of bareroot loblolly and slash pine seedlings to postemergent applications of the nine herbicides. Evaluation of weed control was not an objective of this trial as the assumption was made that each herbicide will control those species listed on its label as controlled or suppressed.

The nine herbicides tested were:

Bentazon (used as Basagran®T/O) is a Photosystem II inhibitor (Group 6) that blocks electron transport during photosynthesis. It is used solely in postemergent applications to actively growing plants, including broadleaf weeds, annual sedge and yellow nutsedge. Bentazon does not control grasses. Basagran®T/O is produced by BASF in liquid formulation for use in the turf and ornamental horticulture markets.

ALWAYS TEST NEW PRODUCTS IN A SMALL AREA OF NURSERY PRIOR TO LARGER-SCALE USE!

Questions/comments?

2018 Herbicide Trials

All studies designed to test seedling tolerance

BAREROOT

- *Post-emergent herbicides screening study*

CONTAINER

- *Ronstar®Flo study*

Post-emergent Herbicide Screening Trial

Expansion and additional testing of post-emergent herbicide trials to determine seedling tolerance to herbicides not currently labelled for conifer nursery use

- 11 herbicides applied at lowest labelled rate at 9 weeks post-sowing (5 from 2017 study + 6 untested-by-SFNMC)
- **Bareroot** trials installed at K & L Forest Nursery (loblolly) and Rayonier Elberta Nursery (loblolly and slash)

- Accepted weeds listed as controlled or suppressed on label
- Groups 1, 2, 14 and 27 herbicides (various modes of action, sites of action, target weeds and currently labelled crops)

Herbicides used

Trade Name	Common Name	Labelled Crops	Target Weeds	MOA Group # and action
Defendor™	***florasulam***	turf	catchweed, dandelion, groundsel, other broadleaf weeds	**2** ***ALS inhibitor***
Envoke®	***trifloxysulfuron***	cotton, sugarcane	beggarweed, Johnsongrass, marestail, morning glory, purple & yellow nutsedge, pigweed, sicklepod	**2** ***ALS inhibitor***
Frequency®	***topramezone***	VM, conifer plantations (site prep and one year post planting)	Palmer amaranth, carpetweed, marestail, morning glory, pigweed, crabgrass, goosegrass	**27** ***Pigment Synthesis inhibitor***
Mission®	***flazasulfuron***	grapes, citrus, conifer trees 'container and field-grown conifers'	pigweed, dandelion, mustard, ragweed, p. spurge, yellow and purple nutsedge, kyllinga, crabgrass, horseweed	**2** ***ALS inhibitor***
Plateau®	***imazapic***	pastures, rangeland, conifer plantation site prep	beggarweed, morningglory, pigweed, mustard, sicklepod, crabgrass, goosegrass, yellow and purple nutsedge, spurge, torpedograss, dallisgrass, crowfootgrass	**2** ***ALS inhibitor***
Ronstar®Flo	***oxadiazon***	turf and ornamentals	annual sedge, crabgrass, goosegrass, carpetweed, p. spurge, pigweed	**14** ***PPO inhibitor***
ShieldEx®	***tolpyralate***	corn	Palmer amaranth, carpetweed, horseweed, morningglory, pigweed, crabgrass, goosegrass, dandelion	**27** ***Pigment Synthesis inhibitor***
Strada®	***orthosulfamuron***	rice	eclipta, rice flatsedge, gooseweed, morningglory, redstem, prickly sida, yellow nutsedge	**2** ***ALS inhibitor***
TapOut®	***clethodim***	conifer trees, flax, cotton, food crops	grasses only	**1** ***ACCase inhibitor***
Velocity®	***bispyribac***	turf	yellow nutsedge, clover, dandelion, henbit, other broadleaf weeds	**2** ***ALS inhibitor***
Venue®	***pyraflufen***	corn, cotton, soybeans, grapes, vegetables, sugarcane	Palmer amaranth, bedstraw, beggarweed, carpetweed, eclipta, morningglory, pigweed, prickly sida	**14** ***PPO inhibitor***

Herbicides are available for testing but task of testing will lie with SFNMC and nurseries, probably not with chemical companies, manufacturers or distributors

Questions/comments?

Ronstar®Flo (*oxadiazon*) Study in Container Nursery

Follow-up to 2017 container trial
reporting positive results on seedling tolerance and
willow and other weed control

- **Container** trial installed at IFCO Moultrie, GA nursery in loblolly, slash, longleaf and shortleaf pine at sowing

2017 Results of CONTAINER Ronstar®Flo study

Table 2. Container pine seedling characteristics treated with Ronstar®Flo in four species, IFCO Nursery, Moultrie, GA.

Species	Rate	Survival[1] (% Fill)	Shoot Height (cm)	RCD (mm)	Shoot Weight (g)	Plug Weight[2] (g)
Loblolly	0 oz./ac	92.7 a	26.2	3.72	2.05	11.38
	40 oz./ac	93.2 a	26.6	3.75	2.09	11.52
	80 oz./ac	90.2 a	26.7	3.78	2.12	11.69
	122 oz./ac	86.5 b	26.1	3.78	2.07	11.81
Longleaf	0 oz./ac	83.4	26.6	8.10	3.12	13.73
	40 oz./ac	82.9	26.4	8.18	3.08	13.77
	80 oz./ac	83.7	26.1	8.18	3.10	13.69
	122 oz./ac	79.8	26.3	8.30	3.18	13.89
Shortleaf	0 oz./ac	88.0	21.5	3.99	1.86	11.22
	40 oz./ac	89.1	21.8	3.92	1.90	11.37
	80 oz./ac	86.7	21.9	3.98	1.92	11.38
	122 oz./ac	88.0	22.0	3.98	1.90	11.36
Slash	0 oz./ac	93.5	28.7	4.22	2.77	12.61
	40 oz./ac	92.5	28.4	4.21	2.66	12.77
	80 oz./ac	89.9	27.8	4.14	2.61	12.78
	122 oz./ac	90.2	27.6	4.18	2.64	12.62

Page 6, RR 18-01

First SFNMC trial of Ronstar®Flo in containers

2017 Results of willow and other weed control in CONTAINER Ronstar®Flo studies

Table 3. Percent likelihood of no willow or other weed populations in containers treated with Ronstar®Flo in four species, IFCO Nursery, Moultrie, GA.

Species	Rate	% likelihood of 0 willows present in 1 container tray	% likelihood of 0 other weeds present in 1 container tray
Loblolly	0.0 oz./ac	20.0	80.0
	40 oz./ac	86.7	100.0
	80 oz./ac	100.0	86.7
	122 oz./ac	93.3	100.0
Longleaf	0.0 oz./ac	53.3	86.7
	40 oz./ac	100.0	100.0
	80 oz./ac	100.0	100.0
	122 oz./ac	100.0	100.0
Shortleaf	0.0 oz./ac	*	*
	40 oz./ac	*	*
	80 oz./ac	*	*
	122 oz./ac	*	*
Slash	0.0 oz./ac	*	66.7
	40 oz./ac	*	100.0
	80 oz./ac	*	100.0
	122 oz./ac	*	93.3

Page 7, RR 18-01

Questions/comments?

Herbicide Trials Recap

2017: 4 bareroot trials and 2 container trials in 27 installations

2018: 1 bareroot trial and 1 container trial in 7 installations

nina.payne@auburn.edu

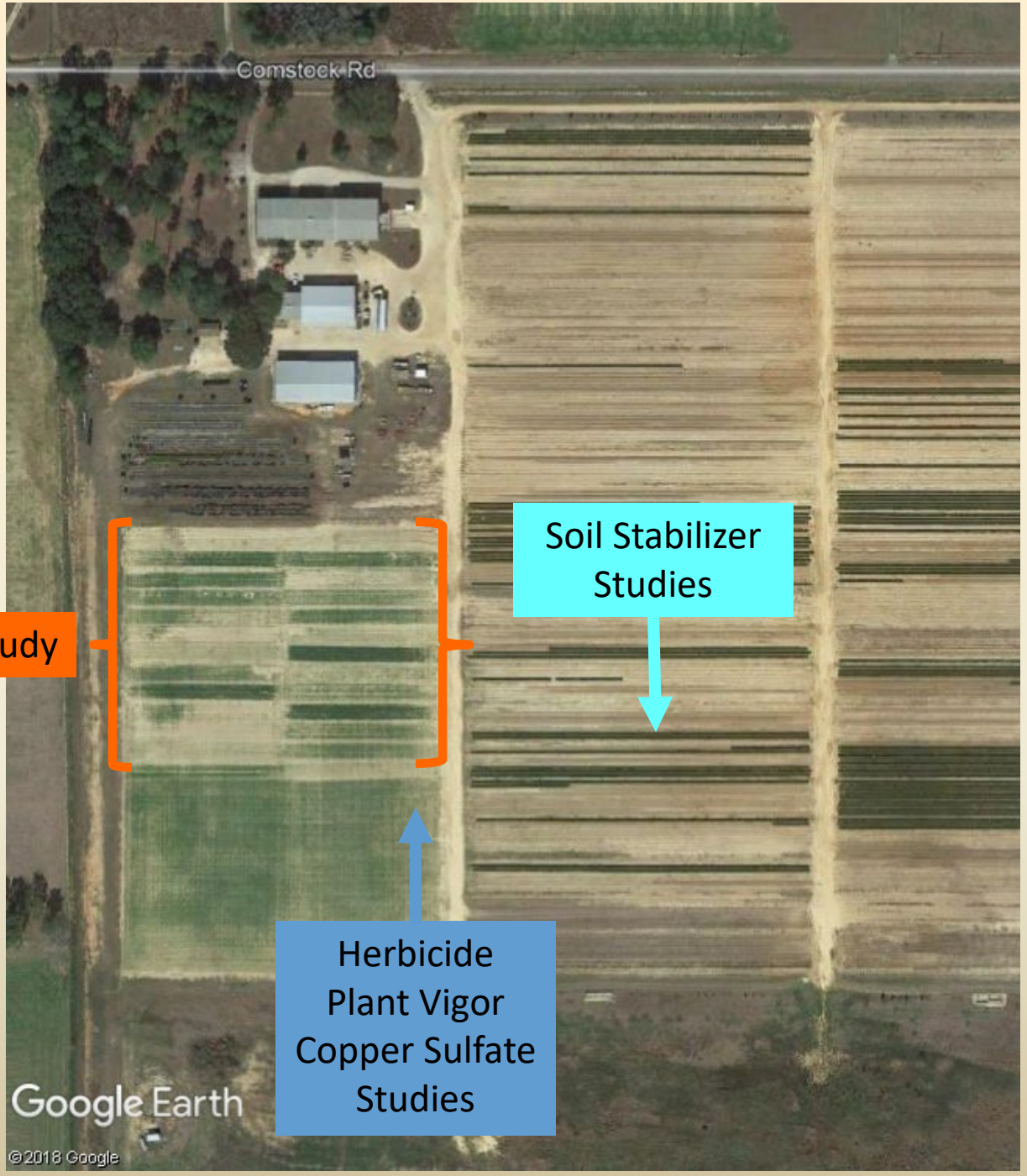
Thanks to:

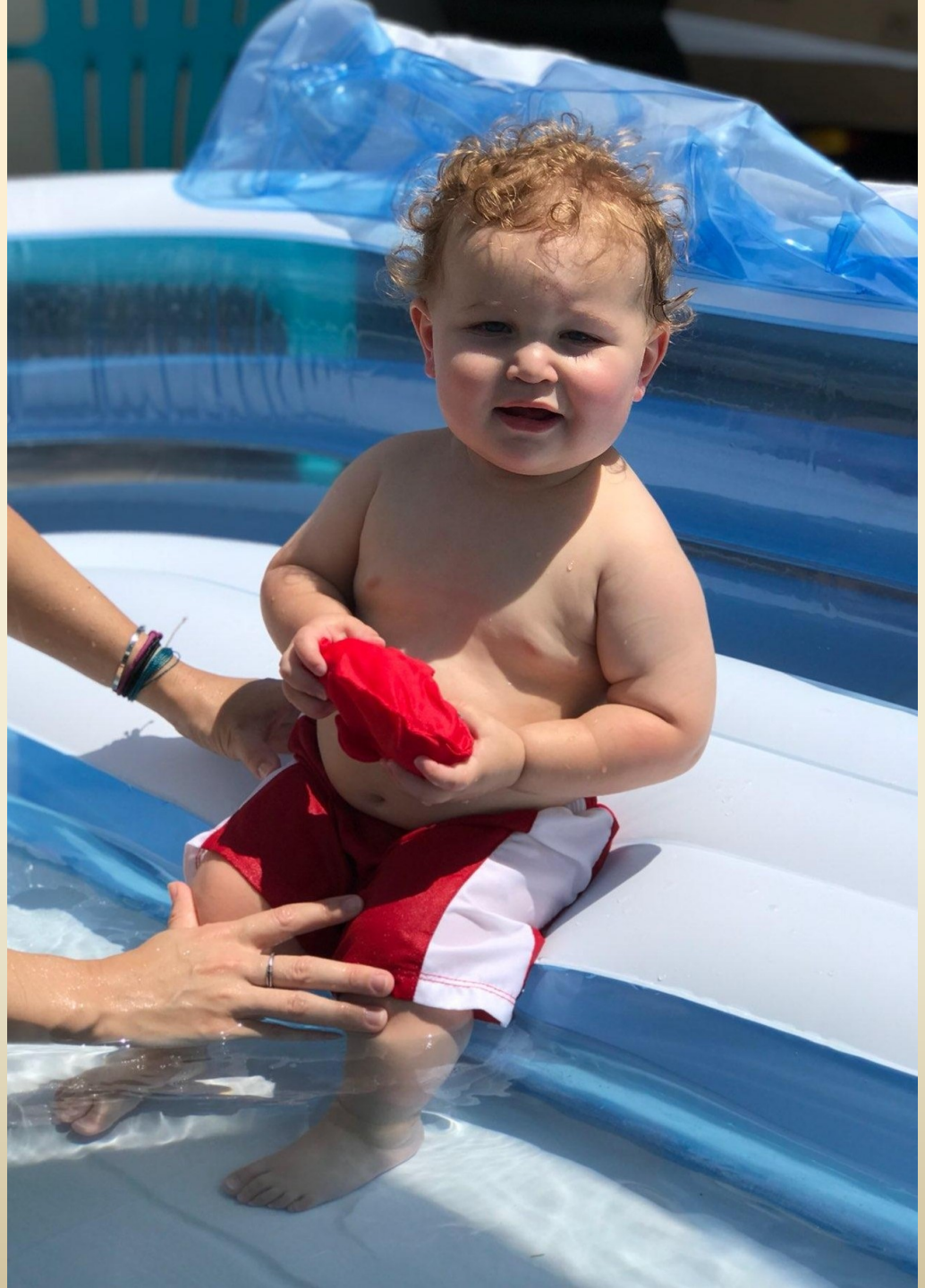
Pat Burch, Dow AgroSciences
Scott Croxton, Nichino America
Wilson Faircloth, Syngenta
Jason Fausey, Nufarm
David Hunt, Valent
Wade Stewart, Summit Agro USA
Kate Venner, BASF
Bobby Walls, FMC

Dr. Steve Li, Auburn University
Dr. Scott McElroy, Auburn University

ArborGen Blenheim SC Nursery
ArborGen Shellman GA Nursery
ArborGen (SCFC) Trenton SC Nursery
Georgia Forestry Commission Flint River GA Nursery
IFCO Jesup GA Nursery
IFCO Moultrie GA Nursery
K & L Forest Nursery Inc. GA Nursery
Rayonier Elberta AL Nursery

Wednesday Tour





Wyatt
summer 2018