SFNMC HERBICIDE TRIALS UPDATE

2019 SFNMC Contact Meeting
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2018 Herbicide Trials Update

BAREROOT

- *Post-emergent Herbicide Screening trial (11)*

CONTAINER

- *Ronstar®Flo study*

Postemergent Herbicide Screening Trial

Expansion of 2016 and 2017 postemergent herbicide trials to determine seedling tolerance

- 11 herbicides applied at lowest labeled rate at 8-9 weeks post-sowing

Loblolly trials installed at K & L Forest Nursery and Rayonier Nursery (+ slash)

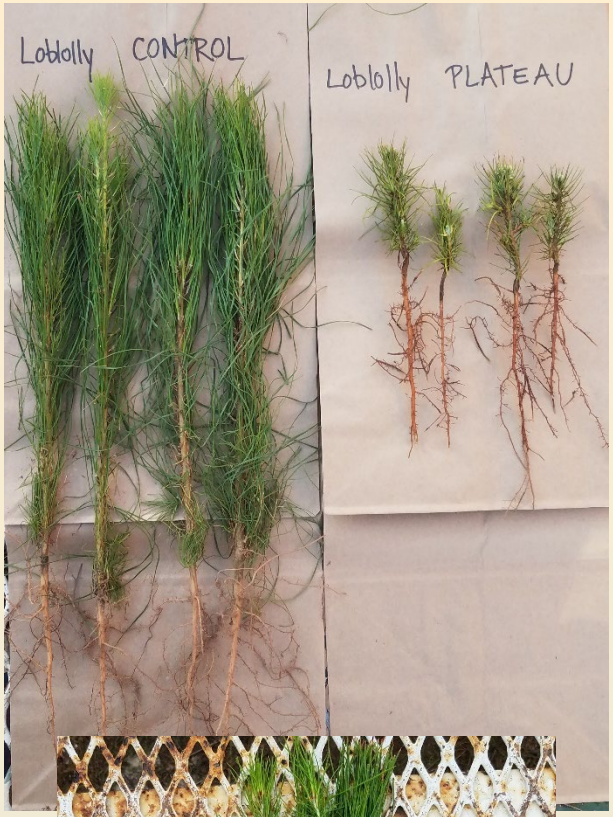
- Accepted weeds listed as controlled or suppressed on label

Herbicides used

Trade Name	Common Name	Labeled Tolerant 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® 2018	***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® 2018	***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 2018	***oxadiazon***	turf and ornamentals	annual sedge, crabgrass, goosegrass, carpetweed, prostrate spurge, pigweed	**14** ***PPO inhibitor***
ShieldEx® 2018	***tolpyralate***	corn	Palmer amaranth, carpetweed, horseweed, morningglory, pigweed, crabgrass, goosegrass, dandelion	**27** ***Pigment Synthesis inhibitor***
Strada® 2018	***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® 2018	***pyraflufen***	corn, cotton, soybeans, grapes, vegetables, sugarcane	Palmer amaranth, bedstraw, beggarweed, carpetweed, eclipta, morningglory, pigweed, prickly sida	**14** ***PPO inhibitor***

Loblolly bed in August 2018

Loblolly seedlings in October 2018



Slash bed in August 2018

Slash seedlings in October 2018

Results on BAREROOT Loblolly and Slash Pine

- Little to no seedling damage by:

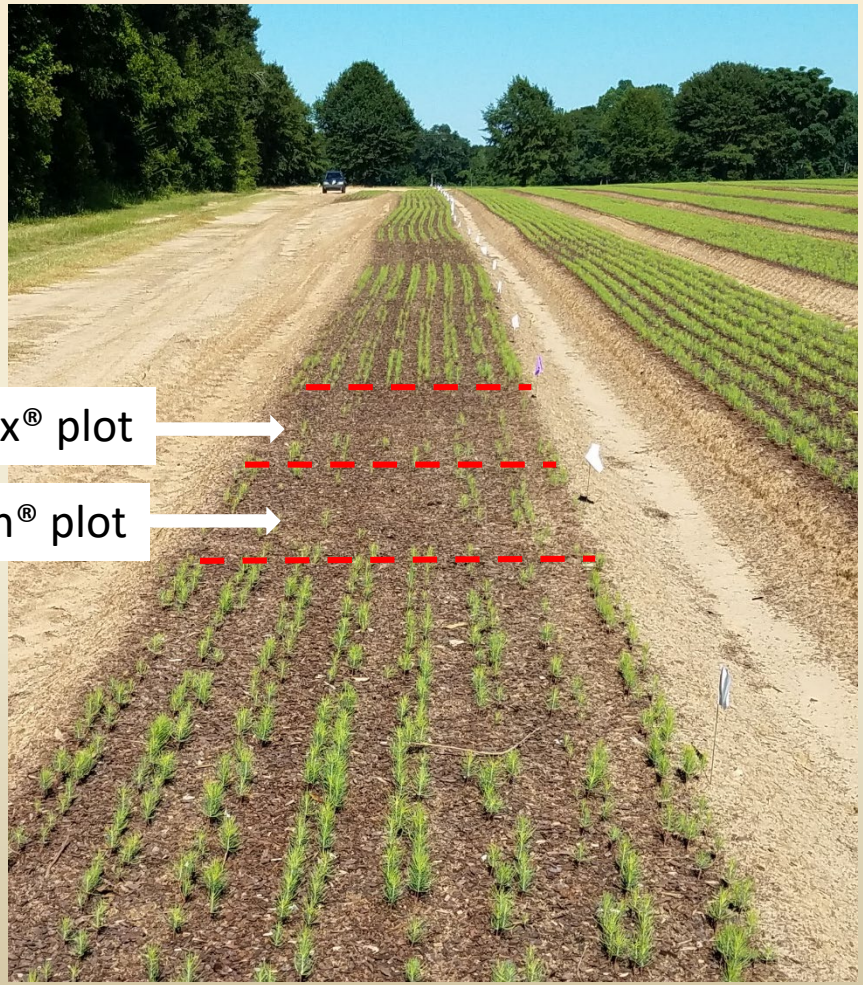
Defendor™ *florasulam*
Envoke® *trifloxysulfuron**
Frequency® *topramezone*
Ronstar®FLO *oxadiazon*
Strada® *orthosulfamuron**
Shieldex®400SC *tolpyralate**
TapOut® *clethodim*
Venue® *pyraflufen**

- Seedling damage by:

Mission® *flazasulfuron**
Plateau® *imazapic*
Velocity® *bispyribac*

Results on BAREROOT Loblolly Pine, continued

2019 germination on bed used in 2018 Study



*Potential for carryover to next growing season by:

Envoke® *trifloxysulfuron**
Mission® *flazasulfuron**
Strada® *orthosulfamuron**
Shieldex®400SC *tolpyralate**
Venue® *pyraflufen**

Recommendations for 2019 Postemergent Herbicide Screening Trial

- Discontinue testing of:

  Mission® *flazasulfuron*
  Plateau® *imazapic*
  Velocity® *bispyribac*

- Continue testing of:

  * track any carryover effects in 2020 plots

  Defendor™ *florasulam*
  Envoke® *trifloxysulfuron**
  Frequency® *topramezone*
  Ronstar®FLO *oxadiazon*
  Strada® *orthosulfamuron**
  Shieldex®400SC *tolpyralate**
  Venue® *pyraflufen**

- Add testing of:

  Beacon® *primisulfuron**
  Tenacity® *mesotrione*
  Grasp® *penoxsulam (from 2016 & 2017)*

2018 Postemergent Herbicide Screening Study RR 19-04

Southern Forest Nursery Management Cooperative

RESEARCH REPORT 19-04

POSTEMERGENT HERBICIDE SCREENING TRIALS ON LOBLOLLY AND SLASH PINE SEEDBEDS II

by
Nina Payne, Ryan Nadel, and Scott Enebak

INTRODUCTION

Since the early 1980s, the Southern Forest Nursery Management Cooperative has conducted herbicide trials to identify products capable of eliminating or reducing populations of undesired plants while causing no damage to desired conifer crop seedlings. While the use of preemergent herbicides is now a common forest-tree nursery practice, the use of postemergent herbicides later in the growing season applied over-the-top of seedlings is limited. Few postemergent herbicides are tested and labeled for the conifer seedling nursery market by manufacturers as the market share of this specialty crop is small compared to the size of agricultural and turf markets. Also, economic analyses of weed density thresholds have been made for most major agricultural crops. However, since little research on the economic threshold of weed density in forest-tree nurseries has been conducted, identification of appropriate herbicides to control weed population continues.

Towards the goal of identifying postemergent herbicides that can be safely used on conifer seedlings grown in nursery beds, the SFNMC has continued and expanded trials conducted in 2016 and 2017 with postemergent herbicides labeled for agricultural and turf applications. The objective of this trial was to determine tolerance of loblolly and slash pine seedlings to 11 postemergent herbicides, six of which were tested in 2017. Because weed populations vary by type and quantity in each nursery, evaluations of weed control are generally not included as an objective of this study. The assumption was made that each product tested will suppress or control those targeted weed species identified on each label.

The eleven herbicides tested were:

Bispyribac (used as Velocity®) is an ALS inhibitor (Group 2) and stops plant growth by disrupting amino acid production. It is used in postemergent applications to control bluegrass, some broadleaf weeds and yellow nutsedge in turf but is not currently labeled for use in conifer nurseries. Valent is the manufacturer of both Velocity® and Regiment®, a bispyribac product labeled for use in rice. This product was tested at two SFNMC member nurseries in 2017.

Clethodim (used as TapOut®) acts to inhibit the enzyme ACCase (Group 1) to block production of lipids. Grasses are the target weed of this herbicide due to their sensitivity to this enzyme inhibition. Broadleaf weeds and sedges

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

Pre-emergent Herbicide Trial in Containers with Ronstar®Flo (*oxadiazon)*

Follow-up to 2012 and 2013 SFNMC bareroot trials and 2017 SFNMC container trials reporting positive results on seedling tolerance and black willow control

- Installed at IFCO Moultrie, GA nursery in loblolly and longleaf pine
- 1 herbicide applied at ½ lowest labeled rate and lowest labeled rate
- Application made over the top of trays either day of or day after sowing, 1X week for 4 weeks during sowing and willow seed dispersal

March and April 2018

Pallet dropped at pivot

Trays to be tagged and sprayed

Sprayed trays randomly placed on pivot

November and December 2018

Seedling and willow/weed counts and collection

Seedling processing

Results of 2018 CONTAINER Ronstar®Flo study

Seedling characteristics measured in December 2018

Species	Application Date	Rate	Survival (% Fill)	Shoot Height (cm)	RCD (mm)	Shoot Weight (g)	Plug Weight (g)
Longleaf	3/21/18	0 oz./ac	85.0	29.6	8.86 a	4.10 a	13.74 a
		40 oz./ac	83.1	29.6	8.49 b	3.71 b	13.61 a
		80 oz./ac	84.2	29.9	8.83 ab	4.11 a	14.08 b
Longleaf	3/28/18	0 oz./ac	88.1 a	28.8	7.66 ab	3.50	12.07
		40 oz./ac	83.5 b	28.6	7.95 a	3.54	11.83
		80 oz./ac	87.0 a	29.3	7.45 b	3.58	11.81
Loblolly	4/2/18	0 oz./ac	97.8	30.1	3.65 a	2.00	10.39
		40 oz./ac	98.0	30.3	3.72 ab	1.99	10.29
		80 oz./ac	95.3	30.3	3.78 b	1.95	10.39
Loblolly	4/10/18	0 oz./ac	98.2	31.5	3.94	2.35 a	11.77 a
		40 oz./ac	97.4	31.2	3.89	2.25 a	11.21 b
		80 oz./ac	97.4	31.2	3.85	2.10 b	11.23 b

Results of 2018 CONTAINER Ronstar®Flo study

Willow and weed control

Species	Application Date	Rate (oz./ac)	% likelihood of 0 willows present in 1 container tray	% likelihood of 0 other weeds present in 1 container tray
Longleaf	3/21/18	0	86.7	93.3
		40	100.0	100.0
		80	100.0	92.3
Longleaf	3/28/18	0	73.3	80.0
		40	100.0	100.0
		80	100.0	100.0
Loblolly	4/2/18[1]	0	13.3	40.0
		40	100.0	73.3
		80	100.0	73.3
Loblolly	4/10/18	0	26.7	73.3
		40	73.3	100.0
		80	46.7	100.0

First SFNMC container trial in 2017:

- Positive results on seedling tolerance except at the 122 oz./ac rate
- Positive results on willow and weed control

Second SFNMC container trial in 2018:

- Mixed results on longleaf seedling tolerance: 2 negative results reported at 40 oz./ac rate but not at 80 oz./ac rate
- Mixed results on loblolly seedling tolerance: lower plug weights reported in 1 installation on treated seedlings, lower density reported in 1 installation on 80 oz./ac treated seedlings
- Positive results on willow and weed control

Recommendations for 2019 RonstarFlo Container Trial

- Continue testing of RonstarFlo:

  4 species for seedling tolerance

  Multiple nursery locations

  With and without shadecloth where feasible

  Use of 40 and 80 oz./ac rates

2018
RonstarFlo on Container Pine Study
RR 19-05

Southern Forest
Nursery Management Cooperative

RESEARCH REPORT 19-05

RONSTAR®FLO (OXADIAZON) ON LOBLOLLY AND LONGLEAF PINE IN A CONTAINER-GROWN NURSERY

by
Nina Payne, Ryan Nadel, and Scott Enebak

INTRODUCTION

In 2017, the SFNMC initiated testing of oxadiazon in container-grown nursery systems in an effort to quantify tolerance of conifer seedlings to pre-emergent applications of the herbicide and to determine its effectiveness in controlling black willow (*Salix nigra*) and other weeds. Ronstar®Flo (liquid formulation of oxadiazon) was selected for testing in container systems after bareroot nursery trials in 2012 and 2013 reported good loblolly pine tolerance and control of annual sedge (*Cyperus compressus*). This product is currently labeled for pre-emergent use in conifer nurseries. Its postemergent use in conifer nurseries is limited to directed sprays or over-the-top applications on tolerant species, which do not include loblolly, longleaf, shortleaf, or slash pine.

Results of the 2017 trial indicated that the effect of at-sowing applications of Ronstar®Flo on containerized conifer seedlings is dependent on species and rate of herbicide applied (Research Report 18-01). The four species used were loblolly, longleaf, shortleaf, and slash pine. Three rates of oxadiazon were tested: 40 oz./ac (one-half the lowest labeled rate), 80 oz./ac (lowest labeled rate) and 122 oz./ac (highest labeled rate). In loblolly pine, seedling density was negatively affected at the highest rate applied (122 oz./acre). No other loblolly seedling characteristic measured was negatively affected at any rate when compared to nontreated seedlings. Similarly, no negative effects were quantified at any rates tested in longleaf and shortleaf pine. Slash pine exhibited negative effects in seedling heights at the 80 and 122 oz./ac rates, although no other negative effects on slash pine were found. Weed populations, especially of black willow, were significantly less in those trays where Ronstar®Flo was applied at sowing.

This 2018 trial was installed to provide additional data on the potential use of Ronstar®Flo in container growing systems. The objectives of this study were: 1) to assess the tolerance of containerized loblolly and longleaf pine to pre-emergent applications of Ronstar®Flo, and 2) evaluate the effectiveness of Ronstar®Flo in controlling black willow and other weed populations in containerized growing systems.

METHODOLOGY

This study was conducted at the IFCO Moultrie, Georgia container nursery. In this study, two rates of the herbicide, 40 and 80 oz./ac, were selected for use due to the negative effect of seedling density seen in loblolly pine at the

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K & L Forest Nursery Inc. Buena Vista, GA Nursery
Rayonier Elberta, AL Nursery

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2019 Herbicide Trials

Bareroot

- Post-emergent herbicides (10) screening study (2 species)

Container

- Ronstar®Flo pre-emergent study targeting willow in 2 nurseries (4 species)
- TapOut® postemergent study targeting grasses in 1 nursery (2 species)