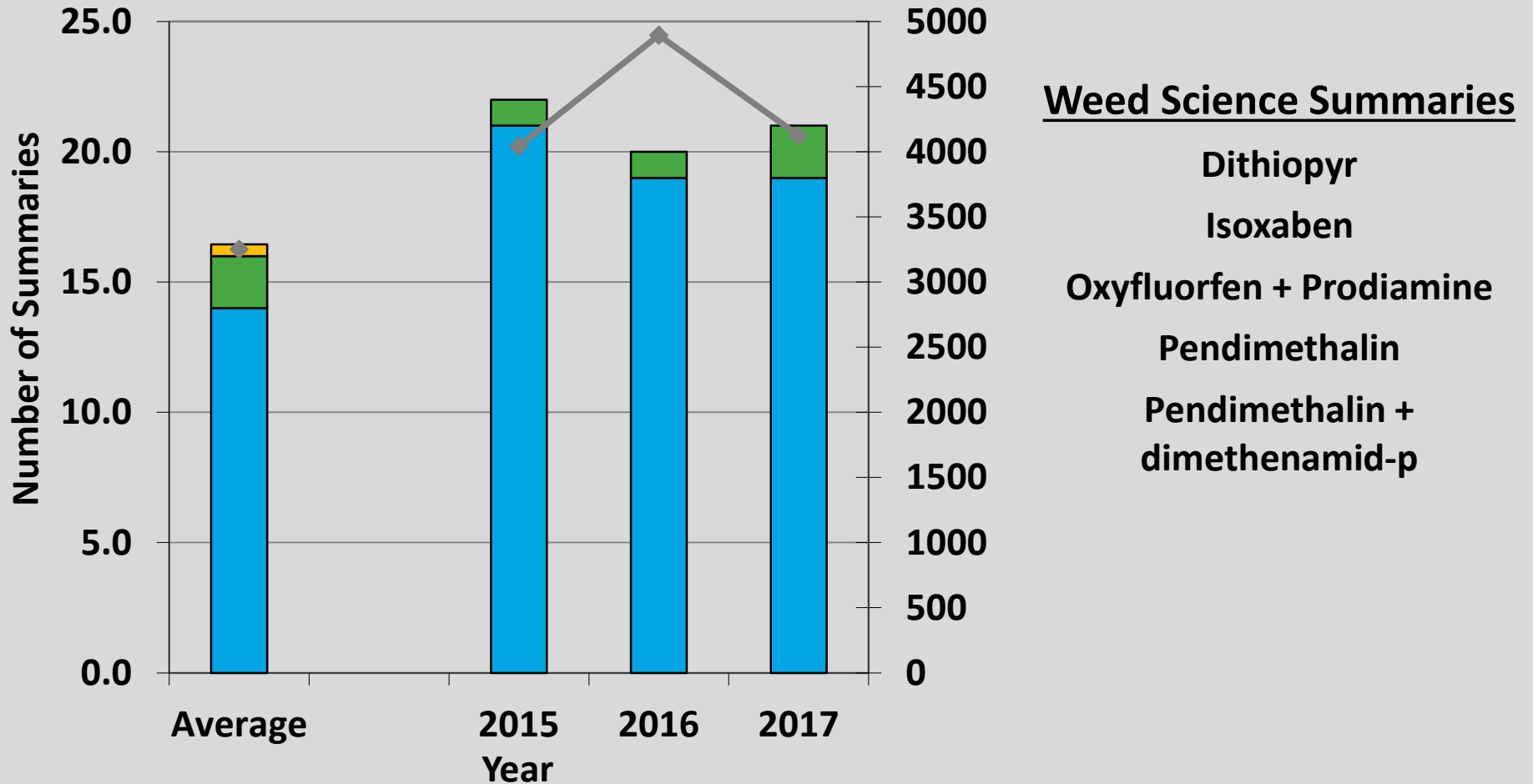


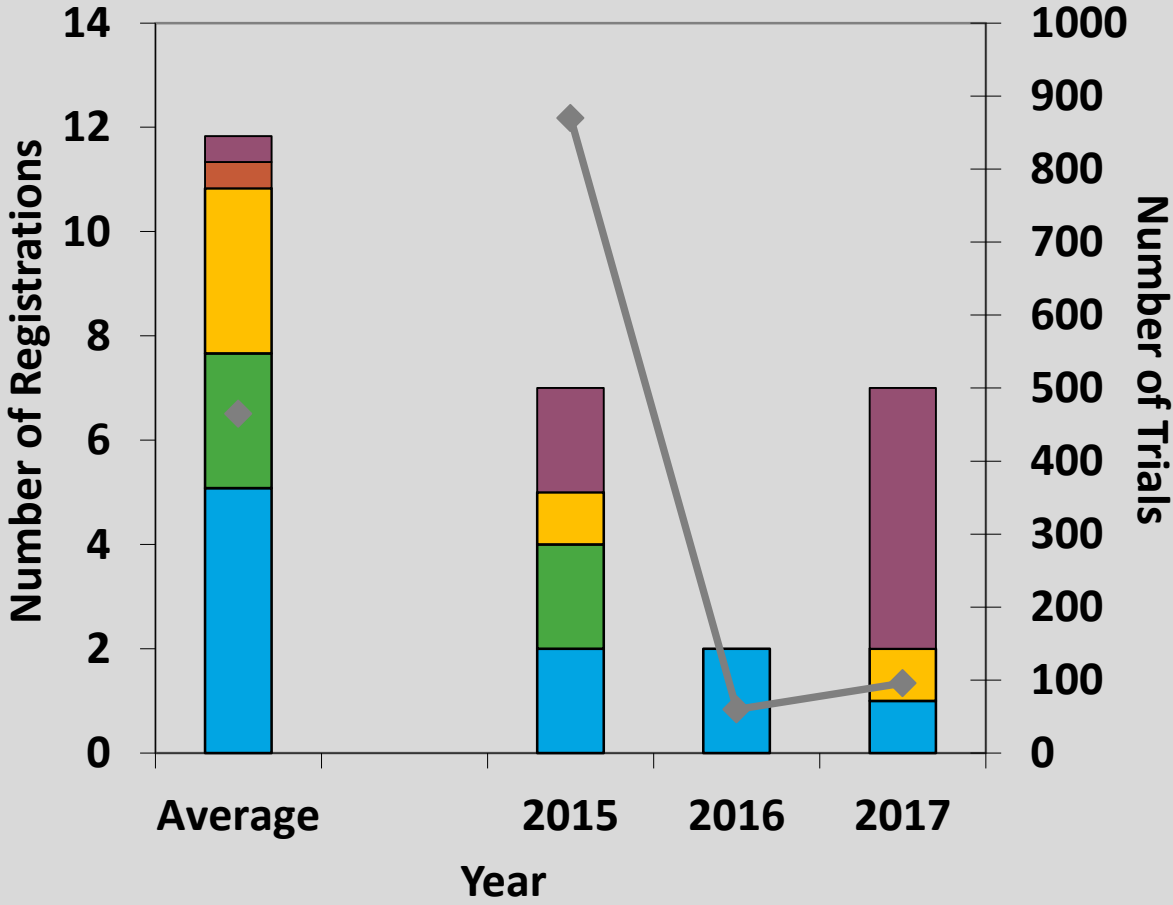
# **Update on 2017 Weed Science Research in the IR-4 Ornamental Horticulture Program**

Palmer, C.L., Y-L. Yan, J. Baron, and E. Vea

# Ornamental Horticulture Program Data Summaries – 2017 Final



# Ornamental Horticulture Program – Registrations – 2017 Final

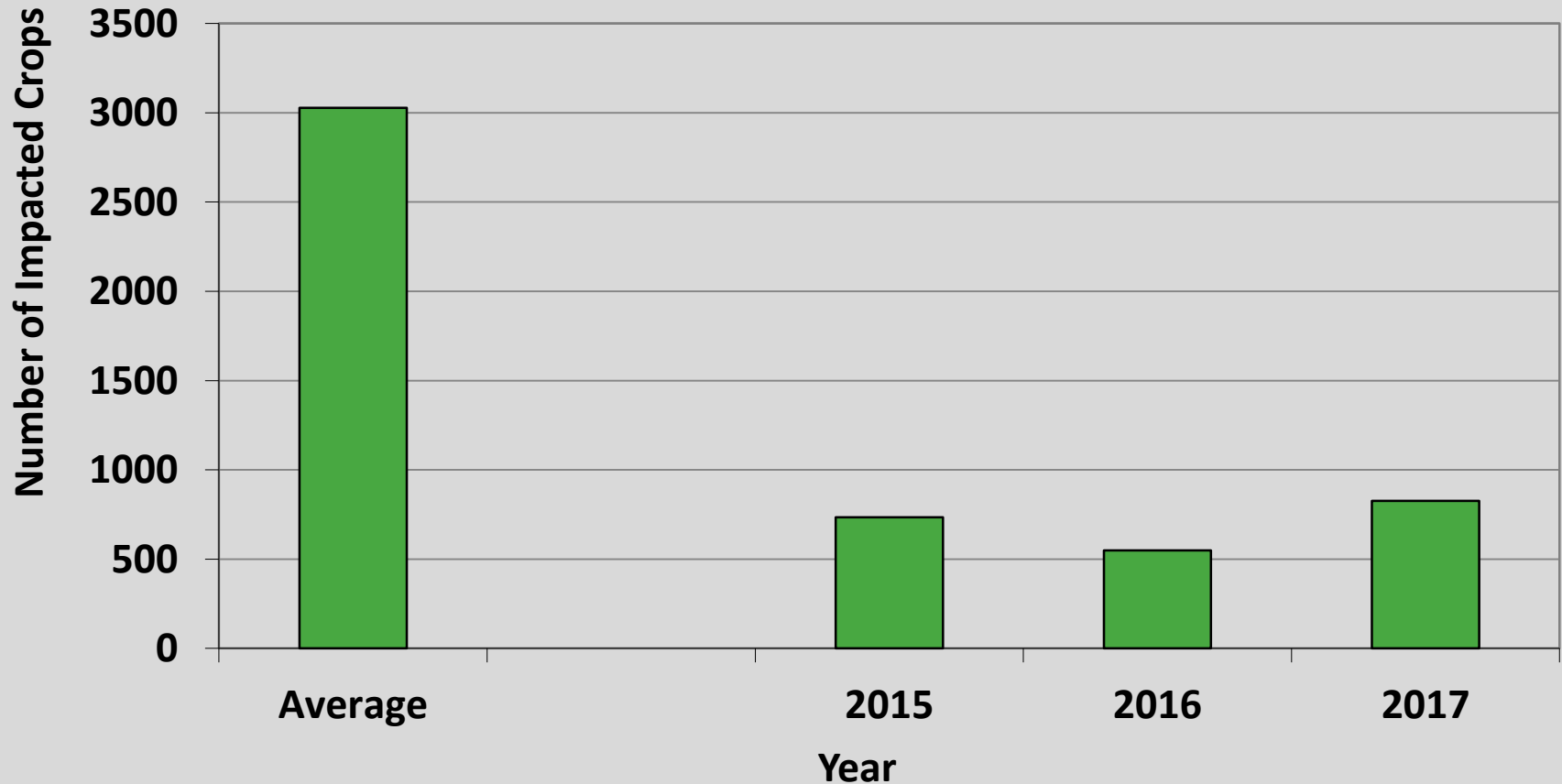


Weed Science Registrations

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# Ornamental Horticulture Program – Crops Impacted by Registrations – 2017 Final



# 2017 Weed Science Research Program

- In Season Pre-emergent Herbicide Crop Safety
- Ornamental Grass Crop Safety
- Bulb Herbicide Crop Safety
  - subset of Pre-emergent
- Flumioxazin + Pyroxasulfone Crop Safety

# 2017 Weed Science Research Program

- In Season Pre-emergent Herbicide Crop Safety
- **Ornamental Grass Crop Safety**
- Bulb Herbicide Crop Safety
  - subset of Pre-emergent
- Flumioxazin + Pyroxasulfone Crop Safety



**Ornamental Grass Crop Safety**

# 2014-2017 Ornamental Grass Crop Safety

- Products
  - Dimension 2EW (dithiopyr)
    - 2 pt (0.5 lb ai)
    - 4 pt (1.0 lb ai)
    - 8 pt (2.0 lb ai)
  - Gallery (isoxaben)
    - 31 fl oz (1.0 lb ai)
    - 62 fl oz (2.0 lb ai)
    - 123 fl oz (4.0 lb ai)
  - Pendulum 2G (pendimethalin)
    - 150 lb (3 lb ai)
    - 300 lb (6 lb ai)
    - 600 lb (12 lb ai)



# 2014-2017 Ornamental Grass Crop Safety

- Applications were applied
  - As/after plants broke dormancy, within 1 week after transplanting
  - Six (6) weeks after the first application
- Ratings
  - Phytotoxicity on a scale of 0 to 10
  - 1, 2, and 4 weeks after each application
- During this period, 215 trials planned on 33 different ornamental grasses

# Ornamental Grass List

- American beachgrass (*Ammophila breviligulata*)
- Big Blue Stem (*Andropogon gerardii*)
- Broom Sedge Bluestem (*Andropogon virginicus*)
- Feather Reed Grass (*Calamagrostis acutiflora*)
- Leatherleaf Sedge (*Carex buchananii*)
- Sedge, Cherokee (*Carex cherokeensis*)
- Carex morrowii (*Carex morrowii*)
- Indian Woodoats (*Chasmanthium latifolium*)
- Pampas Grass, Uruguayan (*Cortaderia selloana*)
- Tufted Hairgrass (*Deschampsia caespitosa*)
- Weeping Lovegrass (*Eragrostis curvula*)
- Purple Lovegrass (*Eragrostis spectabilis*)
- Blue Fescue (*Festuca cinerea*)
- Field Fescue (*Festuca glauca*)
- Sheep Fescue (*Festuca ovina*)
- Hakone Grass (*Hakonechloa sp.*)
- Sweet Grass (*Hierochloa odorata*)
- Common Rush (*Juncus effusus*)
- Ryegrass, Sand (*Leymus arenarius*)
- Muhly, Hairyawm (*Muhlenbergia capillaris*)
- Pine Muhly (*Muhlenbergia dubia*)
- Bamboo Muhly (*Muhlenbergia dumosa*)
- Deer Grass (*Muhlenbergia rigens*)
- Finestem Needlegrass (*Nassella tenuissima*)
- Switch Grass (*Panicum virgatum*)
- Fountaingrass (*Pennisetum alopecuroides*)
- Red Bunny Tails (*Pennisetum messiacum*)
- Oriental Fountain Grass (*Pennisetum orientale*)
- Plumegrass, Ravennagrass (*Saccharum sp.*)
- Little Bluestem (*Schizachyrium scoparium*)
- Indian Grass (*Sorghastrum nutans*)
- Prairie Dropseed (*Sporobolus heterolepis*)
- Feather Grass, Mexican (*Stipa sp.*)

# 2014-2017 Ornamental Grass Crop Safety

- Research Status
  - 2014: 75 completed, 11 cancelled
  - 2015: 78 completed, 7 cancelled
  - 2016: 36 completed, 1 cancelled, and 3 pending trials
  - 2017: 9 completed, 6 pending

Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Fountaingrass ( <i>Pennisetum alopecuroides</i> )	1.0 (1 - 1) n2
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )	1.0 (1 - 1) n2
Common Rush ( <i>Juncus effusus</i> )	1.0 (1 - 1) n3
Ryegrass, Sand ( <i>Leymus arenarius</i> )	1.0 (1 - 1) n3
Muhly, Hairyawn ( <i>Muhlenbergia capillaris</i> )	1.3 (1 - 2) n3
Switch Grass ( <i>Panicum virgatum</i> )	1.3 (1 - 2) n3
Weeping Lovegrass ( <i>Eragrostis curvula</i> )	1.5 (1 - 3) n4
Hakone Grass ( <i>Hakonechloa sp.</i> )	1.7 (1 - 2) n3
Feather Reed Grass ( <i>Calamagrostis acutiflora</i> )	1.7 (1 - 3) n3
Finestem Needlegrass ( <i>Nassella tenuissima</i> )	1.7 (1 - 3) n3
Big Blue Stem ( <i>Andropogon gerardii</i> )	2.3 (1 - 3) n3
Little Bluestem ( <i>Schizachyrium scoparium</i> )	2.3 (1 - 3) n4
American beachgrass ( <i>Ammophila breviligulata</i> )	2.3 (1 - 4) n3
Field Fescue ( <i>Festuca glauca</i> )	2.5 (1 - 4) n4
Indian Woodoats ( <i>Chasmanthium latifolium</i> )	2.5 (1 - 4) n4
Oriental Fountain Grass ( <i>Pennisetum orientale</i> )	2.7 (1 - 4) n3
Prairie Dropseed ( <i>Sporobolus heterolepis</i> )	2.7 (1 - 4) n3
Broom Sedge Bluestem ( <i>Andropogon virginicus</i> )	2.7 (2 - 3) n3
Tufted Hairgrass ( <i>Deschampsia caespitosa</i> )	3.0 (2 - 4) n3
Pine Muhly ( <i>Muhlenbergia dubia</i> )	3.0 (2 - 4) n2
Sheep Fescue ( <i>Festuca ovina</i> )	5.0 (5 - 5) n2
Leatherleaf Sedge ( <i>Carex buchananii</i> )	1.5 (1 - 2) n2 Labeled
Carex morrowii ( <i>Carex morrowii</i> )	2.5 (2 - 3) n2 Labeled
Pampas Grass, Uruguayan ( <i>Cortaderia selloana</i> )	2.0 (2 - 2) n1 Labeled
Blue Fescue ( <i>Festuca cinerea</i> )	1.5 (1 - 2) n2 Labeled

# 2014-2017 Results: Dimension 2EW

Key:

- 1 = No injury
- 2 = Minor injury
- 3 = Moderate injury
- 4 = Severe injury
- 5 = Mortality

An average of 3 or higher should preclude application onto that species

# Dimension EW on *Andropogon gerardii* and *Leymus arenarius*

Hannah Mathers: *Andropogon gerardii* stunting with Dimension (4X, 2X, 1X, nontreated)



Hannah Mathers: *Leymus arenarius* with Dimension (nontreated, 1X, 2X, 4X)

# 2014-2017 Results: Gallery SC

Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Deer Grass ( <i>Muhlenbergia rigens</i> )	1.0 (1 - 1) n1
Bamboo Muhly ( <i>Muhlenbergia dumosa</i> )	1.0 (1 - 1) n2
Big Blue Stem ( <i>Andropogon gerardii</i> )	1.0 (1 - 1) n2
Feather Grass, Mexican ( <i>Stipa sp.</i> )	1.0 (1 - 1) n2
Finestem Needlegrass ( <i>Nassella tenuissima</i> )	1.0 (1 - 1) n2
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )	1.0 (1 - 1) n2
Sweet Grass ( <i>Hierochloe odorata</i> )	1.0 (1 - 1) n2
Pine Muhly ( <i>Muhlenbergia dubia</i> )	2.0 (1 - 3) n2
Tufted Hairgrass ( <i>Deschampsia caespitosa</i> )	3.0 (3 - 3) n1
<b>Indian Grass (<i>Sorghastrum nutans</i>)</b>	<b>1.0 (1 - 1) n3</b>
<b>Prairie Dropseed (<i>Sporobolus heterolepis</i>)</b>	<b>1.0 (1 - 1) n3</b>
<b>Ryegrass, Sand (<i>Leymus arenarius</i>)</b>	<b>1.0 (1 - 1) n3</b>
<b>Switch Grass (<i>Panicum virgatum</i>)</b>	<b>1.0 (1 - 1) n3</b>
<b>Common Rush (<i>Juncus effusus</i>)</b>	<b>1.3 (1 - 2) n3</b>
<b>Muhly, Hairyawn (<i>Muhlenbergia capillaris</i>)</b>	<b>2.0 (1 - 3) n3</b>
<b>Carex morrowii (<i>Carex morrowii</i>)</b>	<b>2.3 (1 - 3) n3</b>
<b>Leatherleaf Sedge (<i>Carex buchananii</i>)</b>	<b>2.0 (1 - 4) n3</b>
<b>Feather Reed Grass (<i>Calamagrostis acutiflora</i>)</b>	<b>2.7 (1 - 4) n3</b>
<b>Sedge, Cherokee (<i>Carex cherokeensis</i>)</b>	<b>3.0 (1 - 4) n3</b>
Indian Woodoats ( <i>Chasmanthium latifolium</i> )	1.3 (1 - 2) n3 Labeled
Pampas Grass, Uruguayan ( <i>Cortaderia selloana</i> )	1.0 (1 - 1) n1 Labeled
Field Fescue ( <i>Festuca glauca</i> )	3.0 (3 - 3) n1 Labeled
Hakone Grass ( <i>Hakonechloa sp.</i> )	1.0 (1 - 1) n2 Labeled
Fountaingrass ( <i>Pennisetum alopecuroides</i> )	1.0 (1 - 1) n1 Labeled
Plumegrass, Ravenagrass ( <i>Saccharum sp.</i> )	1.0 (1 - 1) n1 Labeled

Key:

1 = No injury

2 = Minor injury

3 = Moderate injury

4 = Severe injury

5 = Mortality

An average of 3 or higher should preclude application onto that species

# Gallery SC on *Carex spp*



Joe Neal: Carex 'Red Rooster' tip damage 1-week after treatment with Gallery SC @ 1.3 lbai/A



Andy Senesac: Carex (nontreated, 1X, 2X, 4X) four weeks after treatment with Gallery SC

Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Hakone Grass ( <i>Hakonechloa sp.</i> )	1.0 (1 - 1) n1
Sedge, Cherokee ( <i>Carex cherokeensis</i> )	1.0 (1 - 1) n1
Sweet Grass ( <i>Hierochloe odorata</i> )	1.0 (1 - 1) n1
Pine Muhly ( <i>Muhlenbergia dubia</i> )	1.0 (1 - 1) n2
Plumegrass, Ravnagrass ( <i>Saccharum sp.</i> )	1.0 (1 - 1) n2
Big Blue Stem ( <i>Andropogon gerardii</i> )	1.5 (1 - 2) n2
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )	1.5 (1 - 2) n2
American beachgrass ( <i>Ammophila breviligulata</i> )	1.0 (1 - 1) n3
Common Rush ( <i>Juncus effusus</i> )	1.0 (1 - 1) n3
Feather Reed Grass ( <i>Calamagrostis acutiflora</i> )	1.0 (1 - 1) n3
Fountaingrass ( <i>Pennisetum alopecuroides</i> )	1.0 (1 - 1) n3
Leatherleaf Sedge ( <i>Carex buchananii</i> )	1.0 (1 - 1) n3
Muhly, Hairyawn ( <i>Muhlenbergia capillaris</i> )	1.0 (1 - 1) n3
Prairie Dropseed ( <i>Sporobolus heterolepis</i> )	1.0 (1 - 1) n3
Ryegrass, Sand ( <i>Leymus arenarius</i> )	1.0 (1 - 1) n3
Weeping Lovegrass ( <i>Eragrostis curvula</i> )	1.0 (1 - 1) n3
Carex morrowii ( <i>Carex morrowii</i> )	1.3 (1 - 2) n3
Indian Grass ( <i>Sorghastrum nutans</i> )	1.3 (1 - 2) n3
Indian Woodoats ( <i>Chasmanthium latifolium</i> )	1.3 (1 - 2) n4
Switch Grass ( <i>Panicum virgatum</i> )	1.3 (1 - 2) n6
Bamboo Muhly ( <i>Muhlenbergia dumosa</i> )	1.7 (1 - 2) n3
Tufted Hairgrass ( <i>Deschampsia caespitosa</i> )	1.7 (1 - 3) n3
Oriental Fountain Grass ( <i>Pennisetum orientale</i> )	1.8 (1 - 2) n4
Little Bluestem ( <i>Schizachyrium scoparium</i> )	1.8 (1 - 3) n4
Finestem Needlegrass ( <i>Nassella tenuissima</i> )	2.7 (1 - 4) n3
Flax, New Zealand ( <i>Phormium tenax</i> )	1.0 (1 - 1) n1 Labeled

# 2014-2017 Results: Pendulum 2G

Key:

- 1 = No injury
- 2 = Minor injury
- 3 = Moderate injury
- 4 = Severe injury
- 5 = Mortality

An average of 3 or higher should preclude application onto that species



# Product/Crop Combinations with Registration Potential

- Dimension 2EW (dithiopyr)
  - All but three grasses screened so far exhibited no or low injury with over the top applications
  - Exceptions: *Deschampsia caespitosa*, *Festuca ovina* and *Muhlenbergia dubia*
- Gallery SC (isoxaben)
  - All but three grasses screened so far exhibited no or low injury with over the top applications
  - Exceptions: *Carex cherokeensis*, *Deschampsia caespitosa*, and *Festuca glauca*
- Pendulum 2G (pendimethalin)
  - All grasses tested to date exhibited no to minimal injury with over the top applications
- New crops can be added to these labels (Dimension – 10, Gallery – 7, Pendulum – 17)



# Thank you !



## **Funding for IR-4 Research:**

USDA-NIFA

USDA-ARS

USDA-APHIS

Land Grant Institutions

## **Researchers:**

All the fine researchers throughout the US and in cooperating countries

## **Growers:**

Who donate time to complete the biennial survey and all those plant materials!

## **IR-4 Personnel:**

Susan

Bierbrunner

Michelle Foo

Edith Lurvey

Satoru Miyazaki

Mika Pringle-Tolson

Marylee Ross

Becky Sisco

Ely Vea



Photo by Cristi Palmer

**Thank you !**