



Ornamental Horticulture Program Research Project Sheet

Project Name: Ornamental Grass Pre-emergent Herbicide Crop Safety

New	<input type="checkbox"/>	Ongoing	<input checked="" type="checkbox"/>	Completed	<input type="checkbox"/>	Duration if ongoing or completed:	
------------	--------------------------	----------------	-------------------------------------	------------------	--------------------------	--	--

Project Description:
 Ornamental grasses are becoming more prevalent in production as consumers and landscapers are moving to plant materials with xeriscapic characteristics.

Research Project Abstract (if available):

Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):
 Phytotoxicity

Target Crops (list tested crops if ongoing or completed project)
 Ornamental Grass Species (ie *Muhlenbergia*)

Target Product(s)(list tested products or numbered compounds if ongoing or completed project)
 Gallery
 Pendulum 2G

Product Registration and Research Status	
	Registration Status
Labeled & Commercialized Wide range of ornamental horticulture crops listed	
Labeled & Commercialized Opportunity to add additional ornamental horticulture crops	
Labeled But NOT Commercialized Not yet registered or labeled	
No longer available for development	
* IR-4 Data contributed to registration decision – either adding crop to label or not pursuing further research	
1 At least one crop species screened fully	
2 Product not available for production ornamentals	

Area	Characteristic	Pro	Con
Availability & effectiveness of alternative management tools	Very few registrations currently	X	
	Preliminary crop safety data available for <i>Mulhenbergia</i> , <i>Agrostis</i> , etc with Gallery, Pendulum 2G, Dimension safe at use rates tested so far	X	
Damage potential of target	Snapshot (trifluralin can cause lodging in some of Joe Neal's trials)		X
Performance and crop safety of proposed products (from other systems)	Yes, see above		
Compatibility with IPM, resistance management programs			
Economics			
Geographic distribution			
Manufacturer interest in labeling products	Yes	X	
Other	Ed Beste request for Snapshot for ornamental grasses	X	
	Can pull available data together to determine data gaps and possibly finish in one season	X	

2015 Comments: Limited to only those ornamental grass species already started.



IR-4 Crop Safety Trials to Date

Average rating on a scale of 1 – 5 with 1 = 0 to about no injury and 5 = severe injury and mortality; minimum to maximum rating; number of trials. A rating of 3 or higher is considered commercially unacceptable (*red text*). A rating of 1 or 2 is considered commercially acceptable and those with more than 3 trials are complete (*green text*). 'Labeled' indicates that IR-4 generated data in at least one trial and that this crop is listed on the label. For crop/product combinations that are blank, IR-4 has not screened this combination.

Table 1 of 3. Pre-emergent herbicide ornamental grass safety levels – 2014/2015 protocol

Crop	Dimension 2EW (Dithiopyr)	Gallery 75DF (Isoxaben)	Gallery SC (Isoxaben)	Pendulum 2G (Pendimethalin, multiple formulations)
American beachgrass (<i>Ammophila breviligulata</i>)				1.0 (1 - 1) n1
Big Blue Stem (<i>Andropogon gerardii</i>)	3.0 (3 - 3) n1		1.0 (1 - 1) n2	1.5 (1 - 2) n2
Feather Reed Grass (<i>Calamagrostis acutiflora</i>)	2.0 (1 - 3) n2		1.0 (1 - 1) n1	1.0 (1 - 1) n1
Reed Grass (<i>Calamagrostis arundinacea</i>)		1.0 (1 - 1) n1		1.0 (1 - 1) n1
Carex buechanani (<i>Carex buechanani</i>)	1.5 (1 - 2) n2		2.5 (1 - 4) n2	1.0 (1 - 1) n2
Sedge, Cherokee (<i>Carex cherokeensis</i>)			4.0 (4 - 4) n1	1.0 (1 - 1) n1
Sedge, Grassland (<i>Carex divulsa</i>)				
Carex morrowii (<i>Carex morrowii</i>)	2.5 (2 - 3) n2		1.0 (1 - 1) n1	2.0 (2 - 2) n1
Sedge (<i>Carex</i> sp.)				
Northern Sea Oats, Wild Oats (<i>Chasmanthium latifolium</i>)	2.3 (1 - 4) n3	1.0 (1 - 1) n2	1.3 (1 - 2) n3	1.0 (1 - 1) n3
Pampas grass (<i>Cortaderia selloana</i>)	2.0 (2 - 2) n1		1.0 (1 - 1) n1	
Pampas Grass (<i>Cortaderia</i> sp.)				
Tufted hairgrass (<i>Deschampsia caespitosa</i>)	2.7 (2 - 4) n3		3.0 (3 - 3) n1	2.0 (1 - 3) n2
Hair Grass (<i>Deschampsia</i> sp.)				
Deertongue (<i>Dichanthelium clandestinum</i>)				
Weeping lovegrass (<i>Eragrostis curvula</i>)	2.0 (1 - 3) n2			1.0 (1 - 1) n2
Purple Lovegrass (<i>Eragrostis spectabilis</i>)	1.0 (1 - 1) n1		1.0 (1 - 1) n1	2.0 (2 - 2) n1
Plume Grass; Ravenna (<i>Erianthus</i> sp.)				
Blue Fescue (<i>Festuca glauca</i>)	3.0 (2 - 4) n2		3.0 (3 - 3) n1	
Sheep's fescue (<i>Festuca ovina</i>)	5.0 (5 - 5) n2			
Hakone Grass, Japanese Forest Grass (<i>Hakonechloa</i> sp.)	1.7 (1 - 2) n3		1.0 (1 - 1) n1	1.0 (1 - 1) n1
Indian Grass (<i>Hierochloa odorata</i>)			1.0 (1 - 1) n1	1.0 (1 - 1) n1
Soft rush (<i>Juncus effusus</i>)	1.0 (1 - 1) n1		1.0 (1 - 1) n1	1.0 (1 - 1) n1
Blue Lyme Grass (<i>Leymus arenarius</i>)	1.0 (1 - 1) n2		1.0 (1 - 1) n2	1.0 (1 - 1) n3
Silver Grass (<i>Miscanthus</i> sp.)				
Muhly, hairyawn (<i>Muhlenbergia capillaris</i>)	1.0 (1 - 1) n1		2.0 (1 - 3) n2	1.0 (1 - 1) n2
Mexican deergrass (<i>Muhlenbergia dubia</i>)	4.0 (4 - 4) n1		3.0 (3 - 3) n1	1.0 (1 - 1) n1
Bamboo Muhly (<i>Muhlenbergia dumosa</i>)			1.0 (1 - 1) n1	2.0 (2 - 2) n1
Mexican feather grass (<i>Nassella tenuissima</i>)	2.0 (1 - 3) n2		1.0 (1 - 1) n1	3.0 (3 - 3) n1
Mondo Grass, Lilyturf, Ker-Gawl (<i>Ophiopogon</i> sp.)				
Switch-Grass (<i>Panicum virgatum</i>)	1.3 (1 - 2) n3		1.0 (1 - 1) n2	1.0 (1 - 1) n1
Chinese Pennisetum (<i>Pennisetum alopecuroides</i>)	1.0 (1 - 1) n2		1.0 (1 - 1) n1	1.0 (1 - 1) n3
Pennisetum orientale (<i>Pennisetum orientale</i>)	2.0 (1 - 3) n2			1.7 (1 - 2) n3
Fountain Grass (<i>Pennisetum setaceum</i>)				

Crop	Dimension 2EW (Dithiopyr)	Gallery 75DF (Isoxaben)	Gallery SC (Isoxaben)	Pendulum 2G (Pendimethalin, multiple formulations)
Feathergrass (Pennisetum sp.)				
Ribbon-Grass, Gardeners-Garters (Phalaris arundinacea)				
New Zealand Flax (Phormium sp.)				Labeled
Little Blue Stem (Schizachyrium scoparium)	2.3 (1 - 3) n4	1.0 (1 - 1) n3	1.0 (1 - 1) n2	1.8 (1 - 3) n4
Indian Grass (Sorghastrum nutans)			1.0 (1 - 1) n1	2.0 (2 - 2) n1
Indian Grass, Wood Grass (Sorghastrum sp.)				
Prairie dropseed (Sporobolus heterolepis)	2.7 (1 - 4) n3		1.0 (1 - 1) n1	1.0 (1 - 1) n3
Feather Grass, Mexican (Stipa sp.)			1.0 (1 - 1) n1	
Clover, Buffalo (Trifolium reflexum)				
Clover, White (Trifolium repens)				
Cattails (Typha minima)				

Table 2 of 3. Pre-emergent herbicide ornamental grass safety levels – tested prior to 2014, first set

Crop	Barricade 65WG (Prodiamine)	Biathlon (OHP 052908) (Oxyfluorfen + Prodiamine)	BroadStar (Flumioxazin, multiple formulations)	F6875 0.3G (Sulfentrazone + Prodiamine)	F6875 4SC (Sulfentrazone + Prodiamine)
American beachgrass (<i>Ammophilabreviligulata</i>)					
Big Blue Stem (<i>Andropogongerardii</i>)					
Feather Reed Grass (<i>Calamagrostis acutiflora</i>)				1.8 (1 - 3) n4	1.8 (1 - 3) n4
Reed Grass (<i>Calamagrostis arundinacea</i>)					
Carexbuchanani (<i>Carexbuchanani</i>)					
Grassland Sedge (<i>Carexdivulsa</i>)			2.0 (1 - 3) n2		
Carexmorrowii (<i>Carexmorrowii</i>)					
Sedge (<i>Carex</i> sp.)	2.0 (2 - 2) n1		MFG Hold		
Northern Sea Oats, Wild Oats (<i>Chasmanthium latifolium</i>)		2.0 (2 - 2) n1			3.0 (1 - 4) n4
Pampas Grass (<i>Cortaderia</i> sp.)			3.0 (3 - 3) n1		
Tufted hairgrass (<i>Deschampsiaeaespitosa</i>)					
Hair Grass (<i>Deschampsia</i> sp.)			MFG Hold		
Deertongue (<i>Dichantheiumclandestinum</i>)					
Weeping lovegrass (<i>Eragrostiscurvula</i>)					
Plume Grass; Ravenna (<i>Erianthus</i> sp.)					
Blue Fescue (<i>Festuca glauca</i>)			MFG Hold	1.8 (1 - 2) n4	
Hakone Grass, Japanese Forest Grass (<i>Hakonechloa</i> sp.)					
Indian Grass (<i>Hierochloeodorata</i>)					
Blue Lyme Grass (<i>Leymusarenarius</i>)					
Silver Grass (<i>Miscanthus</i> sp.)				1.3 (1 - 2) n4	
Muhly, hairyawn (<i>Muhlenbergia capillaris</i>)				2.0 (2 - 2) n1	
Mexican deergrass (<i>Muhlenbergia dubia</i>)			1.0 (1 - 1) n1		
Mondo Grass, Lilyturf, Ker-Gawl (<i>Ophiopogon</i> sp.)			1.7 (1 - 2) n3	4.0 (4 - 4) n2	1.7 (1 - 3) n3
Switch-Grass (<i>Panicumvirgatum</i>)					
Chinese Pennisetum (<i>Pennisetumalopecuroides</i>)					
Pennisetumorientale (<i>Pennisetumorientale</i>)					
Fountain Grass (<i>Pennisetumsetaceum</i>)			1.0 (1 - 1) n1		
Feathergrass (<i>Pennisetum</i> sp.)					2.7 (2 - 4) n3
Ribbon-Grass, Gardeners-Garters (<i>Phalarisarundinacea</i>)			3.3 (2 - 4) n3		
New Zealand Flax (<i>Phormium</i> sp.)					
Little Blue Stem (<i>Schizachyriumscoparium</i>)					
Indian Grass, Wood Grass (<i>Sorghastrum</i> sp.)					
Prairie dropseed (<i>Sporobolusheterolepis</i>)					

Crop	Barricade 65WG (Prodiamine)	Biathlon (OHP 052908) (Oxyfluorfen + Prodiamine)	BroadStar (Flumioxazin, multiple formulations)	F6875 0.3G (Sulfentrazone + Prodiamine)	F6875 4SC (Sulfentrazone + Prodiamine)
Feather Grass, Mexican (<i>Stipa</i> sp.)					
Clover, Buffalo (<i>Trifolium reflexum</i>)					
Clover, White (<i>Trifolium repens</i>)	1.0 (1 - 1) n1				
Cattails (<i>Typha minima</i>)					

Table 3 of 3. Pre-emergent herbicide ornamental grass safety levels – tested prior to 2014, second set

Crop	Freehand G (BAS 659H G) (Dimethenamid-p + pendimethalin)	Marengo G (Indaziflam, multiple formulations)	Mesotrione 4SC (Mesotrione)	Snapshot 2.5TG (Trifluralin + Isoxaben)
American beachgrass (Ammophilabreviligulata)				
Big Blue Stem (Andropogongerardii)				1.7 (1 - 4) n6
Feather Reed Grass (Calamagrostis acutiflora)	Labeled		1.0 (1 - 1) n3	1.0 (1 - 1) n3
Reed Grass (Calamagrostis arundinacea)				
Carexbuchanani (Carexbuchanani)				
Grassland Sedge (Carexdivulsa)	1.7 (1 - 2) n3			
Carexmorrowii (Carexmorrowii)				
Sedge (Carex sp.)		Labeled		Labeled
Northern Sea Oats, Wild Oats (Chasmanthium latifolium)		3.3 (2 - 4) n3		1.2 (1 - 2) n5
Pampas Grass (Cortaderia sp.)	2.8 (1 - 4) n4		4.0 (4 - 4) n2	
Tufted hairgrass (Deschampsiaeaespitosa)				
Hair Grass (Deschampsia sp.)				
Deertongue (Dichantheiumclandestinum)				1.5 (1 - 2) n2
Weeping lovegrass (Eragrostiscurvula)				
Plume Grass; Ravenna (Erianthus sp.)	2.0 (1 - 3) n2			
Blue Fescue (Festuca glauca)	Labeled		1.3 (1 - 2) n4	
Hakone Grass, Japanese Forest Grass (Hakonechloa sp.)				
Indian Grass (Hierochloeodorata)				1.3 (1 - 2) n4
Blue Lyme Grass (Leymusarenarius)				1.0 (1 - 1) n2
Silver Grass (Miscanthus sp.)	1.7 (1 - 2) n3	Labeled	1.0 (1 - 1) n3	
Muhly, hairyawn (Muhlenbergia capillaris)	2.0 (1 - 4) n3	Labeled	2.0 (2 - 2) n2	2.0 (1 - 4) n3
Mexican deergrass (Muhlenbergia dubia)	MFG Hold			
Mondo Grass, Lilyturf, Ker-Gawl (Ophiopogon sp.)	1.3 (1 - 2) n3	Labeled	4.0 (4 - 4) n1	
Switch-Grass (Panicumvirgatum)				MFG Hold
Chinese Pennisetum (Pennisetumalopecuroides)				
Pennisetumorientale (Pennisetumorientale)				
Fountain Grass (Pennisetumsetaceum)	Labeled			
Feathergrass (Pennisetum sp.)		Labeled	1.3 (1 - 2) n3	
Ribbon-Grass, Gardeners-Garters (Phalarisarundinacea)				
New Zealand Flax (Phormium sp.)				1.3 (1 - 2) n3
Little Blue Stem (Schizachyriumscoparium)				2.0 (1 - 4) n3
Indian Grass, Wood Grass (Sorghastrum sp.)				1.0 (1 - 1) n6
Prairie dropseed (Sporobolusheterolepis)				

Crop	Freehand G (BAS 659H G) (Dimethenamid-p + pendimethalin)	Marengo G (Indaziflam, multiple formulations)	Mesotrione 4SC (Mesotrione)	Snapshot 2.5TG (Trifluralin + Isoxaben)
Feather Grass, Mexican (<i>Stipa</i> sp.)				2.0 (1 - 4) n3
Clover, Buffalo (<i>Trifolium reflexum</i>)				
Clover, White (<i>Trifolium repens</i>)				
Cattails (<i>Typha minima</i>)				1.0 (1 - 1) n1