

# **Update on 2018 Weed Science Research in the IR-4 Ornamental Horticulture Program**

Palmer, C.L. and E. Vea

# 2018 Weed Science Research Program

- Pre-emergent Herbicide Crop Safety (In Season)
- Post-emergent Over-the-top Herbicide Crop Safety (In Season)
- Post-emergent Directed Herbicide Crop Safety (In Season)
- Post-emergent Herbicide Efficacy (In Season)
- NER Pre-emergent Herbicide Crop Safety for In Ground Cut Flowers
- SOR Regional Cover Crop Management for Christmas Tree Production
- WSR Regional Liverwort Efficacy

# 2018 Weed Science Research Program

- **Pre-emergent Herbicide Crop Safety (In Season)**
- **Post-emergent Over-the-top Herbicide Crop Safety (In Season)**
- Post-emergent Directed Herbicide Crop Safety (In Season)
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**Herbicide Crop Safety**

# 2018 Pre/Post Herbicide OTT 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
- For 2018, 159 trials planned on 84 different crops with 14 different products

# 2014-2018 Pre-emergent Herbicide Crop Safety

- Products
  - **Dimension 2EW (dithiopyr)**
    - 2 pt (0.5 lb ai)
    - 4 pt (1.0 lb ai)
    - 8 pt (2.0 lb ai)
  - **Marengo 74SC (indaziflam)**
    - 9 fl oz/A (40 g ai/Ha)
    - 18 fl oz/A (80 g ai/Ha)
    - 36 fl oz/A (160 g ai/Ha)
  - **Tower EC (dimethenamid-p)**
    - 21 fl oz (0.98 lb ai) \*
    - 42 fl oz (1.97 lb ai) \*
    - 84 fl oz (3.94 lb ai) \*

# 2018 Post-emergent Herbicide Crop Safety

- Products
  - Basagran T/O 4F (bentazon)
    - 32 oz/A
    - 64 oz/A
    - 128 oz/A
  - Dismiss 4F (sulfentrazone)
    - 8 oz/A
    - 16 oz/A
    - 24 oz/A
  - **Fiesta Herbicide (FeHDTA) – plus data from BioPesticide**
    - 25 oz/A
    - 50 oz/A
    - 100 oz/A

# 2014-2018 Herbicide Crop Safety

- Research Status
  - 2014: 233 completed, 28 cancelled
  - 2015: 234 completed, 17 cancelled, and 6 pending
  - 2016: 244 completed, 8 cancelled, and 16 pending
  - 2017: 242 completed, 3 cancelled, and 26 pending
  - 2018: 89 completed, 17 cancelled, and 92 pending



# Dimension EW on *Spiraea japonica*

Hannah Mathers: *Spiraea japonica* 'Tor'  
stunting with Dimension (nontreated,  
1X, 2X, 4X)



Control



Dimension 2EW 2 pt/a



Dimension 2EW 4 pt/a



Dimension 2EW 8 pt/a

Chengsong Hu and Doug Doohan:  
*Spiraea japonica* 'Firelight' with  
Dimension (nontreated, 1X, 2X, 4X)

<b>Common Name (<i>Latin Name</i>)</b>	<b>Ranking: Ave. (Range) Count</b>
Nightshade ( <i>Solanum sp.</i> )	1.0 (1 - 1) n1
Fountaingrass ( <i>Pennisetum alopecuroides</i> )	1.0 (1 - 1) n2
Purple Lovegrass ( <i>Eragrostis spectabilis</i> )	1.0 (1 - 1) n2
<b>Common Rush (<i>Juncus effusus</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>Muhly, Hairyawn (<i>Muhlenbergia capillaris</i>)</b>	<b>1.3 (1 - 2) n3</b>
<b>Switch Grass (<i>Panicum virgatum</i>)</b>	<b>1.3 (1 - 2) n3</b>
<b>Iris (<i>Iris sp.</i>)</b>	<b>1.5 (0 - 3) n4</b>
<b>Gum (<i>Eucalyptus sp.</i>)</b>	<b>1.5 (1 - 3) n4</b>
<b>Weeping Lovegrass (<i>Eragrostis curvula</i>)</b>	<b>1.5 (1 - 3) n4</b>
<b>Hakone Grass (<i>Hakonechloa sp.</i>)</b>	<b>1.7 (1 - 2) n3</b>
<b>Rose-Of-Sharon (<i>Hibiscus syriacus</i>)</b>	<b>1.7 (1 - 2) n3</b>
<b>Feather Reed Grass (<i>Calamagrostis acutiflora</i>)</b>	<b>1.7 (1 - 3) n3</b>
<b>Finestem Needlegrass (<i>Nassella tenuissima</i>)</b>	<b>1.7 (1 - 3) n3</b>
<b>Burning Bush (<i>Euonymus alatus</i>)</b>	<b>1.8 (1 - 3) n5</b>
<b>Beeblossom, Lindheimer's (<i>Gaura lindheimeri</i>)</b>	<b>2.0 (1 - 3) n2</b>
<b>Buckthorn (<i>Rhamnus sp.</i>)</b>	<b>2.0 (1 - 3) n2</b>
<b>Sweet Flag (<i>Acorus sp.</i>)</b>	<b>2.0 (1 - 3) n3</b>
<b>Big Blue Stem (<i>Andropogon gerardii</i>)</b>	<b>2.3 (1 - 3) n3</b>
<b>Lilac (<i>Syringa sp.</i>)</b>	<b>2.3 (1 - 3) n4</b>
<b>Little Bluestem (<i>Schizachyrium scoparium</i>)</b>	<b>2.3 (1 - 3) n4</b>

# 2014-2018 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

Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Indian Woodoats ( <i>Chasmanthium latifolium</i> )	2.5 (1 - 4) n4
Rose Moss ( <i>Portulaca grandiflora</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
Ninebark ( <i>Physocarpus</i> sp.)	2.8 (1 - 4) n4
Stonecrop, Kamchatka ( <i>Sedum kamtschaticus</i> )	3.0 (1 - 4) n3
Pine Muhly ( <i>Muhlenbergia dubia</i> )	3.0 (2 - 4) n2
Stonecrop, Two-Row/Caucasian ( <i>Sedum spurium</i> )	3.0 (2 - 4) n3
Hydrangea ( <i>Hydrangea</i> sp.)	3.0 (2 - 4) n4
Chokeberry, Black ( <i>Aronia melanocarpa</i> )	3.0 (3 - 3) n1
Enkianthus ( <i>Enkianthus</i> sp.)	3.5 (3 - 4) n2
Peony ( <i>Paeonia</i> sp.)	3.5 (3 - 4) n2
Cherry, Black (Non-Bearing) ( <i>Prunus serotina</i> )	4.0 (4 - 4) n1
Sedum Hybrids ( <i>Sedum hybridus</i> )	4.0 (4 - 4) n1
Stonecrop, Gray ( <i>Rhodiola pachyclados</i> )	4.0 (4 - 4) n1
Stonecrop, Jenny's ( <i>Sedum rupestre</i> )	4.0 (4 - 4) n1
Stonecrop, Moss ( <i>Sedum acre</i> )	4.0 (4 - 4) n1
Stonecrop, Tasteless ( <i>Sedum sexangulare</i> )	4.0 (4 - 4) n1
Distylium ( <i>Distylium</i> sp.)	4.0 (4 - 4) n2
Dogwood, Gray ( <i>Cornus racemosa</i> )	5.0 (5 - 5) n1

## 2014-2018 More Results: Dimension 2EW

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Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Tulip ( <i>Tulipa</i> sp.)	1.0 (1 - 1) n1
Elephant's-Ear, Angel-Wings ( <i>Caladium</i> sp.)	1.0 (1 - 1) n2
Dahlia ( <i>Dahlia</i> sp.)	1.0 (1 - 1) n2
Gladiolus ( <i>Gladiolus</i> sp.)	1.0 (1 - 1) n2
<b>Crocus (<i>Crocus</i> sp.)</b>	<b>1.3 (1 - 2) n3</b>
<b>Hyacinth (<i>Hyacinthus</i> sp.)</b>	<b>1.3 (1 - 2) n3</b>
Daffodil ( <i>Narcissus</i> sp.)	1.5 (1 - 2) n2
Chequered Lily ( <i>Fritillaria meleagris</i> )	2.0 (2 - 2) n1
Lilium Asiatic Hybrids ( <i>Lilium</i> Asiatic Hybrids)	2.0 (2 - 2) n1
Dogtooth Violet ( <i>Erythronium americanum</i> )	2.0 (2 - 2) n1

# 2014-2018 Results: Marengo 74SC

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Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Buckeye, Ohio ( <i>Aesculus glabra</i> )	1.0 (1 - 1) n2
Cypress ( <i>Cupressus</i> sp.)	1.0 (1 - 1) n2
Dwarf Palmetto ( <i>Sabal minor</i> )	1.0 (1 - 1) n3
Golden Barrel Cactus ( <i>Echinocactus grusonii</i> )	1.3 (1 - 2) n3
Japanese Zelkova ( <i>Zelkova serrata</i> )	1.3 (1 - 2) n3
Tulip ( <i>Tulipa</i> sp.)	1.5 (0 - 3) n4
Muhly, Hairawn ( <i>Muhlenbergia capillaris</i> )	1.5 (1 - 2) n2
Beeblossom, Lindheimer's ( <i>Gaura lindheimeri</i> )	1.5 (1 - 3) n4
Mock Orange ( <i>Philadelphus</i> sp.)	1.7 (0 - 3) n3
Honeysuckle ( <i>Lonicera</i> sp.)	2.0 (1 - 3) n3
Serviceberry, Canadian ( <i>Amelanchier canadensis</i> )	2.0 (1 - 3) n3
Globe Cactus ( <i>Mammillaria</i> sp.)	2.0 (1 - 4) n3
Fern, Asparagus ( <i>Asparagus densiflorus</i> )	2.0 (2 - 2) n1
Japanese Rose ( <i>Kerria japonica</i> )	2.0 (2 - 2) n1
Palm, Washington Fan ( <i>Washingtonia robusta</i> )	2.0 (2 - 2) n1
Max Chrysanthemum ( <i>Leucanthemum maximum</i> )	2.0 (2 - 2) n3
Coral Bells ( <i>Heuchera sanguinea</i> )	2.3 (1 - 3) n4
Indian Woodoats ( <i>Chasmanthium latifolium</i> )	2.3 (1 - 4) n4
Alder ( <i>Alnus</i> sp.)	2.5 (2 - 3) n2
European Chestnut ( <i>Castanea sativa</i> )	2.7 (1 - 4) n3
Virginia Sweetspire ( <i>Itea virginica</i> )	2.7 (1 - 4) n3
Aloe ( <i>Aloe</i> sp.)	2.7 (2 - 4) n3

# 2014-2018 Results: Tower EC

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Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Black-Eyed Susan ( <i>Rudbeckia hirta</i> )	3.0 (3 - 3) n1
Cosmos ( <i>Cosmos sp.</i> )	3.0 (3 - 3) n1
Chokeberry, Black ( <i>Aronia melanocarpa</i> )	3.0 (3 - 3) n2
Distylium ( <i>Distylium sp.</i> )	3.0 (3 - 3) n2
<b>Pine Muhly (<i>Muhlenbergia dubia</i>)</b>	<b>3.3 (2 - 5) n3</b>
Goldenrod ( <i>Solidago sp.</i> )	3.5 (3 - 4) n2
Pygmyweed ( <i>Crassula sp.</i> )	3.5 (3 - 4) n2
<b>Echeveria (<i>Echeveria sp.</i>)</b>	<b>3.7 (3 - 4) n3</b>
Chocolate Flower/Lyreleaf Greeneyes ( <i>Berlandiera lyrata</i> )	4.0 (3 - 5) n2
<b>Periwinkle, Madagascar (<i>Catharanthus roseus</i>)</b>	<b>4.0 (3 - 5) n3</b>
Dahlia ( <i>Dahlia sp.</i> )	4.0 (4 - 4) n1
Enkianthus ( <i>Enkianthus sp.</i> )	4.0 (4 - 4) n1
Phlox, Fall ( <i>Phlox paniculata</i> )	4.0 (4 - 4) n1
Zinnia ( <i>Zinnia sp.</i> )	4.0 (4 - 4) n1

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Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Fir ( <i>Abies sp.</i> )	1.0 (1 - 1) n1
Hemlock ( <i>Tsuga sp.</i> )	1.0 (1 - 1) n1
Holly, Chinese ( <i>Ilex cornuta</i> )	1.0 (1 - 1) n1
Holly, Japanese ( <i>Ilex crenata</i> )	1.0 (1 - 1) n1
Hybrid Yew ( <i>Taxus X media</i> )	1.0 (1 - 1) n1
Muhly, Hairyawm ( <i>Muhlenbergia capillaris</i> )	1.0 (1 - 1) n1
Pine, Loblolly ( <i>Pinus taeda</i> )	1.0 (1 - 1) n1
Spruce ( <i>Picea sp.</i> )	1.0 (1 - 1) n1
Stonecrop, White ( <i>Sedum album</i> )	1.0 (1 - 1) n1
Wintercreeper ( <i>Euonymus fortunei</i> )	1.0 (1 - 1) n1
American Beachgrass ( <i>Ammophila breviligulata</i> )	1.0 (1 - 1) n2
Boxwood ( <i>Buxus sp.</i> )	1.0 (1 - 1) n2
<b>Field Fescue (<i>Festuca glauca</i>)</b>	<b>1.3 (1 - 2) n3</b>
Feather Reed Grass ( <i>Calamagrostis acutiflora</i> )	1.5 (1 - 2) n2
Laurel Cherry ( <i>Prunus laurocerasus</i> )	1.5 (1 - 2) n2
Little Bluestem ( <i>Schizachyrium scoparium</i> )	1.5 (1 - 2) n2
Pine ( <i>Pinus sp.</i> )	1.5 (1 - 2) n2
Rhododendron ( <i>Rhododendron sp.</i> )	2.0 (1 - 3) n2
<b>Arborvitae, American (<i>Thuja occidentalis</i>)</b>	<b>2.0 (1 - 4) n3</b>
<b>Juniper (<i>Juniperus sp.</i>)</b>	<b>2.0 (1 - 4) n7</b>
Arrowwood ( <i>Viburnum sp.</i> )	2.0 (2 - 2) n1
Bridal-Wreath ( <i>Spiraea sp.</i> )	2.0 (2 - 2) n1
Cotoneaster ( <i>Cotoneaster sp.</i> )	2.0 (2 - 2) n1
Daylily ( <i>Hemerocallis sp.</i> )	2.0 (2 - 2) n1
Houseleek ( <i>Sempervivum sp.</i> )	2.0 (2 - 2) n1
Hydrangea ( <i>Hydrangea sp.</i> )	2.0 (2 - 2) n1
Indian Woodoats ( <i>Chasmanthium latifolium</i> )	2.0 (2 - 2) n1
Japanese Pachysandra ( <i>Pachysandra terminalis</i> )	2.0 (2 - 2) n1
Maple, Red ( <i>Acer rubrum</i> )	2.0 (2 - 2) n1
Oleander, Rosebay ( <i>Nerium oleander</i> )	2.0 (2 - 2) n1
Silver Grass ( <i>Miscanthus sp.</i> )	2.0 (2 - 2) n1
Switch Grass ( <i>Panicum virgatum</i> )	2.0 (2 - 2) n1

# 2018 Results: Fiesta

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Common Name ( <i>Latin Name</i> )	Ranking: Ave. (Range) Count
Privet ( <i>Ligustrum</i> sp.)	2.0 (2 - 2) n2
Cedar ( <i>Chamaecyparis</i> sp.)	2.5 (1 - 4) n2
Japanese Cedar ( <i>Cryptomeria japonica</i> )	2.5 (1 - 4) n2
Sedge, Cherokee ( <i>Carex cherokeensis</i> )	2.5 (2 - 3) n2
Gardenia ( <i>Gardenia</i> sp.)	3.0 (2 - 4) n2
Rosemary ( <i>Rosmarinus officinalis</i> )	3.0 (2 - 4) n2
<b>Lilyturf (<i>Liriope</i> sp.)</b>	<b>3.0 (2 - 4) n3</b>
Alumroot ( <i>Heuchera</i> sp.)	3.0 (3 - 3) n1
Big Blue Stem ( <i>Andropogon gerardii</i> )	3.0 (3 - 3) n1
Burning Bush ( <i>Euonymus alatus</i> )	3.0 (3 - 3) n1
Crape Myrtle ( <i>Lagerstroemia indica</i> )	3.0 (3 - 3) n1
Fountaingrass ( <i>Pennisetum alopecuroides</i> )	3.0 (3 - 3) n1
Lily-Of-The-Nile ( <i>Agapanthus</i> sp.)	3.0 (3 - 3) n1
Pampas Grass ( <i>Cortaderia</i> sp.)	3.0 (3 - 3) n1
Plantain Lily ( <i>Hosta</i> sp.)	3.0 (3 - 3) n1
Rosemallow ( <i>Hibiscus</i> sp.)	3.0 (3 - 3) n1
Sedge ( <i>Carex</i> sp.)	3.0 (3 - 3) n1
<b>Ravennagrass (<i>Saccharum ravennae</i>)</b>	<b>3.5 (3 - 4) n2</b>
Common Ninebark ( <i>Physocarpus opulifolius</i> )	4.0 (4 - 4) n1
Dwarf Fothergilla ( <i>Fothergilla gardenii</i> )	4.0 (4 - 4) n1
Holly, Blue ( <i>Ilex x meserveae</i> )	4.0 (4 - 4) n1
Japanese Rose ( <i>Kerria japonica</i> )	4.0 (4 - 4) n1
<b>Stonecrop (<i>Sedum</i> sp.)</b>	<b>4.0 (4 - 4) n1</b>
<b>Stonecrop, Broadleaf (<i>Sedum spathulifolium</i>)</b>	<b>4.0 (4 - 4) n1</b>
<b>Stonecrop, Moss (<i>Sedum acre</i>)</b>	<b>4.0 (4 - 4) n1</b>
<b>Stonecrop, Two-Row/Caucasian (<i>Sedum spurium</i>)</b>	<b>4.0 (4 - 4) n1</b>
Wall Germander ( <i>Teucrium chamaedrys</i> )	4.0 (4 - 4) n1
<b>Rose (<i>Rosa</i> sp.)</b>	<b>4.0 (4 - 4) n2</b>
<b>Spurge (<i>Euphorbia</i> sp.)</b>	<b>4.0 (4 - 4) n2</b>
<b>Stonecrop, Jenny's (<i>Sedum rupestre</i>)</b>	<b>4.0 (4 - 4) n2</b>
<b>Stonecrop, Kamchatka (<i>Sedum kamtschaticus</i>)</b>	<b>4.0 (4 - 4) n2</b>
<b>Lavender (<i>Lavandula</i> sp.)</b>	<b>4.0 (4 - 4) n3</b>

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# Product/Crop Combinations with Registration Potential

- Dimension 2EW (dithiopyr)
  - Tolerant (17): Acorus sp, Andropogon gerardii, Andropogon virginicus, Calamagrostis acutiflora, Eragrostis curvula, Eucalyptus sp, Euonymus alatus, Hakonechloa sp, Hibiscus syriacus, Iris sp, Juncus effusus, Leymus arenarius, Muhlenbergia capillaris, Nassella tenuissima, Panicum virgatum, Schizachyrium scoparium, Syringa sp
  - Not Tolerant (2+): Hydrangea sp, Sedums
- Marengo 74SC (indaziflam)
  - Tolerant (2): Crocus, Hyacinth
- Tower EC (dimethenamid-p)
  - Tolerant (10): Amelanchier canadensis, Echinocactus grusonii, Gaura lindheimeri, Heuchera sanguinea, Leucanthemum maximum, Lonicera sp, Philadelphus sp, Sabal minor, Tulipa sp, Zelkova serrata
  - Not Tolerant (3): Echeveria, Catharanthus, Muhlenbergia dubia
- Fiesta Herbicide (FeHDTA)
  - Tolerant (1): Festuca glauca
  - Not Tolerant (5+): Euphorbia sp, Lavandula sp, Rosa sp, Saccharum ravennae, Sedum sp
- New crops can be added to these labels (Dimension – 17, Marengo – 2, Tower – 10)
- For Fiesta, while some crops may be tolerant with over the top applications, a directed application approach would be the best labelling option



# Thank you !



The Chemical Company



Bayer Environmental Science



## **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:**

Roger Batts

Marylee Ross

Susan

Tony

Bierbrunner

VanWoerkem

Mika Pringle-

Ely Ve

Tolson



Photo by Crisi Palmer

**Thank you !**