

**IR-4 Ornamental Horticulture Program
Dithiopyr Crop Safety**

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Acknowledgements

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Abstract

Dimension (dithiopyr) was initially registered in 1992 for ornamental horticulture uses. This initial label contained an extensive list of ornamental horticulture plants in landscapes where Dimension could be used without causing phytotoxicity. In 2006, the new Dimension 2EW label contained registered uses for field container and in ground nursery production, the first dithiopyr product to have these use sites. Starting in 1992, IR-4 examined 43 crops to expand this label to other crops, including several different fern species grown in field containers. Of the researched crops and Dimension formulations, only one crop (*Eryngium platium*) can be added at this time based on the data provided here. It is recommended the trials conducted using emulsifiable concentrate formulations be repeated with Dimension 2EW.

Introduction

Dimension (dithiopyr) was initially registered in 1992 for ornamental horticulture uses. This initial label contained an extensive list of ornamental horticulture plants in landscapes where Dimension could be used without causing phytotoxicity. In 2006, the new Dimension 2EW label contained registered uses for field container and in ground nursery production, the first dithiopyr product to have these use sites. Starting in 1992, IR-4 examined 43 crops to contribute crop safety data for dithiopyr formulations, including several different fern species grown in field containers.

Materials and Methods

Several different protocols were used between 1992 and 2003 to test Dimension formulations for crop safety. In the early work, a single application of 0.25, 0.5 and 1.0 lb ai per acre were used. In the later research, two applications were made approximately 30 days apart using 0.5, 1.0, and 2.0 lb ai per acre, plus a water treated control. A minimum of four plants (replicate treatments) were required with many researchers exceeding this minimum. In the more recent research, phytotoxicity was recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill) at 1, 2, 4, 8, and 12 weeks after initial application, but in the earlier research other scales were utilized. Some researchers also included readings 3 to 4 days after the initial and second applications. For more detailed materials and methods, please see Appendix 1: Protocols and review closely the researcher reports.

Dimension formulations were supplied to researchers (See list of researchers in Appendix 2) by Dow Agro Sciences.

Results and Summary

Phytotoxicity

Based on the type and nature of injury seen with applications in this research, tested plant species were placed into four categories: 1) no significant phytotoxicity or growth differences from the untreated check or any injury was transitory, 2) injury was seen but additional research is warranted to clarify response, 3) no or minimal transitory injury seen at the 1X rate, but the 2X and/or 4X rates did cause significant phytotoxicity, 4) Significant injury sufficient to recommend growers not utilize this product.

Dimension 1EC, 2EC, and 2EW

In testing from 1992 through 2003, emulsifiable concentrates and emulsifiable in water formulations exhibited no or minimal negative impact on four plant species (Table 1). Of these three have already been placed on the Dimension 2EW label.

Some minimal injury may be acceptable for growers if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. Two crop species,

exhibited no or little injury at the 0.5 or 1.0 lb ai per acre rates, but significant phytotoxicity occurred at the 2.0 lb ai per acre rate (Table 2), but these were tested with the 1EC formulation. It is recommended that these species be tested with Dimension 2EW to determine whether injury occurs.

There were 6 crops in the testing that exhibited damage sufficient to recommend growers not utilize Dimension EC formulations as an over-the-top treatment for pre-emergent weed control (Table 3). However, further testing is warranted with Dimension 2EW because this label does list *Viola sp.* as exhibiting no injury.

With 19 plants, IR-4 has not generated sufficient information to categorize crop response to Dimension 2EW applications. It is recommended additional trials be conducted to clarify their response (Table 4).

Please see Table 5 for a list of research on Dimension research conducted since 1992 and the summary of the results received.

Table 1. List of Dimension 1EC, 2EC, and 2EW treated crops with no or minimal transitory injury.

<i>Achillea millefolium</i> ¹	<i>Juniperus sp.</i> ¹
<i>Erygium planum</i>	<i>Taxus cuspidate</i> ¹

1 Already registered

2 Crop safety testing was conducted with 4 applications over 2 years.

Table 2. List of Dimension 1EC, 2EC, and 2EW treated crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity

<i>Dendranthemua grandiflorum</i> ²
<i>Echinacea purpurea</i> ²

1 Already registered

2 Crop safety testing was conducted with 4 applications over 2 years.

Table 3. List of Dimension 1EC, 2EC, and 2EW treated crops exhibiting significant injury at 1X.

<i>Impatiens wallerana</i> ²	<i>Physostegia virginiana</i> ²
<i>Lysimachia punctata</i> ²	<i>Polemonium caeruleum</i> ²
<i>Phlox paniculata</i> ²	<i>Viola sp</i> ¹

1 Already registered

2 Data solely with 1EC formulation; recommend further testing with the 2EW formulation

Table 4. List of Dimension 1EC, 2EC, and 2EW treated crops where more research is needed to clarify response

<i>Amsonia ciliata</i>	<i>Hemerocallis sp.</i>
<i>Amsonia hubrichtii</i>	<i>Liatris spicata</i>
<i>Aster dumosus x Aster novibelgii</i> ²	<i>Lobelia cardinalis</i> ²
<i>Aster novi-belgii</i> ²	<i>Perovskia atriplicifolia</i> ²
<i>Athyrium sp.</i> ²	<i>Prunus maritime</i> ²
<i>Begonia sp.</i> ²	<i>Rodgersia henricii</i> ²
<i>Brassica oleracea</i> ²	<i>Salvia splendens</i> ²
<i>Dicentra spectabilis</i> ²	<i>Salvia sylvestris</i> ²
<i>Gaura lindheimeri</i> ²	<i>Veronica prostrate</i> ²
<i>Helleborus orientalis</i>	

1 Already registered

2 Data solely with 1EC formulation; recommend further testing with the 2EW formulation

Dimension 1G

In testing from 1992 through 1997, Dimension G exhibited no injury with over the top applications on *Asparagus virgatus*, *Juniperus chinensis*, *Ruscus aculeatus*, and *Taxus cuspidata* (Table 6). Significant injury was observed with *Rumhora adiantiformis*. However only *Taxus cuspidata* has enough trials demonstrating no injury to place this on the label.

Dimension WSP

In testing from 1992 through 2003, Dimension WSP exhibited no injury with over the top applications on *Aspidistra elatior*, *Boltonia asteroides*, *Hemerocallis sp.*, *Hydrangea macrophylla*, *Juniperus squamata*, and *Rhododendron* (Table 7). Slight but transient injury was observed with *Veronica americana*. However only *Boltonia asteroides* has enough trials demonstrating no injury to place this on the label.

Table 5. Detailed Summary Crop Safety Testing with Dimension 1EC, 2EC, and 2EW.

Notes: Table entries are sorted by crop Latin name. Only those reports received by 8/11/2008 are included.

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
12306	Dimension 1EC	Yarrow	<i>Achillea millefolium</i>	A. filipendulina 'Parkers'	Field Container	Linderman	1999	Directed spray	No injury after single application of 1, 2, and 4 qt per 100 gal per acre on actively blooming plants.	Yes
12307	Dimension 1EC	Bluestar	<i>Amsonia sp.</i>	A. ciliata	Field Container	Buriff	1998	Over the top	No apparent injury at 0.5, 1.0, 2.0 lb ai per acre after single application on actively growing plants.	No
12307	Dimension 1EC	Bluestar	<i>Amsonia sp.</i>	A. hubrichtii	Field Container	Senesac	1998	Over the top	Slight to moderate injury increasing with rate (0.5, 1.0, and 2.0 lb ai per acre) after single application on plants breaking dormancy.	No
18608	Dimension 1EC	Aster, Michaelmas	<i>Aster dumosus x Aster novibelgii</i>	'Jenny'	Field Container	Senesac	1998	Over the top	Moderate injury increasing with rate (0.5, 1.0, 2.0 lb ai per acre) with single application on actively growing rooted cuttings.	No
18609	Dimension 1EC	Aster, New York	<i>Aster novi-belgii</i>	'Celeste'	Field Container	Senesac	1998	Over the top	Moderate injury increasing with rate (0.5, 1.0, 2.0 lb ai per acre) with single application on actively growing rooted cuttings.	No
17262	Dimension 1EC	Fern, Uncrested Lady	<i>Athyrium sp.</i>	'Uncrested'	Field Container	Senesac	1999	Over the top	Slight to moderate injury increasing with rate (0.5, 1.0, 2.0 lb ai per acre) with single application over actively growing plants.	No
23159	Dimension 1EC	Begonia	<i>Begonia sp.</i>	B. x semperflorens-cultorum 'Gin'	Field Container	Knight	2000	Over the top	Slight to moderate injury with single application of 0.25, 0.5, and 1.0 lb ai per acre on actively growing plants.	No
13284	Dimension 1EC	Ornamental Cabbage, Ornamental Kale	<i>Brassica sp.</i>	B. oleracea 'Dynasty Red'	Field Container	Senesac	1998	Over the top	Significant injury at all rates (0.5, 1.0, 2.0 lb ai per acre) after single application on actively growing rooted cuttings.	No

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
13282	Dimension 1EC	Chrysanthemum	<i>Dendranthema sp.</i>	D. x grandiflorum 'Jennifer'	Field Container	Senesac	1998	Over the top	Significant injury at all rates (0.5, 1.0, 2.0 lb ai per acre) after single application on actively growing rooted cuttings.	No
13282	Dimension 1EC	Chrysanthemum	<i>Dendranthema sp.</i>	D. x grandiflorum 'Linda'	Field Container	Senesac	1998	Over the top	Significant injury at all rates (0.5, 1.0, 2.0 lb ai per acre) after single application on actively growing rooted cuttings.	No
13282	Dimension 1EC	Chrysanthemum	<i>Dendranthema sp.</i>	D. x grandiflorum 'Lisa'	Field Container	Senesac	1998	Over the top	Significant injury at all rates (0.5, 1.0, 2.0 lb ai per acre) after single application on actively growing rooted cuttings.	No
13286	Dimension 1EC	Bleeding Heart	<i>Dicentra sp.</i>	D. spectabilis	Field Container	Senesac	1998	Over the top	No initial injury but moderate 30 day after application with 0.5, 1.0, and 2.0 lb ai per acre on plants emerging from dormancy.	No
17265	Dimension 1EC	Purple Coneflower	<i>Echinacea sp.</i>	E. purpurea	Field Container	Knight	2000	Over the top	Moderate injury (0.25, 0.5, 1.0 lb ai per acre) using single application on actively growing plants.	No
17265	Dimension 1EC	Purple Coneflower	<i>Echinacea sp.</i>	E. purpurea	Field Container	Senesac	1999	Over the top	Slight to moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) using single application on actively growing transplants.	No
13287	Dimension 1EC	Sea Holly	<i>Eryngium maritimum</i>	E. planum	Field Container	Senesac	1998	Over the top	No significant injury at 0.5, 1.0, and 2.0 lb ai per acre with single application on plants emerging from dormancy.	No
13287	Dimension 1EC	Sea Holly	<i>Eryngium maritimum</i>	E. planum	Field Container	Senesac	1999	Over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre with single application on actively growing transplants.	No
17266	Dimension 1EC	Gaura	<i>Gaura lindheimeri</i>	'Siskiyou Pink'	Field Container	Senesac	1999	Over the top	Very slight injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) after single application on actively growing transplants.	No

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
28033	Dimension 1EC	Hellebore, Christmas rose, Lenten Rose	<i>Helleborus niger</i>	H. orientalis	Field Container	Czarnota	2004	Over the top	No injury at 0.437 lb ai per acre through 4 weeks after treatment, but very slight injury appeared 8 and 12 weeks after treatment.	No
28020	Dimension 1EC	Daylily	<i>Heemerocallis sp.</i>		Field Container	Knight	2000	Over the top	No significant injury at 0.25, 0.5, and 1.0 lb ai per acre with single application on actively growing plants.	Yes
23160	Dimension 1EC	Balsam	<i>Impatiens sp.</i>	I. wallerana 'Accent White'	Field Container	Knight	2000	Over the top	Moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) using single application on actively growing plants; plants unsaleable.	No
11335	Dimension 1EC	Juniper	<i>Juniperus sp.</i>	J. chinensis 'Hetzii glauca'	Field In-Ground	Derr	1995	Over the top	No injury at 0.25, 0.5 and 1.0 lb ai per acre after single application on actively growing plants; poor control of pigweed, but good to excellent control of comon lambsquarters, yellow foxtail, and carpetweed.	Yes
11335	Dimension 1EC	Juniper	<i>Juniperus sp.</i>	J. sabina 'Broadmoor'	Field In-Ground	Buriff	1996	Over the top	No injury at 0.5, 1.0 and 2.0 lb ai per acre after single application on actively growing plants.	Yes
13288	Dimension 1EC	Blazing-Star, Gayfeather	<i>Liatris sp.</i>	L. spicata	Field Container	Senesac	1998	Over the top	No significant injury with single application of 0.5, 1.0, and 2.0 lb ai per acre on plants emerging from dormancy.	No
12310	Dimension 1EC	Cardinal Flower, Indian Pink	<i>Lobelia cardinalis</i>		Field Container	Buriff	1998	Over the top	Very slight injury (distorted leaves, stunted growth) at 0.5 and 1.0 lb ai per acre, but moderate injury at 2.0 lb ai per acre; plants outgrew this and were salable by the end of the season.	No
12310	Dimension 1EC	Cardinal Flower, Indian Pink	<i>Lobelia cardinalis</i>		Field Container	Linderman	1999	Directed spray	No injury at 0.5, 1.0, and 2.0 lb ai per acre with single application on actively growing plants.	No

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
12310	Dimension 1EC	Cardinal Flower, Indian Pink	<i>Lobelia cardinalis</i>		Field Container	Senesac	1998	Over the top	Moderate to severe injury increasing with rate (0.5, 1.0, 2.0 lb ai per acre) after single application on plants emerging from dormancy.	No
13289	Dimension 1EC	Loosestrife, Circle Flower	<i>Lysimachia sp.</i>	L. punctata	Field Container	Senesac	1998	Over the top	Moderate to severe injury increasing with rate (0.5, 1.0, 2.0 lb ai per acre) with single application on plants emerging from dormancy.	No
13289	Dimension 1EC	Loosestrife, Circle Flower	<i>Lysimachia sp.</i>	L. punctata	Field Container	Senesac	1999	Over the top	Moderate to severe injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) with single application on actively growing transplants.	No
12312	Dimension 1EC	Sage, Russian;Blue Spire	<i>Perovskia sp.</i>	P. atriplicifolia	Field Container	Linderman	1999	Directed spray	No injury at 0.5, 1.0, 2.0 lb ai per acre with single directed application on actively growing plants.	No
12312	Dimension 1EC	Sage, Russian;Blue Spire	<i>Perovskia sp.</i>	P. atriplicifolia	Field Container	Senesac	1998	Over the top	Moderate injury at all rates (0.5, 1.0, 2.0 lb ai per acre) with single application on plants emerging from dormancy.	No
13290	Dimension 1EC	Phlox	<i>Phlox sp.</i>	P. paniculata 'David'	Field Container	Senesac	1998	Over the top	Significant injury and mortality at all rates (0.5, 1.0, 2.0 lb ai per acre) with single application on plants emerging from dormancy.	No
12313	Dimension 1EC	False Dragon Head,Lion's Heart	<i>Physostegia sp.</i>	P. virginiana	Field Container	Buriff	1998	Over the top	Significant injury and mortality of new growth at all rates (0.5, 1.0, 2.0 lb ai per acre) with single application; plants did not die but were not saleable.	No
17268	Dimension 1EC	Jacob's Ladder	<i>Polemonium sp.</i>	P. caeruleum	Field Container	Senesac	1999	Over the top	Moderate to significant injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) using single application on actively growing plants.	No
19736	Dimension 1EC	Beach Plum	<i>Prunus maritima</i>	P. maritima	Field Container	Senesac	1999	Over the top	No injury at 0.25, 0.5, and 1.0 lb ai per acre with single application on actively growing plants.	No

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
12314	Dimension 1EC	Rodgersia	<i>Rodgersia sp.</i>	R. henricii	Field Container	Buriff	1998	Over the top	No injury with 0.5, 1.0, and 2.0 lb ai per acre with single application on actively growing plants.	No
12315	Dimension 1EC	Sage, Scarlet	<i>Salvia splendens</i>		Field Container	Knight	2000	Over the top	Severe injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) with single application on actively growing plants.	No
12315	Dimension 1EC	Sage, Scarlet	<i>Salvia splendens</i>	'Coral Nymph'	Field Container	Linderman	1999	Directed spray	No injury at 0.5, 1.0 and 2.0 lb ai per acre with single directed application.	No
13291	Dimension 1EC	Sage, Ramona	<i>Salvia sylvestris</i>	'Rose Queen'	Field Container	Senesac	1998	Over the top	Slight to moderate injury increasing with rate (0.5, 1.0, 2.0 lb ai per acre) with single application on plants emerging from dormancy.	No
11336	Dimension 1EC	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1994	Over the top	No injury with two applications of 0.25, 0.5 or 1.0 lb ai per acre.	Yes
11336	Dimension 1EC	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1995	Over the top	No injury with two applications of 0.25, 0.5 or 1.0 lb ai per acre; same plant treated with same rates in 1994.	Yes
11336	Dimension 1EC	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1996	Over the top	No injury with two applications of 0.25, 0.5 or 1.0 lb ai per acre; same plant treated with same rates in 1994 and 1995.	Yes
11336	Dimension 1EC	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1997	Over the top	No injury with two applications of 0.25, 0.5 or 1.0 lb ai per acre; same plant treated with same rates in 1994, 1995 and 1996.	Yes
17269	Dimension 1EC	Speedwell, Brooklime	<i>Veronica sp.</i>	V. prostrata 'Georgia Blue'	Field Container	Senesac	1999	Over the top	Very slight to moderate injury increasing with rate (0.25, 0.5, 1.0 lb ai per acre) with single application on actively growing plants.	No
13285	Dimension 1EC	Pansy	<i>Viola sp.</i>	'bingo blue with blotch'	Field Container	Senesac	1998	Over the top	Moderate injury at all rates (0.5, 1.0, 2.0 lb ai per acre) with single application.	Yes

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
13285	Dimension 1EC	Pansy	<i>Viola sp.</i>	'crystal bowl yellow'	Field Container	Senesac	1998	Over the top	Moderate injury at all rates (0.5, 1.0, 2.0 lb ai per acre) with single application.	Yes
17260	Dimension 2EC	Tickseed	<i>Coreopsis sp.</i>	C. lanceolata	Field In-Ground	Norcini	1999	Over the top	No injury at 0.5 or 1.0 lb ai per acre with single application post bloom.	Yes
17261	Dimension 2EC	Blanket Flower	<i>Gaillardia sp.</i>	G. pulchella	Field In-Ground	Norcini	1999	Over the top	Very slight impact on flowering of treated plants at 1.0 lb ai per acre after single treatment, but there was no other apparent injury; no impact at 0.5 lb ai per acre.	Yes

Table 6. Detailed Summary Crop Safety Testing with Dimension 1G.

Notes: Table entries are sorted by crop Latin name. Only those reports received by 8/11/2008 are included.

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
11270	Dimension 1G	Fern, Tree	<i>Asparagus virgatus</i>		Field In-Ground	Stamps	1992	Broadcast	No injury and excellent weed control with 4 applications over 2 years at 2 and 4 lb ai per acre.	No
11386	Dimension 1G	Juniper	<i>Juniperus sp.</i>	J. chinensis 'Hetzii glauca'	Field In-Ground	Derr	1995	Over the top	No injury with 0.25, 0.5, and 1.0 lb ai per acre using single application on actively growing plants.	No
11880	Dimension 1G	Fern, Leatherleaf	<i>Rumohra adiantiformis</i>		Greenhouse	Stamps	1992	Over the top	Significant injury and frond reduction at 2 and 4 lb ai per acre with 4 applications over 2 years.	No
12030	Dimension 1G	Butchers Broom, Israeli Ruscus	<i>Ruscus aculeatus</i>		Greenhouse	Stamps	1992	Over the top	No visible injury occurred with 2 and 4 lb ai per acre with 4 applications over 2 years, but the number of stems was reduced.	No
11387	Dimension 1G	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1994	Over the top	No injury with single application of 0.25, 0.5 or 1.0 lb ai per acre.	No
11387	Dimension 1G	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1995	Over the top	No injury with single application of 0.25, 0.5 or 1.0 lb ai per acre; same plants treated with same rates in 1994.	No
11387	Dimension 1G	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1996	Over the top	No injury with two applications of 0.25, 0.5 or 1.0 lb ai per acre; same plant treated with same rates in 1994 and 1995.	No
11387	Dimension 1G	Yew	<i>Taxus sp.</i>	T. cuspidata	Field In-Ground	Ahrens	1997	Over the top	No injury with two applications of 0.25, 0.5 or 1.0 lb ai per acre; same plant treated with same rates in 1994, 1995 and 1996.	No

Table 7. Detailed Summary Crop Safety Testing with Dimension WSP.

Notes: Table entries are sorted by crop Latin name. Only those reports received by 8/11/2008 are included.

PR#	Product	Crop			Production Site	Researcher(s)	Year	Application Type	Results Summary	Labeled
		Common Name	Latin Name	Cultivar						
11269	Dimension WSP	Cast-Iron Plant, Ker-Gawl	<i>Aspidistra elatior</i>		Field In-Ground	Stamps	1992	Broadcast	Excellent weed control but significant reduction in yield at 2 and 4 lb ai per acre with 4 applications over 2 years.	No
12308	Dimension WSP	Aster, Bolton	<i>Boltonia sp.</i>	B. asteroides 'Pink Beauty'	Field Container	Linderman	1999	Directed spray	No injury with 0.25, 0.5, 1.0 lb ai per acre after single application.	No
12308	Dimension WSP	Aster, Bolton	<i>Boltonia sp.</i>	B. Asteroides 'Snowbank'	Field Container	Senesac	1998	Over the top	No significant injury with 0.25, 0.5, 1.0 lb ai per acre after single application on plants breaking dormancy.	No
12308	Dimension WSP	Aster, Bolton	<i>Boltonia sp.</i>	B. asteroides.	Field Container	Senesac	1999	Over the top	No injury with 0.25, 0.5, 1.0 lb ai per acre after single application over actively growing plants.	No
23158	Dimension WSP	Daylily	<i>Hemerocallis sp.</i>		Field Container	Fraelich	2003	Broadcast	No injury	No
23635	Dimension WSP	Hydrangea	<i>Hydrangea sp.</i>	H. macrophylla 'Nikko Blue'	Field Container	Fraelich	2003	Broadcast	No injury	No
23601	Dimension WSP	Juniper	<i>Juniperus sp.</i>	J. squamata parsoni	Field Container	Fraelich	2003	Broadcast	No injury	No
23603	Dimension WSP	Azalea, & Rhododendron	<i>Rhododendron sp.</i>	Fashion	Field Container	Fraelich	2003	Broadcast	No injury	No
18512	Dimension WSP	Speedwell, Brooklime	<i>Veronica sp.</i>	V. americana	Field Container	Boydston	2003	Over the top	Slight but transient injury (delayed bloom, stunted growth) increasing with rate (0.25, 0.5, 1.0 lb ai per acre) after single application; plants saleable.	No

Label Suggestions

It is suggested that *Eryngium platium* which exhibited no injury in these experiments be added to the Dimension 2EW label.

It is also suggested a section to the label be added listing those crops exhibiting significant injury after over the top and directed applications. This list could include a number of the crops showing injury in these research trials. However, most of the research was conducted using emulsifiable concentrate formulations instead of the newer Dimension 2EW. It is recommended any crops showing injury be retested with this formulation.

Appendix 1: Protocol

PROTOCOL FOR CLEARING DITHIOPYR ON ORNAMENTALS

Date: 01/03

General label directions: As Proposed in Table

Research program:

Site (species, variety, etc.) - As Attached

Pest(s) - As Attached

Pesticide (common name and trade name) - Dithiopyr (DIMENSION ULTRA WSP)

For label, material & if needed spray oil surfactant contact:

Dow Agrosiences, Michael W. Melichar (317) 337-4982, FAX# 317-337-4350; e-mail:mwmelichar@dowagro.com

Formulation- Use only EPA registered product

Experimental design:

Plot size (must be adequate to reflect actual use condition)

Replicates Minimum of 4 Treatment Units

Controls (untreated controls to be included in all experiments)

Application: ULTRA WSP

Dosages - 1x 0.25 lb.ai/A

2x 0.50 lb.ai/A

4x 1.0 lb.ai/A

Volume - 20-40 gal/A

Timing - (Interval) 1 treatment/year for ULTRA WSP

Number Applications: 1 applic for ULTRA WSP

Reports:

Method of application: (treatments should be applied over the top of the plants consistent with conventional commercial equipment).

Report completely on experimental design and method of application.

Weather - Maintain temperature and precipitation (including irrigation) data.

Soil type - Identify soil type used in experimental area.

Product - When submitting data, include EPA registration number of product used.

Efficacy - Data should include both actual counts and percent control as well as an indication that infestation was light, heavy, etc.

Record all application and evaluation dates.

Phytotoxicity - Record phytotoxicity data at all rates. Use a 0-10 scale. 0 = No Phytotoxicity 10 = complete kill.

If appropriate also include a rating for: Chlorosis, Percent of Defoliation (0-10 scale) and stunting (0-10). Indicate if marketable or not.

PROPOSED LABEL DIRECTIONS AFTER EXPERIMENTAL PROGRAM

CROP	USE	RATE	DIRECTIONS FOR USE	LIMITATIONS
As Attached	As Attached	0.5 lb.ai/A	Apply 2 quarts to preemergence weeds.	None

Please direct questions and forward data to: J. Ray Frank, IR-4 Project, 6916 Boyers Mill Road, New Market, MD 21774, Phone: (301) 898-5332, FAX# (301) 898-5937.

Phytotoxicity with post-emergent applications of Dimension 2EW and Showcase.

Ornamental Protocol Number: 07-027

Objective: Determine phytotoxicity of Dimension and Showcase to unlabelled plants commonly grown in nurseries.

Experimental Design:

Plot Size: Must be adequate to reflect actual use conditions.

Replicates: Minimum of 3 replications (preferably 4) with 3 plants per replicate

Application Instructions: Two applications made approximately 4 weeks apart. Plant materials must have broken dormancy prior to first application. For liquid applications, use a minimum of 20 gal per acre. Applications should be made over the top of the plants using application equipment consistent with conventional commercial equipment. Please see table below for instructions for post-application irrigation.

Plant Materials: See attached list of plant materials.

Evaluations: Record plant height & width at initial and final evaluations. At 1, 2, and 4 weeks after each application, record phytotoxicity on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill). If appropriate, also include ratings for chlorosis, defoliation, stunting or other growth effects on a scale of 0 to 10 (0 = No effect; 10 = Complete plant affected). If any phytotoxicity is observed in treated plants, take pictures comparing treated and untreated plant material.

Recordkeeping: Keep detailed records of weather conditions including temperature and precipitation, soil-type or soil-less media, application equipment, irrigation, liner size, plant height & width, and plant growth stage at application and data collection dates.

Treatments:

Product	Rate	Post-Application Irrigation Instructions	Contact Information to obtain materials and any needed adjuvants
Dimension 2EW (dithiopyr)	0.5 lb ai/A	Follow with sufficient overhead irrigation to wash Dimension from the foliage to reduce the chance of injury	Dow AgroSciences, Anita Alexander, 770-339-7322 ALALEXANDER@DOW.com
	1.0 lb ai/A		
	2.0 lb ai/A		
Showcase G (trifluralin+isoxaben +oxyfluorfen)	200 lb product /A	Follow with sufficient overhead irrigation to wash Showcase from the foliage to reduce the chance of injury	Dow AgroSciences, Anita Alexander, 770-339-7322 ALALEXANDER@DOW.com
	400 lb product /A		
	800 lb product /A		
Untreated	--	--	

Reports:

Reports must include:

- Results summary (no more than one page)
- Summary table with appropriate statistical analyses
- Experimental design and materials and methods
- Appendices: raw data and recordkeeping information as listed above
- If pictures were taken, please include them.

A report submitted electronically is preferred but not required. If the report is provided electronically, the basic report can be sent in MS Word or WordPerfect, the recordkeeping information as pdf or other electronic documents, and the raw data in MS Excel or other suitable program such as ARM.

Please direct questions to: Cristi Palmer, IR-4 HQ, Rutgers University, 681 US Hwy 1 S, North Brunswick, NJ 08902-3390, Phone 732-932-9575 x629, palmer@aesop.rutgers.edu OR Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-4880, E-mail: evvea@comcast.net.

Draft Date: 7/02
Revised By: CLP

Appendix 2: Contributing Researchers

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Mr. Ben Fraelich	USDA-ARS CPES P.O. Box 748 Tifton, GA 31793
Patricia Knight (<i>retired</i>)	Coastal Research and Extension Center P.O. Box 193 Poplarville, MS 39470
Dr. Bob Linderman (<i>retired</i>)	Horticultural Crops Research Lab USDA-ARS 3420 NW Orchard Ave. Corvallis, OR 97330
Dr. Jeff Norcini	University of Florida North Florida Research & Education Center Rt 4 Box 4092 Monticello, FL 32344
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Dr. Bob Stamps

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Appendix 3: Submitted Data

Data on following pages (and contained in a separate binder) are sorted in order by PR number then by researchers' last names, with the exception of the fern research reports which are organized by researchers' last names.