

**IR-4 Ornamental Horticulture Program
Polyoxin D Crop Safety**

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Acknowledgements

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Abstract

Polyoxin D was registered as Endorse in the United States in 2003 as a turf fungicide. In 2005, this label was updated to include applications for certain diseases on ornamental crops. During 2002 and 2004, the IR-4 Project conducted 110 trials on 75 ornamental plant species examining phytotoxicity related to Endorse applications. In these trials, only one crop exhibited noticeable, significant injury and that was a slight lower leaf twisting of *Verbascum chaixii*, but all plants were considered salable throughout the experiment. Based on this information, it is recommended that the Endorse label either list all 75 ornamental species or have a specific statement recommending growers apply Endorse to a limited portion of their crops prior to applying to the whole crop if they do not have previous experience applying Endorse to a specific plant species.

Introduction

Polyoxin D was registered as Endorse in the United States in 2003 as a turf fungicide. In 2005, this label was updated to include applications for certain diseases on ornamental crops. During 2002 and 2004, the IR-4 Project conducted 110 trials primarily examining phytotoxicity related to Endorse applications.

Materials and Methods

Rates ranged from 4 to 16 oz per 100 gal.

Endorse was supplied to researchers (See list of researchers in Appendix 2) by Arysta Corporation.

Results and Summary

Based on the type and nature of injury seen with pesticide applications, tested plant species were placed into three categories: 1) no significant phytotoxicity or growth differences from the untreated check or any injury was transitory, 2) no or minimal transitory injury seen at the 1X rate, but the 2X and/or 4X rates did cause significant phytotoxicity, 3) Significant injury sufficient to recommend growers not utilize these prodiamine formulations.

Phytotoxicity of Endorse

Across all plant species tested, Endorse exhibited no or minimal negative impact (Table 1). Seventy five plant genera or species fell into this category.

Please see Table 2 for a summary of the individual trial results.

Table 1. List of Endorse treated crops with no or minimal transitory injury.

<i>Acer saccharum</i>	<i>Gaillardia sp.</i>	<i>Panicum virgatum</i>
<i>Acer rubrum</i>	<i>Gaura lindheimeri</i>	<i>Pelargonium x hortorum</i>
<i>Ageratum sp.</i>	<i>Gleditsia sp.</i>	<i>Perovskia atriplicifolia</i>
<i>Antirrhinum majus</i>	<i>Gymnocladus dioica</i>	<i>Petunia sp.</i>
<i>Aster novi-belgii</i>	<i>Hedera helix</i>	<i>Photinia fraseri</i>
<i>Astilbe chinensis</i>	<i>Helichrysum</i>	<i>Pinus strobus</i>
<i>Aurinia saxatilis</i>	<i>Hemerocallis sp.</i>	<i>Platycodon grandiflorus</i>
<i>Begonia sp.</i>	<i>Heuchera sanguinea</i>	<i>Populus sp.</i>
<i>Berberis sp.</i>	<i>Hibiscus syriacus</i>	<i>Portulca sp.</i>
<i>Boltonia sp.</i>	<i>Hosta fortunei</i>	<i>Quercus rubra</i>
<i>Campanula glomerata</i>	<i>Hydrangea sp.</i>	<i>Quercus palustris</i>
<i>Cercis canadensis</i>	<i>Iberis sempervirens</i>	<i>Rhododendron sp.</i>
<i>Chionanthus retusus</i>	<i>Ilex verticillata</i>	<i>Robinia pseudoacacia</i>
<i>Cladrastis kentukea.</i>	<i>Impatiens sp.</i>	<i>Rosa rugosa</i>
<i>Coreopsis grandiflora</i>	<i>Iris germanica</i>	<i>Rudbeckia sp.</i>
<i>Cyclamen sp.</i>	<i>Juniperus sabina</i>	<i>Salvia splendens</i>
<i>Dahlia sp.</i>	<i>Liatris sp.</i>	<i>Stokesia sp.</i>
<i>Dendranthema sp.</i>	<i>Liriodendron tulipifera</i>	<i>Syringa vulgaris</i>
<i>Dianthus sp.</i>	<i>Lisianthus sp.</i>	<i>Tagetes sp.</i>
<i>Echinacea sp.</i>	<i>Lupinus sp.</i>	<i>Ulmus americana</i>
<i>Erigeron sp.</i>	<i>Malus sp.</i>	<i>Verbascum chaixii</i>
<i>Euonymus alatus</i>	<i>Malva sp.</i>	<i>Verbena sp.</i>
<i>Euphorbia pulcherrima</i>	<i>Monarda didyma</i>	<i>Viburnum sp.</i>
<i>Fraxinus americana</i>	<i>Myrica pensylvanica</i>	<i>Vinca sp.</i>
<i>Fraxinus pennsylvanica</i>	<i>Nicotiana sp.</i>	<i>Viola sp.</i>

Table 2. Detailed Summary of Crop Safety Testing with Endorse

Notes: Table entries are sorted by crop Latin name. Only reports received by 7/1/2007 are included in this table.

PR #	Product	Crop			Production Site	Researcher(s)	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
22510	Endorse	Maple	Acer sp.	A. rubrum	Field Container	Reding	2004	Foliar	No injury
22510	Endorse	Maple	Acer sp.	A. saccharum	Field Container	Freiberger	2004	Foliar	No significant injury
22043	Endorse	Ageratum	Ageratum sp.	'Blue Angel'	Greenhouse	Linderman	2004	Foliar	No injury
21750	Endorse	Ageratum	Ageratum sp.	'Blue Danube'	Field Container	Lehnert	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22043	Endorse	Ageratum	Ageratum sp.	'Blue Danube'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22280	Endorse	Snapdragon	Antirrhinum majus		Greenhouse	Linderman	2004	Foliar	No injury.
22280	Endorse	Snapdragon	Antirrhinum majus	'Sonnet Mix'	Greenhouse	Lehnert	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22345	Endorse	Aster, New York	Aster novi-belgii		Field Container	Pennucci	2004	Foliar	No injury
22424	Endorse	False Spirea	Astilbe sp.	A. chinensis	Field Container	Pennucci	2004	Foliar	No injury
22355	Endorse	Basket-Of-Gold	Aurinia saxatilis		Field Container	Pennucci	2004	Foliar	No injury
22364	Endorse	Begonia	Begonia sp.	'Rio Scarlet'	Field Container	Lehnert	2004	Foliar	No injury at 3.5, 7.0, and 14.0 oz per 100 gal.
22069	Endorse	Begonia	Begonia sp.	'Rio Scarlet'	Greenhouse	Lehnert	2004	Foliar	No injury
22069	Endorse	Begonia	Begonia sp.	'Scarlet'	Greenhouse	Linderman	2004	Foliar	No injury
22059	Endorse	Barberry	Berberis sp.		Greenhouse	Linderman	2004	Foliar	No injury
22051	Endorse	Aster, Bolton	Boltonia sp.	'Asteroids'	Greenhouse	Linderman	2004	Foliar	No injury
21777	Endorse	Bellflower	Campanula sp.	C. glomerata	Field Container	Pennucci	2004	Foliar	No injury
22561	Endorse	Red Bud, Eastern	Cercis canadensis		Field Container	Freiberger	2004	Foliar	No significant injury
22318	Endorse	White Fringetree	Chionanthus retusus		Greenhouse	Linderman	2004	Foliar	No injury at 3.5, 7.0 and 14.0 oz per 100 gal.
22637	Endorse	Yellowwood	Cladrastis sp.	C. kentukea	Field Container	Freiberger	2004	Foliar	No significant injury
22607	Endorse	Tickseed	Coreopsis sp.	C. grandiflora	Field Container	Pennucci	2004	Foliar	No injury
22238	Endorse	Persian Violet	Cyclamen sp.	'Mini-Cyclamen'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22113	Endorse	Dahlia	Dahlia sp.	'Piccolo Mix'	Greenhouse	Lehnert	2004	Drench	No injury
21825	Endorse	Chrysanthemum	Dendranthema sp.	'Late Belgian Dec Carpino'	Field Container	Lehnert	2004	Foliar	No injury at 3.5, 7.0 and 14.0 oz per 100 gal.
22097	Endorse	Chrysanthemum	Dendranthema sp.	'Yellow Jacket'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.

PR #	Product	Crop			Production Site	Researcher(s)	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
26983	Endorse	Pinks	Dianthus sp.	D. chinensis	Greenhouse	Hausbeck	2002	Drench	No efficacy but also no injury.
26984	Endorse	Purple Coneflower	Echinacea sp.	E. purpurea	Field Container	Pennucci	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal; 7 and 14 oz per 100 gal provided good leaf spot and blight prevention.
22437	Endorse	Fleabane	Erigeron sp.	E. speciosus	Field Container	Pennucci	2004	Foliar	Excellent control of leaf spot and blight; no injury at 3.5, 7.0, 14.0 oz per 100 gal.
22627	Endorse	Winged Burning Bush	Euonymus alatus		Field Container	Freiberger	2004	Foliar	No significant injury
22248	Endorse	Poinsettia	Euphorbia pulcherrima	'Freedom White'	Greenhouse	Williams	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
21756	Endorse	Ash, White	Fraxinus americana		Field Container	Freiberger	2004	Foliar	No significant injury
22344	Endorse	Ash, Green	Fraxinus pennsylvanica		Field Container	Freiberger	2004	Foliar	No significant injury
22368	Endorse	Blanket Flower	Gaillardia sp.	'Burgundy'	Greenhouse	Linderman	2004		No injury
21780	Endorse	Blanket Flower	Gaillardia sp.	G. grandiflora	Field Container	Pennucci	2004	Foliar	No injury
22753	Endorse	Gaura	Gaura lindheimeri	'Siskiyou Pink'	Greenhouse	Lieth	2004	Foliar	No injury at all rates.
22468	Endorse	Honey Locust	Gleditsia sp.		Field Container	Freiberger	2004	Foliar	No significant injury
22484	Endorse	Kentucky Coffee Tree	Gymnocladus dioica		Field Container	Freiberger	2004	Foliar	No significant injury
22418	Endorse	English Ivy	Hedera helix L. ssp. Helix		Field Container	Lehnert	2004	Foliar	No injury
22123	Endorse	English Ivy	Hedera helix L. ssp. Helix		Greenhouse	Linderman	2004	Foliar	No injury
22292	Endorse	Strawflower	Helichrysum bracteatum	'Bright Bikinis'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal
22411	Endorse	Daylily	Hemerocallis sp.	'Chesapeake Belle'	Field Container	Lehnert	2004	Foliar	No injury
22116	Endorse	Daylily	Hemerocallis sp.	'Chesapeake Belle'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22411	Endorse	Daylily	Hemerocallis sp.	H. flava	Field Container	Pennucci	2004	Foliar	No injury
22397	Endorse	Coral Bells, Alumroot	Heuchera sanguinea		Field Container	Pennucci	2004	Foliar	No injury
22170	Endorse	Mallow, Rose Mallow	Hibiscus sp.	H. syriacus 'Blue Bird'	Greenhouse	Linderman	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
21971	Endorse	Rose-Of-	Hibiscus	'Bluebird'	Greenhouse	Linderman	2004		No injury

PR #	Product	Crop			Production Site	Researcher(s)	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
		Sharon, Althaea	syriacus						
22495	Endorse	Lily, Plantain	Hosta fortunei		Field Container	Pennucci	2004	Foliar	No injury
22200	Endorse	Lily, Plantain	Hosta fortunei	'Aeromarginata'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22495	Endorse	Lily, Plantain	Hosta fortunei	'Blue Angel'	Field Container	Reding	2004	Foliar	No injury
22177	Endorse	Hydrangea	Hydrangea sp.		Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22472	Endorse	Hydrangea	Hydrangea sp.	'Blue Nikko'	Field Container	Reding	2004	Foliar	No injury
22177	Endorse	Hydrangea	Hydrangea sp.	'Limelight'	Greenhouse	Linderman	2004	Foliar	No injury
26981	Endorse	Candytuft	Iberis sp.	I. sempervirens	Field Container	Pennucci	2004	Foliar	No injury at any rate tested.
22466	Endorse	Holly	Ilex sp.	I. verticillata 'Winterberry Holly'	Field Container	Reding	2004	Foliar	No injury
22058	Endorse	Balsam	Impatiens sp.	'Balsam Mix'	Greenhouse	Lehnert	2004	Drench	No injury
22058	Endorse	Balsam	Impatiens sp.	I. wallerana	Greenhouse	Benson	2004	Drench	No injury
22058	Endorse	Balsam	Impatiens sp.	New Guinea Hybrids	Greenhouse	Linderman	2004	Foliar	No injury
22436	Endorse	Flag	Iris sp.	I. germanica	Field Container	Pennucci	2004	Foliar	Some control of Didymellina leaf blight under sever pressure; no injury at 3.5, 7.0, 14.0 oz per 100 gal.
22483	Endorse	Juniper	Juniperus sp.	J. sabina 'Broadmoor'	Field Container	Reding	2004	Foliar	No injury
21781	Endorse	Blazing-Star, Gayfeather	Liatris sp.		Field Container	Pennucci	2004	Foliar	No injury
22612	Endorse	Tulip Tree	Liriodendron tulipifera		Field Container	Freiberger	2004	Foliar	No significant injury
22204	Endorse	Lisianthus	Lisianthus sp.	'Sapphire Blue Chip'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22209	Endorse	Lupine	Lupinus sp.	L. hybrids 'Russell Hybrids'	Greenhouse	Linderman	2004	Foliar	No injury
22401	Endorse	Apple & Crabapple (Non- Bearing)	Malus sp.		Field Container	Freiberger	2004	Foliar	No significant injury
22508	Endorse	Mallow	Malva sp.		Field Container	Pennucci	2004	Foliar	Excellent leaf spot control; no injury at 3.5, 7.0, 14.0 oz per 100 gal.
21774	Endorse	Bee Balm	Monarda didyma		Field Container	Pennucci	2004	Foliar	No injury at 3.5, 7.0, and 14.0 oz per 100 gal.
21774	Endorse	Bee Balm	Monarda didyma	'Panorama Red Shades'	Field Container	Lehnert	2004	Foliar	No injury at 3.5, 7.0, and 14.0 oz per 100 gal.
21769	Endorse	Bayberry	Myrica		Field Container	Freiberger	2004	Foliar	No injury

PR #	Product	Crop			Production Site	Researcher(s)	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
			pensylvanica						
22146	Endorse	Flowering Tobacco	Nicotiana sp.	'Saratoga Deep Rose'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22299	Endorse	Switch-Grass	Panicum virgatum	'Heavy Metal'	Greenhouse	Linderman	2004	Foliar	No injury
25228	Endorse	Geranium	Pelargonium sp.	P. x hortorum	Greenhouse	Hausbeck	2002	Foliar	Some reduction in sporulation; no injury.
22575	Endorse	Sage, Russian;Blue Spire	Perovskia sp.	P. atriplicifolia	Field Container	Lieth	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22239	Endorse	Petunia	Petunia sp.	'Celebrity Red Improved'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22239	Endorse	Petunia	Petunia sp.	'Purple Waves'	Greenhouse	Linderman	2004	Foliar	No injury
22240	Endorse	Photinia	Photinia sp.	P. fraseri	Greenhouse	Linderman	2004	Foliar	No injury
22547	Endorse	Pine	Pinus sp.	P. strobus	Field Container	Freiberger	2004	Foliar	No significant injury
22547	Endorse	Pine	Pinus sp.	P. strobus	Field Container	Reding	2004	Foliar	No injury
21764	Endorse	Balloon Flower	Platycodon grandiflorus		Field Container	Pennucci	2004	Foliar	No injury
22251	Endorse	Aspen, Poplar	Populus sp.	'Siouxland'	Greenhouse	Linderman	2004	Foliar	No injury
22223	Endorse	Moss Rose	Portulaca sp.	'Magic Carpet Mixed'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 10 gal.
22534	Endorse	Oak	Quercus sp.	Q. palustris	Field Container	Freiberger	2004	Foliar	No significant injury
22534	Endorse	Oak	Quercus sp.	Q. rubra	Field Container	Reding	2004	Foliar	No injury
22259	Endorse	Rhododendron	Rhododendron sp.	'Purple Gem'	Greenhouse	Linderman	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22501	Endorse	Black Locust	Robinia pseudoacacia		Field Container	Freiberger	2004	Foliar	No significant injury
22263	Endorse	Rose	Rosa sp.	R. rugosa	Greenhouse	Linderman	2004	Foliar	No injury
22101	Endorse	Coneflower	Rudbeckia sp.	'Goldstrum'	Greenhouse	Lehnert	2005	Drench	No injury
22396	Endorse	Coneflower	Rudbeckia sp.	R. hirtta	Field Container	Pennucci	2004	Foliar	No injury
22272	Endorse	Sage, Scarlet	Salvia splendens		Greenhouse	Linderman	2004	Foliar	No injury
22272	Endorse	Sage, Scarlet	Salvia splendens	'St. John's Fire'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22594	Endorse	Stokes Aster	Stokesia sp.		Field Container	Pennucci	2004	Foliar	No injury
22198	Endorse	Lilac	Syringa sp.	S. vulgaris 'President Grevy'	Greenhouse	Linderman	2004	Foliar	No injury
22216	Endorse	Marigold	Tagetes sp.	'Pumpkin Crush'	Greenhouse	Lehnert	2004	Drench	No injury
22216	Endorse	Marigold	Tagetes sp.	T. patula 'Aurora Series'	Greenhouse	Linderman	2004	Foliar	No injury
22417	Endorse	Elm	Ulmus sp.	U. americana	Field Container	Freiberger	2004	Foliar	No significant injury
21932	Endorse	Mullein	Verbascum sp.	V. chaixii	Field Container	Pennucci	2004	Foliar	Slight lower leaf twisting,

PR #	Product	Crop			Production Site	Researcher(s)	Year	Application Method	Results Summary
		Common Name	Latin Name	Cultivar					
									but plants salable throughout experiment; excellent control of leaf spot and lower leaf blight.
22311	Endorse	Vervain	Verbena sp.		Greenhouse	Linderman	2004	Foliar	No injury
22048	Endorse	Arrowwood	Viburnum sp.	V. dentatum 'Autumn Jazz'	Greenhouse	Linderman	2004	Foliar	No injury
22237	Endorse	Periwinkle	Vinca sp.	'Cooler Bush'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	'Purple Jester'	Greenhouse	Lehnert	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x cornuta 'Penny Cream'	Greenhouse	Williams	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x cornuta 'Penny Cream'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x cornuta 'Penny Deep Blue'	Greenhouse	Williams	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x cornuta 'Penny Deep Blue'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Clear Sky Primrose'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Clear Sky Primrose'	Greenhouse	Williams	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Clear Sky Primrose'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Penny Cream'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Penny Deep Blue'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Skyline Blue'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Skyline Blue'	Greenhouse	Williams	2004	Drench	No injury at 3.5, 7.0, 14.0 oz per 100 gal.
22234	Endorse	Pansy	Viola sp.	x wittrockiana 'Skyline Blue'	Greenhouse	Williams	2004	Foliar	No injury at 3.5, 7.0, 14.0 oz per 100 gal.

Label Suggestions

Typically, IR-4 bases label suggestions on a minimum of three trials on any given plant species. However, given the lack of phytotoxicity across so many different plant species and genera, it is suggested that all sixty one plants in the IR-4 trials be placed on the Endorse label or that a general statement be placed on the label such as 'Endorse has not been demonstrated to cause damage on various ornamental plant species according to labeled use instructions. Endorse may be used on a wide number of crops, but must be tested on a limited portion of the crop prior to applying to the whole crop if the grower has no previous experience applying Endorse to that crop'.

Acer saccharum

Acer rubrum

Ageratum sp.

Antirrhinum majus

Aster novi-belgii

Astilbe chinensis

Aurinia saxatilis

Begonia sp.

Berberis sp.

Boltonia sp.

Campanula glomerata

Cercis canadensis

Chionanthus retusus

Cladrastis kentukea.

Coreopsis grandiflora

Cyclamen sp.

Dahlia sp.

Dendranthema sp.

Dianthus sp.

Echinacea sp.

Erigeron sp.

Euonymus alatus

Euphorbia pulcherrima

Fraxinus americana

Fraxinus pennsylvanica

Gaillardia sp.

Gaura lindheimeri

Gleditsia sp.

Gymnocladus dioica

Hedera helix

Helichrysum

Hemerocallis sp.

Heuchera sanguinea

Hibiscus syriacus

Hosta fortunei

Hydrangea sp.

Iberis sempervirens

Ilex verticillata

Impatiens sp.

Iris germanica

Juniperus sabina

Liatris sp.

Liriodendron tulipifera

Lisianthus sp.

Lupinus sp.

Malus sp.

Malva sp.

Monarda didyma

Myrica pensylvanica

Nicotiana sp.

Panicum virgatum

Pelargonium x hortorum

Perovskia atriplicifolia

Petunia sp.

Photinia fraseri

Pinus strobus

Platycodon grandiflorus

Populus sp.

Portulca sp.

Quercus rubra

Quercus palustris

Rhododendron sp.

Robinia pseudoacacia

Rosa rugosa

Rudbeckia sp.

Salvia splendens

Stokesia sp.

Syringa vulgaris

Tagetes sp.

Ulmus americana

Verbascum chaixii

Verbena sp.

Viburnum sp.

Vinca sp.

Viola sp.

Appendix 1: Available Protocol

PHYTOTOXICITY PROTOCOL FOR CLEARING POLYOXIN D ON ORNAMENTALS

Date: 11/04

Ornamental Protocol Number: 640

General label directions: Refer to Product Label

Research program:

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

Pest(s) - As Attached

Pesticide (common name and trade name) - Polyoxin D (CL EXP 04)

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

Arvesta, Chuck Schiller (415) 778-4824, FAX# 415-284-9883; e-mail: cschiller@arvesta.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: Drench 2 treatments 14 day intervals. Foliar Spray to drip with spreading/wetting agent.

Dosages - 1x 4.0 oz/100 gal.

2x 8.0 oz/100 gal.

4x 16.0 oz/100 gal.

Volume - 100 gal - 400 gal./acre

Timing - (Interval) 14 day

Number Applications: 3 - 5

Reports:

Method of application: (treatments are to be applied using application equipment 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.

Please direct questions to: Ely Veve, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-488, E-mail: evveve@comcast.net.

Appendix 2: Contributing Researchers

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Appendix 3: Submitted Data

Data on following pages and/or enclosed CD are arranged in PRnumber order.