



[Environment Horticulture Program Research Summaries](#)

IR-4 Environmental Horticulture Program Abamectin Crop Safety

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Table of Contents

Table of Contents	2
Table of Tables	2
Abstract	3
Introduction.....	4
Materials and Methods.....	4
Results and Summary	4
Phytotoxicity	4
Appendix 1: Contributing Researchers.....	12

Table of Tables

Table 1. List of abamectin treated crops with no or minimal transitory injury.	5
Table 2. List of abamectin treated crops with no injury at 1X but significant injury at 2X or 4X.	5
Table 3. List of abamectin treated crops with significant injury at 1X.....	5
Table 4. List of abamectin treated crops where more information is needed.	5
Table 5. List of abamectin treated crops with less than 3 trials.	5
Table 11. Detailed Summary of Crop Safety Testing with abamectin	6

Abstract

Abamectin has been registered since 1987 for environmental horticulture crops, initially for leafminers and spider mites on annuals and herbaceous perennials. Then in 2000, woody ornamentals plus aphids, thrips, whiteflies and other mite groups were added to the Avid 1.5 EC label.

Since 1984, IR-4 has included Avid 0.15EC in 113 crop safety trials and 48 efficacy experiments, with it being viewed as a standard commercially available tool in the more recent research activities.

Introduction

Abamectin has been registered since 1987 for environmental horticulture crops, initially for leafminers and spider mites on annuals and herbaceous perennials. Then in 2000, the Avid 1.5EC label was amended to include woody ornamentals and aphids, thrips, whiteflies and other mite groups. The IR-4 Project completed 113 crop safety trials and 48 efficacy experiments on 47 environmental horticulture plant species or genera from 1984 through 2017. This Summary focuses on the crop safety trials.

Materials and Methods

Avid was applied as foliar treatment from once up to 5 times, at approximately 1 to 3 week intervals. Application rates included 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal or 4, 8, and 16 fl oz per 100 gal, plus a water treated control. A minimum of four plants (replicate treatments) were required based on protocols. Phytotoxicity was recorded on several different scales based on researcher preference. Phytotoxicity was rated multiple times after initial application. For IR-4 screening prior to 2004, no protocol numbers are available.

Avid 0.15EC was supplied to researchers (See list of researchers in Appendix 1) by Merck and Syngenta.

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 at the 1X rate sufficient to recommend growers not utilize SP2478, and 4) more data are needed to make informed recommendations whether due to variable responses or because fewer than 3 trials have been conducted. These categories are represented separately for foliar and drench applications.

Phytotoxicity

Based on the type and nature of injury seen with abamectin applications in the research conducted between 1987 and 2017, tested plant species were placed into five 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 this product, 4) more data are needed to make informed recommendations, and 5) insufficient number of trials have been conducted to determine plant response.

In testing from 1987 and 2017, abamectin exhibited no or minimal negative impact on 14 plant species (Table 1). In this report 3 crop species were found to exhibit little or no injury at the 1x rate, and with significant phytotoxicity at higher rates (Tables 2). One crop species exhibited damage sufficient to recommend growers not utilize Avid 1.5EC (Table 3).

No genera or species exhibited variable responses (Table 4), but IR-4 has not generated sufficient information to categorize crop response on 28 species / genera (Table 4). However, little to no injury was observed on all species / genera.

Please see Table 5 for a summary of the individual trial results.

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

<i>Ageratum sp.</i>	<i>Gerbera sp.</i>
<i>Anthurium sp.</i>	<i>Hosta sp.</i>
<i>Antirrhinum majus</i>	<i>Lobelia cardinalis</i>
<i>Begonia sp.</i>	<i>Petunia sp.</i>
<i>Bellis perennis</i>	<i>Tagetes sp.</i>
<i>Chrysanthemum/Dendranthema sp.</i>	<i>Viola x wittrockiana</i>
<i>Dieffenbachia sp.</i>	<i>Zinnia sp.</i>

Table 2. List of abamectin treated crops with no injury at 1X but significant injury at 2X or 4X.

<i>Euphorbia pulcherrima</i>
<i>Schefflera sp</i>
<i>Spathiphyllum sp.</i>

Table 3. List of abamectin treated crops with significant injury at 1X.

<i>Asplenium nidus</i>

Table 4. List of abamectin treated crops where more information is needed.

None

Table 5. List of abamectin treated crops with less than 3 trials.

<i>Aglaonema sp.</i>	<i>Jacobaea maritima</i>
<i>Alyssum sp.</i>	<i>Leucanthemum x superbum</i>
<i>Aster sp.</i>	<i>Maranta leuconeura</i>
<i>Calendula sp.</i>	<i>Narcissus sp.</i>
<i>Chamaedorea elegans</i>	<i>Pelargonium sp.</i>
<i>Dahlia sp.</i>	<i>Picea sp.</i>
<i>Dianthus sp.</i>	<i>Ptychosperma elegans</i>
<i>Dracaena marginata</i>	<i>Rhododendron sp.</i>
<i>Ficus sp.</i>	<i>Santpaulia splendens</i>
<i>Glandularia x hybrida</i>	<i>Syngonium podophyllum</i>
<i>Gypsophila sp.</i>	<i>Thuja sp.</i>
<i>Hydrangea sp.</i>	<i>Thymophylla tenuiloba var. tenuiloba</i>
<i>Impatiens hawkeri</i>	<i>Verbena sp.</i>
<i>Iris xiphium</i>	<i>Viburnum sp.</i>

Table 6. Detailed Summary of Crop Safety Testing with abamectin

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 4/7/2022 are listed below.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
07651	Ageratum (Ageratum sp.) 'Blue Mink'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07651	Ageratum (Ageratum sp.) 'Spendrift Hybrid'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
09278	Ageratum (Ageratum sp.) 'Blue Mink'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09278	Ageratum (Ageratum sp.) 'Spindrift Hybrid'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
07651	Ageratum (Ageratum sp.) A. houstonianum 'Blue Surf'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
09278	Ageratum (Ageratum sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01 lb ai per 100 gal applied twice at a 3 week interval, but slight tip necrosis on 0.02 and 0.04 lb ai per 100 gal; new foliage not affected.
09340	Aglaonema (Aglaonema sp.) A commutatum 'Schott'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
09340	Aglaonema (Aglaonema sp.) A. commutatum	Greenhouse	Osborne	FL	1985	Foliar	No injury with 0.02, 0.04, and 0.08 ai per 100 gal after 5 applications.
35399	Madwort (Alyssum sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
35401	Laceleaf (Anthurium sp.) 'Goldstein'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Kaumana'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Kobayashi Obake'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Kozohara'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Marian Seefurth'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Maunakea'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Nitta'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Oshiro White'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.
35401	Laceleaf (Anthurium sp.) 'Ozaki'	Shadehouse/Lath House	Hara	HI	1984	Foliar	No injury at 0.04 lb ai per 100 gal.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
07741	Garden Snapdragon (<i>Antirrhinum majus</i>) 'Kolibri - hybrid'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07741	Garden Snapdragon (<i>Antirrhinum majus</i>) 'Pixie - hybrid'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07741	Garden Snapdragon (<i>Antirrhinum majus</i>) 'Panama'	Greenhouse	Locke	MD	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal after 4 applications.
09289	Garden Snapdragon (<i>Antirrhinum majus</i>)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied once.
35385	Hawai'i Birdnest Fern (<i>Asplenium nidus</i>)	Greenhouse	Osborne	FL	1985	Foliar	Injury in the form of ringspots were observed at all rates (0.02, 0.04, and 0.08 ai per 100 gal).
35400	Aster (<i>Aster</i> sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
17850	Begonia (<i>Begonia</i> sp.) <i>B. semperflorens</i>	Field Container	Buriff	OH	1999	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
17850	Begonia (<i>Begonia</i> sp.)	Field Container	Schultz	VA	1999	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
17864	Begonia (<i>Begonia</i> sp.)	Greenhouse	Schultz	VA	2000	Foliar	No injury on flowers or foliage with 8, 16, and 32 fl oz per 100 gal applied 3 times.
08943	Lawn Daisy (<i>Bellis perennis</i>)	Greenhouse	Locke	MD	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal after 4 applications.
09281	Lawn Daisy (<i>Bellis perennis</i>) <i>B. perennis</i>	Field In-Ground	Locke	MD	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal after 4 applications.
35505	Lawn Daisy (<i>Bellis perennis</i>)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
07663	Marigold (<i>Calendula</i> sp.) 'Apricot Sherbet'	Greenhouse	Locke	MD	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal after 4 applications.
09279	Marigold (<i>Calendula</i> sp.) <i>C. officinalis</i> 'Apricot Sherbet'	Field In-Ground	Neal	MD	1986	Foliar	No injury with 0.005, 0.01 lb ai per acre applied 5 times weekly, but stunting occurred with 0.02, 0.04 and 0.08 lb ai per 100 gal starting at week 3 and mortality occurred at 0.04 and 0.08 lb ai per 100 gal by the last evaluation date.
12480	Chrysanthemum, Garden (<i>Chrysanthemum/Dendranthema</i> sp.) <i>C. x morifolium</i>	Field In-Ground	Buriff	OH	1998	Foliar	No injury at 8, 16, and 32 fl oz per 100 gal.
12486	Chrysanthemum, Garden (<i>Chrysanthemum/Dendranthema</i> sp.) 'Yellow Jacket'	Greenhouse	Lehnert	MD	2005	Foliar	Duplicate trial: No injury at 4, 8, and 16 fl oz per 100 gal + 1% Horticultural Oil.
12486	Chrysanthemum, Garden (<i>Chrysanthemum/Dendranthema</i> sp.) 'Yellow Jacket'	Greenhouse	Lehnert	MD	2005	Foliar	No injury at 4, 8, and 16 fl oz per 100 gal +1% Horticultural Oil

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
12480	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.) C. X morifolium 'Autumn Glory'	Field In-Ground	Linderman	OR	1998	Foliar	No injury at 4, 8, and 16 fl oz per 100 gal.
12486	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.) C. morifolium 'Autumn Glory'	Greenhouse	Linderman	OR	1998	Foliar	No injury at 4, 8, and 16 fl oz per 100 gal.
35403	Dahlia (Dahlia sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied once.
35404	Pink (Dianthus sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied once.
09342	Dieffenbachia (Dieffenbachia sp.) D. macuata	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
09342	Dieffenbachia (Dieffenbachia sp.) D. maculata 'Don'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
35491	Dragon Tree (Dracaena marginata)	Interior Plantscape	Nielsen	OH	2002	Foliar	No injury with 4, 8, and 16 fl oz per 100 gal with and without 0.15% oil.
09346	Poinsettia (Euphorbia pulcherrima) 'V-14'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal after the first application but after the second application the 0.04 and 0.08 plants exhibited early decline of bracts.
17870	Poinsettia (Euphorbia pulcherrima) 'Freedom Red'	Greenhouse	Schultz	VA	2000	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
09343	Fig (Ficus sp.) F. benjamina	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
09343	Fig (Ficus sp.) Ficus benjamina	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01 lb ai per acre applied 5 times weekly, but chlorotic mottling occurred with 0.02, 0.04 and 0.08 lb ai per 100 gal starting at week 4 increasing with rate.
17852	Transvaal Daisy (Gerbera sp.) 'Festival Apricot'	Field Container	Schultz	VA	1999	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
17852	Transvaal Daisy (Gerbera sp.) G. Jamesonii 'Special Mix'	Field Container	Treat	WA	2000	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
12482	Plantain Lily (Hosta sp.) H. undulata	Field In-Ground	Buriff	OH	1998	Foliar	No injury at 8, 16, and 32 fl oz per 100 gal.
12488	Plantain Lily (Hosta sp.) 'Aureomarginata'	Greenhouse	Lehnert	MD	2004	Foliar	No injury at 4, 8, and 16 fl oz per 100 gal + 1% horticulture oil.
12482	Plantain Lily (Hosta sp.) H. decorata	Field In-Ground	Linderman	OR	1998	Foliar	No injury at 4, 8, and 16 fl oz per 100 gal.
12488	Plantain Lily (Hosta sp.) H. decorata	Greenhouse	Linderman	OR	1998	Foliar	No injury at 4, 8, and 16 fl oz per 100 gal.
09347	Hydrangea (Hydrangea sp.) H. macrophylla 'Goliath'	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
35500	Hydrangea (Hydrangea sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
17168	Iris, Spanish (Iris xiphium)	Field In-Ground	Simmons	SC	2005	Foliar	No injury at 2, 4, and 8 fl oz per 100 gal.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
35405	Dusty Miller, Silver Ragwort (<i>Jacobaea maritima</i>)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
35386	Daisy, Shasta (<i>Leucanthemum x superbum</i>) 'Alaska'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
35388	Daisy, Shasta (<i>Leucanthemum x superbum</i>) 'Alaska'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
07671	Cardinal Flower (<i>Lobelia cardinalis</i>) 'Blue Stone'	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
09282	Cardinal Flower (<i>Lobelia cardinalis</i>) L. <i>erinus</i> 'Fairy Wings'	Field Container	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
07671	Cardinal Flower (<i>Lobelia cardinalis</i>) 'Blue Stone'	Greenhouse	Locke	MD	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal after 4 applications.
09282	Cardinal Flower (<i>Lobelia cardinalis</i>)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
17898	Prayer Plant (<i>Maranta leuconeura</i>) M. <i>leuconeura erythroneura</i>	Interior Plantscape	Nielsen	OH	2002	Foliar	No injury with 4, 8, and 16 fl oz per 100 gal with and without 0.15% oil.
17167	Daffodil (<i>Narcissus</i> sp.)	Field In-Ground	Simmons	SC	2005	Foliar	No injury at 2, 4, and 8 fl oz per 100 gal.
07719	Petunia (<i>Petunia</i> sp.) 'Bonanza'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07719	Petunia (<i>Petunia</i> sp.) 'Cloud'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07719	Petunia (<i>Petunia</i> sp.) 'Glorious'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07719	Petunia (<i>Petunia</i> sp.) 'Joy'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
09286	Petunia (<i>Petunia</i> sp.) 'Bonanza' Hybrid Double Multiflora	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09286	Petunia (<i>Petunia</i> sp.) 'Cloud' Hybrid Grandlora	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09286	Petunia (<i>Petunia</i> sp.) 'Glorious' Hybrid Double Grandflora	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09286	Petunia (<i>Petunia</i> sp.) 'Joy' Single Multiflora	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
07719	Petunia (<i>Petunia</i> sp.) P. <i>hybrida</i> . 'Salmon Cloud'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
09286	Petunia (<i>Petunia</i> sp.) <i>Petunia hybrida</i> Hort. 'Salmon Cloud'	Field In-Ground	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
35503	Petunia (<i>Petunia</i> sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied after first application but slight to moderate chlorosis was observed after second application.
09286	Petunia (<i>Petunia</i> sp.)	Field In-Ground	Schuder	IN	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 3 times at 2 week intervals.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
19153	Spruce (<i>Picea</i> sp.) <i>P. glauca conica</i>	Field In-Ground	Treat	WA	2000	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
17890	Palm, Alexander (<i>Ptychosperma elegans</i>) 'R. Br. Blume'	Greenhouse	Linderman	OR	2002	Foliar	No injury with 8, 16, and 32 fl oz per 100 gal applied three times weekly.
11858	Azalea & Rhododendron (<i>Rhododendron</i> sp.) 'Herbert' Azalea	Field In-Ground	Buriff	OH	1998	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
07378	Scarlet Sage (<i>Salvia splendens</i>) 'Hotline'	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
09288	Scarlet Sage (<i>Salvia splendens</i>) 'Hotline'	Field Container	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
07378	Scarlet Sage (<i>Salvia splendens</i>) <i>S. splendens</i> 'Hotline'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly. However, all rates appeared to increase height and improve flower vigor.
09288	Scarlet Sage (<i>Salvia splendens</i>)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied once.
09341	Schefflera (<i>Schefflera</i> sp.) <i>S. arboricola</i>	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
09341	Schefflera (<i>Schefflera</i> sp.) <i>S. brassaia actinophylla</i> Endl.	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly. However, all rates appeared to increase height.
09341	Schefflera (<i>Schefflera</i> sp.) <i>S. actinophylla</i>	Greenhouse	Osborne	FL	1985	Foliar	Injury in the form of ringspots were observed with intensity increasing with rate (0.02, 0.04, and 0.08 ai per 100 gal).
09344	Spathe Flower; <i>Spathiphyllum</i> (<i>Spathiphyllum</i> sp.) <i>S. clevelandii</i>	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
09344	Spathe Flower; <i>Spathiphyllum</i> (<i>Spathiphyllum</i> sp.) 'Mauna Loa'	Greenhouse	Osborne	FL	1985	Foliar	Injury in the form of leaf distortion were observed with intensity increasing with rate (0.02, 0.04, and 0.08 ai per 100 gal).
09345	American Evergreen (<i>Syngonium podophyllum</i>)	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
09345	American Evergreen (<i>Syngonium podophyllum</i>) <i>S. podophyllum</i>	Greenhouse	Osborne	FL	1985	Foliar	No injury with 0.02, 0.04, and 0.08 ai per 100 gal after 5 applications.
07675	Marigold (<i>Tagetes</i> sp.) 'Happy Days'	Greenhouse	Halfhill	WA	1985	Foliar	No injury on foliage or flowers with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07675	Marigold (<i>Tagetes</i> sp.) 'Lemon'	Greenhouse	Halfhill	WA	1985	Foliar	No injury on foliage or flowers with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07675	Marigold (<i>Tagetes</i> sp.) 'Lemon'	Greenhouse	Halfhill	WA	1985	Foliar	No injury on foliage with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07675	Marigold (<i>Tagetes</i> sp.) 'Royal'	Greenhouse	Halfhill	WA	1985	Foliar	No injury on foliage or flowers with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07675	Marigold (<i>Tagetes</i> sp.) <i>T. erecta</i> 'First Lady'	Greenhouse	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
09283	Marigold (<i>Tagetes</i> sp.) <i>T. erecta</i> 'First Lady'	Field In-Ground	Neal	MD	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal applied 5 times weekly.
35501	Marigold (<i>Tagetes</i> sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
19150	Red Cedar, <i>Arborvitae</i> (<i>Thuja</i> sp.) <i>T. occidentalis</i> L. 'Emerald Green'	Field In-Ground	Treat	WA	2000	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
35387	Dahlberg Daisy; Golden-Fleece (<i>Thymophylla tenuiloba</i> var. <i>tenuiloba</i>) 'Golden Fleece'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
35389	Dahlberg Daisy; Golden-Fleece (<i>Thymophylla tenuiloba</i> var. <i>tenuiloba</i>) 'Golden Fleece'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
07744	Vervain (<i>Verbena</i> sp.) 'Blaze'	Greenhouse	Linderman	OR	1985	Foliar	No injury with 0.01, 0.02, 0.04, and 0.08 ai per 100 gal.
17875	Arrowwood (<i>Viburnum</i> sp.) <i>V. dentatum</i> L.	Field In-Ground	Buriff	OH	1999	Foliar	No injury observed with 8, 16 and 32 fl oz per 100 gal after three weekly applications.
07676	Pansy, Large Flowering; Wittrock's Violet (<i>Viola X wittrockiana</i>) 'Majestic Giants-Hybrid'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
07676	Pansy, Large Flowering; Wittrock's Violet (<i>Viola X wittrockiana</i>) 'Super Swiss Giants'	Greenhouse	Halfhill	WA	1985	Foliar	No injury with 0.005, 0.01, 0.02, 0.04 and 0.08 lb ai per 100 gal.
09284	Pansy, Large Flowering; Wittrock's Violet (<i>Viola X wittrockiana</i>) 'Majestic Giants-Hybrid'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09284	Pansy, Large Flowering; Wittrock's Violet (<i>Viola X wittrockiana</i>) 'Super Swiss Giants'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09284	Pansy, Large Flowering; Wittrock's Violet (<i>Viola X wittrockiana</i>)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied twice at a 3 week interval.
09290	Zinnia (<i>Zinnia</i> sp.) 'Button Box'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
09290	Zinnia (<i>Zinnia</i> sp.) 'Peter Pan - hybrid'	Field In-Ground	Halfhill	WA	1985	Foliar	No injury with 0.01, 0.02, 0.04, 0.08 and 0.16 lb ai per 100 gal.
35504	Zinnia (<i>Zinnia</i> sp.)	Field Container	Parrella	CA	1985	Foliar	No injury with 0.01, 0.02 and 0.04 lb ai per 100 gal applied once.
28269	Hydrangea (<i>Hydrangea</i> sp.)	Greenhouse	Freiberger	NJ	2006	Foliar	No injury.
28277	Lespedeza, Shrub (<i>Lespedeza bicolor</i>) <i>Lespedeza</i> sp.	Greenhouse	Freiberger	NJ	2006	Foliar	No injury.
28285	Chaste Tree (<i>Vitex</i> sp.)	Greenhouse	Freiberger	NJ	2006	Foliar	No injury.

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