



[Environment Horticulture Program Research Summaries](#)

## **IR-4 Environmental Horticulture Program Fluopicolide Crop Safety**

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### **Acknowledgements**

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## Abstract

Fluopicolide was registered as Adorn 4SC in the United States in 2008 for control of Pythium, Phytophthora and downy mildew in environmental horticulture plants. State registrations in California and New York occurred in 2010 and 2011, respectively. Adorn 4SC may be applied on container, bench, or bed grown ornamentals in greenhouses, lathouses, shadehouses or outdoor landscapes, and on conifers including Christmas trees in outdoor landscapes. The commercial label contains a list of 22 ornamental plants exhibiting no or minimal injury. During 2008 to 2011, the IR-4 Project completed 84 trials on 24 environmental horticulture plant species or genera examining phytotoxicity related to drench and foliar applications of Adorn 4F. In all trials except one, treated plants exhibited minimal or no injury to drench and foliar applications. Sufficient trials showed 16 species or genera exhibiting minimal or no injury. Of these, 5 are already on the Adorn label; *Acer palmatum*, *Begonia sp.*, *Calibrachoa sp.*, *Juniperus sp.*, *Petunia sp.*, *Pinus sp.*, *Quercus sp.*, *Syringa sp.*, *Taxus sp.*, *Thuja sp.*, and *Viburnum sp.* are the 11 crops not yet listed. Based on this information, it is recommended that these be added to the list of tolerant plants on the Adorn 4F label.

## Introduction

Fluopicolide was registered as Adorn 4F in the United States in 2008 for control of Pythium, Phytophthora and downy mildew in ornamental plants. State registrations in California and New York occurred in 2010 and 2011, respectively. It may be used on container, bench, or bed grown ornamentals in greenhouses, lathehouses, shadehouses or outdoor landscapes, and on conifers including Christmas trees in outdoor landscapes. The commercial label contains a list of 22 environmental horticulture crops exhibiting no or minimal injury. During 2008 to 2011, the IR-4 Project completed 84 trials on 24 plant species or genera examining phytotoxicity related to drench and foliar applications of Adorn F, also known as the code number V-10161.

## Materials and Methods

Adorn 4F was tested applied as drench twice at approximately 4 weeks intervals or as foliar treatment 5 times) at approximately 7 days intervals. The application rates were 1, 2 and 4 fl oz per 100 gal, plus a water treated control. A minimum of 3 replicates, three plants per replicate, were required. Phytotoxicity was planned to be recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill). Phytotoxicity was rated 1, 2 and 4 weeks after each application. For more detailed materials and methods, please visit <https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols> to view and download these protocols.

Adorn was supplied to researchers (See list of researchers in Appendix 1) by Valent.

## Results and Summary

Based on the type and nature of injury seen with pesticide applications, 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 at the 1X rate sufficient to recommend growers not utilize this product, and 4) variable responses were observed across trials, and 5) more data are needed to make informed recommendations.

### ***Phytotoxicity***

Across most plant species tested, Adorn 4F exhibited no or minimal negative impact on plant genera or species with drench or foliar applications (Table 1); of these 16 were screened in three or more trials across both application methods (Table 2). No plants exhibited significant injury across multiple trials (Table 3, Table 4). In only one trial, *Abies sp.* showed significant injury so further study is warranted (Table 5). There are 7 species or genera where less than 3 trials were conducted so there is not enough information available at this time (Table 6).

Please see Table 7 for a list of individual trial summaries for Adorn 4F.

**Table 1. Overview of Adorn 4F crop safety with foliar and drench applications.**

CropLatinName	Adorn 4F (Fluopicolide)-Drench	Adorn 4F (Fluopicolide)-Foliar
<i>Abies sp.</i>	2.0 (1 - 5) n4	1.0 (1 - 1) n1
<i>Acer palmatum</i>	1.0 (1 - 1) n2	1.0 (1 - 1) n1
<i>Acer rubrum</i>	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Begonia sp.</i>	1.0 (1 - 1) n6	
<i>Calibrachoa sp.</i>	1.0 (1 - 1) n4	
<i>Camellia sp.</i>	1.0 (1 - 1) n2	1.0 (1 - 1) n1
<i>Cotoneaster sp.</i>	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Ficus sp.</i>	1.0 (1 - 1) n2	
<i>Geranium sp.</i>	1.0 (1 - 1) n4	
<i>Juniperus sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Malus sp.</i>	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Pelargonium sp.</i>	1.0 (1 - 1) n4	
<i>Petunia sp.</i>	1.0 (1 - 1) n6	
<i>Picea sp.</i>	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Pinus sp.</i>	1.0 (1 - 1) n2	1.0 (1 - 1) n1
<i>Quercus sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Rhododendron sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Rosa sp.</i>		1.0 (1 - 1) n1
<i>Salvia x sylvestris</i>		1.0 (1 - 1) n1
<i>Syringa sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Taxus sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Thuja sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Viburnum sp.</i>	1.0 (1 - 1) n3	1.0 (1 - 1) n1
<i>Vinca sp.</i>	1.0 (1 - 1) n4	

Average rating on a scale of 1 – 5 with 1 = 0 to about no injury and 5 = severe injury and mortality; minimum to maximum rating; number of trials. A rating of 3 or higher is considered commercially unacceptable. A rating of 1 or 2 is considered commercially acceptable and those with more than 3 trials are complete.

**Table 2. List of Adorn 4F treated crops with no or minimal transitory injury.**

*Acer palmatum*  
*Begonia sp.*  
*Calibrachoa sp.*  
*Camellia sp.*<sup>1</sup>  
*Geranium sp.*<sup>1</sup>  
*Juniperus sp.*  
*Pelargonium sp.*<sup>1</sup>  
*Petunia sp.*

*Pinus sp.*  
*Quercus sp.*  
*Rhododendron sp.*<sup>1</sup>  
*Syringa sp.*  
*Taxus sp.*  
*Thuja sp.*  
*Viburnum sp.*  
*Vinca sp.*<sup>1</sup>

**Table 3. List of Adorn 4F treated crops with no or minimal transitory injury seen at the 1X rate, but the 2X or 4X rate did cause significant phytotoxicity.**

None

**Table 4. List of Adorn 4F treated crops exhibiting significant injury.**

None

**Table 5. List of Adorn 4F treated crops where more information is needed.**

*Abies sp.*<sup>1</sup>

**Table 6. List of Adorn 4F treated crops with less than 3 trials.**

*Acer rubrum*

*Cotoneaster sp.*

*Ficus sp.*

*Malus sp.*<sup>1</sup>

*Picea sp.*

*Rosa sp.*

*Salvia x sylvestris*

<sup>1</sup> already registered

**Table 7. Detailed Summary of Crop Safety Testing with Fluopicolide.**

Note: Table entries are sorted by crop Latin name. Only those trials with research reports received by 11/2/2023 are listed below.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
27430	Fir (Abies sp.) A. balsamea	Field Container	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27430	Fir (Abies sp.) A. grandis	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27430	Fir (Abies sp.) A. grandis	Field Container	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27430	Fir (Abies sp.) 'Idaho Grand'	Field Container	Harvey	WA	2009	Drench	Severe injury (some plants dead) at 1, 2 and 3 fl oz per 100 gal.
27430	Fir (Abies sp.) A. fraseri	Field Container	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27799	Maple, Japanese (Acer palmatum) 'Atropurpureum'	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27799	Maple, Japanese (Acer palmatum) Maple Japanese	Field Container	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27799	Maple, Japanese (Acer palmatum) 'Bloodgood'	Field Container	Pscheidt	OR	2010	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal.
27800	Maple, Red (Acer rubrum)	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27800	Maple, Red (Acer rubrum) 'Franks Red'	Field Container	Pscheidt	OR	2010	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal.
27433	Begonia (Begonia sp.) B. semperflorens	Greenhouse	Fraelich	GA	2009	Drench	No injury at 1, 2 and 4 fl oz per 100 gal; very slight stunting at 4X; all plants marketable.
27433	Begonia (Begonia sp.) 'Olympia Red'	Greenhouse	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27433	Begonia (Begonia sp.) 'Vodka Bright Red'	Greenhouse	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27433	Begonia (Begonia sp.) Begonia	Greenhouse	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27433	Begonia (Begonia sp.) B. semperflorens	Greenhouse	Hausbeck	MI	2009	Drench	No injury at 1, 2 and 4 fl oz per 100 gal.
27433	Begonia (Begonia sp.)	Greenhouse	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27434	Calibrachoa (Calibrachoa sp.)	Greenhouse	Fraelich	GA	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants marketable.
27434	Calibrachoa (Calibrachoa sp.) Calibrachoa	Greenhouse	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27434	Calibrachoa (Calibrachoa sp.) 'Cherry Pink'	Greenhouse	Hausbeck	MI	2009	Drench	No injury at 1, 2 and 4 fl oz per 100 gal
27434	Calibrachoa (Calibrachoa sp.)	Greenhouse	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.



PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
27435	Camellia (Camellia sp.) 'Magnoliaeflora'	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27435	Camellia (Camellia sp.) C. japonica 'Eg Waterhouse'	Field Container	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27435	Camellia (Camellia sp.) 'April Dawn'	Field Container	Pscheidt	OR	2010	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal.
27802	Cotoneaster (Cotoneaster sp.) C. dammeri 'Coral Beauty'	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27802	Cotoneaster (Cotoneaster sp.) C. dammeri 'Coral Beauty'	Field Container	Grunwald	OR	2011	Drench	No injury with 1, 2 and 4 fl oz per 100 gal applied twice.
27440	Fig (Ficus sp.) F. benjamina	Greenhouse	Fraelich	GA	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants marketable.
27440	Fig (Ficus sp.) F. benjamina	Greenhouse	Uber	CA	2011	Drench	No injury or growth reduction with 1, 2 and 4 fl oz per 100 gal applied twice.
27441	Geranium (Geranium sp.) 'Maverick Red'	Greenhouse	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27441	Geranium (Geranium sp.) 'Orbit Red'	Greenhouse	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27441	Geranium (Geranium sp.)	Greenhouse	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
30530	Geranium (Geranium sp.) 'Brookside'	Field Container	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27443	Juniper (Juniperus sp.) J. sabina 'Broadmoor'	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27443	Juniper (Juniperus sp.) J. procumbens 'Nana	Field Container	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27443	Juniper (Juniperus sp.)	Field Container	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27443	Juniper (Juniperus sp.) J. scopolorum 'Moonglow'	Field Container	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27804	Apple, Non-bearing (Malus sp.) 'Spring Snow'	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27804	Apple, Non-bearing (Malus sp.) 'Spring Snow'	Field Container	Grunwald	OR	2011	Drench	No injury with 1, 2 and 4 fl oz per 100 gal applied twice.
27445	Geranium (Pelargonium sp.) P. x hortorum	TBD	Fraelich	GA	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants marketable.
27445	Geranium (Pelargonium sp.)	TBD	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27445	Geranium (Pelargonium sp.) P. x hortorum 'Rocky Mountain Red'	TBD	Hausbeck	MI	2009	Drench	No injury at 1, 2 and 4 fl oz per 100 gal
27445	Geranium (Pelargonium sp.)	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27446	Petunia (Petunia sp.)	TBD	Fraelich	GA	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants marketable.
27446	Petunia (Petunia sp.) 'Dream Red'	TBD	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27446	Petunia (Petunia sp.) 'Madness Red'	TBD	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27446	Petunia (Petunia sp.)	TBD	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
27446	Petunia (Petunia sp.) P. x. hybrida	TBD	Hausbeck	MI	2009	Drench	No injury at 1, 2 and 4 fl oz per 100 gal
27446	Petunia (Petunia sp.)	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27805	Spruce (Picea sp.) P. sitchensis	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27805	Spruce (Picea sp.) P. sitchensis'	Field Container	Grunwald	OR	2011	Drench	No injury with 1, 2 and 4 fl oz per 100 gal applied twice.
27803	Pine (Pinus sp.) P. ponderosa	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27803	Pine (Pinus sp.) P. ponderosa	Field Container	Grunwald	OR	2011	Drench	No injury with 1, 2 and 4 fl oz per 100 gal applied twice.
27803	Pine (Pinus sp.) P. eldarica	Field Container	Uber	CA	2011	Drench	No injury or growth reduction with 1, 2 and 4 fl oz per 100 gal applied twice.
27449	Oak (Quercus sp.) Q. alba	Field Container	Freiberger	NJ	2008	Drench	All plants were infected with powdery mildew which complicated assessments.
27449	Oak (Quercus sp.) Q. garryanna	Field Container	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27449	Oak (Quercus sp.) Q. suber	Field Container	Grunwald	OR	2011	Drench	No injury with 1, 2 and 4 fl oz per 100 gal applied twice.
27449	Oak (Quercus sp.) Q. alba	Field Container	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27449	Oak (Quercus sp.) Q. virginiana	Field Container	Uber	CA	2011	Drench	No injury or growth reduction with 1, 2 and 4 fl oz per 100 gal applied twice.
27450	Azalea & Rhododendron (Rhododendron sp.) 'White'	TBD	Freiberger	NJ	2008	Drench	No injury with drench at 1, 2, and 4 oz per 100 gal.
27450	Azalea & Rhododendron (Rhododendron sp.) 'Nova Zembla'	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27450	Azalea & Rhododendron (Rhododendron sp.) 'Lees Dark Purple'	TBD	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27450	Azalea & Rhododendron (Rhododendron sp.) R. catawbiense 'Boursault'	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27806	Rose (Rosa sp.) 'Nutmans'	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27807	Woodland Sage (Salvia x sylvestris) S. officinalis	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27453	Lilac (Syringa sp.) S. reticulata	TBD	Freiberger	NJ	2008	Drench	All plants were infected with powdery mildew which complicated assessments.
27453	Lilac (Syringa sp.) S. vulgaris 'President Grevy'	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27453	Lilac (Syringa sp.) 'Tinkerbelle'	TBD	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27453	Lilac (Syringa sp.)	TBD	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
27453	Lilac ( <i>Syringa</i> sp.) <i>S. chiensis</i> 'Lilac Sunday'	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27455	Yew ( <i>Taxus</i> sp.) <i>T. baccata</i> 'Repandens'	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27455	Yew ( <i>Taxus</i> sp.) <i>T. brevifolia</i>	TBD	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27455	Yew ( <i>Taxus</i> sp.)	TBD	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27455	Yew ( <i>Taxus</i> sp.) <i>T. x media</i> 'Bonnie Green Mound'	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27456	Red Cedar, <i>Arborvitae</i> ( <i>Thuja</i> sp.) <i>T. occidentalis</i> 'Emerald Green'	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27456	Red Cedar, <i>Arborvitae</i> ( <i>Thuja</i> sp.) <i>T. plicata</i>	TBD	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27456	Red Cedar, <i>Arborvitae</i> ( <i>Thuja</i> sp.)	TBD	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27456	Red Cedar, <i>Arborvitae</i> ( <i>Thuja</i> sp.) <i>T. occidentalis</i> 'Woodwardii'	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27457	Arrowwood ( <i>Viburnum</i> sp.) <i>V. dentatum</i>	TBD	Grunwald	OR	2008	Foliar	No injury at 1, 2 and 4 fl oz per 100 gal
27457	Arrowwood ( <i>Viburnum</i> sp.) <i>V. pllicatum tomentosum</i> 'Mariesii'	TBD	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27457	Arrowwood ( <i>Viburnum</i> sp.)	TBD	Harvey	WA	2009	Drench	No significant injury at 1, 2 and 3 fl oz per 100 gal.
27457	Arrowwood ( <i>Viburnum</i> sp.) <i>V. opulus</i> 'Compactum'	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.
27458	Periwinkle ( <i>Vinca</i> sp.) <i>V. minor</i> 'Bowles'	TBD	Grunwald	OR	2009	Drench	No injury or growth reduction at 1, 2 and 4 fl oz per 100 gal; all plants saleable.
27458	Periwinkle ( <i>Vinca</i> sp.) Periwinkle	TBD	Harvey	WA	2009	Drench	No injury at 1, 2 and 3 fl oz per 100 gal.
27458	Periwinkle ( <i>Vinca</i> sp.) 'Cooler Pink'	TBD	Hausbeck	MI	2009	Drench	No injury at 1, 2 and 4 fl oz per 100 gal
27458	Periwinkle ( <i>Vinca</i> sp.) 'Illumination'	TBD	Reding	OH	2009	Drench	No injury and no significant difference in growth or marketability with 1, 2 and 4 fl oz per 100 gal.

## **Label Suggestions**

In this report, 17 species or genera exhibited minimal or no injury after drench or foliar treatments of Adorn 4SC (fluopicolide) at 1, 2 and 4 fl oz per 100 gal. Of these, *Acer palmatum*, *Begonia sp.*, *Calibrachoa sp.*, *Juniperus sp.*, *Petunia sp.*, *Pinus sp.*, *Quercus sp.*, *Syringa sp.*, *Taxus sp.*, *Thuja sp.*, and *Viburnum sp.* can be added to the EPA label.

## Appendix 1: Contributing Researchers

Mr. Ben Fraelich	USDA-ARS CPES P.O. Box 748 Tifton, GA 31793
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