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IR-4 Environmental Horticulture Program Pydiflumetofen Crop Safety

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Abstract

Pydiflumetofen is a new fungicide being developed by Syngenta for the control of leaf spots (*Septoria*, *Cercospora*, *Alternaria*, *Venturia*), powdery mildew, *Fusarium*, *Botrytis*, *Sclerotinia*, *Corynespora*, and other foliar diseases. The IR-4 Project completed 32 crop safety trials on 22 ornamental horticulture plant species or genera during 2015 to 2017. In these trials, all 22 species or genera exhibited minimal or no injury. Two genera (*Begonia* sp. and *Petunia* sp.) exhibited minimal or no injury in 3 trials and 20 species or genera exhibited minimal or no injury in the limited number of trials (one or two) for each crop. Syngenta may consider adding these to the label.

Introduction

Pydiflumetofen is a new fungicide being developed by Syngenta for the control of leaf spots (*Septoria*, *Cercospora*, *Alternaria*, *Venturia*), powdery mildew, *Fusarium*, *Botrytis*, *Sclerotinia*, *Corynespora*, and other foliar diseases. The IR-4 Project completed 32 crop safety trials on 22 ornamental horticulture plant species or genera during 2015 to 2017.

Materials and Methods

Pydiflumetofen was applied as foliar treatment typically 3 times at approximately 14 days intervals; in a few trials, it was applied as a single drench treatment. The application rates were 13.7, 27.4 and 54.8 fl oz per 100 gal, plus a water treated control. A minimum of ten plants (replicate treatments) were required. Phytotoxicity was planned to be recorded on a scale of 0 to 10 (0 = No phytotoxicity; 10 = Complete kill). Phytotoxicity was rated weekly up to 6 weeks after initial application. For IR-4 testing, the following protocols were used: 15-003, 16-004, 16-005, 17-004 and 17-005. For more detailed materials and methods, including application rates for various products, please visit <http://ir4.rutgers.edu/ornamental/OrnamentalDrafts.cfm> to view and download these protocols.

Pydiflumetofen was supplied to researchers (See list of researchers in Appendix 1) by Syngenta.

Results and Summary

Based on the type and nature of injury seen with pesticide applications, 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) 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 Pydiflumetofen, and 4) more data are needed to make informed recommendations.

Phytotoxicity

Across all crops tested, Pydiflumetofen exhibited no or minimal negative impact on all plant species or genera. Four genera exhibited minimal or no injury from foliar applied product in 3 trials (Table 1) and 20 species or genera exhibited minimal or no injury in the limited number of trials (one or two) for each crop (Table 4).

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

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

Begonia sp.
Impatiens walleriana
Petunia sp.
*Viola x wittrockiana*¹

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

None

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

None

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

<i>Alyssum montanum</i> ¹	<i>Gerbera</i> sp. ¹
<i>Alyssum</i> sp. ¹	<i>Impatiens hawkeri</i> ¹
<i>Antirrhinum majus</i> ¹	<i>Lupinus</i> sp. ¹
<i>Calibrachoa</i> sp. ¹	<i>Osteospermum</i> sp. ¹
<i>Chamerops humilis</i> ¹	<i>Pelargonium x hortorum</i> ¹
<i>Chrysanthemum/Dendranthema x morifolium</i> ¹	<i>Salvia greggi</i> ¹
<i>Coreopsis</i> sp. ¹	<i>Salvia</i> sp. ¹
<i>Dianthus</i> sp. ²	<i>Verbena x hybrida</i> ¹
<i>Euphorbia pulcherrima</i> ²	<i>Verbena</i> sp. ¹

¹ No injury in 1 trial

² No injury in 2 trials

Table 5 Detailed Summary of Crop Safety Testing with Pydiflumetofen.

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 6/14/2018 are listed below.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
33048	Madwort (<i>Alyssum</i> sp.) <i>A. montanum</i>	Shadehouse/ Lathhouse	Klett	CO	2017	Foliar	No injury or significant growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32428	Madwort (<i>Alyssum</i> sp.) 'Clear Crystal Lavender'	Greenhouse	Bodine	NJ	2015	Foliar	No significant injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32437	Garden Snapdragon (<i>Antirrhinum majus</i>) 'Rocket Mix'	Greenhouse	Bodine	NJ	2015	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32440	Begonia (<i>Begonia</i> sp.) <i>B. semperflorens</i> 'Bada Bing'	Greenhouse	Hausbeck	MI	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32440	Begonia (<i>Begonia</i> sp.) 'Dragon Wing Red'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
33047	Begonia (<i>Begonia</i> sp.) 'Summerwings Rose'	Shadehouse/ Lathhouse	Klett	CO	2017	Drench	No injury with 13.7, 27.4 and 54.8 fl oz per 100 gal; moderate growth reduction at 4X.
33047	Begonia (<i>Begonia</i> sp.) 'Summerwings Rose'	Shadehouse/ Lathhouse	Klett	CO	2017	Foliar	No injury or significant growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32436	Calibrachoa (<i>Calibrachoa</i> sp.) 'Kabloom Deep Blue'	Greenhouse	Bodine	NJ	2015	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
33064	Palm, Mediterranean Fan (<i>Chamaerops humilis</i>)	Field Container	Palmateer	FL	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32434	Hardy Mum (<i>Chrysanthemum/Dendranthema x morifolium</i>) 'Dark Roanole'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32431	Tickseed (<i>Coreopsis</i> sp.) 'Early Sunrise Yellow'	Greenhouse	Bodine	NJ	2015	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32427	Pink (<i>Dianthus</i> sp.) 'Bouquet Rose Magic'	Greenhouse	Bodine	NJ	2015	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
33050	Pink (<i>Dianthus</i> sp.) <i>Dianthus</i> SCENT FIRST POT Coral Reef	Shadehouse/ Lathhouse	Klett	CO	2017	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32444	Poinsettia (<i>Euphorbia pulcherrima</i>) 'Whitestar'	Greenhouse	Freiberger	NJ	2016	Drench	No injury, growth reduction or delayed blooming with 13.7, 27.4 and 54.8 fl oz per 100 gal.
32444	Poinsettia (<i>Euphorbia pulcherrima</i>) 'Whitestar'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury, growth reduction or delayed blooming with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32432	Transvaal Daisy (<i>Gerbera</i> sp.) 'Garvenia Sweet Honey'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32443	Impatiens, New Guinea (<i>Impatiens hawkeri</i>) 'Super Sonic Purple'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times; slight leaf yellowing at end of trial.

32442	Impatiens, Common Garden/Buzzy Lizzy (Impatiens walleriana) 'Impreza Red'	Greenhouse	Madeiras	MA	2017	Foliar	No injury with 13.7 and 27.4, minor with 54.8, fl oz per 100 gal applied 3 times; minor height reduction with 2X and 4X.
33051	Impatiens, Common Garden/Buzzy Lizzy (Impatiens walleriana) 'Sup Elf Lipstick'	Shadehouse/ Lathehouse	Klett	CO	2017	Drench	No injury with 13.7, 27.4 and 54.8 fl oz per 100 gal; moderate growth reduction at 4X.
32442	Impatiens, Common Garden/Buzzy Lizzy (Impatiens walleriana) 'Super XP Pink'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32426	Lupine (Lupinus sp.) 'Gallery Blue'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal.
32435	Daisybush (Osteospermum sp.) 'Asti Purple'	Greenhouse	Bodine	NJ	2015	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32439	Geranium, Zonal (Pelargonium x hortorum) 'Zonal Tango Orange'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32438	Petunia (Petunia sp.) 'Dreams White'	Greenhouse	Madeiras	MA	2017	Drench	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal.
33049	Petunia (Petunia sp.) Petunia hybrid Cascadias Chaplin	Shadehouse/ Lathehouse	Klett	CO	2017	Foliar	No injury or significant growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32438	Petunia (Petunia sp.) Petunia x hybrida 'Carpet velvet'	Greenhouse	Hand	OH	2017	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 per 100 gal applied 3 times. Patchy coloration of flower with 2X and 4X.
32438	Petunia (Petunia sp.) 'Tritunia Blue'	Greenhouse	Bodine	NJ	2015	Foliar	Slight injury only after 3rd application, with complete recovery, with 13.7, 27.4 and 54.8 fl oz per 100 gal; no growth reduction.
32429	Sage (Salvia sp.) 'Evolution White'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
33052	Sage (Salvia sp.) S. greggi 'Raspberry'	Shadehouse/ Lathehouse	Klett	CO	2017	Drench	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal.
32433	Vervain (Verbena sp.) 'Lanai Vintage Vodka'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
33053	Vervain (Verbena sp.) V. x hybrida 'Lanai Magenta'	Shadehouse/ Lathehouse	Klett	CO	2017	Drench	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal.
32430	Wittrock's Violet; Pansy (Viola X wittrockiana) 'Colossus Yellow'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal.
32430	Wittrock's Violet; Pansy (Viola X wittrockiana) 'Delta Orange Blotch'	Greenhouse	Bodine	NJ	2015	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.
32430	Wittrock's Violet; Pansy (Viola X wittrockiana) 'Matrix'	Greenhouse	Madeiras	MA	2017	Drench	Pansies suffered from heat stress and a severe aphid infestation. No injury with 13.7 and 27.4, moderate with 54.8, fl oz per 100 gal; no growth reduction.
32430	Wittrock's Violet; Pansy (Viola X wittrockiana) 'Matrix'	Greenhouse	Madeiras	MA	2017	Foliar	No injury or growth reduction with 13.7, 27.4 and 54.8 fl oz per 100 gal applied 3 times.

Label Suggestions

In this report, all plants exhibited no or minimal injury after foliar treatments of Pydiflumetofen at 13.7, 27.4 and 54.8 fl oz per 100 gal, suggesting that this active ingredient is safe to ornamental horticulture crops. Given the lack of phytotoxicity across so many different plant species and genera, it is suggested that all the 22 plants in Table 1 and Table 4 (listed below) that showed no injury be placed on the Pydiflumetofen label if Syngenta has similar results on these crops. Or a general statement can be placed on the label such as 'has not been demonstrated to cause damage on various ornamental plant species according to labeled use instructions. Pydiflumetofen 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 Pydiflumetofen to that crop'.

Alyssum montanum

Alyssum sp.

Antirrhinum majus

Begonia sp.

Calibrachoa sp.

Chrysanthemum/Dendranthema x morifolium

Coreopsis sp.

Dianthus sp.

Euphorbia pulcherrima

Gerbera sp.

Impatiens hawkeri

Impatiens walleriana

Lupinus sp.

Osteospermum sp.

Pelargonium x hortorum

Petunia sp.

Salvia greggi

Salvia sp.

Verbena x hybrida

Verbena sp.

Viola sp.

Viola x wittrockiana

Appendix 1: Contributing Researchers

Mr. Dave Bodine	Rutgers University Cream Ridge Experiment Station 283 Rt. 539 Cream Ridge, NJ 08514
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