Environment Horticulture Program Research Summaries

IR-4 Environmental Horticulture Program
OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide) Crop Safety

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Abstract

OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide) is labeled for managing oomycetes (downy mildew, Phytophthora and Pythium pathogens) and diseases caused by certain bacterial pathogens. While the label does list specific crops, additional screenings were needed to broaden this list. The IR-4 Project completed 23 crop safety trials on 11 environmental horticulture plant species or genera during 2016 to 2019. No injury was observed on azalea and rose; these two crops can be added to the list of crops previously tested for crop safety. For the remaining nine crops, more information is needed either because only 1 or 2 trials were conducted or because consistent results were not achieved across research sites.

Introduction

OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide) is labeled for managing oomycetes (downy mildew, Phytophthora and Pythium pathogens) and diseases caused by certain bacterial pathogens. While the label does list specific crops, additional screenings were needed to broaden this list. The IR-4 Project completed 23 crop safety trials on 11 environmental horticulture plant species or genera during 2016 to 2019.

Materials and Methods

OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide) was applied as either foliar sprays or drenches to soilless media. The foliar application rates were 1, 2, and 4 gal per 100 gal., plus a water treated control, applied 3 times at 14 day intervals. The drench rates were 50, 100, and 200 fl oz per 100 gal with the resulting solution applied once at 2 pints per sq ft surface area. A minimum of four plants per three blocks or ten plants per completely randomized design were required with many researchers exceeding this minimum. Phytotoxicity was recorded on a scale of 0 to 10 (0 = no phytotoxicity; 10 = complete kill) at 1, 2, and 4 weeks after each application. For IR-4 testing, the following protocol were used: 16-004, 16-005, 17-004, 17-005, 18-006, 19-006, and 19-007. 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.

OxiPhos was supplied to researchers (See list of researchers in Appendix 1) by BioSafe Systems.

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 Mono and di potassium salts of phosphorus acid + hydrogen peroxide, and 4) more data are needed to make informed recommendations.

Phytotoxicity

OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide) exhibited no or minimal negative impact on 2 plant species / genera (azalea and rose) when applied as foliar or drench applications (Table 1). No crop exhibited differential crop safety at the different rates (Table 2), nor did any crop exhibit significant phytotoxicity at even the lowest rate (Table 3). For nine genera / species, more information is needed either because only 1 or 2 trials were conducted or because consistent results were not achieved across research sites (Table 4).

Please see Table 5 for a list of individual trial summaries on OxiPhos.

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

Rhododendron (azalea) sp.
Rosa sp.

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

None

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

None

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

Antirrhinum majus [1]
Chamerops humilis [1]
Coleus sp. [1]
Euphorbia pulcherrima [3]
Gerbera sp. [3]
Impatiens hawkeri [1]
Pelargonium x domesticum [1]
Petunia sp. [3]
Viola x wittrockiana [2]

[1] No injury in 1 trial
[2] No injury in 2 trials
[3] Variable results among sites or use patterns

Table 5 Detailed Summary of Crop Safety Testing with OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide).

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 2/10/2019 are listed below.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
32533	Garden Snapdragon (Antirrhinum majus) 'Montego Yellow'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 50, 100 and 200 fl oz per 100 gal.
33071	Palm, Mediterranean Fan; Dwarf Fan Palm (Chamaerops humilis)	Field Container	Palmateer (UF)	FL	2016	Foliar	No injury or growth reduction with 1, 2 and 4 gal per 100 gal applied 3 times.
32536	Coleus, Flamenettle (Coleus sp.) 'Exhibition Magma'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 50, 100 and 200 fl oz per 100 gal.
32531	Poinsettia (Euphorbia pulcherrima) 'Freedom Red'	Greenhouse	Freiberger	NJ	2016	Drench	No injury, growth reduction or delayed blooming with 50, 100 and 200 fl oz per 100 gal.
32531	Poinsettia (Euphorbia pulcherrima) 'Prestige Red'	Greenhouse	Catlin	NY	2017	Foliar	Moderate to severe injury increasing with rates (1, 2 and 4 gal per 100 gal).
32531	Poinsettia (Euphorbia pulcherrima) 'Winter Blush Marble'	Greenhouse	Freiberger	NJ	2016	Foliar	No injury with 1 gal, slight with 2 and 4 gal per 100 gal, applied 3 times; no growth reduction or delayed blooming.
32539	Transvaal Daisy (Gerbera sp.)	Greenhouse	Grunwald	OR	2017	Foliar	No injury or growth reduction with 1, 2 and 4 gal per 100 gal applied 3 times.
32539	Transvaal Daisy (Gerbera sp.) 'Fan'	Greenhouse	Nansen	CA	2017	Foliar	Minor foliar injury, no flower injury with 1, 2 and 4 gal per 100 gal applied 3 times biweekly; no growth reduction.
32539	Transvaal Daisy (Gerbera sp.) 'Jaguar Deep Orange'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 50, 100 and 200 fl oz per 100 gal.
32540	Impatiens, New Guinea (Impatiens hawkeri) 'Divine Blue Pearl'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 50, 100 and 200 fl oz per 100 gal.
32532	Regal Geranium (Pelargonium x domesticum) 'Maverick Salmon'	Greenhouse	Freiberger	NJ	2016	Drench	No injury or growth reduction with 50, 100 and 200 fl oz per 100 gal.
32534	Petunia (Petunia sp.) 'Frost Blue'	Greenhouse	Freiberger	NJ	2016	Drench	No injury with 50 and 100, slight with 200 fl oz per 100 gal; no growth reduction.
32534	Petunia (Petunia sp.) Petunia x hybrida 'Carpet velvet'	Greenhouse	Hand	OH	2017	Drench	Moderate injury (chlorosis) with almost complete recovery, and two-toned flower color with 50, 100 and 200 fl oz per 100 gal; no growth reduction.
32534	Petunia (Petunia sp.) Petunia x hybrida 'Easy Wave Burgundy Star'	Greenhouse	Beckerman	IN	2018	Foliar	No injury or growth reduction with 1, 2 and 4 gal per 100 gal applied 3 times.
32537	Azalea (Rhododendron sp.) 'Girard Crimson'	Field Container	Fraelich	GA	2016	Foliar	No injury or difference in plant growth and marketability with 1, 2 and 4 gal per 100 gal applied 3 times.
32537	Azalea (Rhododendron sp.) 'Pink Gumpo'	Field Container	Fraelich	GA	2016	Foliar	No injury or difference in plant growth and marketability with 1, 2 and 4 gal per 100 gal applied 3 times.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
32537	Azalea (Rhododendron sp.) 'Ruth May'	Field Container	Brazee	MA	2017	Drench	No significant injury or growth reduction with 50, 100 and 200 fl oz per 100 gal.
32537	Azalea (Rhododendron sp.) 'Ruth May'	Field Container	Brazee	MA	2017	Foliar	No significant injury or growth reduction with 1, 2 and 4 fl oz per 100 gal applied 3 times.
32535	Rose (Rosa sp.) 'Louis Phillip'	Field Container	Baysal-Gurel	TN	2016	Foliar	No injury or growth reduction with 1, 2 and 4 gal per 100 gal applied 3 times.
32535	Rose (Rosa sp.) R. rugosa	Field Container	Brazee	MA	2017	Drench	No injury with 50 and 100, minor with 200 fl oz per 100 gal; no growth reduction.
32535	Rose (Rosa sp.) R. rugosa	Field Container	Brazee	MA	2017	Foliar	No injury with 1, moderate with 2 and 4 fl oz per 100 gal applied 3 times; no growth reduction.
32538	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Spring Matrix DP Orange'	Greenhouse	Freiberger	NJ	2019	Drench	No injury with 50, 100 and 200 fl oz per 100 gal applied once; all plants grew and flowered normally.
32538	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Spring Matrix DP Orange'	Greenhouse	Freiberger	NJ	2019	Foliar	No injury with 1 and 2 gal, minor with 4 gal per 100 gal applied 3 times biweekly.

Appendix 1: Contributing Researchers

Dr. Janna Beckerman	Purdue University Lilly Hall Rm 1-321 West Lafayette, IN 47907
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Mr. Ben Fraelich	USDA-ARS 2316 Rainwater Rd. Tifton, GA 31793
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