



[Environment Horticulture Program Research Summaries](#)

IR-4 Environmental Horticulture Program Fluopyram + Trifloxystrobin Crop Safety

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Date: 11/30/2022**

**Acknowledgements
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This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award numbers 2015-34383-23710, 2017-34383-27100, 2019-34383-29973, 2020-34383-32455 and 2021-343830-34848 with substantial cooperation and support from the State Agricultural Experiment Stations and USDA-ARS.

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Abstract

Broadform SC (fluopyram + trifloxystrobin) is a new fungicide for foliar plant pathogens such as leaf spots, powdery mildew, and rust. The IR-4 Project completed 24 crop safety trials on 14 environmental horticulture plant species or genera during 2020 and 2021. One species (*Antirrhinum majus*) did not exhibit injury after two consecutive drench applications. Significant injury was observed in one species (*Petunia x hybrida*) to recommend growers not apply Broadform SC.

Introduction

Broadform SC (fluopyram + trifloxystrobin) is a new fungicide for foliar plant pathogens such as leaf spots, powdery mildew, and rust. The IR-4 Project completed 24 crop safety trials on 14 environmental horticulture plant species or genera during 2020 and 2021.

Materials and Methods

Broadform SC (fluopyram + azoxystrobin) was applied twice as drenches at 2, 4, and 8 fl oz per 100 gal. 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 initial application. To view the more detailed materials and methods in the protocol 20-012 and 21-012, please see <https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols> to view and download protocols.

Broadform SC was supplied to researchers (See list of researchers in Appendix 1) by Envu (previously known as Bayer Environmental Science).

Results and Summary

Phytotoxicity

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 Broadform SC, 4) more data are needed to make informed recommendations due to variable responses, and 5) less than three trials have been conducted.

Broadform SC exhibited no or minimal negative impact on one species with drench applications (Table 1). Some minimal injury may be acceptable for growers, if applications are made several weeks to months in advance of crop sale particularly for woody ornamental crops. One species tested exhibited damage at the 1X rate sufficient to recommend growers not utilize Broadform SC as a drench application (Table 3). For 12 genera / species, more information is needed either because only 1 or 2 trials were conducted (Table 5).

Please see Table 6 for a list of individual trial summaries for Broadform SC.

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

Antirrhinum majus

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

None

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

Petunia x hybrida

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

None

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

Calibrachoa sp.

Chrysanthemum/Dendranthema x morifolium

Dieffenbachia sp.

Dracaena sp.

Hosta sp.

Impatiens hawkeri

Impatiens walleriana

Lantana sp.

Rudbeckia fulgida

Salvia splendens

Spathiphyllum sp.

Viola X wittrockiana

Table 6. Detailed Summary of Crop Safety Testing with Broadform SC (Fluopyram + Trifloxystrobin).

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 11/28/2022 are listed below.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
34003	Lily-Of-The-Nile (<i>Agapanthus</i> sp.) 'Storm Cloud'	Field Container	Grunwald	OR	2020	Drench	No injury, growth or flowering reduction when applied biweekly at 2, 4 and 8 fl oz per 100 gal rates
33995	Garden Snapdragon (<i>Antirrhinum majus</i>) 'Liberty Yellow'	Greenhouse	Bodine	NJ	2021	Drench	No injury, growth or flowering reduction when applied twice at 2,4 and 8 fl oz per 100 gal; 14 day intervals
33995	Garden Snapdragon (<i>Antirrhinum majus</i>) 'Rocket Red'	Greenhouse	Grunwald	OR	2021	Drench	No injury, growth or flowering reduction when applied at 2, 4 and 8 fl oz per 100 gal rates
33995	Garden Snapdragon (<i>Antirrhinum majus</i>) "Snaptastic Yellow"	Greenhouse	Koski	CO	2021	Drench	No injury observed at 2, 4 and 8 fl oz per 100 gal rates when applied twice at 14 day interval.
33997	Calibrachoa (<i>Calibrachoa</i> sp.) 'Aloha Kona Midnight Blue'	Greenhouse	Koski	CO	2021	Drench	No injury observed at 2, 4 and 8 fl oz per 100 gal rates when applied twice at 14 day interval.
33992	Hardy Mum (<i>Chrysanthemum/Dendranthema x morifolium</i>) 'Rhinos Orange'	Field Container	Klett	CO	2020	Drench	No injury or growth reduction with 2, 4 and 8 fl oz per 100 gal applied twice.
34001	<i>Dieffenbachia</i> (<i>Dieffenbachia</i> sp.)	Shadehouse/ Lath House	Grunwald	OR	2021	Drench	No injury, growth or flowering reduction when applied biweekly at 2, 4 and 8 fl oz per 100 gal rates
33999	<i>Dracaena</i> (<i>Dracaena</i> sp.)	Shadehouse/ Lath House	Grunwald	OR	2021	Drench	No injury, growth or flowering reduction when applied biweekly at 2, 4 and 8 fl oz per 100 gal rates
34004	Plantain Lily (<i>Hosta</i> sp.) 'So Sweet'	Field Container	Fraelich	GA	2022	Drench	No injury and no impact on flowers or plant growth with 2, 4, and 8 fl oz per 100 gal.
34004	Plantain Lily (<i>Hosta</i> sp.) 'Plantain Lily Blue Mouse Ears'	Field Container	Grunwald	OR	2021	Drench	No injury, growth or flowering reduction when applied biweekly at 2, 4 and 8 fl oz per 100 gal rates
33988	Impatiens, New Guinea (<i>Impatiens hawkeri</i>) 'Hot Pink'	Greenhouse	Grunwald	OR	2021	Drench	No injury, growth or flowering reduction when applied at 2, 4 and 8 fl oz per 100 gal rates
33988	Impatiens, New Guinea (<i>Impatiens hawkeri</i>) 'Magnum Hot Pink'	Greenhouse	Koski	CO	2021	Drench	No injury at 1X, minor to moderate injury increasing with rate after second application (2, 4 and 8 fl oz per 100 gal) when applied twice at 14 day interval.
33989	Impatiens, Common Garden; Buzzy Lizzy (<i>Impatiens walleriana</i>) 'Accent White'	Greenhouse	Bodine	NJ	2021	Sprenc	No injury, growth or flowering reduction when applied twice at 2, 4 and 8 fl oz per 100 gal; 14 day interval.
33989	Impatiens, Common Garden; Buzzy Lizzy (<i>Impatiens walleriana</i>) 'Beacon Coral'	Greenhouse	Koski	CO	2021	Drench	Moderate to severe injury increasing with rate after second application; most plants at highest rate died after second application (2, 4 and 8 fl oz per 100 gal) when applied twice at a 14 day interval.
33989	Impatiens, Common Garden; Buzzy Lizzy (<i>Impatiens walleriana</i>)	Greenhouse	Reding	OH	2021	Drench	Severe injury to mortality increasing with application rates; 2, 4 and 8 fl oz/100 gal applied three times.
33998	Lantana (<i>Lantana</i> sp.) 'Havana Sunshine'	Greenhouse	Koski	CO	2021	Drench	No injury observed at 2, 4 and 8 fl oz per 100 gal rates when applied twice at a 14 day interval.
33996	Petunia (<i>Petunia x hybrida</i>) 'Wave Deep Blue'	Greenhouse	Grunwald	OR	2018	Drench	No injury, growth or flowering reduction when applied biweekly at 2, 4 and 8 fl oz per 100 gal rates

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
33996	Petunia (Petunia x hybrida) 'Headliner Electric Purple'	Greenhouse	Koski	CO	2021	Drench	Minor to moderate injury increasing with rate 3 WAT after second application; (2, 4 and 8 fl oz per 100 gal) when applied twice at a 14 day interval.
33996	Petunia (Petunia x hybrida)	Greenhouse	Reding	OH	2021	Drench	Severe injury increasing with application rate; 2, 4 and 8 fl oz/100 gal applied three times.
34002	Coneflower, Orange, var. speciosa (Rudbeckia fulgida)	Field Container	Beckerman	IN	2021	Drench	No injury or impact on plant growth with 2, 4, and 8 fl oz per 100 gal.
34002	Coneflower, Orange, var. speciosa (Rudbeckia fulgida) 'Goldsturm'	Field Container	Fraelich	GA	2020	Drench	No injury or significant growth reduction with 2, 4 and 8 fl oz per 100 gal; all treated plants marketable.
33994	Scarlet Sage (Salvia splendens) 'Vista Red'	Greenhouse	Koski	CO	2021	Drench	No injury observed at 2, 4 and 8 fl oz per 100 gal rates when applied twice at 14 day interval.
34000	Spathe Flower; Spathiphyllum (Spathiphyllum sp.)	Shadehouse/ Lath House	Grunwald	OR	2021	Drench	No injury, growth or flowering reduction when applied biweekly at 2, 4 and 8 fl oz per 100 gal rates
33993	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Delta Premium Blue Blotch'	Greenhouse	Koski	CO	2021	Drench	No injury observed at 2, 4 and 8 fl oz per 100 gal rates when applied twice at a 14 day interval.

Label Suggestions

We suggest that the one plant species exhibiting significant injury with drench applications be added to list of sensitive ornamental species. It is currently listed as a safe species.

Petunia x hybrida

Appendix 1: Contributing Researchers

Dr. Janna L. Beckerman	Purdue University Department of Botany and Plant Pathology West Lafayette, IN 47907
Mr. Dave Bodine (<i>past affiliate</i>)	USDA-ARS Cream Ridge Experiment Station Cream Ridge, NJ 08514
Mr. Ben Fraelich	USDA-ARS CPES P.O. Box 748 Tifton, GA 31793
Dr. Nik Grunwald	USDA-ARS Horticultural Crops Research 3420 NW Orchard Ave Corvallis, OR 97330
Dr. James Klett (<i>retired</i>)	Colorado State University Dept. of Horticulture and Landscape Architecture 219 Shephardson Fort Collins, CO80523
Ms. Ronda Koski	Colorado State University 301 W University Avenue Fort Collins, CO 80523
Dr. Michael Reding	Horticultural Insects Lab USDA-ARS 1680 Madison Ave. Wooster, OH, 44691