



[Environment Horticulture Program Research Summaries](#)

IR-4 Environmental Horticulture Program Flutianil Crop Safety

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Acknowledgements

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Abstract

Flutianil is a new fungicide being developed by OAT Agrico for the control of powdery mildew on environmental horticulture crops. The IR-4 Project completed 36 crop safety trials on 15 environmental horticulture plant species or genera during 2018 to 2021. Seven species (*Begonia sp.*, *Coreopsis sp.*, *Gerbera sp.*, *Hydrangea sp.*, *Rosa sp.*, *Syringa sp.*, *Viola x wittrockiana*) exhibited minimal or no injury in 3 trials and six species or genera exhibited minimal or no injury in the limited number of trials (one or two) for each crop. One species, *Saintpaulia ionantha*, showed no phytotoxicity on foliage but some phytotoxicity on open blooms. *Zinnia* in 2 trials exhibited no injury, but in a third trial injury was observed after the second application. Additional trials are warranted for both crops.

Introduction

Flutianil is a new fungicide being developed by OAT Agrio for the control of powdery mildew on environmental horticulture crops. The IR-4 Project completed 36 crop safety trials on 15 environmental horticulture plant species or genera during 2018 to 2021.

Materials and Methods

Flutianil was applied as foliar treatment typically 3 times at approximately 14 days intervals. The application rates were 6.4, 12.8 and 25.6 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: 18-006, 19-006, 20-011 and 21-011. For more detailed materials and methods, including application rates for various products, please visit <https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-researcher-resources/#Protocols> to view and download these protocols.

Gatten EC (flutianil) was supplied to researchers (See list of researchers in Appendix 1) by Landis.

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 flutianil, and 4) more data are needed to make informed recommendations.

Phytotoxicity

Across all crops tested, flutianil exhibited no or minimal negative impact on 15 plant species or genera. Seven species (*Begonia sp.*, *Coreopsis sp.*, *Gerbera sp.*, *Hydrangea sp.*, *Rosa sp.*, *Syringa sp.*, *Viola x wittrockiana*) exhibited minimal or no injury in 3 trials (Table 1) and six species or genera exhibited minimal or no injury in the limited number of trials (one or two) for each crop (Table 4). One species, *Saintpaulia ionantha*, showed no phytotoxicity on foliage but some phytotoxicity on open blooms. *Zinnia* in 2 trials exhibited no injury, but in a third trial injury was observed after the second application. Additional trials are warranted for both crops.

Please see Table 7 for a summary of the individual trial results.

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

<i>Begonia sp.</i>	<i>Rosa sp.</i>
<i>Coreopsis sp.</i>	<i>Syringa sp.</i>
<i>Gerbera sp.</i>	<i>Viola x wittrockiana</i>
<i>Hydrangea sp.</i>	

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

None

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

None

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

Saintpaulia ionantha
*Zinnia sp.*³

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

<i>Calibrachoa sp.</i> ²	<i>Spirea nipponica</i> ²
<i>Chrysanthemum sp.</i> ²	<i>Verbena sp.</i> ¹
<i>Dahlia sp.</i> ¹	<i>Vinca minor.</i> ¹

¹ No injury in 1 trial

² No injury in 2 trials

³ Some injury observed after second application in one trial

Table 6. Average Crop Safety Rating after Foliar Applications of Gatten EC

Crop	Gatten (flutianil)
<i>Begonia sp.</i>	1.0 (1 - 1) n3
<i>Calibrachoa sp.</i>	1.0 (1 - 1) n2
<i>Chrysanthemum sp.</i>	1.0 (1 - 1) n2
<i>Coreopsis sp.</i>	1.0 (1 - 1) n3
<i>Dahlia sp.</i>	1.0 (1 - 1) n1
<i>Gerbera sp.</i>	1.0 (1 - 1) n3
<i>Hydrangea sp.</i>	1.0 (1 - 1) n3
<i>Rosa sp.</i>	1.3 (1 - 2) n3
<i>Saintpaulia ionantha</i>	2.0 (1 - 3) n2
<i>Spiraea nipponica</i>	1.0 (1 - 1) n2
<i>Syringa sp.</i>	1.0 (1 - 1) n3
<i>Verbena sp.</i>	1.0 (1 - 1) n1
<i>Vinca sp.</i>	1.0 (1 - 1) n1
<i>Viola X wittrockiana</i>	1.0 (1 - 1) n3
<i>Zinnia sp.</i>	1.7 (1 - 3) n3

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.

Table 7. Detailed Summary of Crop Safety Testing with Gatten EC.

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 6/22/2023 are listed below.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
33268	Begonia (Begonia sp.) 'Bada Bing White'	Greenhouse	Bodine	NJ	2021	Foliar	Virtually no injury with 3.2, 6.4, and 12.8 fl oz per 100 gal
33268	Begonia (Begonia sp.) B. x benariensis 'Whopper Rose Bronze Leaf'	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33268	Begonia (Begonia sp.) B. Iconia Portofino yellow	Greenhouse	Koski	CO	2021	Foliar	None of the treatments (3.2, 6.4 & 12.8 fl. oz per 100 gallons) caused phytotoxicity on the crop nor did any of the treatments adversely affect bloom, inflorescence and plant growth.
33269	Calibrachoa (Calibrachoa sp.) 'Blue Legend'	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times.
33269	Calibrachoa (Calibrachoa sp.) 'Minifamous Yellow'	Greenhouse	Grunwald	OR	2018	Foliar	No injury, growth or flowering reduction when applied at 6.4, 12.8 and 25.4 fl oz per 100 gal rates
33269	Calibrachoa (Calibrachoa sp.) 'Kabloom Pink Deep'	Greenhouse	Vafaie	TX	2019	Foliar	Significant blanching due to high salinity of irrigation water may have masked phytotoxicity of treatments; no growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times.
33270	Daisy/Chrysanthemum (Chrysanthemum sp.) 'Jasoda Orange', 'Jasoda Yello	Field Container	Beckerman	IL	2020	Foliar	No injury and growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33270	Daisy/Chrysanthemum (Chrysanthemum sp.) 'Snowland'	Field Container	Grunwald	OR	2021	Foliar	No injury, growth or flowering reduction at 10, 20, and 40 fl oz per 100 gal rates
33271	Tickseed (Coreopsis sp.) C. grandiflora 'Sunray'	Field Container	Koski	CO	2022	Foliar	None of the treatments (3.2, 6.4 & 12.8 fl. oz per 100 gallons) caused phytotoxicity on the crop nor did any of the treatments adversely affect bloom, inflorescence and plant growth.
33271	Tickseed (Coreopsis sp.)	Field Container	Larson	WA	2021	Foliar	No injury with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33271	Tickseed (Coreopsis sp.) American Dream'	Field Container	Wade	SC	2018	Foliar	No injury with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly; all plants marketable.
33272	Dahlia (Dahlia sp.) 'Figaro Mix'	Greenhouse	Freiberger	NJ	2019	Foliar	No injury with or growth reduction with 6.4, 12.8 and 25.6 fl oz per 100 gal applied 3 times.
33273	Transvaal Daisy (Gerbera sp.)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33273	Transvaal Daisy (Gerbera sp.) G. jamesonii Garvinea Sweet Series	Greenhouse	Koski	CO	2019	Foliar	No significant injury or growth reduction with 6.4, 12.8 and 25.6 fl oz per 100 gal applied 3 times to Garvinea Sweet Series cultivars 'Fiesta', 'Frost', 'Glow', 'Memories', and 'Sunset'.
33273	Transvaal Daisy (Gerbera sp.) 'Jaguar Yellow'	Greenhouse	Vafaie	TX	2020	Foliar	No significant injury or growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
33274	Hydrangea (Hydrangea sp.) H. macrophylla 'Nikko Blue'	Field Container	Fraelich	GA	2020	Foliar	No injury or significant growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times; all treated plants marketable.
33274	Hydrangea (Hydrangea sp.)	Field Container	Larson	WA	2021	Foliar	No injury with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33274	Hydrangea (Hydrangea sp.) 'Nikko Blue'	Field Container	Wade	SC	2018	Foliar	No injury with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly; all plants marketable.
33279	Rose (Rosa sp.) 'OSO Easy Double Red'	Field Container	Beckerman	IN	2020	Foliar	No significant injury with 6.4 and 12.8, minor leaf distortion with 25.4 fl oz per 100 gal applied 3 times biweekly; no growth reduction.
33279	Rose (Rosa sp.) 'Lokelani'	Field Container	Cheng	HI	2020	Foliar	No injury or growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33279	Rose (Rosa sp.) 'Oso Easy® Double Red'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly.
33280	African Violet (Saintpaulia ionantha)	Greenhouse	Catlin	NY	2020	Foliar	No injury or growth reduction with 6.4, 12.8, and 25.4 fl oz per 100 gal applied 3 times. Moderate injury on flowers.
33280	African Violet (Saintpaulia ionantha) 'Ladyslippers Strawberry Ice'	Greenhouse	Hausbeck	MI	2020	Foliar	No injury or growth impact with 6.4, 12.8 or 25.4 fl oz per 100 gal.
33275	Spirea (Spiraea nipponica) 'Snowmound'	Field Container	Grunwald	OR	2020	Foliar	No injury, growth or flowering reduction at 10, 20, and 40 fl oz per 100 gal rates
33275	Spirea (Spiraea nipponica) 'Snowmound'	Field Container	Hausbeck	MI	2021	Foliar	No injury, growth or flowering reduction when applied 3x biweekly at 3.2, 6.4 and 12.8 fl oz per 100 gal rates; plant growth increased at higher rates.
33281	Lilac (Syringa sp.)	Field Container	Grunwald	OR	2020	Foliar	No injury, growth or flowering reduction at 10, 20, and 40 fl oz per 100 gal rates
33281	Lilac (Syringa sp.) S. meyeri 'Palibin'	Field Container	Hausbeck	MI	2021	Foliar	No injury, growth or flowering reduction when applied 3x biweekly at 3.2, 6.4 and 12.8 fl oz per 100 gal rates.
33281	Lilac (Syringa sp.) S. vulgaris 'Yankee Doodle'	Field Container	Hausbeck	MI	2021	Foliar	No injury, growth or flowering reduction when applied 3x biweekly at 3.2, 6.4 and 12.8 fl oz per 100 gal rates.
33276	Vervain (Verbena sp.) 'Obsession Burgandy'	Greenhouse	Grunwald	OR	2018	Foliar	No injury, growth or flowering reduction when applied at 6.4, 12.8 and 25.4 fl oz per 100 gal rates
33277	Periwinkle (Vinca sp.) Vinca minor	Greenhouse	Fraelich	GA	2021	Foliar	No injury or growth reduction with 6.4, 12.8 and 25.4 fl oz per 100 gal applied 3 times biweekly. All plants marketable.
33282	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Pennylane mix'	Greenhouse	Grunwald	OR	2018	Foliar	No injury, growth or flowering reduction when applied at 6.4, 12.8 and 25.4 fl oz per 100 gal rates
33282	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Delta Premium Blue Blotch'	Greenhouse	Koski	CO	2021	Foliar	None of the treatments (3.2, 6.4 & 12.8 fl. oz per 100 gallons) caused phytotoxicity on the crop nor did any of the treatments adversely affect bloom, inflorescence and plant growth.
33282	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Matrix Yellow'	Greenhouse	Vafaie	TX	2020	Foliar	No significant injury or growth reduction with 6.4, 12.8 and 25.6 fl oz per 100 gal applied 3 times biweekly.
33278	Zinnia (Zinnia sp.) 'Profusion mix'	Greenhouse	Grunwald	OR	2018	Foliar	No injury, growth or flowering reduction when applied at 6.4, 12.8 and 25.4 fl oz per 100 gal rates

PR#	Crop	Production Site	Researcher	State	Year	Application Type	Results
33278	Zinnia (Zinnia sp.) Z. violaceae 'Zesty Fuschia'	Greenhouse	Koski	CO	2019	Foliar	No significant injury or growth reduction with 6.4, 12.8 and 25.6 fl oz per 100 gal applied 3 times.
33278	Zinnia (Zinnia sp.)	Greenhouse	Saha	MI	2021	Foliar	No significant injury with 3.2, 6.4 and 12.8 fl oz per 100 gal after 1st application; minor and moderate after 2nd and 3rd applications. No significant growth reduction.

Label Suggestions

In this report, all plants, except one, exhibited no or minimal injury after foliar treatments of Flutianil at 6.4, 12.8 and 25.4 fl oz per 100 gal, suggesting that this active ingredient is safe to environmental horticulture crops. Given the lack of phytotoxicity across so many different plant species and genera, we suggest that all the 13 plants in Table 1 and Table 5 (listed below) that showed no injury be placed on the Flutianil label if the registrant 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 environmental plant species according to labeled use instructions. Flutianil may be used on a wide number of crops, but it 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 Flutianil to that crop'.

Begonia sp.

Calibrachoa sp.

Chrysanthemum sp.

Coreopsis sp.

Dahlia sp.

Gerbera sp

Hydrangea sp.

Rosa sp.

Spirea nipponica

Syringa sp.

Verbena sp.

Vinca minor.

Viola x wittrockiana

Appendix 1: Contributing Researchers

Dr. Beckerman	Purdue University Lilly Hall Rm 1-321 West Lafayette, IN 47907
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