



[Environment Horticulture Program Research Summaries](#)

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

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### **Acknowledgements Susan Bierbrunner**

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## Abstract

Picarbutrazox is a novel fungicide with a new mode of action being developed by Nisso America for the control of oomycete diseases such as *Bremia*, *Peronospora*, *Pseudoperonospora*, *Phytophthora*, *Pythium* and *Phytophthium*. The IR-4 Project completed 46 crop safety trials on 14 environmental horticulture plant species or genera between 2018 and 2021. In these trials, 13 of 14 species or genera exhibited no or minimal injury. Three species or genera (*Impatiens hawkeri*, *Impatiens walleriana* and *Rudbeckia hirta*) exhibited no injury in 3 trials. One genera, *Rosa sp*, exhibited moderate injury in one trial after two consecutive biweekly foliar applications of Picarbutrazox SC. The remaining 10 species or genera exhibited no or minimal injury in the limited number of trials (one or two) for each crop.

## Introduction

Picarbutrazox is a novel fungicide with a new mode of action being developed by Nisso America for the control of oomycetes disease such as *Bremia*, *Peronospora*, *Pseudoperonospora*, *Phytophthora* and *Pythium*. The IR-4 Project completed 27 crop safety trials on 12 environmental ornamental horticulture plant species or genera during 2018.

## Materials and Methods

Picarbutrazox as 2 formulations (20WG and SC) was tested with foliar treatments typically applied three times at approximately 14 day intervals. Picarbutrazox 20WG was applied at rates of 7.2, 14.4 and 28.8 oz per 100 gal, and Picarbutrazox SC at 13.6, 27.2 and 54.4 fl oz per 100 gal. A minimum of three plants (replicate treatments) were required with most researchers exceeding this minimum. Phytotoxicity was recorded on a scale of 0 to 10 (0 = no phytotoxicity; 10 = complete kill) one to four times from 1 to 6 weeks after initial application. For IR-4 testing, the following protocol was 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 this protocol.

Picarbutrazox was supplied to researchers (See list of researchers in Appendix 1) by Nisso America.

## Results and Summary

### *Phytotoxicity*

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

Across all but one of the 14 crops tested, Picarbutrazox 20WG and SC exhibited no or minimal negative impact on all plant species or genera. Three species or genera (*Impatiens hawkeri*, *Impatiens walleriana* and *Rosa* sp.) exhibited no or minimal injury in 3 trials (Table 1), and 9 species or genera exhibited no or minimal injury in the limited number of trials (one or two) for each crop (Table 4).

Please see Table 6 for a summary of the individual trial results.

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

*Impatiens hawkeri*  
*Impatiens walleriana*  
*Rosa* sp. (see Saha 2021 for single report of moderate injury after multiple applications)  
*Rudbeckia hirta*

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

None

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

None

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

<i>Antirrhinum majus</i> <sup>1</sup>	<i>Salvia nemorosa</i> <sup>1</sup>
<i>Aster</i> sp. <sup>1</sup>	<i>Salvia splendens</i> <sup>1</sup>
<i>Coleus</i> sp. <sup>1</sup>	<i>Viburnum</i> sp. <sup>1</sup>
<i>Pelargonium x hortorum</i> <sup>1</sup>	<i>Viola x wittrockiana</i> <sup>1</sup>
<i>Potentilla</i> sp. <sup>1</sup>	

<sup>1</sup>For these plants, the one or two trials presented here indicate no phytotoxicity or slight, transient injury, but these findings need to be confirmed.

**Table 5. Average Crop Safety Rating after Foliar Applications of Picarbutrazox formulations**

Crop Latin Name	Picarbutrazox 20WG	Picarbutrazox SC
<i>Antirrhinum majus</i>	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Aster</i> sp.	1.0 (1 - 1) n2	1.0 (1 - 1) n1
<i>Coleus</i> sp.	1.0 (1 - 1) n1	1.0 (1 - 1) n2
<i>Impatiens hawkeri</i>	1.3 (1 - 2) n3	1.5 (1 - 2) n2
<i>Impatiens walleriana</i>	1.0 (1 - 1) n2	1.0 (1 - 1) n1
<i>Pelargonium x hortorum</i>	1.0 (1 - 1) n1	1.5 (1 - 2) n2
<i>Potentilla</i> sp.	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Rosa</i> sp.	1.0 (1 - 1) n2	1.7 (1 - 3) n3
<i>Rudbeckia hirta</i>	1.3 (1 - 2) n3	1.0 (1 - 1) n3
<i>Salvia nemorosa</i>	1.0 (1 - 1) n2	1.0 (1 - 1) n2
<i>Salvia splendens</i>	1.0 (1 - 1) n2	1.0 (1 - 1) n2
<i>Viburnum</i> sp.	1.0 (1 - 1) n1	1.0 (1 - 1) n1
<i>Viola X wittrockiana</i>	1.0 (1 - 1) n1	1.0 (1 - 1) n1

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 6. Detailed Summary of Crop Safety Testing with Picarbutrazox.**

Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 10/19/2021 are listed below.

PR#	Product (Active Ingredients)	Crop	Production Site	Researcher	State	Year	Application Type	Results
33289	Picarbutrazox 20WG (Picarbutrazox)	Garden Snapdragon (Antirrhinum majus)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33292	Picarbutrazox 20WG (Picarbutrazox)	Aster (Aster sp.) 'Pot and Patio Mix'	Field Container	Reding	OH	2018	Foliar	No injury or significant growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33292	Picarbutrazox 20WG (Picarbutrazox)	Aster (Aster sp.)	Field Container	Wade	SC	2019	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33300	Picarbutrazox 20WG (Picarbutrazox)	Coleus, Flamenettle (Coleus sp.)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33296	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, New Guinea (Impatiens hawkeri)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33295	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, New Guinea (Impatiens hawkeri) 'Harmony Snow'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33295	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, New Guinea (Impatiens hawkeri) 'Sonic Salmon'	Field Container	Reding	OH	2018	Foliar	No injury or significant growth reduction with 7.2 and 14.4, suppressed growth and flowering with 28.8 oz per 100 gal after the 3rd applic.; all plants marketable.
33295	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, New Guinea (Impatiens hawkeri) 'Coral Pink'	Field Container	Uber	CA	2019	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33294	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana) 'Dazzler Orange'	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; plants flowered normally.
33293	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana) 'Rockapulco Purple'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33293	Picarbutrazox 20WG (Picarbutrazox)	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana) 'Super Elfin XP Rose'	Field Container	Reding	OH	2018	Foliar	No injury or significant growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.

PR#	Product (Active Ingredients)	Crop	Production Site	Researcher	State	Year	Application Type	Results
33299	Picarbutrazox 20WG (Picarbutrazox)	Geranium, Zonal (Pelargonium x hortorum) 'Ringo 2000 Deep Red'	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; plants flowered normally.
33290	Picarbutrazox 20WG (Picarbutrazox)	Cinquefoil (Potentilla sp.) 'Happy Face Yellow'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33283	Picarbutrazox 20WG (Picarbutrazox)	Rose (Rosa sp.) 'Iceberg White'	Field Container	Uber	CA	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33283	Picarbutrazox 20WG (Picarbutrazox)	Rose (Rosa sp.)	Field Container	Wade	SC	2019	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33285	Picarbutrazox 20WG (Picarbutrazox)	Black-Eyed Susan (Rudbeckia hirta) 'Goldsturm'	Field Container	Fraelich	GA	2020	Foliar	No injury or significant growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times; all treated plants marketable.
33285	Picarbutrazox 20WG (Picarbutrazox)	Black-Eyed Susan (Rudbeckia hirta) 'Toto Gold'	Field Container	Freiberger	NJ	2019	Foliar	No injury or growth reduction with 7.4, 18.8 and 28.8 oz per 100 gal applied 3 times biweekly.
33285	Picarbutrazox 20WG (Picarbutrazox)	Black-Eyed Susan (Rudbeckia hirta) 'Denver Daisy'	Field Container	Reding	OH	2018	Foliar	No injury or significant growth reduction with 7.2 and 14.4, suppressed growth and flowering with 28.8 oz per 100 gal after the 3rd applic.; all plants marketable.
33288	Picarbutrazox 20WG (Picarbutrazox)	Woodland Sage (Salvia nemorosa) 'Maynight'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33288	Picarbutrazox 20WG (Picarbutrazox)	Woodland Sage (Salvia nemorosa) 'Blue Marvel'	Field Container	Reding	OH	2018	Foliar	No injury or significant growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33286	Picarbutrazox 20WG (Picarbutrazox)	Scarlet Sage (Salvia splendens) 'Vista Purple'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.
33286	Picarbutrazox 20WG (Picarbutrazox)	Scarlet Sage (Salvia splendens) 'Vista Red'	Field Container	Reding	OH	2018	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33284	Picarbutrazox 20WG (Picarbutrazox)	Arrowwood (Viburnum sp.)	Field Container	Wade	SC	2019	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33291	Picarbutrazox 20WG (Picarbutrazox)	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Matrix White Blotch'	Greenhouse	Bodine	NJ	2020	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly.



PR#	Product (Active Ingredients)	Crop	Production Site	Researcher	State	Year	Application Type	Results
33228	Picarbutrazox SC (NF-171) (Picarbutrazox)	Garden Snapdragon (Antirrhinum majus)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33225	Picarbutrazox SC (NF-171) (Picarbutrazox)	Aster (Aster sp.) 'Wood's Purple'	Field Container	Wade	SC	2018	Foliar	No injury with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly; all plants marketable.
33219	Picarbutrazox SC (NF-171) (Picarbutrazox)	Coleus, Flamenettle (Coleus sp.)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33219	Picarbutrazox SC (NF-171) (Picarbutrazox)	Coleus, Flamenettle (Coleus sp.) 'Burgundy Wedding Train'	Greenhouse	Hand	OH	2020	Foliar	No injury or impact on growth at 13.6, 27.2 or 54.4 fl oz per 100 gal.
33220	Picarbutrazox SC (NF-171) (Picarbutrazox)	Impatiens, New Guinea (Impatiens hawkeri)	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction, all plants flowered normally, with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33220	Picarbutrazox SC (NF-171) (Picarbutrazox)	Impatiens, New Guinea (Impatiens hawkeri) 'Clockwork Purple'	Greenhouse	Hand	OH	2020	Foliar	No injury at 13.6, 27.2 or 54.4 fl oz per 100 gal, but plants treated with the lowest rate were shorter than nontreated or those plants treated with the higher rates.
33224	Picarbutrazox SC (NF-171) (Picarbutrazox)	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana) 'Dazzler Orange'	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly; plants flowered normally.
33221	Picarbutrazox SC (NF-171) (Picarbutrazox)	Geranium, Zonal (Pelargonium x hortorum) 'Ringo 2000 Deep Red'	Greenhouse	Freiberger	NJ	2018	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly; plants flowered normally.
33221	Picarbutrazox SC (NF-171) (Picarbutrazox)	Geranium, Zonal (Pelargonium x hortorum)	Greenhouse	Saha	MI	2021	Foliar	Minor injury with 13.6, 27.2 and 54.4 fl oz per 100 gal. No significant growth reduction.
33227	Picarbutrazox SC (NF-171) (Picarbutrazox)	Cinquefoil (Potentilla sp.) 'Happy Face Yellow'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33233	Picarbutrazox SC (NF-171) (Picarbutrazox)	Rose (Rosa sp.) 'Oso Easy® Double Red'	Field Container	Gu	TX	2018	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33233	Picarbutrazox SC (NF-171) (Picarbutrazox)	Rose (Rosa sp.)	Field Container	Saha	MI	2021	Foliar	Moderate injury with 13.6, 27.2 and 54.4 fl oz per 100 gal. Minor growth reduction.
33233	Picarbutrazox SC (NF-171) (Picarbutrazox)	Rose (Rosa sp.) 'Iceberg White'	Field Container	Uber	CA	2018	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33231	Picarbutrazox SC (NF-171) (Picarbutrazox)	Black-Eyed Susan (Rudbeckia hirta) 'Goldsturm'	Field Container	Fraelich	GA	2020	Foliar	No injury or significant growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times; all treated plants marketable.

PR#	Product (Active Ingredients)	Crop	Production Site	Researcher	State	Year	Application Type	Results
33231	Picarbutrazox SC (NF-171) (Picarbutrazox)	Black-Eyed Susan (Rudbeckia hirta) 'Toto Gold'	Field Container	Freiberger	NJ	2019	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33231	Picarbutrazox SC (NF-171) (Picarbutrazox)	Black-Eyed Susan (Rudbeckia hirta) 'Denver Daisy'	Field Container	Klett	CO	2020	Foliar	No injury or growth reduction, and no effect on flower production or bloom time, with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33229	Picarbutrazox SC (NF-171) (Picarbutrazox)	Woodland Sage (Salvia nemorosa) 'Haeumanarc'	Field Container	Fraelich	GA	2019	Foliar	No significant injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly; treated plants marketable.
33229	Picarbutrazox SC (NF-171) (Picarbutrazox)	Woodland Sage (Salvia nemorosa) 'Marcus'	Field Container	Klett	CO	2020	Foliar	No injury or growth reduction, and no effect on flower production or bloom time, with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33230	Picarbutrazox SC (NF-171) (Picarbutrazox)	Scarlet Sage (Salvia splendens) 'Grandstand Purple'	Field Container	Klett	CO	2020	Foliar	No injury or growth reduction, and no effect on flower production or bloom time, with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.
33230	Picarbutrazox SC (NF-171) (Picarbutrazox)	Scarlet Sage (Salvia splendens)	Field Container	Wade	SC	2019	Foliar	No injury or growth reduction with 7.2, 14.4 and 28.8 oz per 100 gal applied 3 times biweekly; all plants marketable.
33232	Picarbutrazox SC (NF-171) (Picarbutrazox)	Arrowwood (Viburnum sp.) 'Sweet Viburnum'	Field Container	Wade	SC	2018	Foliar	No injury with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly; all plants marketable.
33226	Picarbutrazox SC (NF-171) (Picarbutrazox)	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana) 'Matrix White Blotch'	Greenhouse	Bodine	NJ	2020	Foliar	No injury or growth reduction with 13.6, 27.2 and 54.4 fl oz per 100 gal applied 3 times biweekly.

## **Label Suggestions**

In this report, 13 of the 14 crops tested exhibited no or minimal injury after foliar treatments of Picarbutrazox 20WG was applied at rates of 7.2, 14.4 and 28.8 oz per 100 gal or Picarbutrazox SC at 13.6, 27.2 and 54.4 fl oz per 100 gal. In one trial with *Rosa* sp, moderate spotting on foliage was observed after two and three consecutive applications. Further research is warranted to screen additional rose cultivars. These results suggest that this active ingredient will generally not harm environmental horticulture crops.

Given the lack of phytotoxicity across many different plant species and genera, it is suggested that the 13 plants tested demonstrating no injury be placed on the Picarbutrazox label if Nisso America 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 when used according to labeled use instructions. Picarbutrazox 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 Picarbutrazox to that crop’.

## Appendix 1: Contributing Researchers

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