IR-4 Ornamental Horticulture Program
Fluensulfone Crop Safety

Authors: Ely Vea and Cristi L. Palmer
Date: December 15, 2017

Acknowledgements
Susan Bierbrunner

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-34383-23710 with substantial cooperation and support from the State Agricultural Experiment Stations and USDA-ARS.
# Table of Contents

Table of Contents .................................................................................................................. 2  
Table of Tables ....................................................................................................................... 3  
Abstract .................................................................................................................................. 4  
Introduction ............................................................................................................................ 5  
Materials and Methods ........................................................................................................... 5  
Results and Summary ............................................................................................................. 5  
  Phytotoxicity ......................................................................................................................... 5  
Label Suggestions ................................................................................................................... 8  
Appendix 1: Contributing Researchers .................................................................................. 9
Table of Tables

Table 1. List of MCW-2 480EC treated crops with no or minimal transitory injury. .............6
Table 2. List of MCW-2 480EC treated crops with no injury at 1X but significant injury at 2X or 4X. .................................................................6
Table 3. List of MCW-2 480EC treated crops with significant injury at 1X..........................6
Table 4. List of MCW-2 480EC treated crops where more information is needed...............6
Table 5 Detailed Summary of Crop Safety Testing with MCW-2 480EC (fluensulfone)
Abstract

Fluensulfone was registered as Nimitz Pro G in the United States in 2016 for nematode control in turf. Between 2012 and 2014, the IR-4 Project completed 13 trials on 8 ornamental horticulture plant species or genera examining phytotoxicity related to soil drench applications of fluensulfone (MCW-2 480EC). In these trials, one genus (*Petunia sp.*) exhibited minimal or no injury after drench applications. Based on this information, it is recommended that this genus be added to the list of tolerant plants on a future fluensulfone label for uses on ornamental horticulture crops.
Introduction
Fluensulfone was registered as Nimitz Pro G in the United States in 2016 for nematode control in turf. Between 2012 and 2014, the IR-4 Project completed 13 trials on 8 ornamental horticulture plant species or genera examining phytotoxicity related to soil drench applications of fluensulfone (MCW-2 480EC).

Materials and Methods
Fluensulfone (MCW-2 480EC) was tested applied as drench treatment at rates of 0.11, 0.22 and 0.44 ml per cu ft potting mix. Product was sprayed on potting mix and blended for even distribution or applied in sufficient water to thoroughly wet the entire mix in the pot. A minimum of six 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 at 7, 14 and 21 days after application. For IR-4 testing, the following protocols were used: 12-011 and 13-011. 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.

MCW-2 480EC was supplied to researchers (See list of researchers in Appendix 1) by MANA and Quali-Pro.

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 sufficient to recommend growers not utilize fluensulfone, and 4) more data are needed to make informed recommendations.

Phytotoxicity
Across all plant species tested fluensulfone (MCW-2 480EC) exhibited no or minimal negative impact on one genus (Table 1). All the other 7 species or genera tested also exhibited no or minimal negative impact, but less than 3 trials were conducted so there is not enough information available at this time (Table 4).

Please see Error! Reference source not found. for a summary of the individual trial results.
Table 1. List of MCW-2 480EC treated crops with no or minimal transitory injury.

*Petunia* sp.

Table 2. List of MCW-2 480EC treated crops with no injury at 1X but significant injury at 2X or 4X.

None

Table 3. List of MCW-2 480EC treated crops with significant injury at 1X.

None

Table 4. List of MCW-2 480EC treated crops where more information is needed.

<table>
<thead>
<tr>
<th>Calibrachoa sp</th>
<th>Pseudotsuga menziesii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lantana camara</td>
<td>Rhododendron sp (azalea)¹</td>
</tr>
<tr>
<td>Lantana sp.</td>
<td>Rhododendron sp. (rhododendron)¹</td>
</tr>
<tr>
<td>Osteospermum sp.</td>
<td></td>
</tr>
</tbody>
</table>

¹For 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  Detailed Summary of Crop Safety Testing with MCW-2 480EC (fluensulfone)
Notes: Table entries are sorted by crop Latin name. Only those trials with research reports received by 12/14/2017 are listed below.

<table>
<thead>
<tr>
<th>PR#</th>
<th>Crop</th>
<th>Production Site</th>
<th>Researcher</th>
<th>State</th>
<th>Year</th>
<th>Application Type</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>30852</td>
<td>Calibrachoa (Calibrachoa sp.) ’Minifamous Red’</td>
<td>Greenhouse</td>
<td>Grunwald</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix; all plants saleable.</td>
</tr>
<tr>
<td>30858</td>
<td>Lantana (Lantana sp.) ’Chapel Hill Sunny Side Up’</td>
<td>Greenhouse</td>
<td>Catlin</td>
<td>NY</td>
<td>2013</td>
<td>Drench</td>
<td>No injury with 0.11, 0.22, and 0.44 ml/cu ft potting mix; slight growth reduction.</td>
</tr>
<tr>
<td>30858</td>
<td>Lantana (Lantana sp.) L. camara ’Confetti’</td>
<td>Greenhouse</td>
<td>Grunwald</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix; all plants saleable.</td>
</tr>
<tr>
<td>30882</td>
<td>Daisybush (Osteospernum sp.) ’Akila’</td>
<td>Greenhouse</td>
<td>Freiberger</td>
<td>NJ</td>
<td>2014</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix.</td>
</tr>
<tr>
<td>30882</td>
<td>Daisybush (Osteospernum sp.) ’Copper Purple’</td>
<td>Greenhouse</td>
<td>Grunwald</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix; all plants saleable.</td>
</tr>
<tr>
<td>30884</td>
<td>Petunia (Petunia sp.) ’Carpet Blue Sky’</td>
<td>Greenhouse</td>
<td>Catlin</td>
<td>NY</td>
<td>2013</td>
<td>Drench</td>
<td>Slight injury (interveinal chlorosis) with 0.11, 0.22 and 0.44 ml per cu ft potting mix; no growth reduction.</td>
</tr>
<tr>
<td>30884</td>
<td>Petunia (Petunia sp.) ’Picobella Salmon’</td>
<td>Greenhouse</td>
<td>Freiberger</td>
<td>NJ</td>
<td>2013</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix.</td>
</tr>
<tr>
<td>30884</td>
<td>Petunia (Petunia sp.) ’Single Wave Purple’</td>
<td>Greenhouse</td>
<td>Grunwald</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix; all plants saleable.</td>
</tr>
<tr>
<td>30885</td>
<td>Fir, Douglas (Pseudotsuga menziesii)</td>
<td>Greenhouse</td>
<td>DeFrancesco</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix; all plants saleable.</td>
</tr>
<tr>
<td>30885</td>
<td>Fir, Douglas (Pseudotsuga menziesii)</td>
<td>Greenhouse</td>
<td>Grunwald</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting media.</td>
</tr>
<tr>
<td>30886</td>
<td>Rhododendron (Rhododendron sp.) ’Hino Crimson’</td>
<td>Greenhouse</td>
<td>DeFrancesco</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting media.</td>
</tr>
<tr>
<td>30887</td>
<td>Rhododendron (Rhododendron sp.) R. catawbiensis ’Album’</td>
<td>Greenhouse</td>
<td>Grunwald</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting mix; all plants saleable.</td>
</tr>
<tr>
<td>30887</td>
<td>Rhododendron (Rhododendron sp.) ’Vulcan’</td>
<td>Greenhouse</td>
<td>DeFrancesco</td>
<td>OR</td>
<td>2012</td>
<td>Drench</td>
<td>No injury or growth reduction with 0.11, 0.22 and 0.44 ml per cu ft potting media.</td>
</tr>
</tbody>
</table>
Label Suggestions

In this report, one genus exhibited minimal or no injury after soil drench treatment with fluensulfone (MCW-2 480EC) at rates of 0.11, 0.22 and 0.44 ml per cu ft potting mix. It is recommended that this genus be added to the list of tolerant plants on future fluensulfone label on ornamentals.
Appendix 1: Contributing Researchers

Dr. Nora Catlin  
Cornell Cooperative Extension  
423 Griffin Avenue  
Riverhead, NY 11901

Mr. Joe DeFrancesco  
Oregon State University  
2040 Cordley Hall  
Corvalis, OR 97331

Mr. Tom Freiberger  
Rutgers University  
Cream Ridge Experiment Station  
283 Rt. 539  
Cream Ridge, NJ 08514

Dr. Nik Grunwald  
Horticultural Crops Research Lab  
USDA-ARS  
3420 NW Orchard Ave.  
Corvallis, OR 97330