Efficacy of Management Tools for Downy Mildew. Final

Ornamental Protocol Number: 09-001
Objective: Determine efficacy of new active ingredient formulations and new biopesticides for managing downy mildew diseases.

Experimental Design:
Plot Size: Must be adequate to reflect actual use conditions.
Replicates: Minimum of 4 replications
Application Instructions: tbd
Target Species: tbd
Plant Hosts: Use a plant host suitable for target species, recording species and variety used.
Use Site: May be greenhouse, field container or field in-ground. Please specify in final report.

Evaluations: Record disease severity and incidence 0, 7, 14, and 28 days after application for herbaceous plant material. For woody plant material, record disease severity and incidence 0, 14, 28, 42 and 56 days after initial application. Record plant height & width at initial and final evaluations only. Record phytotoxicity at each rating date on a scale of 0 to 10 (0 = no phytotoxicity; 10 = complete kill). If phytotoxicity is observed in treated plants, take pictures comparing treated and untreated plant material.

Recordkeeping: Keep detailed records of weather conditions including temperature and precipitation, soil-type or soil-less media, application equipment, application volume per area, irrigation, pot/liner size, plant height & width, and plant growth stage at application and data collection dates.

If different application methods or evaluations are made, please clearly specify differences in final report and explain how they enhanced results.

Treatments:
See tables on the following pages. Standards and A priority treatments are in the first table. B and C priority treatments are in the second table.

Reports:
Reports submitted on the standard IR-4 Ornamental Horticulture Research Report Form are preferred. However, reports in the F&N Tests format are acceptable as long as those reports are amended with detailed experimental design and materials and methods, along with raw data, recordkeeping information, and any pictures.

A report submitted electronically is preferred but not required. If the report is provided electronically, the basic report can be sent in MS Word or WordPerfect, the recordkeeping information as pdf or other electronic documents, and the raw data in MS Excel or other suitable program such as ARM.

Please direct questions to: Cristi Palmer, IR-4 HQ, Rutgers University, 500 College Road East, Suite 201W, Princeton, NJ 08540, Phone 732-932-9575 x4629, palmer@aesop.rutgers.edu OR Ely Vea, 308 Aston Forest Lane, Crownsville, MD 21032, Phone & FAX#: 410-923-4880, E-mail: evvea@comcast.net.

Draft Date: 5/18/09
Revised By: CLP
Priority A and Standard Treatments List with rates, special application instructions, and contact information to obtain product and any suitable adjuvant needed.

<table>
<thead>
<tr>
<th>Priority</th>
<th>#</th>
<th>Product</th>
<th>Rates</th>
<th>Reapplication Interval</th>
<th>Special Application Instructions (Soil Drench)</th>
<th>Contact Information to obtain materials and any needed adjuvants</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Adorn (fluopicolide) aka V-10161</td>
<td>1 fl oz/100 gal</td>
<td>28 day</td>
<td>Drench 1 pint solution per sq ft. Increase volume to 2 pints solution per sq ft if soil media depth is greater than 4 inches.</td>
<td>Valent, Joe Chamberlin, 770-985-0303, <a href="mailto:jcham@valent.com">jcham@valent.com</a></td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Adorn (fluopicolide) aka V-10161</td>
<td>2 fl oz/100 gal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>BAS 651 F</td>
<td>11 fl oz/100 gal</td>
<td>14 d</td>
<td>Foliar application</td>
<td>BASF, Kathie Kalmowitz, 919-270-4592, <a href="mailto:kathie.kalmowitz@basf.com">kathie.kalmowitz@basf.com</a></td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>BAS 651 F</td>
<td>13.4 fl oz/100 gal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>Disarm 480SC</td>
<td>2 fl oz per 100 gal</td>
<td>14 d</td>
<td>Foliar</td>
<td>Arysta, Doug Houseworth, 904-321-0795, <a href="mailto:LlHouse9@aol.com">LlHouse9@aol.com</a></td>
</tr>
<tr>
<td>A</td>
<td>6</td>
<td>Disarm 480SC</td>
<td>4 fl oz per 100 gal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>7</td>
<td>Heritage (azoxystrobin)</td>
<td>4 oz/100 gal</td>
<td></td>
<td>Spray on a 7 day interval</td>
<td>Syngenta, Nancy Rechcigl, 941-238-7413, <a href="mailto:nancy.rechcigl@syngenta.com">nancy.rechcigl@syngenta.com</a></td>
</tr>
<tr>
<td>A</td>
<td>8</td>
<td>Heritage (azoxystrobin)</td>
<td>4 oz/100 gal</td>
<td></td>
<td>Spray on a 14 day interval</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>9</td>
<td>NOA 44610 (mandipropamide)</td>
<td>4 oz/100 gal</td>
<td></td>
<td>Spray on a 7 day interval</td>
<td>Syngenta, Nancy Rechcigl, 941-238-7413, <a href="mailto:nancy.rechcigl@syngenta.com">nancy.rechcigl@syngenta.com</a></td>
</tr>
<tr>
<td>A</td>
<td>10</td>
<td>NOA 44610 (mandipropamide)</td>
<td>8 oz/100 gal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>11</td>
<td>Regalia SC</td>
<td>0.5%</td>
<td>7 d</td>
<td>Foliar</td>
<td>Marrone Organic Innovations, Tim Johnson, 570-441-8775, <a href="mailto:tjohnson@marronebio.com">tjohnson@marronebio.com</a></td>
</tr>
<tr>
<td>A</td>
<td>12</td>
<td>Regalia SC</td>
<td>1%</td>
<td></td>
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<td></td>
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<tr>
<td>Standards</td>
<td>11</td>
<td>Standard Control 1*</td>
<td>See below</td>
<td>See below</td>
<td>See below</td>
<td>See below</td>
</tr>
<tr>
<td>Standards</td>
<td>12</td>
<td>Standard Control 2*</td>
<td>See below</td>
<td>See below</td>
<td>See below</td>
<td>See below</td>
</tr>
<tr>
<td>Standards</td>
<td>13</td>
<td>Untreated Uninoculated</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>14</td>
<td>Untreated Inoculated</td>
<td>--</td>
<td>--</td>
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<td></td>
</tr>
</tbody>
</table>

* Select 2 of the four standards below

**Standards**

<table>
<thead>
<tr>
<th>Standards</th>
<th>Example 1 Name</th>
<th>Example 1 Rate</th>
<th>Example 1 Application</th>
<th>Example 1 Instructions</th>
<th>Example 1 Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Aliette (fosetyl Al)</td>
<td>6.4 to 12.8 oz/100 gal</td>
<td>Apply 2 pints solution per sq ft</td>
<td>Bayer, Mike Gorrell, <a href="mailto:mike.gorrell@bayercropscience.com">mike.gorrell@bayercropscience.com</a></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Fenstop (fenamidone)</td>
<td>14.0 oz per 100 gal</td>
<td>Refer to label for directions</td>
<td>Bayer, Mike Gorrell, <a href="mailto:mike.gorrell@bayercropscience.com">mike.gorrell@bayercropscience.com</a></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Stature SC (dimethomorph)</td>
<td>6.12 fl oz</td>
<td>Foliar application</td>
<td>BASF, Kathie Kalmowitz, 919-270-4592, kathie. <a href="mailto:kalmowitz@basf.com">kalmowitz@basf.com</a></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>Subdue Maxx (mefenoxam)</td>
<td>1 oz/100 gal</td>
<td>14 day</td>
<td>Syngenta, Nancy Rechcigl, 941-238-7413, nancy. <a href="mailto:rechcigl@syngenta.com">rechcigl@syngenta.com</a></td>
<td></td>
</tr>
</tbody>
</table>
Priority B & C Treatments List with rates, special application instructions, and contact information to obtain product and any suitable adjuvant needed.

<table>
<thead>
<tr>
<th>Priority</th>
<th>Product</th>
<th>Rates</th>
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</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Alude</td>
<td>12.7 fl oz/100 gal</td>
<td>14 d</td>
<td>Drench: Apply 1 pint per sq ft. Foliar: Tank mix with Protect using 1 lb/100. Record species</td>
<td>Cleary, Rick Fletcher, 732-329-8399, <a href="mailto:rick.fletcher@clearychemical.com">rick.fletcher@clearychemical.com</a></td>
</tr>
<tr>
<td>C</td>
<td>AgriPhos</td>
<td>64 fl oz/100 gal</td>
<td></td>
<td>Apply at 2 pts per sq ft</td>
<td>AgBio, Jan Meneley, 303-469-9221, <a href="mailto:agbio@agbio-inc.com">agbio@agbio-inc.com</a></td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>C</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Cymoxanil</td>
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<tr>
<td>B</td>
<td>Insignia (pyraclostrobin)</td>
<td>4 oz/100 gal</td>
<td>Spray on a 7 day interval</td>
<td></td>
<td>BASF, Kathie Kalmowitz, 919-270-4592, <a href="mailto:kathie.kalmowitz@basf.com">kathie.kalmowitz@basf.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 oz/100 gal</td>
<td>Spray on a 14 day interval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Magellan</td>
<td>Foliar applications: Herbaceous: 1.25 – 4 pints per 100 gal</td>
<td>14 d for bedding plants</td>
<td></td>
<td>Nufarm, Darin Allred, 919-655-0061, <a href="mailto:Darin.Allred@us.nufarm.com">Darin.Allred@us.nufarm.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Woodies: 2 – 5 pints per 100 gal</td>
<td>30 d for conifers</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drench application: 6 – 12 fl oz/100 gal</td>
<td>28 d</td>
<td>Apply 2 pints solution per sq ft.</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Pageant 38WG (pyraclostrobin +boscalid)</td>
<td>12 oz/100 gal</td>
<td>Spray on a 14 day interval</td>
<td></td>
<td>BASF, Kathie Kalmowitz, 919-270-4592, <a href="mailto:kathie.kalmowitz@basf.com">kathie.kalmowitz@basf.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 oz/100 gal</td>
<td></td>
<td></td>
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<tr>
<td>B</td>
<td>Segway (cyazofamid)</td>
<td>2.1 to 3.5 fl oz/A</td>
<td>14-21 day interval</td>
<td>An organosilicone or other surfactant should be used</td>
<td>FMC, Bobby Walls, 919-735-3862, <a href="mailto:Bobby.Walls@fmc.com">Bobby.Walls@fmc.com</a></td>
</tr>
<tr>
<td>B</td>
<td>SP2015 (famoxadone +cymoxanil)</td>
<td>3.5 oz/100 gal</td>
<td>7-14 d</td>
<td>First two drenches are to be given at 7 d intervals followed by foliar spray applications at 14 d</td>
<td>SePro, Todd Bunnell, 317-216-5667, <a href="mailto:toddb@sepro.com">toddb@sepro.com</a></td>
</tr>
</tbody>
</table>
| B        | Taegro (Bacillus subtilis var. amyloliquefaciens) | 3.5 oz/100 gal | 14 d |                                  | Novozymes Biologicals
<p>|          |          |                | 14 d |                                  | Lee West |
| B        | Vital    | Herbaceous: 2 - 4 pints/100 gal | 14 d |                                  | Luxembourg Industries, Vince Morton, 336-286-9714, <a href="mailto:mortv@aol.com">mortv@aol.com</a> |
|          |          | Woodies: Drench application: 4 pints/100 gal per 400 sq.ft. | 30 d |                                  |                                                               |
|          |          | Foliar application: 4 pints/100 gal | 14 d |                                  |                                                               |</p>
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<tbody>
<tr>
<td></td>
<td>Zoxium</td>
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</table>