Efficacy of Management Tools for Foliar *Phytophthora* Species.

**Ornamental Protocol Number: 06-002**

**Objective:** Determine efficacy of foliar sprays with new active ingredient formulations and new biopesticides for managing foliar diseases of ornamental plants caused by *Phytophthora* species.

**Experimental Design:**
- **Plot Size:** Must be adequate to reflect actual use conditions.
- **Replicates:** Minimum of 4 replications
- **Application Instructions:** Apply each treatment according to directions below. For contact products, the recommendation is every 7 days; for systemic products the recommendation is every 14 to 28 days depending upon label directions. Applications should be made using application equipment consistent with conventional commercial equipment.
- **Target Species:** *Phytophthora ramorum*, *P. cactorum*, and *P. citrophthora*. Contact your regional coordinator if other target species are of interest.
- **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. Inoculations with *P. ramorum* will only be conducted on detached leaves in sealed containers as this pathogen is currently regulated by APHIS. Please specify test conditions in final report.

**Evaluations:**
- **For *P. ramorum***: After application of fungicide treatment, hold plant for 7 days for systemic products or 2-3 days for contact materials before inoculation ensuring that neither rain nor irrigation water wash off treatments. Inoculate detached leaves 7 DAT for systemic products or 2-3 DAT for contact materials. Wound-inoculate 3 leaves per replication and treatment using sporangia or zoospores as inoculum. Inoculation control consist of same treatment using plain water (instead of sporangia/zoospores). Record phytotoxicity 0, 7, 14, and 28 days after fungicide/biopesticide application 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. Disease severity will be assessed 7-10 days after inoculation on detached leaves as lesion area and percentage of leaf that shows lesions.

For **Other *Phytophthora* species:** 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.

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

**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.

**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 must include:
- Results summary (no more than one page)
- Summary table with appropriate statistical analyses
- Experimental design and materials and methods
- Appendices: raw data and recordkeeping information as listed above
If pictures were taken, please include them.
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, 681 US Hwy 1 S, North Brunswick, NJ 08902-3390, Phone 732-932-9575 x629, 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: 2/10/06
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>Special Application Instructions (Foliar Sprays)</th>
<th>Contact Information to obtain materials and any needed adjuvants</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>Cyazofamid</td>
<td>3.0 oz/100 gal 3.0 oz/100 gal</td>
<td>Reapply at 14 – 28 d intervals. DO NOT add organosilicone surfactant</td>
<td>ISK, Mel Grove, 713-393-3750, <a href="mailto:grovem@iskbc.com">grovem@iskbc.com</a></td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Cyazofamid</td>
<td>6.0 oz/100 gal 6.0 oz/100 gal</td>
<td></td>
<td>Bayer, Mike Gorrell, <a href="mailto:mike.gorrell@bayercropscience.com">mike.gorrell@bayercropscience.com</a></td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Fenamidone</td>
<td>7.0 oz/100 gal 7.0 oz/100 gal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>Fenamidone</td>
<td>14.0 oz/100 gal 14.0 oz/100 gal</td>
<td></td>
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<td>A</td>
<td>5</td>
<td>MultiGuard (furfural)</td>
<td>500 ppm drench 1000 ppm drench</td>
<td>Foliar application every 7 days; Multiguard Protect contains 8.68 lbs. furfural/gallon: to make a 1,000 PPM solution, use 0.96 ml Multiguard Protect/liter of solution. Foliar spray solutions should be made immediately prior to use and should be applied just to the point of runoff with coverage on both upper and lower leaf surfaces. NOTE: if wound inoculation is used, please also include single treatment using inoculations without wounding leaves.</td>
<td>Agriguard, Jerry Hensley, 731-664-9185, <a href="mailto:jhensley@agriguardcompanyllc.com">jhensley@agriguardcompanyllc.com</a></td>
</tr>
<tr>
<td>A</td>
<td>6</td>
<td>MultiGuard (furfural)</td>
<td>500 ppm drench 1000 ppm drench</td>
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<tr>
<td>A</td>
<td>7</td>
<td>NOA 446510 (mandipropamid)</td>
<td>2 oz/100 gal 2 oz/100 gal</td>
<td>Apply at 7 day intervals</td>
<td>Syngenta, Dave Ross, 336-632-6411, <a href="mailto:david.ross@syngenta.com">david.ross@syngenta.com</a></td>
</tr>
<tr>
<td>A</td>
<td>8</td>
<td>NOA 446510 (mandipropamid)</td>
<td>8 oz/100 gal 8 oz/100 gal</td>
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<tr>
<td>A</td>
<td>9</td>
<td>V-10161 4FL</td>
<td>60 ml/ 100 gal 60 ml/ 100 gal</td>
<td>Apply at 14 day intervals</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>10</td>
<td>V-10161 4FL</td>
<td>120 ml/ 100 gal 120 ml/ 100 gal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>11</td>
<td>Standard Control Tool 1*</td>
<td>See below</td>
<td>See below</td>
<td></td>
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<tr>
<td>A</td>
<td>12</td>
<td>Standard Control Tool 2*</td>
<td>See below</td>
<td>See below</td>
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<tr>
<td>A</td>
<td>13</td>
<td>Untreated Uninoculated</td>
<td>--</td>
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<td></td>
</tr>
<tr>
<td>A</td>
<td>14</td>
<td>Untreated Inoculated</td>
<td>--</td>
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</tbody>
</table>

Standards

- Select 2 of the four standards below

<table>
<thead>
<tr>
<th>Standards</th>
<th>a</th>
<th>Aliette (fosetyl Al)</th>
<th>6.4 to 12.8 oz/100 gal 6.4 to 12.8 oz/100 gal</th>
<th>Apply 2 pints solution per sq ft</th>
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</thead>
<tbody>
<tr>
<td>Standards</td>
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Bayer, Mike Gorrell, mike.gorrell@bayercropscience.com
<table>
<thead>
<tr>
<th>Priority</th>
<th>#</th>
<th>Product</th>
<th>Rates</th>
<th>Special Application Instructions (Foliar Sprays)</th>
<th>Contact Information to obtain materials and any needed adjuvants</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>Captan</td>
<td>See label for specific rate based on plant</td>
<td>Refer to label for directions</td>
<td>Arysta, Doug Houseworth, 904-321-0795, <a href="mailto:LIHouse9@aol.com">LIHouse9@aol.com</a></td>
</tr>
<tr>
<td></td>
<td>c</td>
<td>Subdue Maxx (mefonaxam)</td>
<td>See label for specific rate based on plant species</td>
<td>Refer to label for directions</td>
<td>Syngenta, Dave Ross, 336-632-6411, <a href="mailto:david.ross@syngenta.com">david.ross@syngenta.com</a></td>
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<tr>
<td></td>
<td>d</td>
<td>Stature DM (dimethomorph)</td>
<td>6.4 oz/100 gal</td>
<td>12.8 oz/100 gal</td>
<td>Apply at 14 d intervals</td>
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<tr>
<td>Priority</td>
<td>#</td>
<td>Product</td>
<td>Rates</td>
<td>Special Application Instructions</td>
<td>Contact Information to obtain materials and any needed adjuvants</td>
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<td></td>
<td></td>
<td></td>
<td>Herbaceous Plants</td>
<td>Woody Plants</td>
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<td>B</td>
<td></td>
<td>Alude</td>
<td>2 quarts per 100 gal</td>
<td>2 quarts per 100 gal</td>
<td>Foliar application: Spray to wet. Do not use a wetting agent.</td>
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<td>Cleary, Rick Fletcher, 732-329-8399, <a href="mailto:rick.fletcher@clearychemical.com">rick.fletcher@clearychemical.com</a></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>BioPhos</td>
<td>256 fl oz per 100 gal</td>
<td>256 fl oz per 100 gal</td>
<td>Apply 25 gal per acre</td>
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<td>AgBio, Jan Meneley, 303-469-9221, <a href="mailto:agbio@agbio-inc.com">agbio@agbio-inc.com</a></td>
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<tr>
<td>B</td>
<td></td>
<td>Heritage (azoxystrobin)</td>
<td>4 oz per 100 gal</td>
<td>4 oz per 100 gal</td>
<td>Spray 100 gal/acre</td>
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<td></td>
<td>Syngenta, Dave Ross, 336-632-6411, <a href="mailto:david.ross@syngenta.com">david.ross@syngenta.com</a></td>
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<tr>
<td>B</td>
<td></td>
<td>Insignia (pyraclostrobin)</td>
<td>8 oz per 100 gal</td>
<td>8 oz per 100 gal</td>
<td>Spray to run off where foliage and soil glisten (slightly wet at soil and stem line)</td>
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<td>BASF, Kathie Kalmowitz, 919-785-9659, <a href="mailto:kalmowk@basf-corp.com">kalmowk@basf-corp.com</a></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>Magellan</td>
<td>Foliar application: 1.25 – 4 pints per 100 gal</td>
<td>Foliar application: 2 – 5 pints per 100 gal</td>
<td>Do not exceed one application every 14 days for bedding plants or every 30 days for conifers</td>
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<td>Drench application: 6 – 12 fl oz per 100 gal</td>
<td>Drench application: 6 – 12 fl oz per 100 gal</td>
<td>Apply 2 pints solution per sq ft. Repeat at 28 d intervals</td>
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<td>Nufarm, DarinAllred, 919-547-9600 ext 225, <a href="mailto:Darin.Allred@us.nufarm.com">Darin.Allred@us.nufarm.com</a></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>TM-473 480SC</td>
<td>3 oz per 100 gal</td>
<td>3 oz per 100 gal</td>
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<tr>
<td>B</td>
<td></td>
<td>Vital</td>
<td>2 - 4 pints per 100 gallons on a 14 day interval</td>
<td>Drench application: 4 pints /100 gallons per 400 sq ft. repeat every 30 days. Foliar application: 4 pints /100 gallons apply every 14 days.</td>
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<td>Luxembourg Industries, Vince Morton, 336-286-9714, <a href="mailto:mortv@aol.com">mortv@aol.com</a></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>Actinovate</td>
<td>10 oz per 100 gal</td>
<td>10 oz per 100 gal</td>
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<tr>
<td>C</td>
<td></td>
<td>Terrazole (etridiazole)</td>
<td>8 oz per 100 gal</td>
<td>8 oz per 100 gal</td>
<td>Refer to label for specific directions based on planting location or container size</td>
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<td>Chemtura, Kevin Donovan, 203-573-2028, <a href="mailto:kevin.donovan@chemtura.com">kevin.donovan@chemtura.com</a></td>
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