

Project Name: Botrytis Efficacy

New		Ongoing	X	Completed		Duration if ongoing or completed:	2004, 2005 2011-2015, 2017 - 2021
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Project Description:

This project originated as a regional project and then at the 2011 IR-4 Ornamental Horticulture Workshop became a high priority project due to reports of tolerance developing among *Botrytis cinerea* populations to several key fungicides and because there are other Botrytis species not typically screened for efficacy.

Research Project Abstract (if available):

Abstract from 2019 Botrytis Efficacy Summary

At the IR-4 Environmental Horticulture Program Workshop in 2011, Botrytis Efficacy was selected as a high priority project to expand the knowledge and list of fungicides available to growers for these diseases. In addition to research collected through the IR-4 Program, this summary includes a review of experiments conducted from 1998 to 2020 on environmental horticulture crops. During this time period, numerous products representing 54 active ingredients were tested as foliar applications against several *Botrytis* species causing blight and gray mold on multiple environmental horticulture crops. Most products are now registered and commercially used. Almost all trials were conducted on *Botrytis cinerea*; however, other species tested were *B. elliptica*, *B. paeoniae* and *B. tulipae*. Although there were insufficient IR-4 data for definitive conclusions, seven relatively new products that are included in this research project, Orkestra Intrinsic, Mural and Emblem (NUP 09092), Rhapsody/Serenade, Astun/IKF 5411, Picatina, and Picatina Flora looked effective, while Botector, BW165N, Proud 3, SP2480, SP2770 and SP2773 looked ineffective. Data on other relatively new products (Broadform, EcoSwing, Regime/F9110, MBI-110, Oxiphos, PreStop, Prophytex, Regalia, S2200, Torque, Tournay, Trinity) were limited to provide some conclusions. Of the established registered products, Compass, Daconil, Decree, Heritage, Insignia, Pageant and Palladium generally provided excellent efficacy; Chipco 26019 and Veranda O provided good efficacy and Disarm/Fame provided mediocre efficacy. ZeroTol, and the copper products (Badge X2, Camelot, Phyton 27, STBX-304) generally performed poorly under the conditions of these experiments.

Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):

<i>Botrytis cinerea</i>	<i>Botrytis tulipae</i>
<i>Botrytis elliptica</i>	

Target Crops (list tested crops if ongoing or completed project)

Begonia (<i>Begonia sp.</i>)	Lily (<i>Lilium sp.</i>)
Fir, Douglas (<i>Pseudotsuga menziesii</i>)	Pansy, Large Flowering; Wittrock's Violet (<i>Viola X wittrockiana</i>)
Geranium (<i>Pelargonium sp.</i>)	Peony (<i>Paeonia sp.</i>)
Geranium, Zonal (<i>Pelargonium x hortorum</i>)	Poinsettia (<i>Euphorbia pulcherrima</i>)
Hemlock, Western (<i>Tsuga heterophylla</i>)	Rose (<i>Rosa sp.</i>)
Hydrangea (<i>Hydrangea sp.</i>)	Tulip (<i>Tulipa sp.</i>)
Impatiens, Common Garden; Buzzy Lizzy (<i>Impatiens walleriana</i>)	Violet (<i>Viola sp.</i>)

Target Product(s)(list tested products or numbered compounds if ongoing or completed project)		
3336 F	Fore 80WP	Prophytex WP
Affirm	Heritage	Proud 3
Alibi Flora SC	IKF-309	Regalia MAXX
Astun/IKF-5411	IKF-5411	Regalia O5 (MOI-10605)
Badge X2	Insignia 20WDG Intrinsic Brand	Regalia SC (MOI 106)
BAS 516 UFF	Fungicide	Regime
Bayleton 25WP	Medallion	S2200 4SC
Botector	Milban 39EC	SP2480
Broadform SC500	MilStop	SP2770 10WP
BW165N	Mural WDG	SP2773
Chipco 26019 N/G 50WP	Orkestra Intrinsic	Spectro 90WDG
Daconil 54EC	OxiPhos	Stargus
Daconil Weather Stik (2787 Flowable Fungicide)	Pageant Intrinsic	Switch 62.5WG
Decree	Palladium	Torque 3.6SC
Disarm 480SC	Phyton-27	Tourney 50WDG
EcoSwing	Picatina	Triathlon
Empress Intrinsic Brand Fungicide	Picatina Flora	Trinity 2SC
Endorse	Postiva	V-10135
Fame SC	Prestop	ZeroTol
	Prophytex EC	ZeroTol 2.0

Product Registration and Research Status					
	Fully Screened (also includes standards)			Partially Screened through IR-4 ¹	Need Data Across Species?
Labeled Generally & Commercialized	Affirm/ Endorse *	Daconil Decree	Phyton-27 Prestop	Astun/ IKF-5411* Insignia *	BotryStop Proud 3
	Alibi Flora	Disarm	Regalia 50	Medallion *	
	Badge 2X	Emerald	Switch	Orkestra *	
	Botector*	Milstop	Tourney	Pageant *	
	Chipco	Mural	ZeroTol	Picatina *	
	26019	Palladium		Picatina Flora *	
				Regime *	
				Spirato	
				Stargus *	
Labeled Generally But NOT Commercialized					
Labeled for Specific Diseases & Commercialized					
Labeled for Specific Diseases but NOT Commercialized					
Not yet registered or Labeled					IKF-309 IKF-5411 S2200 Torque Trinity V-10135

Product Registration and Research Status	Product Registration and Research Status	Product Registration and Research Status	Product Registration and Research Status
No longer available for development	Prophytex * SP2770 * SP2773 *		
* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research 1 At least one species screened fully			

Area	Characteristic	Pro	Con
Availability & effectiveness of alternative management tools	Botrytis is prone to resistance development and new classes of chemistry are a critical component	x	
	A number of biological and chemical products now registered		x
	Very few new products to screen		x
	Biologicals	x	x
	Need new application technology/strategy for post-harvest disease	x	
Damage potential of target			
Performance and crop safety of proposed products (from other systems)			
Compatibility with IPM, resistance management programs	Resistance management	x	
Economics	High economic impact on certain crops	x	
	Cost of applications		x
Geographic distribution			
Manufacturer interest in labeling products			
Other			

IR-4 Efficacy Trials to Date
Average rating on a scale of 1 – 5 with 1 = 0 to about 50% efficacy (not effective) and 5 = 95 to 100 efficacy (very effective); minimum to maximum rating; number of trials (See table on next page). For product/disease combinations that are blank, IR-4 has not screened this combination.
‘Labeled’ indicates that this disease species or genera is listed on the label. A rating of 2 or lower is considered unacceptable efficacy (<i>red text</i>). A rating of 3 or higher is considered commercially acceptable (black text). Non-labeled, completed product/disease combinations (3 or more trials) with an average rating of 3 or higher are highlighted with <i>green text</i> . For disease/product combinations that are blank, IR-4 has not screened this combination.

MOA	Product (Active Ingredients)	<i>Botrytis elliptica</i>	Botrytis Gray Mold (<i>Botrytis cinerea</i>)	<i>Botrytis tulipae</i>
FRAC 1	3336 F (Thiophanate-methyl)		5.0 (5 - 5) n1 Labeled	
FRAC 1 + FRAC M5	Spectro 90WDG (Thiophanate-methyl + Chlorothalonil)		5.0 (5 - 5) n1	
FRAC 2	Chipco 26019 FLO (Iprodione)		<i>2.2 (1 - 5) n5</i>	
FRAC 2	Chipco 26019 N/G 50WP (Iprodione)	<i>1.0 (1 - 1) n2</i> Labeled	<i>1.5 (1 - 2) n2</i> Labeled	<i>2.0 (2 - 2) n2</i> Labeled
FRAC 3	Bayleton 25WP (Triadimefon)		5.0 (5 - 5) n1	
FRAC 3	Torque 3.6SC (Tebuconazole)	<i>1.0 (1 - 1) n2</i>	3.0 (1 - 5) n2	<i>2.0 (2 - 2) n1</i>
FRAC 3	Tourney 50WDG (Metconazole)	<i>1.0 (1 - 1) n1</i> Labeled	3.3 (1 - 5) n3 Labeled	
FRAC 3	Trinity 2SC (Triticonazole)	<i>1.0 (1 - 1) n2</i>	3.0 (1 - 5) n4	
FRAC 5	Milban 39EC (Dodemorph)		4.0 (4 - 4) n1	
FRAC 7	Astun (isofetamid)		3.8 (2 - 5) n8 Labeled	
FRAC 7	IKF-5411 (isofetamid)		3.3 (1 - 5) n7 Labeled	
FRAC 7	Picatina (Pydiflumetofen)		4.0 (3 - 5) n2 Labeled	
FRAC 7 + 11	Broadform SC500 (Fluopyram + Trifloxystrobin)		<i>2.0 (1 - 5) n6</i> Labeled	
FRAC 7 + FRAC 11	BAS 516 UFF (Boscalid + pyraclostrobin)		<i>2.0 (1 - 3) n2</i>	
FRAC 7 + FRAC 11	Orkestra Intrinsic (Fluxapyroxad + pyraclostrobin)	4.8 (4 - 5) n4 Labeled	<i>2.9 (1 - 5) n17</i> Labeled	4.0 (3 - 5) n2 Labeled
FRAC 7 + FRAC 11	Pageant Intrinsic (Boscalid + pyraclostrobin)	<i>2.0 (1 - 3) n2</i> Labeled	3.0 (1 - 5) n8 Labeled	3.5 (3 - 4) n2 Labeled
FRAC 7 + FRAC 12	Picatina Flora (Pydiflumetofen + fludioxonil)		4.3 (3 - 5) n3 Labeled	
FRAC 7 + FRAC 3	Postiva (pydiflumetofen + difenoconazole)		<i>2.3 (2 - 3) n3</i>	
FRAC 9 + FRAC 12	Palladium (Cyprodinil + fludioxonil)	<i>1.5 (1 - 2) n2</i> Labeled	<i>2.8 (1 - 5) n4</i> Labeled	
FRAC 9 + FRAC 12	Switch 62.5WG (Cyprodinil + Fludioxonil)		3.0 (2 - 4) n2	
FRAC 11	Disarm 480SC (Fluoxastrobin)	<i>2.0 (1 - 3) n2</i> Labeled	<i>1.0 (1 - 1) n1</i> Labeled	
FRAC 11	Empress Intrinsic Brand Fungicide (Pyraclostrobin)		3.0 (3 - 3) n1	
FRAC 11	Fame SC (Fluoxastrobin)		<i>1.0 (1 - 1) n1</i>	
FRAC 11	Heritage (Azoxystrobin)		5.0 (5 - 5) n1 Labeled	
FRAC 11	Insignia 20WDG Intrinsic Brand Fungicide (Pyraclostrobin)		<i>2.5 (1 - 4) n2</i> Labeled	
FRAC 11	S2200 4SC (Mandestrobin)	4.5 (4 - 5) n4	<i>2.5 (1 - 5) n17</i>	<i>2.5 (2 - 3) n2</i>
FRAC 11 + FRAC 3	Alibi Flora SC (Azoxystrobin + difenoconazole)		3.0 (1 - 5) n2 Labeled	
FRAC 11 + FRAC 7	Mural WDG (Azoxystrobin + benzovindiflupyr)	4.3 (3 - 5) n3 Labeled	<i>2.8 (1 - 5) n4</i> Labeled	

MOA	Product (Active Ingredients)	<i>Botrytis elliptica</i>	<i>Botrytis Gray Mold (Botrytis cinerea)</i>	<i>Botrytis tulipae</i>
FRAC 12	Medallion (Fludioxonil)	3.0 (3 - 3) n1 Labeled	2.7 (1 - 5) n13 Labeled	
FRAC 12	Spirato (Fludioxonil)	5.0 (5 - 5) n2 Labeled	3.6 (2 - 5) n7 Labeled	3.0 (3 - 3) n1 Labeled
FRAC 17	Decree (Fenhexamid)	1.3 (1 - 2) n3 Labeled	2.9 (1 - 5) n8 Labeled	
FRAC 17	V-10135 (Fenpyrazamine)	1.0 (1 - 1) n1	1.0 (1 - 1) n1	
FRAC 19	Affirm (Polyoxin D zinc salt)	1.0 (1 - 1) n1 Labeled	4.3 (3 - 5) n4 Labeled	
FRAC 19	Endorse (Polyoxin D)		2.0 (1 - 3) n3 Labeled	
FRAC 33	OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide)		1.8 (1 - 3) n5	
FRAC BM01	EcoSwing (Swinglea glutinosa)		1.3 (1 - 2) n7 Labeled	
FRAC BM01	Proud 3 (Thyme oil (5.6%))	1.0 (1 - 1) n5	1.2 (1 - 3) n13	1.0 (1 - 1) n2
FRAC BM01	Regime (Banda de Lupinus albus doce (BLAD))	1.0 (1 - 1) n4 Labeled	1.5 (1 - 5) n11 Labeled	1.5 (1 - 2) n2 Labeled
FRAC BM01	Regalia MAXX (Extract of Reynoutria sachalinensis)		1.0 (1 - 1) n1	
FRAC BM01	Regalia O5 (MOI-10605) (Extract of Reynoutria sachalinensis)	1.0 (1 - 1) n1 Labeled	1.0 (1 - 1) n2 Labeled	
FRAC BM01	Regalia SC (MOI 106) (Extract of Reynoutria sachalinensis)		2.4 (1 - 5) n5	
FRAC BM02	BW165N (Ulocladium oudemansii strain U3)	1.0 (1 - 1) n1	2.0 (1 - 5) n15	
FRAC BM02	Botector (Aureobasidium pullans strain DSM 14940 + strain DSM 14941)	1.0 (1 - 1) n2 Labeled	1.8 (1 - 4) n19 Labeled	
FRAC BM02	Prestop (Gliocladium catenulatum Strain J1446)		2.4 (1 - 5) n5 Labeled	
FRAC BM02	Prophytex EC (Bacillus subtilis strain B1111)	1.0 (1 - 1) n2	1.6 (1 - 3) n5	
FRAC BM02	Prophytex WP (Bacillus subtilis strain B1111)	1.0 (1 - 1) n2	1.6 (1 - 2) n5	
IRAC 11 / FRAC BM02	Triathlon (Bacillus amyloliquefaciens Strain D747)		1.0 (1 - 1) n1	
IRAC UNF / FRAC BM02	Stargus (Bacillus nakamurai strain F727)	1.0 (1 - 1) n3 Labeled	1.6 (1 - 4) n10 Labeled	1.0 (1 - 1) n1 Labeled
FRAC M1	Badge X2 (Copper Oxychloride + Copper Hydroxide)		2.5 (1 - 4) n2 Labeled	
FRAC M1	Phyton-27 (Copper sulfate pentahydrate)		1.0 (1 - 1) n2 Labeled	
FRAC M3	Fore 80WP (Manganese + Zinc + Ethylene bis-dithiocarbamate Ion)		3.0 (1 - 5) n2 Labeled	
FRAC M5	Daconil 54EC (Chlorothalonil)		2.0 (2 - 2) n1 Labeled	
FRAC M5	Daconil Weather Stik (2787 Flowable Fungicide) (Chlorothalonil)		4.5 (4 - 5) n2 Labeled	
FRAC NC	MilStop (Potassium bicarbonate)		1.0 (1 - 1) n2 Labeled	
FRAC NC	ZeroTol (Hydrogen dioxide)	1.0 (1 - 1) n1 Labeled	1.0 (1 - 1) n3 Labeled	

MOA	Product (Active Ingredients)	<i>Botrytis elliptica</i>	Botrytis Gray Mold (<i>Botrytis cinerea</i>)	<i>Botrytis tulipae</i>
FRAC NC	ZeroTol 2.0 (Hydrogen dioxide + peroxyacetic acid)		5.0 (5 - 5) n1 Labeled	
unknown	IKF-309 (IKF-309)	5.0 (5 - 5) n1		
unknown	SP2480 (SP2480)		<i>1.9 (1 - 5) n10</i>	
unknown	SP2770 10WP (SP2770)	<i>2.0 (2 - 2) n1</i>	<i>1.0 (1 - 1) n2</i>	<i>1.0 (1 - 1) n1</i>
unknown	SP2773 (SP2773)	<i>2.0 (2 - 2) n1</i>	<i>1.0 (1 - 1) n2</i>	<i>1.0 (1 - 1) n1</i>

*Regalia rate used was lower than the lowest labeled rate of 2 quarts per 100 gal.

FRAC Class	Fungicides (active ingredients)	Registered Use Site(s)	REI	<i>Botrytis cinerea</i>	<i>Botrytis elliptica</i>	<i>Botrytis paeoniae</i>	<i>Botrytis tulipae</i>
Registered Products							
1	3336, OHP 6672, etc. (thiophanate methyl)	G, I, L, N, S	12 h	P-E	-	-	-
2	Chipco 26019, etc. (iprodione)	G, N	12 h	P-G	P		F-G
2 + 1	26/36 (iprodione+thiophanate methyl)	G, N	12 h	-	-	-	-
3	Avelyo, BAS 750 (mefentrifluconazole)	G, I, L, N, S	12 h	F	-	-	-
	Banner MAXX, ProPensity (propiconazole)	N	12 h	-	-	-	-
	Bayleton, Strike (triadimefon)	G, N	12 h	-	-	-	-
	Eagle, etc. (myclobutanil)	G, N	24 h	-	-	-	-
	Terraguard (triflumizole)	G, I, N, S	12 h	P	-	-	-
	Tourney (metconazole)	N	12 h	E	P	-	-
7	Picatina, A19649B (pydiflumetofen)	G, L, N, S	4 h	F-G	-	-	-
	Astun, IKF-5411 (isofetamid)	G,N	12 h	F-E	-	G	-
7 + 3	Postiva (pydiflumetofen + difenoconazole)	TBD	-	E	-	-	-
7 + 11	Broadform (fluopyram + trifloxystrobin)	G, I, L, N, S	12 h	P-E	-	F	-
7 + 11	Orkestra/BAS703 (fluxapyroxad + pyraclostrobin)	G, L, N, S	12 h	P-E	E	P-G	G-E
9 + 12	Palladium (cyprodinil+fludioxonil)	G, L, N, S	12 h	G-E	P-F	G	-
11	Compass O (trifloxystrobin) ^b	G, I, L, N, S	12 h	G	-	-	-
	Cygnus (kresoxym-methyl)	G, L, N, S	12 h	-	-	-	-
	Disarm, Fame (fluoxastrobin)	G, I, N, S	12 h	P-F	P-G	-	-
	Heritage (azoxystrobin)	G, N, S	4 h	P-E	-	-	-
	Insignia/Empress (pyraclostrobin) [*]	^c	12 h	E	-	-	-
12	Medallion (fludioxonil)	G, I, L, N, S	12 h	G-E	G	E	-
	Emblem, Spirato, NUP 09092 (fludioxonil)	G, I, L, N, S	12 h	F-E	E	G	E
11 + 3	Alibi Flora (azoxystrobin + difenoconazole)	G, L, N, S	12 h	E	-	-	-
	Strike Plus (trifloxystrobin + triadimefon)	G, N	12 h	-	-	-	-
11 + 7	Mural, A18126B (azoxystrobin + benzovindiflupyr)	G, L, N, S	12 h	F-E	E		-
	Pageant Intrinsic (pyraclostrobin+boscalid)	G, L, I, N, S	12 h	F-E	P-G	G	G-E
12 + 7	Picatina Flora (fludioxonil+pydiflumetofen)	TBD	-	F-E	-	-	-
14	Botran (dicloran)	G, N	12 h	-	-	-	-
17	Decree (fenhexamid)	G, N	12 h	F-E	-	F	-
18B	Triact, Trilogy, etc. (neem oil extract)	G, I, L, N, S	4 h	-	-	-	-
19	Affirm, Veranda (polyoxin D zinc salt)	G, L, N, S	1 h	G-E	-	-	-
33 +	Oxiphos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide)	G, N	0 h	P-G	-	-	-
BM 01	EcoSwing (<i>Swinglea glutinosa</i>)	G	4 h	P-F	-	-	-
	Regime, F9110 (<i>Lupinus</i> extract)	TBD	4 h	P-E	P	F	P-F
	Regalia (extract of <i>Reynoutria sachalinensis</i>)	G, I, L, N, S	4 h	P-E	-	-	-
BM 02	Actinovate (<i>Streptomyces lydicus</i>)	G, I, L, N, S	1 h	E,G	-	-	-
	Botector (<i>Aureobasidium pullulans</i> strains DSM 14940 & 14941)	TBD	4 h	P-F	P	F	-
	Cease, Rhapsody, Serenade Optimum, etc. (<i>Bacillus subtilis</i>)	G, I, N, S	4 h	P-E	-	P-F	P-F
	Mycostop (<i>Streptomyces griseoviridis</i>)	G, N	4 h	F	-	-	-
	Prestop (<i>Gliocladium catelunatum</i> strain J446)	G, I, N, S	0 h	P-E	-	-	-

FRAC Class	Fungicides (active ingredients)	Registered Use Site(s)	REI	<i>Botrytis cinerea</i>	<i>Botrytis elliptica</i>	<i>Botrytis paeoniae</i>	<i>Botrytis tulipae</i>
BM 02	Stargus/MBI 110 (<i>Bacillus amyloliquifaciens</i> strain F727)	G, N, S	4 h	P-G	P	G	P
	Triathlon ((<i>Bacillus amyloliquifaciens</i> strain F747)	G, I, L, N, S	4 h	P	-	-	-
M1	Basicop, Cuprofix (copper sulfate)	G, N, S	48 h	-	-	-	-
	Camelot O, etc. (copper octanoate)	G, I, N, S	4 h	P	-	-	-
	Champ, Champion, Kentan, Kocide, etc. (copper hydroxide)	G, I, N, S	48 h	-	-	-	-
	Badge 2X (copper hydroxide+copper oxychloride)	G, N, S	48 h	-	-	G	-
	Copper Count-N, etc. (copper ammonium complex)	G, I, N, S	12 h	-	-	-	-
	Nordox (cuprous oxide)	M1	24 h	-	-	-	-
	Phyton 27 (copper sulfate pentahydrate)	G, I, N	24 h	P	-	-	-
M1 + M3	Junction (copper hydroxide+mancozeb)	G, N	24 h	-	-	-	-
M2	Microthiol Disperss etc. (sulfur)	G, N	24 h	-	-	-	-
M3	Dithane, Fore, etc. (mancozeb)	G, N	24 h	E	-	-	-
	Ziram (ziram)	G, N	48 h	-	-	-	-
M3 + 1	Zyban (mancozeb + thiophanate methyl)	G, N	24 h	-	-	-	-
M3 + 3	Clevis (mancozeb+myclobutanil)	G, N	24 h	-	-	-	-
M4	Captan (captan)	G	48 h	G	-	-	-
M5	Concorde, Daconil, etc. (chlorothalonil)	G, N	12 h	E	-	G	-
M5 + 1	Consyst, Spectro (chlorothalonil+thiophanate methyl)	G, I, N	12 h	E	-	-	-
M5 + 3	Concert II (propiconazole + chlorothalonil)	N	12 h	G-E	-	-	-
NC	Armcarb, Milstop, etc. (potassium bicarbonate)	G, I, L, N, S	4, 1 h	E	-	-	-
	Kleengrow (Didecyl dimethyl ammonium chloride)	G	48 h	-	-	-	-
	JMS Stylet Oil, SuffOil-X, etc. (mineral oil)	G, N	4 h	-	-	-	-
	Proud 3 (thyme oil)	TBD	0 h	P-G	P	F	P
	ZeroTol (hydrogen dioxide + peroxyacetic acid)	G, I, N	0 h	P-E	-	P	-
Product Registered but not for this disease							
3	Torque, Tebuconazole SC T&O Fungicide (tebuconazole)	N	12 h	E	P	-	F
	Trinity (triticonazole)	G, L, I, N, S	12 h	P-E	P	-	-
Experimental Actives							
7	Indemnify (fluopyram) 500 SC ^a	TBD	-	-	-	-	-
11	S2200/Pinpoint (mandestrobin)	TBD	12 h	P-E	E	G	F-E
17	V-10135 (fenpyrazamine)	TBD	-	-	P	-	-
21	XDE-659	TBD	TBD	-	-	-	-
BM 02	BW165N (<i>Ulocladium oudemansii</i> strain U3)	G, N	4 h	P-G	-	F	-
-	BW159	TBD					
-	IKF-309	TBD	TBD	E			
-	SP2480	TBD	TBD	P-E	?	-	-

Registered Use Sites: G = Greenhouse; L = Lath House; I = Indoors; N = Nursery; S = Shade House; TBD = To Be Determined

Application Method: D = Drench; S = Spray

Efficacy: E = clearly statistically equivalent or better than untreated non-inoculated and/or clearly statistically different than untreated inoculated; G = statistically different from untreated inoculated and untreated non-inoculated; F = statistically equivalent to both untreated inoculated and untreated non-inoculated; P = statistically equivalent to untreated inoculated. For trials without non-inoculated check, efficacy determined on author's conclusions, % control or comparisons to standard product(s).

Information presented is based on the best data available on August 23, 2021.



Registered and Experimental Products for Botrytis*

Botrytis Efficacy taken from 2021 IR-4 Botrytis efficacy summary and 3 2016 and 2018 PDMR reports. * Efficacy rating based on six trials provided by BioWorks and 1 IR-4 trial.

* Insignia is labeled for use in landscape and turf use only. Empress Intrinsic has replaced Insignia for use in production ornamentals applied as drench to control soil-borne diseases caused by *Fusarium*, *Phytophthora*, *Pythium* and *Rhizoctonia* spp.

Updated 9/17/2021