



Ornamental Horticulture Program Research Project Sheet

<http://ir4.rutgers.edu/Ornamental/ornamentalProjectInformationSheets.cfm>

Project Name: Leaf Spots & Anthracnose Efficacy

New	X	Ongoing		Completed		Duration if ongoing or completed:	
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Project Description:

Leaf spots and anthracnose diseases have routinely surfaced in the biennial survey of grower needs. While numerous classes and subclasses for fungal mode of action are currently available, growers continue to have difficulty managing these diseases.

Research Project Abstract (if available):

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

Alternaria alternata *Phaeocryptopus gaumannii*
Apiognomonia quercina

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

Douglas Fir (*Psuedotsuga menziesii*) Oak (*Quercus alba*)
 New Guinea Impatiens (*Impatiens hawkeri*)

Target Product(s) (list tested products or numbered compounds if ongoing or completed project)

BAS 703 06F (Fluxapyroxad + pyraclostrobin)	Pageant Intrinsic (Boscalid + pyraclostrobin)
CG100 (Caprylic acid)	Palladium (Cyprodinil + fludioxanil)
Chipco 26019 N/G (Iprodione)	Proud 3 (Thyme oil 5.6%)
Compass) 50WG (Trifloxystrobin)	SP2770 WP
Concert II (Propiconazole + chlorothalonil)	Terraguard 50W (Triflumizole)
Daconil Weather Stik (Chlorothalonil)	Torque 3.65SC (Tebuconazole)
DisArm 480SC (Fluoxastrobin)	Tourney 50WDG (Metconazole)
F9110	Trinity 2SC (Triticonazole)
Headway (Propiconazole + azoxystrobin)	Vanguard 75WG (Cyprodinil)
Heritage (Azoxystrobin)	

Product Registration and Research Status

	Fully Screened (also includes standards)	Partially Screened through IR-4 ¹	Need Data Across Species?
Labeled Generally & Commercialized	Chipco 26019 DisArm 480SC		Trinity
Labeled Generally But NOT Commercialized			
Labeled for Specific Diseases & Commercialized			
Labeled for Specific Diseases but NOT Commercialized			
Not yet registered or Labeled		BAS703 06F Proud 3 F9110 S2200 MBI110	
No longer available for development		SP2770 10WP *	

* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research
 1 At least one species screened fully

Project Pros	Project Cons
<ol style="list-style-type: none"> 1 Leaf spot and anthracnose diseases can cause significant economic damage 2 A couple new active ingredients are available in current and new MOA classes 3 Several different genera cause these diseases and performance may not be similar 4 A few good products, but growers need more 	<ol style="list-style-type: none"> 1 Many classes are currently available for growers 2 Several different genera cause these diseases and performance may not be similar 3 Difficult pathogen 4 Lack of potential researchers for certain diseases

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/insect 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 (*red text*). 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 *green text*. For disease/product combinations that are blank, IR-4 has not screened this combination.

Product (Active Ingredients)	<i>Alternaria alternara</i>	Oak Anthracnose (<i>Apiognomonina quercina</i>)	Swiss Needle Cast (<i>Phaeocryptopus gaeumannii</i>)
BAS703 06F/BAS703 01F (Fluxapyroxad + pyraclostrobin)	5.0 (5 - 5) n1	4.0 (4 - 4) n1	
CG100 (Caprylic acid)			2.5 (2 - 3) n2
Chipco 26019 N/G (Iprodione)	5.0 (5 - 5) n1		
Compass 0 50WDG (Trifloxystrobin)			4.5 (4 - 5) n2
Concert II (Propiconazole + chlorothalonil)			5.0 (5 - 5) n2
Daconil Weather Stik (Chlorothalonil)			5.0 (5 - 5) n2
Disarm 480SC (Fluoxastrobin)	5.0 (5 - 5) n1		
F9110 (F9110)	1.0 (1 - 1) n1	4.0 (4 - 4) n1	
Headway (Propiconazole + azoxystrobin)			1.0 (1 - 1) n2
Heritage (Azoxystrobin)			1.0 (1 - 1) n2
Pageant Intrinsic (Boscalid + pyraclostrobin)			1.0 (1 - 1) n2
Palladium (Cyprodinil + fludioxanil)			1.0 (1 - 1) n2
Proud 3 (Thyme oil (5.6%))	1.0 (1 - 1) n1		
SP2770 10WP (SP2770)	1.0 (1 - 1) n1	1.0 (1 - 1) n1	
Terraguard 50W (Triflumizole)			1.0 (1 - 1) n1
Torque 3.6SC (Tebuconazole)		5.0 (5 - 5) n1	
Tourney 50WDG (Metconazole)			1.0 (1 - 1) n2
Trinity 2SC (Triticonazole)	4.0 (4 - 4) n1		1.0 (1 - 1) n2
Vanguard 75WG (Cyprodinil)			1.0 (1 - 1) n1

Fungicides (active ingredients)	FRAC Class	Registered Use Site(s)	REI	Efficacy on Leafspots, Blights & Anthracnose			
				<i>Diplocarpon rosae</i>	Other Leafspots*	<i>Botrytis cinerea</i>	Anthracnose
26/36 (iprodione+thiophanate methyl)	2 + 1	G, N	12 h	?	?	?	?
3336, OHP 6672, etc. (thiophanate methyl)	1	G, I, L, N, S	12 h	F	G	P	P-E
Actinovate (<i>Streptomyces lydicus</i>)	NC	G, I, L, N, S	1 h	?	G,F	E,G	E,G
Affirm, Veranda (polyoxin D zinc salt)	19	G, L, N, S	1 h	?	P	G	?
Alibi Flora (azoxystrobin + difenoconazole)	11 + 3	G, L, N, S	12 h	?	?	?	?
Armicarb, Milstop, etc. (potassium bicarbonate)	NC	G, I, L, N, S	4, 1 h	P	P	E	?
Badge (copper hydroxide+copper oxychloride)	M1	G, N, S	48 h	?	?	?	?
Banner Maxx, ProPensity (propiconazole)	3	N	12 h	?	E	?	G-E
Basicop, Cuprofix (copper sulfate)	M1	G, N, S	48 h	?	E	?	?
Bayleton, Strike (triadimefon) ^a	3	G, N	12 h	?	G	?	?
Botran (dicloran)	14	G, N	12 h	?	?	?	?
Camelot, etc. (copper octanoate)	M1	G, I, N, S	4 h	?	E	P	?
Captan (captan)	M4	G	48 h	?	?	G	?
Cease, Serenade Optimum, etc. (<i>Bacillus subtilis</i>)	44	G, I, N, S	4 h	P	P	E	F
Champ, Champion, Kentan, Kocide, etc.(copper hydroxide)	M1	G, I, N, S	48 h	?	?	?	?
Chipco 26019, etc. (iprodione)	2	G, N	12 h	?	G-E	G	?
Clevis (mancozeb+myclobutanil)	M3+3	G, N	24 h	?	?	?	?
Compass O (trifloxystrobin) ^b	11	G, I, L, N, S	12 h	E	G	G	P
Concorde, Daconil, etc. (chlorothalonil)	M5	G, N	12 h	E	E	E	P-E
Concert II (chlorothalonil+propiconazole)	M5+3	N	12 h	E	E	G-E	P-E
Consynt, Spectro (chlorothalonil+thiophanate methyl)	M5+1	G, I, N	12 h	?	G	E	?
Copper Count-N, etc. (copper ammonium complex)	M1	G, I, N, S	12 h	?	E	?	?
Cygnus (kresoxym-methyl) *	11	G, L, N, S	12 h	?	?	?	?
Decree (fenhexamid)	17	G, N	12 h	?	?	E	?
Disarm, Fame (fluoxastrobin) ^c	11	G, I, N, S	12 h	?	E	F	?
Dithane, Fore, etc. (mancozeb)	M3	G, N	24 h	?	?	E	?
Eagle, etc. (myclobutanil)	3	G, N	24 h	E	E	?	E
Heritage (azoxystrobin)	11	G, N, S	4 h	F	E	F-E	G-E
Insignia, Empress Intrinsic (pyraclostrobin) ^c	11	^c	12 h	G	P-E	E	F-G
JMS Stilet Oil, SuffOil-X, etc. (mineral oil)	NC	G, N	4 h	P-G	F	?	P
Junction (copper hydroxide+mancozeb)	M1 + M3	G, N	24 h	?	G	?	?
Kleengrow (Didecyl dimethyl ammonium chloride)	-	G	48 h	?	?	?	?
Medallion (fludioxonil)	12	G, I, L, N, S	12 h	?	G-E	G-E	?
Microthiol Disperss etc. (sulfur)	M2	G, N	24 h	F	P	?	?
Mural, A18126B (benzovindiflupyr + azoxystrobin)	- +11	TBD	-	?	?	?	?
Mycostop (<i>Streptomyces griseoviridis</i>)	NC	G, N	4 h	?	?	F	?
Nordox (cuprous oxide)	M1	M1	24 h	?	?	?	?
Pageant Intrinsic (pyraclostrobin+boscalid)	11+7	G, L, I, N, S	12 h	E	E	E	G

Fungicides (active ingredients)	FRAC Class	Registered Use Site(s)	REI	Efficacy on Leafspots, Blights & Anthracnose			
				<i>Diplocarpon rosae</i>	Other Leafspots*	<i>Botrytis cinerea</i>	Anthracnose
Palladium (cyprodinil+fludioxonil)	9+12	G, L, N, S	12 h	G	G-E	E	P-G
Phyton (copper sulfate pentahydrate)	M1	G, I, N	24 h	F	P-G	P	E
Prestop (<i>Gliocladium catelunatum</i> strain J446)	NC	G, I, N, S	0 h	?	?	P	?
Regalia (extract of <i>Reynoutria sachalinensis</i>)	P5	G, I, L, N, S	4 h	P	?	?	?
Strike Plus (trifloxystrobin + triadimefon)	11 + 3	G, N	12 h	?	?	?	?
Terraguard (triflumizole)	3	G, I, N, S	12 h	F	G-E	P	?
Torque, Tebuconazole SC T&O Fungicide (tebuconazole)	3	N	12 h	G	E	?	E
Tourney (metconazole)	3	N	0 h	F	E	?	G-E
Triact, Trilogy, etc. (neem oil extract)	18B	G, I, L, N, S	4 h	P-F	P	-	P
Tourney (metconazole)	3	N	12 h	?	?	?	?
Trinity (triticonazole)	3	G, L, I, N, S	12h	?	F-E	G	G
ZeroTol (hydrogen dioxide)	NC	G, I, N	0 h	?	?	P-F	?
Ziram (ziram)	M3	G,N	48 h	?	?	?	?
Zyban (Mancozeb + thiophanate methyl)	M3 + 1	G, N	24 h	?	G	?	?
Experimentals							
BAS703 (fluxapyroxad + pyraclostrobin)	7 + 11	TBD	-	?	E	?	G
F9110 (F9110)	-	TBD	-	?	P	?	G
Fluopyram 500 SC ^d	7	TBD	-	?	?	?	?
Fluopyram + Trifloxystrobin ^d	7 + 11	TBD	-	?	?	?	?
MBI-110 (<i>Bacillus amyloliquifaciens</i> strain F727)	44	TBD	-	?	?	?	?
NUP 09092 (fludioxonil)	12	TBD	12 h	?	?	?	?
Proud 3 (thyme oil)	NC	TBD	0 h	?	P	?	P
S2200 (mandestrobin)	11	TBD	-	?	E	?	P
SP2770 (SP2770) **	-	TBD	-	?	P	?	P
SP2773 (SP2773) **	-	TBD	-	?	?	?	?

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).

Efficacy ratings taken from 2 IR-4 trials (1 *Alternaria alternata* and 1 *Apiognomonia quercina*) and 73 PDMR efficacy reports: 20 *Diplocarpon roseae*, 22 Other Leafspots (5 *Cercospora cornicola*, 1 *Cercospora lythracearum*, 3 *Corynespora cassiicola*, 9 *Entomosporium mespili*, 1 *Myrothecium roridum*, 1 *Septoria* sp., and 2 *Sphaceloma poinsettiae*), 24 *Botrytis cinerea* and 7 Anthracnose (2 *Colletotrichum navitas*, 4 *Elsinoe corni* and 1 *Discula destructiva*)

* *Cercospora cornicola*, *Cercospora lythracearum*, *Corynespora cassiicola*, *Entomosporium mespili*, *Myrothecium roridum*, *Septoria* sp., *Sphaceloma poinsettiae*

** Not for development in ornamental horticulture

^a Will be replaced with Armada 50WDG/Strike Plus (triadimefon + trifloxystrobin). Anthracnose in nursery grown fruit and ornamental varieties.

^b Bayer comments: Leafspot and blight disease in foliage, annual and perennial crops. Anthracnose in nursery grown fruit and ornamental varieties.



Registered and Experimental Products for Leaf Spots & Anthracnose Management*

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^c 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.

^d Bayer supports testing.

^e Fame will be replacing DisArm