

Project Name: Rust Efficacy

New	Ongoing	Completed	X	Duration if ongoing or completed:	2010-2011
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Project Description:

Rusts diseases are caused by complex fungi that can produce up to 5 types of spores. One spore type has orangish pigments giving infected plants a “rusty” look, hence the name of these diseases. Rusts impact both monocot and dicot plants. In some cases, these diseases are relatively innocuous causing quality issues, but in other cases rust diseases can be quite severe causing significant economic losses. At the 2009 Ornamental Horticulture Workshop, rust diseases were discussed as regional priority projects and funded accordingly.

Research Project Abstract (if available):

Abstract from 2012 Rust Efficacy Summary: A Literature Review

From 2000 to 2011, numerous products representing 30 active ingredients were tested as foliar applications against several genera and species of pathogens causing rust on ornamentals and food crops (Tables 1 and 2). These genera/species tested included: *Cronartium ribicola*, *Gymnosporangium libocedri*, *G. clavipes*, *G. juniperi-virginianae*, *Phragmidium* sp., *Puccinia hemerocallidis*, *P. pelargonii-zonalis*, *P. malvacearum*, *P. emaculata*, *P. veronica-longifoliae*, *P. arachidis* and *Uromyces apendiculatus*. Although there were insufficient data for definitive conclusions, new products like SP2169, Tourney (metconazole), LEM-17 (penthioopyrad) and Topguard (flutriafol) - looked promising. The products registered on ornamentals - Banner (propiconazole), Compass O (trifloxystrobin), Eagle (myclobutanil), Heritage (azoxystrobin), Insignia (pyraclostrobin), Pageant (boscalid+pyraclostrobin), Prostar (flutolanil) and Trinity (triticonazole) - generally performed well. Tank-mix combinations with mancozeb generally improved rust control.

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

Chrysanthemum White Rust (<i>Puccinia horiana</i>)	Rust, Cedar-Apple (<i>Gymnosporangium juniperi-virginianae</i>)
Geranium Rust (<i>Puccinia pelargonii-zonalis</i>)	Rust, Dichondra (<i>Puccinia dichondrae</i>)
Gladiolus Rust (<i>Uromyces transversalis</i>)	Rust, Hollyhock (<i>Puccinia malvacearum</i>)
<i>Gymnosporangium libocedri</i> (<i>Gymnosporangium libocedri</i>)	Rust, Poplar (<i>Melampsora medusae</i>)
Rust, Aster (<i>Coleosporium asterum</i>)	Rust, Veronica (<i>Puccinia veronicae-longifoliae</i>)

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

<i>Alcea rosea</i>	<i>Dichondra carolinensis</i>	<i>Pelargonium x hortorum</i>
<i>Amelanchier canadensis</i>	<i>Gladiolus</i> sp.	<i>Pelargonium x hortorum</i>
<i>Aster</i> sp.	<i>Malus</i> sp.	<i>Populus deltoides</i>
<i>Crataegus</i> sp.	None	<i>Veronica</i> sp.

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

3336 WP (50%) (Thiophanate-methyl)	Compass O 50WDG (Trifloxystrobin)
Alto (Cyproconazole)	Contrast 70WSP (Flutalanil)
Amistar (Heritage) (Azoxystrobin)	Daconil 2787 W75 (Chlorothalonil)
Armada 50WP (Trifloxystrobin + triadimefon)	Daconil 54EC (Chlorothalonil)
Banner MAXX (Propiconazole)	Daconil Weather Stik (2787 Flowable Fungicide) (Chlorothalonil)
Baycor 25W (Bitertanol)	Eagle 20 EW (Myclobutanil)
Bayleton 25WP (Triadimefon)	Flint (Compass O) (Trifloxystrobin)
Bayleton 50WDG (Triadimefon)	Folicur (Torque) (Tebuconazole)
Bayleton 50WP (Triadimefon)	Funginex (Triforine 18.2) (Triforine)
Cabrio (Pageant) (Boscalid + pyraclostrobin)	Headline (Insignia) (Pyraclostrobin)
Captan (Captan)	Heritage (Azoxystrobin)
CGA 64251 10W (Etaconazole)	Hurricane (Fludioxonil + mefenoaxam)
CGA 71818 10W (Penconazole)	



Environmental Horticulture Program Research Project Sheet

<https://www.ir4project.org/ehc/ehc-registration-support-research/env-hort-extension-resources/>

Target Product(s)(cont.)	
Insignia 20WDG Intrinsic Brand Fungicide (Pyraclostrobin)	Score (Difenconazole)
Insimmo (Acibenzolar-S-methyl)	SP2169 (SP2169)
Opus (Epoconazole)	Stroby DF (Cygnus) (Kresoxim methyl)
Pageant Intrinsic (Boscalid + pyraclostrobin)	Tebacur (Torque) (Tebuconazole)
Plant Vax (Oxycarboxin)	Tilt (Banner Maxx) (Propiconazole)
ProStar 70WP/WG (Flutalonil)	Tourney 50WDG (Metconazole)
Protect T/O (Mancozeb)	Trinity 2SC (Triticonazole)
Rally (Eagle) (Myclobutanil)	Vigold (DisArm) (Fluoxastrobin)
Rubigan AS Turf and Ornamental (Fenarimol)	

Product Registration and Research Status			
	Fully Screened (also includes standards)	Partially Screened through IR-4 ¹	Need Data Across Species ?
Labeled Generally & Commercialized	3336 WP Armada 50WP Banner MAXX Bayleton 50WDG Captan Eagle 20 EW	Heritage Insignia Pageant Protect Rubigan Tourney	
Labeled Generally But NOT Commercialized			
Labeled for Specific Diseases & Commercialized	Compass 0 50WDG ProStar		
Labeled for Specific Diseases but NOT Commercialized			
Not yet registered or Labeled		BAS 703 06F	Acibenzolar-S-methyl Hurricane Indiflin Midori Trinity
No longer available for development			
* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research			
1 At least one species screened fully			

PRO	CON
New biological to screen: Midori	

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 (*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.

MOA Class	Product (Active Ingredients)	Geranium Rust (<i>Puccinia pelargonii-zonalis</i>)	Gymnosporangium libocedri (<i>Gymnosporangium libocedri</i>)	Rust, Aster (<i>Coleosporium asterum</i>)	Rust, Cedar-Apple (<i>Gymnosporangium juniperi-virginianae</i>)	Rust, Dichondra (<i>Puccinia dichondrae</i>)	Rust, Hollyhock (<i>Puccinia malvacearum</i>)	Rust, Poplar (<i>Melampsora medusae</i>)	Rust, Veronica (<i>Puccinia veronicae-longifoliae</i>)
FRAC 1	3336 WP (50%) (Thiophanate-methyl)						1.0 (1 - 1) n1 <i>Labeled</i>		
FRAC 3	Banner MAXX (Propiconazole)	1.0 (1 - 1) n1 <i>Labeled</i>	3.0 (3 - 3) n1 Labeled				1.0 (1 - 1) n1 <i>Labeled</i>		5.0 (5 - 5) n1 Labeled
	Baycor 25W (Bitertanol)			5.0 (5 - 5) n1					
	Bayleton 25WP (Triadimefon)			4.0 (4 - 4) n1 Labeled	5.0 (5 - 5) n1 Labeled	1.0 (1 - 1) n1 <i>Labeled</i>			
	Bayleton 50WDG (Triadimefon)						5.0 (5 - 5) n1 Labeled		
	Bayleton 50WP (Triadimefon)							5.0 (5 - 5) n2	
	CGA 64251 10W (Etaconazole)			4.0 (4 - 4) n1					
	CGA 71818 10W (Penconazole)			4.0 (4 - 4) n1					
	Eagle 20 EW (Myclobutanil)	1.0 (1 - 1) n1 <i>Labeled</i>	4.0 (4 - 4) n1 Labeled				5.0 (5 - 5) n1 Labeled		5.0 (5 - 5) n1 Labeled
	Funginex (Triforine 18.2) (Triforine)			4.0 (4 - 4) n1					
	Rubigan AS Turf and Ornamental (Fenarimol)						1.0 (1 - 1) n1 <i>Labeled</i>		
	Tourney 50WDG (Metconazole)	1.0 (1 - 1) n1 <i>Labeled</i>	3.0 (3 - 3) n1 Labeled				3.0 (3 - 3) n1 Labeled		5.0 (5 - 5) n1 Labeled
Trinity 2SC (Triticonazole)	1.0 (1 - 1) n1					3.0 (3 - 3) n1		3.0 (3 - 3) n1	
FRAC 3 / FRAC 11	Rotation: Banner Maxx / Compass O (Propiconazole / trifloxystrobin)		2.0 (2 - 2) n1						
FRAC 7	ProStar 70WP/WG (Flutalonil)	1.0 (1 - 1) n1 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>				3.0 (3 - 3) n1 Labeled		5.0 (5 - 5) n1 Labeled
FRAC 7 + FRAC 11	Pageant Intrinsic (Boscalid + pyraclostrobin)		2.0 (2 - 2) n1 <i>Labeled</i>				5.0 (5 - 5) n1 Labeled		
FRAC 11	Compass O 50WDG (Trifloxystrobin)	1.0 (1 - 1) n1 <i>Labeled</i>	3.0 (3 - 3) n1 Labeled				5.0 (5 - 5) n1 Labeled		5.0 (5 - 5) n1 Labeled
	Heritage (Azoxystrobin)						5.0 (5 - 5) n1 Labeled		5.0 (5 - 5) n1 Labeled

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FRAC 11	Insignia 20WDG Intrinsic Brand Fungicide (Pyraclostrobin)		2.0 (2 - 2) n1 <i>Labeled</i>				3.0 (3 - 3) n1 Labeled		
FRAC 11 + FRAC 3	Armada 50WP (Trifloxystrobin + triademefon)								3.0 (3 - 3) n1 Labeled
FRAC 12 + FRAC 4	Hurricane (Fludioxonil + mefonaxam)						5.0 (5 - 5) n1		
FRAC M3	Protect T/O (Mancozeb)						1.0 (1 - 1) n1 <i>Labeled</i>		
FRAC M4	Captan (Captan)						1.0 (1 - 1) n1 <i>Labeled</i>		
FRAC M5	Daconil 2787 W75 (Chlorothalonil)			1.0 (1 - 1) n1					
	Daconil Weather Stik (2787 Flowable Fungicide) (Chlorothalonil)			1.0 (1 - 1) n1 <i>Labeled</i>					
FRAC P1	Insimmo (Acibenzolar-S-methyl)						1.0 (1 - 1) n1		1.0 (1 - 1) n1
unknown	SP2169 (SP2169)	1.0 (1 - 1) n1							5.0 (5 - 5) n1