

Project Name: Phytophthora Efficacy

New		Ongoing		Completed	X	Duration if ongoing or completed:	2003 – 2010, 2014 – 2017, 2022 – 2023
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Project Description:

In 2002 the concept of ‘Super A’ studies was initiated to group together research areas needing higher attention. This concept morphed into ‘High Priority Projects’ by 2005. Screening biological and chemical tools for efficacy on Phytophthora diseases fell under the initial concept and continued through 2010. The impetus was to determine whether newer products were efficacious and to scope out the range of efficacy among the different *Phytophthora* species. These diseases have periodically become either regional or national high priority projects at subsequent workshops.

Research Project Abstract (if available):

Abstract from 2016 Phytophthora Efficacy Summary

From 2003 to 2015, 66 products representing 59 active ingredients were tested through the IR-4 Program as drench or foliar applications against nine *Phytophthora* species causing root rots and stem/leaf blights. *Phytophthora* species tested included: *P. cactorum*, *P. cinnamomi*, *P. citricola*, *P. cryptogea*, *P. dreschleri*, *P. nicotianae/parasitica*, *P. palmivora*, *P. plurivora*, *P. ramorum*, *P. syringae*, and *P. tropicalis*. Control of *Phytophthora cinnamomi* root rot was achieved primarily with drench applications onto azaleas. When this pathogen was tested on rhododendrons, the data were either inconclusive or the products did not perform as well as on azaleas with the exception of Magellan and Fenamidone. For *Phytophthora dreschleri* root rot, the good to excellent efficacy was achieved with several products including BioPhos, Segway, Stature DM, and Terrazole. For *Phytophthora nicotianae*, consistent efficacy across crops was difficult to achieve, but the best performers included Adorn, Aliette, Alude, Biophos, Fenamidone, Insignia, Micora Segway, Stature DM, Subdue MAXX, and Vital. The best control of *Phytophthora citricola* blight was achieved with foliar applications of the phosphorus acid generators Aliette, Biophos and Magellan. For *Phytophthora ramorum* blights, Subdue MAXX provided the most consistent control. Adorn, Fenamidone, Insignia, Segway, and Stature also provided good control. For *Phytophthora tropicalis*, the best control was achieved with Adorn and Stature. Micora and Segovis provided effective control of *Phytophthora plurivora* in two rhododendron experiments.

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

<i>Phytophthora cactorum</i>	<i>Phytophthora palmivora</i>
<i>Phytophthora cinnamomi</i>	<i>Phytophthora plurivora</i>
<i>Phytophthora citricola</i>	<i>Phytophthora ramorum</i>
<i>Phytophthora cryptogea</i>	Phytophthora root rot (<i>Phytophthora</i> sp.)
<i>Phytophthora drechleri</i>	<i>Phytophthora syringae</i>
<i>Phytophthora nicotianae</i>	<i>Phytophthora tropicalis</i>

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

<i>Abies grandis</i>	<i>Gerbera</i> sp.	<i>Saintpaulia</i> sp.
<i>Abies</i> sp.	<i>Gloxinia</i> sp.	<i>Salvia officinalis</i>
<i>Antirrhinum majus</i>	<i>Hedera helix</i>	<i>Salvia x sylvestris</i>
<i>Buxus</i> sp.	<i>Juniperus virginiana</i>	<i>Shepherdia argentea</i>
<i>Calibrachoa</i> sp.	<i>Leucothoe</i> sp.	<i>Spathiphyllum</i> sp.
<i>Camellia</i> sp.	<i>Liriope muscari</i>	<i>Tagetes</i> sp.
<i>Catharanthus roseus</i>	<i>Malus</i> sp.	<i>Tsuga</i> sp.
<i>Chamaedorea seifrizii</i>	<i>Pothos</i> sp.	<i>Viburnum</i> sp.
<i>Epipremnum pinnatum</i>	<i>Pseudotsuga menziesii</i>	<i>Vinca</i> sp.
<i>Euphorbia pulcherrima</i>	<i>Purshia mexicana</i>	<i>Viola</i> sp.
<i>Fallugia paradoxa</i>	<i>Rhododendron</i> sp.	

Target Product(s)(list tested products or numbered compounds if ongoing or completed project)	
<p>Actinovate Soluble (Streptomyces lydicus WYEC 108) Adorn 4F (Fluopicolide) Agrifos (Dipotassium phosphonate + Dipotassium phosphate) Alette WDG (Fosetyl AI) Alude (Potassium phosphite) Banol (Propamocarb hydrochloride) BW161N (BW161N) Calirus 150 (Mono- and di- potassium salts of phosphorus acid + copper sulfate pentahydrate) Captan (Captan) Cease (Bacillus subtilis strain QST 713) Celero 16WSG (Clothianadin) CG100 (Caprylic acid) Champ Formula 2F (Copper hydroxide) Companion (Bacillus subtilis GB03) Daconil 54EC (Chlorothalonil) Daconil Ultrex (Chlorothalonil) Daconil Weather Stik (2787 Flowable Fungicide) (Chlorothalonil) Daconil ZN (Chlorothalonil) Disarm 480SC (Fluoxastrobin) Dithane 75DF Rainshield (Mancozeb) EcoGuard (Bacillus licheniformis SB3086 + Indole-3-butyric Acid) Endorse (Polyoxin D) Fenstop (Fenamidone) Fluazinam (Fluazinam) Fore 80WP (Manganese + Zinc + Ethylene bis-dithiocarbamate Ion) Gavel DF (Mancozeb + Zoxamide) Heritage (Azoxystrobin) Hymexazol 30L (Hymexazol) Incept (T382) (Trichoderma hamatum strain 382) Insignia 20WDG Intrinsic Brand Fungicide (Pyraclostrobin) K-Phite (Phosphorus acid salts) Magellan (Mono- and Dibasic Sodium, Potassium and Ammonium Phosphites) Maneb 75DF (Maneb) MBI 121 (MBI 121) Medallion (Fludioxonil) Micora (Mandipropamid)</p>	<p>MultiGuard (Furfural) Muscodor albus (Muscodor albus) Orkestra Intrinsic (Fluxapyroxad + pyraclostrobin) Orvego (BAS 651F) (Ametoctradin + dimethomorph (BAS 651)) Pageant Intrinsic (Boscalid + pyraclostrobin) Picarbutrazox 20WG (Picarbutrazox) Polyram (EBDC) Prestop (Gliocladium catenulatum Strain J1446) Promax (Thyme oil) Proud 3 (Thyme oil) RD00AS-1 (BW159) (BW159) Regalia O5 (MOI-10605) (Extract of Reynoutria sachalinensis) Regalia SC (MOI 106) (Extract of Reynoutria sachalinensis) Remedier (Trichoderma asperellum + Trichoderma gamsii) RootShield Plus WP (aka BW240) (Trichoderma harzianum T-22 + Trichoderma virens G-41) SA 11210 (SA 11210) Segovis (Oxathiapiprolin) Segway (Cyazofamid) Serenade Prime (aka Rhapsody ASO) (Bacillus subtilis strain QST 713) SP2770 10WP (SP2770) Stargus (Bacillus nakamurai strain F727) Stature DM (Dimethomorph) Stature MZ (Dimethomorph + Mancozeb) Stature SC (Dimethomorph) Subdue MAXX (Mefenoxam) Taegro (Bacillus subtilis var amyloliquefaciens strain FZB24) Tanos (Famoxadone + Cymoxanil) Terramec SP (Chloroneb) Terrazole 35%WP (Etridiazole) TM-435 (TM-435) TM-459 (TM-459) Trichoderma harzianum (Trichoderma harzianum) Tril-21 (Thyme oil) Truban 25EC (Etridiazole) Truban 30WP (Etridiazole) V-10162 5.73FL (Fluopicolide + propamacarb hydrochloride) Vital 4L (Potassium phosphite) ZeroTol (Hydrogen dioxide)</p>

Products/Crops Registered through IR-4Research:				
	Fully Screened (also includes standards)	Partially Screened through IR-4 ¹		Need Data Across Species ?
Labeled Generally & Commercialized	<p>Alette Captan Stature * Subdue Maxx * Terrazole</p>	<p>Actinovate Champ Banol Banrot Cease</p>	<p>Mycostop Orvego * Pageant * PlantShield, RootShield</p>	Hurricane

		Companion Daconil DisArm Empress * Heritage Insignia * Micora *	Phosphorus Acid Salts ¹ RootShield Plus * Segway * Soilguard Taegro *	
Labeled Generally But NOT Commercialized				
Labeled for Specific Phytophthora & Commercialized	Adorn *		FenStop	Compass
Labeled for Specific Phytophthora but NOT Commercialized				
Not yet registered or labeled for Phytophthora		Bio-Tam MBI 121 MGCI	Picarbutrazox RD00AS-1 Tril-21	<i>Bacillus pumilus</i> BAS703 06F
No longer available for development for Phytophthora	Gavel DF ² Maneb ² Polyram ²	CG100 MOI-106 MOI-107 Multiguard	<i>Muscodor</i> <i>albus</i> SP2015 SP2770	
* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research				
¹ Agri-Fos, Alude Magellan, Vital etc.				
² Not for development for ornamental horticulture crops				

PROS	CONS
Individual Phytophthora species vary in response	Individual Phytophthora species vary in response
General labels could be refined by listing species – however, growers may not know which species they might have without detailed diagnostics	Multiple years of data with successful registrations of products of different classes
Best management practices water quality	Many labels already list “Phytophthora diseases” on the label so further refinement of labels is not needed
More of issue in Southern & Western with woodies, less in Northeast & North Central. Issue with Christmas trees in general.	Growers may not know which species they might have without detailed diagnostics
Rotations for resistance management	
More important in future with water recycling	
Biofiltration with microbes	
Looking for more foliar applications for root control	
Comments: awaiting outcomes from current protocol	



IR-4 Efficacy Trials to Date

Average rating on a scale of 1 – 5 with 1 = 0 to about 60% efficacy and 5 = 100 efficacy or equivalent to non-inoculated control; minimum to maximum rating; number of trials (See table on next page).

'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.

Table 1 of 2.

MOA	Product (Active Ingredients)	<i>Phytophthora cinnamomi</i>	<i>Phytophthora citricola</i>	<i>Phytophthora cryptogea</i>	<i>Phytophthora drechsleri</i>	<i>Phytophthora nicotianae</i>	<i>Phytophthora palmivora</i>
FRAC 11	Disarm 480SC (Fluoxastrobin)	3.0 (1 - 5) n4 Labeled	1.0 (1 - 1) n1 Labeled	1.8 (1 - 5) n5 Labeled	1.0 (1 - 1) n1 Labeled	5.0 (5 - 5) n1 Labeled	3.0 (3 - 3) n1 Labeled
FRAC 11	Fenstop (Fenamidone)	3.3 (1 - 5) n7 Labeled	1.5 (1 - 2) n2 Labeled	5.0 (5 - 5) n5 Labeled	4.0 (3 - 5) n2 Labeled	3.6 (1 - 5) n8 Labeled	3.0 (3 - 3) n2 Labeled
FRAC 11	Heritage (Azoxystrobin)	2.2 (1 - 4) n6 Labeled	1.0 (1 - 1) n1 Labeled	3.0 (1 - 5) n4 Labeled	1.0 (1 - 1) n1 Labeled	5.0 (5 - 5) n1 Labeled	2.5 (2 - 3) n4 Labeled
FRAC 11	Insignia 20WDG Intrinsic Brand Fungicide (Pyraclostrobin)	2.7 (1 - 5) n6 Labeled	1.5 (1 - 2) n2 Labeled	2.2 (1 - 5) n5 Labeled	1.0 (1 - 1) n4 Labeled	2.9 (1 - 5) n7 Labeled	2.5 (2 - 3) n4 Labeled
FRAC 11 + FRAC 27	Tanos (Famoxadone + Cymoxanil)		1.0 (1 - 1) n1	1.0 (1 - 1) n2	1.0 (1 - 1) n1		3.0 (3 - 3) n1
FRAC 11 + FRAC 4	Tank Mix: Heritage + Subdue MAXX (Azoxystrobin + mefonaxam)		1.0 (1 - 1) n1			5.0 (5 - 5) n1	4.5 (4 - 5) n2
FRAC 12	Medallion (Fludioxonil)	1.0 (1 - 1) n1		1.0 (1 - 1) n1		1.0 (1 - 1) n2	
FRAC 14	Terrazole 35%WP (Etridiazole)	2.0 (1 - 3) n3 Labeled			4.7 (4 - 5) n3 Labeled	1.0 (1 - 1) n3 Labeled	3.0 (3 - 3) n1 Labeled
FRAC 14	Truban 25EC (Etridiazole)	1.0 (1 - 1) n3 Labeled					
FRAC 14	Truban 30WP (Etridiazole)					1.0 (1 - 1) n1 Labeled	
FRAC 21	Segway (Cyazofamid)	3.1 (1 - 5) n11 Labeled	1.0 (1 - 1) n3 Labeled	3.0 (1 - 5) n5 Labeled	3.3 (1 - 5) n6 Labeled	3.0 (1 - 5) n15 Labeled	3.0 (2 - 5) n6 Labeled
FRAC 21 / FRAC P07	Tank Mix: Cyazofamid + Alude (Cyazofamid + potassium phosphite)	3.0 (3 - 3) n1					
FRAC 28	Banol (Propamocarb hydrochloride)	1.0 (1 - 1) n1					
FRAC 28 + FRAC 43	V-10162 5.73FL (Fluopicolide + propamacarb hydrochloride)					5.0 (5 - 5) n1 Labeled	
FRAC 29	Fluazinam (Fluazinam)	3.0 (3 - 3) n1					
FRAC 32	Hymexazol 30L (Hymexazol)	1.0 (1 - 1) n1					
FRAC 4	Subdue MAXX (Mefenoxam)	1.9 (1 - 5) n15 Labeled	1.0 (1 - 1) n1 Labeled	4.2 (1 - 5) n5 Labeled	3.0 (1 - 5) n2 Labeled	4.8 (4 - 5) n4 Labeled	4.0 (3 - 5) n4 Labeled
FRAC 40	Micora (Mandipropamid)	4.0 (1 - 5) n4 Labeled	1.0 (1 - 1) n1 Labeled	3.0 (1 - 5) n2 Labeled		5.0 (5 - 5) n3 Labeled	3.0 (1 - 5) n2 Labeled
FRAC 40	Stature DM (Dimethomorph)	3.4 (1 - 5) n8 Labeled	1.3 (1 - 2) n3 Labeled	4.0 (3 - 5) n2 Labeled	4.5 (4 - 5) n4 Labeled	2.6 (1 - 5) n14 Labeled	3.0 (3 - 3) n1 Labeled
FRAC 40	Stature SC (Dimethomorph)			5.0 (5 - 5) n2 Labeled	1.0 (1 - 1) n1 Labeled		2.3 (2 - 3) n3 Labeled
FRAC 40 + FRAC M3	Stature MZ (Dimethomorph + Mancozeb)	1.0 (1 - 1) n1					

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FRAC 43	Adorn 4F (Fluopicolide)	2.6 (1 - 5) n5 <i>Labeled</i>	3.0 (1 - 5) n2 Labeled	3.8 (1 - 5) n5 Labeled	5.0 (5 - 5) n2 Labeled	5.0 (5 - 5) n4 Labeled	3.0 (2 - 5) n5 Labeled
FRAC 45 + FRAC 40	Orvego (BAS 651F) (Ametoctradin + dimethomorph (BAS 651))			5.0 (5 - 5) n1 Labeled	5.0 (5 - 5) n1 Labeled		
FRAC 49	Segovis (Oxathiapiprolin)						
FRAC 7 + FRAC 11	Orkestra Intrinsic (Fluxapyroxad + pyraclostrobin)						
FRAC 7 + FRAC 11	Pageant Intrinsic (Boscalid + pyraclostrobin)				1.0 (1 - 1) n1 <i>Labeled</i>		
FRAC BM01	Promax (Thyme oil)						
FRAC BM01	Proud 3 (Thyme oil)						
FRAC BM02	Actinovate Soluble (Streptomyces lydicus WYEC 108)	1.0 (1 - 1) n1 <i>Labeled</i>					
FRAC BM02	Cease (Bacillus subtilis strain QST 713)						
FRAC BM02	Incept (T382) (Trichoderma hamatum strain 382)	1.0 (1 - 1) n1					
FRAC BM02	Prestop (Gliocladium catenulatum Strain J1446)						
FRAC BM02	Remedier (Trichoderma asperellum + Trichoderma gamsii)			1.0 (1 - 1) n2 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>	
FRAC BM02	RootShield Plus WP (aka BW240) (Trichoderma harzianum T-22 + Trichoderma virens G-41)			1.0 (1 - 1) n1 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>		
FRAC BM02	Seranade Prime (aka Rhapsody ASO) (Bacillus subtilis strain QST 713)						
FRAC BM02	Taegro (Bacillus subtilis var amyloliquefaciens strain FZB24)			1.0 (1 - 1) n2 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>		3.0 (3 - 3) n1 Labeled
FRAC M1	Champ Formula 2F (Copper hydroxide)						
FRAC M3	Dithane 75DF Rainshield (Mancozeb)						
FRAC M3	Fore 80WP (Manganese + Zinc + Ethylene bis-dithiocarbamate Ion)		1.0 (1 - 1) n1				
FRAC M3	Maneb 75DF (Maneb)						
FRAC M3	Polyram (EBDC)						
FRAC M3 + FRAC 22	Gavel DF (Mancozeb + Zoxamide)						

MOA	Product (Active Ingredients)	<i>Phytophthora cinnamomi</i>	<i>Phytophthora citricola</i>	<i>Phytophthora cryptogea</i>	<i>Phytophthora drechsleri</i>	<i>Phytophthora nicotianae</i>	<i>Phytophthora palmivora</i>
FRAC M4	Captan (Captan)	1.7 (1 - 3) n3 <i>Labeled</i>				4.0 (4 - 4) n1 <i>Labeled</i>	3.0 (3 - 3) n1 <i>Labeled</i>
FRAC M5	Daconil Ultrex (Chlorothalonil)						
FRAC M5	Daconil Weather Stik (2787 Flowable Fungicide) (Chlorothalonil)					1.0 (1 - 1) n2 <i>Labeled</i>	
FRAC NC	CG100 (Caprylic acid)						
FRAC NC	Muscodor albus (Muscodor albus)	1.0 (1 - 1) n3		1.0 (1 - 1) n1		1.0 (1 - 1) n1	
FRAC NC	ZeroTol (Hydrogen dioxide)	1.0 (1 - 1) n1 <i>Labeled</i>			1.0 (1 - 1) n1 <i>Labeled</i>		
FRAC P05	Regalia O5 (MOI-10605) (Extract of Reynoutria sachalinensis)						
FRAC P05	Regalia SC (MOI 106) (Extract of Reynoutria sachalinensis)						
FRAC P07	Agrifos (Dipotassium phosphonate + Dipotassium phosphate)	3.3 (1 - 5) n9 <i>Labeled</i>	3.0 (3 - 3) n2 <i>Labeled</i>	1.0 (1 - 1) n2 <i>Labeled</i>	3.8 (1 - 5) n4 <i>Labeled</i>	3.4 (1 - 5) n5 <i>Labeled</i>	1.0 (1 - 1) n2 <i>Labeled</i>
FRAC P07	Aliette WDG (Fosetyl Al)	4.0 (2 - 5) n9 <i>Labeled</i>	4.3 (3 - 5) n3 <i>Labeled</i>	1.0 (1 - 1) n5 <i>Labeled</i>	1.8 (1 - 3) n4 <i>Labeled</i>	3.6 (1 - 5) n9 <i>Labeled</i>	2.0 (2 - 2) n1 <i>Labeled</i>
FRAC P07	Alude (Potassium phosphite)	2.9 (1 - 5) n7 <i>Labeled</i>	4.0 (4 - 4) n1 <i>Labeled</i>	1.0 (1 - 1) n3 <i>Labeled</i>	2.3 (1 - 3) n4 <i>Labeled</i>	3.0 (1 - 5) n4 <i>Labeled</i>	2.0 (2 - 2) n1 <i>Labeled</i>
FRAC P07	Calirus 150 (Mono- and di- potassium salts of phosphorus acid + copper sulfate pentahydrate)	5.0 (5 - 5) n2					
FRAC P07	K-Phite (Phosphorus acid salts)	5.0 (5 - 5) n1 <i>Labeled</i>				5.0 (5 - 5) n1 <i>Labeled</i>	
FRAC P07	Magellan (Mono- and Dibasic Sodium, Potassium and Ammonium Phosphites)	2.7 (1 - 5) n6 <i>Labeled</i>	4.0 (3 - 5) n3 <i>Labeled</i>	1.0 (1 - 1) n5 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>	4.0 (3 - 5) n2 <i>Labeled</i>	3.0 (3 - 3) n1 <i>Labeled</i>
FRAC P07	Vital 4L (Potassium phosphite)	3.6 (1 - 5) n8 <i>Labeled</i>		1.0 (1 - 1) n3 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>	4.3 (3 - 5) n3 <i>Labeled</i>	1.0 (1 - 1) n2 <i>Labeled</i>
IRAC 4A	Celero 16WSG (Clothianadin)						1.0 (1 - 1) n1
IRAC UNF & FRAC BM02	Stargus (Bacillus nakamurai strain F727)						
unknown	MultiGuard (Furfural)	1.0 (1 - 1) n3 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>	1.0 (1 - 1) n1 <i>Labeled</i>		1.7 (1 - 3) n3 <i>Labeled</i>	
unknown	SA 11210 (SA 11210)						
unknown	SP2770 10WP (SP2770)						
unknown	TM-459 (TM-459)		1.0 (1 - 1) n1				

*Replaced in the marketplace with Empress Intrinsic; the WDG formulation is no longer available

** Disarm 480SC is now known as Fame SC

Table 2 of 2.

MOA	Product (Active Ingredients)	<i>Phytophthora plurivora</i>	<i>Phytophthora ramorum</i>	<i>Phytophthora sp</i>	<i>Phytophthora syringae e</i>	<i>Phytophthora tropicalis</i>
FRAC 11	Disarm 480SC (Fluoxastrobin)		2.1 (1 - 5) n10 <i>Labeled</i>	4.0 (4 - 4) n1 Labeled	1.0 (1 - 1) n2 <i>Labeled</i>	5.0 (5 - 5) n2 Labeled
FRAC 11	Fenstop (Fenamidone)		2.9 (2 - 5) n7 <i>Labeled</i>	5.0 (5 - 5) n1 Labeled	1.0 (1 - 1) n1 <i>Labeled</i>	5.0 (5 - 5) n3 Labeled
FRAC 11	Heritage (Azoxystrobin)		1.5 (1 - 3) n4 <i>Labeled</i>		1.0 (1 - 1) n1 <i>Labeled</i>	5.0 (5 - 5) n2 Labeled
FRAC 11	Insignia 20WDG Intrinsic Brand Fungicide (Pyraclostrobin)		2.0 (1 - 5) n8 <i>Labeled</i>		1.0 (1 - 1) n1 <i>Labeled</i>	2.0 (2 - 2) n1 <i>Labeled</i>
FRAC 11 + FRAC 27	Tanos (Famoxadone + Cymoxanil)		5.0 (5 - 5) n1		1.0 (1 - 1) n1	
FRAC 11 + FRAC 4	Tank Mix: Heritage + Subdue MAXX (Azoxystrobin + mefonaxam)		2.0 (2 - 2) n1		1.0 (1 - 1) n1	
FRAC 12	Medallion (Fludioxonil)					
FRAC 14	Terrazole 35%WP (Etridiazole)		1.0 (1 - 1) n2 <i>Labeled</i>			
FRAC 14	Truban 25EC (Etridiazole)					
FRAC 14	Truban 30WP (Etridiazole)					
FRAC 21	Segway (Cyazofamid)		3.2 (2 - 5) n9 Labeled	4.0 (4 - 4) n1 Labeled	1.0 (1 - 1) n3 <i>Labeled</i>	5.0 (5 - 5) n4 Labeled
FRAC 21 / FRAC P07	Tank Mix: Cyazofamid + Alude (Cyazofamid + potassium phosphite)					
FRAC 28	Banol (Propamocarb hydrochloride)					
FRAC 28 + FRAC 43	V-10162 5.73FL (Fluopicolide + propamacarb hydrochloride)					
FRAC 29	Fluazinam (Fluazinam)					
FRAC 32	Hymexazol 30L (Hymexazol)					
FRAC 4	Subdue MAXX (Mefenoxam)	5.0 (5 - 5) n1 Labeled	3.7 (1 - 5) n12 Labeled		1.0 (1 - 1) n2 <i>Labeled</i>	5.0 (5 - 5) n1 Labeled
FRAC 40	Micora (Mandipropamid)	4.0 (3 - 5) n2 Labeled	3.3 (1 - 5) n7 Labeled	4.0 (4 - 4) n1 Labeled	1.0 (1 - 1) n2 <i>Labeled</i>	5.0 (5 - 5) n1 Labeled
FRAC 40	Stature DM (Dimethomorph)		2.7 (1 - 5) n11 <i>Labeled</i>	5.0 (5 - 5) n1 Labeled	1.0 (1 - 1) n3 <i>Labeled</i>	
FRAC 40	Stature SC (Dimethomorph)		3.0 (3 - 3) n1 Labeled			5.0 (5 - 5) n2 Labeled
FRAC 40 + FRAC M3	Stature MZ (Dimethomorph + Mancozeb)					
FRAC 43	Adorn 4F (Fluopicolide)		2.3 (1 - 5) n12 <i>Labeled</i>	4.0 (4 - 4) n1 Labeled	1.0 (1 - 1) n3 <i>Labeled</i>	5.0 (5 - 5) n4 Labeled

MOA	Product (Active Ingredients)	<i>Phytophthora plurivora</i>	<i>Phytophthora ramorum</i>	<i>Phytophthora sp</i>	<i>Phytophthora syringae e)</i>	<i>Phytophthora tropicalis</i>
FRAC 45 + FRAC 40	Orvego (BAS 651F) (Ametoctradin + dimethomorph (BAS 651))		4.0 (3 - 5) n3 Labeled			5.0 (5 - 5) n1 Labeled
FRAC 49	Segovis (Oxathiapiprolin)	5.0 (5 - 5) n2 Labeled				
FRAC 7 + FRAC 11	Orkestra Intrinsic (Fluxapyroxad + pyraclostrobin)	4.0 (4 - 4) n1 Labeled				
FRAC 7 + FRAC 11	Pageant Intrinsic (Boscalid + pyraclostrobin)					
FRAC BM01	Promax (Thyme oil)	<i>1.0 (1 - 1) n1</i>				
FRAC BM01	Proud 3 (Thyme oil)	5.0 (5 - 5) n1				
FRAC BM02	Actinovate Soluble (Streptomyces lydicus WYEC 108)		<i>1.0 (1 - 1) n2 Labeled</i>	<i>2.0 (2 - 2) n1 Labeled</i>		
FRAC BM02	Cease (Bacillus subtilis strain QST 713)		<i>1.0 (1 - 1) n2 Labeled</i>			
FRAC BM02	Incept (T382) (Trichoderma hamatum strain 382)					
FRAC BM02	Prestop (Gliocladium catenulatum Strain J1446)	<i>1.0 (1 - 1) n1 Labeled</i>				
FRAC BM02	Remedier (Trichoderma asperellum + Trichoderma gamsii)					
FRAC BM02	RootShield Plus WP (aka BW240) (Trichoderma harzianum T-22 + Trichoderma virens G-41)		<i>1.0 (1 - 1) n1 Labeled</i>			
FRAC BM02	Seranade Prime (aka Rhapsody ASO) (Bacillus subtilis strain QST 713)	<i>1.0 (1 - 1) n1</i>				
FRAC BM02	Taegro (Bacillus subtilis var amyloliquefaciens strain FZB24)					<i>1.0 (1 - 1) n1 Labeled</i>
FRAC M1	Champ Formula 2F (Copper hydroxide)		<i>1.5 (1 - 2) n2</i>			
FRAC M3	Dithane 75DF Rainshield (Mancozeb)		3.7 (1 - 5) n6 Labeled			
FRAC M3	Fore 80WP (Manganese + Zinc + Ethylene bis-dithiocarbamate Ion)					
FRAC M3	Maneb 75DF (Maneb)		5.0 (5 - 5) n5			
FRAC M3	Polyram (EBDC)		4.4 (3 - 5) n5			
FRAC M3 + FRAC 22	Gavel DF (Mancozeb + Zoxamide)		4.6 (3 - 5) n5			

MOA	Product (Active Ingredients)	<i>Phytophthora plurivora</i>	<i>Phytophthora ramorum</i>	<i>Phytophthora sp</i>	<i>Phytophthora syringae e</i>	<i>Phytophthora tropicalis</i>
FRAC M4	Captan (Captan)		2.0 (1 - 5) n7 <i>Labeled</i>		1.0 (1 - 1) n1 <i>Labeled</i>	
FRAC M5	Daconil Ultrex (Chlorothalonil)		2.5 (2 - 3) n2 <i>Labeled</i>			
FRAC M5	Daconil Weather Stik (2787 Flowable Fungicide) (Chlorothalonil)					
FRAC NC	CG100 (Caprylic acid)		3.0 (1 - 5) n2			
FRAC NC	Muscodor albus (Muscodor albus)					
FRAC NC	ZeroTol (Hydrogen dioxide)					
FRAC P05	Regalia O5 (MOI-10605) (Extract of Reynoutria sachalinensis)		5.0 (5 - 5) n1 <i>Labeled</i>			
FRAC P05	Regalia SC (MOI 106) (Extract of Reynoutria sachalinensis)		2.0 (2 - 2) n1			
FRAC P07	Agrifos (Dipotassium phosphonate + Dipotassium phosphate)		1.2 (1 - 2) n5 <i>Labeled</i>	4.0 (4 - 4) n1 <i>Labeled</i>		
FRAC P07	Aliette WDG (Fosetyl Al)		1.3 (1 - 2) n8 <i>Labeled</i>		2.3 (1 - 3) n3 <i>Labeled</i>	1.7 (1 - 3) n3 <i>Labeled</i>
FRAC P07	Alude (Potassium phosphite)		1.3 (1 - 2) n4 <i>Labeled</i>		3.0 (3 - 3) n1 <i>Labeled</i>	
FRAC P07	Calirus 150 (Mono- and di- potassium salts of phosphorus acid + copper sulfate pentahydrate)					
FRAC P07	K-Phite (Phosphorus acid salts)					
FRAC P07	Magellan (Mono- and Dibasic Sodium, Potassium and Ammonium Phosphites)		1.0 (1 - 1) n6 <i>Labeled</i>		3.0 (3 - 3) n2 <i>Labeled</i>	
FRAC P07	Vital 4L (Potassium phosphite)		1.0 (1 - 1) n5 <i>Labeled</i>	5.0 (5 - 5) n1 <i>Labeled</i>		
IRAC 4A	Celero 16WSG (Clothianadin)					
IRAC UNF & FRAC BM02	Stargus (Bacillus nakamurai strain F727)	5.0 (5 - 5) n1 <i>Labeled</i>				
unknown	MultiGuard (Furfural)		1.0 (1 - 1) n2 <i>Labeled</i>	3.0 (3 - 3) n1 <i>Labeled</i>		1.0 (1 - 1) n1 <i>Labeled</i>
unknown	SA 11210 (SA 11210)		1.0 (1 - 1) n1			
unknown	SP2770 10WP (SP2770)	3.5 (2 - 5) n2				
unknown	TM-459 (TM-459)					

*Replaced in the marketplace with Empress Intrinsic; the WDG formulation is no longer available

** Disarm 480SC is now known as Fame SC