

**Project Name:** Fungicide Crop Safety – New Products

<b>New</b>	<b>Ongoing</b>	X	<b>Completed</b>		<b>Duration if ongoing or completed:</b>	2010-2019
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**Project Description:**

While labels allowing the use of fungicides generally on ornamental horticulture crops is fairly common, developing crop safety data is still critical to support these ‘open’ labels. Many labels list the tested crops along with the plant type as well as any crops that might be injured after application. From 2010 through 2019, IR-4 has tested several new fungicides to verify and expand the screened crops.

**Research Project Abstract (if available):**

**Abstract from 2015 Benzovindiflupyr + Azoxystrobin Crop Safety Summary**

In 2013, as part of the crop safety screening for new active ingredients and recently registered fungicides, IR-4 started testing Mural WDG (benzovindiflupyr + azoxystrobin) for safety on several ornamental horticulture crops. During 2013 to 2017, the IR-4 Project completed 78 trials on 27 ornamental plant genera or species examining phytotoxicity related to foliar and/or drench applications. In these trials, no injury was observed on any species or genera. If a list of tested plants is placed on the Mural WDG label, 15 of the IR-4 screened plants can be added to the EPA label based on having 3 or more completed trials: *Aquilegia sp.*, *Buddleia davidii*, *Buxus sp.*, *Calibrachoa sp.*, *Camellia sp.*, *Dianthus sp.*, *Helianthus sp.*, *Heuchera sp.*, *Juniperus sp.*, *Lamium sp.*, *Lavandula sp.*, *Monarda sp.*, *Osteospermum sp.*, *Rhaphiolepis sp.*, and *Scindapsus aureus*.

**Abstract from 2020 F6123 Crop Safety Summary**

F6123 is a new fungicide being developed by FMC for the control of powdery mildew, rusts, scab, black spot (*Diplocarpon rosae*), and other foliar diseases. The IR-4 Project completed 25 crop safety trials on 13 environmental horticulture plant species or genera during 2019 to 2020. At this time, sufficient information has not yet been generated for reliable conclusions on F6123 crop safety. In these limited number of trials, F6123 applied foliar caused minimal or no injury in 12 species or genera; however, drench application caused significant injury in 8 species or genera.

**Abstract from 2019 Fluxapyroxad + Pyraclostrobin Crop Safety Summary**

The IR-4 Project screens new active ingredients for potential deleterious impacts to aid growers in selection of appropriate disease management tools for their crops. From 2014 to 2018, IR-4 completed 78 trials on 34 environmental horticulture plant species examining phytotoxicity related to foliar applications of Orkestra (fluxapyroxad + pyraclostrobin). During 2016 and 2018, an additional 15 trials were conducted using drench application on 9 crops. In these trials, 17 species or genera exhibited minimal or no injury after foliar applications in a minimum of 3 trials for each crop. Thirteen of these are already on the current label for this active ingredient; the other four (*Aquilegia sp.*, *Hemerocallis sp.*, *Picea sp.* and *Pinus sp.*) can be added to a list of tolerant plants in the current label. Only two plant species (*Cornus florida* and *Impatiens hawkeri*) exhibited significant injury in one study. All trials for 13 other species or genera exhibited no or minimal injury in the limited number of trials (one or two) for each crop. Four of these are already in the current label; BASF can consider adding the other nine to the label. Drench application caused no significant phytotoxicity on all crops tested.

**Abstract from 2020 Fluopyram Crop Safety Summary**

Indemnify (fluopyram) is a new fungicide being developed by Bayer for the control of nematodes; the current product is only registered for turf uses. The IR-4 Project has completed 37 crop safety trials on 18 environmental horticulture plant species or genera. Two crops (begonia, petunia) exhibited differential responses between foliar and drench applications with no to slight injury observed with foliar sprays, but moderate to severe injury with soil drenches. Four additional crops also did not exhibit injury after foliar or soil

applications. Additional data are needed for 12 other crops (including foliar application on petunia) are needed for a definitive conclusion on crop safety.

***Abstract from 2021 Mefentrifluconazole Crop Safety Summary***

Mefentrifluconazole is a new fungicide being developed by BASF for the control of foliar diseases of environmental horticulture crops. The IR-4 Project completed 24 crop safety trials on 15 environmental horticulture plant species or genera during 2019 to 2020. In these trials, no significant impacts were observed in data received so far for these crops.

***Abstract from 2020 Mono Dipotassium Phosphorus Acid + Hydrogen Peroxide Crop Safety Summary***

OxiPhos (Mono and di potassium salts of phosphorus acid + hydrogen peroxide) is labeled for managing oomycetes (downy mildew, *Phytophthora* and *Pythium* pathogens) and diseases caused by certain bacterial pathogens. While the label does list specific crops, additional screenings were needed to broaden this list. The IR-4 Project completed 23 crop safety trials on 11 environmental horticulture plant species or genera during 2016 to 2019. No injury was observed on azalea and rose; these two crops can be added to the list of crops previously tested for crop safety. For the remaining nine crops, more information is needed either because only 1 or 2 trials were conducted or because consistent results were not achieved across research sites.

***Abstract from 2017 Oxathiapiprolin Crop Safety Summary***

Oxathiapiprolin was registered as Segovis in the United States in 2017 for disease control on ornamental horticulture plants in greenhouse and nurseries. The commercial label contains a general list of 17 crop groups that cover virtually all ornamental crops. During 2015 and 2016, the IR-4 Project completed 19 trials on 18 ornamental plant species or genera examining phytotoxicity related to drench applications of Segovis. In these trials, all species or genera exhibited minimal or no injury after drench applications. These results confirm the crop safety for Segovis.

***Abstract from 2020 Pydiflumetofen Crop Safety Summary***

Pydiflumetofen is a new fungicide being developed by Syngenta for the control of leaf spots (*Septoria*, *Cercospora*, *Alternaria*, *Venturia*), powdery mildew, *Fusarium*, *Botrytis*, *Sclerotinia*, *Corynespora*, and other foliar diseases. The IR-4 Project completed 61 crop safety trials on 22 ornamental horticulture plant species or genera during 2015 to 2019. In these trials, all 22 species or genera exhibited minimal or no injury. Ten genera exhibited minimal or no injury in 3 trials and 12 species or genera exhibited minimal or no injury in the limited number of trials (one or two) for each crop. Syngenta may consider adding these to the label.

***Abstract from 2021 Pydiflumetofen Crop Safety Summary***

Pydiflumetofen + Difenconazole is a new fungicide being developed by Syngenta for the control of foliar diseases of ornamental horticulture crops. The IR-4 Project completed 20 crop safety trials on 26 ornamental horticulture plant species or genera during 2019 to 2020. In these trials, 10 species or genera exhibited minimal or no injury in the limited number of trials (two) for each crop. Syngenta may consider adding these to the label.

***Abstract from 2019 SP2700 Crop Safety Summary***

SP2700 is a new fungicide being developed by SePro for the control of diseases on ornamentals such as *Alternaria*, *Cylindrocladium*, *Fusarium*, *Rhizoctonia*, and *Thielaviopsis*. The IR-4 Project completed 18 crop safety trials on 10 ornamental horticulture plant species or genera from 2018 through 2019. In these trials, two genera or species exhibited minimal or no injury after foliar applications in a minimum of 3 trials for each crop; these can be added to a list of tolerant plants in the new label for this active ingredient. All trials for 8 other species or genera exhibited minimal or no injury in the limited number of trials (one or two) for each crop.



# Environmental Horticulture Program Research Project Sheet

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

<b>Target Species (Phytotoxicity, or common and Latin name of arthropod, pathogen, weed):</b>
Crop Safety

<b>Target Crops (list tested crops if ongoing or completed project)</b>
See "IR-4 Crop Safety to Date" below

<b>Target Product(s) (list tested products or numbered compounds if ongoing or completed project)</b>	
Avelyo (BAS 750 02F Broadform F6123 Gatten IKF-309 Indemnify Picarbutrazox 20WG Picarbutrazox SC	Postiva Reklemele S2200 SP2478 SP2700WP TDA NC1 XDE-659

Product Registration and Research Status	
	Registration Status
Labeled & Commercialized Wide range of ornamental horticulture crops listed	Avelyo Broadform Indemnify Postiva
Labeled & Commercialized Opportunity to add additional ornamental horticulture crops	
Labeled But NOT Commercialized	
Not yet registered or labeled	Picarbutrazox 20WG Picarbutrazox SC Reklemele S2200 SP2478 SP2700WP TDA NC1 XDE-659

\* IR-4 Data contributed to registration decision – either adding pest to label or not pursuing further research

<b>Other:</b>

Project Pros	Project Cons
1	1

<b>IR-4 Crop Safety Trials to Date</b>
<p>Average rating on a scale of 1 – 5 with 1 = 0 to about no injury and 5 = severe injury and mortality; minimum to maximum rating; number of trials. A rating of 3 or higher is considered commercially unacceptable (<i>red text</i>). A rating of 1 or 2 is considered commercially acceptable and those with more than 3 trials are complete (<i>green text</i>). 'Labeled' indicates that IR-4 generated data in at least one trial and that this crop is listed on the label. For crop/product combinations that are blank, IR-4 has not screened this combination.</p>

**Table 1. Foliar Applications - Set 1.**

Plant Group	Crop	Avelyo (BAS 750 02F) (Mefen-trifluconazole)	F6123 (F6123)	Gatten (Flutianil)	IKF-309 (IKF-309)	Mural WDG (Azoxystrobin + benzovindiflupyr)
Broadleaf Evergreen Tree/Shrub	Boxwood (Buxus sp.)					1.0 (1 - 1) n2
	Bottlebrush, Crimson (Callistemon citrinus)	1.0 (1 - 1) n1				
	Camellia (Camellia japonica)	1.0 (1 - 1) n1				
	Camellia (Camellia sp.)					1.0 (1 - 1) n3
	Loropetalum (Loropetalum sp.)	1.0 (1 - 1) n1				
	Indian Hawthorn (Raphiolepis indica)					1.0 (1 - 1) n3
Broadleaf Evergreen/Deciduous Tree/Shrub	Barberry (Berberis sp.)					1.0 (1 - 1) n1
	Ceanothus (Ceanothus sp.)					1.0 (1 - 1) n2
Bulbs & Corms	Dahlia (Dahlia sp.)			1.0 (1 - 1) n1		
	Daylily (Hemerocallis sp.)					
Deciduous Tree/Shrub/Vine	Butterfly Bush (Buddleia davidii)					1.0 (1 - 1) n4
	Burning Bush (Euonymus alatus)	1.0 (1 - 1) n1				
	Hydrangea (Hydrangea sp.)			1.0 (1 - 1) n4		1.5 (1 - 3) n4
	Crape Myrtle (Lagerstroemia indica)	1.0 (1 - 1) n1				
	Rose (Rosa sp.)		1.0 (1 - 1) n1	1.3 (1 - 2) n3		
Hardy Ground Cover Foliage	Periwinkle (Vinca sp.)			1.0 (1 - 1) n1		
Herbaceous Flowering Plant	Daisy/Chrysanthemum (Chrysanthemum sp.)			1.0 (1 - 1) n1		
	Dead Nettle (Lamium sp.)					1.0 (1 - 1) n3
Herbaceous Flowering Plant - Annual	Garden Snapdragon (Antirrhinum majus)		2.0 (2 - 2) n1			
Herbaceous Flowering Plant - Annual	Clubed Begonia (Begonia semperflorens)		2.0 (2 - 2) n1			
	Begonia (Begonia sp.)			1.0 (1 - 1) n1	1.5 (1 - 2) n2	
	Calibrachoa (Calibrachoa sp.)					1.0 (1 - 1) n5
	Dahlia Hybrids (Dahlia x hortensis)		1.0 (1 - 1) n1			
	Poinsettia (Euphorbia pulcherrima)				1.0 (1 - 1) n1	
	Barberton Daisy (Gerbera jamesonii)		3.0 (3 - 3) n1			
	Transvaal Daisy (Gerbera sp.)			1.0 (1 - 1) n3		
	Sunflower (Helianthus sp.)					1.0 (1 - 1) n3
Impatiens, New Guinea (Impatiens hawkeri)					1.0 (1 - 1) n1	

Plant Group	Crop	Avelyo (BAS 750 02F) (Mefen-trifluconazole)	F6123 (F6123)	Gatten (Flutianil)	IKF-309 (IKF-309)	Mural WDG (Azoxystrobin + benzovindiflupyr)	
	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana)				1.0 (1 - 1) n1		
	Daisybush (Osteospermum sp.)					<b>1.0 (1 - 1) n2</b>	
	Geranium, Zonal (Pelargonium x hortorum)		<i>3.0 (3 - 3) n1</i>		<b>1.0 (1 - 1) n2</b>		
	Petunia (Petunia sp.)						
	Petunia (Petunia x hybrida)			1.0 (1 - 1) n1		<b>1.5 (1 - 2) n2</b>	
	African Violet (Saintpaulia ionantha)				<i>3.0 (3 - 3) n1</i>		
	Common Sage (Salvia officinalis)					1.0 (1 - 1) n1	
	Marigold, African (Tagetes erecta)			1.0 (1 - 1) n1		1.0 (1 - 1) n1	
	Marigold, French (Tagetes patula)			1.0 (1 - 1) n1		1.0 (1 - 1) n1	
	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana)			2.0 (2 - 2) n1	1.0 (1 - 1) n1	<b>1.5 (1 - 2) n2</b>	
	Zinna, Elegant (Zinnia elegans)			1.0 (1 - 1) n1			
	Zinnia (Zinnia sp.)				1.0 (1 - 1) n1		
Herbaceous Flowering Plant - Annual/Biennial/Peren	Sage (Salvia sp.)					<b>1.0 (1 - 1) n3</b>	
Herbaceous Flowering Plant - Perennial	Columbine (Aquilegia sp.)					<b>1.0 (1 - 1) n4</b>	
	Aster (Aster sp.)					<b>1.0 (1 - 1) n3</b>	
	False Goat's Beard (Astilbe sp.)	1.0 (1 - 1) n1					
	Tickseed (Coreopsis sp.)	<b>1.0 (1 - 1) n2</b>	<b>1.0 (1 - 1) n2</b>	<b>1.0 (1 - 1) n2</b>			
	Siberian Lackspur (Delphinium grandiflorum)		1.0 (1 - 1) n1				
	Cheddar Pink (Dianthus gratianopolitanus)					<b>1.0 (1 - 1) n2</b>	
	Pink (Dianthus sp.)					<b>1.0 (1 - 1) n4</b>	
	Blanket Flower (Gaillardia x grandiflora)	1.0 (1 - 1) n1					
	Sunflower, Maximilian (Helianthus maximiliani)	1.0 (1 - 1) n1					
	Alumroot (Heuchera sp.)					<b>1.0 (1 - 1) n3</b>	
	Rosemallow (Hibiscus sp.)					<b>1.0 (1 - 1) n3</b>	
	Bee Balm, Scarlet (Monarda didyma)	1.0 (1 - 1) n1				<b>1.0 (1 - 1) n3</b>	
	Phlox, Fall (Phlox paniculata)	1.0 (1 - 1) n1				<b>1.0 (1 - 1) n3</b>	
	Phlox (Phlox sp.)			<b>1.0 (1 - 1) n2</b>			
	Coneflower, Orange, var. speciosa (Rudbeckia fulgida var. speciosa)			<b>1.0 (1 - 1) n2</b>			
Woodland Sage (Salvia nemorosa)					1.0 (1 - 1) n1		

Plant Group	Crop	Avelyo (BAS 750 02F) (Mefen-trifluconazole)	F6123 (F6123)	Gatten (Flutianil)	IKF-309 (IKF-309)	Mural WDG (Azoxystrobin + benzovindiflupyr)
Herbaceous Flowering Plant - Perennial	Vervain (Verbena sp.)	1.0 (1 - 1) n2				
Herbaceous Perennials	Lavender (Lavandula sp.)					1.0 (1 - 1) n5
	Rosemary (Rosmarinus officinalis)	1.0 (1 - 1) n1				
Narrowleaf Evergreen Tree/Shrub	Fir (Abies sp.)					1.0 (1 - 1) n3
	Leyland Cypress (Cuprocyparis leylandii)	1.0 (1 - 1) n1				
	Juniper (Juniperus sp.)	1.0 (1 - 1) n2				1.0 (1 - 1) n3
Palm	Palm, Mediterranean Fan; Dwarf Fan Palm (Chamaerops humilis)					1.0 (1 - 1) n1
Tropical Foliage Plant	Aglaonema (Aglaonema sp.)					1.0 (1 - 1) n3
	Devil's Ivy (Epipremnum pinnatum)					1.0 (1 - 1) n2
	Coleus (Solenostemon sp.)				1.0 (1 - 1) n1	

**Table 2. Foliar Applications - Set 2.**

Plant Group	Crop	NF-149 (Cyflufenamid)	Orkestra (Fluxapyroxad + pyraclostrobin)	OxiPhos	Picarbutrazox 20WG (Picarbutrazox)	Picarbutrazox SC (NF-171) (Picarbutrazox)
Broadleaf Evergreen Tree/Shrub	Azalea (Rhododendron sp.)	MFG Hold		1.0 (1 - 1) n3		
	Magnolia (Magnolia sp.)		1.0 (1 - 1) n1			
Bulbs & Corms	Daylily (Hemerocallis sp.)		1.7 (1 - 3) n3			
Deciduous Tree/Shrub/Vine	Dogwood (Cornus sp.)		1.8 (1 - 4) n4			
	Hydrangea (Hydrangea sp.)	MFG Hold	1.8 (1 - 3) n4			
	Apple (Malus sp.)		1.0 (1 - 1) n1 Labeled			
	Oak (Quercus sp.)		1.0 (1 - 1) n1 Labeled			
	Rose (Rosa sp.)	MFG Hold	1.0 (1 - 1) n3	2.0 (1 - 3) n2	1.0 (1 - 1) n2	1.0 (1 - 1) n2
	Elm (Ulmus sp.)		1.3 (1 - 2) n3			
	Arrowwood (Viburnum sp.)				1.0 (1 - 1) n1	1.0 (1 - 1) n1
Hardy Ground Cover Foliage	Periwinkle (Vinca sp.)		1.0 (1 - 1) n3			
Herbaceous Flowering Plant - Annual	Garden Snapdragon (Antirrhinum majus)	MFG Hold			1.0 (1 - 1) n1	1.0 (1 - 1) n1
	Calibrachoa (Calibrachoa sp.)	MFG Hold				
	Periwinkle, Madagascar (Catharanthus roseus)		1.0 (1 - 1) n3			

Plant Group	Crop	NF-149 (Cyflufenamid)	Orkestra (Fluxapyroxad + pyraclostrobin)	OxiPhos	Picarbutrazox 20WG (Picarbutrazox)	Picarbutrazox SC (NF-171) (Picarbutrazox)
Herbaceous Flowering Plant - Annual	Coleus, Flamenettle (Coleus sp.)				1.0 (1 - 1) n1	1.0 (1 - 1) n2
	Poinsettia (Euphorbia pulcherrima)			3.0 (2 - 4) n2		
	Transvaal Daisy (Gerbera sp.)		1.0 (1 - 1) n1	1.5 (1 - 2) n2		
	Impatiens, New Guinea (Impatiens hawkeri)		3.0 (1 - 4) n3		1.3 (1 - 2) n3	1.5 (1 - 2) n2
	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana)		2.0 (2 - 2) n1 Labeled		1.0 (1 - 1) n2	1.0 (1 - 1) n1
	Lantana (Lantana sp.)		1.0 (1 - 1) n3			
	Daisybush (Osteospermum sp.)	MFG Hold	1.0 (1 - 1) n1			
	Geranium, Zonal (Pelargonium x hortorum)		1.0 (1 - 1) n2		1.0 (1 - 1) n1	1.0 (1 - 1) n1
	Petunia (Petunia sp.)	MFG Hold			1.0 (1 - 1) n1	
	Scarlet Sage (Salvia splendens)				1.0 (1 - 1) n2	1.0 (1 - 1) n2
	Violet (Viola sp.)	MFG Hold	1.0 (1 - 1) n1 Labeled			
	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana)		1.3 (1 - 2) n3	2.0 (2 - 2) n1	1.0 (1 - 1) n1	1.0 (1 - 1) n1
Zinnia (Zinnia sp.)	MFG Hold	1.0 (1 - 1) n4				
Herbaceous Flowering Plant - Annual/Biennial/Peren	Sage (Salvia sp.)		1.0 (1 - 1) n2			
Herbaceous Flowering Plant - Perennial	Columbine (Aquilegia sp.)		1.5 (1 - 3) n4			
	Aster (Aster sp.)				1.0 (1 - 1) n2	1.0 (1 - 1) n1
	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.)	1.0 (1 - 1) n3				
	Tickseed (Coreopsis sp.)		1.0 (1 - 1) n1 Labeled			
	Pink (Dianthus sp.)		1.0 (1 - 1) n4			
	Max Chrysanthemum (Leucanthemum maximum)		1.0 (1 - 1) n3			
	Daisy, Shasta (Leucanthemum x superbum)		3.0 (3 - 3) n2 Labeled			
	Lupine (Lupinus sp.)		1.0 (1 - 1) n3			
	Cinquefoil (Potentilla sp.)				1.0 (1 - 1) n1	1.0 (1 - 1) n1
	Black-Eyed Susan (Rudbeckia hirta)				1.3 (1 - 2) n3	1.0 (1 - 1) n3
	Woodland Sage (Salvia nemorosa)				1.0 (1 - 1) n2	1.0 (1 - 1) n2

Plant Group	Crop	NF-149 (Cyflufenamid)	Orkestra (Fluxapyroxad + pyraclostrobin)	OxiPhos	Picarbutrazox 20WG (Picarbutrazox)	Picarbutrazox SC (NF-171) (Picarbutrazox)
Herbaceous Flowering Plant - Perennial	Vervain ( <i>Verbena</i> sp.)		2.0 (1 - 5) n4			
Narrowleaf Evergreen Tree/Shrub	Spruce ( <i>Picea</i> sp.)		1.0 (1 - 1) n3			
	Pine ( <i>Pinus</i> sp.)		1.0 (1 - 1) n3			
	Fir, Douglas ( <i>Pseudotsuga menziesii</i> )	MFG Hold	1.0 (1 - 1) n3			
Palm	Palm, Mediterranean Fan; Dwarf Fan Palm ( <i>Chamaerops humilis</i> )	1.0 (1 - 1) n1	1.0 (1 - 1) n1	1.0 (1 - 1) n1		

Table 3. Foliar Applications - Set 3.

Plant Group	Crop	Picatina (Pydiflumetofen)	Postiva (pydiflumetofen + difenoconazole)	S2200 4SC (Mandestrobin)	Segovis (Oxathiapiprolin)
Deciduous Tree/Shrub/Vine	Hydrangea ( <i>Hydrangea</i> sp.)		1.0 (1 - 1) n3		
	Rose ( <i>Rosa</i> sp.)		1.0 (1 - 1) n2		
Herbaceous Flowering Plant - Annual	Garden Snapdragon ( <i>Antirrhinum majus</i> )	1.0 (1 - 1) n4		1.0 (1 - 1) n3	
	Clubed Begonia ( <i>Begonia semperflorens</i> )		1.0 (1 - 1) n1		
	Begonia ( <i>Begonia</i> sp.)	1.0 (1 - 1) n3		1.7 (1 - 3) n3	
	Calibrachoa ( <i>Calibrachoa</i> sp.)	1.0 (1 - 1) n2	1.0 (1 - 1) n1	1.0 (1 - 1) n1	
	Cockscomb, Wool Flower ( <i>Celosia</i> sp.)		1.0 (1 - 1) n1		
	Poinsettia ( <i>Euphorbia pulcherrima</i> )	1.0 (1 - 1) n2		1.5 (1 - 2) n2	
	Transvaal Daisy ( <i>Gerbera</i> sp.)	1.0 (1 - 1) n3		1.0 (1 - 1) n2	
	Impatiens, New Guinea ( <i>Impatiens hawkeri</i> )	2.0 (2 - 2) n1 Labeled	2.5 (1 - 4) n2	1.0 (1 - 1) n1	
	Impatiens, Common Garden; Buzzy Lizzy ( <i>Impatiens walleriana</i> )	1.5 (1 - 2) n2	2.0 (1 - 3) n2		
	Daisybush ( <i>Osteospermum</i> sp.)	1.0 (1 - 1) n1 Labeled		1.0 (1 - 1) n1	
	Geranium, Zonal ( <i>Pelargonium x hortorum</i> )	1.0 (1 - 1) n3	1.5 (1 - 2) n2	1.0 (1 - 1) n2	
	Petunia ( <i>Petunia</i> sp.)	1.3 (1 - 2) n3		1.7 (1 - 2) n3	
	Petunia ( <i>Petunia x hybrida</i> )		1.0 (1 - 1) n1		
	Violet ( <i>Viola</i> sp.)	1.0 (1 - 1) n1 Labeled		1.0 (1 - 1) n1	
	Pansy, Large Flowering; Wittrock's Violet ( <i>Viola X wittrockiana</i> )	1.0 (1 - 1) n3	1.0 (1 - 1) n2	1.5 (1 - 3) n4	



Plant Group	Crop	Picatina (Pydiflumetofen)	Postiva (pydiflumetofen + difenoconazole)	S2200 4SC (Mandestrobin)	Segovis (Oxathiapiprolin)
Herbaceous Flowering Plant - Annual/Biennial/Peren	Sage (Salvia sp.)	<b>1.0 (1 - 1) n2</b>		1.0 (1 - 1) n1	
Herbaceous Flowering Plant - Perennial	Madwort (Alyssum sp.)	1.0 (1 - 1) n1 Labeled		1.0 (1 - 1) n1	
	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.)		<b>1.0 (1 - 1) n2</b>		
	Hardy Mum (Chrysanthemum/Dendranthema x morifolium)	1.0 (1 - 1) n2 Labeled		1.0 (1 - 1) n1	
	Tickseed (Coreopsis sp.)	1.0 (1 - 1) n2 Labeled		<b>1.0 (1 - 1) n2</b>	
	Pink (Dianthus sp.)	1.0 (1 - 1) n3 Labeled		<b>1.0 (1 - 1) n2</b>	
	Lupine (Lupinus sp.)	<b>1.0 (1 - 1) n2</b>		1.0 (1 - 1) n1	
	Vervain (Verbena sp.)	<b>1.0 (1 - 1) n2</b>		1.0 (1 - 1) n1	
Palm	Palm, Mediterranean Fan; Dwarf Fan Palm (Chamaerops humilis)	1.0 (1 - 1) n1 Labeled		1.0 (1 - 1) n1	

**Table 4.** Foliar Applications - Set 4.

Plant Group	Crop	SP2478 (SP2478)	SP2480 (SP2480)	SP2700 AS (SP2700)	SP2700 WP (SP2700)
Deciduous Tree/Shrub/Vine	Hydrangea (Hydrangea sp.)		<b>1.0 (1 - 1) n3</b>	<b>1.0 (1 - 1) n3</b>	
	Rose (Rosa sp.)		<b>2.0 (1 - 3) n2</b>	MFG Hold	
Hardy Ground Cover Foliage	Periwinkle, Common (Vinca minor)	1.0 (1 - 1) n1			
Herbaceous Flowering Plant	Daisy/Chrysanthemum (Chrysanthemum sp.)				1.0 (1 - 1) n1
Herbaceous Flowering Plant - Annual	Clubed Begonia (Begonia semperflorens)				<b>1.5 (1 - 2) n2</b>
	Fuschia; Ladies-Eardrops (Fuschia sp.)		2.0 (2 - 2) n1	MFG Hold	
	Impatiens, New Guinea (Impatiens hawkeri)		2.0 (2 - 2) n1	MFG Hold	1.0 (1 - 1) n1
	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana)		2.0 (2 - 2) n1	<b>1.7 (1 - 2) n3</b>	1.0 (1 - 1) n1
	Geranium, Zonal (Pelargonium x hortorum)		1.0 (1 - 1) n1	MFG Hold	
	Petunia (Petunia sp.)		2.0 (2 - 2) n1	<b>1.7 (1 - 2) n3</b>	

Plant Group	Crop	SP2478 (SP2478)	SP2480 (SP2480)	SP2700 AS (SP2700)	SP2700 WP (SP2700)
Herbaceous Flowering Plant - Annual	Marigold (Tagetes sp.)		1.0 (1 - 1) n2	MFG Hold	
	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana)		3.0 (3 - 3) n1	MFG Hold	
Herbaceous Flowering Plant - Perennial	Daisy, Shasta (Leucanthemum x superbum)		1.0 (1 - 1) n1	MFG Hold	
Tropical Foliage Plant	Dracaena (Dracaena sp.)				1.0 (1 - 1) n1

**Table 5.** Foliar Applications - Set 5.

Plant Group	Crop	SP8000 (SP8000)	TDA-NC-1 (TDA)	XDE-659 (XDE-659)	Zio (Pseudomonas chlororaphis strain AFS009)
Bulbs & Corms	Dahlia (Dahlia sp.)		1.0 (1 - 1) n1		
	Daylily (Hemerocallis sp.)			1.0 (1 - 1) n3	
Deciduous Tree/Shrub/Vine	Butterfly Bush, Silver (Buddleia alternifolia)			1.0 (1 - 1) n1	
	Hydrangea (Hydrangea sp.)			1.0 (1 - 1) n2	
	Rose (Rosa sp.)			1.0 (1 - 1) n1	
Edibles	Cayenne Pepper (Capsicum annuum)		1.0 (1 - 1) n1		
Fern	Fern, Boston Sword (Nephrolepis exaltata)			1.0 (1 - 1) n1	
Hardy Ground Cover Foliage	Periwinkle, Common (Vinca minor)	2.0 (2 - 2) n1			
Herbaceous Flowering Plant - Annual	Begonia (Begonia sp.)		1.0 (1 - 1) n1		1.3 (1 - 2) n3
	Poinsettia (Euphorbia pulcherrima)		2.0 (2 - 2) n1		MFG Hold
	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana)				1.7 (1 - 3) n3
	Regal Geranium (Pelargonium x domesticum)		2.0 (2 - 2) n1		
	Geranium, Zonal (Pelargonium x hortorum)		1.0 (1 - 1) n1		MFG Hold
Narrowleaf Evergreen Tree/Shrub	Arborvitae, American (Thuja occidentalis)			1.0 (1 - 1) n3	
Tropical Foliage Plant	Jasmine, Confederate (Trachelospermum jasminoides)			1.0 (1 - 1) n1	

**Table 6.** Drench Applications - Set 1.

Plant Group	Crop	Avelyo (BAS 750 02F) (Mefentri-fluconazole)	Broadform SC500 (Fluopyram + Trifloxystrobin)	F6123 (F6123)	Heritage (Azoxystrobin)	Medallion (Fludioxonil)
Broadleaf Evergreen Tree/Shrub	Bottlebrush, Crimson ( <i>Callistemon citrinus</i> )	1.0 (1 - 1) n1				
	Camellia ( <i>Camellia japonica</i> )	1.0 (1 - 1) n1				
Bulbs & Corms	Garlic, Golden ( <i>Allium moly</i> )					1.0 (1 - 1) n1 Labeled
	Montbretia ( <i>Crococsmia x crocosmiiflora</i> )					1.0 (1 - 1) n1 Labeled
	Gladiolus ( <i>Gladiolus sp.</i> )					1.0 (1 - 1) n1 Labeled
	Daylily ( <i>Hemerocallis sp.</i> )					1.0 (1 - 1) n1 Labeled
Deciduous Tree/Shrub/Vine	Burning Bush ( <i>Euonymus alatus</i> )	1.0 (1 - 1) n1				
Herbaceous Flowering Plant - Annual	Garden Snapdragon ( <i>Antirrhinum majus</i> )			4.0 (4 - 4) n1		
	Clubed Begonia ( <i>Begonia semperflorens</i> )			4.0 (4 - 4) n1		
	Dahlia Hybrids ( <i>Dahlia x hortensis</i> )			2.0 (2 - 2) n1		
	Geranium, Zonal ( <i>Pelargonium x hortorum</i> )			4.0 (4 - 4) n1		1.0 (1 - 1) n1 Labeled
	Marigold, African ( <i>Tagetes erecta</i> )			5.0 (5 - 5) n1		
	Marigold, French ( <i>Tagetes patula</i> )			4.0 (4 - 4) n1		
	Pansy, Large Flowering; Wittrock's Violet ( <i>Viola X wittrockiana</i> )			4.0 (4 - 4) n1		
	Zinna, Elegant ( <i>Zinnia elegans</i> )			2.0 (1 - 3) n2		
Herbaceous Flowering Plant - Perennial	Hardy Mum ( <i>Chrysanthemum/Dendranthema x morifolium</i> )		1.0 (1 - 1) n1 Labeled			
	Tickseed ( <i>Coreopsis sp.</i> )	1.0 (1 - 1) n1		1.7 (1 - 3) n3		
	Siberian Lackspur ( <i>Delphinium grandiflorum</i> )			1.0 (1 - 1) n1		
	Larkspur ( <i>Delphinium sp.</i> )					1.0 (1 - 1) n1 Labeled
	Pink ( <i>Dianthus sp.</i> )					1.0 (1 - 1) n1 Labeled
	Strawberry (Non-Bearing) ( <i>Fragaria sp.</i> )					1.0 (1 - 1) n1 Labeled
	Max Chrysanthemum ( <i>Leucanthemum maximum</i> )					1.0 (1 - 1) n1 Labeled

Plant Group	Crop	Avelyo (BAS 750 02F) (Mefentri-fluconazole)	Broadform SC500 (Fluopyram + Trifloxystrobin)	F6123 (F6123)	Heritage (Azoxystrobin)	Medallion (Fludioxonil)
	Daisy, Shasta ( <i>Leucanthemum x superbum</i> )					
	Phlox, Fall ( <i>Phlox paniculata</i> )	1.0 (1 - 1) n1				
	Phlox ( <i>Phlox</i> sp.)			2.3 (1 - 5) n3		
	Coneflower, Orange, var. <i>speciosa</i> ( <i>Rudbeckia fulgida</i> )		1.0 (1 - 1) n1			
	Coneflower, Orange, var. <i>speciosa</i> ( <i>Rudbeckia fulgida</i> var. <i>speciosa</i> )			1.0 (1 - 1) n2		
	Vervain ( <i>Verbena</i> sp.)	1.0 (1 - 1) n2				1.0 (1 - 1) n1 Labeled
Herbaceous Perennials	Rosemary ( <i>Rosmarinus officinalis</i> )	1.0 (1 - 1) n1				
Narrowleaf Evergreen Tree/Shrub	Fir ( <i>Abies</i> sp.)				1.0 (1 - 1) n1 Labeled	1.0 (1 - 1) n1 Labeled
	Fir, Douglas ( <i>Pseudotsuga menziesii</i> )				2.0 (2 - 2) n1 Labeled	2.0 (1 - 3) n2 Labeled
	Hemlock, Western ( <i>Tsuga heterophylla</i> )				2.0 (2 - 2) n1	3.0 (3 - 3) n1
Ornamental Grass	Fescue ( <i>Festuca</i> sp.)					1.0 (1 - 1) n1 Labeled

**Table 7.** Drench Applications - Set 2.

Plant Group	Crop	Mural WDG (Azoxystrobin + benzo-vindiflupyr)	Orchestra Intrinsic (Fluxapyroxad + pyraclostrobin)	OxiPhos	Picatina (Pydiflumetofen)	Postiva (pydiflumetofen + difenconazole)
Broadleaf Evergreen Tree/Shrub	Boxwood ( <i>Buxus</i> sp.)	1.0 (1 - 1) n1				
	Camellia ( <i>Camellia</i> sp.)	1.0 (1 - 1) n1				
	Azalea ( <i>Rhododendron</i> sp.)			1.0 (1 - 1) n1		
Broadleaf Evergreen/Deciduous Tree/Shrub	Barberry ( <i>Berberis</i> sp.)	1.0 (1 - 1) n2				
Deciduous Tree/Shrub/Vine	Dogwood ( <i>Cornus</i> sp.)		1.0 (1 - 1) n1			
	Hydrangea ( <i>Hydrangea</i> sp.)					1.0 (1 - 1) n1
	Apple ( <i>Malus</i> sp.)		1.0 (1 - 1) n1 Labeled			

Plant Group	Crop	Mural WDG (Azoxytobin + benzo- vindiflupyr)	Orkestra Intrinsic (Fluxapyroxad + pyraclostrobin)	OxiPhos	Picatina (Pydi- flumetofen)	Postiva (pydi- flumetofen + difeno- conazole)
	Rose (Rosa sp.)		<b>1.0 (1 - 1) n2</b>	2.0 (2 - 2) n1		
Hardy Ground Cover Foliage	Periwinkle (Vinca sp.)		1.0 (1 - 1) n1			
Herbaceous Flowering Plant - Annual	Garden Snapdragon (Antirrhinum majus)			1.0 (1 - 1) n1		
	Clubed Begonia (Begonia semperflorens)					1.0 (1 - 1) n1
	Begonia (Begonia sp.)				<b>3.0 (3 - 3) n1</b>	
	Calibrachoa (Calibrachoa sp.)	2.0 (2 - 2) n1			<b>1.0 (1 - 1) n2</b>	1.0 (1 - 1) n1
	Coleus, Flamenettle (Coleus sp.)			1.0 (1 - 1) n1		
	Poinsettia (Euphorbia pulcherrima)			1.0 (1 - 1) n1	1.0 (1 - 1) n1	
	Transvaal Daisy (Gerbera sp.)		1.0 (1 - 1) n1	1.0 (1 - 1) n1	1.0 (1 - 1) n1	
Herbaceous Flowering Plant - Annual	Sunflower (Helianthus sp.)	1.0 (1 - 1) n1				
	Impatiens, New Guinea (Impatiens hawkeri)			1.0 (1 - 1) n1	<b>4.0 (4 - 4) n1 Labeled</b>	1.0 (1 - 1) n1
	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana)				<b>3.0 (3 - 3) n1</b>	1.0 (1 - 1) n1
	Daisybush (Osteospermum sp.)	<b>1.0 (1 - 1) n2</b>	1.0 (1 - 1) n1		1.0 (1 - 1) n1 Labeled	
	Regal Geranium (Pelargonium x domesticum)			1.0 (1 - 1) n1		
	Geranium, Zonal (Pelargonium x hortorum)		<b>2.0 (2 - 2) n2</b>		1.0 (1 - 1) n1	1.0 (1 - 1) n1
	Petunia (Petunia sp.)			<b>2.5 (2 - 3) n2</b>	1.0 (1 - 1) n1	
	Petunia (Petunia x hybrida)					1.0 (1 - 1) n1
	Common Sage (Salvia officinalis)	1.0 (1 - 1) n1				
	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana)		1.0 (1 - 1) n1	1.0 (1 - 1) n1	<b>1.5 (1 - 3) n4</b>	1.0 (1 - 1) n1
	Zinna, Elegant (Zinnia elegans)					
	Zinnia (Zinnia sp.)		1.0 (1 - 1) n1			
Herbaceous Flowering Plant - Annual/Biennial/Peren	Sage (Salvia sp.)		<b>1.5 (1 - 2) n2</b>		2.0 (2 - 2) n1	
Herbaceous Flowering Plant - Perennial	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.)					1.0 (1 - 1) n1
	Hardy Mum (Chrysanthemum/Dendranthema x morifolium)				1.0 (1 - 1) n1 Labeled	
	Tickseed (Coreopsis sp.)				1.0 (1 - 1) n1 Labeled	

Plant Group	Crop	Mural WDG (Azoxytobin + benzo- vindiflupyr)	Orkestra Intrinsic (Fluxapyroxad + pyraclostrobin)	OxiPhos	Picatina (Pydi- flumetofen)	Postiva (pydi- flumetofen + difeno- conazole)
	Alumroot (Heuchera sp.)	1.0 (1 - 1) n1				
	Max Chrysanthemum (Leucanthemum maximum)		1.0 (1 - 1) n1			
	Daisy, Shasta (Leucanthemum x superbum)		1.0 (1 - 1) n1 Labeled			
	Lupine (Lupinus sp.)				1.0 (1 - 1) n2	
	Vervain (Verbena sp.)				1.0 (1 - 1) n2	
Narrowleaf Evergreen Tree/Shrub	Juniper (Juniperus sp.)	1.0 (1 - 1) n1				
	Spruce (Picea sp.)		1.0 (1 - 1) n1			
Narrowleaf Evergreen Tree/Shrub	Fir, Douglas (Pseudotsuga menziesii)	1.0 (1 - 1) n1 Labeled	1.0 (1 - 1) n1			
Tropical Foliage Plant	Devil's Ivy (Epipremnum pinnatum)	1.0 (1 - 1) n1				

**Table 8.** Drench Applications - Set 3.

Plant Group	Crop	Segovis (Oxathiapiprolin)	SP2480 (SP2480)	SP2700 AS (SP2700)	SP2700 WP (SP2700)
Herbaceous Flowering Plant	Daisy/Chrysanthemum (Chrysanthemum sp.)				1.0 (1 - 1) n1
Herbaceous Flowering Plant - Annual	Garden Snapdragon (Antirrhinum majus)	1.0 (1 - 1) n2			
	Clubed Begonia (Begonia semperflorens)				3.0 (3 - 3) n1
	Begonia (Begonia sp.)	1.0 (1 - 1) n1			
	Calibrachoa (Calibrachoa sp.)	1.0 (1 - 1) n1			
	Periwinkle, Madagascar (Catharanthus roseus)	1.0 (1 - 1) n2			
	Transvaal Daisy (Gerbera sp.)	1.0 (1 - 1) n2			
	Impatiens, New Guinea (Impatiens hawkeri)	1.0 (1 - 1) n2			5.0 (5 - 5) n1
	Impatiens, Common Garden; Buzzy Lizzy (Impatiens walleriana)	1.3 (1 - 2) n3			2.0 (2 - 2) n1
	Daisybush (Osteospermum sp.)	1.0 (1 - 1) n3			
	Geranium, Zonal (Pelargonium x hortorum)	1.0 (1 - 1) n2	1.0 (1 - 1) n1	MFG Hold	
	Petunia (Petunia sp.)	1.0 (1 - 1) n1			
Violet (Viola sp.)	1.0 (1 - 1) n1				

Plant Group	Crop	Segovis (Oxathiapiprolin)	SP2480 (SP2480)	SP2700 AS (SP2700)	SP2700 WP (SP2700)
	Pansy, Large Flowering; Wittrock's Violet (Viola X wittrockiana)	1.0 (1 - 1) n1			
Herbaceous Flowering Plant - Annual/Biennial/Peren	Sage (Salvia sp.)	1.0 (1 - 1) n1			
Herbaceous Flowering Plant - Perennial	Madwort (Alyssum sp.)	<b>1.0 (1 - 1) n2</b>			
	Hardy Mum (Chrysanthemum/Dendranthema x morifolium)	1.0 (1 - 1) n1			
	Tickseed (Coreopsis sp.)	1.0 (1 - 1) n1			
Herbaceous Flowering Plant - Perennial	Pink (Dianthus sp.)	1.0 (1 - 1) n1			
	Daisy, Shasta (Leucanthemum x superbum)		1.0 (1 - 1) n1	MFG Hold	
	Lupine (Lupinus sp.)	1.0 (1 - 1) n1			
	Vervain (Verbena sp.)	1.0 (1 - 1) n1			
Tropical Foliage Plant	Dracaena (Dracaena sp.)				1.0 (1 - 1) n1

**Table 10.** Applications for Nematodes.

Plant Group	Crop	Application Type	Indemnify (Fluopyram)	Reklemel (fluazaindolizine)
Broadleaf Evergreen Tree/Shrub	Gardenia (Gardenia sp.)	Drench	1.0 (1 - 1) n1	
		Foliar	1.0 (1 - 1) n1	
	Indian Hawthorn (Raphiolepis indica)	Drench	1.0 (1 - 1) n1	
		Foliar	<b>1.0 (1 - 1) n2</b>	
	Azalea (Rhododendron sp.)	Drench	1.0 (1 - 1) n1	
		Foliar	1.0 (1 - 1) n1	
Broadleaf Evergreen/Deciduous Tree/Shrub	Abelia, Glossy (Abelia x grandiflora)	Drench	1.0 (1 - 1) n1	
		Foliar	<b>1.0 (1 - 1) n2</b>	
Deciduous Tree/Shrub/Vine	Plumeria (Plumeria sp.)	Foliar	1.0 (1 - 1) n1	
Herbaceous Flowering Plant	Flamingo Lily, Painters Palette (Anthurium andraeanum)	Foliar	1.0 (1 - 1) n1	
	Daisy/Chrysanthemum (Chrysanthemum sp.)	Drench		1.0 (1 - 1) n1
	Orchid, Moth (Phalaenopsis sp.)	Foliar	1.0 (1 - 1) n1	
Herbaceous Flowering Plant - Annual	Garden Snapdragon (Antirrhinum majus)	Drench	<b>1.0 (1 - 1) n2</b>	
		Foliar	1.0 (1 - 1) n1	
	Begonia (Begonia sp.)	Drench	<b>3.3 (3 - 4) n3</b>	

Plant Group	Crop	Application Type	Indemnify (Fluopyram)	Reklamel (fluazaindolizine)	
		Foliar	<b>2.3 (2 - 3) n3</b>		
	Coleus, Flamenettle (Coleus sp.)	Drench	1.0 (1 - 1) n1		
	Petunia (Petunia x hybrida)	Drench	<b>3.0 (3 - 3) n2</b>		
		Foliar	<b>1.5 (1 - 2) n2</b>		
	Zinna, Elegant (Zinnia elegans)	Drench	<b>1.0 (1 - 1) n2</b>		
		Foliar	1.0 (1 - 1) n1		
	Chrysanthemum, Garden (Chrysanthemum/Dendranthema sp.)	Drench	<b>1.0 (1 - 1) n2</b>		
		Foliar	<b>1.0 (1 - 1) n2</b>		
	Herbaceous Flowering Plant - Perennial	Tickseed, Largeflower (Coreopsis grandiflora)	Drench	1.0 (1 - 1) n1	
			Foliar	1.0 (1 - 1) n1	
Rosemallow (Hibiscus sp.)		Drench	1.0 (1 - 1) n1		
		Foliar	1.0 (1 - 1) n1		
Plantain Lily (Hosta sp.)		Drench	1.0 (1 - 1) n1		
		Foliar	<b>1.0 (1 - 1) n2</b>		
Daisy, Shasta (Leucanthemum x superbum)		Drench	1.0 (1 - 1) n1		
		Foliar	<b>2.0 (1 - 3) n2</b>		
Palm	Palm, Mediterranean Fan; Dwarf Fan Palm (Chamaerops humilis)	Foliar	1.0 (1 - 1) n1		