## MARYLAND TURFGRASS DISEASE CONTROL RECOMMENDATIONS



## University of Maryland Turfgrass Technical Update TT-38 March 2010

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Diseases can seriously damage turfgrass plants and the appearance of turf. Promoting vigorous growth through sound cultural practices greatly aids in minimizing disease injury. Frequently, however, environmental stress, traffic, or poor management weakens plants and predisposes them to invasion by fungal pathogens.

When disease symptoms appear, the turfgrass manager must make a rapid and accurate diagnosis of the disorder. The prudent manager also attempts to determine the cultural factors that may have contributed to the disease.

The most common cultural abuses that aggravate turf diseases include close and frequent mowing, poor drainage.



Dollar Spot and Slime Mold in Perennial Ryegrass

excessive thatch, light and frequent irrigation, inadequate or excessive nitrogen fertility, shade and traffic. An example is summer patch, which is particularly damaging when turf is mown too closely, given light and frequent irrigations, and fertilized with excessive amounts of nitrogen.

Despite hard work and good management, disease frequently becomes a serious problem. This normally occurs when environmental conditions favor disease development instead of plant growth. For example, snow molds, Pythium blight, and brown patch are damaging when unfavorable temperatures stress plants, impairing their growth and recuperative capacity. In these situations, fungicides are generally recommended in conjunction with cultural practices that promote turf vigor.

Fungicides may be applied prior to disease outbreak in a preventive program or after disease symptoms appear as a curative treatment. Because of increasing costs of pesticides and application, it is an economic necessity that fungicides be chosen wisely. In selecting a fungicide consider its effectiveness, spectrum of activity, shelf-life, ease of application, availability, cost, and safety to the user, environment and plants. Ultimately, use of disease resistant cultivars and sound cultural practices will provide the most efficient means of discouraging disease. See TT-77 for current Maryland turfgrass cultivar recommendations.

The fungicides that are recommended for turfgrass disease control are listed on the following pages. Fungicides should be applied in one to two gallons of water per 1000ft<sup>2</sup>. Consult the label for more information on rates, spray frequency, tankmixing and other important facts. See TT-32 for Diagnosis of Common Lawn and Athletic Field Diseases.

References to trade or brand names does not constitute an endorsement, guarantee or warranty by the Univ. of Maryland. No discrimination is intended against products not mentioned.

## **KEY POINTS**

Accurate disease diagnosis is essential for effective control: Refer to TT-32 for assistance.

Fungicides are costly and may provide only 10 to 21 days of control.

Proper cultural practices can reduce disease severity.

Fungicide application rates that are appropriate for preventive control may not stop active disease.

Labels, formulations and fungicide rates are constantly updated. Before any pesticide application, be sure to consult the most recent product label for directions regarding spray frequency, tank mixes, rates and other important facts.

Disease, Turfgrass Host and Season	Fungicide	Rate of Formulated Material/1000ft <sup>2</sup>	Schedule and Comments
Algae (Blue-green; aka Cyanobacteria)  All turfgrasses, especially putting greens  May to October  Anthracnose  Colletotrichum cereale  Annual bluegrass and bentgrass  March to October	*Banner MAXX *Bayleton 50W 3336 Plus Compass Chlorothalonil (Daconil, others) Disarm *Eagle Endorse Heritage Insignia Medallion *Rubigan AS Signature *Trinity *Tourney *Triton Flo	3-6 oz. 6-8 oz. 2-6 oz.  1-2 oz. 1-2 oz. 6-8 oz 0.15-0.25 oz. 3-6 oz.  0.18-0.36 oz. 1.0-2.0 oz 4.0 oz. 0.2- 0.4 oz. 0.5-0.9 oz. 0.25-0.50 oz. 0.75-3.5 fl. oz. 4-6 oz. 1-2 oz. 0.28-0.37 oz. 0.4-1.1 oz.	Apply preventively on 10-14 day intervals. Alleviate compaction and poor surface drainage. Increase mowing height and ensure proper N-P-K nutrition.  Junction may discolor turf; apply in 5.0 gal. water/1000ft²; do not use in sprayers with aluminum parts. *Preventive applications of chlorothalonil is most efficacious.  Apply as needed on 7 to 14 day intervals. Alleviate compaction and use modest levels of N-fertilizer in summer. On greens, spoon feed 0.10 lb N per 1000ft² weekly when disease is active, increase mowing height, and reduce mowing frequency.  Apply fungicides preventively on 14 to 21 day intervals. *DMI fungicides are less effective when applied alone and should be mixed with either chlorothalonil or Medallion. For best results tank-mix one of the listed fungicides with either chlorothalonil or Medallion when applying fungicides after disease symptoms have appeared.
Bacterial Wilt  Xanthomonas spp.  Annual bluegrass  May to October	COCS Junction Kocide	0.5-1.0 oz. 1.0-2.0 oz. 1.0-2.0 oz.	Copper-based products are contact protectants that may slow spread of the bacteria. These products do not control the disease in infected plants. Apply on a 5-7 day interval. Disease can rapidly redevelop after rain. Increase mowing height and avoid abrasive cultural practices.
Bentgrass Dead Spot  Ophiosphaerella agrostis  Bentgrass  June to October	Banner MAXX Chipco 26GT 3336 Plus Chlorothalonil (Daconil, others) Emerald Insignia Medallion Signature	1-2 oz. 4-6 oz. 6-8 oz. 3-6 oz. 0.18 oz. 0.5-0.9 oz. 0.3-0.5 oz. 4-6 oz.	Apply as needed on a 7-14 day interval and tank-mix with 0.10 lb N/1000ft <sup>2</sup> to promote recovery.

Brown Patch	*Banner MAXX	1-2 oz.	Apply during hot humid weather especially
	*Bayleton 50W	1.0 oz.	when night temperatures exceed 68°F,
Rhizoctonia solani	Chipco 26GT	4-6 oz.	and avoid excessive N and night irrigation.
	3336 Plus	4-6 oz.	
All turfgrasses,	<sup>‡</sup> Compass	0.15-0.25 oz.	*DMI fungicides are more effective when
Particularly ryegrasses,	Curalan	4-6 oz.	tank-mixed with either chlorothalonil,
bentgrasses, and	Chlorothalonil	3-6 oz.	Chipco 26GT, Fore or Medallion.
tall fescue	(Daconil, others)		
	Disarm	0.9-0.36 oz.	<sup>‡</sup> Compass, Endorse, Heritage, Insignia
June to September	*Eagle	1.0-2.0 oz	and ProStar can provide 21 days or longer
cano la coptomba	‡ Endorse	4.0 oz.	control. Granular formulation of Heritage
	Fore, Dithane	6-8 oz.	(see label for rates) is very effective.
	*Eagle	0.6-1.2 oz.	(See label for fates) is very effective.
	<sup>‡</sup> Heritage	0.0-1.2 02. 0.2-0.4 oz.	
	<sup>‡</sup> Insignia	0.5-0.9 oz	
	Medallion	0.3-0.9 02 0.25 oz.	
	<sup>‡</sup> ProStar		
		2.2-3.0 oz.	
	*Trinity	1.0-2.0 oz.	
	*Tourney	0.28-0.37 oz.	
	*Triton Flo	0.4-1.1 oz.	<u> </u>
Brown Ring Patch	Disarm	0.36 oz.	Tank-mix with chlorothalonil or mancozeb
aka Waitea Patch	Heritage	0.2-0.4 oz.	for best results.
	Insignia	0.5-0.9 oz.	3336 Plus has little or no effect on this
Rhizoctonia circinata	ProStar	2.2-3.0 oz.	disease.
Annual bluegrass on			
greens			
9.00.10			
May and June			
Copper Spot	Bayleton 50W	1-2 oz.	Apply as needed. Copper spot rarely
	3336 Plus	4-6 oz.	occurs in Maryland.
Gloeocercospora sorghi	Chlorothalonil		
-	(Daconil, others)	3-6 oz.	
Bentgrasses; particularly	Rubigan	0.7-1.5 oz.	
velvet bentgrass			
July to September			

Dollar Spot	*Banner MAXX *Bayleton 50W	1-2 oz. 0.5-1.0 oz.	Maintain adequate N levels, increase mowing height, mow early AM to remove
Sclerotinia homoeocarpa	Chipco 26GT 3336 Plus	2-4 oz. 2-4 oz.	dew and maintain good soil moisture during dry periods in late summer
All turfgrasses	Curalan, Touche Chlorothalonil	2-4 oz.	(especially August and September).
May to November	(Daconil, others) Emerald *Eagle *Rubigan AS *Trinity *Tourney *Triton Flo	3-6 oz.  0.13-0.18 oz. 0.6-1.2 oz 0.75-1.5 fl. oz. 1-2 oz. 0.18-0.37 oz. 0.3-1.1 oz.	Alternate fungicides with different modes of action to avoid development of resistant strains. Avoid Heritage DG formulation and ProStar when dollar spot is active. Most Qol fungicides (e.g., Disarm, Insignia, Heritage TL) suppress dollar spot, but their use should be avoided when dollar spot is active to reduce the potential for resistance. Thiophanate (3336 Plus, TM, etc) resistance and reduced sensitivity to *DMI fungicides is common.
Fairy Rings  Marasmius oreades, Agaricus spp., Lycoperdon spp., and others  All turfgrasses  All year; especially damaging in summer	Bayleton Disarm Heritage ProStar Endorse Tourney	2-4 oz. 0.28-0.36 oz. 0.4 oz. 2.2-4.5 oz. 4.0 oz. 0.37 oz.	Frequent aeration, water injection into dry "fairy ring" soil with a tree root feeder or water fork, wetting agents and maintaining adequate N fertility alleviates symptoms.  Drench ProStar or Heritage on a 4 week interval or Endorse twice on a 7 day interval after aeration. Tank-mixing Bayleton with ProStar may improve performance. Tank-mix fungicide with a soil wetting agent to improve penetration. Core or spike prior to drenching-in fungicide + wetting agent.
Gray Leaf Spot  Pyricularia grisea  Perennial ryegrass and tall fescue  Mid July to early November	Chlorothalonil (Daconil, Others) 3336 Plus Compass Endorse Fore, Dithane Disarm Heritage Insignia  †Banner MAXX+ Chlorothalonil †Bayleton 50W+ Chlorothalonil †Tourney	3-6 oz. 6-8 oz 0.15-0.25oz. 4.0 oz. 6 oz. 0.18-0.36 oz. 0.2-0.4 oz. 0.5-0.9 oz. 1.0 + 3.2 oz. 0.5-0.3.2 oz.	Apply as needed on a 10-14 day interval beginning mid-July. †DMI fungicides alone are weak, but tank-mixes with chlorothalonil or Fore may provide up to 21 days control during low to moderate disease pressure periods. Collect clippings and mow when turf is dry. Avoid using 3336 Plus, Compass, Disarm Heritage, and Insignia more than twice annually to delay the onset of resistance.

Leaf Spot, Melting-Out, and Net-blotch  Drechslera spp., Bipolaris spp. (Formerly Helminthosporium spp.) All turfgrasses	Chipco 26GT Compass Curalan Chlorothalonil (Daconil, others) Fore, Dithane Medallion	2-4 oz. 0.15-0.25 oz. 2-4 oz. 3-6 oz. 4-6 oz. 0.25 oz.	Apply as needed on 14-21 day intervals. Avoid drought stress, light and frequent watering, excessive thatch, applications of broadleaf herbicides and high N fertility in spring. Overseed with improved cultivars.
April to November			
Microdochium Patch (a.k.a. Pink Snow Mold and Fusarium Patch)  Microdochium nivale  All turfgrasses, esp. bentgrass and annual bluegrass  November to May	†Banner MAXX †Bayleton 50W †Chipco 26GT †Chlorothalonil (Daconil, Others) †Disarm †Heritage †Insignia †Compass †3336 Plus **Medallion †Terraclor 75 WP †Tourney †Triton Flo	2-4 oz. 1-2 oz 4-8 oz. 3-6 oz. 0.18-0.36 oz. 0.4-0.7 oz. 0.9 oz. 0.25 oz. 2-4 oz. 0.5 oz. 6-8 oz. 0.37 oz. 0.3-1.1 oz.	Symptoms appear during cool, wet weather in the presence or absence of snow cover. Where chronic, apply just prior to cold and wet weather. Disease can be most damaging in April and May.  † Tank-mix with chlorothalonil, Terraclor or Chipco 26GT for best results.  **Tank-mix with Banner MAXX.  ‡ See label restrictions.
Moss All turfgrasses, especially putting greens All year, especially summer	Junction Fatty acid soaps TerraCyte Quicksilver	2-6 oz. See label See label See label	Chemicals are more effective in spring and fall than summer. Quicksilver is most consistent. All can discolor. Apply Junction in 5.0 gal. water/1000ft <sup>2</sup> . Physically remove by verticutting; increase mowing height; and increase N fertility in fall [ammonium sulfate (3.0 lb N/M <sup>2</sup> /yr)].
Necrotic Ring Spot  Ophiosphaerella korrae  Kentucky bluegrass and creeping red fescue  All year, especially April to November	Banner MAXX Eagle 3336 Plus Heritage Rubigan AS Triton Flo	4.0 oz. 1.2 oz. 4.0 oz. 0.2-0.4 oz 4.0-6.0 fl. oz. 0.3-1.1 oz.	Apply fungicide in April and May, and water-in prior to drying on leaves. The symptoms of this disease mimic summer patch. Necrotic ring spot is uncommon in Maryland, but can be severe in some cultivars.
Nematodes  All turfgrass species host nematodes, but putting greens are most susceptible to injury.  Summer	None available		Increase mowing height, irrigate deeply but infrequently, use proper amounts of N-P-K fertilizers at appropriate times of year. There are no commercially available chemicals that are known to effectively control plant parasitic nematodes.

Powdery Mildew	Banner MAXX Bayleton 50W	1-2 oz. 1.0 oz.	Apply as needed. Reduce shade and improve air movement. Avoid excessive N
Blumeria graminis	Disarm	0.18-0.36 oz.	fertility, drought stress, and increase
(Formerly <i>Erysiphe</i>	Eagle	1.2 oz.	mowing height.
graminis)	Heritage	0.2-0.4 oz.	
g.a.ro,	Tiomago	0.2 0.1 02.	
Bluegrasses and fine fescues in shaded sites			
April to November			
Pythium Blight	Alude	5-10 oz.	†Koban and SP are best for curative (i.e.,
D 41.	(other K		knockdown) treatment. Water early in the
<i>Pythium</i> spp.	phosphites)	4 - 4	day, and improve drainage and air
	*Banol	1.5-4 oz.	circulation. Avoid excessive N fertility.
All turfgrasses, particularly	<sup>†</sup> Koban	4-6 oz.	Most of these materials can discolor
ryegrass, bentgrass,	Segway	0.45-0.9 fl. oz.	greens when applied during hot weather.
annual bluegrass, and	*Signature	4-6 oz.	
fescues. Spring or summer	*Subdue MAXX	0.5-1.0 oz.	*Tank-mixing with Fore/Dithane WP (4.0-
seeded stands are	<sup>†</sup> Terramec SP	4-6 oz.	6.0 oz/1000ft <sup>2</sup> ) is suggested.
especially vulnerable.			- <del>-</del>
			Signature, Banol and Subdue can provide
June to September			14 or more days of control. Length of
			control can be less than 7 days when
			environmental conditions are very
			conducive for this disease. Signature and
			Banol should be applied preventively for
			best results.
	+		
Pythium Root Diseases	† Banol	1.5-4 oz.	Apply as needed on 14- 21 day intervals.
	<sup>†</sup> Koban	4-6 oz.	Improve drainage and increase mowing
<i>Pythium</i> spp.	**Insignia	0.9 oz.	height. †Water-in to a 0.5-1.0 inch soil
	*Signature	4-6 oz.	depth.
Annual bluegrass and	Segway	0.45-0.9 fl. oz.	*Tank mix with Fore WP (4-6 oz/1000ft <sup>2</sup> )
bentgrass	<sup>†</sup> Subdue MAXX	0.5-1.0 oz.	and do not water-in. Fore flowable is not
	<sup>†</sup> Terramec SP	4-6 oz.	compatible with Signature.
Spring and autumn during			** Insignia drenches were shown to be
excessively wet periods			effective on patch-type root Pythium (i.e.,
, , , , , , , , , , , , , , , , , , , ,			P. volutum).
Ded There d / D'   D / C	D 1440///		,
Red Thread / Pink Patch	Banner MAXX Bayleton 50W	2 oz. 0.5- 1.0 oz.	Apply as needed on 14-21 day intervals.  Maintain adequate N fertility levels. Apply
Laetisaria fuciformis and	Curalan	2-4 oz.	1.0 lb N/1000ft <sup>2</sup> in the spring when the
Pink Patch ( <i>Limonomyces</i>	Chipco 26GT	2-4 02. 4 oz.	disease is evident.
	•		uisease is evidelit.
spp.)	Compass	0.10-0.25 oz.	
All trinferences as a self-ride t	Chlorothalonil	3-6 oz.	
All turfgrasses, particularly	(Daconil, others)	0.40.000	
ryegrasses and creeping	Disarm	0.18-0.36 oz.	
red fescue	Endorse	4.0 oz.	
	Heritage	0.2-0.4 oz	
All year during wet,	Insignia	0.5-0.9 oz.	
overcast periods	ProStar	2.2 oz.	
(especially April to June)	Trinity	1-2 oz.	
, , , , , , , , , , , , , , , , , , , ,	Tourney	0.37 oz.	
	Triton Flo	0.4-1.1 oz.	
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Rust	Banner MAXX	2 oz.	One application would be expected to be
Puccinia graminis and other Puccinia spp.  Bluegrasses (especially Merion), ryegrass and zoysiagrass	Bayleton Disarm Eagle Heritage Insignia Tourney Triton Flo	0.5 -1.0 oz. 0.18-0.36 oz. 1.0-2.0 oz 0.2-0.4 oz. 0.5-0.9 oz. 0.37 oz. 0.3-1.1 oz.	very effective. Improve turf vigor by maintaining adequate N levels.
July to October			
Spring Dead Spot  Ophiosphaerella korrae	Banner MAXX Eagle Disarm Heritage	4.0 fl. oz. 2.4 oz 0.36 oz. 0.4 oz.	Apply a fungicide once in mid-Sept. or about 30 days prior to expected bermudagrass dormancy. Expect only 30-60% reduction in disease. Spring and
Bermudagrass, esp. Tufcote and Vamont	*Rubigan AS	4.0-6.0 fl. oz.	summer applications of ammonium sulfate + KCl help to reduce disease severity over time. Avoid applying N after mid-August. Avoid nitrate forms of N. *Rubigan applied at 4.0 fl. oz. per 1000ft²., three times on a 14 day interval ending prior to bermudagrass dormancy also provides preemergence <i>Poa annua</i> control.
Stripe Smut	Banner MAXX Bayleton	1-2 oz. 1-2 oz.	A single application in May or during mid to late October provides good control.
Ustilago striiformis and Flag Smut Urocystis agropyri Bluegrasses (particularly Merion), ryegrasses, and tall fescue Primarily spring and fall	Eagle	1-2 oz. 1-2 oz.	Avoid drought stress and control excessive thatch.
Slime Molds	No fungicide necessary		Remove fruiting structures from turfgrass leaves by mowing, poling, dragging,
Physarum cinereum and others	necessary		brushing or hosing with water.
All turfgrasses	MINISTER CONTRACTOR OF THE PROPERTY OF THE PRO		
Moist periods, moderate temperature of spring, summer and fall			
Southern Blight	Disarm	0.36 oz.	Apply or spot apply fungicide as needed.
Sclerotium rolfsii	Heritage ProStar	0.4 oz 2.2-4.0 oz.	This disease rarely occurs in Maryland.
Bluegrass and bentgrass			
Summer			

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Summer Patch  Magnaporthe poae	Banner MAXX Bayleton 50W Compass	2-4 oz. 1-2 oz. 0.25 oz.	Apply in early June and early July to lawns.
Kentucky bluegrass,	3336 Plus Disarm	4-8 oz. 0.18-0.36 oz.	For greens, begin treatment in mid-May and apply on 28 day intervals. Increase
annual bluegrass, and fine	Eagle	1.2-2.4 oz.	mowing height, and irrigate deeply at
leaf fescue	Heritage	0.2-0.4 oz.	onset of drought. Avoid excessive thatch,
1001 100000	Insignia	0.9 oz	compaction, high N fertility in spring, and
July to September	Tourney Triton Flo	0.37 oz. 0.6-1.1 oz.	nitrate forms of N. Use slow release and acidifying N fertilizers such as sulfur coated urea.
			Watering-in fungicide before it dries on leaves may improve effectiveness.
Take-all Patch	Bayleton	2.0-4.0 oz.	Disease injury is best alleviated by
Coolingon	Banner MAXX	2.0-4.0 oz.	acidifying soil with ammonium sulfate
Gaeumannomyces	*Rubigan AS Dismiss	4.0 oz. 0.36 oz.	(A.S.) or ammonium chloride (A.C.). Substitute A.S. or A.C. for other water
graminis var. avenae	Heritage	0.30 02. 0.4 oz.	soluble N fertilizers, and apply 3-4 lbs
var. avonao	Insignia	0.9 oz.	N/1000ft <sup>2</sup> annually, with one application
Bentgrasses	Triton Flo	0.6-1.1 oz.	during April.
Infection periods spring			Maintain soil pH = 5.5, and avoid use of
and fall;			limestone unless pH falls below 5.2. Apply
damage may not appear until late spring or summer			potassium (2-4 lbs/1000ft²) from KCl and phosphorus (1-2 lbs/1000ft²) annually. Apply MnSO <sub>4</sub> (Mn at 1-2 lb/acre) monthly, except winter.
			Fungicides applied 2 to 4 times curatively or preventively in Oct., Nov., Apr., and May will alleviate disease injury. Apply fungicides to greens in 100 gal./acre with flat-fan nozzles. *Rubigan may injure annual bluegrass.
Typhula Blight or	<sup>,‡</sup> Banner MAXX	2-4 oz.	Apply before the first heavy snow or onset
Gray Snow Mold	<sup>‡</sup> Bayleton 50W	1-2 oz.	of cold, rainy weather. Generally, only one
Timbula inagmata	<sup>‡</sup> Compass	0.25 oz.	early winter application is sufficient in
Typhula incarnata Typhula ishikariensis	<sup>‡</sup> Chipco 26GT <sup>‡</sup> Chlorothalonil	4-8 oz. 3-6 oz.	Maryland.
i ypiiula isilikalielisis	(Daconil, others)	J-U UZ.	*See label restrictions.
All turfgrasses	<sup>‡</sup> Disarm	0.18-0.36 oz.	<sup>‡</sup> Tank-mix with Chlorothalonil, Chipco
<u>5</u>	<sup>‡</sup> Heritage	0.4 oz.	26GT or Terraclor for best results.
December to April	<sup>‡</sup> Insignia	0.9 oz.	
	<sup>‡</sup> Medallion	0.5 oz.	
	<sup>‡</sup> ProStar	3.0-4.5 oz.	
	*Terraclor 75 WP  †Terramec SP	6-8 oz. 6-9 oz.	
	<sup>‡</sup> Tourney	0-9 02. 0.37 oz.	
	<sup>‡</sup> Triton Flo	0.3-1.1 oz.	
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Yellow Patch or Cool Temperature Brown Patch  Rhizoctonia cerealis  Bentgrass, annual bluegrass and perennial ryegrass  November to May	†Chipco 26GT †Chlorothalonil (Daconil, others) †Dismiss †Endorse †Heritage †Medallion ‡ProStar	4-6 oz. 3-6 oz. 0.28-0.36 oz. 4-0 oz. 0.2-0.4 oz. 0.5 oz. 3.0-4.5 oz.	Apply as needed on a 14 day interval.  †Tank-mix with chlorothalonil, Chipco 26GT, or Medallion for best results.  ‡ ProStar has both preventive and curative activity.  3336 Plus has little or no effect on this disease.
Yellow Tuft  Sclerophthora macrospora  All turfgrasses  All year, especially late fall to spring	*Subdue MAXX	0.5-1.0 oz.	Make one or two annual applications preventively in spring or fall. Apply three times on a two week interval for curative control; curative control can be erratic. Improve drainage.  *Tank-mix with Medallion for best results.

<sup>&</sup>lt;sup>x</sup> Chlorothalonil is sold under the following trade names: Daconil Ultrex, Daconil Weatherstik, Concorde, Echo, Manicure and others. There are several formulations and rates vary. See the label for more specific rate information.

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<sup>&</sup>lt;sup>y</sup> Propiconazole is sold under the following trade names: Banner MAXX, Propiconazole Pro, and Spectator. There are two formulations and rates vary. See the label for more specific rate information information.

<sup>&</sup>lt;sup>z</sup> Iprodione is sold under the trade names of Chipco 26GT, Iprodione Pro and others.