

# Commercial Crop Production: Turfgrass

## Turfgrass

### Integrated Disease Management

Effective turfgrass disease management can be achieved by maintaining healthy and vigorously growing grass. Diseases can be avoided by selecting turfgrass species that are well-adapted to site conditions and the local climate. Establishing a fertility program that promotes turfgrass vigor, adopting optimal mowing heights and using good irrigation practices can minimize fungicide use significantly.

### Disease identification key for southern turfgrass.

Developed by G. Holcomb, Professor Emeritus

#### I. Grass affected in patches.

Patch Size	Leaf Lesions Present	Disease
about 3" in diameter	Yes	Dollar spot
greater than 3" in diameter	No	<b>See rows 1-4 in table below.</b>

Patch Details	Disease
<b>Ring or arc of lush growth or dead grass; mushrooms present or absent.</b>	Fairy ring
<b>No ring or arc of lush growth present; no mushrooms present.</b> Grass often affected in streaks, with leaves matted; primarily on rye grass over-seeded on golf courses and Bermudagrass greens.	Pythium blight
<b>No ring or arc of lush growth present; no mushrooms present.</b> Patches more or less circular, may enlarge to several feet; leaves rotted at the base, can be pulled easily from the leaf sheath.	Large patch <sup>1</sup>
<b>No ring or arc of lush growth present; no mushrooms present.</b> Affected areas irregular in shape, 8-24 inches in diameter (or larger) with a mixture of yellow and dead grass; roots are sparse, short and black; stolons may be rotted.	Take-all root rot <sup>2</sup>

<sup>1</sup> Formerly known as brown patch.

<sup>2</sup> Take-all root rot may also resemble chinch bug damage.

**Table 1. Fertility and mowing practices for turfgrass.**

Grass Type	Nitrogen Fertility Timing	Mowing <sup>1</sup>
Warm season grasses	Summer (April-August)	1-2 inches
Cool season grasses	Fall	2.5 to 4.0 inches

<sup>1</sup> Do not remove more than one-third of the leaf growth during a single mowing. Maintain a sharp blade to minimize mechanical injuries on leaf blades.

#### II. Grass not affected in patches.

Description	Disease
Chlorotic spots and orange powder (spores that can be rubbed off) on leaves.	Rust
Leaf spots present, but no orange powder present.	<b>See rows 1-3 in table below.</b>
No leaf spots present.	<b>See row 4 or 5 in table below.</b>

Affected Turf Grass Details	Disease
Leaf spots varying in size; occurring primarily on Bermudagrass and ryegrass.	Leaf spots or melting out
Leaf spots oval to irregular in shape with brown borders and tan to gray centers; primarily on St. Augustinegrass.	Gray leaf spot
Leaf spots reddish brown to brown surrounded by a yellow halo; primarily on centipedegrass.	Anthrachnose
Grass covered with an easily removed slimy or crusty growth.	Slime molds <sup>3</sup>
Mottle, chlorosis or mosaic on leaves; on St. Augustinegrass or centipedegrass.	St. Augustine decline or Centipede decline <sup>4</sup>

<sup>3</sup> Nonpathogenic. Not a disease.

<sup>4</sup> Viral diseases caused by *Panicum mosaic virus*.

**Table 2. Fungicides labeled for use on commercial turfgrasses for specific disease management.**

Fungicide <sup>1</sup>	Large patch	Dollar spot	Gray leaf spot	Leafspots & melting out	Take-all root rot <sup>2</sup>	Fairy ring	Pythium blight	Algae
azoxystrobin	Yes	No	Yes	Yes	Yes	Yes	Yes	No
boscalid	No	Yes	No	No	No	No	No	No
captan	No	No	No	Yes	No	No	No	No
chlorothalonil	No	Yes	Yes	Yes	No	No	No	Yes
cyazofamid	No	No	No	No	No	No	Yes	No
ethazole (etridiazole)	No	No	No	No	No	No	Yes	No
fenarimol	No	Yes	No	No	Yes	No	No	No
fludioxonil	No	No	Yes	Yes	No	No	No	No
fluoxastrobin	No	No	Yes	Yes	Yes	No	Yes	No
flutolanil	Yes	No	No	No	No	Yes	No	No
fosetyl-al	No	No	No	No	No	No	Yes	No
iprodione	Yes	Yes	No	Yes	No	No	No	No
mancozeb	No	Yes	Yes	Yes	No	No	Yes	Yes
mefenoxam	No	No	No	No	No	No	Yes	No
metconazole	Yes	Yes	No	No	No	Yes	No	No
myclobutanil	Yes	Yes	No	Yes	Yes	No	No	No
polyoxin D	Yes	No	Yes	Yes	No	Yes <sup>3</sup>	No	No
phosphites (various salts)	No	No	No	No	No	No	Yes	No
propamocarb	No	No	No	No	No	No	Yes	No
propiconazole	Yes	Yes	Yes	Yes	Yes	No	No	No
pyraclostrobin	No	Yes <sup>3</sup>	Yes	Yes	Yes	Yes	Yes	No
quintozene (PCNB)	No	Yes	No	Yes	No	No	No	No
tebuconazole	Yes	Yes	Yes	No	Yes	No	No	No
thiophanate-methyl	Yes	Yes	Yes	Yes	Yes	No	No	No
thiram	No	Yes	No	No	No	No	No	No
triadimefon	Yes	Yes	Yes	No	Yes	No	No	No
trifloxystrobin	No	Yes	Yes	Yes	No	No	No	No
triticonazole	Yes	Yes	No	No	Yes	No	No	Yes
vinclozolin	No	Yes	No	Yes	No	No	No	No

<sup>1</sup> Active ingredient.<sup>2</sup> Also known as *Gaeumannomyces graminis* var. *graminis* (Ggg) root decline, Bermuda decline and spring dead spot.<sup>3</sup> For disease suppression only.

**Table 3. Efficacy<sup>1</sup> of fungicides in managing turfgrass diseases.**

**Table Legend**

Efficacy	Number
Consistently good	4
Good to excellent control in most experiments	3
Fair to good control in most experiments	2
Inconsistent but performs well in some instances	1
Not effective	-

<sup>1</sup>Efficacy data are based on trials using commercial formulations of the fungicides, not the formulations readily available to homeowners. Ratings were compiled by Bruce B. Clarke Department of Plant Biology, Rutgers University; Paul Vincelli, Department of Plant Pathology, University of Kentucky; Paul Koch, Department of Plant Pathology, University of Wisconsin-Madison; Ming-Yi Chou, Department of Plant Biology, Rutgers University; (PPA-1 Chemical Control of Turfgrass Diseases 2024; <https://publications.ca.uky.edu/ppa-1>).

<sup>2</sup>Active ingredient.

<sup>3</sup>Also known as *Gaeumannomyces graminis* var. *avenae* (Ggg) root decline, Bermuda decline and spring dead spot.

<sup>4</sup>Ratings within parentheses are for take-all root decline caused by Ggg.

Fungicide <sup>2</sup>	Large patch	Dollar spot	Gray leaf spot	Leaf spots & melting out	Take-all root rot <sup>3</sup>	Fairy ring	Pythium blight	Algae
azoxystrobin	4	-	4	3	(3)	3	2	-
boscalid	-	4	-	-	-	-	-	-
chlorothalonil	-	3	2	2				3
copper hydroxide + mancozeb	-	-	-	-	-	-	-	4
cyazofamid	-	-	-	-	-	-	3	-
fenarimol	-	3	-	-	(2)	-	-	-
fludioxonil	-	-	-	3	-	-	-	-
fluopicolide + pfropamocarb	-	-	-	-	-	-	3	-
fluxastrobin	-	-	-	-	-	-	2	-
flutolanil	4	-	-	-	-	3	-	-
fosetyl-al	-	-	-	-	-	-	2	-
iprodione	2	3	-	4	-	-	-	-
mancozeb	-	1	2	3	-	-	2	3
mefenoxam	-	-	-	-	-	-	2	-
metconazole	-	4	2	-	-	3	-	-
myclobutanil	2+	4	-	1	-	-	-	-
polyoxin D	1	-	1	-	-	2+	-	-
phosphite salts	-	-	-	-	-	-	2	-
propamocarb	-	-	-	-	-	-	2	-
propiconazole	2	4	2	2	(2)		-	-
pyraclostrobin	3	2+	4	3	(3)	3	2+	-
quintozene (PCNB)	4	-	-	2	-	-	-	-
tebuconazole	-	4	-	-	-	-	-	-
thiophanate-methyl	-	4	4	2	-	-	-	-
triadimefon	4	4	2	-	(2)	3	-	-
trifloxystrobin	-	-	3	2	-	-	-	-
triticonazole	3	4	-	-	-	-	-	2
vinclozolin	-	4	-	3+	-	-	-	-

**Table 4. Fungicides registered for use on commercial turfgrasses only.**

Fungicide <sup>1</sup>	Trade Name <sup>2</sup>	Product Mode of Action Group (FRAC) <sup>2</sup>	Formulation	Rate <sup>4</sup>	Maximum Use
azoxystrobin	Heritage	11	50WG	0.2-0.4 oz	3.7 oz
azoxystrobin	Heritage G	11	0.31G	2-4 lb	37 lb
azoxystrobin	Heritage TL	11	8.8L	1-2 fl oz	18.5 fl oz
boscalid	Emerald <sup>6</sup>	7	70WG	0.13-0.18 oz	1.1 oz
captan	Captan	M	50WP	0.13-0.2 lb	N/A
captan	Captan	M	80WDG	0.125 lb	N/A
chlorothalonil	Chlorostar, Chlorothalonil, Ensign	M	82.5WDG	1-5 oz	See label
chlorothalonil	Daconil, Echo, Equus, Initiate, Mainsail, Manicure	M	54F	1-5.5 oz	See label
cyazofamid	Segway	21	34.5F	0.45-0.9 fl oz	2.7 fl oz
ethazole (etridiazole)	Terrazole <sup>8</sup>	14	35WP	2-4 oz	10 oz
fenarimol	Rubigan	3	11.6L	0.75-8 fl oz	32 fl oz
fludioxonil	Medallion	12	50WP	0.25-0.5 oz	1.5 oz
fluopicolide	Stellar <sup>9</sup>	43	5.7SC	1.2 fl oz	2.4 fl oz
fluoxastrobin	Disarm	11	480SC	0.09-0.36 fl oz	0.4 fl oz
fluoxastrobin	Disarm	11	0.25G	1.2-4.6 lb	0.4 fl oz
flutolanil	Prostar	7	70WP	1.5-4.5 oz	4.5 oz
fosetyl-al	Chipco Signature	33	80WDG	4-8 oz	180 lb
fosetyl-al	Prodigy Signature	33	80WDG	4-8 oz	181 lb
iprodione	26GT	2	23.3F	3-8 fl oz	35 fl oz
iprodione	Chipco 26019	2	50WP	1.5-4 oz	17.6 oz
iprodione	Iprodione Pro	2	23.3F	3-8 fl oz	35 fl oz
mancozeb	Dithane	M	37F	6.4-12.8 fl oz	See label
mancozeb	Fore	M	75DF	4-8 oz	See label
mancozeb	Manzate, Penncozeb	M	80WP	4-8 oz	See label
mancozeb	Pentathlon	M	37F	6.4-12.8 fl oz	See label
mancozeb	Protect	M	75DF	4-8 oz	See label
mefenoxam	Fenox	4	22.5F	0.2-1 fl oz	3 apps/ season
mefenoxam	Mefenoxam, Ultra Flourish	4	25.1	0.5-1 fl oz	3 apps/ season
mefenoxam	Subdue	4	1G	12.5-25 oz	3 apps/ season

Fungicide <sup>1</sup>	Trade Name <sup>2</sup>	Product Mode of Action Group (FRAC) <sup>2</sup>	Formulation	Rate <sup>4</sup>	Maximum Use
metconazole	Tourney	3	50WDG	0.18-0.44 oz	4 lb/A
myclobutanil	Eagle	3	20EW	1-2.4 fl oz	13.8 fl oz
myclobutanil	Hoist	3	40WP	0.6-1.2 oz	7.2 oz
polyoxin D zinc salt	Endorse	19	2.5WP	See label	See label
propamocarb hydrochloride	Banol	28	66.5L	1.3-4 fl oz	12.5 fl oz
propiconazole	Banner	3	14.3L	0.5-4 fl oz	16 fl oz
propiconazole	Spectator	3	41.8L	0.18-1.44 fl oz	5.8 fl oz
propiconazole	Dorado	3	14.3L	0.5-4 fl oz	16 fl oz
propiconazole	Fathom	3	14.3L	0.5-4 fl oz	16 fl oz
propiconazole	Honor Guard	3	14.3L	0.5-4 fl oz	16 fl oz
propiconazole	Propensity	3	14.3L	0.5-4 fl oz	16 fl oz
propiconazole	Propiconazole	3	41.8L	0.18-1.44 fl oz	5.8 fl oz
propiconazole	Savvi	3	14.3L	0.5-4 fl oz	16 fl oz
pyraclostrobin	Insignia	11	20WG	0.5-0.9 oz	5.5 oz
quintozene (PCNB)	Glacier	14	10G	5-7.5 lb	Refer to label
quintozene (PCNB)	Parflo	14	38.3F	11-24 fl oz	Refer to label
quintozene (PCNB)	PCNB	14	75WP	7-16 oz	Refer to label
quintozene (PCNB)	Revere	14	Refer to label	Refer to label	Refer to label
quintozene (PCNB)	Terraclor	14	Refer to label	Refer to label	Refer to label
quintozene (PCNB)	Turfcide	14	Refer to label	Refer to label	Refer to label
tebuconazole	Torque <sup>13,6</sup>	3	38.7L	0.6 fl oz	3.6 fl oz
thiophanate-methyl	3336	1	50WP	1-5 fl oz	Refer to label
thiophanate-methyl	Allban	2	46.2F	2-6 fl oz	Refer to label
thiophanate-methyl	Cavalier	3	41.25L	2-6 fl oz	Refer to label
thiophanate-methyl	Quali-Pro TM	4	46.2F	2-6 fl oz	Refer to label
thiophanate-methyl	T-Methyl	5	46.2F	2-6 fl oz	Refer to label
thiophanate-methyl	Transom	6	46.2F	2-6 fl oz	Refer to label
thiophanate-methyl	T-Storm	7	2G	1.5-9 lb	Refer to label
thiram	Defiant	M	75WDG	3.8-7.5 fl oz	Refer to label
thiram	Spotrete	M	44F	3.75-7.1 fl oz	Refer to label
thiram	Thiram	M	42.1L	2.5-5 oz	Refer to label
triadimefon	Bayleton	3	50WP	0.25-2 oz	Refer to label

Fungicide <sup>1</sup>	Trade Name <sup>2</sup>	Product Mode of Action Group (FRAC) <sup>2</sup>	Formulation	Rate <sup>4</sup>	Maximum Use
trifloxystrobin	Compass	11	50WDG	0.1-0.25 oz	3 apps
triticonazole	Trinity, Triton	3	19.2L	0.5-2 fl oz	6 fl oz
vinclozolin	Curalan	2	50EG	1 oz	3 oz
vinclozolin	Touché	2	50EG	1 oz	3 oz

<sup>1</sup> Active ingredient

<sup>2</sup> Reference to commercial or trade names is made with the understanding that no discrimination is intended nor endorsement of a particular product by LSU or the LSU AgCenter is implied.

<sup>3</sup> Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

<sup>4</sup> Rates are the amount of formulation (product) per 1,000 square feet unless otherwise indicated.

<sup>5</sup> Maximum use per 1,000 square feet per year unless otherwise noted.

<sup>6</sup> For golf course use only.

<sup>7</sup> Not for use on home lawns or turf associated with apartments, day care centers, playgrounds or athletic fields next to schools (elementary through high school).

<sup>8</sup> For use on golf course tees and greens only.

<sup>9</sup> Premixed with propamocarb for control of *Pythium* spp.

<sup>10</sup> Do not use on Bermudagrass.

<sup>11</sup> Helena Prophyt for use on sod farms only. Refer to label for modes of application and restrictions.

<sup>12</sup> Formulation based on phosphorous acid equivalent in lb/gal.

<sup>13</sup> Bermudagrass may be sensitive.

<sup>14</sup> For use on golf courses and sod farms only.

<sup>15</sup> Not for use on commercial sod.

**Table 5. Turfgrass fungicide combinations**

Fungicide <sup>1</sup>	Trade Name <sup>3</sup>	Product Mode of Action Group <sup>2</sup>	Formulation	Rate <sup>4</sup>	Maximum Use
azoxystrobin + propiconazole	Headway	11, 3	5.7 + 9.5L	0.75-3.0 fl oz	Refer to label
azoxystrobin + propiconazole	Headway G	11, 3	0.31 + 0.75G	2-4 lb	Refer to label
azoxystrobin + chlorothalonil	Renown <sup>7</sup>	11, M	3 + 45L	2.5-4.5 fl oz	Refer to label
chlorothalonil + propiconazole + fludioxonil	Instrata <sup>7</sup>	M, 3, 12	29.9 + 4.7 + 1.2L	2.75-11 fl oz	Refer to label
chlorothalonil + thiophanate-methyl	Consyst <sup>7</sup>	M, 1	50 + 16.7WDG	2-5 oz	Refer to label
chlorothalonil + thiophanate-methyl	Spectro 90 <sup>7</sup>	M, 2	72 + 18WDG	3-5.8 oz	Refer to label
chlorothalonil + thiophanate-methyl	Peregrine <sup>7</sup>	M, 3	72 + 18WDG	3-5.8 oz	Refer to label
chlorothalonil + thiophanate-methyl	Quali-Pro TM/C <sup>7</sup>	M, 4	50 + 16.7WDG	2-5 oz	Refer to label
fluopicolide + propamocarb hydrochloride	Stellar <sup>14</sup>	43, 28	5.54 + 55.4SC	1.2 fl oz	Refer to label
fluoaxastrobin + chlorothalonil	Disarm C <sup>7</sup>	11, M	2.44 + 38.4L	1.5-5.9 fl oz	Refer to label
fluoaxastrobin + myclobutanil	Disarm M	11, 3	15.8 + 25.6L	0.25-1.0 fl oz	Refer to label
iprodione+ thiophanate-methyl	26/36 <sup>15</sup>	2, 1	19.65 + 19.65L	1-4 fl oz	14.5 fl oz
iprodione+ thiophanate-methyl	TM + IP <sup>15</sup>	2, 1	19.65 + 19.65L	1-4 fl oz	6 apps/season
mancozeb + copper hydroxide	Junction	M, M	15 + 46.1DF	2-4 oz	Refer to label
propiconazole + chlorothalonil	Concert <sup>7</sup>	3, M	2.9 + 38.5L	1.5-8.5 fl oz	Refer to label
pyraclostrobin + boscalid	Honor <sup>6</sup>	11, 7	16.8 + 11.2WG	0.55-1.1 oz	Refer to label
thiophanate-methyl + flutolanil	SysStar	1, 7	28.6 + 51.4WDG	2-3 oz	Refer to label
trifloxystrobin + triadimefon	Armada	11, 3	25L	1-2 fl oz	3 apps
trifloxystrobin + triadimefon	Tartan	11, 3	50WP	0.6-1.2 oz	Refer to label
triticonazole + chlorothalonil	Reserve <sup>7</sup>	3, M	5 + 40L	3.2-5.4 fl oz	Refer to label

<sup>1</sup> Active ingredient

<sup>2</sup> Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).

<sup>3</sup> Reference to commercial or trade names is made with the understanding that no discrimination is intended nor endorsement of a particular product by LSU or the LSU AgCenter is implied.

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<sup>5</sup> Maximum use per 1,000 square feet per year unless otherwise noted.

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<sup>7</sup> Not for use on home lawns or turf associated with apartments, day care centers, playgrounds or athletic fields next to schools (elementary through high school).

<sup>8</sup> For use on golf course tees and greens only.

<sup>9</sup> Premixed with propamocarb for control of *Pythium* spp.

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The turf grass section was revised October 2023 by R. Singh.