

Commercial Crop Production Turfgrass

Integrated Turfgrass Disease Management

Effective turfgrass disease management can be achieved by maintaining healthy and vigorously growing grass. Diseases can be avoided by selecting resistant cultivars and turfgrass species that are well-adapted to site conditions and the local climate. Establishing a fertility program that promotes turfgrass vigor (Table 1), adopting optimal mowing heights (Table 1) and using good irrigation practices can minimize fungicide use significantly.

| Table 1. Fertility and mowing practices for turfgrass | | |
|--|----------------------------------|---------------------------|
| Grass Type | Nitrogen Fertility Timing | Mowing¹ |
| Warm season grasses | Summer (April-August) | 1-2 inches |
| Cool season grasses | Fall | 2.5 to 4.0 inches |

¹Do 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.

Commercial Crop Production Turfgrass

Table 2. Disease identification key for Southern turfgrass

Developed by Dr. G. Holcomb, Professor Emeritus

I. Grass affected in distinct patches, yellow to brown.

- | | |
|---|---|
| <p>A. Patches about 3 inches in diameter; leaf lesions present.</p> | <p>Dollar spot</p> |
| <p>B. Patches greater than 3 inches in diameter; no leaf lesions present. Go to 1 or 2.</p> | |
| <p>1. Ring or arc of lush growth or dead grass; mushrooms present or absent.</p> | <p>Fairy ring</p> |
| <p>2. No ring or arc of lush growth present; no mushrooms present.</p> | |
| <p> a. Grass often affected in streaks, with leaves matted; primarily on rye grass over-seeded on golf courses and Bermudagrass greens.</p> | <p>Pythium blight</p> |
| <p> b. Patches more or less circular, may enlarge to several feet; leaves rotted at the base, can be pulled easily from the leaf sheath.</p> | <p>Large patch¹</p> |
| <p> c. 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.</p> | <p>Take-all root rot²</p> |

II. Grass not affected in patches.

- | | |
|--|--|
| <p>A. Chlorotic spots and orange powder (spores that can be rubbed off) on leaves.</p> | <p>Rust</p> |
| <p>B. Leaf spots present, but no orange powder present. Go to 1, 2, or 3.</p> | |
| <p>C. No leaf spots present. Go to 4 or 5.</p> | |
| <p>1. Leaf spots varying in size; occurring primarily on Bermudagrass and ryegrass.</p> | <p>Melting out or Leaf spot</p> |
| <p>2. Leaf spots oval to irregular in shape with brown borders and tan to gray centers; primarily on St. Augustinegrass.</p> | <p>Gray leaf spot</p> |
| <p>3. Leaf spots reddish brown to brown surrounded by a yellow halo; primarily on centipedegrass.</p> | <p>Anthracnose</p> |
| <p>4. Grass covered with an easily removed slimy or crusty</p> | |

Commercial Crop Production Turfgrass

| Table 2. Disease identification key for Southern turfgrass <i>Developed by Dr. G. Holcomb, Professor Emeritus</i> | |
|---|--|
| growth. 5. Mottle, chlorosis or mosaic on leaves; on St. Augustinegrass or centipedegrass. | Slime molds³ St. Augustine decline or Centipede dDecline⁴ |
| ¹ Formerly known as Brown patch. ² Take-all root rot may also resemble chinch bug damage. ³ Nonpathogenic. Not a disease. ⁴ Viral diseases caused by <i>Panicum mosaic virus</i> . | |

| Table 3. Fungicides labeled for use of commercial turfgrasses | | | | | | | | |
|--|-------------|----------------|----------------|--------------------------|--------------------------------|----------------|----------------|-------|
| Fungicide ¹ | Large patch | Dollar spot | Gray leaf spot | Leaf spots & Melting out | Take-all root rot ² | Fairy ring | Pythium blight | Algae |
| azoxystrobin | X | | X | X | X | X | X | |
| boscalid | | X | | | | | | |
| captan | | | | X | | | | |
| chlorothalonil | | X | X | X | | | | X |
| cyazofamid | | | | | | | X | |
| ethazole (etridiazole) | | | | | | | X | |
| fenarimol | | X | | | X | | | |
| fludioxonil | | | X | X | | | | |
| fluoxastrobin | | | X | X | X | | X | |
| flutolanil | X | | | | | X | | |
| fosetyl-al | | | | | | | X | |
| iprodione | X | X | | X | | | | |
| mancozeb | | X | X | X | | | X | X |
| mefenoxam | | | | | | | X | |
| metconazole | X | X | | | | X | | |
| myclobutanil | X | X | | X | X | | | |
| polyoxin D | X | | X | X | | X ³ | | |
| phosphites (various salts) | | | | | | | X | |
| propamocarb | | | | | | | X | |
| propiconazole | X | X | X | X | X | | | |
| pyraclostrobin | | X ^c | X | X | X | X | X | |

Commercial Crop Production Turfgrass

| Table 3. Fungicides labeled for use of commercial turfgrasses | | | | | | | | |
|---|-------------|-------------|----------------|--------------------------|--------------------------------|------------|----------------|-------|
| Fungicide ¹ | Large patch | Dollar spot | Gray leaf spot | Leaf spots & Melting out | Take-all root rot ² | Fairy ring | Pythium blight | Algae |
| quintozene (PCNB) | | X | | X | | | | |
| tebuconazole | X | X | X | | X | | | |
| thiophanate-methyl | X | X | X | X | X | | | |
| thiram | | X | | | | | | |
| triadimefon | X | X | X | | X | | | |
| trifloxystrobin | | X | X | X | | | | |
| triticonazole | X | X | | | X | | | X |
| vinclozolin | | X | | X | | | | |

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

| Table 4. Efficacy ¹ of fungicides in managing turfgrass diseases | | | | | | | | |
|---|-------------|-------------|----------------|--------------------------|--------------------------------|------------|----------------|-------|
| Fungicide ² | Large patch | Dollar spot | Gray leaf spot | Leaf spots & Melting out | Take-all root rot ^c | 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 + pfpromocarb | | | | | | | 3 | |
| fluoxastrobin | | | | | | | 2 | |
| flutolanil | 4 | | | | | 3 | | |
| fosetyl-al | | | | | | | 2 | |
| iprodione | 2 | 3 | | 4 | | | | |

Commercial Crop Production Turfgrass

Table 4. Efficacy¹ of fungicides in managing turfgrass diseases

| Fungicide ² | Large patch | Dollar spot | Gray leaf spot | Leaf spots & Melting out | Take-all root rot ^c | Fairy ring | Pythium blight | Algae |
|------------------------|-------------|-------------|----------------|--------------------------|--------------------------------|------------|----------------|-------|
| 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 | | 3.5 | | | | |

¹Efficacy ratings are on a scale from 1 to 4 where 1=inconsistent but performs well in some instances, and 4=consistently good to excellent results. Efficacy data are based on trials using commercial formulations of the fungicides, not the formulations readily available to homeowners. Ratings were compiled by Drs. Vincelli and Williams at the University of Kentucky (PPA-1 Chemical Control of Turfgrass Diseases 2011; <http://pest.ca.uky.edu/PSEP/Manuals/ppa1.pdf>).

²Active ingredient.

³Also, *Gaeumannomyces graminis* var. *avenae* (Ggg) root decline, Bermuda decline and spring dead spot.

⁴Ratings within parentheses are for take-all patch caused by Ggg.

Commercial Crop Production Turfgrass

| Table 5. Fungicides registered for use on commercial turfgrasses only | | | | | |
|--|----|--|-------------------------|--|--------------------------------|
| Fungicide¹ and Product Mode of Action Group² | | Trade Name³ | Formulation | Rate⁴ | Maximum Use⁵ |
| azoxystrobin | 11 | Heritage Heritage G Heritage TL | 50WG 0.31G 8.8L | 0.2-0.4 oz 2-4 lb 1-2 fl oz | 3.7 oz 37 lb 18.5 fl oz |
| boscalid | 7 | Emerald ⁶ | 70WG | 0.13-0.18 oz | 1.1 oz |
| captan | M | Captan | 50WP 80WDG | 0.13-0.2 lb 0.125 lb | |
| chlorothalonil | M | Chlorostar, Chlorothalonil, Countdown, Daconil, Echo, Ensign, Equus, Initiate, Mainsail, Manicure | 38.5F 54F 82.5WDG | 1.5-8.3 fl oz 1-5.5 fl oz 1-5 oz | |
| cyazofamid | 21 | Segway | 34.5F | 0.45-0.9 fl oz | 2.7 fl oz |
| ethazole (etrifiazole) | 14 | Terrazole ⁸ | 35WP | 2-4 oz | 10 oz |
| fenarimol | 3 | Rubigan | 11.6L | 0.75-8 fl oz | 32 fl oz |
| fludioxonil | 12 | Medallion | 50WP | 0.25-0.5 oz | 1.5 oz |
| fluopicolide | 43 | Stellar ⁹ | 5.7SC | 1.2 fl oz | 2.4 fl oz |
| fluoxastrobin | 11 | Disarm | 480SC 0.25G | 0.09-0.36 fl oz 1.2-4.6 lb | 0.4 fl oz |
| flutolanil | 7 | Prostar | 70WP | 1.5-4.5 oz | 4.5 oz |
| fosetyl-al | 33 | Chipco Signature Prodigy Signature | 80WDG 80WDG | 4-8 oz 4-8 oz | |
| iprodione | 2 | 26GT Chipco 26019 Iprodione Pro | 23.3F 50WP | 3-8 fl oz 1.5-4 oz | 35 fl oz 17.6 oz |
| mancozeb | M | Dithane, Fore, Manzate, Penncozeb, Pentathlon, Protect | 37F 75DF 80WP | 6.4-12.8 fl oz 4-8 oz 4-8 oz | See label |

Commercial Crop Production Turfgrass

| Table 5. Fungicides registered for use on commercial turfgrasses only | | | | | |
|---|-------------------------|---|--|---|-----------------------|
| Fungicide ¹ and Product Mode of Action Group ² | Trade Name ³ | Formulation | Rate ⁴ | Maximum Use ⁵ | |
| mefenoxam | 4 | Fenox Mefenoxam Subdue Ultra Flourish | 1G 21.3L 22.5F 25.1 45WP | 12.5-25 oz 0.5-1 fl oz 0.2-1 fl oz 0.5-1 fl oz 0.28-0.56 oz | 3 apps/ season |
| metconazole | 3 | Tourney | 50 WDG | 0.18-0.44 oz | 4 lb/A |
| myclobutanil | 3 | Eagle Hoist | 20EW 40WP | 1-2.4 fl oz 0.6-1.2 oz | 13.8 fl oz 7.2 oz |
| phosphite (salts of phosphorous acid) | 33 | Alude, Exel, Fosphite, Fungi-phite, Helena Prophyt ¹¹ , Primera Magellan, Vital | 3.35 ¹² 3.9 4.2 4.32 | 5-10 fl oz 2-3 fl oz 4-6 fl oz 4.1-8.2 fl oz | |
| polyoxin D zinc salt | 19 | Endorse | 2.5WP | Refer to label | |
| propamocarb hydrochloride | 28 | Banol | 66.5L | 1.3-4 fl oz | 12.5 fl oz |
| propiconazole | 3 | Banner, Dorado, Fathom, Headway, Honor Guard, Propensity, Propiconazole, Sarvi, Spectator | 14.3L 41.8L | 0.5-4 fl oz 0.18-1.44 fl oz | 16 fl oz 5.8 fl oz |
| pyraclostrobin | 11 | Insignia | 20WG | 0.5-0.9 oz | 5.5 oz |
| quintozene (PCNB) | 14 | Glacier, Parflo, PCNB, Revere, Terraclor, Turfcide | 10G 38.3F 75WP | 5-7.5 lb 11-24 fl oz 7-16 oz | Refer to label |
| tebuconazole | 3 | Torque ^{13,6} | 38.7L | 0.6 fl oz | 3.6 fl oz |
| thiophanate- methyl | 1 | 3336, Allban, Cavalier, Quali- Pro TM, T- Methyl, Transom, T- Storm | 2G 41.25L 46.2F 50WP | 1.5-9 lb 2-6 fl oz 1-5 fl oz 2-6 oz | Refer to label |

Commercial Crop Production Turfgrass

| Table 5. Fungicides registered for use on commercial turfgrasses only | | | | | |
|---|-------------|--|----------------------------|---------------------------|-----------------------------|
| Fungicide ¹ and Product Mode of Action Group ² | | Trade Name ³ | Formulation | Rate ⁴ | Maximum Use ⁵ |
| thiram | M | Defiant, Spotrete, Thiram | 42.1L 75WDG | 3.8-7.5 fl oz 2.5-5 oz | Refer to label |
| triadimefon | 3 | Bayleton | 50WP | 0.25-2 oz | Refer to label |
| trifloxystrobin | 11 | Compass | 50WDG | 0.1-0.25 oz | 3 apps |
| triticonazole | 3 | Trinity, Triton | 19.2L | 0.5-2 fl oz | 6 fl oz |
| vinclozolin | 2 | Curalan Touché | 50EG | 1 oz | 3 oz |
| Fungicide Combinations | | | | | |
| azoxystrobin + propiconazole | 11, 3 | Headway Headway G | 5.7 + 9.5L 0.31 + 0.75G | 0.75-3.0 fl oz 2-4 lb | Refer to labels |
| azoxystrobin + chlorothalonil | 11, M | Renown ⁷ | 3 + 45L | 2.5-4.5 fl oz | |
| chlorothalonil + propiconazole + fludioxonil | M, 3, 12 | Instrata ⁷ | 29.9+ 4.7+ 1.2L | 2.75-11 fl oz | |
| chlorothalonil + thiophanate-methyl | M, 1 | Consyst ⁷ Spectro 90 ⁷ Peregrine ⁷ Quali-Pro TM/C ⁷ | 50 + 16.7WDG 72 + 18WDG | 2-5 oz 3-5.8 oz | |
| fluopicolide + pPropamocarb hydrochloride | 43, 28 | Stellar ¹⁴ | 5.54 + 55.4SC | 1.2 fl oz | |
| fluoxastrobin + chlorothalonil | 11, M | Disarm C ⁷ | 2.44 + 38.4L | 1.5-5.9 fl oz | |
| fluoxastrobin + myclobutanil | 11, 3 | Disarm M | 15.8 + 25.6L | 0.25-1.0 fl oz | Refer to label |
| iprodione + thiophanate-methyl | 2, 1 | 26/36 ¹⁵ TM + IP ¹⁵ | 19.65 + 19.65L | 1-4 fl oz | 14.5 fl oz 6 apps/season |
| mancozeb + copper hydroxide | M, M | Junction | 15 + 46.1DF | 2-4 oz | |
| propiconazole + | 3, M | Concert ⁷ | 2.9 + 38.5L | 1.5-8.5 fl oz | |

Commercial Crop Production Turfgrass

| Table 5. Fungicides registered for use on commercial turfgrasses only | | | | | |
|---|-------------------------|----------------------|-------------------|-----------------------------|----------------|
| Fungicide ¹ and Product Mode of Action Group ² | Trade Name ³ | Formulation | Rate ⁴ | Maximum Use ⁵ | |
| chlorothalonil | | | | | |
| pyraclostrobin + boscalid | 11, 7 | Honor ⁶ | 16.8 + 11.2WG | 0.55-1.1 oz | |
| thiophanate-methyl + flutolanil | 1, 7 | SysStar | 28.6 + 51.4WDG | 2-3 oz | Refer to label |
| trifloxystrobin + triadimefon | 11, 3 | Armada Tartan | 25L 50WP | 1-2 fl oz 0.6-1.2 oz | 3 apps |
| triticonazole + chlorothalonil | 3, M | Reserve ⁷ | 5 + 40L | 3.2-5.4 fl oz | |

¹Active ingredient
²Mode of action groups are determined by the Fungicide Resistance Action Committee (FRAC).
³Reference 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.
⁴Rates are the amount of formulation (product) per 1,000 square feet unless otherwise indicated.
⁵Maximum use per 1,000 square feet per year unless otherwise noted.
⁶For golf course use only.
⁷Not for use on home lawns or turf associated with apartments, day care centers, playgrounds or athletic fields next to schools (elementary through high school).
⁸For use on golf course tees and greens only.
⁹Premixed with propamocarb for control of *Pythium*.
¹⁰Do not use on bermudagrass.
¹¹Helena Prophyt for use on sod farms only. Refer to label for modes of application and restrictions.
¹²Formulation based on phosphorous acid equivalent in lb/gal.
¹³Bermuda grass may be sensitive.
¹⁴For use on golf courses and sod farms only.
¹⁵Not for use on commercial sod.

Information in this section was last updated in December 2018 by Dr. R. Singh.