Turf Disease

Disease-Description	Cultural Management	Chemical Controls*
Algae- black scum-like or slimy growth in thin turf areas or non-crop areas such as gravel. Found often in sunny areas.	- Improve drainage - Diagnose and correct conditions that limit turf growth - Decrease irrigation frequency and/or duration - Aerify and/or rake area to break up algal mats	benzyl ammonium-chloride, chlorothalonil, chlorothalonil + zinc, mancozeb, mancozeb + copper hydroxide
Anthracnose- thinning of cool-season turf during hot, humid weather. Dead leaves are scattered among healthy leaves	-Any practice that will relieve heat stress (fans, syringing, etc.) -Raise mowing height	azoxystrobin, chlorothalonil, chlorothalonil + thiophanate methyl, fenarimol, myclobutanil, propiconazole, pyraclostrobin, thiophanate methyl, triadimefon, trifloxystrobin
Brown Patch- Bentgrass- patches 6" to 1' in diameter, “smoke ring” visible at outer edge of patch early in morning, favored by hot, humid weather Tall fescue-patches 6" to 3' in diameter, “smoke ring” may be visible, as well as lesions on leaf blades; favored by hot, humid weather and moderate to high N fertility Bermudagrass + Zoysia-large patches up to 10' in diameter appear at greenup in Spring	Cool season grasses - reduce N fertility during hot, humid weather; syringe or sweep turf to remove dew	azoxystrobin, chlorothalonil, chlorothalonil + thiophanate methyl, fludioxonil, flutolanil, iprodione, mancozeb, myclobutanil, polyoxin D, propiconazole, pyraclostrobin, thiophanate methyl, triadimefon, trifloxystrobin, vinclozolin
Bentgrass Dead Spot - Small patches, similar to ball marks, appear on bentgrass golf greens. During early development, patches are reddish-brown or copper colored. Unlike dollar spot, you will see no visible fungal growth with BDS. BDS is usually most active during summer and early fall.	Urea forms of N fertilizer have been reported to help speed recovery when used in conjunction with fungicide sprays	boscalid, fludioxonil, pyraclostrobin

Disease-Description	Cultural Management	Chemical Controls*
Dollar Spot- Small silver dollar-size spots appear on golf greens; on higher cut turf, patches may be 6" in diameter; favored by low N fertility; white mycelium is often visible in patches early in morning when dew is present	-Increase N fertility according to soil test -Some bentgrass cultivars are resistant -Remove dew on golf greens	boscalid, chlorothalonil, myclobutanil, propiconazole, pyraclostrobin, triadimefon
Fairy Ring- Mushrooms and/or fungal puffballs may be associated with rings of dark green turf, dead turf or normal looking turf	-Remove all woody debris during establishment -Aerify and use wetting agents -N fertilization may mask dark green rings -Soil removal or fumigation are more drastic measures for high value turf areas	azoxystrobin, flutolanil, flutolanil + thiophanate methyl, pyraclostrobin
Gray Leaf Spot - May cause blighting of ryegrass and tall fescue during summer months; leaf spots may be present on foliage	-Avoid high N during summer months -Irrigate only as needed to keep foliage as dry as possible -Thatch removal may help	azoxystrobin, chlorothalonil, chlorothalonil + thiophanate methyl, flutolanil + thiophanate methyl, mancozeb, propiconazole, pyraclostrobin, thiophanate methyl, trifloxystrobin
Leaf Spot/Melting Out- (Bipolaris or Drechslera spp.)- One of the most visible symptoms is a dark brown leaf lesion. These fungi may attack leaves, crowns and roots, causing a generalized thinning, browning and melting out.	-Avoid over fertilization -Stress from improper soil fertility, pH or herbicide applications may increase disease severity -Raise mowing height -Reduce thatch	azoxystrobin, chlorothalonil, fludioxonil, iprodione, mancozeb, propiconazole, pyraclostrobin, trifloxystrobin, vinclozolin

Disease-Description	Cultural Management	Chemical Controls*
Microdochium Patch (Pink Snow Mold)- Small patches of diseased turf form on golf greens or under tarps on athletic fields overseeded with pyrennial rygrass. Mycelium is often visible and has a pinkish hue.	-Avoid high N fertilization going into winter -Mow turf as long as it is actively growing -Remove leaves from turf promptly -Remove tarps from overseeded athletic fields when possible during warm periods during winter months	azoxystrobin, chlorothalonil, chlorothalonil + thiophanate methyl, fludioxonil, iprodione, mancozeb, myclobutanil, propiconazole, pyraclostrobin, thiophanate methyl, triadimefon, trifloxystrobin, vinclozolin
Pythium Diseases- Pythium Blight (Cottony Blight, Greasy Spot)- white mycelium may be visible on affected grass. Symptoms follow drainage areas. Plants totally collapse. Pythium Root Rot- part of the summer decline syndrome of bentgrass. Affected grass may thin, have a short root system, and wilt easily. Pythium Patch- a cool season disease of bentgrass, in which affected greens have mottled appearance. Infected plants have dead leaf tips	-Improve drainage to prevent standing water -Greens should be built to ensure excellent drainage -Deep tine aerification may help on older greens by improving water infiltration -Avoid excessive irrigation -Fungicide treated seed can be used to protect seedlings in areas with a history of pythium blight -Avoid excessive N rates	etridiazole, fosetyl Al, potassium salt of phosphoric acid, mefanoxam, propamocarb,
Red Thread- usually found on bluegrass, but may be found on fescues and ryegrass. Patches may resemble dollar spot. Pinkish-red “threads” (mycelium) are visible at the tips of leaf blades. Red thread occurs most often during the spring.	-Fertilize turf according to soil test as red thread most often appears on nutrient deficient turf -Irrigate deeply but infrequently -Sanitation: remove clippings when mowing	azoxystrobin, chlorothalonil, flutolanil, iprodione, myclobutanil, polyoxin D, propiconazole, pyraclostrobin, thiophanate methyl, triadimefon, vinclozolin

Disease-Description	Cultural Management	Chemical Controls*
Rust-normally the first symptom noticed is a yellowing of affected turf. Close examination of leaf blades reveals yellow leaf spots with yellow to orange pustules of rust. Thinning occurs in diseased turf.	-Plant resistant species or cultivars when available -Mow at regular intervals as rust may develop on overgrown turf -Remove clippings on diseased turf -Fertilize turf according to soil test	chlorothalonil, mancozeb, myclobutanil, propiconazole, pyraclostrobin, triadimefon
Slime Mold- brown to gray fungal growth appears on leaf blades following warm, wet weather. Slime mold fungi move from soil onto leaf blades. Slime mold is harmless to turf.	-Slime mold may be removed by mowing, raking or brushing; fungicides are not necessary	
Spring Dead Spot- SDS is normally a disease of hybrid bermudagrass. Bleached patches of dead grass 6"-3' in diameter appear at greenup. The fungi associated with SDS are active in early fall, although symptoms only appear the following spring.	-Avoid N fertilization after late August -Apply potassium (2 lbs/1000 sq ft) -Raise mowing height -Reduce thatch by dethatching (power rake) or core aerification	azoxystrobin, fenarimol, myclobutanil, propiconazole
Take-all Patch - frog eye spots develop on bentgrass greens. **Bermuda Decline**- affected bermuda thins; roots, rhizomes and stolons may be dark and discolored	-Maintain soil pH at 6.0 -Use acidifying fertilizers if soil pH is alkaline -Core aerify and topdress with clean sand -Application of manganese may help -Raise mowing height on bermuda greens	azoxystrobin, fenarimol, propiconazole, pyraclostrobin, triadimefon
Yellow Patch (Cool Season Brown Patch)- yellow rings develop on bentgrass rings during late fall or winter months. This disease often disappears with the advent of warmer weather		azoxystrobin, fludioxonil, flutolanil,

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Insect Control for Home Lawns

PEST	INSECTICIDE	AMOUNT/1000 SQ. FT. (or as noted)	REMARKS, PRECAUTIONS
IMPORTED FIRE ANTS Around residences, try **Program 1,** **Two Step method:** 1. Broadcast one of the baits first. IGR baits are distributed well because they don't affect the worker. 2. 7-10 days later, apply a drench, dust, fast-acting bait (hydramethylnon, indoxacarb, abamectin, or spinosad), granules, dust or drench to the individual mounds that are likely to be encountered by people. See **http://fireant.utk.edu or extension.org/fire+ants** for more fire ant control strategies. Contact your local county Extension agent or TDA if fire ants are located in regions of the state where they have not been seen before. Fire ants are in all (A) or part (P) of the following counties as of 2015: Anderson (A), Bedford (A), Benton (A), Bledsoe (A), Blount (A), Bradley (A), Cannon (P), Carroll (A), Chester (A), Coffee (A), Crockett (A), Cumberland (P), Davidson (P), Decatur (A), Dickson (P), Fayette (A), Franklin (A), Gibson (P), Giles (A), Grundy (A), Hamilton (A), Hardeman (A), Hardin (A), Haywood (A), Henderson (A), Hickman (A), Houston (A), Humphreys (P), Knox (A), Lauderdale (P), Lawrence (A), Lewis (A), Lincoln (A), Loudon (A), Madison (A), Marion (A), Marshall (A), Maury (A), McMinn (A), McNairy (A), Meigs (A), Monroe (A), Moore (A), Morgan (P), Perry (A), Polk (A), Rhea (A), Roane (A), Rutherford (A), Sequatchie (A), Sevier (A), Shelby (A), Stewart (P), Tipton (A), Van Buren (A), Warren (A), Wayne (A), White (A), Williamson (A), Wilson (P). For details on quarantine lines and other info, see http://fireants.utk.edu or TDA's web site at: http://www.tn.gov/agriculture/regulatory/importedfireants.shtml	**BAITS** Extinguish™ bait (IGR) 0.5% methoprene	broadcast 1-1.5 lb/acre or 3-5 Tbsp. around the mound (& labeled for pasture, cropland)	***Use fresh bait.*** Most available fire ant baits use soybean oil as a feeding attractant. Baits that are old (over 2 years old in an air-tight container), left in unsealed bags, or stored at high temperatures may become rancid and will not be fed upon by foraging workers. ***Keep baits dry.*** Wet baits are not attractive to fire ants. Apply baits when the grass and ground are dry or drying, and rain is not expected, preferably for the next 24 hours. ***Apply baits when fire ants are actively foraging.*** Foraging activity can be determined by spreading bait in a small pile in the area to be treated. If fire ants are actively foraging, you should see ants removing the bait within 10 to 30 minutes. This also will indicate that the bait is attractive, and not too old. Fire ants generally will forage when air temperatures are between 70 and 90F. During hot, summer weather, apply baits in the late afternoon or evening because fire ants will forage at night under these conditions. **Broadcast the bait, or apply it as directed 2-4 ft. around, NOT ON, the mound.** **Avoid disturbing the ants right before applying the bait.** **Do not contaminate baits with fertilizer or other pesticides.**
	Distance bait (IGR) 0.5% 2-[1-Methyl-2(4-phenoxyphenoxy)ethoxy]pyridine	broadcast 1-1.5 lb/acre or 1-4 Tbsp. around the mound	
	Award II /Optigard 0.011% abamectin For use by professionals	broadcast 1 lb/acre, limited to 4 lb per acre per yr. or for 12 or less mounds per acre 5-7 Tbsp. around the mound.	
	PT Ascend Fire Ant Bait Formula 1 0.011% abamectin	broadcast 0.4 oz/1000 sq.ft. or 5-7 Tbsp. around the mound	
	Spectracide Fire Ant Killer Plus Preventer Bait Once & Done 0.016% indoxacarb	broadcast 0.5 lb/1000sqft or 4 Tbsp. around the mound	
	Advion Fire Ant Bait 0.045% indoxacarb	broadcast 1.5 lb/acre or 0.5 oz/1000 sq. ft. or 4 Tbsp. around the mound; up to 4 app/yr.	
	Garden Tech Over n' Out Fire Ant Mound Treatment (blue jug) 0.008% indoxacarb	Measure and pour cap (Mound treatment only)	
	Amdro® Fire Ant Bait 0.73% hydramethylnon Other hydramethylnon fire ant baits include ProBait, AmdroPro, etc.	broadcast 1-2 lb/acre or 2- 5 level Tbsp. around the mound See labels for other hydramethylnon baits.	
	Siesta Fire Ant Bait 0.063% metaflumizone	apply 1.5 pounds per acre. If needed, retreat after 4 to 8 weeks. DO NOTexceed 6.0 lbs/A total or 4 apps.per year.	
	Extinguish Plus (IGR & Other) 0.37% hydramethylnon 0.25% s-methoprene	broadcast 1-1.5 lb/acre or 2-5 Tbsp. around the mound (& labeled for pasture)	
	spinosad baits, such as, Ferti-Lome, and Southern Ag Payback. Spinosyns are produced by a soil microorganism (Saccharopolyspora spinosa).	See label. Usually 4 Tbs around the mound	

PEST	INSECTICIDE	AMOUNT/1000 SQ. FT. (or as noted)	REMARKS, PRECAUTIONS
IMPORTED FIRE ANTS CONT'D **Program 2.** Small areas where less than 20 - 30 mounds per acre. Apply individual mound (drench, dust or granular) treatments as needed. See the following web sites for more fire ant management info: http://fireants.utk.edu http://www.extension.org/fire+ants	**DRENCHES**	See label	For a list of many products available to treat fire ants see http://fireants.utk.edu/resources/updates.html . For a list of Alabama products by price and application type (broadcast vs. individual mound treatment) see http://www.aces.edu/pubs/docs/A/ANR-0175-A/ANR-0175-A.pdf .
	DUSTS	See label	
	GRANULES	See label	
Program 3. Ant Elimination Method. 1. Broadcast a bait (optional) 2. Broadcast a contact insecticide(granule or liquid) to lawn when fire ant activity noted.			For a list of many products available to treat fire ants in Tennessee see http://fireants.utk.edu/resources/updates.html.

PEST	INSECTICIDE	AMOUNT/1000 SQ. FT. (or as noted)	REMARKS, PRECAUTIONS
ARMYWORMS AND CUTWORMS	Bayer Advanced Complete Insect Killer for Soil and Turf ready-to-spray imidacloprid 0.72% β-cyfluthrin 0.36%	dilutes automatically, see label	See label at http://www.bayeradvanced.com Imidacloprid for early instar white grubs and β-cyfluthrin for above ground pests such as armyworms, cutworms, sod webworms, etc.
	Bayer Advanced Complete Insect Killer for Soil and Turf ready-to-spread granules imidacloprid 0.15% β-cyfluthrin 0.05%	2 to 3 lbs.	See label at http://www.bayeradvanced.com Imidacloprid for early instar white grubs and β-cyfluthrin for above ground pests such as armyworms, cutworms, sod webworms, etc.
	Spectracide Triazide Insect Killer for Lawns & Landscapes Conc. & Ready to Spray gamma-cyhalothrin 0.08%	see label	See label at http://www.spectracide.com/Customer-Help/Labels-and-MSDS.aspx
	Ortho Bug-B- Gon Max Lawn & Garden Insect Killer1 RTS Concentrate bifenthrin 0.3%	dilutes automatically, see label	See label
	Bayer Advanced Vegetable & Garden Insect Spray Concentrate cyfluthrin 0.75%	3 fl. oz./gallon per 500 sq. ft.	See label at http://www.bayeradvanced.com
	Bayer Advanced PowerForce Multi-insect Killer Ready-to-Spread Granules β-cyfluthrin 0.05%G	2-3 lbs.	See label at http://www.kellysolutions.com/erenewals/documentsubmit/KellyData/OK/pesticide/Product%20Label/72155/72155-35/72155-35_Bayer_Advanced_Power_Force_Multi_Insect_Killer_R_T_Spread_Granules_6_28_2006_1_01_02_PM.pdf
	Monterey Garden Insect Spray spinosad 0.5%	2 oz. per gallon	for armyworms only Mix and apply a minimum of 3 gal. of spray per 1,000 sq. ft. Delay watering or mowing for 24 hr. after application. For best results apply in early morning or late afternoon. See label at http://www.montereylawngarden.com/product_labels_msds.aspx
	Spectracide Triazide Insect Killer for Lawns Granules gamma-cyhalothrin 0.05% G	0.8 lb	Apply with a fertilizer spreader. Apply when grass is dry. Water lawn lightly immediately after application. See label at http://www.spectracide.com/Customer-Help/Labels-and-MSDS.aspx
	GrubEx$_1$ chlorantraniliprole 0.08%	See label	Apply spring to late summer to dry lawn with a spreader and lightly water to activate. See label at http://www.kellysolutions.com/erenewals/documentsubmit/KellyData/OK/pesticide/Product%20Label/538/538-306/538-306_GrubEx_1_7_6_2009_9_50_42_AM.pdf

PEST	INSECTICIDE	AMOUNT/1000 SQ. FT. (or as noted)	REMARKS, PRECAUTIONS
BEES, WASPS, CICADA KILLERS, YELLOWJACKETS See SP341M	Bee/Wasp Killer Aerosols		Apply spray directly into nest entrance at dusk when wasps are less active. Repeat at 2-3 day intervals if activity in nest continues.
	Apicide Carbaryl 5% D		See label at http://www.mysticchemical.com/images/labels/Apicide_Label.pdf
	Bonide Termite and Carpenter Ant Dust deltamethrin 0.05% D		See label at http://www.bonideproducts.com/retail_support/labels/index.php
GREEN JUNE BEETLES (Grubs Only)	GardenTech Sevin Lawn Insect Granules carbaryl 2% G	2.25 lbs.	See label at http://www.gardentech.com
	GrubEx$_1$ chlorantraniliprole 0.08%G	See label	Apply spring to late summer to dry lawn with a spreader and lightly water to activate. http://www.kellysolutions.com/erenewals/documentsubmit/KellyData/OK/pesticide/Product%20Label/538/538-306/538-306_GrubEx_1_7_6_2009_9_50_42_AM.pdf
	Maxide Dual Action Insect Killer Concentrate Thiamethoxam 0.4% Lambda-cyhalothrin 0.16%	8 fl. Oz	Apply when insects are present. http://www.kellysolutions.com/erenewals/documentsubmit/KellyData%5COK%5Cpesticide%5CProduct%20Label%5C85579%5C100-1334-85579%5C100-1334-85579_Maxide_Dual_Action_Insect_Killer_Concentrate_12_14_2009_2_46_45_PM.pdf
WHITE GRUBS of MAY BEETLES, CHAFERS, JAPANESE BEETLE, **GREEN JUNE BEETLES**, ETC.	Bayer Advanced 24-Hour Grub Killer Plus[I] Ready-To-Spread Granules trichlorfon 9.3 % G	2 lbs.	Treat lawn early to mid-August. When grubs are present. Water grass thoroughly after application. See label at http://www.bayeradvanced.com
	GrubEx imidacloprid 0.2% G	2.87 lbs.	Apply once, anytime from mid-June through mid-July. http://www.kellysolutions.com/erenewals/documentsubmit/KELLYDATA%5COK%5CPESTICIDE%5CPRODUCT%20LABEL%5C538%5C432-1339-538%5C432-1339-538_GRUBEX_1_25_2005_5_24_53_PMSecured.Pdf
	Bayer Advanced Lawn Season Long Grub Control ready-to-spray imidacloprid 1.47%	dilutes automatically, see label	You may spray this product over soil or mulch. Remove weed barrier before applying. See label at http://www.bayeradvanced.com
	Bayer Advanced Complete Insect Killer for Soil and Turf ready-to-spray imidacloprid 0.72% β-cyfluthrin 0.36%	dilutes automatically, see label	see label at http://www.bayeradvanced.com Imidacloprid should control early instar white grubs and beta-cyfluthrin should control above ground pests such as armyworms, cutworms, sod webworms,etc.
	GrubEx$_1$ chlorantraniliprole 0.08%	See label	Apply spring to late summer to dry lawn with a spreader and lightly water to activate. http://www.kellysolutions.com/erenewals/documentsubmit/KellyData/OK/pesticide/Product%20Label/538/538-306/538-306_GrubEx_1_7_6_2009_9_50_42_AM.pdf

PEST	INSECTICIDE	AMOUNT/1000 SQ. FT. (or as noted)	REMARKS, PRECAUTIONS
MILLIPEDES, SOWBUGS, PILLBUGS	GardenTech Sevin Lawn Insect Granules carbaryl 2% G	2.25 lbs.	See label at http://www.gardentech.com
	Spectracide Triazide Insect Killer for Lawns Granules gamma-cyhalothrin 0.05% G	0.8 lb	See label at http://www.spectracide.com/Customer-Help/Labels-and-MSDS.aspx
SOD WEBWORMS	Bayer Advanced Complete Insect Killer for Soil and Turf ready-to-spray imidacloprid 0.72% β-cyfluthrin 0.36%	dilutes automatically, see label	See label at http://www.bayeradvanced.com Imidacloprid should control early instar white grubs and β-cyfluthrin should control above ground pests such as armyworms, cutworms, sod webworms,etc.
	Bayer Advanced Complete Insect Killer for Soil and Turf ready-to-spread granules imidacloprid 0.15% β-cyfluthrin 0.05%	2 to 3 lbs.	See label at http://www.bayeradvanced.com Imidacloprid should control early instar white grubs and β-cyfluthrin should control above ground pests such as armyworms, cutworms, sod webworms, etc.
	Bayer Advanced Vegetable & Garden Insect Killer cyfluthrin 0.75%	3 fl. oz./gallon per 500 sq. ft.	See label at http://www.bayeradvanced.com
	Spectracide Triazide Lawn and Landscape Concentrate gamma-cyhalothrin 0.08%	3 Tbsp per gallon per 240 sq. ft.	Thoroughly wet grass before applying. Delay additional watering or mowing for 24 hours. http://www.spectracide.com/Customer-Help/Labels-and-MSDS.aspx
	Monterey Garden Insect Spray spinosad 0.5%	2 oz. per gallon	Mix and apply a minimum of 3 gal. of spray per 1,000 sq. ft. Delay watering or mowing for 24 hr. after application. http://www.montereylawngarden.com/product_labels_msds.aspx
	GrubEx$_1$ chlorantraniliprole 0.08%	See label	Apply spring to late summer to dry lawn with a spreader and lightly water to activate. http://www.kellysolutions.com/erenewals/documentsubmit/KellyData/OK/pesticide/Product%20Label/538/538-306/538-306_GrubEx_1_7_6_2009_9_50_42_AM.pdf
	Bayer Advanced 24-Hour Grub Killer Plus [I] Ready-To-Spread Granules trichlorfon 9.3% G	1.33 lbs.	See label at http://www.bayeradvanced.com

Remove thatch prior to treatment to reduce pest harborage sites, and to allow insecticide and water to reach the soil.

Sampling and Economic Thresholds for Turfgrass Insect Pests

White grubs -Sample several square foot sections of turf by using a shovel or spade to cut out a square foot section and lift the turf back to count grubs. Treatment should be made if white grubs have reached the economic threshold. See above and http://eppserver.ag.utk.edu/redbook/pdf/commturfinsects.pdf for treatment times.

Threshold Targets for White Grubs

Assuming Adequate Growing Conditions & No Digging Animals

Annual White Grubs 5-10 grubs/square foot
(Japanese Beetle, Oriental Beetle, European Chafer, Asiatic Garden Beetle)

Masked Chafer (Annual White Grub) 15-20 grubs/square foot

Black Turfgrass Ataenius 30-50 grubs/square foot

May/June Beetles 3-8 grubs/square foot

Green June beetle grubs 6-8 grubs/square foot

Adapted from D.J. Shetlar (1995) and D.A. Potter (1982) in Hale (2012) Commercial Turfgrass Insect Control
http://eppserver.ag.utk.edu/redbook/pdf/commturfinsects.pdf

Sod webworms -- These caterpillars feed on the blades of grass. The light colored caterpillars with dark spots make silk tunnels in the grass. Check for sod webworms and cutworms by preparing a soap solution of 2 teaspoons of liquid dishwashing detergent in a gallon of water. Pour this solution over a 2 ft. by 2 ft. (4 ft^2) area. Treat when 4 to 6 or more sod webworms per 4 ft^2 are found.

Cutworms -- These dark, dingy colored caterpillars feed at night and hide in the ground in the daylight. They clip off the blades of grass at the crown. Treat when one or more cutworms per 4 ft^2 are found.

References:
Potter, D.A. 1982. Influence of feeding by grubs of the southern masked chafer on quality and yield of Kentucky bluegrass. J. Econ. Entomol. 75: 21-24.
Shetlar, D.J. 1995. Lawns and Turf/North. pp. 316-317. In R. Foster, E. Knake, R.H. McCarty, & J.J. Mortvedt [eds.], 1995 Insect Control Guide. Meister Publishing Co., Willoughby, Ohio.