

Key Points: Georgia's Turfgrass Industry and UGA's Turfgrass Program

Industry

- ✎ Estimates suggest that at 1.8 million acres, turfgrass is one of the largest agricultural commodities in the state.
- ✎ This includes home lawns, sports fields, golf courses, sod farms, and other managed landscapes areas.
- ✎ The Georgia turfgrass and related industries contribute a total of \$7.8 billion annually to the economy.
- ✎ In terms of earnings and value added, the turfgrass and related industries contribute \$4.6 billion each year.
- ✎ The federal, state, and local tax impact is over \$1 billion dollars annually.
- ✎ This industry accounts for 87,000 full- and part-time jobs.
- ✎ The majority of these jobs are related to landscape maintenance of buildings and households.
- ✎ The landscape industry has a history of professional development and use of researched-based information.
- ✎ Through drought periods, the golf and landscape segments have demonstrated exceptional environmental stewardship with their Best Management Practices (BMPs) approach to water use efficiency and conservation.
- ✎ This industry has strived to be a part of the solution to Georgia's environmental issues.

UGA Turfgrass Program

- ✎ UGA is the research, development, and education arm of Georgia's turfgrass industry.
- ✎ UGA has a 60+ year history of providing scientifically based information to the turfgrass industry.
- ✎ UGA is known for its renowned scientists and specialists developing practices, pest management strategies, and grasses that are best adapted to Georgia.
- ✎ Turfgrass breeding for warm-season species dates back to the 1950s and continues today with two productive programs focused on sustainable bermudagrass, centipedegrass, seashore paspalum (pronounced *pass-pal-um*), and zoysiagrass cultivars.
- ✎ These scientists are continuing to stretch the scientific boundaries with novel approaches and strategies to solve the most challenging management and environmental issues that face this industry.
- ✎ UGA scientists continue to be involved with water conservation and have demonstrated effective methods of achieving sustainability of natural resources (i.e. water) while maintaining industry viability.
- ✎ Extension and professional development of Georgia's turfgrass practitioners is also of strong emphasis. Without a well-educated workforce, economic development of the turfgrass industry would not be where it is today.
- ✎ Opportunities exist with continued support of strong academic programs along with industry partnership to increase economic development, further scientific exploration, and enhance the environment.

Turfgrass Industry Facts in Georgia

Clint Waltz, University of Georgia

Benefits of Turfgrass.

Turfgrasses are the primary vegetative covers on airports, athletic fields, cemeteries, churches, commercial buildings, golf courses, home lawns, schools, parks, and roadsides. While turfgrasses are typically thought of for recreation and aesthetic value, they also provide a valuable environmental service by preventing soil erosion from wind and rain, reducing runoff from rainfall, improving soil absorption of and infiltration of water, remediation of contaminated or polluted water, fire abatement, and other beneficial environmental impacts. Additionally, turfgrass are an integral component of the landscape that positively influences human behavior characteristics like improved ability to concentrate and self-discipline.

Turfgrass Industry Size.

To determine the size of the turfgrass industry in Georgia a survey was conducted in 2010 with results analyzed and published in 2012. The turfgrass and related industries contribute \$7.8 billion annually to Georgia's economy, generating over \$1 billion annually to federal, state, and local tax revenues. This industry accounts for 87,000 full- and part-time jobs, the majority related to landscape maintenance. For a copy of the survey visit www.GeorgiaTurf.com and click on "2010 Turfgrass Industry Survey" in the *Industry* link. Other estimates suggest that at 1.8 million acres, turfgrass is clearly one of the largest agricultural commodities in the state.

Home Lawns.

It is estimated there are greater than 1.25 million acres of home lawns in Georgia. In 2006, homeowners across Georgia spent about \$2.77 billion annually to maintain their lawns, labor accounted for 35% of the spending. Greater than 60% of homeowners employed fertilization and weed control practices. Generally, lawns represent the largest segment based on acreage of the industry.

Professional Landscape and Turfgrass Industry.

Based on the 2006 UGA survey, the professional turfgrass and landscape industry had annual economic impact of \$3.7 billion and employed greater than 13,000 people.

Golf Course Industry.

Based on a 2010 report commissioned by GOLF 20/20 for the Georgia Allied Golf Council and prepared by SRI International, the size of Georgia's direct golf economy was approximately \$2.4 billion. Golf brings visitors to the state, drives new construction and residential development, generates retail sales, and creates demand for goods and services.

When the total economic impact of Georgia's golf-related activities is considered, the golf industry generated approximately \$5.1 billion of direct, indirect, and induced economic output, \$1.5 billion of wage income, and 56,922 jobs.

Sod Production Industry.

The 2016 Center for Agribusiness & Economic Development Farm Gate Value Report compiled by the University of Georgia reported nearly 26,172 acres used for producing sod/stolons. The farm gate value was \$111.7 million, a 2% increase from 2015. The sale represents only the first step in turfgrass's use. After being installed it is maintained for an indefinite period which further contributes to the State's economy. In 2019, the Georgia Crop Improvement Association (www.GeorgiaCrop.com) reported 8019 acres of certified grass in production which is a 8% increase from 2018. This represents four warm-season species (bermudagrass, centipedegrass, seashore paspalum, and zoysiagrass) and one cool-season species (tall fescue). High quality turfgrasses which are true to variety also offer the end-consumer assurances they are getting the latest technology in turfgrass breeding.

Pesticide Use in Turf.

The Georgia Department of Agriculture estimates that over 3,780 people have a commercial pesticide applicators license in Category 24 – Turf and Ornamentals. This is the largest group of commercial pesticide applicator license holders in Georgia. The University of Georgia College of Agricultural and Environmental Sciences faculty hold numerous trainings each year for this group. License holders receive information on topics such as pesticide disposal and storage, safety, ground and surface water protection, non-chemical methods of pest control, and etc.

The University of Georgia Turfgrass Program.

With over 60 years of providing scientifically based information, UGA scientists provide the research, development, and education for Georgia's turfgrass industry. UGA is known for its scientists and specialists developing practices, pest management strategies, and grasses that are best adapted to Georgia. Research and Extension efforts are directed towards developing and disseminating environmentally and economically sound best management practices to maintain a sound basis for the continued growth of this dynamic industry that impacts Georgia through jobs, goods/services, property values, tourism, and the quality of life in Georgia.

BASIC TURFGRASS MANAGEMENT FOR GEORGIA

Clint Waltz, Extension Turfgrass Specialist

This calendar is a basic guide to turfgrass management in Georgia. The different geographic locations and weather conditions within the state may alter this schedule by as much as four weeks. The schedule can also change within a site because of environmental factors such as moisture, temperature, shade, soil types and conditions, and pest populations. For additional turfgrass management information, contact your county Extension office, visit www.GeorgiaTurf.com, and follow us on Twitter @GeorgiaTurf.

SELECTION:

Turfgrass selection is arguably the most important factor in developing and maintaining a high quality, problem-free turf. Selection should be based on the environment, expected use, and management intensity. Turfgrass "certified" by the Georgia Crop Improvement Association (www.GeorgiaCrop.com) as to varietal purity, freedom from noxious weeds, and documented by the **blue certified tag** should be used.

ESTABLISHMENT:

The three phases of establishment are 1) soil preparation, 2) proper planting, and 3) maintenance for two to four weeks after planting. Cool-season grasses are best established in the fall four to six weeks before the first killing frost date. The best time to plant warm-season grasses is late spring or early summer, once soil temperature at the 4-inch depth is consistently above 65° F. Visit www.weather.uga.edu to find local climatic conditions.

MOWING:

Proper mowing involves cutting the grass at the recommended height and often enough to prevent scalping. This means removing no more than 1/3, or 30%, of the total leaf surface in a mowing. So, if a turf is being cut at 2-inches, mow it when it reaches 3 inches. Not removing clippings and allowing them to naturally filter down into the turf recycles nutrients, is environmentally sound, saves time and energy, and landfill space. Visit <https://t.uga.edu/4Mp> for more information on Grasscycling. Generally raising the mowing height during periods of stress helps maintain turfgrass vigor.

IRRIGATION:

Turfgrass water needs depend on grass species, maintenance level, soil type, and weather. Proper irrigation means waiting to irrigate when the turfgrass shows signs of moisture stress, such as a bluish-gray color. Most established turfgrasses require about 1-inch of water per week during the active growth season. Supplemental irrigation should wet the soil to a 6- to 8- inch depth. Multiple start times may be needed to prevent runoff and improve irrigation efficiency on clay based soils. Likewise, two, ½-inch applications are better on sandy soils. The most efficient and effective time to irrigate is after sunset and before sunrise.

Irrigating after dew development and before sunrise is most efficient and will not increase disease problems. The Water Stewardship Act of 2010 <https://t.uga.edu/4Mo> provides outdoor irrigation guidance to local communities and water purveyors. Per the act, outdoor irrigation can occur between the hours of 4 p.m. and 10 a.m. (evening, night and early morning). Local water providers can provide details for any additional restrictions on outdoor irrigation. Visit <https://t.uga.edu/2LN> for more information on turfgrass and landscape water conservation practices.

FERTILIZATION:

Depend on soil test analysis to determine the best fertilizer grade, rate and time of application. Generally, turfgrasses require ½ - to 1-pound of nitrogen per 1,000 ft² per month during active growth. Excess nitrogen increases plant growth which means more frequent mowing, increased plant water needs, thatch formation, and possibly insect and disease problems. Visit <https://t.uga.edu/2LK> and <https://t.uga.edu/2LL> for more information on turfgrass fertility.

Turfgrass	Annual Nitrogen Rate
	(lbs. per 1,000 ft ²)
Bermudagrass	2 to 5
Centipedegrass	1 to 2
Seashore Paspalum	2 to 5
St. Augustinegrass	2 to 5
Zoysiagrass	2 to 3
Tall Fescue	2 to 4

*Clippings do not contribute to thatch under proper management and do not need to be removed. Also, recycling clippings can decrease fertilizer needs by 30 percent.

CULTIVATION:

Common cultivation practices include coring, spiking and vertical mowing. Coring is the best method to reduce soil compaction and improve water infiltration. Coring is most effective using hollow or spoon-type tines which remove plugs of soil 2 to 3 inches deep and ½- to ¾-inch in diameter. The cores may be removed or broken-up and worked back into the turf by dragging or shattering and thus serving as topdressing. The recovery rate can be improved with a fertilizer application 10 to 14 days prior to cultivation.

THATCH CONTROL:

If the thatch layer is thicker than ½-inch turfgrass vigor can be reduced. Thatch can be effectively controlled by topdressing with a ¼-inch layer of topsoil. Thatch can also be reduced by vertical mowing. Vertical mowing should be done when the turf is actively growing and at least 30 days before the "first killing frost date". Vertical mowing should be avoided during periods of temperature and moisture stress, during periods of weed seed germination, or when a preemergence herbicide has been used.

OVERSEEDING:

Warm-season turfgrasses can be overseeded with cool-season grasses (ryegrass or rough bluegrass) to provide year-long green color. This type overseeding is usually done 2 to 4 weeks prior to the first fall temperature date of 32° F. The bermudagrasses tolerate overseeding best, while it is difficult to get a uniform overseeding in centipedegrass and zoysiagrass turfs. However, overseeding can be problematic for any turfgrass species, especially when already weakened from improper management. Common warm-season grass problems associated with overseeded turfs are weak stands due to competition with the overseeding species and delayed spring green-up.

RENOVATION: Turfgrass renovation is needed when a turf declines to the point that normal management and cultural practices are not enough to revive the grass but complete re-establishment is not needed. Generally, if 50% or more of the area contains desirable turfgrass, renovation will work. Renovate at the start of the growing season.

PEST CONTROL:

Good lawn management can help reduce pest problems. When pest control is needed; (1) identify the pest problem, (2) determine if cultural or other management practices are best suited for control, (3) select the chemical recommended to control the pest, (4) be sure the turfgrass will tolerate the chemical and (5) apply the chemical according to label recommendations. Proper timing of pesticide application is needed for effective and efficient pesticide use.

WEED CONTROL:

Preemergence herbicides should be applied before weed emergence. Recommended dates of application for crabgrass and other annual grasses are February 15 to March 5 in South Georgia and March 1 to March 20 in North Georgia. These dates typically correlate to surface soil temperatures which are below 55° F, the temperature at which crabgrass will germinate. Recommended dates for annual bluegrass and selected winter annual broadleaf weed control are September 1 to September 15 in North Georgia and October 1 to October 15 in South Georgia. Apply postemergence herbicides to small, actively-growing weeds at air temperatures between 60°F and 90°F. Applications to turfgrass stressed by high temperature or drought increases the possibility of injury and usually results in poor weed control. Atrazine or simazine can be applied to warm-season turfgrasses for preemergence and/or postemergence control of annual bluegrass and selected winter annual broadleaf weeds from November through February. Avoid all postemergence herbicide applications during spring green-up of warm-season turfgrasses.

DISEASE CONTROL:

The development and maintenance of a healthy, vigorous plant through proper turfgrass management is the best method of disease prevention. Proper fertilization and irrigation are important disease prevention practices. If a disease is suspected, identification of the disease is needed before treatment can be recommended. (<http://t.uga.edu/so>)

INSECT CONTROL:

Of the many insects and related species living within a turfgrass canopy, very few cause damage. Some insects, such as white grubs and mole crickets, live in the soil and damage turfgrass roots. Others, such as armyworms and chinch bugs, feed on grass leaves and stems by chewing or sucking plant juices. When damage is apparent, an insecticide may be needed.



BERMUDAGRASS LAWN CALENDAR

Mowing Height:

Common Bermuda: 1 – 2” Hybrid Bermuda: 1 – 1½” raise 0.5” higher in hot weather. Remove no more than ⅓ total height at one time.

Water:

1” per week if no rainfall. 30 days watering allowed for newly planted sod or seed. Sod laid in fall or winter months should be kept moist.

Fertilization: 2 – 5 lbs N/1000 ft²/YR

Follow fertilizer recommendations on soil test report. If the soil was not tested, use any turf fertilizer and follow label rates.

In the spring, do not apply nitrogen containing fertilizers until the soil temperature at the 4” depth is constantly 65°F and rising.

Ideal pH Range: 5.5 – 6.5

Use dolomitic lime per soil test recommendation. Can be applied at any time.

Aeration:

Use a core aerator during active growth season.

Dethatch: If thatch exceeds ½” deep use a vertical mower with blades 1” apart; go over the lawn two directions. Top dressing with 0.25” of soil can be effective.

Seeding – New Lawn*:

Unhulled: 4 – 8 lbs per 1,000 ft². Hulled: 1 – 2 lbs per 1,000 ft².

Overseeding – Established Lawns*:

5 – 10 lbs ryegrass seed per 1,000 ft².

Sodding:

500 ft² per pallet typical.

Weed Control:

Read product label carefully to determine which weeds are controlled and on which grasses the product can be used.

Spring preemergence* prevents crabgrass, goosegrass and other annual weeds.

Broadleaf postemergence* spot spray to kill broadleaf plants like chickweed, wild violet, dandelion, wild onion, etc.

Grassy weed postemergence* kills grassy weeds like crabgrass, dallisgrass, etc. Do not apply to drought-stressed bermudagrass.

Winter preemergence* prevents chickweed and other winter weeds.

B		Best Month		P		Possible Month		M		Marginal Month	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			OK	OK	OK	OK	OK	OK	OK		
New sod	New sod	New sod	OK	OK	OK	OK	OK	OK	OK	New sod	New sod
			P	B	B	B	B	P			
B	B	B	P	P	P	P	P	P	P	B	B
			P	B	B	B	B	P			
				P	B	B	P				
			P	B	B	B	P				
								P	B	P	
M	M	M	P	B	B	B	B	P	M	M	M
	B	B	P								
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
				B	B	B	B	P			
								B	P		

* Read weed control product labels carefully. Some products cannot be applied within a few weeks of establishment or spring transition.



CENTIPEDEGRASS LAWN CALENDAR

Mowing Height:

1" – 2" raise 0.5" higher in hot weather. This is the most important practice for a healthy centipedegrass lawn.

Water:

1" per week if no rainfall. 30 days watering allowed for newly planted sod or seed. Sod laid in fall or winter months should be kept moist.

Fertilization: 1 – 2 lbs N/1000 ft²/Yr

Follow fertilizer recommendations on soil test report. If the soil was not tested, use any turf fertilizer and follow label rates.

In the spring, do not apply nitrogen containing fertilizers until the soil temperature at the 4" depth is constantly 65°F and rising.

Ideal pH Range: 5.0 – 6.0

Lime is rarely needed.

Aeration:

Use a core aerator during active growth season.

Dethatch: If thatch exceeds 0.5" deep use a vertical mower with blades 1" apart; go over the lawn only one direction. Top dressing with 0.25" of soil can be effective.

Seeding – New Lawn*:

0.25 – 1.0 lb per 1,000ft².

Overseeding – Established Lawns*:

Overseeding centipedegrass with ryegrass is not recommended.

Sodding:

500 ft² per pallet typical.

Weed Control:

Read product label carefully to determine which weeds are controlled and on which grasses the product can be used.

Spring preemergence* prevents crabgrass, goosegrass and other annual weeds.

Broadleaf postemergence* spot spray to kill broadleaf plants like chickweed, wild violet, dandelion, wild onion, etc.

Grassy weed postemergence* kills grassy weeds like crabgrass, dallisgrass, etc. Do not apply to drought-stressed centipedegrass.

Winter preemergence* prevents chickweed and other winter weed seeds from sprouting.

B		Best Month		P		Possible Month		M		Marginal Month	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				OK	OK	OK	OK	OK			
			OK	OK	OK	OK	OK	OK			
				B	P	B	P				
				B	B	B	P				
				P	P	P					
				B	B	B	P				
			P	B	B	B	P	M	M		
	B	B	P								
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
				B	B	B	B	P			
								B	P		

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ST. AUGUSTINEGRASS LAWN CALENDAR

Mowing Height:

2" – 3" raise 0.5" higher in hot weather. Remove no more than 1/3 total height at one time.

Water:

1" per week if no rainfall. 30 days watering allowed for newly planted sod or seed. Sod laid in fall or winter months should be kept moist.

Fertilization: 2 – 5 lbs N/1000 ft²/YR

Follow fertilizer recommendations on soil test report. If the soil was not tested, use any turf fertilizer and follow label rates.

In the spring, do not apply nitrogen containing fertilizers until the soil temperature at the 4" depth is constantly 65°F and rising.

Ideal pH Range: 5.5 – 6.5

Use dolomitic lime per soil test. Can be applied at any time.

Aeration:

Use a core aerator during active growth season.

Dethatch: If thatch exceeds 0.5" deep use a vertical mower with blades 1" apart; go over the lawn only one direction. Top dressing with 0.25" of soil can be effective.

Seeding – New Lawn:

St. Augustinegrass cannot be established from seed.

Overseeding – Established Lawns*:

Overseeding with ryegrass in winter is not recommended.

Sodding:

500 ft² per pallet typical.

Weed Control:

Read product label carefully to determine which weeds are controlled and on which grasses the product can be used.

Spring preemergence* prevents crabgrass, goosegrass and other summer weed seeds from sprouting.

Broadleaf postemergence* spot spray to kill broadleaf plants like chickweed, wild violet, dandelion, wild onion, etc. Herbicides like 2,4-D and MCPA cause injury, especially during green-up.

Grassy weed postemergence* kills grassy weeds like crabgrass, dallisgrass, etc. Do not apply to drought-stressed St. Augustinegrass.

Winter preemergence* prevents chickweed and other winter weed seeds from sprouting.

B		<u>B</u> est Month		P		<u>P</u> ossible Month		M		<u>M</u> arginal Month	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			OK	OK	OK	OK	OK	OK			
			OK	OK	OK	OK	OK	OK			
				B	B	B	B	P			
B	B	B	P	P	P	P	P	P	P	B	B
			P	B	B	B	P				
				P	P	P	P				
			P	B	B	B	B	P			
	B	B	P								
OK	OK			OK	OK	OK	OK	OK	OK	OK	OK
								B	P		

* Read weed control product labels carefully. Some products cannot be applied within a few weeks of establishment or spring transition.

January 2019



TURF-TYPE TALL FESCUE LAWN CALENDAR

Mowing Height:

2" – 3" raise 0.5" higher in hot weather. Remove no more than 1/3 total height at one time.

Water:

1" per week if no rainfall. 30 days watering allowed for newly planted sod or seed. Sod laid in fall or winter months should be kept moist.

Fertilization: 2 – 4 lbs N/1000 ft²/YR

Follow fertilizer recommendations on soil test report. If the soil was not tested, use any turf fertilizer and follow label rates.

Ideal pH Range: 5.5 – 6.5

Use dolomitic lime per soil test recommendation. Can be applied at any time.

Aeration:

Use a core aerator during active growth season.

Dethatch: Generally not necessary.

Seeding – New Lawn*:

5 - 6 lbs per 1000 ft².

Interseeding–Established Lawns*:

3 - 5 lbs seed per 1000 ft².

Sodding:

Tall fescue is not available in all months of the year.

Weed Control:

Read product label carefully to determine which weeds are controlled and on which grasses the product can be used.

Spring preemergence* prevents crabgrass, goosegrass and other summer weed seeds from sprouting.

Broadleaf postemergence* spot spray to kill broadleaf plants like chickweed, wild violet, dandelion, wild onion, etc.

Grassy weed postemergence* kills grassy weeds like crabgrass, dallisgrass, etc. Do not apply to drought-stressed tall fescue.

Winter preemergence* prevents chickweed and other winter weed seeds from sprouting. Do not apply preemergence herbicides if lawn is to be seeded or interseeded within 3 to 4 months.

B		Best Month		P		Possible Month		M		Marginal Month	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	New sod	New sod
	B	B	P					P	B	B	
B	B	B	P	P	P	P	P	P	P	B	B
M	M	B	B	M				P	B	P	M
P	P	P	P						P	P	P
	P	P	M	M				P	B	P	
M	P	P	P					P	B	P	M
	B	P	P	M				P	B	P	
B	B	B	P	M				P	B	B	B
	B	B	P								
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
				P	P	M	M				
								B	P		

* Read weed control product labels carefully. Some products cannot be applied within a few weeks of establishment.



ZOYSIAGRASS LAWN CALENDAR

Mowing Height:

1 – 2” raise 0.5” higher in hot weather. Remove no more than ½ total height at one time.

Water:

1” per week if no rainfall. 30 days watering allowed for newly planted sod or seed. Sod laid in fall or winter months should be kept moist.

Fertilization: 2 – 3 lbs N/1000 ft²/YR

Follow fertilizer recommendations on soil test report. If the soil was not tested, use any turf fertilizer and follow label rates.

In the spring, do not apply nitrogen containing fertilizers until the soil temperature at the 4” depth is constantly 65°F and rising.

Ideal pH Range: 6.0 – 7.0

Use dolomitic lime per soil test recommendation. Can be applied at any time.

Aeration:

Use a core aerator during active growth season.

Dethatch: If thatch exceeds 0.5” deep use a vertical mower with blades 1” apart; go over the lawn two directions. Top dressing with 0.25” of soil can be effective.

Seeding – New Lawn*:

1 – 2 lbs per 1,000ft².

Overseeding – Established Lawns*:

Overseeding zoysiagrass with ryegrass is not recommended.

Sodding:

500 ft² per pallet typical

Weed Control:

Read product label carefully to determine which weeds are controlled and on which grasses the product can be used.

Spring preemergence* prevents crabgrass, goosegrass and other summer weed seeds from sprouting.

Broadleaf postemergence* spot spray to kill broadleaf plants like chickweed, wild violet, dandelion, wild onion, etc.

Grassy weed postemergence* kills grassy weeds like crabgrass, dallisgrass, etc. Do not apply to drought-stressed zoysiagrass.

Winter preemergence* prevents chickweed and other winter weed seeds from sprouting.

B <u>Best Month</u>			P <u>Possible Month</u>				M <u>Marginal Month</u>				
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			OK	OK	OK	OK	OK	OK	OK		
New sod	New sod	New sod	OK	OK	OK	OK	OK	OK	New sod	New sod	New sod
			P	B	B	B	B	P			
B	B	B	P	P	P	P	P	P	P	B	B
			P	B	B	B	B	P			
				P	B	B	P				
			P	B	B	P					
M	M	M	P	B	B	B	B	P	M	M	M
	B	B	P								
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
				B	B	B	B	P			
								B	P		

* Read weed control product labels carefully. Some products cannot be applied within a few weeks of establishment or spring transition.

Managing Overseeded Grasses in Georgia

Clint Waltz, University of Georgia

Successful overseeding involves proper seed selection, overseeding timing and preparation, post planting maintenance, and spring transition. Successful overseeding also requires maintaining a healthy warm-season turf throughout the year. It is particularly important to maintain proper soil fertility, to relieve soil compaction, and to prevent excessive thatch development.

Overseeding selection involves selecting grasses that have characteristics suited to the particular needs. Annual ryegrass has been replaced by perennial ryegrasses, because of improved turf quality, stress and pest tolerance and manageability. The "intermediate" ryegrasses tend to perform as the name implies somewhere between annual and perennial ryegrass, unfortunately most are either much like annual ryegrass or perennial but not half way between the two. Roughstalk bluegrass, or what is referred to in the industry as "Poa triv" (short for the botanical name *Poa trivialis*), is also as an overseeding grass. It has better shade tolerance than the ryegrasses, but is slower to germinate and will die out earlier in the spring due to poor heat tolerance.

Overseeding rates generally range between 5 and 10 pounds per 1,000 ft² in lawns and 8 to 12 pounds per 1000 ft² for athletic fields and golf courses. Using high quality "Certified" (blue tag) ryegrass seed that is free of annual bluegrass (*Poa annua*) is important in maintaining weed free turf. It is also important to use seed treated with fungicides such as mefenoxam, particularly for early fall overseeding since seedling blight diseases can be a particular problem at this time.

The ten pound seeding rate generally provides rapid stand for fall use, while the five pound rate provides a thinner stand that does not provide much coverage until spring. Choice of seeding rate generally relates to appearance desired and when (fall or spring) and the amount of traffic. Higher trafficked areas need higher seeding rates. However, higher seeding rates also may mean more difficult spring transition.

Indicators for proper timing of overseeding include: soil temperatures at a 4" depth approaching 75° F, night temperatures consistently in the 50's, average midday temperature below 70° F, or 2 to 4 weeks before the average annual first killing frost date. Overseeding before environmental conditions are suitable can encourage warm-season species competition and reduce the overseeding stand.

The objective to insuring a successful overseeding is a good soil to seed contact. Seedbed preparations generally consist of close mowing or scalping, with some light vertical mowing, and sweeping, blowing, or vacuuming the loose plant debris from the soil surface.

Generally, the more the turf is opened, the better the establishment rate, but the more competitive the cool-season turf will be in the spring. Seed which germinate in thatch or above the soil surface are more likely to dry-out and die before becoming established.

After dragging the seed into the soil, begin lightly irrigating to maintain good surface moisture and get the seed to germinate. This generally means irrigating three to five times per day until the seedlings are well established, but the total amount of water applied during a day would seldom exceed 0.5". This irrigation practice should be done without causing puddling on the soil surface because free standing water encourages disease. After germination, gradually reduce the frequency and increase the time of irrigation until a normal irrigation program can be established.

Begin mowing when seedling height is 30% higher than desired. Use a mower with sharp blades and mow when the grass is dry to reduce seedling injury. Use a rotary-type mower for the first mowing to insure seedlings are cut and not ripped. Transitioning to a reel-type mower after the second or third mowing can provide a high quality appearance. Fertilize after seedling emergence (generally three weeks after seeding). Earlier fertilizing may encourage warm-season turf competition. One pound of N per 1,000 ft² per month is adequate with less commonly used. Use a soil test report to guide phosphorus needs.

Most turf managers are beginning to recognize the importance of a good year-round turf management program to a smooth spring transition. Proper fertilization, irrigation, mowing, thatch control, cultivation and pest management throughout the year affect transition. A good transition also requires knowing and making use of normal climatic conditions. Most warm-season turfgrasses resume growth when soil and night temperatures approach 65° F. Sometimes forcing soil temperature warming by aeration can lead to early spring growth and premature reduction of overseeding, particularly if cool spring temperatures follow.

Maintaining a mowing height that prevents the overseeding from shading out the bermudagrass is critical to a smooth transition. Lowering the mowing height when soil temperatures increase, stresses the cool-season turf and aids in soil warming. When temperatures are high enough an application of soluble N can encourage warm-season growth and encourage cool-season decline.

While a natural spring transitions is typically desirable, rapid removal of the cool-season grass without harming the warm-season species is possible by using some herbicides (see Postemergence Herbicides).

INSECT CONTROL IN COMMERCIAL TURF

Will Hudson, Extension Entomologist
and Shimat Joseph, Assistant Professor

Note on insecticide selection and use for various turfgrass sites:

Not all turfgrass sites are created equal. It is important to read the label on the product before purchasing an insecticide for a particular site use. An insecticide may not be labeled for all turfgrass uses (e.g., lawns, athletic fields, sod farms, or golf courses). Some products are only labeled for use on golf courses or sod farms. For example, Dursban 50W (chlorpyrifos) is not labeled for use on residential or commercial lawns. Furthermore, Orthene (acephate) formulations are labeled for use against fire ants in residential and commercial lawns, but not other pests.

In some instances, manufacturers will add “GC” as part of the title to inform users that a product can be used on golf courses when other formulations of that product are not labeled for that site. For example, Allectus SC is not labeled for use on golf courses but Allectus GC SC is. Labeling for sod farms will also follow similar rules. For example, Merit 0.5G is not to be used on sod farms, but Merit 2 and Merit 75WP are labeled for use on sod farms.

If product restrictions are noted on the label, they may appear as a note next to the product names in this publication. For example, when you read, “landscape turf only” that product is not available for use on golf courses or sod farms. When a product labeled for these other sites is available it is included but it may not have any restrictions noted. If no restrictions are noted, the product is likely labeled for general use on turfgrass or on all turfgrass sites. The label on your individual product may vary from the online version of the manufacturer’s label, therefore abide by all restrictions on the product label if they differ from those presented in this guide.

The pyrethroid class of active ingredients (those ending in –thrin, MOA 3A) are all off patent and available in hundreds of products. Brand names listed are examples and are not intended as endorsements.

Restricted entry intervals (REI) listed are for sod farm use. For landscape sites, re-entry is allowed once sprays have dried completely.

Restricted Use Pesticides (RUPs), those that only a certified pesticide applicator may use, supervise the use of, or purchase, will be noted. Uncertified pesticide applicators may not purchase, use or supervise the use of these products.

Protection of pollinators: Managed landscapes often contain flowering plants and can be important foraging sites for bees and other pollinators. Many insecticides are extremely toxic to bees, and others can affect colony health with repeated exposure. Use extreme care when applying insecticides to flowering plants, including turfgrasses. The neonicotinyl insecticides (MOA 4A) have systemic activity and can move to pollen and nectar if applied to plants in bloom. If there are flowering weeds, such as clover, in the turf, the blossoms should be mowed before application of this class of insecticide. Read and follow all restrictions on the labels, as there have been changes made recently to neonicotinyl use instructions

PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Imported Fire Ants/ Ants	BAIT TREATMENTS				The most effective method for control of ants over a broad area is the use of a broadcast bait two times per year (spring/fall) coupled with individual mound treatments as needed. Broadcast Bait Treatments Broadcast baits when ants are actively foraging for food (typically, warm, dry days in spring and fall). Some baits work within 48 hrs, some may take a month. Avoid applying baits just before or after irrigation or rain. Individual Mound Treatments Do not disturb mounds before treatment. <i>Drenches:</i> Drench mounds when queen and brood are located close to soil surface on warm, dry days. Generally, it takes 1-2 gallons of water to drench a fire ant mound effectively. <i>Granules:</i> Scatter granules around the edge of the nest, not on top. <i>Dusts:</i> Dust evenly over top mound. Many generic formulations of the pyrethroid insecticides are available for use on commercial turf.
	indoxacarb Advion	22A	4 Tbsp/mound or 1.5 lb/A	24	
	Metaflumizone Siesta	22B	2-4 Tbsp/mound or 1-1.5 lb/A	12	
	hydromethylnon Amdro	20A	5 Tbsp/mound or 1-1.5 lb/A	12	
	Methoprene Extinguish Plus	7A	2-5 Tbsp/mound or 1.5 lb/A	12	
	MOUND DRENCH TREATMENTS				
	acephate Orthene TTO 75WP Orthene TTO 97	1B	1 oz/5 gal 0.75 oz/5 gal	24	
	bifenthrin Talstar GC Flowable	3A	1 tsp/gal	12	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user’s responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Imported Fire Ants/ Ants (continued)	MOUND DRENCH TREATMENTS (continued)				The most effective method for control of ants over a broad area is the use of a broadcast bait two times per year (spring/fall) coupled with individual mound treatments as needed.
	carbaryl Sevin SL	1A	0.75 fl oz/gal	12	
	chlorpyrifos Dursban 50W (golf courses & sod farms only) Dursban Pro	1B	RUP 0.24 oz/gal 1 fl oz/2 gal	24	
	deltamethrin DeltaGard GC 5SC	3A	1.5 fl oz/gal		Broadcast Bait Treatments Broadcast baits when ants are actively foraging for food (typically, warm, dry days in spring and fall). Some baits work within 48 hrs, some may take a month. Avoid applying baits just before or after irrigation or rain.
	imidacloprid + bifenthrin Allectus GC SC (golf courses & sod farms only) Allectus SC (landscape turf only)	4A + 3A	0.33 fl oz/gal 0.33 fl oz/gal	12	
	lambda-cyhalothrin Scimitar CS (landscape turf only) Scimitar GC	3A	0.5 fl oz/2.5 gal	12	
	permethrin Astro (landscape turf only)	3A	1.6 fl oz/gal	12	
	spinosad Conserve	3A	0.1 fl oz/gal	4	
	DRY MOUND TREATMENTS				Individual Mound Treatments Do not disturb mounds before treatment. Drenches: Drench mounds when queen and brood are located close to soil surface on warm, dry days. Generally, it takes 1-2 gallons of water to drench a fire ant mound effectively. Granules: Scatter granules around the edge of the nest, not on top. Dusts: Dust evenly over top mound. Many generic formulations of the pyrethroid insecticides are available for use on commercial turf.
	acephate Orthene TTO 75WP	1B	1-2 tsp/mound	24	
	cyfluthrin Bayer Fire Ant Killer	3A	1 tsp/mound	12	
	deltamethrin Bengal Ultra Dust Fire Ant Killer 0.05% Terro Fire Ant Killer 0.05% DeltaGard G (landscape turf only)	3A	1 Tbsp/mound 1 Tbsp/mound 2 Tbsp/mound**	12	** Follow with 1-2 gallons water for best results
	imidacloprid + bifenthrin Allectus GC (golf course & sod farms only) Allectus G (landscape turf only)	4A + 3A	4 oz/mound** 4 oz/mound**	12	** Follow with 1-2 gallons water for best results
	BROADCAST TREATMENTS				
	bifenthrin Talstar GC Flowable Talstar EZ Golf Granular	3A	0.5 fl oz/1,000 ft² 2.3-4.6 lb/1,000 ft²	12	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Imported Fire Ants/ Ants (continued)	BROADCAST TREATMENTS (continued)				
	<i>carbaryl</i> Sevin SL	1A	3 fl oz/1,000 ft ²	12	
	<i>chlorpyrifos</i> Dursban 50W (golf course & sod farms only) Dursban Pro	1B	RUP 16 lb/acre 1.5 fl oz/1,000 ft ²	24	
	<i>cyfluthrin</i> Tempo SC Ultra (landscape turf only) Tempo WP Ultra (landscape turf only) Tempo WP GC (golf courses & sod farms only)	3A	8 ml/1,000 ft ² 5-10 g (1-2 scoops)/ 1,000 ft ² 1 packet/7,800 ft ²	12	Many formulations and brand names are available.
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O 5SC (landscape turf only) DeltaGard G (landscape turf only)	3A	1.5 fl oz/gal 1.5 fl oz/gal 1.5 fl oz/gal	12	
	<i>Fipronil</i> 0.01% Chipco Top Choice	2B	2 lb/1000 ft. ²	24	
	<i>imidacloprid + bifenthrin</i> Allectus GC SC Allectus SC (landscape turf only) Allectus GC Allectus G (landscape turf only)	4A + 3A	1.32-1.65 fl oz/1,000 ft ² 1.32-1.65 fl oz/1,000 ft ² 1.7-2.9 lb/1,000 ft ² 1.7-2.9 lb/1,000 ft ²	12	Many formulations and brand names are available.
	<i>lambda cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	7 ml/1,000 ft ² 7 ml/1,000 ft ²	12	
Bees and Wasps (burrowing)	<i>acephate</i> Orthene TTO 75WP, Surrender, others	1B	1-2 tsp/hole (do not exceed this amount in 1ft ²)	24	Apply in late afternoon or early evening at insect entrance/exit holes. Bee, wasp, and hornet sprays in pressurized cans are also effective. Follow label instructions
	<i>carbaryl</i> 10% Sevin granules	1A	1.4-1.9 lb/1,000 ft ² <i>Water in after application</i>	12	
	various pyrethroids	3A	See label.		

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Billbugs	<i>bifenthrin</i> Talstar EZ Golf Granular Talstar GC flowable	3A	1.15-2.3 lb/ 1,000 ft ² 0.25-0.5 fl oz/1,000 ft ² 6 fl oz	12	The sporadic occurrence and multiple generations of this pest makes its appearance unpredictable. Some areas that consistently experience billbug injury may be treated in a prophylactic manner.
	<i>carbaryl</i> Sevin SL	1A	6-8 oz/1,000 ft ² or 8 qt/A	12	
	<i>chlorantraniliprole</i> Acelepryn	28	8-20 oz	4	
	<i>chlorpyrifos</i> Dursban 50W	1B	RUP 2-4 lb/A	24	
	<i>clothianidin</i> Arena 50WDG Arena 0.5G	4A	8 oz/A 50 lb/A	12	
	<i>clothianidin + bifenthrin</i> Aloft GC SC Aloft LC G	4A +3A	0.27-0.44 fl oz/1000 ft ² 1.8-3.6 lb/1000 ft ²	12	
	<i>imidicloprid</i> Merit 75WSP Merit 0.5G	4A	1.6 oz/8250 ft ² or 8.6 oz/A 1.4 lb/1,000 ft ² or 60 lb/A	12	
	<i>imidacloprid + bifenthrin</i> Allectus GC SC Allectus GC	4A + 3A	RUP 0.4-1.65 fl oz/1,000 ft ² 1.7-2.9 lb/1,000 ft ²	12	
	<i>trichlorfon</i> Dylox 420 SL Dylox 6.2 G	1B	4.6-6.9 fl oz/1000 ft ² (200-300 fl oz/A) 3 lb/1,000 ft ² or 130 lb/A		For use on residential and golf course turf only. Post-application irrigation required. Not for sod farm use.
	NOTE: Premixed formulations of systemic insecticides with pyrethroids are available (Allectus, Aloft). These may provide control of multiple pests with a single spray.				
Chinch bugs	<i>acephate</i> Orthene 75WP Orthene 97 (golf courses & sod farms only)	1B	1.2-2.4 oz/1,000 ft ² 0.9-1.8 oz/1,000 ft ²	24	Reducing the number of treatments and applying spot treatments (which is most effective especially early in the season) will allow for the conservation of natural enemies, as native parasites and predators can play a significant role in chinch bug management.
	<i>bifenthrin</i> Talstar EZ Golf Granular Talstar GC Flowable	3A	2.3-4.6 lb/1,000 ft ² 0.25-0.5 fl oz/1,000 ft ²	12	Pyrethroids are effective, but they provide no residual control and evidence of resistance has already surfaced for bifenthrin (Talstar, Bifen), with cross-resistance to other pyrethroids expected. Rotation of chemistries is, therefore, important. In most cases, irrigate turf area prior to application unless noted otherwise on the product label.
	<i>carbaryl</i> Sevin SL	1A	6-8 fl oz/1,000 ft ²	12	
	<i>clothianidin</i> Arena 50WDG Arena 0.5G	4A	10.67 oz/A 66.67 lb/A	12	Granules can be used but must be watered in thoroughly. Use high volume application (5 gal/1000 ft ²) especially with pyrethroids.
	<i>clothianidin + bifenthrin</i> Aloft GC SC Aloft LC G	4A + 3A	0.27-0.44 fl oz/1000 ft ² 1.8-3.6 lb/1000 ft ²	12	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Chinch bugs (continued)	<i>cyfluthrin</i> Tempo SC Ultra (landscape turf only) Tempo WP Ultra (landscape turf only) Tempo 20 WP (golf course only)	3A	8 ml/1,000 ft ² 7.7-15.4 oz/A 1 packet/7,800 ft ²		Many formulations and brand names available. Reducing the number of treatments and applying spot treatments (which is most effective especially early in the season) will allow for the conservation of natural enemies, as native parasites and predators can play a significant role in chinch bug management.
	<i>deltamethrin</i> DeltaGard T&O 5SC (landscape turf only) DeltaGard GC 5SC DeltaGard G (landscape turf only) DeltaGard T&O Granular	3A	0.6-0.9 fl oz/1,000 ft ² 0.6-0.9 fl oz/1,000 ft ² 2-3 lb/1,000 ft ² 2-3 lb/1,000 ft ²		Pyrethroids are effective, but they provide no residual control and evidence of resistance has already surfaced for bifenthrin (Talstar, Bifen), with cross-resistance to other pyrethroids expected. Rotation of chemistries is, therefore, important. In most cases, irrigate turf area prior to application unless noted otherwise on the product label. Granules can be used but must be watered in thoroughly. Use high volume application (5 gal/1000 ft ²) especially with pyrethroids.
	<i>dinotefuran</i> Zylam 20 SG	4A	1 oz/1,000 ft ²	12	
	<i>imidacloprid + bifenthrin</i> Allectus SC (landscape turf only) Allectus GC	4A + 3A	0.4-1.65 fl oz/1,000 ft ² 1.7-2.9 lb/1,000 ft ²	12	
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	19.2 oz/A 19.2 oz/A		Many formulations and brand names available.
	<i>trichlorfon</i> Dylox 420 SL	1B	4.6-6.9 fl oz or 200-300 fl oz/A		Post application irrigation required.
Ground Pearls	None				No effective chemical control. Practice good management.
Millipedes, sowbugs and pillbugs	<i>bifenthrin</i> Talstar F, GC, G	3A	0.25-0.5 fl oz/1,000 ft ²	12	Many formulations and brand names available.
	various pyrethroids*		See label		
Mites/Eriophyid mites	none				Carbaryl may provide some suppression, but no effective miticides are labeled.
Mole Crickets	<i>acephate</i> Orthene 75WP Orthene 97 (golf courses & sod farms only)	1B	1-1.9 oz/1,000 ft ² 0.8-1.4 oz/1,000 ft ²	24	Best results with early instar nymphs. Fipronil is a widely used insecticide that has proven to be the most effective and most expensive single application approach. Since it provides season-long control the economics must be considered in that context.
	<i>bifenthrin</i> Talstar GC Flowable Talstar GC Granular	3A	0.25-0.5 fl oz/1,000 ft ² 2.3-4.6 lb/1,000 ft ²	12	Indoxacarb, acephate, and bifenthrin + imidacloprid combination baits are available for use against larger nymphs in late summer.
	<i>carbaryl</i> Mole Cricket Bait	1A	0.75-0.9 lb/1,000 ft ²	12	
	<i>chlorpyrifos</i> Dursban 50W	1B	RUP	24	
	<i>clothianidin</i> Arena 50WDG	4A	Suppression only 10.67 oz/A	12	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Mole Crickets (continued)	<i>clothianidin + bifenthrin</i> Aloft LC SC	4A + 3A	11.65-23.3 oz	12	<p>The pyrethroids and imidacloprid are less effective, particularly on larger nymphs and adults. Imidacloprid should be applied at or just before egg hatch.</p> <p>Clothianidin is less susceptible to photodegradation than imidacloprid.</p> <p>For most treatments irrigate 24 hours before treatment if soil is dry. Apply in late afternoon to dry turf, then do not irrigate for 48 hrs.</p> <p>Rates of Chipco Choice higher than 12.5 lb/A must be applied through slit-seed (subsurface) application equipment.</p>
	<i>cyfluthrin</i> Tempo WP Ultra Tempo SC Ultra	3A	7.7-15.4 oz/acre 8 mL/1,000 sq ft or 12 fl oz/A		
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O Granular (landscape turf only)	3A	0.6-0.9 fl oz/1,000 ft ² 2-3 lb/1,000 ft ²		
	<i>fipronil</i> Chipco Topchoice	2B	2 lb/1,000 ft ²	24	
	<i>imidacloprid</i> Merit 75WSP Merit 0.5G (not for sod farms)	4A	1.6 oz/8,250 ft ² 1.8 lb/1,000 ft ²	12	
	<i>indoxacarb</i> Advion	22	1.15 to 4.6/1,000 ft ²		
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	Nymphs: 7 mL/1,000ft ² Adults: 14 mL/1,000 ft ²	12	Many formulations and brand names available.
	<i>permethrin</i> Astro	3A	1.6 fl oz/gal	12	
	<i>trichlorfon</i> Dylox 420 SL Dylox 6.2 G	1B	4.6-6.9 fl oz/1,000 ft ² 3 lb/1,000 ft ²		
Slugs and Snails	Metaldehyde or mesurol	1A	Follow label directions for mixed baits	12	Apply late in afternoon. Fall applications will help control slugs and snails before egg laying.
Spittlebugs	<i>acephate</i> Orthene 75WP Orthene 97	1B	1-1.9 oz/1,000 sq ft 0.8-1.4 oz/10,000 sq ft	24	<p>Pyrethroids applied with sufficient volume of water have been effective but not always consistently so.</p> <p>Cut grass to its recommended height and remove clippings prior to application.</p>
	<i>bifenthrin</i> Onyx	3A	0.07-0.15 fl oz/ 1,000 sq ft	12	
	<i>carbaryl</i> Sevin SL	1A	1.5-3 fl oz/1,000 sq ft or 2-4 qt / acre 2.5-5 lb/acre	12	
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O 5 SC (landscape turf only)	3A	0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A 0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A	12	Many formulations and brand names available.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Turf caterpillars (cutworms, armyworms, webworms, loopers)	<i>acephate</i> Orthene 75WP Orthene 97 (golf course & sod farm only)	1B	0.5-1.2 oz/1,000 ft ² 0.4-0.9 oz/1,000 ft ²	24	Caterpillar pests are best controlled with insecticides in the early instars when they are still small. Higher rates must be used for larger caterpillars. Reduced-risk products like B.t. Mach 2, and Conserve are also more effective against younger caterpillars. On larger caterpillars even higher rates of these products may not be effective. A number of chemicals listed for control are broad-spectrum and fairly economical, especially chlorpyrifos, acephate, carbaryl and several labeled pyrethroids. Treat in late afternoon. DO NOT cut grass for 1-3 days after application. B.t. is not toxic to non-lepidopterous pests.
	<i>bifenthrin</i> Talstar GC Flowable	3A	RUP 0.25-0.5 fl oz/1,000 ft ² or 10 fl oz/A	12	
	<i>carbaryl</i> Sevin 80 WSP Sevin SL	1B	2.5-5 lb/A 1.5-3 fl oz/1,000 or 2-4 qt/A	12	
	<i>chlorantraniliprole</i> Acelepryn	28	2-16 oz/A	4	
	<i>clothiaidin + bifenthrin</i> Aloft LCSC	4A + 3A	11.65-23.3 fl oz/A	12	
	<i>cyfluthrin</i> Tempo SC Ultra (landscape turf only) Tempo 20 WP (golf courses only)	3A	4-8 mL/1,000 ft ² or 6-12 fl oz/A 55 g/7,800-11,000 ft ²	12	Many formulations and brand names available.
	<i>deltamethrin</i> DeltaGard GC 5SC	3A	0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A		Many formulations and brand names available.
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only)	3A	3.4-7 ml/1,000 ft ² or 5-10 fl oz/A	12	Post application irrigation required.
	<i>spinosad</i> Conserve 1SC	5	0.25-0.8 fl oz/1,000 ft ² or 10-35 fl oz/A	4	
	<i>trichlorfon</i> Dylox 420 SL	1B	4.6-6.9 fl oz/1000 ft ² or 200-300 fl oz/A		
White Grubs (Japanese Beetle, Chafers, Green June Beetle)	<i>carbaryl</i> Sevin SL	1A	6 fl oz/1,000 ft ² or 8 qt/A	12	Best results can be expected if early instars are treated.
	<i>clothianidin</i> Arena 50WDG Arena 0.5G	4A	8 oz/A 50 lb/A	12	The number of grubs per ft ² or damage threshold varies by grub species, grass species and variety, and management intensity or use.
	<i>chlorantraniliprole</i> Acelepryn	28	8-16 oz/A	4	
	<i>dinotefuran</i> Zylam 20 SG	4A	1 oz/1,000	12	Identification of pest grub species is important for effective control recommendations. Consult your County Extension Agent.
	<i>imidacloprid</i> Merit 75 WSP Merit 0.5 G	4A	6.8-8.6 oz/A 1.4 lb/1,000 ft ² or 60 lb/A	12	Carbaryl and pyrethroids are excellent for June beetle control, less effective on other species. Generally good adult control. Curative control of older larvae is excellent with trichlorfon for most grub species.

*NOTE: A number of pyrethroid materials are available in a variety of formulations for use as broad-spectrum contact insecticides. Common names include permethrin, bifenthrin, cypermethrin, cyfluthrin, lambda-cyhalothrin and deltamethrin.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF INSECT CONTROL (continued)					
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
White Grubs (Japanese Beetle, Chafers, Green June Beetle) (continued)	<i>imidacloprid + bifenthrin</i> Allectus SC (landscape turf only) Allectus GC	4A + 3A	RUP 1.32-1.65 fl oz/1,000 ft ² 2.3-2.9 lb/1,000 ft ²	12	
	<i>trichlorfon</i> Dylox 420 SL		4.6-6.9 fl oz/1,000 ft ² or or 200-300 fl oz/A		Post application irrigation required.

*NOTE: A number of pyrethroid materials are available in a variety of formulations for use as broad-spectrum contact insecticides. Common names include permethrin, bifenthrin, cypermethrin, cyfluthrin, lambda-cyhalothrin and deltamethrin.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

Insect Pets of Turfgrass

Kris Braman, Professor of Entomology and Will Hudson, Extension Entomologist

Armyworms

Identification: Armyworms, which attain a length of ½ inches, are also caterpillars of moths. Their bodies are greenish when small, but become brown when fully grown. Several stripes usually are apparent, extending from the head to the rear. The adult is a mottled brownish-gray moth with a wingspan of nearly 1 ½ inches. Armyworms occur throughout Georgia.

Life Cycle and Biology: Armyworm caterpillars pupate in the soil. The moths emerge within a couple of weeks. They are active mainly at night. There are three to six generations a year in Georgia. Female moths lay clusters of eggs on grass blades, lawn furniture, white or light colored walls, and other objects near lawns. Caterpillars hatch and begin to feed on the turf.

Damage: Damaged turf appears ragged with individual blades showing signs of chewing damage. When numerous, armyworms may devour the grass down to the ground. Young larvae skeletonize grass blades; older larvae feed on entire blades.

Control Strategies: The irrigation technique described below for sod webworm also is effective for sampling armyworm populations. Populations tend to increase after drought conditions; maintain a consistent soil moisture level to help manage this pest. Time insecticide applications to control armyworms during the early evening when caterpillars are feeding.

Billbugs

Identification: Adult billbugs are weevils 1/5 to 3/4 inch long. The reddish-brown to black adults have a pair of jaws at the tip of a long snout or "bill". The young are white, legless grubs about 3/8 inch in length with the rear end wider than the head. The "hunting billbug" is the most common type found in Georgia. It occurs throughout the state.

Life Cycle and Biology: Adults feed above ground and deposit eggs in the stems of host grasses. Hatching larvae feed within the stems; larger larvae feed on the crown; mature larvae feed on the roots of the turf. One generation occurs annually, but adults and larvae may be found at any time of year.

Damage: Zoysiagrass and bermudagrass are most often injured, but feeding may occur on many grasses. When infestations are heavy, roots of grass are destroyed and the turf is killed in irregular patches. Early damage resembles dollar spot disease in small spots of dead or dying grass. The most damage occurs in June and July. Damage from billbugs differs from white grub or mole cricket injured turf in that infested soil usually stays firm.

Control Strategies: Varieties of turf resistant to billbug damage are available and should be considered when establishing a new lawn in an area with a history of billbug problems. Maintaining constant soil moisture and moderate fertility levels during the fall months into winter helps mask damage by low-moderate infestations. An insecticide application in mid- to late-May and repeated in June can help reduce adult activity.

Cinch Bugs

Identification: Adults are about 1/5 inch long and light in color with small black triangular patches on the wings. The wings are carried folded over the back. The nymphs are from 1/20 to 1/5 inch long and vary in color from reddish with a white band across the back to black as they near adult size. Chinch bugs occur throughout the state.

Life Cycle and Biology: The eggs are laid in leaf sheaths or crevices in nodes and other protected places. The young develop into adults in four to six weeks. There are three to four generations a year. The bugs insert their slender beak into the grass and suck the plant juices.

Damage: Typical injury appears as spreading patches of brown, dead grass. St. Augustine grass is the most seriously injured, but other lawn grasses, including zoysia, bermuda, and centipede grasses, also are subject to attack. Chinch bug infestations and damage are most often first noticed during hot dry periods in sunny areas of the lawn.

Control Strategies: A common method of determining population levels of chinch bugs is the "flotation technique". A coffee can, or similarly sized can, with its ends cut away, is pushed two to three inches down into turf in a suspected area of chinch bug infestation. The can is filled with water and kept full for about five to seven minutes by adding more water as necessary. All stages of chinch bugs, if present, will float to the top. A threshold level of 20 to 25 chinch bugs per square foot can cause damage. This monitoring technique should be repeated in several spots at the edge of the suspected area to increase chances of finding the bugs. Treat if populations are at or above the damage threshold. Pesticides should not be applied to turf in dry soil to avoid potential chemical injury. Irrigate the lawn several hours to a day before treating.

Cutworms

Identification: Cutworms, also the caterpillar stages of certain moths, grow to a length of 1 ½ to 2 inches. The caterpillars are mottled, dull brown, gray, or nearly black and usually appear plump and greasy. If disturbed, the caterpillar usually curls into a C-shaped ball. The front wings of the moth are dark brown to gray, are mottled or streaked, and have a wingspan of 1 ½ to 2 inches. Cutworms also occur throughout the state.

Life Cycle and Biology: Eggs are laid on grass and weed stems or behind the leaf sheath of such plants. Caterpillars usually remain below the ground surface, under clods, or other shelters during the day; they feed at night. Cutworms pupate in the soil. Three to as many as seven generations occur each year. Cutworms can be active all year.

Damage: Foliage or stems may be cut off (hence the name cutworm) by the caterpillars. Circular spots of dead grass or sunken spots are indicative of cutworm infestation.

Control Strategies: The irrigation technique described below for sod webworm also is effective for determining cutworm population levels. Insecticide treatment should be made when this technique flushes three to eight larvae per square yard. Due to their nocturnal behavior, it is best to time control measures for early evening when caterpillars are feeding. Do not irrigate turf after treatment is applied for control of caterpillars. For these pests, you want the material to remain at the surface rather than have it move down into the soil.

Mole Crickets

Identification: Mole crickets are light brown, up to 1 ½ inches long, have short, stout forelegs, spade-like feet, and large eyes. The young resemble the adults except that they are much smaller, have no wings, and are sexually immature. Three species occur in Georgia. Two, the tawny mole cricket and the southern mole cricket, are pest species. Mole crickets occur primarily in the sandy soils of the Coastal Plain.

Life Cycle and Biology: Adults lay eggs in underground cells in the spring. The eggs hatch in two to four weeks, depending on the weather. Nymphs feed and grow through the summer and mature into adults in the late fall or winter. Mole crickets spend the winter deep in the soil, but come to the surface to feed during warm periods. Adult crickets leave the soil on warm spring nights to fly around, sometimes in huge numbers, looking for mates and egg-laying sites. There is one generation per year, and most adults die by early summer. Tawny mole cricket mating flights occur in March and early April; southern mole cricket flights occur in April and in early May. Cold or wet spring weather may delay flights.

Damage: The most damaging species of mole crickets feed on grass. Other species don't feed directly on grass, but their tunneling activity damages turf. Both young and adults burrow beneath the soil and make tunnels similar to, but much smaller than, those made by moles. This loosens the soil and causes it to dry out quickly. It also clips the roots of the grass plants. Left unchecked, mole crickets will build up in an area and completely destroy the grass, leaving bare ground.

Control Strategies: Insecticidal control of mole crickets is most effective in summer (late June or early July) when most of the mole cricket eggs have hatched and nymphs are still small. Granular or spray insecticides are the formulations of choice for summer application. In late summer, mole cricket baits or insecticides with longer residual activity will be more effective. Effective control in spring and fall is difficult because of unpredictable weather, cricket activity, and their large dispersal flights. At these times of year, treat only severely damaged areas where grass is dying out. Spot treat with an appropriate insecticide. Bait formulations are most effective in spring and fall.

Sod Webworms

Identification: Sod webworms are caterpillars of small brown to dull gray moths. Webworms grow to a length of nearly ¾ inch and vary in color from pinkish white to light green to yellowish brown with a light to dark brown or black head. They are covered with fine hairs. The moths have a wingspan of about ¾ inch. They fold their wings closely about their bodies when at rest and have a prominent forward projection on the head. Sod webworms are found throughout Georgia.

Life Cycle and Biology: Moths hide in shrubbery or other sheltered spots during the day. They fly over the grass in early evening. The female scatters eggs over the lawns as she flies. Two to three generations occur each year. Sod webworms feed only at night.

Damage: Damaged grass blades appear notched on sides and are chewed raggedly. Irregular brown spots are the first signs of damage. Large areas of grass may be damaged severely, especially under drought conditions. A heavy infestation can destroy a lawn in only a few days. Damage tends to become visible in mid to late summer and in highly maintained lawns. Sod webworms are partial to newly established lawns. Favored turf types are bermuda, centipede, bahia, zoysia, and St. Augustine grasses.

Control Strategies: Sod webworm populations (and those of other soil-inhabiting insects) can be monitored using the "irritation technique". One ounce of dish detergent is mixed with one gallon of water and the solution is poured over a one square yard area where an infestation is suspected. The detergent irritates the insects, causing them to come to the surface quickly. Damage thresholds vary in different areas. A rough guide is 15 or more larvae per square yard. Insecticide application should be timed for treatment two weeks after peak moth activity and should be made during early evening hours when caterpillars begin feeding.

Spittlebugs

Identification: Spittlebug adults, commonly called froghoppers, are about ¾ inch long, dark brown or black, and have two orange stripes across their wings. The nymph is ivory-colored with a brown head. Nymphs live inside masses of spittle or froth, hence the name "spittlebug". They occur throughout Georgia.

Life Cycle and Biology: Adult females deposit orange eggs in bits of hollow stems and other debris. Nymphs hatch in about two weeks and begin to feed immediately by sucking juices from the grass. They cover themselves with a frothy mass known as spittle. There may be one or several nymphs in each spittle mass. The masses are found from just below the soil surface to a few inches above it. Two generations occur annually in Georgia. Overwintering eggs hatch in March and April. This generation reaches maturity by June. Adult activity is also noticeable in August and September, when the second generation matures.

Damage: Spittlebugs are associated with heavy thatch. A heavily infested area will feel "squishy" when you walk across it due to numerous spittle masses. Centipede grass is especially prone to spittlebug infestation; other warm season grasses also are susceptible. Populations often begin and increase in shady areas. The second generation appears to cause more injury. Populations, and therefore, damage, can be especially high during years with high spring and summer rainfall.

Control Strategies: Don't allow a heavy thatch layer to accumulate. Adult spittlebugs feed on a number of shrubs and other plants, so avoid locating host plants that attract the adults, especially hollies with *Ilex cassine* in their parentage, near susceptible turfgrasses. Time insecticide treatment in heavily infested areas for July. Mow and irrigate the grass several hours before applying treatment late in the day.

White Grubs

Identification: These grubs are plump, C-shaped insects with three pairs of legs. They are whitish with dark areas near the rear. They have a distinct, brown head. The adults are beetles commonly referred to as chafers, May beetles, June beetles, Japanese beetles or green June beetles. They occur throughout the state of Georgia.

Life Cycle and Biology: Adult female beetles lay their eggs in the soil. The grubs hatch and spend most of their life beneath the soil feeding on underground plant parts. Most have rather long life cycles. The grub stage can last from several months to two or three years. Most species of grubs found in Georgia have a one year life cycle.

Damage: Grub feeding destroys roots, leaving the tops to wither and die. In heavy infestations, roots are pruned off to the extent that turf can be rolled back like a carpet. Symptoms of grub damage include yellowing or browning of the grass and signs of drought stress when moisture levels are good. Grass may feel spongy when infestations are heavy.

Control Strategies: Time insecticide applications to target the early stage grubs. Applications during July and August are recommended for the newer products. During this time of the year, the grubs are small and are near the soil surface feeding at the root zone. Later in the season, when grubs are bigger, sample to determine if curative treatments may be required. Use a spade to cut three sides of a strip one foot square by two or three inches deep. Force the spade under the sod and lay it back, using the uncut side as a hinge. Use a trowel to dislodge soil from the overturned roots. Count the grubs in the exposed soil. Replace the strip of sod. Following the same procedure, cut strips of sod in several other parts of the lawn and count grubs under each strip. Calculate the average number of grubs per square foot of lawn by dividing the total number of grubs by the number of strips. If the average number lies between five and ten grubs in non-irrigated turf or greater than 20 grubs in highly maintained, irrigated turf, control measures may be required. Irrigating a few days before treatment will bring grubs closer to the soil surface where pesticides can reach them. Irrigate thoroughly after treatment to get the material into the root zone where grubs are feeding, but not so much as to cause run-off.

Insecticide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
acephate	Orthene TTO 75WP	AMVAC	Y	Y			Y
acephate	Orthene TTO 97	AMVAC	Y	Y	Y	Y	Y
acephate	Surrender Acephate	Surrender	Y		Y	Y	
bifenthrin	Onyx	FMC	Y		Y	Y	
bifenthrin	Talstar EZ Golf Granular	FMC	Y	N	Y	Y	N
bifenthrin	Talstar GC Flowable	FMC	Y				
carbaryl	10% Sevin Granules	GardenTech	Y	Y	Y	Y	Y
carbaryl	Mole Cricket Bait	DuPont	Y	Y			Y
carbaryl	Sevin 80WSP	Bayer	Y	Y	Y	Y	Y
carbaryl	Sevin SL	Bayer	Y	Y	Y	Y	
chlorpyrifos	Dursban 50W	Dow Agro Sciences	Y				Y
chlorpyrifos	Dursban Pro	Dow Agro Sciences	Y	Y	Y		
chlorpyrifos	Engage	Prescription Treatment			Y	Y	
clothianidin	Arena 50WDG	Valent	Y	Y	Y	Y	Y
cyfluthrin	Tempo 20WP	Bayer	Y	N	Y	Y	N
cyfluthrin	Tempo SC Ultra	Bayer	Y	N	Y	Y	
cyfluthrin	Tempo WP GC	Bayer	Y	N	Y	Y	
cyfluthrin	Tempo WP Ultra	Bayer	Y	N	Y	Y	
deltamethrin	DeltaGard G	Bayer	Y	N	Y	Y	N
deltamethrin	DeltaGard GC 5SC	Bayer	Y	Y	Y	Y	Y
deltamethrin	DeltaGard T&O 5SC	Bayer	Y		Y	Y	N
deltamethrin	DeltaGard T&O Granular	Bayer	Y	N	Y	Y	N
dinotefuran	Zylam	PBI/Gordon	Y	Y	Y	Y	Y
fenoxycarb	Award	Syngenta	Y	Y	Y	Y	Y
flupyrifur	Chipco FireStar	Chipco	Y	Y	Y	Y	Y
flupyrifur	Chipco Topchoice	Chipco	Y	Y	Y	Y	Y
flupyrifur	Over 'n Out!	GardenTech	Y	N	N	Y	N
halofenozide	Mach 2 1.5G	Dow Agro Sciences	Y	Y	Y	Y	Y
halofenozide	Mach 2 2SC	Dow Agro Sciences	Y	Y	Y	Y	Y
hydamethylnon	Amdro	BASF	Y	Y	Y	Y	Y
imidacloprid	Merit 0.5G	Bayer	Y	Y	Y	Y	N
imidacloprid	Merit 75WSP	Bayer	Y	Y			Y
imidacloprid + bifenthrin	Allectus G	Bayer	Y	N	Y	Y	N
imidacloprid + bifenthrin	Allectus GC	Bayer	Y				Y
imidacloprid + bifenthrin	Allectus GC SC	Bayer	Y	Y			Y
imidacloprid + bifenthrin	Allectus SC	Bayer	Y	N	Y	N	N
indoxacarb	Advion	DuPont	Y		Y	Y	
lambda-cyhalothrin	Scrimtar CS	Syngenta	Y		Y	Y	
lambda-cyhalothrin	Scrimtar GC	Syngenta	Y	Y	Y	Y	Y
permethrin	Astro	FMC	Y		Y	Y	
spinosad	Conserve SC	Dow Agro Sciences	Y				
trichlorfon	Dylox 6.2G	Bayer	Y	Y			
trichlorfon	Dylox 80	Bayer	Y				
trichlorfon	Dylox 80 T&O	Bayer	Y				

Recommended site usages were from label of each product. Some labels listed a general “Turfgrass” use and specific site uses; other site uses were prohibited (e.g. “do not use”). A “Y” indicates specific mention on the label, an “N” indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

TURF DISEASE CONTROL

Alfredo Martinez-Espinoza, Extension Plant Pathologist

DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Algae	<i>chlorothalonil</i> Chlorostar Chlorothalonil 500ZN, 720SFT, DF Daconil Action Daconil G Daconil Ultrex Daconil Weatherstik Daconil Zn Docket Echo DF Echo Dyad ETQ Evade Legend, Manicure Manicure Ultra Pegasus DFX	M5	1.8-7.4 oz. at 7-14 day intervals	Make sure surface drainage is good. Spike, slice or aerify if necessary. Label changes by manufacturers restrict use to commercial turf only. Not to be used on home lawns.
	<i>copper hydroxide</i> Kocide 54DF	M1	16 oz	1 application.
	<i>fluazinam</i> Secure Rotator	29	0.5 fl oz at a 14 day interval	For Algal scum (filamentous blue-green algae/cyanobacteria).
	<i>fluazinam + acibenzolar-S-methyl</i> Secure Action	20 + PO1	0.5 fl oz at a 14 day interval	Golf courses only.
	<i>fluazinam + tebuconazole</i> Traction	29 + 3	1.3 fl oz at a 14 day interval	Golf courses only.
	<i>fluxapyroxad</i> Xzemplar	7	0.21-0.26 fl oz at 14-28 day interval	
	<i>hydrogen dioxide</i> Zerotol TerraCyte Pro Perpose Plus	NC	6-25 oz	Curative control may require 2-3 consecutive applications. Perpose Plus Preventative: Dilute 1 fl oz/1 gal of water. Apply diluted 1-10 gal of solution to 1000ft ² . Curative: Dilute 5-10 fl oz/5 gal of water. Apply 5-10 gal of solution to 1000ft ² . Note: Perpose Plus label also includes control for Brown patch, dollar spot, Anthracnose, Fairy ring, Pythium, Summer patch, Rhizoctonia, Fusarium, Leaf spot, and slime mold. Check label for individual disease.
	<i>mancozeb</i> Dithane, Fore Manzate Protect T/O	M3	80WP-6 oz 4F-9.6 fl oz	
	<i>mancozeb + copper sulfate</i> Junction	M3 + M1	2-4 oz at 7- 14 day intervals	May cause phytotoxicity during hot weather.
	<i>triticonazole</i> Trinity, Triton	3	0.5-1.0 fl oz at 14-28 day intervals	For algae suppression.
Brown/Large Patch (<i>Rhizoctonia solani</i>) and Dollar Spot (<i>Sclerotinia homoeocarpa</i>)	<i>triticonazole + chlorothalonil</i> Reserve	3 + M5	3.2-5.4 oz at 14-28 day intervals	Use the lower rate preventively for the suppression of algae.
	<i>azoxystrobin</i> Heritage 50WG Heritage G Heritage TL, Strobe, ArmorTech	11	0.2-0.4 oz. at 14-28 day intervals 2-4 lbs. at 14-28 day intervals Heritage TL: 2 fl. oz.	*Not Recommended for Dollar Spot.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Brown/Large Patch (<i>Rhizoctonia solani</i>) and Dollar Spot (<i>Sclerotinia homoeocarpa</i>) (continued)	<i>azoxystrobin</i> + <i>acibenzolar-s-methyl</i> Heritage Action	11 + P	0.2-0.4 oz. at 14-28 day intervals	*Not Recommended for Dollar Spot.
	<i>azoxystrobin</i> + <i>chlorothalonil</i> Renown	11 + M5	2.5-4.5 fl. oz. at 7-28 day intervals	
	<i>azoxystrobin</i> + <i>difenconazole</i> Briskway	11 + 3	BP/LP = 0.3-0.725 fl oz at 14-28 day intervals DS = 0.3-0.725 fl oz at 14-21 day intervals	
	<i>azoxystrobin</i> + <i>propiconazole</i> Headway	11 + 3	0.75-3 oz. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>tebuconazole</i> ZoxyT, Strobe T	11 + 3	0.5-1.5 oz. at 14-28 day intervals 0.75-1.5 oz. at 14-28 day intervals	
	<i>Boscalid</i> Emerald	7	0.13-0.18 oz. at 14-21 day intervals	*For Dollar Spot control only. Apply when conditions are favorable for disease development.
	<i>bacillus licheniformis</i> EcoGuard SB 3086	44	Up to 20 oz. at 3-14 day intervals	
	<i>bacillus subtilis</i> Strain QST713 Rhapsody, Sonnet, ArmorTech Sonnet	44	2.0-10 fl oz at 7-10 day intervals 0.5-2.5 fl oz at 7-10 day intervals	Apply in sufficient water to provide thorough coverage 2 gals./1000 ft ² are commonly used.
	<i>bacillus subtilis</i> Strain GB03 Companion	44	4.0-6 fl oz at 14-28 day intervals	
	<i>chlorothalonil</i> ArmorTech CLT 720 ArmorTech CLT 825 Chlorostar Chlorothalonil 500ZN, 720SFT, DF Daconil Action Daconil G Daconil Ultrex Daconil Weatherstik Daconil Zn Docket Echo DF Echo Dyad ETQ Evade Legend Manicure Manicure Ultra Pegasus DFX	M5	Flowable 40.4% Preventive: Brown Patch - 3-6 fl oz at 7-10 day intervals Dollar Spot - 3-6 fl oz at 7-14 day intervals Curative: Brown Patch - 6-11 fl oz at 7-10 day intervals Dollar Spot - 6-11 fl oz at 7-14 day intervals Wettable Powder (WDG90) Preventive: Brown Patch - 1.75-3.5 oz. at 7-10 day intervals Dollar Spot - 1.75-3.5 oz. at 7-14 day intervals. 4 oz. = 15 Tbs. Curative: Brown Patch - 3.5-6.5 oz. at 7-10 day intervals Dollar Spot - 3.5-6.5 oz. at 7-14 day intervals	Recent label changes by manufacturers restrict use to commercial turf only. Not to be used on home lawns.
	<i>chlorothalonil</i> + <i>propiconazole</i> Concert Concert II	M5 + 3	1.5-3 fl oz at 7-10 day intervals 3-5.5 fl oz at 14-21 day intervals 5.5- 8.5 fl oz at 14-28 day intervals	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

TURF DISEASE CONTROL (continued)					
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS	
Brown/Large Patch (<i>Rhizoctonia solani</i>) and Dollar Spot (<i>Sclerotinia homoeocarpa</i>) (continued)	<i>chlorothalonil</i> + <i>propiconazole</i> + <i>fludioxonil</i> Instrata	M5 + 3 + 12	2.75-6 fl oz at 21-28 day intervals		
	<i>chlorothalonil</i> + <i>thiophanate methyl</i> Consyst Peregrine Tee-1-up WDG TM + CTN SPC	M5 + 1	2-8 oz. at 7-21 day intervals 2-5.76 oz. at 7-14 day intervals		
	<i>chlorothalonil</i> + <i>thiophanate methyl</i> + <i>iprodione</i> + <i>tebuconazole</i> Enclave	M5 + 1 + 2 + 3	3-4 fl oz at 14-21 day intervals 7-8 fl oz at 28 day intervals	Apply when disease first appears. Make additional applications as needed. Allow spray to dry watering in.	
	<i>hydrogen dioxide</i> TerraCyte Pro Zerotol Perpose Plus	NC	6-25 oz.	Curative control may require 2-3 consecutive applications. Purpose Plus Preventative: Dilute 1 fl oz/1 gal of water. Apply diluted 1-10 gal of solution to 1000ft ² . Curative: Dilute 5-10 fl oz/5 gal of water. Apply 5-10 gal of solution to 1000ft ² .	
	<i>fluazinam</i> Secure Rotator	29	0.5 fl oz at a 14 day interval	D.S. Apply as preventative disease program, starting when conditions become favorable for disease. B.P. Apply when conditions become favorable for disease. L.P. Apply in fall when temperatures drop below 70°F.	
	<i>fluazinam</i> + <i>acibenzolar-S-methyl</i> Secure Action	20 + PO1	0.5 fl oz at a 14 day interval	Golf courses only. For both Dollar spot and Brown/Large patch.	
	<i>fluazinam</i> + <i>tebuconazole</i> Traction	29 + 3	1.3 fl oz at a 14 day interval	Golf Courses only.	
	<i>fludioxonil</i> Medallion Medallion SC	12	0.5-0.9 oz. at 14-28 day intervals 0.75- 2 fl oz at 7-14 day interval	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.	
	<i>fluopyram</i> + <i>trifloxystrobin</i> Exteris	7+11	BP - 2.1-6.0 fl oz at 14-28 day intervals DS - 1.5-4.13 fl oz at 7-28 day intervals	B.P. lightly water-in application to move fungicide into thatch for increased effectiveness.	
	<i>Flutolanil</i> ProStar 70WG Prostar WP	7	Preventative: 2.2 oz at 21-28 day intervals Curative: 4.5 oz Repeat in 30 days.	Use of wetting agent or aerification prior to treatment may improve disease control. Do not treat more than 10,000ft ² per acre of turfgrass.	
	<i>flutolanil</i> + <i>thiophanate methyl</i> Systar	7 + 1	2-3 oz. at 14-30 day intervals		
	<i>fluoxastrobin</i> Disarm 480 SC Disarm G Fame SC Fungicide Fame G Fungicide	11	0.18-0.36 fl oz at 21 day intervals 2.3-4.6 lbs. at 14-21 day intervals 0.18-0.36 fl oz at 28 day intervals	Recommended for Brown Patch. For optimum results begin applications preventatively and continue as needed (21 day intervals). To limit the potential for development of fungicide resistance use a maximum of 2 sequential applications of a QoI fungicide followed by at least an equal number of applications of another mode of action fungicide. Preventive control of light to moderate Dollar Spot infections.	
	<i>fluoxastrobin</i> + <i>chlorothalonil</i> Disarm C, Fame + C	11 + M5	3-5.9 oz. at 7-28 day intervals		
	<i>fluoxastrobin</i> + <i>myclobutanil</i> Disarm M	11 + 3	0.25-1.0 oz. at 14-28 day intervals		
	<i>fluoxastrobin</i> + <i>tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals		
	<i>fluxapyroxad</i> Xzemplar	7	0.21-0.26 fl oz at 14-28 day intervals	For BP, LP and DS	
	<i>fluxapyroxad</i> + <i>pyraclostrobin</i> Lexicon	7 + 11	0.34-0.47 fl oz at 14-28 days intervals	For BP, LP and DS	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Brown/Large Patch (<i>Rhizoctonia solani</i>) and Dollar Spot (<i>Sclerotinia homoeocarpa</i>) (continued)	<i>iprodione</i> 18 Plus Armor Tech IP233 Chipco 26GT, Chipco 26019, Eclipse ETQ, Iprodione Pro 2SE Iprodione SPC Ipro2SE, Raven	2	2-4 fl oz in 2-10 gals. water. Apply every 14-21 day. 1.5-2.0 oz at 14-21 day intervals 3-4 fl oz at 14-28 day intervals 1.5 oz = 9 Tbsp	Not for use in residential areas.
	<i>iprodione + thiophanate methyl</i> 26/36 ArmorTech TMI 2020 Dovetail Lesco Twosome TM + IP SPC	2 + 1	1-4 oz at 14-21 day intervals	
	<i>iprodione + trifloxystrobin</i> Interface	2 + 11	4-6 oz at 14- 21 day intervals	
	<i>isofetamid</i> Kabuto Fungicide SC	7	0.4-0.5 fl oz at 14 day interval	For dollar spot only.
	<i>isofetamid + tebuconazole</i> Tekken	7 + 3	3.0 fl oz	
	<i>mancozeb + copper hydroxide</i> Junction	M3 + M1	2-4 oz at 7-14 day intervals	
	<i>maneb</i> <i>maneb + zinc sulfate</i> <i>mancozeb</i> Dithane, Fore Protect T/O Tersan LSR, etc.	M3	Preventive: 3-4 oz in 3-5 gals water at 7-10 day intervals Curative: 6-8 oz in 3-5 gals water at 7-10 day intervals 3 oz = 10 Tbs.	
	<i>metconazole</i> Tourney	3	D.S. - 0.18 to 0.37 oz at 14-21 day intervals B.P. - 0.28 to 0.37 oz at 14-21 day intervals	Apply when conditions are favorable for disease development. DO NOT use on bermudagrass.
	<i>mineral oil</i> Civitas	NC	8-32 oz	Use only in conjunction with Civitas Harmonizer.
	<i>myclobutanil</i> ArmorTech Myclo 20EW Eagle 20EW Eagle 40WSP Lebanon Eagle G Myclobutanil 20EW T/O	3	Preventive: 0.6 oz at 10-28 day intervals (3 oz. pkt/5000 ft ²) Myclo 20EW 1.2-2.4 oz	DO NOT apply more than 7.2 oz./1000 ft ² per year.
	<i>PCNB</i> Engage Penstar Revere Terraclor Turfcide	14	Brown Patch warm season grasses - 16 oz in 10-15 gal water at 3-4 week intervals cool season grasses - 3-4 oz in 3-6 gal water at 7-10 day intervals Dollar Spot 7-10 oz in 5 to 10 gal water at 3 to 4 week intervals	
	<i>PCNB + tebuconazole</i> Oreon	14 + 3	6-8 fl oz at 14-28 day intervals	

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Brown/Large Patch (<i>Rhizoctonia solani</i>) and Dollar Spot (<i>Sclerotinia homoeocarpa</i>) (continued)	<i>penthiopyrad</i> Velista	7	DS and BP - 0.3 to 0.5 oz 14-21 day intervals LP - 0.7 oz at 14-28 day intervals	Begin applications at early stages of disease development. Use high rate for high disease pressure or for curative situations. L.P. - Make two applications in the fall as a preventative. Apply in early spring if disease pressure is high.
	<i>phosphorous acid</i> Fosphite	33	2-3 fl oz	
	<i>polyoxin D</i> Affirm Endorse	19	4 oz in a minimum of 2 gal at 14 day intervals 2.4 lbs/acre at 7-14 day intervals	Do not irrigate for 12 hrs. after application. Not recommended for Dollar Spot.
	<i>propiconazole</i> ArmorTech PPZ143MC Banner Maxx Banner GL Kestrel Monsoon turf ProPensity 1.3ME Propiconazole SPC 14.3 Propicure 3.6F Prophesy Savvi Strider	3	D.S. - 1-2 fl oz in 2-5 gals water at 14-28 day intervals B.P. - 1-2 fl oz in 2-5 gals water at 14-21 day intervals Banner GL individual packets; one packet treats 11,000-22,000 sq ft	Do not mow or irrigate treated areas until grass is completely dry. Do not use on home lawns. Bermudagrass and St. Augustinegrass can be sensitive to Banner. DO NOT exceed 2 fl. oz. per 1000 ft ² every 30 days on any variety of Bermudagrass or St. Augustinegrass. As conditions become more severe, use the shorter application schedule and the higher rate.
	<i>pydiflumetofen</i> Posterity	7	0.08 – 0.32 fl oz at 21-28 day interval	
	<i>pyraclostrobin</i> Insignia Intrinsic	11	0.5-0.9 oz at 14-28 day intervals	For Dollar Spot, begin applications prior to or in the early stages of disease development. Use shorter specified application intervals and / or higher specified rate when prolonged favorable disease conditions exist.
	<i>pyraclostrobin + boscalid</i> Honor Honor Intrinsic	11 + 7	Brown Patch - 0.55-1.1 oz at 14 to 28 day intervals Dollar Spot - 0.88-1.1 oz at 14 to 21 day intervals	
	<i>pyraclostrobin + triticonazole</i> Pillar	11 + 3	3.0 lbs at 28 day intervals	DO NOT make more than 5 applications per year at the use rate of 3.0 lbs. per 1000 ft ² .
	<i>Reynoutria sachalinensis</i> Regalia PTO	P5	1-3 fl oz at 7-14 day intervals	Plant extract. Use in a minimum of 1.5 gal water /1000 ft ² . Begin applications preventatively.
	<i>tebuconazole</i> ArmorTech 360 XL, Mirage Stressguard, Sipcam Clearscape Sipcam Clearscape ETO Torque	3	0.6 fl oz Mirage = 1.0-2.0 fl oz	For prevention, begin applications when conditions are favorable for disease development. DO NOT make two consecutive applications of Torque fungicide. Alternate with another fungicide with different mode of action. A second application may be made after 28 days. Mirage – B.P. and D.S. - 14-28 day intervals; L.P. - Begin fungicide applications preventatively in the fall and spring. Make 1-2 applications when conditions are favorable for disease development.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Brown/Large Patch (<i>Rhizoctonia solani</i>) and Dollar Spot (<i>Sclerotinia homoeocarpa</i>) (continued)	<i>thiophanate methyl</i> ArmorTech TM462 Cleary's 3336 3336 DG Lite 3336 F 3336 G 3336 GC 3336 Plus Cavalier Fungo Systec 1998 T-Bird 4.5L T-Bird 85 WDG T-Storm Tee-Off 4.5F	1	Wettable Powder (50%) 2 oz/5 gals water Apply at 7-10 day intervals Dollar Spot fairways—1 oz/5 gals water Apply at 2-4 week intervals Flowable 46.2 % 1-2 fl oz at 10-14 day intervals TM462 2-5.3 fl oz	
	<i>thiram</i> Spotrete F	M3	Preventative: 3.75fl oz at 7-10 day intervals Curative: 7.5 fl oz at 3-5 day intervals	For best results use spray mix the same day it is prepared. Spray right after mowing or avoid mowing 12 hrs after application.
	<i>triadimefon</i> Bayleton 25WP Bayleton 50 Bayleton Flo Granular turf fungicide Systemic fungicide Fungicide VII	3	Preventative: 1 oz./2-4 gals. water Curative: 2 oz./2-4 gals water 1 oz. = 6 tbs. Preventative: 1.5 lbs. at 15-30 day intervals Curative: 3 lbs. at 15-30 day intervals Syst. Fung. 0.5-1 oz. at 15-30 day intervals Bayleton 50 and Flo 0.5-1.0 oz	Apply recommended rate at 15-30 day intervals. Protective activity can be longer than 30 days depending on environmental conditions. After the application of curative rate, subsequent applications should be applied on a preventative schedule and rate. For golf and sod. Not to be used on residential or commercial areas.
	<i>trifloxystrobin</i> Compass	11	Preventative: 0.1-0.2 oz. in 1-2 gals. of water per 1000 ft ² at 14 day intervals Curative: 0.15-0.25 oz. in 1-2 gals. of water per 1000 ft ²	Apply when conditions are favorable for disease development. Apply 0.2 oz. and repeat on a 21 day interval. During periods of Dollar Spot pressure, mix Compass with fungicides labeled for Dollar Spot.
	<i>trifloxystrobin + triadimefon</i> Armada, Tartan	11 + 3	1- 2 oz at 14 to 28 day intervals 0.6-1.2 oz at 14 to 28 day intervals	
	<i>triticonazole</i> Trinity Triton	3	D.S. - 0.5-1.0 fl oz at 14-28 day intervals B.P. - 0.5-2.0 fl oz at 14-28 day intervals	2 fl. oz. rates may be applied if needed in transition areas of the South under heavy disease pressure.
	<i>triticonazole + chlorothalonil</i> Reserve	3 + M5	B.P. - 3.2-5.4 oz at 14-28 day intervals D.S. - 3.2-4.5 oz at 14-28 day intervals	B.P. - Begin fungicide applications preventatively when conditions are favorable for disease development. D.S. - Begin fungicide applications preventatively.
	<i>vinclozolin</i> Curalan Touche	2	2 oz/5 gals water 2 oz = 8.5 Tbsp	Repeat application in 1-3 weeks while disease conditions prevail. Toxic to fish.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Fairy Ring	<i>azoxystrobin</i> Heritage 50WG Heritage TL Heritage G Strobe Strobe 50WG Strobe 2L	11	0.4 oz applied at 28 day intervals 2-4 lbs at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>acibenzolar-s-methyl</i> Heritage Action	11 + P	0.2-0.4 oz. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>propiconazole</i> Headway	11 + 3	3 oz at 28 day intervals	
	<i>azoxystrobin</i> + <i>difenconazole</i> Briskway	11 + 3	0.5- 0.725 fl oz at 14-28 day intervals	For preventive control apply in early spring prior to disease development. Apply in 2-4 gals. of water/1000 ft ² . Irrigate into thatch prior to the spray drying. For curative control apply as soon as possible after fairy ring symptoms appear. Apply in 2-4 gals. of water, irrigate lightly. Add recommended rate of a wetting agent to the final spray. Re-apply after 28 days.
	<i>azoxystrobin</i> + <i>tebuconazole</i> ZoxyT, Strobe T	11 + 3	0.7-1.5 oz. at 14-28 day intervals	
	<i>hydrogen dioxide</i> + <i>hydrogen peroxide</i> Perpose Plus TerraCyte Pro Zerotol	NC	2 to 12 fl oz	Curative control may require 2-3 consecutive applications. Drench the soil to saturate root system. Use on 5-10 gals. per 1000 ft ² .
	<i>flutolanil</i> ProStar 70 WG Prostar 70 WP	7	Preventive: 2.2 oz at 21-28 day intervals Curative: 4.5 oz at first sign of activity. Repeat in 30 days. Apply in 10 to 50 gals. water/1000 ft ² .	Use of wetting agent or aerification prior to treatment may improve disease control. DO NOT treat more than 10,000 ft ² . per acre of turfgrass.
	<i>flutolanil</i> + <i>thiophanate methyl</i> Systar	7 + 1	3-6.12 oz at 21-28 day intervals	
	<i>fluoxastrobin</i> Disarm 480 SC Disarm G Fame SC Fungicide Fame G Fungicide	11	0.36 fl oz at 28 day intervals 0.28-0.36 fl oz at 21-28 day intervals 2.3-4.6 lb at 14-28 day intervals	
	<i>fluoxastrobin</i> + <i>chlorothalonil</i> Disarm C Fame +C	11 + M5	4.5-5.9 oz at 21-28 day intervals	
	<i>fluoxastrobin</i> + <i>myclobutanil</i> Disarm M	11 + 3	0.5-1.0 oz at 21-28 day intervals	
	<i>fluoxastrobin</i> + <i>tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals	
	<i>fluxapyroxad</i> + <i>pyraclostrobin</i> Lexicon	7 + 11	0.47 fl oz at 28 days interval	Apply as soon as possible after fairy ring development. Fairy ring symptoms may take 2-3 weeks to disappear following application. Use 2-4 gallons of spray volume per 1000 ft ² and appropriate soil wetting agent at the time of application. Provide short irrigation cycle directly following treatment to move fungicide through thatch.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Fairy Ring (continued)	<i>metconazole</i> Tourney	3	0.37 oz.	Apply in 4 gals. water/1000 ft ² . Symptoms may take several weeks to disappear following application. Do not use on bermudagrass.
	<i>pydiflumetofen</i> Posterity	7	0.16-0.32 fl oz at 21-28 day intervals	Apply when conditions become favorable for disease development. Add the recommended rate of a wetting agent. Labeled for golf courses only.
	<i>pyraclostrobin</i> Insignia Insignia Intrinsic	11	0.5-0.9 oz at 14-28 day intervals	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.
	<i>pyraclostrobin</i> + <i>boscalid</i> Honor Honor Intrinsic	11 + 7	1.1 oz. at 28 day intervals	
	<i>polyoxin D</i> Affirm Endorse	19	4 oz. in a minimum of 2 gallons at 14 day intervals For Affirm make 2-3 applications of 1 oz. rate at 7 day intervals	Make 2-3 applications. Use a penetrating wetting agent. Water in immediately after treatment.
	<i>tebuconazole</i> Torque ArmorTech Teb360 XL Mirage Stressguard	3	0.6 fl oz 0.6-1.1 fl oz 1.0-2.0 fl oz	Preventative = Apply before fairy ring symptoms appear in the spring when soil temperatures consistently reach 55-60°F. Water into root zone within 4 hrs. Do not tank mix a wetting agent with preventative applications. Curative = Water into root zone within 4 hrs. Use a wetting agent as required for penetration of active hydrophobic soil conditions. A second application after 28 days may be required. Mirage = Apply in late winter/early spring preventatively when mean soil temperatures reach 55-60°F over 5 days a 2 inch depth.
	<i>triadimefon</i> Bayleton 25WP Bayleton 50 Bayleton Flo	3	1-2 oz or fl oz	Apply recommended rate in 2-4 gallons of water in the spring prior to appearance of Fairy Ring symptoms. Before the spray dries, irrigate to wash the fungicide into the thatch/soil where the fungus is active. Repeat application 14 days later. If the 2 ounce rate is used on <i>Poa annua</i> putting greens, extend the intervals to 21 days. For golf and sod. Not to be used on residential or commercial areas.
Fusarium/ Microdochium	<i>azoxystrobin</i> Heritage 50WG, G, TL Strobe, Strobe 50WG, Strobe XL ArmorTech Zoxy	11	0.2-0.4 oz at 14-28 day intervals 4 lbs at 10-28 day intervals 7 lbs single application, For AT Zoxy= 0.37-0.77 oz at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>acibenzolar-s-methyl</i> Heritage Action	11 + P	0.2-0.4 oz. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>chlorothalonil</i> Renown	11 + M5	2.5-4.5 fl oz at 14-21 day intervals	
	<i>azoxystrobin</i> + <i>difencconazole</i> Briskway	11 + 3	0.5-0.725 fl oz at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>propiconazole</i> Headway	11 + 3	3-5.25 oz at 10-28 day intervals	
	<i>azoxystrobin</i> + <i>tebuconazole</i> ZoxyT Strobe T	11 + 3	0.75-1.5 oz. at 14-21 day intervals	
	<i>Bacillus subtilis</i> Strain GB03 Companion	44	4.0-6 fl oz at 14-28 day intervals	

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Fusarium/ Microdochium (continued)	<i>chlorothalonil</i> Chlorothalonil 500ZN, 720SFT, DF Daconil Action Daconil Ultrex Daconil Weatherstik Daconil Zn Echo DF Echo Dyad ETQ Evade Manicure Manicure Ultra Pegasus DFX	M5	5-5.5 oz at 21-28 day intervals	Recent label changes by manufacturers restrict use to commercial turf only. Not to be used on home lawns.
	<i>chlorothalonil + propiconazole + fludioxonil</i> Intsrata	M5 + 3 + 12	5-11 fl oz	Late fall
	<i>chlorothalonil + propiconazole + PCNB</i> , FFIII Fungicide	M5 + 3 + 14	3.3-6.6 lbs	Fall/late winter
	<i>chlorothalonil + thiophanate methyl</i> Consyst Peregrin Spectro Tee-1-Up WDG	M5 + 1	Single application: 6-8 oz 3.72-5.76 at 7-14 day intervals	
	<i>chlorothalonil + thiophanate methyl + iprodione + tebuconazole</i> Enclave	M5 + 1 + 2 + 3	Blight - 3-4 fl oz at 14-21 day intervals Microdochium patch - 7-8 fl oz at 28 day intervals	For Blight make two applications at 14-28 day intervals beginning when disease first appears.
	<i>fenarimol</i> Rubigan AS 11.6	3	Patch - 8 fl oz apply 1 or 2 applications Blight - 2 fl oz at 30 day intervals	Use caution on bentgrass at high rate (See label). Irrigate with 0.5-1" of water following application.
	<i>fluazinam</i> Secure Rotator	29	0.5 fl oz at a 14 day interval	
	<i>fluazinam + acibenzolar-S-methyl</i> Secure Action	29 + P01	0.5 fl oz at a 14 day interval	Golf courses only.
	<i>fluazinam + tebuconazole</i> Traction	29 + 3	1.3 fl oz at a 14 day interval	Golf courses only.
	<i>fluopyram + trifloxystrobin</i> Exteris	7+11	4.135-12.6 fl oz	
	<i>fludioxonil</i> Medallion Medallion SC	12	Single application: 0.5 oz 1-2 fl oz at 7-14 day intervals	
	<i>fluoxastrobin</i> Disarm 480 SC Disarm G Fame SC Fungicide Fame G Fungicide	11	0.18 - 0.36 fl oz at 14-28 day intervals 2.3 - 4.6 lbs. at 14 to 21 or 28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + chlorothalonil</i> Disarm C Fame + C	11 + M5	3 - 5.9 oz. at 28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + myclobutanil</i> Disarm M	11 + 3	0.25-1.0 oz. at 14-28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Fusarium/ Microdochium (continued)	<i>fluoxastrobin + tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals	
	<i>flutolanil + thiophanate methyl</i> Systar	7 + 1	4-6.12 oz. one application	
	<i>hydrogen dioxide/hydrogen peroxide</i> TerraCyte Pro Zerotol Perpose Plus	NC	6-12 fl oz	Curative control may require 2-3 consecutive applications.
	<i>iprodione</i> 18 Plus ArmorTech IP233 Chipco 26GT Chipco 26019 Fungicide X Eclipse ETQ Iprodione Pro 2SE Iprodione SPC Ipro 2SE Raven	2	Blight - 8 fl oz repeat applications at 28 day intervals 1.5-2.0 oz at 14-21 day intervals 3-4 fl oz at 14-28 day intervals	Use only preventative foliar applications when conditions first become favorable for disease development. Not for use in residential areas.
	<i>iprodione + thiophanate methyl</i> 26/36 ArmorTech TMI 2020 Dovetail Lescro Twosome TM + IP SPC	2 + 1	1-4 oz at 14-21 day intervals	
	<i>iprodione + trifloxystrobin</i> Interface	2 + 11	5-7 oz at 14-21 day intervals	
	<i>isofetamid + tebuconazole</i> Tekken	7 + 3	3.0 fl oz	
	<i>mancozeb + copper hydroxide</i> Junction	M3 + M	2-4 oz. at 7-14 day intervals	
	<i>metconazole</i> Tourney	3	0.37-0.44 oz.	Late fall.
	<i>myclobutanil</i> ArmorTech Myclo 20EW Eagle 20EW Lebanon Eagle G Myclobutanil 20EW T/O	3	0.6-2.4 oz Myclo 20EW 1.2-2.4 oz	1 application.
	<i>PCNB</i> Engage Penstar Revere Terraclor Turfcide	14	8 oz. in 10-15 gals. water	Caution on bentgrass for phytotoxicity.
	<i>PCNB + tebuconazole</i> Oreon	14 + 3	6-8 fl oz at 28 day intervals	
	<i>penthiopyrad</i> Velista	7	0.7 oz only one application	Only one application allowed per season.
	<i>polyoxin D</i> Affirm Endorse	19	4 oz. in a minimum of 2 gallons at 14 day intervals. 2.4 lbs/acre at 7-14 day intervals	

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Fusarium/ Microdochium (continued)	<i>propiconazole</i> ArmorTech PPZ143MC Banner Maxx Banner GL Kestrel Monsoon turf Savvi Strider ProPensity 1.3ME Prophesy Propiconazole SPC 14.3 Propicure 3.6F	3	2-4 oz	
	<i>pydiflumetofen</i> Posterity	7	0.08-0.16 fl oz at 14-28 day interval	Golf courses only.
	<i>pyraclostrobin</i> Insignia Insignia Intrinsic	11	0.5-0.9 oz at 14-28 day intervals	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.
	<i>pyraclostrobin + boscalid</i> Honor Honor Intrinsic	11 + 7	0.55-1.1 oz at 14-28 day intervals	
	<i>pyraclostrobin + tritconazole</i> Pillar	11 + 3	3.0 lbs at 28 day intervals	DO NOT make more than 5 applications per year at the use rate of 3.0 lbs. per 1000 ft ² .
	<i>Reynoutria sachalinensis</i> Regalia PTO	P5	1-3 fl oz at 7-14 day intervals	Use in a minimum of 1.5 gal water /1000 ft ² . Begin applications preventatively.
	<i>tebuconazole</i> ArmorTech TEB 360 XL Mirage Stressguard Sipcam Clearscape Sipcam Clearscape ETQ Torque	3	0.6 fl. oz. 1.0-2.0 fl oz	Apply in the fall, before anticipated turf dormancy. If turf breaks dormancy during winter months a second application may be made.
	<i>thiophanate methyl</i> ArmorTech TM462 Cavalier Cleary's 3336, 3336 DG Lite, 3336 F, 3336 G, 3336 GC, 3336 Plus Fungo Systec 1998 T-Bird 4.5L T-Bird 85 WDG T-Storm	1	Patch - 2 oz. Repeat at 5 to 14 day intervals Blight - 4-8 oz. Apply 2 applications at 10-14 day intervals	Water into root zone after application.
	<i>thiram</i> Spotrete F	M3	3 to 12 oz.	
	<i>triadimefon</i> Bayleton 25WP Bayleton 50 Bayleton Flo Fungicide VII Granular turf fungicide Systemic fungicide	3	2 oz. on 15 day intervals or 4 oz. on 30 day intervals Preventive: 1.5 lbs. at 15-30 day intervals Curative: 3 lbs. at 15-30 day intervals Syst. Fung. 0.5-1 oz. at 15-30 day intervals Bayleton 50 and Flo 1-2 oz.	Apply first in mid-June or 30 days prior to time blight normally becomes evident.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Fusarium/ Microdochium (continued)	<i>trifloxystrobin</i> Compass	11	Apply 0.2-0.25 oz	Apply when conditions are favorable for disease development, fall to early spring.
	<i>trifloxystrobin</i> + <i>triadimefon</i> Armada,Tartan	11 +3	2 oz. at 14-28 day intervals 1.2 oz. at 14-28 day intervals	Fall to Early Spring
	<i>triticonazole</i> Trinity Triton	3	0.5-1.0 fl. oz. 0.15-0.3 fl. oz.	
	<i>triticonazole</i> + <i>chlorothalonil</i> Reserve	3 + M5	3.2-4.5 oz. at 10-14 day intervals	
	<i>vinclozolin</i> Curalan Touche	2	2-4 oz. Repeat at 7-21 day intervals	
Gray Leaf Spot (<i>Pyricularia</i>)	<i>azoxystrobin</i> Heritage 50WG, TL, G, Strobe 50 WG, Strobe 2L, ArmorTech Zoxy	11	0.2-0.4 oz. at 14-28 day intervals 2-4 lbs. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>acibenzolar-s-methyl</i> Heritage Action	11 + P	0.2-0.4 oz. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>chlorothalonil</i> Renown	11 + M5	2.5-4.5 fl. oz. at 10-14 day intervals	
	<i>azoxystrobin</i> + <i>difenconazole</i> Briskway	11 + 3	0.5-0.725 fl. oz. at 14-21 day intervals	
	<i>azoxystrobin</i> + <i>propiconazole</i> Headway	11 + 3	1.5-3 oz. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>tebuconazole</i> ZoxyT Strobe T	11 + 3	0.75-1.5 oz. at 14-28 day intervals	
	<i>Bacillus subtilis</i> Strain QST713 Rhapsody Sonnet, ArmorTech	44	0.5-2.5 fl. oz. at 7-10 day intervals	Apply in sufficient water to provide thorough coverage.2 gals./1000 ft ² .
	<i>chlorothalonil</i> Chlorothalonil 500ZN, 720SFT, DF ArmorTech CLT720 ArmorTech CLT825 Chlorstar Daconil 2787 Daconil Action Daconil G Daconil Ultrex Daconil Weatherstik Daconil Zn Docket Echo DF, Echo Dyad ETQ, Evade Legend Manicure, Manicure Ultra Pegasus DFX	M5	Flowable Preventive: 3-6 fl. oz. at 7-10 day intervals Curative: 6-11 fl. oz. at 7-10 day intervals Wettable Powder (WDG90) Preventive: 1.75-3.5 oz. at 7-10 day intervals Curative: 3.5-6.5 oz. at 7-10 day intervals	Recent label changes by manufacturers restrict use to commercial turf only. Not to be used on home lawns.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Gray Leaf Spot (Pyricularia) (continued)	<i>chlorothalonil + propiconazole</i> Concert Concert II	M5 + 3	3-5.5 fl. oz. at 7-14 day intervals 5.5-8.5 fl. oz. at 14-21 day intervals	
	<i>chlorothalonil + propiconazole + fludioxonil</i> Instrata	M5 + 3 + 12	2.75-6 fl. oz. at 10-14 day intervals	
	<i>chlorothalonil + thiophanate methyl</i> Consyst Peregrine Spectro Tee-1-up WDG TM + CTN SPC	M5 + 1	2-8 oz. at 7-14 day intervals 2 -5.76 oz.	
	<i>chlorothalonil + thiophanate methyl + iprodione + tebuconazole</i> Enclave	M5 + 1 + 2 + 3	3-4 fl. oz. at 14-21 day intervals 7-8 fl. oz. at 28 day intervals	Apply when disease first appears. Make additional applications as needed. Allow spray to dry before watering in.
	<i>fluazinam + tebuconazole</i> Traction	29 + 3	1.3 fl oz at a 14 day interval	Golf courses only.
	<i>fluopyram + trifloxystrobin</i> Exteris	7+11	2.1-6.0 fl oz at 14-28 day intervals	
	<i>fluoxastrobin</i> Disarm 480 SC, G Fame SC Fungicide Fame G Fungicide	11	0.18-0.36 fl. oz. at 14-28 day intervals 2.3-4.6 lbs. at 14-21 or 28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + chlorothalonil</i> Disarm C Fame + C	11 + M5	3-5.9 oz. at 14-28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + myclobutanil</i> Disarm M	11 + 3	0.25-1.0 oz. at 14 to 28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals	
	<i>flutolanil + thiophanate methyl</i> Systar	7 + 1	2-3 oz. at 14 day intervals	
	<i>fludioxonil</i> Medallion Medallion SC	12	0.25-0.50 oz. at 14 day intervals 1-2 fl. oz. at 7-14 day interval	
	<i>fluxapyroxad + pyraclostrobin</i> Lexicon	7 + 11	0.34-0.47 fl. oz. at 14 to 28 days interval	
	<i>isofetamid + tebuconazole</i> Tekken	7 + 3	3.0 fl oz	
	<i>metconazole</i> Tourney	3	0.37 oz. at 14-21 day intervals	Apply when conditions are favorable for disease development. DO NOT use on Bermudagrass.
	mineral oil Civitas	NC	8 to 32 oz.	Use only in conjunction with Civitas Harmonizer.
	<i>myclobutanil</i> ArmorTech Myclo 20EW Eagle 20EW Eagle 40WSP Lebanon Eagle G Myclobutanil 20EW T/O	3	1.2- 2.4 oz.	1 application.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Gray Leaf Spot (Pyricularia) (continued)	<i>PCNB + tebuconazole</i> Oreon	14 + 3	6-8 fl oz at 14-28 day intervals	
	<i>polyoxin D</i> Affirm Endorse	19	4 oz. in a minimum of 2 gals at 14 day intervals 2.4 lbs./acre at 7-14 day intervals	Do not irrigate for 12 hrs. after application.
	<i>propiconazole</i> ArmorTech PPZ143MC, Banner Maxx Banner GL, Kestrel, Monsoon turf, Savvi Spectator, Strider, ProPensity 1.3ME Prophecy, Propiconazole SPC 14.3 Propicure 3.6F	3	2 fl. oz. at 14 day intervals Banner GL individual packets; one packet treats 11,000-22,000 ft ²	
	<i>pyraclostrobin</i> Insignia Insignia Intrinsic	11	0.5-0.9 oz. at 14-28 day intervals	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.
	<i>pyraclostrobin + boscalid</i> Honor Honor Intrinsic	11 + 7	0.55-1.1 oz. at 14-28 day intervals	
	<i>pyraclostrobin + triticonazole</i> Pillar	11 + 3	3.0 lbs. at 28 day intervals	DO NOT make more than 5 applications per year at the use rate of 3.0 lbs. per 1000 ft ² .
	<i>Reynoutria sachalinensis</i> Regalia PTO	P5	1-3 fl. oz. at 7-14 day intervals	Use in a minimum of 1.5 gal water /1000 ft. ² Begin applications preventatively.
	<i>tebuconazole</i> ArmorTech TEB360 XL Mirage Stressguard Sipcam Clearscape ETQ Torque	3	0.6 fl. oz. 1.0-2.0 fl oz at 14-28 day intervals	Apply when conditions are favorable for disease development at 28 day intervals.
	<i>thiophanate methyl</i> ArmorTech TM462 Cavalier Cleary's 3336, 3336 DG Lite, 3336 F, 3336 G, 3336 GC, 3336 Plus Fungo, Systec 1998 T-Bird 4.5L, T-Bird 85 WDG T-Methyl SPC 4.5 T-Methyl SPC 50 T-Methyl G, T-Storm Tee-off 4.5F	1	Preventive: 1 oz/5 gals. water. Apply at 10-14 day intervals as needed Curative: Apply 2 oz/5 gals. water	
	<i>triadimefon</i> Bayleton 25WP Bayleton 50 Bayleton Flo Fungicide VI Granular turf fungicide Systemic fungicide	3	Preventive: 1.5 lbs. at 15-30 day intervals Curative: 3 lbs at 15-30 day intervals S Syst. Fung. 0.5-1 oz. at 15-30 day intervals	For golf and sod. Not to be used on residential or commercial areas.
	<i>trifloxystrobin</i> Compass	11	Apply 0.15-0.2 oz. in 1-2 gals. water at 14 day intervals or 0.25 oz. in 1-2 gals water at 21 day intervals.	Apply when conditions are favorable for disease development.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Gray Leaf Spot (Pyricularia) (continued)	<i>trifloxystrobin</i> + <i>triadimefon</i> Armada Tartan	11 + 3	1-2 oz. at 14-28 day intervals 0.6-1.2 oz. at 14-28 day intervals	
	<i>triticonazole</i> + <i>chlorothalonil</i> Reserve	3 + M5	3.2-4.5 oz. at 14-28 day intervals	
Helminthosporium, Curvularia, Leaf Spots, Rusts, Anthracnose	<i>azoxystrobin</i> Heritage 50WG, G, TL Strobe, Strobe 50WG, Strobe 2L, ArmorTech Zoxy	11	0.2-0.4 oz. at 14-28 day intervals 2-4 lbs. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>chlorothalonil</i> Renown	11 + M5	2.5-4.5 oz. at 7-10 day intervals	
	<i>azoxystrobin</i> + <i>difenconazole</i> Briskway	11 + 3	0.3-0.725 fl. oz. at 14-28 day intervals	14 day intervals for anthracnose; 14-28 day intervals for other leaf spots.
	<i>azoxystrobin</i> + <i>propiconazole</i> Headway	11 + 3	0.75-3 oz. at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>tebuconazole</i> ZoxyT Strobe T	11 + 3	0.75-1.5 oz. at 14-28 day intervals	
	<i>Bacillus licheniformis</i> EcoGuard SB 3086	44	Up to 20 oz. at 3-14 day intervals	
	<i>Bacillus subtilis</i> Strain QST713 Rhapsody ArmorTech Sonnet	44	2.0-10 fl. oz. at 7-10 day intervals	Apply in sufficient water to provide thorough coverage. 2 gals. /1000 ft ² are commonly used.
	<i>Bacillus subtilis</i> Strain GB03 Companion	44	4.0-6 fl. oz. 14-28 day intervals	
	<i>chlorothalonil</i> Chlorothalonil 500ZN, 720SFT, DF ArmorTech CLT720 ArmorTech CLT825 Chlorstar Daconil 2787 Daconil Action Daconil G Daconil Ultrex Daconil Weatherstik Daconil Zn Docket Echo DF Echo Dyad ETQ Evade Legend Manicure Manicure Ultra Pegasus DFX	M5	Flowable Preventive: 3-6 fl oz at 7-10 day intervals Curative: 6-11 fl oz at 7-10 day intervals Wettable Powder (WDG90) Preventive: 1.75-3.5 oz at 7-10 day intervals Curative: 3.5-6.5 oz at 7-10 day intervals	Recent label changes by manufacturers restrict use to commercial turf only. Not to be used on home lawns.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Helminthosporium, Curvularia, Leaf Spots, Rusts, Anthracnose (continued)	<i>chlorothalonil + propiconazole</i> Concert Concert II	M5 + 3	3-5.5 fl. oz. at 14-21 day intervals 5.5-8.5 fl. oz. at 14-28 day intervals	
	<i>chlorothalonil + propiconazole + fludioxonil</i> Instrata	M5 + 3 + 12	2.75-6 fl. oz. at 10-21 day intervals	
	<i>chlorothalonil + thiophanate methyl</i> Consyst Peregrin Spectro Tee-1-Up WDG, TM + CTN SPC	M5 + 1	2-8 oz. at 7-21 day intervals 2-5.76 oz. at 7-14 day intervals	
	<i>chlorothalonil + thiophanate methyl + iprodione + tebuconazole</i> Enclave	M5 + 1 + 2 + 3	3-4 fl. oz. at 14-21 day intervals For basal anthracnose use 4 fl. oz. at 14 day intervals 7-8 fl. oz. at 28 day intervals	Apply when disease first appears. Make additional applications as needed. Allow spray to dry before watering in.
	<i>fluazinam</i> Secure Rotator	29	0.5 fl. oz. at 14 day intervals	Applications should be made prior to infection or when conditions become favorable for disease development.
	<i>fluazinam + acibenzolar-S-methyl</i> Secure Action	29 + P01	0.5 fl. oz. at 14 day intervals	Golf courses only.
	<i>fluazinam + tebuconazole</i> Traction	29 + 3	1.3 fl. oz. at 14 day intervals	Golf courses only.
	<i>fludioxonil</i> Medallion Medallion SC	12	0.25-0.50 oz. at 14-21 day intervals Anthracnose = 1-2 fl. oz. at a 14 day interval Leaf spot = 1-2 fl. oz. at 14-21 day intervals	
	<i>fluopyram + trifloxystrobin</i> Exteris	7+11	Anthracnose = 2.135-6.0 fl oz at 14-28 day intervals Rust = 1.5-4.135 fl oz	
	<i>fluoxastrobin</i> Disarm 480 SC, G Fame SC Fungicide Fame G Fungicide	11	0.18-0.36 fl oz at 14-28 day intervals 2.3-4.6 lbs at 14-28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + chlorothalonil</i> Disarm C Fame + C	11 + M5	3-5.9 oz at 14-28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + myclobutanil</i> Disarm M	11 + 3	0.25-1.0 oz at 14-28 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development.
	<i>fluoxastrobin + tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals	
	<i>flutolanil + thiophanate methyl</i> Systar	7 + 1	2-3 oz at 14 day intervals	
	<i>fluxapyroxad + pyraclostrobin</i> Lexicon	7 + 11	0.34-0.47 fl oz at 14 to 28 days interval	
	<i>hydrogen dioxide</i> TerraCyte Pro Zerotol Perpose Plus	NC	6-25 oz	Curative control may require 2-3 consecutive applications. Use on 3-5 gals. per 1000 ft ² . Perpose Plus Preventative: Dilute 1 fl oz in 1 gal. of water. Apply diluted 1-10 gal of solution to 1000ft ² . Curative: Dilute 5-10 fl oz in 5 gals of water. Apply 5-10 gallons of dilute solution to 1000ft ² .

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Helminthosporium, Curvularia, Leaf Spots, Rusts, Anthracnose (continued)	<i>iprodione</i> 18 Plus ArmorTech IP233, Chipco 26GT, Chipco 26019, Eclipse ETQ, Iprodione Pro 2SE, Iprodione SPC, Ipro 2SE Fungicide X Raven	2	2-4 fl oz in 2-10 gals water Apply every 14-21 days 2 oz. = 12 tbs 1.5-2.0 oz at 14-21 day intervals 3-4 fl. oz at 14-28 day intervals	Not for use in residential areas.
	<i>iprodione + thiophanate methyl</i> 6/36 ArmorTech TMI 2020 Dovetail Lesco Twosome TM + IP SPC	2 + 1	1-4 oz at 14-21 day intervals	
	<i>iprodione + trifloxystrobin</i> Interface	2 + 11	5-7 oz at 14-21 day intervals	Anthracnose suppression only.
	<i>isofetamid + tebuconazole</i> Tekken	7 + 3	3.0 fl. oz.	
	<i>mancozeb + copper hydroxide</i> Junction	M3 + M1	2-4 oz at 5 day intervals	
	<i>maneb, maneb + zinc sulfate</i> & <i>mancozeb</i>	M3	4 oz at 10-14 day intervals	
	<i>myclobutanil</i> ArmorTech Myclo 20EW Eagle 20EW Eagle WSP 40 Golden Eagle Lebanon Eagle G Myclobutanil 20EW T/O	3	Preventive: 0.6 oz at 14 day intervals (3 oz. pkt./5000 ft ²)	Do not graze treated areas or feed clippings to livestock.
	<i>metconazole</i> Tourney	3	0.28-0.37 oz at 14-21 day intervals	Apply when conditions are favorable for disease development. Do not use on Bermudagrass.
	<i>mineral oil</i> Civitas	NC	8-32 oz	Use only in conjunction with Civitas Harmonizer.
	<i>PCNB</i> Engage Penstar Revere Terraclor Turfcide, Autilus	14	7-10 oz. in 5-10 gals water at 3-4 week intervals. 5-6 oz. in 1-10 gals water at 7-10 day intervals	
	<i>penthiopyrad</i> Velistar	7	0.3-0.5 oz. at 14 day intervals	Begin applications at early stages of disease development.
	<i>phosphorus acid</i> Fosphite	33	2-3 fl oz	Use only as preventative treatment or when conditions are favorable for disease development.
	<i>polyoxind</i> Affirm Endorse	19	4 oz. in a minimum of 2 gallons at 14 day intervals. 2.4 lbs./acre at 7-14 day intervals	Do not irrigate for 12 hrs after application.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Helminthosporium, Curvularia, Leaf Spots, Rusts, Anthracnose (continued)	<i>propiconazole</i> ArmorTech PPZ143MC Banner Maxx Banner GL Kestrel Monsoon Turf ProPensity 1.3ME Prophecy Propiconazole SPC 14.3 Propicure 3.6F Savvi Strider	3	1-2 fl oz at 14-28 day intervals Banner GL individual packets; one packet treats 11,000-22,000 ft ²	If anthracnose is present use 2 oz. rate in combination with Daconil or Chipco 26GT. Do not mow or irrigate treated areas until grass is completely dry. Do not use on home lawns. Bermudagrass and St. Augustinegrass can be sensitive to Banner. Do not exceed 2 fl. oz./1000 ft ² every 30 days on any variety of Bermudagrass or St. Augustinegrass. On Bentgrass, do not exceed 1 oz. /1000 ft ² or apply at less than 21 day intervals when temperatures exceed 80°F.
	<i>pyraclostrobin</i> Insignia Insignia Intrinsic	11	0.5-0.9 oz at 14-28 day intervals	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.
	<i>pyraclostrobin + boscalid</i> Honor Honor Intrinsic	11 + 7	0.55-1.1 oz at 14-28 day intervals	
	<i>pyraclostrobin + triticonazole</i> Pillar	11 + 3	3.0 lbs at 28 day intervals	Do not make more than 5 applications per year at the use rate of 3.0 lbs. per 1000 ft ² .
	<i>Reynoutria sachalinensis</i> Regalia PTO	P5	1-3 fl oz at 7-14 day intervals	Use in a minimum of 1.5 gal water /1000 ft. ² Begin applications preventatively.
	<i>tebuconazole</i> ArmorTech TEB360 XL Mirage Stressguard Sipcam Clearscape Sipcam Clearscape ETQ Torque	3	0.6 fl oz Mirage – 1.0-2.0 fl oz at 14-28 day intervals	For prevention, begin applications when conditions are favorable for disease development. Do not make two consecutive applications of Torque fungicide. Alternate with another fungicide with different mode of action. A second application may be made after 28 days.
	<i>thiophanate methy</i> ArmorTech TM462 Cavalier Cleary's 3336, 3336 DG Lite, 3336 F, 3336 G, 3336 GC, 3336 Plus Fungo Systec 1998 T-Bird 4.5L T-Bird 85 WDG T-Methyl SPC 4.5 T-Methyl SPC 50 T-Methyl G T-Storm Tee-off 4.5F	1	Preventative: 1 oz/5 gals water (Anthracnose) Apply every 10-14 day as needed Curative: Apply 2 oz/5 gals water	
	<i>thiram</i> Spotrete F	M3	Preventative: 3 ¾ fl oz at 7-10 day intervals Curative: 7 ½ fl oz at 3-5 day intervals	For best results use spray mix the same day it is prepared. Spray right after mowing or avoid mowing 12 hrs after application.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Helminthosporium, Curvularia, Leaf Spots, Rusts, Anthracnose (continued)	<i>trifloxystrobin</i> Compass	11	Preventive: Apply 0.1-0.15 oz. at 14 day intervals Curative: Leaf spot—0.15-0.25 oz. in 1-2 gals. water at 21-28 day intervals Rust—0.2-0.25 oz. in 1-2 gals. water at 21 day intervals Preventive: Anthracnose - 0.15-0.2 oz at 14 day intervals in 1-2 gals water Curative: 0.25 oz at 21 day intervals in 1-2 gals Water	Apply when conditions are favorable for disease.
	<i>triadimefon</i> Bayleton 50 Bayleton Flo0	3	1.0 oz/fl oz	For Anthracnose: Preventative rate: Apply at 30 day intervals and repeat as necessary for seasonal control. Depending on environmental conditions, residual control may be extended to 45 days. Curative rate: To control existing infections. Subsequent applications should be applied on a preventative schedule and rate. For golf and sod only. Not to be used on residential or commercial areas.
	<i>trifloxystrobin + triadimefon</i> Armada Tartan	11 + 3	1-2 oz. at 14-28 day intervals 0.6-1.2 oz at 14-28 day intervals	
	<i>triticonazole</i> Trinity Triton	3	0.5-1.0 fl oz at 14-28 day intervals	
	<i>triticonazole + chlorothalonil</i> Reserve	3 + M5	3.2-4.5 oz at 14-28 day intervals	
	<i>vinclozolin</i> Curalan Touche	2	1-2 oz (Helminthosporium) at 14-28 day intervals	
Pythium Blight, Pythium Root Rots, Pythium Root Dysfunction	<i>azoxystrobin</i> Heritage 50WG, G, TL, ArmorTech Zoxy, Strobe 50 WG, Strobe 2L	11	0.4 oz on 10-14 day intervals 2-4 lbs at 10-14 day intervals	
	<i>azoxystrobin + acibenzolar-s-methyl</i> Heritage Action	11 + P	0.2-0.4 oz. at 10-14 day intervals	
	<i>azoxystrobin + propiconazole</i> Headway	11 + 3	3 oz at 10-14 day intervals	
	<i>azoxystrobin + tebuconazole</i> ZoxyT Strobe T	11 + 3	1.5 oz. at 10-14 day intervals	
	<i>bacillus subtilis</i> Strain GB03 Companion	44	4.0-6 fl oz 14-28 day intervals	
	<i>chloroneb</i> Termec SP Terraneb	14	4 oz in 3-5 gals. water 4 oz = 12.5 tbs	
	<i>cyazofamid</i> Segway	21	0.45-0.9 fl oz at 14-21 day intervals	Apply as a preventative treatment at 0.45 to 0.9 fl. oz. in 2 to 4 gals. of water. On established turf apply as a preventative treatment when conditions are favorable for disease development. During periods of prolonged favorable conditions use 0.45 fl. oz. at 14 day intervals, using another fungicide having a different mode of action between applications of Segway. For newly seeded areas use 0.45 fl. oz. in 2-4 gals. water immediately after seeding.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Pythium Blight, Pythium Root Rots, Pythium Root Dysfunction (continued)	<i>etridiazole</i> Koban 30WP Terrazole	14	Established Turf: 2-4.5 oz in 5 gals water Newly Seeded Areas: 7-9 oz in 5 gals water 4 oz = 9.5 tbs Terrazole = 2-4.5 oz at 10-14 day intervals	Re-treat in 5-10 days depending on weather conditions. Can cause phytotoxicity on cool season turfgrass in hot weather at low carrier volumes.
	<i>fosetyl AL (Aluminum tris)</i> Alliette 80WP ArmorTech ALT 70 Autograph Chipco Signature Signature Stressguard XTRA Fosetyl-Al 80WDG Prodigy Signature	33	4-8 oz in 1-5 gal water per 1000 ft ² at 14-21 day intervals ALT 70 = 4.6-9.2 oz	Do not mow and/or water treated areas until foliage is completely dry. Begin preventive applications when conditions first favor disease and repeat as recommended 4-8 oz. at 14-21 day intervals.
	<i>flouxastrubin</i> Disarm 480 SC	11	0.18 to 0.36 fl oz at 7-14 day intervals	Begin applications when conditions are favorable for disease development, prior to disease development. When conditions are conducive for heavy Pythium infections use Disarm in combination with another product labeled for Pythium control.
	<i>flouxastobin + chlorothalonil</i> Disarm C	11 + M5	3-5.9 oz at 7-14 day intervals	
	<i>flouxastobin + myclobutanil</i> Disarm M	11 + 3	0.25-1.0 oz at 14 day intervals	Use preventatively.
	<i>fluxapyroxad + pyraclostrobin</i> Lexicon	7 + 11	0.34-0.47 fl oz at 14 to 28 days interval	Use preventatively.
	<i>hydrogen dioxide/hydrogen peroxide</i> TerraCyte Pro Zerotol Perpose Plus	NC	6-12 oz at 7 day intervals	Curative control may require 2-3 consecutive applications. Use on 3-5 gals. per 1000 ft ² . Perpose Plus Preventative: Dilute 1 fl oz in 1 gal. of water. Apply diluted 1-10 gal of solution to 1000ft ² . Curative: Dilute 5-10 fl oz in 5 gals of water. Apply 5-10 gallons of dilute solution to 1000ft ² .
	<i>mefenoxam</i> Mefenoxam 2AQ Subdue Subdue G Subdue Maxx	4	Established Turf: Maxx: 0.5-1 fl oz in 1-5 gals of water Newly Seeded Areas: Maxx: 0.5-1 fl oz in 1-5 gals of water	Re-treat at 10-14 day intervals depending on disease pressure and weather conditions. Apply immediately after seeding and irrigate with ¼ to ½" water. Repeat application at 7-14 day intervals if conditions remain favorable for disease.
	<i>mancozeb + copper hydroxide</i> Junction	M3 + M1	2-4 oz at 5 day intervals	
	<i>phosphorous acid</i> Alude Fiata-Stressguard Fosphite Jetphiter Reliant	33	5-10 fl oz at 7-14 day intervals Fosphite – 2-3 fl oz Jetphiter – 3.5 to 5 fl oz	Apply recommended quantity of product in 1 to 5 gals. of water. Do not irrigate or mow treated areas until spray has completely dried.
	<i>phosphate</i> Appear Magellan Phostrol Vital	33	4.1 fl. oz. at 14 day intervals 8.2 fl. oz. at 21 day intervals Appear = P. blight 3-4 fl oz at 7-14 day intervals. P. root and crown/damping 6-8 fl oz at 7-14 day intervals.	Do not irrigate or mow treated areas until spray has completely dried. Begin preventative applications when conditions first favor disease.
	<i>propamocarb</i> Banol Lesco Banol Proplant	28	Preventative: 1.25-2 fl oz in 2-5 gals water Curative: 3-4 fl oz in 2-5 gals water	Established Turf: Apply as a preventative treatment during periods of high temperature and humidity. Overseeded Areas: Apply after germination. Repeat at 7-21 day intervals if favorable disease conditions persist.

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TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Pythium Blight, Pythium Root Rots, Pythium Root Dysfunction (continued)	<i>propamocarb + fluopicolide</i> Stellar	28 + 43	1.2 fl oz	The maximum Stellar application rate is 2.4 oz. per year per 1000 ft ² . Overseeded Turf: Apply after seed germination to prevent Pythium damping off. Established Turf: Apply when conditions are favorable for disease development.
	<i>pyraclostrobin</i> Insignia Insignia Intrinsic	11	0.5-0.9 oz at 14-28 day intervals	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.
	<i>pyraclostrobin + boscalid</i> Honor Honor Intrinsic	11 + 7	Dysfunction = 1.1 oz at 14-28 day intervals Blight = 1.1 oz at 10-14 day intervals	
	<i>pyraclostrobin + triticonazole</i> Pillar	11 + 3	3.0 lbs at 28 day intervals	Do not make more than 5 applications per year at the use rate of 3.0 lbs. per 1000 ft ² .
	<i>Reynoutria sachalinensis</i> Regalia PTO	P5	1-3 fl oz at 7-14 day intervals	Use in a minimum of 1.5 gal water /1000 ft. ² Begin applications preventatively.
Spring Dead Spot (<i>Ophiosphaerella korrae</i> , <i>Ophiosphaerella narmari</i> , <i>Ophiosphaerella herpotricha</i>)	<i>azoxystrobin</i> Heritage 50 WG, TL ArmorTech Zoxy, Strobe 50WG, Strobe 2L	11	0.4 oz at 28 day intervals 0.38-0.77 at 28 days intervals	Make 1 or 2 applications in fall or when conditions are favorable for disease development.
	<i>azoxystrobin + acibenzolar-S-Meth</i> Heritage Action	11 + P	0.4 oz at 28 day intervals 0.2-0.4 oz. at 14-28 day intervals	
	<i>azoxystrobin + propiconazole</i> Headway	11 + 3	3 oz at 14 to 28 day intervals	
	<i>azoxystrobin + tebuconazole</i> ZoxyT Strobe T	11 + 3	1.5 oz. at 14-28 day intervals	
	<i>chlorothalonil + thiophanate methyl + iprodione + tebuconazole</i> Enclave	M5 + 1 + 2 + 3	3-4 fl oz at 14-21 day intervals 7- 8 fl oz at 28 day intervals	Apply when disease first appears. Make additional applications as needed. Allow spray to dry before watering in.
	<i>fluoxastrobin</i> Disarm 480 SC, G Fame SC Fungicide Fame G Fungicide	11	0.36 fl oz at 28 day intervals 2.3 to 4.6 lbs at 14-28 day intervals	Begin applications before disease is present and continue applications while conditions for disease development are present. Make two applications 28 days apart during spring or fall.
	<i>fluoxastrobin + chlorothalonil</i> Disarm C Fame + C	11 + M5	5.9 oz at 14-28 day intervals	
	<i>fluoxastrobin + myclobutanil</i> Disarm M	11 + 3	0.5-1.0 oz at 14-28 day intervals	Apply 1 or 2 applications approximately one month prior to Bermudagrass dormancy. ¼-½ inch of irrigation after application is recommended. Re-apply 14-28 days later.
	<i>fluoxastrobin + tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals	
	<i>fluxapyroxad + pyraclostrobin</i> Lexicon	7 +11	0.47 fl oz	Section 2(ee)
	<i>isofetamid</i> Kabuto	7	Program A: 3.2 fl oz preventative. Single application. Program B: First application 0.5 – 2 fl oz; second application 0.5 – 1.2 fl oz at 14 – 28 day intervals	When soil temperatures have declined to 65°F. Use 2 gal of water and water in immediately with 1/8 inch of irrigation. DO NOT apply more than 3.2 fl oz per year.
	<i>isofetamid + tebuconazole</i> Tekken	7 + 3	3.0 fl oz	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Spring Dead Spot (<i>Ophiosphaerella korrae</i> , <i>Ophiosphaerella narmari</i> , <i>Ophiosphaerella herpotricha</i>) (continued)	<i>myclobutanil</i> ArmorTech Myclo 20EW Eagle 20EW Eagle WSP 40 Golden Eagle	3	2.4 fl oz at 28 day intervals	Make 1 to 2 applications in the fall before turfgrass dormancy. Make a second application one month later.
	<i>PCNB</i> + <i>tebuconazole</i> Oreon	14 + 3	6 – 8 fl oz at 28 day intervals	
	<i>penithiopyrad</i> Velista	7	0.5 – 0.7 fl oz at 28 day intervals	Make two applications on a 28 day interval prior to winter dormancy.
	<i>propiconazole</i> ArmorTech PPZ143MC Banner Maxx Banner GL Kestrel Monsoon turf ProPensity 1.3ME Prophecy Propiconazole SPC 14.3 Savvi Spectator Strider Propicure 3.6F	3	4 oz at 30 day intervals Banner GL individual packets; one packet treats 11,000-22,000 ft ²	Make 1-3 applications. For one application apply in September or October. For multiple applications, begin sprays in August.
	<i>tebuconazole</i> ArmorTech TEB360 XL Mirage Stressguard Sipcam Clearscape Sipcam Clearscape ETQ Torque	3	0.6 fl oz 2.0 fl oz at 28 day intervals	For prevention, apply in fall when soil temperatures reach 65°F and again in spring under similar temperature conditions or after dormancy break. Begin applications preventatively when soil temperatures drop below 70°F at 2 inch soil depth in the fall.
	<i>thiophanate methy</i> ArmorTech TM462 Cavalier Cleary's 3336, 3336 DG Lite, 3336 F, 3336 G, 3336 GC Fungo Systec 1998 T-Methyl SPC 4.5 T-Methyl SPC 50 T-Methyl G	1	4-6 oz at 14 day intervals TM 462 3.5-5.3 oz	
Take all patch/root rot (<i>Gaeumannomyces graminis</i>)	<i>azoxystrobin</i> Heritage 50 WG, G, ArmorTech Zoxy, Strobe 50WG, Strobe 2L	11	0.4 oz at 28 day intervals 2-4 lbs at 28 day intervals 0.38-0.77 oz at 28 day intervals	Make 1 or 2 applications in fall or when conditions are favorable for disease development.
Bermuda Decline	<i>Azoxystrobin</i> + <i>Acibenzolar-S-Methyl</i> Heritage Action	11 + P	0.2-0.4 oz. at 28 day intervals	
(see fungicide labels for specific <i>Gaeumannomyces</i> species/disease)	<i>azoxystrobin</i> + <i>difenconazole</i> Briskway	11 + 3	0.5-0.725 fl oz at 28 day intervals	Begin applications prior to disease development. Make two applications in the spring and two applications 28 days apart in the fall.
	<i>azoxystrobin</i> + <i>propiconazole</i> Headway	11 + 3	3 oz at 14-28 day intervals	
	<i>azoxystrobin</i> + <i>tebuconazole</i> ZoxyT	11 + 3	1.5 oz. at 14-28 day intervals	

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Take all patch/root rot (<i>Gaeumannomyces graminis</i>)	<i>fluoxastrobin</i> Disarm 480 SC, G Fame SC Fungicide Fame G Fungicide	11	0.36 fl oz at 14 day intervals 0.36 fl oz at 28 day intervals 2.3-4.6 oz at 14-28 days intervals	Apply 1-2 applications approximately one month before turfgrass dormancy. ¼ to ½" of direct irrigation is recommended after application.
Bermuda Decline (see fungicide labels for specific <i>Gaeumannomyces</i> species/disease (continued))	<i>fluoxastrobin</i> + <i>chlorothalonil</i> Disarm C Fame + C	11 + M5	5.9 oz at 28 day intervals	
	<i>fluoxastrobin</i> + <i>myclobutanil</i> Disarm M	11 + 3	0.5-1.0 at 28 day intervals	
	<i>fluoxastrobin</i> + <i>tebuconazole</i> Fame + T	11 + 3	0.45-0.9 oz. at 21-28 day intervals	
	<i>hydrogen dioxide</i> TerraCyte Pro Zerotol	NC	6-12 oz at 7 day intervals	Curative control may require 2-3 consecutive applications. Use on 3-5 gals. per 1000 ft ² .
	<i>fluxapyroxad</i> + <i>pyraclostrobin</i> Lexicon	7 + 11	0.47 fl oz at 28 days interval	Use preventively. Begin applications when conditions are favorable for fungal infection, prior to disease symptom development. Make 1 or 2 applications in the fall, 28 days apart, followed by 1 or 2 applications in the spring, 28 days apart. DO Not exceed 3 applications in a 12 month period.
	<i>isofetamid</i> + <i>tebuconazole</i> Lexicon	7 + 3	3.0 fl oz	
	<i>myclobutanil</i> Eagle 40WSP	3	1.2-2.4 oz at 28 day intervals (spring and fall)	
	<i>propiconazole</i> ArmorTech PPZ143MC Banner GL Banner Maxx Kestrel Monsoon turf ProPensity 1.3ME Prophesy Propiconazole SPC 14.3 Savvi Spectator Strider Propicure 3.6F	3	4 oz at 30 day intervals. Banner GL individual packets; one packet treats 11,000-22,000 ft ²	Make 1-3 applications. For one application apply in September or October. For multiple applications, begin sprays in August.
	<i>PCNB</i> + <i>tebuconazole</i> Oreon	14 + 3	6-8 fl oz at 14-28 day intervals	
	<i>pyraclostrobin</i> Insignia Insignia Intrinsic	11	0.5-0.9 oz at 14-28 day intervals	Use as preventative. Begin application when conditions are favorable for fungal infection; prior to disease symptom development.
	<i>pyraclostrobin</i> + <i>boscalid</i> Honor Honor Intrinsic	11 + 7	Bermudagrass decline 1.1 oz Take All Patch = 1.1 oz at 28 day intervals	Bermudagrass decline = Make one application in the spring following green-up and a second application in the fall when air temperatures remain above 80°F and humidity is 75% or higher. Apply in 4 gallons of water per 1000ft ² .
	<i>pyraclostrobin</i> + <i>triticonazole</i> Pillar	11 + 3	3.0 lbs. at 28 day intervals	Do not make more than 5 applications per year at the use rate of 3.0 lbs. per 1000 ft ² .
	<i>Reynoutria sachalinensis</i> Regalia PTO	P5	1-3 fl. oz. at 7-14 day intervals	Use in a minimum of 1.5 gal water /1000 ft ² . Begin applications preventatively.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

TURF DISEASE CONTROL (continued)				
DISEASE	FUNGICIDE	FRAC	RATES (OZS./1000 ft ²)	REMARKS
Take all patch/root rot <i>(Gaeumannomyces graminis)</i> Bermuda Decline (see fungicide labels for specific <i>Gaeumannomyces</i> species/disease (continued))	<i>tebuconazole</i> ArmorTech TEB360 XI, Mirage Stressguard, Sipcam Clearscape Sipcam Clearscape ETQ Torque	3	0.6 fl oz 2.0 fl oz at 28 day intervals	Bermudagrass decline: Irrigate the area with sufficient water to move fungicide into crown and root zone of the turf. Take All Patch: For prevention, apply in fall when soil temperatures reach 65°F and again in spring under similar temperature conditions Apply preventatively in the fall and spring.
	<i>trifloxystrobin + triadimefon</i> Tartan	11 + 3	For take all patch – 1.5-2 oz at 28 day intervals	
	<i>thiophanate methyl</i> Cavalier Cleary's 3336, 3336 DG Lite, 3336 F, 3336 G, 3336 GC, 3336 Plus, Fungo Systec 1998 T-Methyl SPC 4.5 T-Methyl SPC 50 T-Methyl G	1	4-6 oz at 14 day intervals	
	<i>triadimefon</i> Bayleton 25WP Bayleton 50 Bayleton Flo Granular turf fungicide Systemic fungicide	3	Preventative = 2 oz. start sprays 2-4 weeks before symptoms reappear. Re-apply every 3-4 weeks Curative = 4 oz make 1-2 sprays on a 2-3 week intervals followed by the preventative rate at 3-4 week intervals	Apply 2 to 4 gallons of spray volume per 1,000 ft ² . Thoroughly water after each application. 50 and Flo; Immediately after the fungicide is applied, the area should be thoroughly irrigated to move the active ingredient down into the crown and root zone of the turf. The amount of water is dependent on the depth of the root zone. The objective is to water the fungicide into the crown and root zone. For golf and sod only. Not to be used on residential or commercial areas.
	<i>triticonazole</i> Trinity Triton	3	0.5-1.0 fl oz at 14-28 day intervals	Make 1 or 2 fall applications (September and October) and 1 or 2 spring applications (April and May) depending on local conditions.
	<i>triticonazole + chlorothalonil</i> Reserve	3 + M5	Take All Patch = 3.2 to 4.5 oz at 14 to 28 day intervals	Begin fungicide applications preventatively in the fall and repeat in the spring. Make 1 to 2 applications depending on local disease conditions, repeat under active disease conditions as needed.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

FUNGICIDES SOLD AS PRE-PACKED MIXTURES

ACTIVE INGREDIENTS	PRODUCT NAMES
azoxystrobin + propiconazole	Headway
azoxystrobin + chlorothalonil	Renown
azoxystrobin + difenconazole	Briskway
copper hydroxyde + mancozeb	Junction
chlorothalonil + propiconazole	Concert, Concert II
chlorothalonil + tebuconazole	E-Scape ETQ
chlorothalonil + fludioxonil + propiconazole	Instrata
chlorothalonil + thiophanate methyl + iprodione + tebuconazole	Enclave
chlorothalonil + acibenzolar-S-methyl	Daconil Action
fluopyram + trifloxastrobin	Exteris
fluoxastrobin + chlorothalonil	Disarm C, Fame + C
fluoxastrobin + miclobutanil	Disarm M
Fluoxastrobin + tebuconazole	Fame + T
fluxapyroxad + pyraclostrobin	Lexicon (Lexicon Intrinsic)
iprodione + thiophanate methyl	26/36 Fungicide, ArmorTech TMI 2020, Dovetail, Lescotwosome, TM + IP SPC
iprodione + trifloxystrobin	Interface
myclobutanil + mancozeb	MANhandle
pyraclostrobin + boscalid	Honor, Honor Intrinsic
pyraclostrobin + triticonazole	Pillar
thiophanate methyl + chlorothalonil	Broadcide, ConSyst, Peregrine, Spectro, Tee-1-up WDG, TM + CTN SPC
thiophanate methyl + flutolanil	Systar
thiophanate methyl + mancozeb	Duosan
thiophanate methyl + thiram	Bromosan
triadimefon + flutolanil	Prostar plus
triadimefon + trifloxystrobin	Armada 50WGD, Armada 50WP, Tartan
triticonazole + chlorothalonil	Reserve

See labels for rates and specific recommendations

MAJOR CHEMICAL GROUPS OF TURFGRASS FUNGICIDES			
Chemical Family	Common Name	Trade Name	Type/Mode of Action
acylpicolides	fluopicolide	Stellar	Delocalization of proteins
Aromatic Hydrocarbons	chloroneb	Anderson's Fungicide V 6.25G Anderson's Turf Fungicide 7.5G Termec SP, Terraneb SP	Protectant Fungicide
	etridiazol	Koban 30WP, Terrazole	Mode of action: Interferes with mitosis
	PCNB	Anderson's 10-0-14 Fertilizer + 15% PCNB, Anderson's FFII 15 .4G (14-3-3), Cleary's PCNB, Engage 75W, Engage 10GF, FF II, Lescos Revere 4000 4F, Lescos Revere 10G, Parflo 4F, Penstar 75WP, Penstar 15G, Penstar 4F, Revere 10G, Revere 4000, Flowable Turf, Terraclor 75%WP, Terraclor 75%WP (T&O), Turfcide 400F, Turfcide 10G	
Antibiotic	polyoxin d	Affirm, Endorse	Localized penetrant fungicide Mode of action: Inhibits chitin production, which is a major component of the cell wall in many fungi; Inhibits spore germination
Benzimidazoles	thiophanate methyl	Anderson's Systemic Fungicide 2.3G, ArmorTech TM 462, Cavalier, Cleary's 3336 50W/WSP, 3336 2G, 3336 4.5F, 3336 GC, 3336 DG Lite, Fungo Flo AGC, Fungo 4.5F, Fungo Flo 50WSB, Lescos T-Storm (50WSP, 2G, Flowable), OHP 6672 (4.5L & 50W), Scott's Lawn Fungus Control, Systec 1998 85WDG, T-Bird 4.5L, T-Bird 85 WDG, T-Methyl SPC 4.5, T-Methyl SPC 50, T-Methyl G, Tee-off 4.5F	Acropetal penetrant Mode of action: Fungicide binds tubulin subunits that results in mitotic arrest
Carboximides	boscalid	Emerald	Acropetal penetrant fungicide
	Fluopyram	Part of Exteris	Basidiomycete control
	fluxapyroxad	Xzemplar	Mode of action: Blocks activity of certain respiratory enzymes.
	flutalonil	Prostar	Inhibition of succinate dehydrogenase in a complex of the mitochondrial respiratory chain
	penthiopyrad	Velista	
Demethylation Inhibitors (DMI's)	fenarimol	Rubigan	Broad spectrum acropetal penetrant fungicide
	myclobutanil	ArmorTech Myclo 20 EW, Eagle 20 EW, Eagle 40 WSP, Lescos Eagle G, Lebanon Eagle G, Myclobutanil 20EW T/O	Mode of action: Sterol inhibitor (ergosterol). Inhibits cell membrane synthesis
	propiconazole	ArmorTech PPZ143MC, Banner GL 3.6 WSP, Banner Maxx 1.24 MEC, Lescos Spectator 3.6EC, Lescos Spectator Ultra 1.3 MEC, Monsoon turf, ProPensity 1.3 ME, Propiconazole SPC 14.3, Quali-pro propiconazole 14.3, Strider	
	tebuconazole	ArmorTech TEB360, Sipcam Clearscape, Sipcam Clearscape ETQ, Torque, Mirage Stressguard	
	triadimefon	Accost 1G, Anderson's Fungicide VII 0.59G, Anderson's 1% Bayleton 1G, Bayleton 25WP, Bayleton 50WSP, Bayleton Flo, Lebanon Bayleton 1G, Lescos Granular turf fungicide 1G, Lescos Systemic, Pro Bayleton, Strike 25 WP	
	triticonazole	Trinity, Triton	
Dicarboximides	iprodione	ArmorTech IP233, Chipco 26GT, Chipco 26019, Eclipse ETQ, Lescos 18 plus, Iprodione Pro 2SE, Iprodione SPC, Ipro2SE	Localized Penetrant
	vinclozolin	Curalan, Touche	Mode of action: Affects DNA synthesis and lipid metabolism

MAJOR CHEMICAL GROUPS OF TURFGRASS FUNGICIDES

Chemical Family	Common Name	Trade Name	Type/Mode of Action
Carbamates and Dithiocabamates	mancozeb	Dithane 4SC Rainshield, Dithane 75DF Rainshield, Dithane DF, Dithane DF Rainshield, Dithane F-45 Rainshield, Dithane M-45, Dithane WF Rainshield, Dithane T/O Rainshield 75WP, Dithane 37WF, Flowable Mancozeb 4, Fore, Fore Flo-XL 4F, Fore 80WP Rainshield, Formex 80W, Lescro Mancozeb 75DG, Lescro 4 Flowable Mancozeb 4F, Mancozeb + Copper, Mancozeb DG, Manzate 80WP, Manhandle, ManKocide, Manzate 75DF, Manzate Flowable Protect T/O	Protectant fungicide Mode of action: Enzyme inactivation
	propamocarb hydrochloride	Banol, Lescro Banol, Proplant	Localized penetrant Mode of action: Alters cell membrane function
Nitriles	chlorothalonil	ArmorTech CLT720, ArmorTech CLT825, Anderson's 5% ChloroStar 6F, 82.5WDG, Chlorothalonil 500ZN, 720SFT, DF, CountDown, Daconil 5G, Daconil Action, Daconil Ultrex, Daconil Weatherstik, Daconil Zn, Docket, Echo DF, Echo 500, Echo Ultimate ETQ, Echo 6F ETQ, Echo Dyad ETQ, Evade, 75WDG, Lebanon Daconil 5G, Lescro Manicure T/O, 6F, Legend, Thaloniil, Manicure, Manicure Ultra, Pegasus DFX, Ultrex 82.5WDG	Protectant Fungicide Mode of action: Toxic to cell membrane
Phenylamides	mefenoxam	Anderson's Pythium Control 1.2G, Apron XL LS, Mefanoxam 2AQ, Quell, Ridomil Gold EC, Subdue GR, Subdue Maxx, Subdue WSP, Tri-Power Selective	Acropetal penetrant fungicide Mode of action: Inhibits RNA synthesis
Phenylpyrrole	fludioxonil	Medallion	Protectant Fungicide Mode of action: Cell membrane toxicity, amino acids uptake inhibition
phenylpyridnamine	fluazinam	Secure	Protectant Fungicide Mode of action: Inhibits respiration
Phosphonates	fosetyl-a1	ArmorTech ALT70, Aliette 80WP, Aliette WDG, Chipco Signature, Prodigy Signature, Fosetyl-Al 80WGD, Lescro Prodigy Signature 80DG, Terra Aliette T/O, 80WDG	Systemic fungicide
	potassium phosphonate, phosphite	Alude, Appear, Magellan, Phostrol, Vital, Jetphiter	Mode of action: General fungitoxic effect
Strobilurins	azoxystrobin	Heritage, Strobe, Strobe 50WG, Strobe 2L	Broad spectrum, systemic
	flouxastrobin	Disarm, Disarm C, Disarm GC, Disarm M	Broad spectrum, systemic
	trifloxystrobin	Compass	Broad spectrum, localized penetrant
	pyraclostrobin	Insignia, Insignia Intrinsic	Mode of action: ATP inhibition

BIOFUNGICIDES

Biofungicides are naturally based microbial or biochemical products. There are two types of biofungicides: (1) Microbial biofungicides with an active ingredient that is a biological control agent (organism capable of attacking or competing with a pathogen or pest), and (2) plant biofungicides or plant-incorporated protectants are “pesticidal substances that plants produce from genetic material that has been added to the plant.”

Biofungicides			
Trade Name	Active Ingredients	RATES (OZS./1000 ft ²)	Company
Companion	<i>bacillus subtilis</i> Strain GB03	4.0-6 fl. oz.	Growth Products
EcoGuard SB 3086	<i>bacillus licheniformis</i>	Up to 20 oz.	Novozymes
Rhapsody Strain QST713	<i>bacillus subtilis</i>	2.0-10 fl. oz.	Agraquest ArmorTech
Regalia PTO	<i>Reynoutria sachalinensis</i>	Plant Extract. 1.0-3.0 fl. oz.	Marrone BioInnovations/Engage Agro USA

ADDITIONAL NOTES ON TURFGRASS FUNGICIDES

Protectant and Systemic Fungicides

There are two general types of fungicides: protectants and systemics. Protectant fungicides (sometimes called contacts), remain on the plant surfaces after application and do not penetrate the plant tissue. Systemic fungicides are absorbed into the plant and move within the plant tissue. Some fungicides are locally systemic and move only a limited distance within the plant. The dicarboximide fungicides are good examples of this group. Some systemics are moderately systemic, such as the DMI fungicides, whereas others are highly systemic and move readily through the plant's vascular transport system (e.g., the phosphonates). Examples of highly mobile systemics include the benzimidazoles. Most systemic fungicides only move upward in plant tissues. Only one systemic fungicide (fosetyl-Al) moves bidirectionally (from leaves to roots and vice versa). Systemic fungicides sometimes can suppress the fungus after it has infected the plant, whereas protectant fungicides must be present on the plant surfaces before infection begins to be effective.

Formulation

Several fungicidal products are available in more than one formulation. For protectant fungicides, a sprayable formulation (wetable powder, flowable, dry flowable, water dispersible granule, emulsifiable concentrate) usually provides better disease control than a granular formulation. Sprayable formulations can be superior to granular formulations even for systemics that are not highly mobile in plant tissues. Spray equipment allows more thorough coverage of plant surfaces than does a granular spreader. More thorough coverage can result in better control of fungi infecting foliage. If fungicide sprays are applied to control a root disease, it is often advisable to lightly irrigate before the fungicide dries to wash it into the root zone. Likewise, if granular fungicides are applied to control root diseases, apply to dry turf and irrigate after application.

Fungicide Mixtures

Several products formulated for turf disease control are prepackaged mixtures containing two or more active ingredients. Mixtures provide some protection against fungicide resistance and typically provide a broader spectrum of activity against turfgrass diseases. Prepackaged mixtures offer convenience and assurance against incompatibility, whereas tank-mixing on site offers greater flexibility in fungicide choice and application rates.

Fungicide Resistance

Infectious fungi sometimes develop resistance to particular fungicides, especially when a product is used repeatedly without alternating with chemically unrelated fungicides. When fungicide resistance develops, there is no value in increasing rates, shortening intervals between sprays, or using other fungicides with similar modes of action. Fungicide resistance has been confirmed in numerous instances for each of the following diseases and fungicide groups: dollar spot against benzimidazole fungicides and DMI fungicides (e.g. Bayleton etc.), gray leaf spot against strobilurin (QoI) fungicides (e.g. Heritage, Compass etc), and Pythium blight against phenylamide fungicides (Subdue etc). Benzimidazoles (e.g., Cleary 3336) and phenylamides (e.g., Subdue MAXX) have the highest risk of resistance. Strobilurins (e.g., Heritage) have a moderately high risk of resistance, DMIs (e.g., Bayleton) and the dicarboximides (e.g., Chipco 26GT) have a moderate risk, and the nitriles (e.g., Daconil), aromatic hydrocarbons (e.g., PCNB), and dithiocarbamates (e.g., mancozeb) have a low risk of resistance. Several general strategies are recommended to minimize the risk of fungicide resistance. First, don't rely on fungicides alone for disease control. Avoid using turfgrass varieties that are highly susceptible to common diseases. Follow good disease management practices to reduce the possibility of fungicide resistance. Limit the number of times at-risk fungicides are used during a growing season. Alternate at-risk fungicides with different fungicide groups. When using an at-risk fungicide, tank-mixing it with another fungicide from another chemical group (different mode of action) can also reduce the risk of resistance. These are general principles that can help to reduce but not eliminate risk. A fungicide-resistant pathogen population can still develop when these principles are practiced. Refer to product labels before tank-mixing products to ensure compatibility and to avoid phytotoxicity. For major chemical groups description, see “Major Chemical Groups” section located at the end of this handbook.

Chlorothalonil Restrictions on Residential (Home) Lawns

As a result of the Food Quality Protection Act of 1996, the EPA has decided to curtail the use of fungicides containing chlorothalonil and iprodione on residential turf.

Chlorothalonil Restrictions on Golf Courses

As of 2001, the following restrictions are in effect for the use of chlorothalonil on golf courses:

Seasonal maximum:

-73 lbs. ai/A/season on greens

-52 lbs. ai A/season on tees

-26 lbs. ai/A/season on fairways.

Maximum single application rate: 7.3 lbs. ai/A

Minimum spray intervals: 7 day

Methods to maximize efficacy of turfgrass fungicides

- All fungicides are not equally effective on all diseases. Proper selection is very important on disease management.
- Read the label directions carefully before applying fungicide.
- Apply fungicides at the rate specified in the label.
- Use compatible tank mixes at recommended label rates.
- The best control is achieved by applying fungicides preventatively.
- Fungicides should be sprayed when air temperatures are between 60°F and 85°F (15.3°C and 29.4°C).
- Avoid turfgrass stress (drought or temperature) before or at the time of application.
- Use proper sprayer to deliver appropriate coverage.
- Fungicides should stay on the foliage for at least 6 h for most effective control.
- Some fungicides have to be watered-in for proper place of action.
- Do not apply fungicides if rain is expected within 3-4 h (ideally 12 h after application).
- Delay mowing as much as possible to give the fungicide a chance to work (should follow the one-third rule).
- Use enough water when applying fungicide (usually 2 gallons/1000 ft² will give adequate coverage).
- Water pH for dilution or mix should be between 6-7.
- Do not apply fungicides when conditions are windy. Wind velocity tends to be the lowest early in the morning and late in the afternoon.
- When using granular materials, best results are obtained if soil is moist.
- Keep traffic off the area at least 2-3 hours after application.
- Be patient if an application appears to have produced no results. Some fungicide application results can be seen months later.

Fungicide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
aluminum tris	Chipco Signature	Chipco	Y	Y	Y		Y
azoxystrobin	Heritage 50WG/TL	Syngenta	Y	Y	Y	Y	Y
azoxystrobin	Heritage TL	Syngenta	Y	Y	Y	Y	
azoxystrobin	Heritage G	Syngenta		Y	Y	Y	
azoxystrobin	Strobe	Quali-Pro	Y	Y	Y	Y	Y
azoxystrobin + chlorothalonil	Renown	Syngenta	Y	Y	N	N	Y
azoxystrobin + propiconazole	Headway	Syngenta		Y	Y	Y	
<i>bacillus licheniformis</i>	EcoGuard SB 3086	Roots	Y				
<i>bacillus subtilis</i>	Companion	Growth Products	Y	Y	Y	Y	Y
<i>bacillus subtilis</i>	Rhapsody	Agra Quest	Y	Y	Y	Y	Y
boscalid	Emerald	BASF		Y		N	N
chloroneb	Teremec SP	Gordon's	Y				N
chloroneb	Terraneb	Kincaid	Y	Y	N	N	
chlorothalonil	Daconil 2787	Syngenta		Y	N	N	Y
chlorothalonil	Daconil Ultrex	Syngenta	Y	Y	Y	N	
chlorothalonil	Daconil Weatherstik	Syngenta	Y	Y	Y	N	Y
chlorothalonil	Daconil Zn	Syngenta	Y	Y	N	N	Y
chlorothalonil	Echo DF	Sipcam Agro				N	Y
chlorothalonil	Evade	Loveland	Y	Y		Y	Y
chlorothalonil	Pegasus DFX	Phoenix		Y	N	N	Y
chlorothalonil	Manicure	Syngenta	Y	Y			Y
chlorothalonil + propiconazole	Concert	Syngenta		Y	N	N	Y
chlorothalonil + propiconazole + fludioxonil	Instrata	Syngenta	Y	Y	Y	N	Y
chlorothalonil + thiophanate methyl	Consyst	Regal	Y	Y			
chlorothalonil + thiophanate methyl	Peregrine	Phoenix		Y	N	N	N
chlorothalonil + thiophanate methyl	Spectro	Cleary/Nufarm	Y	Y	Y	N	N
chlorothalonil + thiophanate methyl	Tee-1-up WDG	Advan	Y	Y		N	
copper hydroxide	Kocide 54 DF	Griffin					
cyazofamid	Segway	FMC	Y	Y	Y	Y	Y
etridiazole	Koban 30 WP	Anderson's	Y	Y	N	N	
ertridiazole	Terrazole	Chemtura	Y	Y	N	N	N
fenarimol	Rubigan A.S.	Gowan		Y	Y		
fludioxonil	Medallion	Syngenta	Y	Y	Y	Y	Y
fluoxastobin	Disam 480SC	Arysta	Y				
fluoxastrobin	Disarm G	Arysta	Y			N	
fluoxastrobin + chlorothalonil	Disarm C	Arysta	Y		N	N	
fluoxastrobin + myclobutanil	Disarm M	Arysta	Y			N	
flutolanil	Prostar 70WP	Bayer	Y				

Recommended site usages were from label of each product. Some labels listed a general "Turfgrass" use and specific site uses; other site uses were prohibited (e.g. "do not use"). A "Y" indicates specific mention on the label, an "N" indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

Fungicide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
flutolanil + thiophanate methyl	Systar	Regal	Y	Y	Y	Y	Y
fluxapyroxad	Xzemplar	BASF	Y	Y	Y	Y	Y
Fluxapyroxad + pyraclostrobin	Lexicon	BASF	Y	Y	Y	Y	Y
fosetyl AL	Alliette 80WP	Bayer	Y	Y	Y	Y	Y
fosetyl AL	Autograph	Phoenix		Y		N	Y
fosetyl AL	Chipco Signature	Bayer	Y	Y	Y		Y
fosetyl AL	Prodigy Signature	Lesco	Y	Y			Y
hydrogen dioxide	TerraCyte Pro	BioSafe	Y	Y			
hydrogen dioxide	Zerotol	BioSafe	Y	Y		Y	
iprodione	Chipco 26019	Chipco	Y	Y	Y	N	Y
iprodione	Chipco 26GT	Chipco	Y	Y			Y
iprodione	Fungicide X	Anderson's	Y	Y		N	N
iprodione	Iprodione Pro 2SE	Etigra	Y	Y			Y
iprodione	Raven	Phoenix	Y	Y			Y
iprodione + thiophanate methyl	26/36	Cleary					
iprodione + trifloxystrobin	Interface	Bayer	Y	Y			
mancozeb	Ditahane	Dow Agro Sciences	Y	Y	Y	N	Y
mancozeb	Fore	Dow Agro Sciences	Y	Y	Y	N	Y
mancozeb	Manzate	Griffin	Y			N	
mancozeb	Protect T/O	Cleary	Y	Y	Y		Y
mancozeb + copper hydroxide	Junction	SePRO		Y	Y	N	Y
mancozeb + copper sulfate	Junction	SePRO		Y	Y		Y
mefenoxam	Subsue	Syngenta	Y				
mefenoxam	Subdue G	Syngenta	Y				
mefenoxam	Subdue MAXX	Syngenta	Y				
metconazole	Tourney	Valent	Y	Y	Y	Y	Y
mineral oil	Civitas	Dow Agro Sciences	Y	Y			
myclobutanil	Eagle 40WSP	Dow Agro Sciences	Y				
myclobutanil	Echo DF	Sipcam Agro	Y				
myclobutanil	Golden Eagle	Anderson's	Y				N
PCNB	Engage	AMVAC	Y	Y	Y	Y	Y
PCNB	Penstar	Anderson's	Y				N
PCNB	Revere	Lesco	Y	Y	Y	Y	Y
PCNB	Terraclor	Chemtura	Y	Y	Y	Y	Y
PCNB	Turfcede	Chemtura	Y	Y	Y	Y	Y
phosphite	Magellan	Nufarm	Y	Y	Y		Y
phosphite	Vital	Phoenix	Y				
phosphorous acid	Alude	Cleary	Y	Y	Y		Y
phosphorous acid	Fosphite	JH Biotech	Y	Y	Y	Y	Y
polyoxin D	Affirm	Cleary	Y	Y	Y	Y	Y
polyoxin D	Endorse	Cleary	Y	Y	Y	Y	Y
propamocarb	Banol	Bayer		Y			Y
propamocarb + fluopicolide	Stellar	Valent		Y			Y

Recommended site usages were from label of each product. Some labels listed a general "Turfgrass" use and specific site uses; other site uses were prohibited (e.g. "do not use"). A "Y" indicates specific mention on the label, an "N" indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

Fungicide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
propiconazole	Banner GL	Syngenta	Y				
propiconazole	Banner MAXX	Syngenta	Y				
propiconazole	Kestrel	Phoenix	Y				
propiconazole	Prophesy	Anderson's	Y	Y			
propiconazole	Propiconazole Pro	Quali-Pro	Y				
propiconazole	Savvi	Regal Chemical	Y				
propiconazole	Spectator	Lesco	Y				
pyraclostrobin	Insignia	BASF	Y	Y	Y	Y	Y
pyraclostrobin	Insignia Intrinsic	BASF	Y	Y	Y	Y	Y
pyraclostrobin + boscalid	Honor	BASF	N	Y	N	N	N
pyraclostrobin + boscalid	Honor Intrinsic	BASF	N	Y	N	N	N
tebuconazole	Torque	Cleary	N	Y	N	N	N
thiophanate methyl	Cavalier	Lesco	Y			N	
thiophanate methyl	Cleary's 3336 F	Cleary	Y	Y	Y	Y	Y
thiophanate methyl	Cleary's 3336 G/GC	Cleary	Y	Y	Y	Y	Y
thiophanate methyl	Cleary's 3336 Plus	Cleary	Y	Y	Y	Y	N
thiophanate methyl	Cleary's 3336 WP	Cleary	Y	Y	Y	Y	Y
thiophanate methyl	SysTec 1998	Regal Chemical	Y				
thiophanate methyl	T-storm	Lesco	Y				
thiram	Sportrete	Cleary	Y			Y	
triadimefon	Bayleton 25WP	Bayer	Y	Y	Y	Y	
Triadimefon	Fungicide VII	Anderson's	Y	Y			N
trifloxystrobin	Compass	Bayer	Y	Y	Y	Y	Y
trifloxystrobin + triadimefon	Armada	Bayer	Y	Y	Y	Y	Y
trifloxystrobin + triadimefon	Tartan	Bayer	Y	Y	Y	Y	Y
triticonazole	Trinity	BASF	Y	Y	Y	Y	Y
triticonazole	Triton	Bayer	Y	Y	Y	Y	Y
triticonazole + chlorothalonil	Reserve	Bayer		Y	N	N	
vinclozolin	Curalan	BASF	Y	Y	Y	N	
vinclozolin	Touche	BASF	Y	Y	Y	N	

Recommended site usages were from label of each product. Some labels listed a general "Turfgrass" use and specific site uses; other site uses were prohibited (e.g. "do not use"). A "Y" indicates specific mention on the label, an "N" indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

Nematode Control in Turfgrass

Alfredo Martinez-Espinoza, Extension Pathologist and Clint Waltz, Extension Agronomist

Disease	Nematicide	Rates	Remarks
Nematodes	<i>abamectin</i> Avid	57 oz. per acre	Special Local Needs Label for Georgia (24c). For golf greens only. Avid 0.15EC is the only abamectin formulation approved for nematode control. Apply Avid 0.15EC as an early curative treatment (after appropriate nematode extraction, identification, and counts). Apply in the early morning while grass is wet with dew or irrigate prior to application with 0.1 inches of water. Within one hour following application, irrigate with 0.1 inches of water to move the treatments through the thatch. Do not over irrigate. Apply 3-4 consecutive Avid 0.15EC applications at 14-21 day intervals. Avid 0.15EC should be applied in 2 gallons of water / 1000 ft2 (approximately 100 gpa) with a non-ionic surfactant (0.25% v/v) included. Including Heritage (azoxystrobin) with Avid 0.15EC applications has demonstrated healthier turf.
	<i>azadirachtin</i> AzaGuard	15 fl. oz. per acre	Apply in sufficient amount of water to penetrate in the soil to a depth of 12 inches. Repeat applications every 3-4 weeks or as needed.
	<i>Bacillus firmus</i> strain I-1582 Nortica	0.7-2.3 lbs. (10-30 oz.)	For turf, lawns, sod farms, and golf courses. Make applications every 3 months as necessary and irrigate to a depth of 4 in. For warm-season grasses make the first application prior to first flush of roots (e.g. 65° F soil temperature at the 4-inch depth). Do not exceed a 20% concentration of the suspension (30 lbs. Nortica / 20 gallons of water or 100 lbs. Nortica / 100 gallons of water).
	<i>fluensulfone</i> Nimitz ProG	60-120 lbs/A (22-44 oz/1000 sq ft)	To improve product penetration to the root zone/soil the broadcast application should follow aerification prior to application. It's required to irrigate following application with adequate amount of water (generally 0.5 inches). For golf course, sport fields, sod farms, and commercial and residential lawns.
	<i>fluopyram</i> Indemnify	0.195-0.39 fl oz/1000 sq ft	Irrigate to root zone. For golf courses, sod farms, sport fields, residential, institutional, commercial, and other turfgrass areas.
	<i>furfural</i> MultiGuard Protect	High infestation: 8.0 gals./acre (0.184 gal/1000 ft²) Maintenance: 5.5-8.0 gals./acre (0.126-0.184gal/1000 ft²)	For golf courses and sod farms. Prior to application, treated area should be at 70% field capacity (i.e. well irrigated). Apply at 5.5 to 8.0 gpa (a 1:9 dilution with water). Incorporate with irrigation (0.25- to 0.5-inch) within 15 min of application. Two hour reentry following application. Up to 6 applications per year are permissible.
	<i>1,3-dichloropropene</i> Curfew	3-5 gal/acre	Restricted Use FUNGICIDE. For golf course and athletic field use only. Must be applied by an approved applicator. Liquid soil fumigant placed in the soil a minimum of 5 inches deep. Apply 0.25 to 0.5" of water immediately after application. This product has a 24 hour reentry restriction and cannot be applied within 30 ft. of an occupied structure. Not for use on turfgrass being grown for sale or other commercial uses as sod or seed production.
	<i>Pasteuria usage</i> Econem	2-10 lbs./1000 ft²	A minimum of 3 sequential applications may be required. Apply 0.10 inch of water immediately following applications
	<i>sesame oil</i> Neo-Tec S. O.	3.5 oz/1000 sq ft	Apply Neo-Tec in the late afternoon or evening, particularly in warm weather.
	Telone II	5-10 gal/acre	Restricted Use FUNGICIDE. Liquid soil fumigant placed in the soil a minimum of 12 inches deep. Do not mow or fertilize treated areas for 5 day after application. This product can not be applied within 100 ft. of an occupied structure (Sod Production Only).

Recommended site usages were from label of each product. Some labels listed a general "Turfgrass" use and specific site uses; other site uses were prohibited (e.g. "do not use"). A "Y" indicates specific mention on the label, an "N" indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

ADDITIONAL NOTES ON NEMATODE CONTROL IN TURFGRASS

Nematodes are soil-dwelling, microscopic, colorless, unsegmented, round worms that can be plant parasitic or plant beneficial. Depending on the species of parasitic nematode and the numbers in soil, they are capable of causing turfgrass decline.

Above-ground symptoms of nematode damage begin with a yellowing of turf, followed by wilting and slow recovery from wilt, poor response of turf to fertilization and eventual thinning in irregular shapes, followed by weed invasion. These symptoms occur over months and years. While below-ground or root symptoms are characterized by short, stubby roots with few branch roots compared to healthy roots. Roots may have a dark brown color, and sometimes (with sting or stubby root nematodes) exhibit swollen root tips. In sod with severe infestations, the sod strength is low.

Soil sampling is necessary for accurate diagnosis. A quart-size sample is needed and your County Extension Agent can help you submit samples to the Extension Nematology Laboratory at The University of Georgia (2350 College Station Road, Athens GA 30602). The number of nematodes recovered from the soil sample can vary greatly, depending on the time of year and the growth stage of the plant at the time the samples are taken. Samples taken during the winter and early spring are less reliable, and some nematode species may be missed entirely. For routine assays, sample during the time of year that the turf is growing. For warm-season turfgrasses, June or July is an optimal time to detect high population densities. For cool-season grasses, late spring or early summer should detect harmful populations. If nematodes are not found in damaging numbers, it does not preclude their role if the time of year the sample was taken was unfavorable for their survival.

Most grasses can withstand moderate numbers of most kinds of nematodes. If nematode populations are high, improving turf management practices, planting a new grass type, and chemical control are management strategies. Usually a combination or integrated approach leads to the best success. Deep, infrequent watering encourages deeper rooting, allowing grass to obtain more water and nutrients than a turf having a short root system due to shallow, daily watering. Avoid excess nitrogen fertilization; this encourages lush, succulent roots conducive to nematode population buildup. Avoid stresses to turf such as mowing too short. Alleviate compacted soils and correct any nutrient deficiencies. No variety of turfgrass is known to have true resistance to all nematodes, but planting another grass species may be a choice if the new grass provides acceptable quality and is adapted to the site. Using proper management practices and the best-adapted turfgrass species is the most practical approach to nematode management.

Because crop rotation, varietal resistance, biological control and several other disease management strategies are not practical or effective for turfgrass nematode control, the use of chemical nematicides is the next available and most reliable approach to reducing parasitic nematode levels. Chemical nematicides can be applied as pre-plant fumigants and as post-plant non-fumigant contact chemicals. Fumigants are toxic to plants and are labeled for use only before establishment of the turfgrass stand. In established turfgrass, contact nematicides come in granular or spray formulations and are always watered-in immediately after application. Nematicides can be toxic to humans and animals and should be handled with all precautions indicated on the product label. No single product is effective against all nematodes on a given turfgrass species.

Soil fumigants are chemicals applied as gases or liquids that readily vaporize. They are toxic to the turfgrass but may be used to treat soil prior to seeding or planting to reduce populations of plant parasitic nematodes, weeds, fungal pathogens, and other soil-borne microorganisms. The exceptions are Curfew and Telone II, which can be applied to actively growing turfgrass if delivered below the root system (e.g. 5 to 12 inches deep). All labeled soil fumigants are Restricted Use pesticides that usually require special equipment and application by licensed professionals.

Chemical nematicides have shown best results when the turf is first stripped from the affected area, followed by thorough tilling of the soil two-weeks prior to the nematicide application, this practice allows for adequate decomposition of old roots. Additionally, tilling loosens the soil and permits more rapid and uniform diffusion of the fumigant. At the time of application the soil should be moist (not water-saturated). Too much fumigant escapes in dry soil and too little diffuses when pores are filled with water. The 4-inch soil temperature should be 50° to 80°F. Too much fumigant evaporates from hot soil, whereas, diffusion is too slow in cold soil. For maximum effectiveness, the treated area should be sealed immediately with a plastic tarp for several days. Nematicide applications should be made in autumn or spring, before nematode population peak and according to the product label.

The effects of nematicides are temporary. Fumigants have no residual activity; therefore nematodes which survived the treatment or were brought in on new grass can re-colonize the rootzone. Nematicide treatment cannot provide improved growing conditions unless other stresses are alleviated, and nutrients (especially potassium) and water are readily available.

Nematodes affecting commercial turfgrasses and golf courses in Georgia

Alfredo Martinez-Espinoza, Extension Pathologist and Clint Waltz, Extension Agronomist

Nematode	Group	Minimum Threshold	Most Susceptible Turfgrasses
Sting <i>Belonolaimus longicaudatus</i>	ectoparasitic	5 – 10	All turfgrasses in Georgia; Ultradwarf bermudagrass putting greens more sensitive
Ring <i>Criconemella ornata</i> (<i>Mesocriconema</i> spp.)	ectoparasitic	150 – 500	Centipedegrass is particularly sensitive
Awl <i>Dolichodorus heterocephalus</i>	ectoparasitic	5 – 80	Bermudagrass in wet locations; Ultradwarf bermudagrass putting greens more sensitive
Spiral <i>Helicotylenchus</i> spp.	ectoparasitic	200 – 700	All turfgrasses in Georgia
Sheath <i>Hemicycliophora</i> spp.	ectoparasitic	80 – 200	All turfgrasses in Georgia
Stubby-root <i>Paratrichodorus</i> spp.	ectoparasitic	40 (100) – 150	All turfgrasses in Georgia; St. Augustinegrass is particularly sensitive
Stunt <i>Tylenchorhynchus</i> spp.	ectoparasitic	1,000	All turfgrasses in Georgia
Cyst <i>Heterodera</i> spp.	endoparasitic	10 – 40	St. Augustinegrass is particularly sensitive
Lance <i>Hoplolaimus galeatus</i>	endoparasitic	40 (60) – 80	All turfgrasses in Georgia; Bermudagrass & St. Augustinegrass are particularly sensitive
Root-knot <i>Meloidogyne</i> spp.	endoparasitic	40 – 80	Bermudagrass, St. Augustinegrass, & zoysiagrass; Ultradwarf bermudagrass putting greens more sensitive
Lesion <i>Pratylenchus</i> spp.	endoparasitic	150	All turfgrasses in Georgia

* Minimum threshold levels are in number per 100 cc of soil and may vary depending on source, the levels listed in the UGA “Guide for interpreting Nematode Assay Results” (Extension Circular 834) are listed in bold type. Minimum thresholds are a compilation from various sources and recommendations of other Southeastern U.S. states.

UGA “Guide for interpreting Nematode Assay Results” (Extension Circular 834)

(<https://t.uga.edu/4N8>)

Nematodes affecting home lawns in Georgia
 Alfredo Martinez-Espinoza, Extension Pathologist and Clint Waltz, Extension Agronomist

Nematode	Group	Minimum Threshold	Most Susceptible Turfgrasses
Sting <i>Belonolaimus longicaudatus</i>	ectoparasitic	20	All turfgrasses in Georgia
Ring <i>Criconemella ornata</i> (<i>Mesocriconema</i> spp.)	ectoparasitic	150 – 500	Centipedegrass is particularly sensitive
Awl <i>Dolichodorus heterocephalus</i>	ectoparasitic	25 – 80	Bermudagrass in wet locations
Spiral <i>Helicotylenchus</i> spp.	ectoparasitic	200 – 1,500	All turfgrasses in Georgia
Sheath <i>Hemicycliophora</i> spp.	ectoparasitic	80 – 300	All turfgrasses in Georgia
Stubby-root <i>Paratrichodorus</i> spp.	ectoparasitic	100 – 300	All turfgrasses in Georgia; St. Augustinegrass is particularly sensitive
Stunt <i>Tylenchorhynchus</i> spp.	ectoparasitic	1,000	All turfgrasses in Georgia
Cyst <i>Heterodera</i> spp.	endoparasitic	40	St. Augustinegrass is particularly sensitive
Lance <i>Hoplolaimus galeatus</i>	endoparasitic	50 – 80 (100)	Bermudagrass & St. Augustinegrass
Root-knot <i>Meloidogyne</i> spp.	endoparasitic	80 – 300	Bermudagrass, St. Augustinegrass, & zoysiagrass
Lesion <i>Pratylenchus</i> spp.	endoparasitic	150	All turfgrasses in Georgia

* Minimum threshold levels are in number per 100 cc of soil and may vary depending on source, the levels listed in the UGA “Guide for interpreting Nematode Assay Results” (Extension Circular 834) are listed in bold type. Minimum thresholds are a compilation from various sources and recommendations of other Southeastern U.S. states.

UGA “Guide for interpreting Nematode Assay Results” (Extension Circular 834)

(<https://t.uga.edu/4N8>)

Turfgrass Weed Control for Professional Managers

Patrick E. McCullough, Extension Weed Scientist

Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides						
Applications must be made prior to weed emergence or poor control will result. Recommended dates of application for crabgrass and other annual grasses are February 15 - March 5 in south Georgia and March 1-20 in north Georgia. Recommended dates for annual bluegrass and selected winter annual weeds are September 1-15 in north Georgia and October 1-15 in south Georgia.						
atrazine (Aatrex) 4L (Aatrex) 90DG (Aatrex) 80W	bermudagrass, centipedegrass, dormant, St. Augustinegrass, zoysiagrass	5	1.0-2.0 qts. 1.1-2.2 lbs. 1.2-2.5 lbs.	1.0-2.0 1.0-2.0 1.0-2.0	See Label	Atrazine provides both preemergence and postemergence control of annual broadleaf weeds. Control of summer annual grasses is weak. Aatrex formulations are labeled for applications from October 1 to April 15. Avoid applications during green-up. For bermudagrass, atrazine should be applied only to dormant turf. DO NOT overseed 4 months before or 6 months after treatment. DO NOT apply within the active root zone of azaleas, camellias, boxwoods, etc. DO NOT apply more than 1.0 lb. ai/A on hybrid bermudagrasses. Atrazine is a Restricted Use Herbicide. Refer to atrazine-POSTEMERGENCE.
benefin (Balan) 2.5G (Other trade names)	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	3	80.0-120.0 lbs.	2.0-3.0	12	Controls annual grasses and selected broadleaf weeds. An additional application may be made 8 weeks after the initial treatment for continued weed control. DO NOT apply to newly sprigged grasses until these turfs are well established. DO NOT use on golf course greens. DO NOT apply Balan 2.5G in the spring to fall planted turfgrasses. Delay reseeding for 6 weeks after application for the low rate, and for 12-16 weeks at the high rate.
benefin + oryzalin (XL) 2G	bermudagrass, centipedegrass, St. Augustinegrass, tall fescue, zoysiagrass	3 + 3	100.0-150.0 lbs.	1.0-1.5 benefin + 1.0-1.5 oryzalin	24	Controls annual grasses and selected broadleaf weeds. DO NOT apply to newly sprigged grasses until well established. DO NOT apply to golf course greens. DO NOT make a spring application to fall planted turfgrasses. Delay reseeding for 6 weeks (low rate) and for 12-16 weeks (high rate) after application.
benefin + trifluralin (Team Pro) 0.86G (Team) 2G	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	3 + 3	174-349 lbs. 100-150 lbs.	0.75-1.5 benefin + 0.75-1.5 Trifluralin 1.3-2.0 benefin + 0.7-1.0 trifluralin	See Label	Team Pro is a dry fertilizer based product that contains 0.43% benefin and 0.43% trifluralin. The fertilizer analysis will depend upon the respective company marketing the product. Controls summer annual grasses and annual bluegrass. Split applications of 233 lbs. product/acre followed 10 weeks later by an additional 233 lbs. product/acre may also be used. DO NOT apply to newly sprigged grasses until well established. DO NOT apply to putting greens. Delay reseeding for 8 weeks (low rate) and for 12-16 weeks (high rate) after application.
bensulide (Bensumec) 4LF (Pre-San) 7G	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	8	1.9-3.1 gals. 107.0- 180.0 lbs.	7.5-12.5 7.5-12.5	See Label	Controls annual grasses and selected broadleaf weeds. Apply high rate in fall for annual bluegrass control. Apply a light irrigation immediately after treatment. DO NOT apply to newly sprigged grasses. Delay reseeding for 4 months after treatment. May be used on bermudagrass and bentgrass greens.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides - continued						
bensulide + oxadiazon (Goosegrass/Crabgrass Control) 5.25% + 1.31% G	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	8 + 14	115.0 lbs.	6.0 bensulide + 1.5 oxadiazon	See Label	Controls summer annual grasses. Apply a light irrigation after treatment. DO NOT use on newly sprigged grasses until well established. Delay reseeding for 5 months after treatment. Recommended for professional applicator use. May be used on bermudagrass and bentgrass greens under conditions of heavy goosegrass infestations. See label for precautions concerning use on putting greens.
dimethenamid (Tower) 6 L	bahiagrass, bermudagrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	15	21-32 fl. oz.	1-1.5	12	Controls annual grasses and broadleaf weed control. Tower may be applied to tees; fairways, roughs, and any other maintained turf areas on golf courses (except putting greens). In a single application, DO NOT apply more than the equivalent of 32 fl. oz. of Tower per acre. For extended weed control, sequential applications can be made 5-8 weeks between applications. DO NOT apply more than 64 fl. oz./A of Tower per year. Tower may be applied in a sequential use program with other herbicides that control emerged weeds.
dimethenamid 0.75% + pendimethalin 1% (Freehand) 1.75G	bermudagrass, centipedegrass, kikuyugrass, seashore paspalum, St. Augustinegrass	15 + 3	100-200 lbs.	1.75-3.5	12	Apply for preemergence control of annual grassy weeds, annual broadleaf weeds, and sedges in established tolerant warm-season turfgrasses. Freehand may be applied to lawns, parks, golf courses, sod farms, athletic fields, and other turf areas. Do not apply more than 200 lbs./acre in a single application. Do not apply more than 400 lbs./acre per year. Do not apply to golf greens. Make initial applications when soil temperatures are 55°F or higher and delay winter overseeding for at least three months after applications. Do not apply to cool-season grasses.
dithiopyr (Dimension 1EC) (Dimension Ultra 40%WSP) (each 5.0 oz. water soluble bag contains 0.125 lb. of dithiopyr) (Dimension 2 EW)	bermudagrass, buffalograss, carpetgrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	3	2.0 qts. 0.95 lb. 2.0 pts.	0.5 0.38 0.5	See Label	Provides preemergence control of annual grasses and certain annual broadleaf weeds. Dimension will also provide postemergence control of crabgrass (when treated prior to the tillering stage of growth). Apply as a spring or fall application. For split applications, use Dimension 1EC up to 1.5 qts./acre per application, or Dimension Ultra at 0.625 lbs./acre per application. Bermudagrass can be overseeded with perennial ryegrass 6-8 weeks after a Dimension application. For other turfgrass areas do not reseed, overseed or sprig treated areas for 2.5-4 months after treatment (see label).
flumioxazin (Sureguard) 51WDG	bermudagrass (dormant)	14	8-12 oz.	0.23-0.38	12	Provides preemergence control of annual broadleaf weeds and annual grasses including crabgrass, goosegrass, and annual bluegrass. Flumioxazin also provides postemergence control of annual bluegrass and annual broadleaf weeds. Applications should be limited to dormant bermudagrass only. Late fall applications to partially green bermudagrass can aid in transition to dormancy. Do not apply to golf greens or actively growing turfgrasses. Do not apply more than 24 oz./acre per year. The addition of a nonionic surfactant is recommended for postemergence applications.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides - continued						
indaziflam (Specticle Flo 0.62L) (Specticle G 0.0224%)	bahiagrass, bermudagrass, buffalograss, centipedegrass, seashore paspalum, St. Augustinegrass, zoysiagrass	29	3-10 fl. oz. 100 to 200 lbs.	0.015-0.05 0.022-0.044	12	Apply for preemergence control of annual bluegrass, crabgrass, goosegrass, annual sedges, and broadleaf weeds in warm-season grasses. Use only on established turf. Do not apply to desirable cool-season grasses, golf greens, or within 15 feet of golf greens. Indaziflam may affect sensitive grasses downslope from treated areas, do not use on slopes uphill and adjacent to bentgrass or bermudagrass golf greens. Do not apply more than 18.5 fl oz. of Specticle Flo per acre in a 12 month period. Do not exceed 6 fl oz. per acre in a single application to centipedegrass and St. Augustinegrass. Other labeled warm-season grasses may be treated with up to 10 oz. of product per acre in a single application. Do not apply more than 400 lb/acre of Specticle G per year. See label for further information before using the herbicide.
isoxaben (Gallery) 75DF	bermudagrass, buffalograss, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	21	0.66-1.33 lbs.	0.5-1.0	12	Controls a broad spectrum of annual broadleaf weeds. Apply in the late summer or early spring prior to annual broadleaf weed seed germination. Established turf may be overseeded 60 days following a Gallery application. DO NOT use on putting greens.
mesotrione (Tenacity) 4.0 lbs./gal.	centipedegrass, Ky. bluegrass, St. Augustinegrass (grown for sod), tall fescue	27	4.0-8.0 fl. oz.	0.125-0.25	12	Provides preemergence control of crabgrass, yellow foxtail and certain annual broadleaf weeds such as carpetweed and chickweed sp. Tenacity may be tank-mixed with preemergence herbicides such as Barricade for extended control of crabgrass and foxtail. Tenacity may also be applied at the time of seeding Ky. bluegrass, centipedegrass, or tall fescue. It may also be applied after new seedlings have been mowed two times or 4 weeks after emergence (whichever is longer). Do not exceed 4.0 fl. oz./acre on St. Augustinegrass sod. Tenacity may cause temporary whitening of turfgrass foliage (see label). If Tenacity is tank-mixed with atrazine or simazine for use on St. Augustinegrass or centipedegrass use only 4.0 fl. oz. of Tenacity and 0.5 lbs. ai/A of either atrazine or simazine. Zoysiagrass, bermudagrass and seashore paspalum are sensitive to Tenacity. Do not use on golf course putting greens and maintain a five-foot buffer between treated areas and putting greens.
metolachlor (Pennant Magnum) 7.62 lbs./gal	bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	15	1.3-2.6 pts.	1.25-2.5	24	Controls annual sedge, yellow nutsedge and certain annual grass weeds. Split applications at intervals of 6-8 weeks will extend control. In sod fields do not apply more than 4.2 pts. /acre per year. For other turf sites, the maximum annual rate is 2.6 pts. /acre. DO NOT use on putting greens.
oryzalin (Surflan) 4AS (Harrier) 85WDG	bermudagrass, buffalograss, centipedegrass, St. Augustinegrass, tall fescue, zoysiagrass	3	1.5-2.0 qts. 1.75-2.4 lbs.	1.5-2.0 1.5-2.0	24	Controls annual grasses and selected broadleaf weeds. Apply 2.0 qts./A for summer annual grass control, or apply 1.5 qts./A and apply an additional 1.5 qts./A 8-10 weeks after the initial application. Split applications are recommended for improved goosegrass control and for tall fescue. DO NOT apply to newly sprigged grasses until well established. DO NOT apply to golf course greens. DO NOT make a spring application to fall planted turfgrasses. Surflan is recommended for use on healthy, established turf. Delay reseeding for 3-4 months after application.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides - continued						
oxadiazon (Ronstar) 2G (Oxadiazon) 2G	bermudagrass, buffalograss, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	14	100-200 lbs.	2.0-4.0	12	Controls annual grasses and selected broadleaf weeds. DO NOT apply more than 3.0 lbs. ai/A on St. Augustinegrass. May cause temporary discoloration of bermudagrass and St. Augustinegrass which is normally outgrown in 2-3 weeks. DO NOT apply to wet turf. Delay reseeding for 4 months after treatment. DO NOT apply to centipedegrass or golf course greens or tees. Ronstar 50WSP is labeled only on bermudagrass, St. Augustinegrass and zoysiagrass. Ronstar 2G may be used immediately prior or immediately after sprigging bermudagrass or zoysiagrass at 2.0-3.0 lbs. ai/A to control various annual weeds. Ronstar 2G may also be applied 10-14 days after sprigging seashore paspalum. Ronstar 50WSP Oxadiazon 50WSB is not labeled for use on home lawns.
(Ronstar) 50WSP (Oxadiazon) 50WSB (Starfighter) 3.17 L	bermudagrass, St. Augustinegrass, zoysiagrass		4.0-6.0 lbs.	2.0-3.0		
			2.5-3.8 qts.	2.0-3.0		
oxadiazon (1.0%) + prodiamine (0.2%) (Regalstar II) (Regalstar G)	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	14 + 3	200.00 lbs.	2.0 oxadiazon + 0.4 prodiamine	See Label	Controls annual grasses. Regalstar II is formulated on a 38-0-0 urea form nitrogen carrier. Regalstar G does not contain fertilizer. Apply to dry foliage. Delay applications to newly sprigged bermudagrass until after stolon's have rooted and the grass has filled in. DO NOT apply to putting greens.
pendimethalin (Pendulum) 2G (Pendulum) 3.3 EC (Pendulum AquaCap) 3.8 CS	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	3	75-150 lbs. 3.6-7.2 pts. 3.1-6.3 pts.	1.5-3.0 1.5-3.0 1.5-3.0	24	Controls annual grasses and selected broadleaf weeds. DO NOT use on newly sprigged turfgrasses. Not recommended for turfgrass that has been severely thinned due to winter stress. DO NOT reseed within 3 months of application. Use the low rate for tall fescue and KY bluegrass. The high rate may be used on warm season grasses. On newly seeded or sodded areas, delay application until after the fourth mowing. In established turfgrasses that have been reseeded, delay application until grass seedlings have been mowed 4 times. (This may be up to 3 months from the date of seeding.) Refer to label for information on split applications.
prodiamine (Barricade) 65WDG (ProClipse) 65 WDG (Cavalcade) 65 WDG (StoneWall) 65 WDG (Barricade) 4L (RegalKade) 0.5G (RegalKade) 0.37G	bermudagrass, buffalograss, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	3	1.15 lbs. 1.5 pts. 100-300 lbs. 135-406 lbs.	0.75 0.75 0.5-1.5 0.5-1.5	See Label	Controls annual grasses and broadleaf weeds. DO NOT apply to newly seeded, sprigged or sodded turfgrasses. On fall-seeded turfgrasses, delay the application for 60 days after seeding or until after the second mowing, whichever is longer time period. Split applications, each at one-half the maximum annual labeled rate, at a 60 day interval, may also be used. DO NOT apply to golf course putting greens or tees. RegalKade and RegalKade 37 are formulated on a 32-3-12 dry fertilizer carrier. Barricade 65WDG at 0.58 lbs. product/acre may be applied 8-10 weeks before overseeding perennial ryegrass into bermudagrass fairways. Reseeding restrictions can range from 4-12 months, depending upon the product and rate used, reseeding method and environmental conditions. Refer to the individual product label for additional information.
pronamide (Kerb T/O) 50WSP	bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	3	1.0-2.0 lbs.	0.5-1.0	24	Preemergence or postemergence applications of Kerb will control annual bluegrass. May also be used in spring to slowly remove (4 to 6 weeks) overseeded perennial ryegrass from warm-season turfgrasses. For this purpose, apply Kerb at the 50% spring green-up warm-season turfgrass growth stage. A light overhead irrigation is necessary to move Kerb into the weed root zone if no rainfall occurs within 24-48 hours. DO NOT apply Kerb to any cool-season turfgrass. DO NOT apply to areas that will be overseeded with cool-season turfgrasses within 90 days of treatment. Kerb is a Restricted Use Herbicide.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides - continued						
simazine (Princep) 90DF (Princep Liquid) 4L Wynstar 90DF	bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	5	1.1-2.2 lbs. 1.0-2.0 qts. 1.1-2.0 lbs.	1.0-2.0 1.0-2.0 1.0-1.8	12	Apply simazine in October or November for preemergence control of winter annual weeds. Apply December through February for late postemergence control of winter annuals. Apply low rate for annual bluegrass control; or high rate for winter annual broadleaf control. DO NOT overseed with desirable turfgrass within 4 months before or 6 months after treatment. DO NOT apply more than 1.0 lb. ai/A on newly sprigged turfgrass or on hybrid bermudagrass such as Tiflawn, Tifway and Ormond.
sulfentrazone + prodiamine (Echelon) 4SC	bermudagrass, buffalograss, carpetgrass, centipedegrass, Ky. bluegrass, seashore paspalum, tall fescue, zoysiagrass	14 + 3	18.0-36.0 fl. oz.	0.56-1.125	12	Controls annual grasses, certain annual broadleaf weeds, annual sedges, <i>kyllinga sp.</i> and yellow nutsedge. Use in established turfgrasses. May be applied after the second mowing of seeded grasses provided the grass has developed a uniform stand and a good root system. The high rate of 36.0 fl. oz./acre is recommended only for use on bermudagrass. This product can provide postemergence control of some, small annual broadleaf weeds. Do not apply to newly installed sod until the sod has rooted and exposed edges have grown in. Do not add an adjuvant or surfactant to the spray solution. In sod fields do not apply Echelon within 3 months of harvest. Echelon is not labeled for use on golf course putting greens.
Postemergence Herbicides						
2,4-D (Weedar 64) 3.8 lbs./gal. (Other trade names)	bermudagrass, centipedegrass, Ky. bluegrass, tall fescue, zoysiagrass	4	See Label	0.5-2.0	See Label	Amine formulations of 2,4-D are non-volatile and are safer than ester formulations to use near ornamentals. Apply to small and actively growing broadleaf weeds as a summer or winter treatment. To control wild garlic/onion, use 2.0 lbs. ai/A plus surfactant. Make first application in late November or early December and follow with a second application in February or March. Repeat this schedule for 3 consecutive years to control this weed. DO NOT apply 2,4-D to St. Augustinegrass. DO NOT apply more than 0.5 lb. ai/A of 2,4-D to centipedegrass. DO NOT allow spray drift to contact the foliage of ornamentals.
2,4-D + MCP + dicamba (Three-way) (Trex-San) (Triplet) (Other trade names)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	4 + 4 + 4	See Label	0.75 + 0.4 + 0.08	See Label	Several commercial formulations are available. Refer to individual labels for the recommended amount of formulated product. Controls a broader spectrum of broadleaf weeds than 2,4-D alone. DO NOT spray when turfgrass is emerging from winter dormancy. Low rates of Triplet products may be used on St. Augustinegrass or centipedegrass. Avoid applications if air temperatures exceed 85°F. Delay reseeding for 4 weeks after treatment.
2,4-D + MCP + 2,4-DP (Triamine) (Dissolve)	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	4 + 4 + 4	See Label	See Label	See Label	Refer to individual labels for recommended amount of formulated product. Controls a broader spectrum of weeds than 2,4-D alone. DO NOT spray at air temperatures greater than 85°F and when warm-season turfgrasses are growing under stress conditions. Delay reseeding for 4 weeks after treatment. Avoid applications when warm-season turfgrasses are emerging from winter dormancy.
2,4-D + clopyralid + dicamba (Millennium Ultra)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	4 + 4 + 4	2.0-3.0 pts.	--	48	Controls a broader spectrum of weeds than 2,4-D alone. DO NOT mow 1-2 days before or after application. Delay application to newly seeded grasses until after 3-4 mowings. Delay reseeding for 3-4 weeks after application. DO NOT spray when air temperatures are > 90°F. Not recommended for use on centipedegrass and St. Augustinegrass. Avoid applications during the spring transition of warm-season turfgrasses. Not labeled for use on residential turfgrasses.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
2,4-D + fluroxypyr + dicamba (Escalade)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	4 + 4 + 4	2.0-3.0 pts.	--	48	Controls a broader spectrum of weeds than 2,4-D alone. DO NOT mow 1-2 days before or after application. Delay application to newly seeded grasses until after 3-4 mowings. Delay reseeding for 3-4 weeks after application. DO NOT spray when air temperatures are > 90°F. Not recommended for use on centipedegrass and St. Augustinegrass. Avoid applications during the spring transition of warm-season turfgrasses.
2,4-D + triclopyr (Turflon II Amine) 2.8 + 1.1 lbs./gal.	Ky. bluegrass, tall fescue	4 + 4 + 4	1.0-2.0 qts.	0.7+0.3 - 1.4+0.6	See Label	Controls a broader spectrum of weeds than 2,4-D alone. NOT RECOMMENDED for warm-season grasses. Apply in spring or fall months when weeds are actively growing. Newly seeded turf should be mowed 3 times before application. DO NOT reseed until 3 weeks after application. Repeat applications are recommended for corn speedwell, ground ivy, woodsorrel, parsley-piert and wild violet(s).
2,4-D + triclopyr + Sulfentrazone + dicamba (T-Zone) 1.75 + 0.5 + 0.06 + 0.2 lbs./gal.	bahiagrass (dormant), bermudagrass (dormant), Ky. bluegrass, ryegrass, tall fescue, zoysiagrass (dormant)	4 + 4 + 14 + 4	2-4 pts.	0.44+0.125+0.015+0.05-0.88+0.25+0.03+0.1	24	Apply to cool-season turfgrasses for broadleaf weed control and suppression. Apply to fully DORMANT bermudagrass, bahiagrass, or zoysiagrass only. DO NOT apply to bentgrass or greens, T-Zone is labeled for yellow nutsedge suppression. Add more sulfentrazone with this product to increase activity on sedges. DO NOT apply when temperatures exceed 85°F or if turf is under stress from drought, heat, or disease.
amicarbazon (Xonerate) 70WDG (Xonerate) 2SC	bahiagrass, bermudagrass, buffalograss, centipedegrass, creeping bentgrass, fine fescue, kikuyugrass, Ky. bluegrass, perennial ryegrass, seashore paspalum, St. Augustinegrass, zoysiagrass	5	1-10 oz.	0.04-0.18	12	Provides postemergence control of annual bluegrass and broadleaf weeds in creeping bentgrass, tall fescue, perennial ryegrass, and warm-season turfgrasses. Make applications when air temperatures range 50-80°F and do not make applications to cool-season grasses in summer or fall due to increased injury. For annual bluegrass control in creeping bentgrass, make applications a 1 oz./acre on a seven-day interval for a maximum of four applications. In overseeded perennial ryegrass, applications from 2-4 oz./acre may control annual bluegrass and broadleaf weeds. Do not apply to desirable roughstalk bluegrass turf. In tolerant warm-season turfgrass, 3-10 oz./acre may be applied. Do not exceed 10 oz./acre per year or 29 fl. oz./acre of the 2SC formulation.
atrazine (AAtrex) 4L (AAtrex) 90DG (AAtrex) 80W	bermudagrass, centipedegrass, (dormant) St. Augustinegrass, zoysiagrass	5	1.0-2.0 qts. 1.1-2.2 lbs. 1.2-2.5 lbs.	1.0-2.0 1.0-2.0 1.0-2.0	See Label	Apply to dormant bermudagrass for annual bluegrass and winter annual broadleaf weed control. DO NOT apply during bermudagrass green-up. AAtrex formulations may be applied from October 1 to April 15. DO NOT apply over the root zone of ornamental shrubs. For spurweed, apply in December or January. For Florida betony, apply in late October and follow with a second treatment in late February. DO NOT apply more than 1.0 lb. ai/A to hybrid bermudagrass. AAtrex is a Restricted Use Herbicide.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
bentazon (Basagran T/O) 4.0 lbs./gal. (Lescogran) 4.0 lbs./gal.	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass,	6	1.5-2.0 pts.	0.75-1.0	48	Apply to emerged, actively-growing yellow nutsedge. Use 2.0 pts./acre and repeat the application 7-14 days later. Thorough spray coverage is essential for acceptable control. DO NOT mow 3 days before or after application. Other weeds controlled include annual sedges and dayflower. Add a crop oil concentrate at 2.0 pts./acre to the spray mix. Bentazon is not recommended for use on putting greens.
bentazon + atrazine (Prompt) 5L 2.5 + 2.5 lbs./gal.	centipedegrass, St. Augustinegrass, zoysiagrass	6 + 5	1.8-2.4 pts.	0.6-0.75 + 0.6-0.75	See Label	Controls several broadleaf weeds. For yellow nutsedge, initially apply Prompt at 3.5 pts./acre and follow 7-10 days later with Basagran at 2.0 pts./acre. Apply no earlier than 10 days after sprigging or plugging turfgrasses. On newly sprigged turfgrasses and hybrid bermudagrass, Prompt may cause temporary injury.
bispyribac-sodium (Velocity) 80SP (Velocity) 17.6SG	bermudagrass (overseeded with perennial ryegrass on golf course fairways)	2	2.0 oz./1.5 acres 6.0 Oz	0.06	12	Apply Velocity between February 1 and March 15 to bermudagrass overseeded the previous fall with perennial ryegrass for annual bluegrass control and seedhead suppression. Earlier or later applications may decrease efficacy or increase risk of injury to perennial ryegrass. The first application should be made just as soon as annual bluegrass seedhead begin to emerge from the leaf sheath. Apply a second application at the same rates 14-21 days after the first application. DO NOT apply if air temperatures are less than 50°F. Or if maximum temperatures are expected to be less than 50°F. For the first three days after application. Two applications as described above will be needed for control. Chlorosis (yellowing) will typically occur on perennial ryegrass between 7-21 days after application. Not recommended for use on other cool-season turfgrasses. Velocity should not be applied in late spring after bermudagrass begins active growth. DO NOT mow or irrigate for 24 hours after application.
bispyribac-sodium (Velocity) 80SP (Velocity) 17.6SG	bermudagrass (overseeded with perennial ryegrass on golf course fairways)	2	2.0 oz./1.5 acres 6.0 Oz	0.06	12	Apply Velocity between February 1 and March 15 to bermudagrass overseeded the previous fall with perennial ryegrass for annual bluegrass control and seedhead suppression. Earlier or later applications may decrease efficacy or increase risk of injury to perennial ryegrass. The first application should be made just as soon as annual bluegrass seedhead begin to emerge from the leaf sheath. Apply a second application at the same rates 14-21 days after the first application. DO NOT apply if air temperatures are less than 50°F. Or if maximum temperatures are expected to be less than 50°F. For the first three days after application. Two applications as described above will be needed for control. Chlorosis (yellowing) will typically occur on perennial ryegrass between 7-21 days after application. Not recommended for use on other cool-season turfgrasses. Velocity should not be applied in late spring after bermudagrass begins active growth. DO NOT mow or irrigate for 24 hours after application.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
carfentrazone (QuickSilver) T&O 1.9 lbs./gal. (Quicksilver) 1.03 lbs./gal/	bermudagrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass water-soluble 5 ml bag	14	0.9-2.1 fl. oz. 0.8-2.0 fl. oz. 5 ml/2,000 ft²	0.013-0.031	Until Dry	Controls numerous broadleaf weeds including plantains, chickweed(s), dandelion, thistle(s), lawn burweed, henbit, corn speedwell, purslane(s) and spotted spurge. QuickSilver may also be applied to newly-seeded, sodded or sprigged turfgrasses. To expand the weed spectrum, QuickSilver may be tank-mixed with numerous other postemergence herbicides. Aim formulations are registered for use only on seed and sod farms. Add a nonionic surfactant at 0.125-0.25% v/v to the spray mix.
carfentrazone (0.04 lb./gal.) + 2,4-D (0.52 lb./gal.) + MCPP (0.2 lb./gal.) + dicamba (0.05 lb./gal.) (SpeedZone - Southern)	bermudagrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	14 + 4 + 4 + 4	2.0-5.0 pts.	--	48	Controls a wide range of broadleaf weeds, including spotted spurge. May be applied after the second mowing in newly-established cool-season turfgrasses, or 4 weeks after sprigging or sodding warm-season turfgrasses. DO NOT reseed until 1 week after application. DO NOT apply at air temperatures > 90°F. DO NOT apply during the spring green-up of St. Augustinegrass, or to Floratam, BitterBlue and other improved varieties of St. Augustinegrass.
carfentrazone (0.04 lb./gal.) + MCPA (2.21 lbs./ gal.) + MCPP (0.44 lb./gal.) + dicamba (0.22 lbs./gal.) (PowerZone)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	14 + 4 + 4 + 4	2.0-6.0 pts.	--	48	Controls a wide range of broadleaf weeds, including spotted spurge. May be applied after the second mowing in newly-established cool-season turfgrasses, or 4 weeks after sprigging or sodding warm-season turfgrasses. DO NOT reseed until 2 weeks after application. DO NOT apply at air temperatures > 90°F.
carfentrazone (0.05 lb./gal.) + 2,4-D (1.53 lbs. gal.) + MCPA (0.48 lb./gal.) + dicamba (0.14 lb./gal.) (SpeedZone)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	14 + 4 + 4 + 4	2.0-5.0 pts.	--	48	Controls a wide range of broadleaf weeds, including spotted spurge. May be applied after the second mowing in newly-established cool-season turfgrasses, or 4 weeks after sprigging or sodding warm-season turfgrasses. DO NOT reseed until 2 weeks after application. DO NOT apply at air temperatures > 90°F.
chlorsulfuron (Corsair) 75DF	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, zoysiagrass	2	1.0-5.33 oz.	0.05-0.25	See Label	Particularly effective for the control of Aclump-type@ tall fescue. Labeled only as spot treatment in lawns, but may be applied as a broadcast application on golf courses. Add a nonionic surfactant at 1/4-1/3fl. oz. per gallon of spray mix. DO NOT apply to ryegrass or tall fescue being grown as a turfgrass.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
clopyralid (Lontrel) 3 lbs. /gal.	bermudagrass, buffalograss, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	4	0.25-1.33 pts.	0.09-0.5	12	Effectively controls numerous broadleaf weeds that belong to the aster and legume families. Control of other broadleaf weed species is poor. Sold in combination with triclopyr as Confront. Clopyralid is not labeled for use on residential turfgrasses.
dicamba (Vanquish) 4 lbs. /gal. (XetendiMax) 2.9 lbs. /gal	bermudagrass, centipedegrass, Ky. bluegrass, tall fescue, zoysiagrass	4	0.5-1.0 pts. 4.1-44 fl. oz.	0.25-0.5 0.1-1.0	24	Apply to small and actively-growing broadleaf weeds as a summer or winter treatment. Provides better control of henbit, knotweed, lespedeza, clovers, docks and woodsorrel than 2,4-D. Repeat treatment if necessary. DO NOT apply to St. Augustinegrass. DO NOT use over the root zone of ornamental trees and shrubs. Xtendimax is labeled for sod farms for the control of annual and perennial broadleaf weeds. Do not broadcast apply more than 44 fluid ounces per acre per growing season. Applying more than 16 fl oz/acre to buffalograss or St. Augustinegrass may result in excessive stunting or discoloration. Do not make retreat applications in these areas for 30 days until previous applications have been activated in the soil by rain or irrigation. Do not use on residential sites.
diclofop-methyl (Illoxan) 3EC	bermudagrass (golf courses only)	1	1.0-1.4 qts.	0.75-1.0	See Label	Illoxan may be used for goosegrass control on bermudagrass golf courses. Use the high rate for goosegrass with one to two tillers. Lower rates may be used on smaller goosegrass. DO NOT mow for 24-36 hours after application. Control requires 2-3 weeks. May cause temporary phytotoxicity (7-10 days.) DO NOT mix with other pesticides or fertilizers as control will be reduced. DO NOT overseed treated areas for at least 2 months after the last application. Illoxan is a Restricted Use Pesticide.
diquat (Reward) 2.0 lbs. /gal.	bermudagrass (dormant)	22	1.0-2.0 pts.	0.25-0.5	24	Controls certain winter annual broadleaf weeds, such as little barley, annual bluegrass, henbit and Carolina geranium in dormant bermudagrass in lawns, parks and golf courses. A nonionic surfactant at 0.25% v/v should be added to the spray mix. Apply only to dormant bermudagrass.
ethofumesate (Prograss) 1.5EC	bermudagrass (dormant), perennial ryegrass, Kentucky bluegrass, tall fescue	8	See Label	See Label	12	Apply Prograss in fall for pre- and postemergence control of annual bluegrass in perennial ryegrass and tall fescue. Prograss can be applied to dormant bermudagrass in the fall one to two weeks after emergence of perennial ryegrass for the control of annual bluegrass. An additional application at 1.0 lb. ai/A at 21-28 day intervals may be required to maintain control. The initial treatment may cause immediate browning of bermudagrass that is not completely dormant. DO NOT apply Prograss after Jan. 15 to overseeded bermudagrass. Applications after this date can severely delay bermudagrass growth in the spring. Prograss is not labeled for use on golf course putting greens.
ethofumesate (Prograss) 1.5EC + Atrazine (numerous formulations)	St. Augustinegrass	8 + 5	2.0 gal. + 2.0 lbs. ai/acre	3.0 + 2.0	See Label	Prograss + atrazine may be used to control bermudagrass in St. Augustinegrass. Make the first application in mid-March when bermudagrass initiates green-up. Repeat this application 30 days later. Use of this application timing is critical for control. Temporary St. Augustinegrass stunting may occur. Avoid improper overlapping of the spray pattern.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
fenoxaprop (Acclaim Extra) 0.57 lb./gal.	fine fescue, Ky. bluegrass, tall fescue, zoysiagrass	1	13.0-39.0 fl. oz.	0.06-0.17	24	Controls annual grasses. Apply in late spring or early summer to weedy grasses in the 3-leaf (low rate) to 5-tiller (high rate) growth stage. Repeat application at 14 days if weed regrowth has occurred and no turfgrass injury is present. DO NOT tank mix Acclaim with phenoxy containing herbicides. Fescues and ryegrasses may be seeded immediately after application. Acclaim may be used on newly plugged zoysiagrass and seedling fescues and perennial ryegrasses that are 4 weeks old. Acclaim Extra + Turflon Ester tank-mixtures can be used to control bermudagrass in tall fescue and zoysiagrass.
flazasulfuron (Katana) 25 WG	bermudagrass, centipedegrass, zoysiagrass	2	0.25-3 oz.		12	Flazasulfuron (Katana) is a selective herbicide for removal of overseeded cool-season grasses as well as control of annual and perennial grasses, sedges, and broadleaf weeds in bermudagrass, zoysiagrass, and certain other warm-season turfgrasses. Flazasulfuron has postemergence and some preemergence activity and may be used on golf courses (fairways, roughs, and tees) and the following non-residential turf areas: industrial parks, tank farms, sod farms, seed farms, cemeteries, professionally managed college and professional sports fields, and commercial lawns for control of cool-season grasses and weeds from tolerant grasses. The maximum yearly application rate is 9.0 oz. per acre. Use only on labeled turfgrasses or severe injury may result. Do not apply to newly seeded, sodded, or sprigged Turfgrass until well established. Allow at least 2 weeks from the last application to the time of overseeding when applied at 1.5 oz. per acre. Allow 4 weeks for rates above 1.5 oz. per acre.
florasulam (Defendor) 0.42 lbs./gal.	bahiagrass, bentgrass, bermudagrass, centipedegrass, Kentucky bluegrass, perennial ryegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	2	4.0 fl. oz.	0.013	4	Apply for postemergence control of annual and perennial broadleaf weeds in established turfgrass, including residential lawns, golf courses, sports fields, sod farms and commercial turfgrass areas. Apply with a nonionic surfactant when florasulam is applied alone. Make applications in a minimum of 20 gallons per acre of spray solution. Do not apply more than 12 fl. oz./acre per year. Do not make repeat treatments within four weeks of initial applications. Do not apply to golf greens.
fluazifop-butyl (Fusilade II) 2.0 lbs./gal.	tall fescue, zoysiagrass	1	3.0 -6.0 fl. oz.	0.05-0.10	12	Use to control common and hybrid bermudagrass in zoysiagrass and tall fescue. Tank mix with Turflon Ester to improve control of bermudagrass. In zoysiagrass, apply 3.0-4.0 fl. oz./A plus 0.25% v/v nonionic surfactant. Make the first application around June 1 and repeat every 20-30 days. Reduce the rate to 2.0-3.0 fl. oz./A in the late summer. In tall fescue, apply 5.0-6.0 fl. oz./A plus 0.25% v/v nonionic surfactant in the spring (April-May) as bermudagrass begins to green-up. Repeat the application in September-October. DO NOT apply to tall fescue during the hot summer months. Some injury (discoloration) will occur on tall fescue for up to 14 days after application.
flumioxazin (Sureguard) 51WDG	bermudagrass (dormant)	14	8-12 oz.	0.23-0.38	12	Provides preemergence control of annual broadleaf weeds and annual grasses including crabgrass, goosegrass, and annual bluegrass. Flumioxazin also provides postemergence control of annual bluegrass and annual broadleaf weeds. Applications should be limited to dormant bermudagrass only. Late fall applications to partially green bermudagrass can aid in transition to dormancy. Do not apply to golf greens or actively growing turfgrasses. Do not apply more than 24 oz./acre per year. The addition of a nonionic surfactant is recommended for postemergence applications.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
fluroxypyr (Spotlight) 1.5 lbs./gal.	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	4	0.67-1.33 pts.	0.125-0.25	12	Controls numerous broadleaf weeds including common purslane, chickweed(s), white clover, ground ivy and woodsorrel Apply to newly seeded turf after 2-3 mowings or to established turf. To broaden weed spectrum, Spotlight can be mixed with other labeled turf herbicides. Use Spotlight on bermudagrass and St. Augustinegrass only at 0.67 pt./acre and only if some injury can be tolerated. Not recommended for use on golf course putting greens
foramsulfuron (Revolver) 0.19 lbs./gal	bermudagrass, zoysiagrass	2	8.8-26.2 fl. oz.	0.013-0.04	12	Apply Revolver for: a) control of undesirable cool-season grasses (including tall fescue), b) control of emerged annual bluegrass 1 week before overseeding bermudagrass with perennial ryegrass, c) postemergence control of goosegrass in late spring and early summer, and d) spring transition of bermudagrass overseeded the previous fall with cool-season turfgrasses. For tillered goosegrass, make 2 applications at the high rate 7-14 days apart. A tank-mix of Revolver at 26.2 fl. oz. + MSMA (normal rate) applied twice 3-4 weeks apart will control dallisgrass. Late summer and early fall applications of this tank-mix usually provide better control than earlier applications. DO NOT apply Revolver within 2 weeks of sprigging. Revolver is rainfast within 2 hours of application.
glufosinate (Finale) 1.0 lb./gal.	bermudagrass (dormant)	10	3.0-6.0 qts./acre	0.75-1.5	12	Controls numerous winter annual broadleaf weeds and annual bluegrass in completely dormant Bermudagrass. DO NOT apply during spring green-up.
glyphosate (Roundup Pro) 4 lbs./gal.	bermudagrass (dormant)	9	0.75 pt.	0.375	4	APPLY ONLY TO DORMANT BERMUDAGRASS. Controls annual bluegrass. Apply in 5-20 gals. Water/A. DO NOT apply during green-up or to actively growing bermudagrass.
halosulfuron (SedgeHammer) 75DF	bermudagrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	2	0.67-1.33 oz.	0.031-0.062	12	Controls yellow and purple nutsedge, and suppresses green kyllinga. A second application may be needed 6 to 10 weeks after the initial application. Apply at the 3 to 8 leaf nutsedge growth stage. Add a nonionic surfactant at 0.5% v/v (2.0 qts./100 gal.) DO NOT mow 2 days before or after application. DO NOT apply to golf course putting greens.
imazaquin (Image) 70DG (Celero) 75WDG	bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	2	8.6-11.4 oz. 8-14 oz.	0.37-0.5 0.38 to 0.66	12	Controls nutsedge(s), wild garlic, and selected broadleaf weeds. Add a nonionic surfactant (1.0 qt./100 gals.). The addition of MSMA (bermudagrass only) will aid in control of nutsedge(s) and escaped weedy grasses. Two applications per year, at an interval of 6-8 weeks, will be needed to control purple nutsedge. DO NOT apply when turfgrass is emerging from winter dormancy. Image will severely injure fescue(s) and ryegrass(s). DO NOT apply to newly planted or sprigged lawns or golf greens. Celero provides postemergence control of annual and perennial sedges, kyllinga, and broadleaf weeds. Celero is labeled for residential and non-residential turfgrass including golf courses, sod farms, sports fields, parks, and lawns. Apply with a non-ionic surfactant at 0.25% v/v. Make second treatments no sooner than 21 days after the initial treatment. Do not apply more than 14 oz/acre per application. Do not apply to golf greens.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
MCPA + MCPP + 2,4-DP (Triamine II) (TriEster II) (Trimec Encore)	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	4+4+4	See Label	See Label	48	Refer to individual labels for recommended amount of formulated product. Controls a broader spectrum of weeds than 2,4-D alone. DO NOT spray at air temperatures greater than 85°F and, when warm-season turfgrasses are growing under stress conditions. Delay reseeding for 4 weeks after treatment. Trimec Encore is not labeled on St. Augustinegrass.
MCPA + triclopyr + dicamba (Cool Power) (HorsePower)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	4+4+4	See Label	See Label	See Label	Controls a broader spectrum of weeds than 2,4-D alone. Cool Power is an ester formulation of MCPA + triclopyr + dicamba primarily for use during the cool winter months. HorsePower contains amine formulations of these herbicides. DO NOT mow 1-2 days before or after application. Delay application to newly seeded grasses until after 3-4 mowings. Delay reseeding for 3-4 weeks after application. Avoid applications during the spring transition of warm-season turfgrasses.
MCPA + MCPP + dicamba (Tri-Power)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	4+4+4	See Label	See Label	See Label	Controls a broader spectrum of weeds than 2,4-D alone. DO NOT mow 1-2 days before or after application. Delay application to newly seeded grasses until after 3-4 mowings. Delay reseeding for 3-4 weeks after application. Avoid applications during the spring transition of warm-season turfgrasses unless a slight delay in green-up can be tolerated.
MCPP + 2,4-D + dicamba (Trimec Southern)	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, tall fescue, zoysiagrass	4+4+4	See Label	0.7 + 0.4 + 0.08	48	Controls a broader spectrum of weeds than 2,4-D alone. DO NOT spray when turfgrass is emerging from winter dormancy. Avoid application if air temperatures exceed 85°F. Delay reseeding for 4 weeks after application. Refer to label for rates for St. Augustinegrass and centipedegrass.
mesotrione (Tenacity) 4.0 lbs./gal	centipedegrass, Ky. bluegrass, St. Augustinegrass (grown for sod), tall fescue	27	4.0-8.0 fl. oz.	0.125-0.25	12	Provides postemergence control of crabgrass (< 4 tillers), nimblewill, creeping bentgrass, white clover and numerous broadleaf weeds. Apply to small, actively growing weeds. A repeat application at two to three weeks may be required for adequate control. Add a nonionic surfactant at 0.25% v/v to the spray mix. Tenacity may also be applied at the time of seeding Ky. bluegrass, centipedegrass or tall fescue. It may also be applied after new seedlings have been mowed two times or 4 weeks after emergence (whichever is longer). Do not exceed 4.0 fl. oz./acre on St. Augustinegrass sod. Tenacity may cause temporary whitening of turfgrass foliage (see label). If Tenacity is tank-mixed with atrazine or simazine for use on St. Augustinegrass or centipedegrass use only 4.0 fl. oz. of Tenacity and 0.5 lbs. ai/A of either atrazine or simazine. Zoysiagrass, Bermudagrass and seashore paspalum are sensitive to Tenacity. Do not use on golf course putting greens and maintain a five foot buffer between treated areas and putting greens.
metribuzin (Sencor) 75 Turf	bermudagrass	5	0.67 lb.	0.5	See Label	Dormant bermudagrass: Apply to emerged winter annual weeds. Make only one application per season. Actively growing bermudagrass: Apply to bermudagrass that is actively growing and not under stressed conditions. Controls goosegrass and selected annual weeds. DO NOT make more than two applications per season. Sencor may cause temporary discoloration. Delay mowing treated areas for at least 3 days.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
metribuzin (Sencor) 75 Turf + MSMA (Several trade names)	bermudagrass	5+17	2.6 dry oz. + See Label	0.125 + 2.0	See Label	This tank mix provides better control of goosegrass than the use of MSMA alone. Apply ONLY to established bermudagrass that is actively growing and not under stressed conditions. Two applications spaced 7-10 days apart may be necessary for acceptable control.
metsulfuron (Manor) 60DF (Blade) 60DF (Various) 60DF	bermudagrass, centipedegrass, Ky. bluegrass, St. Augustinegrass, zoysiagrass	2	0.25-1.0 oz.	0.009-0.037	See Label	Controls a wide range of broadleaf weeds, 'Pensacola' bahiagrass and wild garlic/onion. May also be used hasten the spring transition of bermudagrass overseeded with perennial ryegrass to bermudagrass. Add a nonionic surfactant at 0.25% v/v. DO NOT exceed 0.5 oz. on centipedegrass or Kentucky bluegrass. DO NOT overseed for 8 weeks after application, or plant woody ornamentals in treated areas for one year after application. Not recommended for use on tall fescue.
Metsulfuron + Sulfentrazone (Blindside) 66WDG (6%+66%)	bermudagrass, centipedegrass, St. Augustinegrass, tall fescue, zoysiagrass	17+17	3.25-10 oz.	0.13-0.41 (0.01+0.12 to 0.038+0.375)	12	Apply for selective post-emergence control of annual grasses, broadleaf weeds, and sedges in established turf areas including, but not limited to, residential, commercial and institutional lawns, athletic fields, commercial sod farms, golf course fairways, and golf course roughs. Best weed control results will be obtained when no rainfall or irrigation occurs within 24 hours after application. If no rainfall or irrigation occurs within 7 days after applications in the amount of 0.5 inches, then irrigation of at least 0.5 inches is recommended. Do not apply to tall fescue at temperatures above 75° F. Do not apply to centipedegrass during spring transition. Use the lowest rate for tall fescue. Do not apply to golf course putting greens, collars, or tees. Do not use on turfgrass other than those listed on the label or turfgrass under stress. See product label for further information before use.
MSMA (Buena 6)6.0 lbs./gal. (Daconate 6)6.0 lbs./gal. (Other trade names) DSMA (DSMA Liquid) 3.6 lbs./gal. (Weed-E-Rad 360) 3.6 lbs./gal. (Other trade names)	bermudagrass, Ky. bluegrass, tall fescue	17+17	2.7 pts. 2.7 pts. 1.0 gal. 1.0 gal.	2.0 2.0 3.6 3.6	See Label	These herbicides control emerged annual grasses, bahiagrass, and dallisgrass and provide fair control of nutsedge. Multiple applications spaced 7-10 days apart are needed for acceptable control. Temporary discoloration of turf will occur. May be applied to newly sprigged bermudagrass at the above rates. On new stands of fescue, apply one-half rate after 3 mowings. Add a surfactant according to label directions. Zoysiagrass cultivars vary in tolerance to MSMA. 'Meyer' is more tolerant than 'Emerald' or 'Matrella'. DO NOT apply to centipedegrass or St. Augustinegrass.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
penoxsulam + sulfentrazone + 2,4-D + dicamba (Avenue South)	bermudagrass, buffalograss, centipedegrass, Kentucky bluegrass, ryegrass, seashore paspallum, St. Augustinegrass, tall fescue, zoysiagrass	2+4+14	3 to 6 pints		48	Provides postemergence control of annual and perennial broadleaf weeds in established residential and non-residential turf including lawns, parks, golf courses, sports facilities, and sod farms. Do not apply this product to golf greens, collards, tees, bentgrass, carpetgrass, dichondra, legumes, and lawns where desirable clovers are present. Applications made when ambient temperatures are above 90°F (85°F for St. Augustinegrass) may cause undesirable turf injury. Environmental conditions and spray tank, liquid fertilizers, and tank mixtures containing other emulsifiable concentrates may reduce the selectivity on turfgrass. Do not collect grass clippings for use as mulch around plants. Do not broadcast apply to bare ground or paved surfaces.
pronamide (Kerb T/O) 50WSP	bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	3	1.5-3.0 lbs.	0.75-1.5	24	Pronamide will control emerged annual bluegrass, corn speedwell, and common chickweed. Increase rate as annual bluegrass approaches maturity. Pronamide acts slowly (3-5 weeks) on seedling to mature annual bluegrass. DO NOT apply to any cool season grass. A light overhead irrigation is necessary to move Kerb into the weed root zone if not rainfall occurs within 24-48 hours. Kerb is a Restricted Use Herbicide.
quinclorac (Drive) 75DF (Drive XLR8) 1.5SL	bermudagrass, Ky. bluegrass, seashore paspalum, tall fescue, zoysiagrass	4	1.0 lb. 64 fl. oz.	0.75 0.75	12	Provides excellent control of crabgrass, barnyardgrass and clovers with one application. Multiple applications will also provide control of torpedograss. Add methylated seed oil at 1.5 pts./A to the spray mix. DO NOT mow 2 days before or after application. Drive may also be applied before, at, and during seedling emergence of bermudagrass, tall fescue and zoysiagrass. DO NOT add an adjuvant until 28 days after emergence. Apply under conditions of good soil moisture. For best results do not irrigate for 24 hours after application. DO NOT apply to bahiagrass, carpetgrass, St. Augustinegrass or centipedegrass. DO NOT apply to exposed feeder roots of ornamental trees and shrubs.
quinclorac (0.75 lb./gal) + 2,4-D (1 lb./gal) + dicamba (0.125 lb./gal.) (Qunicept)	Bentgrass, bermudagrass, buffalograss, KY. bluegrass, ryegrass, tall fescue, zoysiagrass	4+4+4	7-8 pts.	0.66+0.88 + 0.1-0.75 + 1+0.125	48	Apply to residential and nonresidential cool-season turfgrasses for broadleaf weed control and suppression or control of grassy weeds. Apply lower rates on bermudagrass and zoysiagrass and DO NOT apply to Golf Greens. Controls young barnyardgrass, crabgrass, and foxtails but repeat applications may be needed for complete control of mature plants. DO NOT apply when temperatures exceed 90° F or if turf is under stress from drought, heat, or disease.
quinclorac + dicamba + MCPP (One-Time) 2.45 SL	bentgrass, bermudagrass, Ky. bluegrass, seashore paspalum, tall fescue, zoysiagrass	4+4+4	21-64 Fl. Oz.	0.25+0.03+ 0.12-0.75+ 0.1+0.375	48	Controls broadleaf weeds, barnyardgrass, crabgrass, foxtails, and torpedograss in cool and warm-season turfgrasses. Repeat applications may be needed for grassy weed control. DO NOT apply more than 128 fl. oz./acre in one year or more than two applications per year. DO NOT apply to golf course collars, greens, or turf grown for sod. DO NOT apply to fine fescue, bahiagrass, St. Augustinegrass, or centipedegrass.
quinclorac + carfentrazone (SquareOne) 70 WDG 0.66+0.04	bermudagrass, bluegrasses, buffalograss, fine fescue, perennial ryegrass, Seashore Paspalum, tall fescue, zoysiagrass	4+14	8-18 oz.	0.35-.079 (0.33+0.02 to 0.75+0.05)	12	Apply for postemergence control of annual grasses and broadleaf weeds in established turf areas including, residential, commercial, and industrial lawns, athletic fields, commercial sod farms, golf course fairways, and golf course roughs. SquareOne is absorbed by shoots, foliage, and roots, and can be applied to several turfgrasses at 7 days or more after emergence by both seeding and sprigging (See Label). Application to zoysiagrass should be delayed until at least 14 days after emergence to avoid extended discoloration. Slight discoloration may be observed immediately after application for hybrid bermudagrasses, however, normal turf color returns by 12 days after emergence if no other stresses are present. Areas treated with SquareOne Herbicide may be seeded or overseeded one day following application. This product may be applied to established sod. See product label for further information before use.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
rimsulfuron (TranXit GTA) 25DF	bermudagrass, centipedegrass, zoysiagrass	2	1.0-2.0 Oz.	0.016-0.032	See Label	May be used: a) to control annual bluegrass before overseeding bermudagrass with perennial ryegrass or <i>Poa Trivialis</i> ; b) to control annual bluegrass and certain weeds in non-overseeded bermudagrass, centipedegrass and zoysiagrass and c) to remove perennial ryegrass or <i>Poa trivialis</i> from bermudagrass in the late spring. Add a nonionic surfactant at 0.25% v/v. Apply 10-14 days in late summer or early fall before overseeding bermudagrass. DO NOT apply after overseeding, or to bentgrass putting greens. To hasten spring transition on overseeded bermudagrass, apply at the 60 to 75% green-up growth stage of bermudagrass, or approximately 2-3 weeks before transition is desired. DO NOT apply to residential lawns, cool-season turfgrasses or to newly sprigged or sodded bermudagrass.
sethoxydim (Segment) 1.0 lb./gal.	centipedegrass, fine fescue	1	1.5-2.25 pts.	0.19-0.28	12	Apply sethoxydim only to centipedegrass and fine fescues (creeping red, Chewings, hard fescue). Other turfgrasses, including tall fescue, will be severely injured by sethoxydim. Controls annual grasses and suppresses bahiagrass growth. Apply no sooner than 3 weeks after green-up. DO NOT exceed 1.5 pts./acre on seedling centipedegrass. DO NOT mow 7 days prior to or after application. Two applications per season may be utilized in seedling and established centipedegrass. For bahiagrass suppression, repeat treatment 10-14 days after the first application. No adjuvant is needed with Segment.
sulfentrazone (Dismiss) 4.0SC (Spartan) 4F	bermudagrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	14	4.0-12.0 fl. oz.	0.125-0.375	12	Controls nutsedge(s), annual sedges, kyllinga species and a wide range of broadleaf weeds. Add a nonionic surfactant at 0.25 v/v to the spray mix. Apply to established grasses, or to newly established grasses (seeded or sodded) after the second mowing. Treated areas may be reseeded or sodded 3 months after application. Overseeding with perennial ryegrass may be done 6 weeks after application if slight injury to ryegrass can be tolerated. Do not apply Dismiss within 3 months of sod harvest. Dismiss is not recommended for use on golf course putting greens. Spartan is labeled for use only on seed and sod farms.
sulfentrazone + carfentrazone (Dismiss NXT) 3.5 lbs./gal.	bermudagrass, centipedegrass, Ky. bluegrass, seashore paspalum, St. Augustinegrass, tall fescue, zoysiagrass	14	5.1 to 15.3 fl. oz.	0.14-0.4	12	Controls nutsedges, annual sedges, kyllinga species and a wide range of broadleaf weeds. Apply to established grasses, or to newly established grasses (seeded or sodded) after the second mowing. Treated areas may be reseeded or sodded 3 months after application. Overseeding with perennial ryegrass may be done 2 to 4 weeks after application if slight injury to ryegrass can be tolerated. Dismiss NXT is not labeled for use on golf course putting greens, collar, or tees.
sulfentrazone (0.06 lb./gal.) + 2,4-D (1.4 lbs. gal.) + MCPP (0.5 lb./gal.) + dicamba (0.22 lb./gal.) (Surge)	bermudagrass, Ky. bluegrass, tall fescue, zoysiagrass	14+4+4+4	2.75-4.0 pts.	--	48	Controls a wide range of broadleaf weeds, including spotted spurge. This product will also provide some suppression of small, actively-growing yellow nutsedge. May be applied after the second mowing in newly-established cool-season turfgrasses, or 4 weeks after sprigging or sodding warm-season turfgrasses. DO NOT reseed until 3 weeks after application. DO NOT apply at air temperatures > 90°F, or during the spring transition of warm-season turfgrasses.
sulfentrazone (0.06 lb./gal.) + quinclorac (0.5 lb./gal.) + dicamba (0.09 lb./gal) (Q4, Q4 Plus)	bermudagrass, buffalograss, Ky. bluegrass, ryegrass, tall fescue, zoysiagrass	14+4+4+4	7-8 pts.	0.05+0.04+0.77+0.08 - 0.06+0.5+0.88+0.09	48	Apply to cool-season turfgrasses for broadleaf weed control and suppression or control of grassy weeds. DO NOT apply to bentgrasses or greens. See labels for use on warm-season grasses. Controls young barnyardgrass, crabgrass, and foxtails but repeat applications will be needed for complete control of mature plants. DO NOT apply when temperatures exceed 90°F or if turf is under stress from drought, heat, or disease.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
sulfosulfuron (Certainty) 75DF	bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	2	0.75-1.25 oz.	0.035-0.07	12	Controls nutsedge(s), annual sedges, kyllinga species, annual bluegrass, tall fescue, and certain broadleaf weeds in warm-season turfgrasses. Add a nonionic surfactant at 0.25 v/v to the spray mix. Avoid mowing for 1-2 days before and after application. For nutsedge repeat the application at 4 to 10 weeks if regrowth is observed. Certainty may be applied 7-10 days before overseeding bermudagrass with perennial ryegrass. Certainty is not recommended for use on putting greens.
thiencarbazone-methyl 10% + foramsulfuron 20% + halosulfuron 31% (Tribute Total) 61% WDG	bermudagrass	2+2+2	1-3.2 oz.	0.006-0.02	12	Provides selective, postemergence control of annual and perennial grassy weeds, sedges and kyllingas, and broadleaf weeds growing in well-established bermudagrass. Use only on commercial and residential turf including golf courses (excluding greens and overseeded tees), residential and commercial lawns, sports fields, cemeteries, parks, campgrounds, recreational areas, roadsides, school grounds, and sod farms. For postemergence control of dallisgrass in well-established bermudagrass, use 3.2 oz./acre and include the addition of a methylated seed soil and ammonium sulfate. Make an application in late summer / early fall while the weeds are still actively growing and not under stress. Follow up with a second application after 4-6 weeks. Tribute Total also controls annual bluegrass, overseeded ryegrass, creeping bentgrass, and other weeds. See label for further information.
thiencarbazone + iodosulfuron + dicamba (Celsius 68 WG)	bahiagrass, bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass	2+2+4	2.5-4.9 oz.	See Label	24	This product is intended for commercial application (licensed applicators only) to residential lawns, commercial lawns, golf courses, sports fields, parks, campsites, recreational areas, residential lawns, roadsides, school grounds, cemeteries, sod farms to control annual and perennial broadleaf weeds and grasses in warm-season grasses. For certain weeds, a second application made two to four weeks later may be needed for complete weed control (see label). Total amount of product applied in a calendar year must not exceed 7.4 oz. per acre. See label before use. Do not apply to areas with desirable carpetgrass or bahiagrass.
topramezone (Pylex) 2.8 lbs./gal	centipedegrass, fine fescue, Ky. bluegrass, perennial ryegrass, tall fescue	27	1-2 fl. oz.	0.023-0.046	12	Apply for postemergence control of crabgrass, goosegrass, foxtails, clovers, and other broadleaf weeds. Repeat applications with triclopyr in late summer will suppress bermudagrass in tall fescue. Labeled use areas include commercial lawns, golf courses, sod farms, parks, residential turf, and athletic fields. Apply with crop oil concentrate or methylated seed oil at 0.5-1% v/v. Treatments may be made before seeding tolerant turfgrass species, but do not apply within 28 days after seeding. Do not apply more than 2 fl. oz./acre per application. Do not apply more than 4 fl. oz./acre (0.089 lb. ai/acre) per year. Do not apply to golf greens.
triclopyr (Turflon Ester Ultra) 4.0 lb/gal.	tall fescue, zoysiagrass	4	1.0-2.0 pts.	0.5-1.0	12	Controls wild violet, ground ivy, yellow woodsorrel, and selected other broadleaf weeds. Tank mix with recommended rates of Fusilade II or Acclaim Extra to suppress bermudagrass in tall fescue and zoysiagrass. Repeat the application 3-4 times at intervals of 4 weeks. Do not apply to other turfgrass species, unless injury can be tolerated. Areas treated with Turflon Ester can be reseeded 3 weeks after application.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides - continued						
triclopyr + clopyralid (Confront) 2.25 + 0.75 lbs./gal.	bermudagrass, centipedegrass, Ky. bluegrass, tall fescue, zoysiagrass	4+4	1.0-2.0 pts.	0.3+0.1 - 0.6+0.2	48	Controls a wide range of broadleaf weeds. Repeat the application in approximately 4 weeks if necessary. Repeat treatments will also be necessary for the control of violets and woodsorrel. Newly seeded turf should be mowed 2-3 times before treatment. DO NOT water for 6 hours after application or apply at air temperatures > 85°F. DO NOT apply to exposed roots of shallow rooted trees and shrubs. DO NOT reseed for 3 weeks after application. Not labeled for use on residential turfgrasses.
trifloxysulfuron-sodium (Monument) 75DG	bermudagrass, zoysiagrass	2	0.33-0.56 oz.	0.015-0.026	12	Controls nutsedge(s), green kyllinga, annual bluegrass, tall fescue, torpedograss and certain broadleaf weeds in established bermudagrass and zoysiagrass. Monument is not recommended for use on other turfgrass species. Add a nonionic surfactant at 0.25-0.5% v/v to the spray mix. Monument at rates of 0.1-0.3 oz./acre may be used as a spring transition aid for the removal of perennial ryegrass and <i>Poa trivialis</i> . Avoid mowing for 1-2 days before and after application. For nutsedge repeat the application at 4-6 weeks if regrowth is observed. DO NOT overseed bermudagrass with cool-season turfgrasses for 3 weeks after application.
Turf Renovation						
glyphosate (Roundup Pro) 4 lbs./gal.	Existing vegetation	9	1.0-5.0 qts.	1.0-5.0	4	Apply to areas that are being renovated (establishment of desirable turfgrass) to kill existing vegetation. Refer to Roundup Pro label for recommended rates for specific species. Apply to actively growing bermudagrass when seedheads appear. Repeat treatment may be required for complete control. Tillage or renovation techniques (vertical mowing, coring, slicing) should be delayed for 7 days after treatment. Avoid contact of spray with ornamentals.
Preemergence Herbicides – Golf Course Putting Greens						
bensulide (Bensumec) 4LF	bentgrass, bermudagrass	8	1.9-3.1 gals.	7.5-12.5	See Label	Controls annual grasses and selected broadleaf weeds. Apply high rate in fall for annual bluegrass control. Apply a light irrigation immediately after treatment. DO NOT apply to newly sprigged grasses. Delay reseeding for 4 months after treatment.
(Pre-San) 7G			107.0-180.0 lbs.	7.5-12.5		
pronamide (Kerb T/O) 50WSP	bermudagrass	3	1.0-2.0	0.5-1.0	24	Preemergence or postemergence applications of Kerb will control annual bluegrass. Apply to non-overseeded bermudagrass greens. Do not apply closer than 90 days before overseeding cool-season grasses unless deactivation with activated charcoal is planned. To deactivate Kerb with activated charcoal, such as Gro-Safe, use 10 lbs. charcoal per 1,000 sq. ft. Reseed no sooner than 7 days after charcoal application. A light overhead irrigation is necessary to move Kerb into the weed root zone if no rainfall occurs within 24 hours. DO NOT apply Kerb to any cool-season turfgrass. Kerb is a Restricted Use Herbicide.
siduron (Tupersan) 50 WP	creeping bentgrass	7	4.0-24 lbs.	2.0-12.0	4	May be applied at the time of seeding or to established creeping bentgrass for crabgrass spp. control. Siduron does not control goosegrass or annual bluegrass. Irrigate within 3 days of application with 2 inch of water/acre if rainfall does not occur. Tupersan at 1.0 lb. product per 1,000 sq. ft. may be used as band treatment along the perimeter of creeping bentgrass putting greens to suppress stolon growth of bermudagrass. Make the initial application in the March/April time frame. Repeat applications can be made at 4-5 week intervals.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides – Golf Course Putting Greens - continued						
fenarimol (Rubigan) 1AS (Patchwork) 0.78G	overseeded bermudagrass	n/a	See Label See Label	See Label See Label	12	Fenarimol is a systemic fungicide that reduces the infestation level of annual bluegrass. May be applied as a sequential treatment to bermudagrass greens that are overseeded with perennial ryegrass, <i>Poa Trivialis</i> or bentgrass. Sequential treatments should be applied at intervals of 10 to 14 days. Use the triple application program if bentgrass or <i>Poa Trivialis</i> is used for overseeding. For double applications, apply 6.0 fl. oz. of Rubigan AS or 6.0 lbs. of Patchwork per 1,000 sq. ft. with the last application 2 weeks prior to overseeding ryegrass. For triple applications, apply 4.0 fl. oz. of Rubigan AS or 4.0 lbs. Patchwork per 1,000 sq. ft with the last application 2 weeks prior to overseeding ryegrass or 4 weeks prior to overseeding bentgrass or <i>Poa Trivialis</i> . A single application of Rubigan AS at 2.0 fl. oz. Or Patchwork at 2.0 lbs. per 1,000 sq. ft. in January or February will help to maintain annual bluegrass control. Rubigan will not control perennial bluegrass.
bensulide + oxadiazon (Goosegrass/Crabgrass Control) 5.25% + 1.31% G	bentgrass, bermudagrass	8+14	115.0 lbs.	6.0 bensulide + 1.5 oxadiazon	See Label	Controls summer annual grasses. Apply a light irrigation after treatment. DO NOT use on newly sprigged grasses until well established. Delay reseeding for 5 months after treatment. On putting greens overseeded with perennial ryegrass or <i>Poa Trivialis</i> apply 1/2 the maximum labeled rate to dry turf. Apply an additional application at 1/2 the maximum labeled rate to dry turf 10 to 14 days later. See label before use on putting greens.
Postemergence Herbicides – Golf Course Putting Greens						
carfentrazone (QuickSilver) 1.9 lbs./gal. (QuickSilver) 1.03 lbs./gal. (water-soluble 5 ml bag)	bentgrass	14	6.7 fl. oz. use 3-4 5 ml bags/2,000 sq. ft	0.1	Until Dry	Apply to creeping bentgrass putting greens and tees for the control of silvery-thread moss (<i>Byrum argenteum</i>). Repeat the application in 2 weeks. Add a nonionic surfactant at 0.25% v/v. Apply at a spray volume of > 100 GPA. Transitory injury (yellowing) may occur when applied to bentgrass stressed from high air temperatures (> 90°F.), disease and soil moisture stress.
diclofop-methyl (Illoxan) 3EC	bermudagrass	1	1.0-1.4 qts.	0.75-1.0	See Label	Illoxan may be used for goosegrass control on bermudagrass golf greens, tees and fairways. Use the high rate for goosegrass with one to two tillers. Lower rates may be used on smaller goosegrass. DO NOT mow for 24-36 hours after application. Control requires 2-3 weeks. May cause temporary phytotoxicity (7-10 days). DO NOT tank mix with other pesticides or fertilizers as control will be reduced. DO NOT overseed treated areas for at least 2 months after the last application.
foramsulfuron (Revolver) 0.19 lb./gal.	bermudagrass	2	8.8-26.2 fl. oz.	0.013-0.04	12	Apply Revolver for: a) control of emerged annual bluegrass 2 weeks before overseeding bermudagrass with perennial ryegrass, b) postemergence control of goosegrass in late spring and early summer, c) postemergence control of annual bluegrass in non-overseeded putting greens, and d) spring transition of bermudagrass overseeded the previous fall with cool-season turfgrasses. For tillered goosegrass, make 2 applications at the high rate 7-14 days apart. DO NOT apply Revolver within 2 weeks of sprigging. Revolver is rainfast within 2 hours of application. Revolver must be allowed to dry on bermudagrass foliage before traffic is allowed through treated areas. Revolver is NOT recommended for use on creeping bentgrass greens.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides – Golf Course Putting Greens - continued						
mecoprop (MCPP-4 Amine)	bentgrass, bermudagrass	4	2.5 pts.	1.25	See Label	Apply to small and actively growing broadleaf weeds as a summer or winter treatment. Avoid spray drift to ornamentals tree, shrub or flower foliage. DO NOT water for 24 hours after application. Delay mowing 2-3 days before or after application. DO NOT apply during conditions of drought, high temperatures (> 90°F.) or very wet weather. Weekly applications at one-half recommended rates will provide better control of knotweed than a single application at normal use rates. DO NOT reseed for 3-4 weeks after application.
rimsulfuron (TranXit GTA) 25DF	bermudagrass	2	1.0-2.0 oz.	0.016-0.032	4	May be used: a) to control annual bluegrass before overseeding bermudagrass with perennial ryegrass or <i>Poa Trivialis</i> ; b) to control annual bluegrass in non-overseeded bermudagrass, and c) to remove perennial ryegrass or <i>Poa Trivialis</i> from bermudagrass greens in the late spring. Add a nonionic surfactant at 0.25% v/v. Apply 10-14 days in late summer or early fall before overseeding bermudagrass. DO NOT apply after overseeding, or to bentgrass putting greens. To hasten spring transition on overseeded bermudagrass, apply at the 60-75% green-up growth stage of bermudagrass, or approximately 2-3 weeks before transition is desired. Irrigate within 2 hours of a TranXit application and then follow normal irrigation schedule. TranXit is NOT recommended for use on creeping bentgrass putting greens.
MCPP + 2,4-D + dicamba (Trimec Bentgrass)	bentgrass	4+4+4	2.7 pts.	0.5 + 0.15 + 0.06	See Label	Apply to small and actively-growing broadleaf weeds when air temperatures are less than 80°F. DO NOT water for 24 hours after application. DO NOT apply if bentgrass is showing the effects of environmental stresses.
sulfosulfuron (Certainty) 75WDG	bermudagrass, centipedegrass, seashore paspalum, St. Augustinegrass, zoysiagrass	2	0.75-2oz.	0.04-0.09	12	Sulfosulfuron controls nutsedge(s), annual sedges, kyllinga species, tall fescue, and certain broadleaf weeds in warm-season turfgrasses. Add a nonionic surfactant at 0.25% v/v to the spray mix. Avoid mowing for 1-2 days before and after application. For nutsedge, repeat the application at 4-10 weeks if regrowth is observed. Sulfosulfuron may be applied 7-10 days before overseeding bermudagrass with perennial ryegrass. DO NOT use on putting greens. DO NOT use on tall fescue or other cool-season grasses.
trifloxysulfuron-sodium (Monument) 75DG	bermudagrass	2	0.33-0.56 oz.	0.015-0.026	12	Controls nutsedge(s), annual sedges, kyllinga species, and certain broadleaf weeds in established bermudagrass putting greens. Applications should be made to actively-growing bermudagrass after 100% spring green-up. Monument is not recommended for use on creeping bentgrass. Add a nonionic surfactant at 0.25-0.5% v/v to the spray mix. Monument at rates of 0.1-0.3 oz./acre may be used as a spring transition aid for the removal of perennial ryegrass and <i>Poa trivialis</i> . Avoid mowing for 1-2 days before and after application. For nutsedge repeat the application at 4-6 weeks if regrowth is observed. DO NOT overseed bermudagrass with cool-season turfgrasses for 3 weeks after application.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Preemergence Herbicides – Golf Course Putting Greens - continued						
fenarimol (Rubigan) 1AS (Patchwork) 0.78G	overseeded bermudagrass	n/a	See Label See Label	See Label See Label	12	Fenarimol is a systemic fungicide that reduces the infestation level of annual bluegrass. May be applied as a sequential treatment to bermudagrass greens that are overseeded with perennial ryegrass, <i>Poa Trivialis</i> or bentgrass. Sequential treatments should be applied at intervals of 10 to 14 days. Use the triple application program if bentgrass or <i>Poa Trivialis</i> is used for overseeding. For double applications, apply 6.0 fl. oz. of Rubigan AS or 6.0 lbs. of Patchwork per 1,000 sq. ft. with the last application 2 weeks prior to overseeding ryegrass. For triple applications, apply 4.0 fl. oz. of Rubigan AS or 4.0 lbs. Patchwork per 1,000 sq. ft with the last application 2 weeks prior to overseeding ryegrass or 4 weeks prior to overseeding bentgrass or <i>Poa Trivialis</i> . A single application of Rubigan AS at 2.0 fl. oz. Or Patchwork at 2.0 lbs. per 1,000 sq. ft. in January or February will help to maintain annual bluegrass control. Rubigan will not control perennial bluegrass.
bensulide + oxadiazon (Goosegrass/Crabgrass Control) 5.25% + 1.31% G	bentgrass, bermudagrass	8+14	115.0 lbs.	6.0 bensulide + 1.5 oxadiazon	See Label	Controls summer annual grasses. Apply a light irrigation after treatment. DO NOT use on newly sprigged grasses until well established. Delay reseeding for 5 months after treatment. On putting greens overseeded with perennial ryegrass or <i>Poa Trivialis</i> apply 1/2 the maximum labeled rate to dry turf. Apply an additional application at 1/2 the maximum labeled rate to dry turf 10 to 14 days later. See label before use on putting greens.
Postemergence Herbicides – Golf Course Putting Greens						
carfentrazone (QuickSilver) 1.9 lbs./gal. (QuickSilver) 1.03 lbs./gal. (water-soluble 5 ml bag)	bentgrass	14	6.7 fl. oz. use 3-4 5 ml bags/2,000 sq. ft	0.1	Until Dry	Apply to creeping bentgrass putting greens and tees for the control of silvery-thread moss (<i>Byrum argenteum</i>). Repeat the application in 2 weeks. Add a nonionic surfactant at 0.25% v/v. Apply at a spray volume of ≥ 100 GPA. Transitory injury (yellowing) may occur when applied to bentgrass stressed from high air temperatures (> 90°F.), disease and soil moisture stress.
diclofop-methyl (Illoxan) 3EC	bermudagrass	1	1.0-1.4 qts.	0.75-1.0	See Label	Illoxan may be used for goosegrass control on bermudagrass golf greens, tees and fairways. Use the high rate for goosegrass with one to two tillers. Lower rates may be used on smaller goosegrass. DO NOT mow for 24-36 hours after application. Control requires 2-3 weeks. May cause temporary phytotoxicity (7-10 days). DO NOT tank mix with other pesticides or fertilizers as control will be reduced. DO NOT overseed treated areas for at least 2 months after the last application.
foramsulfuron (Revolver) 0.19 lb./gal.	bermudagrass	2	8.8-26.2 fl. oz.	0.013-0.04	12	Apply Revolver for: a) control of emerged annual bluegrass 2 weeks before overseeding bermudagrass with perennial ryegrass, b) postemergence control of goosegrass in late spring and early summer, c) postemergence control of annual bluegrass in non-overseeded putting greens, and d) spring transition of bermudagrass overseeded the previous fall with cool-season turfgrasses. For tillered goosegrass, make 2 applications at the high rate 7-14 days apart. DO NOT apply Revolver within 2 weeks of sprigging. Revolver is rainfast within 2 hours of application. Revolver must be allowed to dry on bermudagrass foliage before traffic is allowed through treated areas. Revolver is NOT recommended for use on creeping bentgrass greens.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF WEED CONTROL (continued)						
Use Stage and Herbicide	Turfgrasses	WSSA Group	Broadcast Rate/Acre		REI	Remarks and Precautions
			Amount of Formulation	Pounds Active Ingredient		
Postemergence Herbicides – Golf Course Putting Greens - continued						
mecoprop (MCPP-4 Amine)	bentgrass, bermudagrass	4	2.5 pts.	1.25	See Label	Apply to small and actively growing broadleaf weeds as a summer or winter treatment. Avoid spray drift to ornamentals tree, shrub or flower foliage. DO NOT water for 24 hours after application. Delay mowing 2-3 days before or after application. DO NOT apply during conditions of drought, high temperatures (> 90°F.) or very wet weather. Weekly applications at one-half recommended rates will provide better control of knotweed than a single application at normal use rates. DO NOT reseed for 3-4 weeks after application.
rimsulfuron (TranXit GTA) 25DF	bermudagrass	2	1.0-2.0 oz.	0.016-0.032	4	May be used: a) to control annual bluegrass before overseeding bermudagrass with perennial ryegrass or <i>Poa Trivialis</i> ; b) to control annual bluegrass in non-overseeded bermudagrass, and c) to remove perennial ryegrass or <i>Poa Trivialis</i> from bermudagrass greens in the late spring. Add a nonionic surfactant at 0.25% v/v. Apply 10-14 days in late summer or early fall before overseeding bermudagrass. DO NOT apply after overseeding, or to bentgrass putting greens. To hasten spring transition on overseeded bermudagrass, apply at the 60-75% green-up growth stage of bermudagrass, or approximately 2-3 weeks before transition is desired. Irrigate within 2 hours of a TranXit application and then follow normal irrigation schedule. TranXit is NOT recommended for use on creeping bentgrass putting greens.
MCPP + 2,4-D + dicamba (Trimec Bentgrass)	bentgrass	4+4+4	2.7 pts.	0.5 + 0.15 + 0.06	See Label	Apply to small and actively-growing broadleaf weeds when air temperatures are less than 80°F. DO NOT water for 24 hours after application. DO NOT apply if bentgrass is showing the effects of environmental stresses.
sulfosulfuron (Certainty) 75WDG	bermudagrass, centipedegrass, seashore paspalum, St. Augustinegrass, zoysiagrass	2	0.75-2oz.	0.04-0.09	12	Sulfosulfuron controls nutsedge(s), annual sedges, kyllinga species, tall fescue, and certain broadleaf weeds in warm-season turfgrasses. Add a nonionic surfactant at 0.25% v/v to the spray mix. Avoid mowing for 1-2 days before and after application. For nutsedge, repeat the application at 4-10 weeks if regrowth is observed. Sulfosulfuron may be applied 7-10 days before overseeding bermudagrass with perennial ryegrass. DO NOT use on putting greens. DO NOT use on tall fescue or other cool-season grasses.
trifloxysulfuron-sodium (Monument) 75DG	bermudagrass	2	0.33-0.56 oz.	0.015-0.026	12	Controls nutsedge(s), annual sedges, kyllinga species, and certain broadleaf weeds in established bermudagrass putting greens. Applications should be made to actively-growing bermudagrass after 100% spring green-up. Monument is not recommended for use on creeping bentgrass. Add a nonionic surfactant at 0.25-0.5% v/v to the spray mix. Monument at rates of 0.1-0.3 oz./acre may be used as a spring transition aid for the removal of perennial ryegrass and <i>Poa trivialis</i> . Avoid mowing for 1-2 days before and after application. For nutsedge repeat the application at 4-6 weeks if regrowth is observed. DO NOT overseed bermudagrass with cool-season turfgrasses for 3 weeks after application.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURFGRASS WEED RESPONSE TO HERBICIDES

	atrazine	benefin	bensulide	dithiopyr	ethofume -sate	indaziflam	isoxaben	mesotrione	oryzalin	oxadiazon	pendimeth -alin	prodia -mine	pronamide	simazine
Time of application	PREEMERGENCE													
PERENNIAL WEEDS														
bahiagrass	F	P	P	P	P	P	P		P	P	P	P	P	P
bermudagrass	P	P	P	P	P-G	P	P	P	P	P	P	P	P	P
dallisgrass	P	P	P	P	P	P	P	P	P	P	P	P	P	P
nutsedge, purple	P	P	P	P	P	P	P	P	P	P	P	P	P	P
nutsedge, yellow	P	P	P	P	P	P	P	F	P	P	P	P	P	P
tall fescue	F	P	P	P	F	P	P	P	P	P	P	P	G	F
wild garlic/onion	P	P	P	P	P		P		P	P	P	P	P	P
ANNUAL GRASSES														
annual bluegrass	E	E	F	G	G-E	E	P	P	G	G	G	E	E	E
crabgrass	F	E	E	G-E	P	G-E	P	F	E	E	E	E	F	F
crowfootgrass		G	G		P			G	G	G	G			
goosegrass	P	F	F	F	P	G-E	P	P-F	F-G	E	F-G	G	P	P
sandbur		F	G		P		P		G	F	G			
BROADLEAF WEEDS														
carpetweed	E			G-E			G-E	E	G-E	G-E	G-E	G-E	G	G-E
chamberbitter (niruri)	G						G-E							
common chickweed	E	G	P	G		E	E	G	G	P	G	G	E	E
corn speedwell	E	E	P	G			G			G	E		G	G
cudweed	E	P					F		P	P	P		P	
dandelion	F	P	P	P		P	P		P	P	P	P	P	P
dichondra	F	P	P	P			P		P	P	P	P	P	P
docks	G	P	P	P			P		P	P	P	P	P	P
doveweed	G	P	P		P	G			P	P	P		P	G
Florida betony	E	P	P						P	P	P		P	P
ground ivy		P	P	P			P		P	P	P	P	P	P
henbit	E	G	P	G		G-E	E	G-E	G	P	G	G	P	E
hop clovers	E	P	P			G-E		G-E		G			P	E
knotweed	E		G				G		F	G				G
lespedeza	E			E		F						P		E
mallow, bristly		P	P	P			P		P	P	P	P	P	P
mock strawberry		P	P	P			P		P	P	P	P	P	P

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	atrazine	benefin	bensulide	dithiopyr	ethofume -sate	indaziflam	isoxaben	mesotrione	oryzalin	oxadiazon	pendimeth- alin	prodia -mine	pronamide	simazine
Time of application	PREEMERGENCE													
BROADLEAF WEEDS (continued)														
mouseear chickweed		E	P			G-E	G	G	P	P	G		G	
mugwort		P	P	P			P	P	P	P	P	P	P	P
mustards	E		G							E				
parsley piert	E	P	E			G	E			G	P		P	G
pennywort	F	P	P						P	P	P		P	P
plantains	G	P	P	P		G-E			P	P	P	P	P	P
purslane, common	G			G			E	G-E		G	G	G		G
spurges	E	P	P	G			E		P	P	F			G
spurweed (burweed)	E	P	P	P			G		F	P	G	P	P	E
star-of-Behlehem	P	P	P	P	P		P		P	P	P	P	P	P
VA buttonweed		P	P	P		P	P		P	P	P	P	P	P
violets		P	P	P			P		P	P	P	P	P	P
white clover	E	P	P	P		G	P	G-E	P	P	P	P	P	G
yellow woodsorrell	E	P	P	P			G		F	G	F	P	P	P

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	2,4-D	2,4-D + 2,4-DP	2,4-D+ MCP + dicamba	atrazine	amicarb -azone	bentazon	bromoxy -nil	carfentra -zone	clethodim	clopyralid	dicamba	diclofop	fenoxa -prop	flaza -sulfuron
Time of application	POSTEMERGENCE													
PERENNIAL WEEDS														
bahiagrass	P	P	P	P-F		P	P	P		P	P	P	G	
bermudagrass	P	P	P	P	P	P	P	P	G	P	P	P	F-G	P
dallisgrass	P	P	P	P	P	P	P	P		P	P	P	P	P
nutsedge, purple	F	P	P	P	P	P	P	P	P	P	P	P	P	E
nutsedge, yellow	F	P	P	P	P	G	P	P	P	P	P	P	P	E
tall fescue	P	P	P	F	P	P	P	P		P	P	P	P	G-E
wild garlic/onion	G	G	G	P		P	P	P	P	P	F	P	P	
ANNUAL GRASSES														
annual bluegrass	P	P	P	E	P	P	P	P	F	P	P	P	P	G-E
crabgrass	P	P	P	F	P	P	P	P	E	P	P	P	G-E	P-F
crowfootgrass	P	P	P	P		P	P	P	E	P	P		G-E	
goosegrass	P	P	P	P	P	P	P	P	G-E	P	P	G-E	G-E	P
sandbur	P	P	P	F		P	P	P	G	P	P	P	G	
BROADLEAF WEEDS														
carpetweed	G	G-E	G-E	G-E				G-E	P		E	P	P	
chamberbitter (niruri)	P			G		P			P	P		P	P	
common chickweed	P	G	G	E		G	P	G	P	P	E	P	P	E
corn speedwell	F	F	F	E	G	P	G	G	P		F	P	P	
cudweed	G-E	G-E	E	G			G		P	E	E	P	P	G
dandelion	E	G	G	F		P	P	G	P	F	E	P	P	E
dichondra	G	G	G	F		P	P		P		G	P	P	P
docks	F	F	G	G		P			P	G	E	P	P	
doveweed	F	F	F-G	G-E		P	P		P	P	P	P	P	
Florida betony	F	G	G	F-G		P	P	P-F	P	P	G	P	P	
ground ivy	P-F	F	F			P	P	G	P		G	P	P	
henbit	P	G	G	E	E	P	G	G	P		E	P	P	
hop clovers	F	E	G	E			F		P	E	E	P	P	E
knotweed	P	F	G	E			F		P		E	P	P	
lespedeza	P-F	G	G	E					P	P	E	P	P	
mallow, bristly	F	F-G	F-G			P			P		E	P	P	
mock strawberry	P	P	G			P			P		G	P	P	

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	2,4-D	2,4-D + 2,4-DP	2,4-D+ MCPP + dicamba	atrazine	amicarb -azone	bentazon	bromoxy -nil	carfentra -zone	clethodim	clopyralid	dicamba	diclofop	fenoxa -prop	flaza -sulfuron
Time of application	POSTEMERGENCE													
BROADLEAF WEEDS (continued)														
mouseear chickweed	P-F	G	G	G	G	P			P	P	E	P	P	
mugwort	P	F	P-F			P			P	G	P-F	P	P	
mustards	E	G	G	E		G	G		P	P	E	P	P	
parsley piert	P	P	F	E	G-E	G	G		P	P	E	P	P	G
pennywort	G	G	G	F		P	P		P		E	P	P	
plantains	E	G	G	F		P	P		P		F	P	P	F-G
purslane, common	G	G	G-E	G		G-E		F	P		G	P	P	
spurges	F	G	G	E	G-E	P	F	F	P		G	P	P	F-G
spurweed (burweed)	G	E	G	E		E	G		P	E	E	P	P	
star-of-Behlehem	P	P	P	P		P	G	G-E	P	P	P	P	P	
VA buttonweed	P	P	P			P	G		P		F	P	P	
violets	P	P-F	P-F			P			P		F	P	P	
white clover	F	G	G	E		P			P	E	E	P	P	E
yellow woodsorrell	P	P-F	F	G		P	F		P		G	P	P	

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	flumioxazolin	fluroxypyr	foramsulfuron	glyphosate	halosulfuron	imazaquin	MCPP	mesotrione	metasulfuron	metribuzin	MSMA DSMA	pronamide	rimisulfuron	sethoxydim
Time of application	POSTEMERGENCE													
PERENNIAL WEEDS														
bahiagrass		P	P	G	P	P	P	P	G-E	P	F	P	P	F
bermudagrass	P	P	P	E	P	P	P	P	P	P	P	P	P	F
dallisgrass	P	P	F*	E	P	P	P	P	P	P	F-G	P	P	P
nutsedge, purple	P	P	P	G	G-E	G	P	P	P	P	F	P	P	P
nutsedge, yellow	P	P	P	E	G-E	F-G	P	F	P	P	F	P	P	P
tall fescue		P	G-E	E	P	P-F	P	P	P	F	P	E	G	P-F
wild garlic/onion				G	P	E	P		E	P	P	P		P
ANNUAL GRASSES														
annual bluegrass	G	P	E	E	P	P-F	P	P	P	G	P	E	E	P
crabgrass		P	P	E	P	P	P	F	P	F	E	P	P	E
crowfootgrass		P	P	E	P	P	P		P	G	E	P		F-G
goosegrass		P	G	E	P	P	P	F	P	G	F	P	P	G
sandbur		P	P	E	P	F	P	P	P	G	G	P		G
BROADLEAF WEEDS														
carpetweed				E			F		P	G-E				P
chamberbitter (niruri)				E		P			G		P-F			P
common chickweed	G-E	G		E		E	G	G-E	E	G	P	G	G	P
corn speedwell	G-E			E		P	P		E	E	P	G		P
cudweed	F			G		F			E		F-G			P
dandelion	P-F	F-G		E			E	G	E		P	P		P
dichondra				E			F		P		P	P		P
docks				E	G		P	F	E		P	P		P
doveweed				G					P	F		P		P
Florida betony			E	E			G	G	G-E		P	P		P
ground ivy		G		G			F	G			P	P		P
henbit	G-E	F-G	E	E		G	G	G	G	G	P	P	G	P
hop clovers	G	G	F	E			E	G-E	P-F	G	P			P
knotweed		G	P	E			F		E	G	P			P
lespedeza				E			G		E	E	P			P
mallow, bristly									G		P	P		P
mock strawberry											P	P		P

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

*Apply as tank mix with or in a sequential program with MAMA to improve dallisgrass control.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	flumioxazolin	fluroxypyr	foramsulfuron	glyphosate	halosulfuron	imazaquin	MCPP	mesotrione	metasulfuron	metribuzin	MSMA DSMA	pronamide	rim sulfuron	seth oxydim
Time of application	POSTEMERGENCE													
BROADLEAF WEEDS (continued)														
mouseear chickweed		G		E		G	G	G-E	E	E	P	P		P
mugwort				G			P				P	P		P
mustards				E			F		F	F	P	P		P
parsley piert	F-G		P	E		G	F			E	P	P	G-E	P
pennywort				E			E		G		P	P		P
plantains	P	F-G		E			F	F	G		P	P		P
purslane, common				F			F	G-E	F-G					P
spurges				E			F	G	E	E	P		G-E	P
spurweed (burweed)			P	E		E	F	G	E	G	P	P		P
star-of-Behlehem				F		P	P		P	P	P	P		P
VA buttonweed		F		G			P		F		P	P		P
violets							P	G	G		P	P		P
white clover	P	G-E	F	F		F	E	G-E	E	F	P	P		P
yellow woodsorrell		G		E			F	G	G		G	P		P

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	simazine	sulfen -trazone	sulfo -sulfuron	thien- carbazone + foram -sulfuron + halo -sulfuron	thien- carbazone + iodo -sulfuron + dicamba	triclopyr	triclopyr + clopyralid	trifloxy- sulfuron- sodium
Time of application	POSTEMERGENCE							
PERENNIAL WEEDS								
bahiagrass	P	P	P		F	P	P	F
bermudagrass	P	P	P	P	P	P	P	P
dallisgrass	P	P	P	G	F	P	P	P-F
nutsedge, purple	P	P-F	G-E		P	P	P	E
nutsedge, yellow	P	E	G-E	E	P	P	P	E
tall fescue	F	P	G	E	P	P	P	G-E
wild garlic/onion	P	F	P-F			P		G-E
ANNUAL GRASSES								
annual bluegrass	G-E	P	F-G	G	P	P	P	E
crabgrass	P	P	P	F-G	P	P	P	P-F
crowfootgrass	P	P			P	P	P	P
goosegrass	P	P	P	G-E	P	P	P	P
sandbur	P	P				P	P	P
BROADLEAF WEEDS								
carpetweed		G				G	P	F-G
chamberbitter (niruri)								
common chickweed	E	G	E		E	E	E	
corn speedwell	E	G	E		E	G	P	
cudweed					G-E	F	G-E	
dandelion	P	P	P		G-E	G	E	E
dichondra	P		P			F-G	E	E
docks	P		P		G	F-G	E	
doveweed	P		F	F-G	F	F	P	
Florida betony	P		P			G	G	E
ground ivy	P		P			G	G-E	F-G
henbit	E	P	E		E	E	E	E
hop clovers	E	P	E		E	E	E	G
knotweed		P				F		
lespedeza		P		P	F	G	E	
mallow, bristly	P	P	P			G		P
mock strawberry	P	P	P					

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS WEED RESPONSE TO HERBICIDES (continued)

	simazine	sulfen -trazone	sulfo -sulfuron	thien- carbazon + foram -sulfuron + halo -sulfuron	thien- carbazon + iodo -sulfuron + dicamba	triclopyr	triclopyr + clopyralid	trifloxy- sulfuron- sodium
Time of application	POSTEMERGENCE							
BROADLEAF WEEDS (continued)								
mouseear chickweed	P	P	P		G-E	G	E	
mugwort	P	P	P			P-F		
mustards	G	P	G			F		
parsley piert	E	P	E		G	E		G-E
pennywort	P	P	P			F	E	G
plantains	P	P	P		G-E	F	E	P
purslane, common	P	P	P		G	G		
spurges		P				F	F-G	E
spurweed (burweed)	E	P	E			F	E	E
star-of-Behlehem	P	P	P			P	P	
VA buttonweed	P	P	P	F-G	G-E	F	F	F-G
violets	P	P	P			F-G	F-G	G
white clover	P	P	P		E	F-G	E	G
yellow woodsorrell	P	P	P			F	F-G	E

Key to response symbols: E – Excellent control (0 to 100%), G = Good control (80 to 89%), F = Fair Control (70 to 79%), P = Poor control (<70%)

A blank space indicated weed response is not known.

TURFGRASS TOLERANCE TO PREEMERGENCE HERBICIDES								
	Bahiagrass	Bermudagrass	Centipedegrass	Kentucky Bluegrass	St. Augustinegrass	Seashore Paspalum	Tall Fescue	Zoysiagrass
PREEMERGENCE								
atrazine	NR	D	T	NR	T	NR	NR	I-T
benefin	T	T	T	T	T	NR	T	T
benefin + oryzalin	T	T	T	NR	T	NR-I	T	T
benefin + trifluralin	T	T	T	T	T	NR-T	T	T
bensulide	T	T	T	T	T	NR-T	T	T
bensulide + oxadiazon	NR	T	NR	T	NR	NR	T	T
dithiopyr	T	T	T	T	T	T	T	T
fenarimol	-	T	-	-	-	-	-	-
isoxaben	T	T	T	T	T	NR	T	T
mesotrione	NR	NR	T	T	I	NR	T	NR
metolachlor	T	T	T	NR	T	NR	NR	T
oryzalin	T	T	T	NR	T	NR-I	T	T
oxadiazon	T	T	NR	T	T	T	T	T
oxadiazon + benefin	NR	T	T	T	T	NR	T	T
pendimethalin	T	T	T	T	T	NR-T	T	T
prodiamine	T	T	T	T	T	T	T	T
pronamide	NR	T	T	NR	T	NR-T	NR	T
simazine	NR	I-T	T	NR	T	NR	NR	T
sulfentrazone + prodiamine	T	T	T	T	NR	T	T	T
T = tolerant; I=intermediate tolerance, use low rates; D = dormant use; NR = not registered for use; S = sensitive								

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations

TURFGRASS TOLERANCE TO POSTEMERGENCE HERBICIDES								
	Bahiagrass	Bermudagrass	Centipedegrass	Kentucky Bluegrass	St. Augustinegrass	Seashore Paspalum	Tall Fescue	Zoysiagrass
POSTEMERGENCE								
amicarbazone	T	T	T	I	T	T	I-T	T
atrazine	NR-I	D	T	NR-S	T	NR-I	NR-S	I-T
bentazon	T	T	T	T	T	NR-T	T	T
bromoxynil	T	T	T	T	T	NR-T	T	T
2,4 -D	I-T	T	S-I	T	S-I	I-T	T	T
2,4 - D + dicamba	T	T	I	T	S-I	I-T	T	T
2,4 - D + MCPP	T	T	I	T	S-I	I-T	T	T
2,4 - D + triclopyr	NR	NR-S	NR-S	T	NR-S	NR	T	NR
2,4 - D + MCPP + dicamba	I-T	I-T	S-I	T	S-I	I-T	T	T
carfentrazone	T	T	T	T	T	T	T	T
clopyralid	T	T	T	T	T	NR-T	T	T
clopyralid + triclopyr	I	I	T	T	S	NR	T	T
dicamba	T	T	I-T	T	S-I	T	T	T
diclofop-methyl	NR	T	NR	NR	NR	NR	NR	NR
DSMA/MSMA	S	T	S	I-T	S	S	I-T	I
ethofumesate	NR	I	NR	NR	NR	NR	T	NR
fenoxaprop	NR	NR-S	NR-S	T	NR-S	NR-S	T	T
fluazifop	NR	S	S	-	S	S	T	T
foramsulfuron	NR	T	NR-S	NR-S	NR-S	NR-I	NR-S	I
glyphosate	S	D	S	S	S	S	S	S
halosulfuron	T	T	T	T	T	NR-T	T	T
imazaquin	S	I-T	T	S	T	NR-S	S	T
MCPP	T	T	I-T	T	S-I	T	T	T
mesotrione	NR	NR-S	T	T	I	NR	T	NR-S
metribuzin	NR-S	I-T	NR-S	NR-S	NR-S	NR-I	NR-S	NR-S

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURFGRASS TOLERANCE TO POSTEMERGENCE HERBICIDES (cont.)								
	Bahiagrass	Bermudagrass	Centipedegrass	Kentucky Bluegrass	St. Augustinegrass	Seashore Paspalum	Tall Fescue	Zoysiagrass
metsulfuron	S	T	I	I	T	NR-T	S-I	T
fluroxypyr	-	I	I	T	I	NR	T	I
pronamide	NR	T	T	S	T	NR-T	S	T
rimsulfuron	NR	T	T	NR-S	NR	NR	NR-S	T
quinclorac	NR-S	I-T	NR-S	T	NR-S	T	T	T
sethoxydim	NR-S	NR-S	T	NR-S	NR-S	NR-S	NR-S	NR-S
sulfosulfuron	NR-T	T	T	NR	T	NR	NR-S	T
sulfentrazone	T	T	T	T	NR-I	T	T	I
trifloxysulfuron-sodium	NR	T	NR	NR	NR	NR	NR-S	T
T = tolerant; I=intermediate tolerance, use low rates; D = dormant use; NR = not registered for use; S = sensitive								

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

Using Integrated Weed Management Strategies in Turfgrasses

Patrick E. McCullough, Extension Weed Scientist

Successfully managing weeds in Turfgrasses incorporates the contributions from preventive, cultural, mechanical and chemical control methods into an integrated weed management (IWM) strategy. An IWM strategy consists of the following components:

1) Scout the site and identify the problem weed(s).

The various weed species that may infest a site respond differently to herbicides and other types of control methods. Since certain weed species infest a particular site only during certain times of the year, scouting should be periodically conducted. At a minimum, sites should be scouted at least twice per year. In the South, scouting for winter annuals should be done in the mid-winter months (December – early February). At this time of year, winter annuals are small and can be easily controlled with Postemergence herbicides. Scouting should also be conducted during the late April to July time frame so that control practices can be implemented for summer annual weeds. Scouting is also advisable in the late summer and fall to assess the effectiveness of the summer weed control program, and in late spring to assess the effectiveness of the winter weed program. Information obtained at these times of year will be invaluable data in developing future weed management strategies.

Scouting is not a difficult process. However, accurate records must be kept so that correct weed management decisions can be made. The scout should divide the area into some type of management unit. In the case of home landscapes this could be the front lawn and back lawn. If possible, a representative map should be drawn of the areas for future reference. On larger, commercial properties it may be advisable to categorize the different types of landscaped areas by the original landscape design plan. Each management unit should then be scouted by walking or riding over the area. Typically a zigzag pattern is utilized with random stops along the way. At each stop, the weed species present and density should be recorded. Density can be recorded as low (1 to 10%), medium (11 to 20%), or high (>20%). In certain pest control disciplines, such as entomology, threshold population values are established for some of the major insect pests. If the population value exceeds and amount that research has shown to cause an unacceptable level of damage, then an insecticide is utilized. Weed thresholds have not been established for Turfgrass and landscape ornamentals primarily since a weed density of X% may be acceptable to some clientele on certain types of sites, but the same density level would be totally unacceptable on other types of sites. For example, a light weed infestations may be acceptable in a home lawn, but the same infestation level would be unacceptable on a golf course putting green. Thus, establishing a weed threshold is site dependent and requires that the clientele that use or view the site establish a threshold level in concert with the Turfgrass or landscape site manager.

2) Know the life cycle of the weeds that infest a site.

Once the weeds have been identified, determine their life cycle. Identification references usually list the life cycle of the weed. If the weed is annual it may be possible to identify a preemergence herbicide that can be used for control.

3) Record observations as to any site or management problems.

This may include items such as thin turfgrass areas caused by disease or insects, drainage problems, drought, incorrect mowing height or frequency, a non-adapted turfgrass species, compacted soils, shade, insufficient mulch cover, and mechanical damage to plants. Weeds are often indicators of certain soil, management, and environmental problems. For example, the presence of sedges (perennial ryegrass, purple nutsedge, annual sedges) may indicate that the site may be excessively wet – either from over application of irrigation water or poor soil drainage. Conversely, the presence of drought tolerant weeds such as pink purslane, annual lespedeza and goosegrass may indicate that supplemental irrigation is needed. Certain weed species such as annual bluegrass, prostrate knot weed and broadleaf plantain thrive in compacted soils. Mowing below the recommended mowing height will favor the growth of weeds such as annual bluegrass, common chickweed, crabgrass and dandelion. A high population of weeds in densely shaded areas may indicate that there is not enough sunlight for turfgrass. Attention to correcting these problems will enable the turfgrass or ornamental plant to properly grow in and compete with weeds.

4) Develop an appropriate control program for the target, problem weeds.

After the weeds and populations have been recorded, a control program should be developed. This control program should utilize the relative contributions that can be made from preventative, cultural, mechanical and chemical methods. For example, if moisture-loving weeds are present, soil drainage problems or excessive irrigation applications should be corrected as part of an IWM plan that also utilizes labeled herbicides. Evaluation of the success of this two-phase program should be conducted at various times intervals following the initiation of the IWM plan.

IWM strategies can be successfully be used as part of the overall management plan for turfgrasses and landscape ornamentals. IWM does not mean eliminating herbicide use in the landscape. In fact, herbicide use may actually increase in the first few years as the scouting program identifies additional problem weeds areas. However if good preventative, cultural and mechanical practices are utilized over the time the total quantity of herbicides used should decrease.

Herbicide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
2,4-D	Weedar 64	Nufarm	Y	Y	Y		
2,4-D + clopyralid + dicamba	Millennium Ultra	Nufarm	Y			Y	Y
2,4-D + fluroxypyr + dicamba	Escalade	Nufarm	Y	Y	Y	Y	Y
2,4-D + triclopyr	Turfлон II Amine	Nufarm	Y		Y		Y
2,4-D + MCPP + 2,4-DP	Triamine	Nufarm	Y	Y	Y	Y	
2,4-D + MCPP + dicamba	Three-Way	Lesco	Y				Y
2,4-D + MCPP + dicamba	Trex-San						
2,4-D + MCPP + dicamba	Triplet	Nufarm	Y				
amicarbazon	Xonerate	Arysta LifeScience	Y	Y	Y	Y	Y
aminocyclopyrachlor	Imprelis 2L						
atrazine	Aatrex 4L	Syngenta		Y	Y	Y	Y
atrazine	Aatrex 90DG	Syngenta	Y	Y		Y	Y
benefin	Balan 2.5G	UHS	Y			Y	
benefin + oryzalin	XL 2G	Setre Chemical	Y				
benefin + trifluralin	Team 2G	UHS	Y	Y		Y	
benefin + trifluralin	Team Pro 0.86G	UHS	Y				
bensulide	Bensumec 4LF	Gordon's		N	N	Y	
bensulide	Pre-San 7G	Gordon's	Y				
bentazon	Lescogran	Lesco	Y				
bentazon	Basagran T/O	BASF		N			
bispyribac – sodium	Velocity 80SP	Valent	Y	Y			Y
bromoxylbil	Buctril	Bayer	Y		Y		Y
carfentrazone	Aim EC	FMC	Y				Y
carfentrazone	Aim EW	FMC	Y				Y
carfentrazone	Quicksilver	FMC	Y	Y	Y	Y	
carfentrazone	Quicksilver EW	FMC					
carfentrazone + 2,4-D + MCPP + dicamba	Speedzone	Gordon's	Y				
carfentrazone + 2,4-D + MCPP + dicamba	Speedzone – Southern	Gordon's	Y	Y	Y	Y	Y
chlorsulfuron	Corsair 75DF	Nufarm	Y				Y
clethodim	Envoy	Valent		Y			Y
clopyralid	Lontrel	Dow Agro Sciences	Y	N	Y	N	Y
diclofop	Illoxan 3EC	Bayer		Y	N	N	N
diglycolamine	Vanquish	Syngenta	Y	Y			
diquat	Reward	Syngenta	Y				N
dithiopyr	Dimension 1EC	Dow Agro Sciences	Y	Y	Y	Y	Y
dithiopyr	Dimension Ultra 40%WP	Dow Agro Sciences	Y	Y	Y	Y	Y
ethofumesate	Prograss 1.5EC	Bayer	Y		Y	Y	Y
fenoxaprop	Acclaim Extra	Bayer	Y		Y	Y	Y
flazasulfuron	Katana						
fluazifop	Fusilade II	Syngenta	Y	Y	Y	Y	Y
fenoxypyr	Spotlight	Dow Agro Sciences	Y	Y	Y	Y	Y
foramsulfuron	Revolver	Bayer	Y	Y	Y	Y	Y

Recommended site usages were from label of each product. Some labels listed a general “Turfgrass” use and specific site uses; other site uses were prohibited (e.g. “do not use”). A “Y” indicates specific mention on the label, an “N” indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

Herbicide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
glufosinate	Finale	Bayer		Y	Y	Y	
glyphosate	Roundup Pro	Monsanto	Y	Y	Y	Y	Y
halosulfuron	Sedgehammer 75DF	Gowan	Y	Y	Y	Y	Y
imazaquin	Image 70DF	BASF	Y	Y	Y	Y	
indaziflam	Specticle 20 WSP	Bayer	Y	Y	Y	Y	Y
isoxaben	Gallery 75DF	Dow Agro Sciences	Y				
MCPA + MCPP + 2,4-DP	Triamine II	Nufarm	Y	Y	Y	Y	N
MCPA + MCPP + dicamba	Trimec Encore	Gordon's	Y	Y		Y	Y
MCPA + MCPP + dicamba	Tri-Power	Nufarm	Y	Y	Y	Y	N
MCPA + triclopyr + dicamba	Cool Power	Nufarm	Y	Y	Y	Y	Y
MCPA + triclopyr + dicamba	Horsepower	Nufarm	Y	Y	Y	Y	N
MCPP + 2,4-D + dicamba	Trimec Bentgrass	Gordon's	Y			Y	
MCPP + 2,4-D + dicamba	Trimec Southern	Gordon's	Y				
mecoprop	MCPP-4 Amine	Nufarm	Y	Y		Y	
mecoprop + carfentrazone + MCPA + dicamba	Powerzone	Gordon's	Y				
merotrine	Tenacity	Syngenta		Y			Y
metolachlor	Pennant Magnum	Syngenta	Y	Y	Y		Y
metribuzin	Sencor 75 Turf	Bayer	Y	Y	Y		
metsulfuron	Blade 60DF	Gordon's	Y	Y	Y	Y	Y
metsulfuron	Manor 60DF	Nufarm	Y	Y	Y	Y	Y
oryzalin	Surflan 4AS	UPI	Y				
MSMA	MSMA			Y	Y	Y	Y
oxadiazon	Oxadiazon 50WSB	Quali-Pro	Y	Y	Y	Y	
oxadiazon	Oxadiazon 2G	Quali-Pro			Y	N	
oxadiazon	Ronstar 50WSP	Bayer		Y	Y		
oxadiazon	Ronstar G	Bayer		Y	Y	N	
oxadiazon + prodiamine	Regalstar G	Regal Chemical	Y	Y			
oxadiazon + prodiamine	Regalstar II	Regal Chemical	Y	Y			
pendimethalin	Pendulum 2G	BASF	Y	Y	Y	Y	Y
pendimethalin	Pendulum 3.3 EC	BASF	Y	Y	Y	Y	Y
pendimethalin	Pendulum Aquacap 3.8CS	BASF	Y	Y	Y	Y	Y
prodiamine	Barricade 4L	Syngenta	Y			Y	Y
prodiamine	Barricade 65WDG	Syngenta	Y			Y	Y
prodiamine	Cavalcade 65WDG	Sipcam Agro	Y			Y	Y
prodiamine	ProClipse 65 WDG	Nufarm	Y			Y	Y
prodiamine	RegalKade 37	Regal Chemical	Y			Y	
prodiamine	RegalKade 50	Regal Chemical	Y			Y	
prodiamine	RegalKade G	Regal Chemical	Y				
prodiamine	StoneWall 65WDG	Lesco	Y	Y			Y
pronamide	Kerb T/O 50WSP	Dow Agro Sciences	Y	Y	Y		Y

Recommended site usages were from label of each product. Some labels listed a general "Turfgrass" use and specific site uses; other site uses were prohibited (e.g. "do not use"). A "Y" indicates specific mention on the label, an "N" indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

Herbicide Recommended Site Usage

Active Ingredient	Product Name	Company Name	Turfgrasses	Golf	Municipal	Residential	Sod
quinclorac	Drive 75DF	BASF	Y	Y	Y	Y	Y
rimsulfuron	TranXit GTA 25DF	Dupont	Y	Y	Y	Y	Y
sethoxydim	Segment	BASF	Y		Y		
siduron	Tupersan 50WP	Gordon's	Y				
simazine	Princep 90DF	Syngenta	Y	Y	Y	Y	Y
simazine	Princep Liquid 4L	Syngenta	Y				
simazine	Wynstar 90DF	Regal Chemical	Y	Y	Y	Y	Y
sulfentrazone	Dismiss 4.0SC	FMC	Y	Y	Y	Y	Y
sulfentrazone + 2,4-D + MCPP + dicamba	Surge	Gordon's	Y	Y	Y	Y	Y
sulfentrazone + prodiamine	Echelon 4SC	FMC	Y	Y	Y		Y
sulfentrazone + quinclorac + dicamba	Q4						
sulfentrazone + quinclorac + dicamba	Q4 Plus						
sulfosulfuron	Certainty 75DF	Monsanto	Y	Y	Y	Y	Y
thiencarbazon + iodosulfuron + dicamba	Celsius 68 WG						
triclopyr	Turflon E	Dow Agro Sciences		N			Y
triclopyr + clopyralid	Confront	Dow Agro Sciences	Y			N	N
trifloxysulfuron	Monument 75WG	Syngenta	Y	Y	Y	N	Y

Recommended site usages were from label of each product. Some labels listed a general "Turfgrass" use and specific site uses; other site uses were prohibited (e.g. "do not use"). A "Y" indicates specific mention on the label, an "N" indicates not labeled for that site, and a blank means the site was not mentioned. Labels change, so read and follow label recommendations.

Turfgrass Growth Regulators For Professional Managers

Patrick E. McCullough, Extension Weed Scientist

Chemical	Turfgrasses	Broadcast Rate/Acre		REI	Remarks and Precautions
		Amount of Formulation	Pounds Active Ingredient		
flurprimidol (Cutless) 50W	bermudagrass, (Tif 419, 328 and common), zoysiagrass	See label.	See label.	See Label	Cutless may be used on medium to high quality, well maintained turfgrasses. Refer to label for rates for different bermudagrass cultivars and zoysiagrass. Apply after full spring green-up (usually mid-May to mid-June) for the first application. An additional application may be made in the late summer to bermudagrasses only. Treated areas should receive 0.5 inches of rainfall or irrigation within 24 hours of application. Make uniform application with a boom-type sprayer and avoid overlaps.
flurprimidol (Cutless) 50W	bentgrass putting greens	0.25 - 0.5 lbs.	0.125 - 0.25	See Label	Apply to actively growing bentgrass putting greens to suppress annual bluegrass. Apply in the spring after 3 to 4 mowings or in the fall. If necessary, repeat the application at 3 to 6 week intervals. DO NOT exceed 2.0 lbs. ai/acre per growing season. Make the final fall application 8 weeks before the onset of winter dormancy. Delay reseeding for 2 weeks after application.
flurprimidol + trinexapac-ethyl (Legacy) 1.1 + 0.41 lb/gal	bentgrass, KY bluegrass, perennial ryegrass, bermudagrass, seashore paspalum, zoysiagrass	See Label	See Label	See Label	Controls annual grasses and selected broadleaf weeds. DO NOT apply to newly sprigged grasses until well established. DO NOT apply to golf course greens. DO NOT make a spring application to fall planted turfgrasses. Delay reseeding for 6 weeks (low rate) and for 12-16 weeks (high rate) after application.
maleic hydrazide (Retard) 2.25 lb./gal.	bahiagrass, Ky. bluegrass, Tall fescue, Common bermudagrass	1.3 gal.	3.0	See Label	Flurprimidol + trineapac-ethyl (Legacy) can be applied to actively growing turf for clipping management and annual bluegrass suppression. Apply Legacy for annual bluegrass suppression in fairway height bentgrass at 8 to 15 Fl. Oz./acre in early spring upon active turfgrass growth. Repeat applications of 8 to 20 Fl. Oz./acre of Legacy should be made at 3 to 6 week intervals until late summer or early fall. Apply 15 to 25 Fl. Oz./acre for annual bluegrass suppression in Kentucky bluegrass and perennial ryegrass mixtures mowed at fairway heights. Reduced rates of Legacy should be considered in bentgrass fairways with high populations of annual bluegrass or when temporary annual bluegrass discolorations cannot be tolerated. For both warm and cool-season grasses, applications should be discontinued a minimum of 4 weeks before the onset of inactive growth or winter dormancy.
mefluidide (Embark) 2S	Ky. bluegrass, centipede, tall fescue, common bermudagrass	1.5 - 4.0 pts.	0.38 - 1.0	See Label	Use the low rate on Ky. bluegrass, centipede and tall fescue. Use the high rate on common bermudagrass. Mowing 3 weeks after application to centipede will extend the period of seedhead suppression. Apply after uniform spring green-up but prior to seedhead emergence. Suppresses vegetative and seedhead development. Recommended for turf grasses on difficult-to-mow sites. Not recommended for turfgrasses when maintained under intensive management systems. DO NOT mow two days prior to or after application. Remove clippings prior to application. The addition of a nonionic surfactant (0.25% v/v) may enhance suppression; however, temporary discoloration may increase. DO NOT apply within 4 growing months of seeding or reseed within 3 days of an application. Embark requires an 8-hour rain-free period for optimum activity.
paclobutrazol (Trimmit) 2SC	hybrid bermudagrass, St. Augustinegrass	See Label	See Label	12	Recommended for hybrid bermudagrass golf course fairways, tees and roughs, and St. Augustinegrass. Apply in spring after uniform green-up. Do not seed within 6 weeks prior to or 2 weeks after application. Do not aerify or drag greens with steel mats while under growth regulation effects. Not recommended for use on common bermudagrass. DO NOT sprig within 4 weeks of application. On newly sprigged or sodded turf delay application until the sod has firmly rooted or sprigs have achieved complete soil coverage.
paclobutrazol (Trimmit) 2SC	bentgrass and bermudagrass putting greens	6.4 - 16.0 fl. ozs.	0.1 - 0.25	See Label	Used on creeping bentgrass greens to suppress annual bluegrass. Apply in the spring at least one month before the onset of high air temperatures. Repeat applications can be made at 4 to 6 week intervals. For late summer and early fall applications, apply Trimmit at least one month before hard frost. Do not use on bermudagrass greens except for winter overseeding enhancement (see Label).

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

TURF GROWTH REGULATORS (continued)					
Chemical	Turfgrasses	Broadcast Rate/Acre		REI	Remarks and Precautions
		Amount of Formulation	Pounds Active Ingredient		
prohexadione-Ca (Anuew) 27.5%	Ky. bluegrass, bermudagrass, bentgrass, perennial ryegrass	1.8-44 oz.	0.031-0.76 lb.	See Label	Apply to actively growing turfgrasses for growth regulation and clipping management. Anuew is absorbed by turfgrass foliage and is rainfast within 1 hour. Use of a non-ionic surfactant may improve spray coverage of the turf foliage to maximize efficacy. DO NOT apply more than 26 oz. per 1000ft ² per year.
trinexapac-ethyl (Governor) 1 MC (Primo) 1 MC (Primo) 25 WSB (T-Nex) 1 AQ	bahiagrass, Ky. Bluegrass, bermudagrass, centipedegrass, tall fescue, St. Augustinegrass, zoysiagrass bentgrass putting greens, bermudagrass putting greens	See Label.	See Label.	See Label	Apply to actively-growing turfgrasses. The rate of application is dependent upon turfgrass species and desired length of growth suppression. Refer to the Primo label for additional information. Repeat applications may be made as soon as the treated turfgrass resumes growth. Primo is foliage-absorbed and is rainfast within one hour of application. Primo does not require the addition of a surfactant. Primo may cause temporary yellowing (about one week). Primo is labeled for use on home lawns, commercial lawns, golf courses, golf course putting greens, sod farms, athletic fields, cemeteries and other similar areas. Additionally, Primo may be applied to bermudagrass to enhance establishment of cool-season turfgrasses (overseeding). Apply Primo before verticutting, scalping, spiking or other similar operations. Apply Primo 1 to 5 days before overseeding. Primo may also be used for growth regulation of grasses around monuments and structural materials. At normal dilution rates, Primo does not stain brass, bronze, concrete, marble, granite and other types of stone.
trinexapac-ethyl 0.11lb/gal + flurrimidol 0.44 lb/gal + paclobutrazol 0.44 lb/gal	Ky. bluegrass, bermudagrass, bentgrass putting greens, perennial ryegrass	18-40 oz.	0.015-0.034 + 0.062-0.14 + 0.062-0.14	See Label	Apply to actively growing turfgrass for growth regulation and annual bluegrass suppression. DO NOT apply to residential lawns. DO NOT apply to bermudagrass golf greens or overseed putting greens. DO NOT apply to saturated soils or areas where annual bluegrass is desired turfgrass. DO NOT exceed 580 fl. oz./acre per year. DO NOT apply for commercial sod or seed production.

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user's responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

The ABC's of Pesticide Formulations

Clint Waltz – Extension Agronomist, and Alfredo Martinez – Extension Pathologist

Pesticides are not sold as pure chemical or active ingredient; it is the active ingredient which is responsible for controlling the unwanted pest. Instead, active ingredients are combined or mixed with other materials such as solvents, diluents, or adjuvants. The final product containing the active ingredient and the added materials is called a **formulation**. It is the one, two, and sometimes three capital letters in a pesticide's name that indicates the type of formulation. For example, Barricade 65**WG**, the WG indicates the product is formulated as a water dispersible granule.

Pesticides can be formulated in many ways, but the purposes for formulations are to increase pesticide activity, improve uniform application, extend the stability of the active ingredient, provide a longer shelf-life, convenient packaging, and improve user safety. Some pesticides may be sold as different formulations, so it is important to understand the formulation of the pesticide you are using and mix it correctly. There have been cases where pesticides were misapplied because the applicator did not understand the differences in formulation, a lack of pest control and an increased cost of application was the result. There are many formulations which you may encounter but the most common are described below, notice they are listed in proper mixing order from first to last.

Code	Term	Description
WP	Wettable Powder	A powder formulation to be applied after mixing with water. Wettable powders do not dissolve in water; instead they form a suspension and require constant agitation to prevent settling.
WG or WDG	Water Dispersible Granules	A formulation to be applied after mixing with water. Water Dispersible Granules do not dissolve in water; instead they form a suspension and require constant agitation to prevent settling.
F, AS, or L	Flowable, Aqueous Suspension, or Liquid	A formulation to be applied after mixing with water. These formulations are commonly very thick (not easily poured) and do not dissolve in water. Instead they form a suspension and require constant agitation to prevent settling.
E or EC	Emulsifiable Concentrate	A liquid formulation to be applied after mixing in water. Emulsifiable Concentrates form emulsions in water and require mild agitation to keep the pesticide uniformly mixed.
SP or WSP	Water-soluble Powder	A powder formulation which dissolves in water to form a solution. Once mixed, a solution of water and water-soluble powder does not require agitation.
S or SL	Water-soluble Liquid	A liquid formulation to be applied after mixing in water. Once mixed, a solution of water and water-soluble liquid does not require agitation.
G	Granular	A formulation applied as a dry material (not mixed in water). Granulars can be applied with rotary or drop spreaders.

Proper Order for Tank Mixing

Clint Waltz – Extension Agronomist, and Alfredo Martinez – Extension Pathologist

For the sake of time, it is common for various pesticides and fertilizers to be tank mixed. Proper mixing of these materials is important to ensure uniform coverage and effective pest control. Improper mixing can cost more money than it saves when the spray tank becomes clogged and requires dismantling of the entire spray rig for a complete cleaning.

Reading the pesticide label can provide information on compatibility of some pesticides, however, it is impossible to test the compatibility of all combinations. Therefore, a simple compatibility test where the mixed materials are combined in a small (1 quart or 1 liter) container at intended rates prior to needed use can give a quick indication of how the materials will behave in a spray tank. Also, when mixing compatible pesticides of different formulations (more on formulations in the next issue of Tech Center) there is a general mixing order that minimizes the likelihood of pesticides inter-reacting with each other. From mixing first to last, mix:

Wettable Powders • Dispersible Granules • Flowables • Emulsifiable Concentrates • Solutions

- The mixture should be agitated after each addition.

Reminders for proper tank mixing:

- Familiarize yourself with the adjustments specific to your sprayer, not all sprayers operate
- the same and are adjusted differently
- Be sure the sprayer is parked on a level surface
- Know the exact tank volume
- Mark the tank volumes where they can easily be read
- Calibrate the sprayer
- Choose a formulation that best meets the need of a particular application
- Read the label and be aware of mixing precautions and personal protection equipment
- Mix only what is needed for that day
- Fill half the tank with clean water, **never** add concentrated chemicals to an empty tank
- Start the agitation before adding any chemicals
- To avoid back-siphoning of chemicals, there should be no direct connection between the water source and the sprayer tank
- Properly measure and add the chemicals to the tank.
- If using different formulations, follow the mixing order above
- Sometimes it is easier to premix the chemicals into a slurry before adding to the tank
- Rinse any mixing containers and pour the rinsate into the tank
- Fill the tank to its final volume, avoid over-filling the tank
- Properly dispose of all empty pesticide containers
- Properly clean-up and dispose of any spilled chemical or pesticide solution
- Apply the pesticide according to labeled directions

Six Easy Steps for Success with Preemergence Herbicides

Clint Waltz – Extension Agronomist, and Alfredo Martinez – Extension Pathologist

1. Apply the product at the recommended time and rate.

Weather varies from year to year and it may be necessary to apply earlier than normal. Reference to 30 day weather forecasts can help with this decision.

2. Apply the product before rain is expected or water it in with 2 inch of irrigation water.

Poor weed control can occur because of the lack of rain or an irrigation event within 7 days of preemergence application. Additionally, irrigating-in the herbicide is an excellent method to prevent losses due to volatility and lateral herbicide leaching. Turfgrass preemergence herbicides essentially do not leach beyond a depth of 2 to 3 inches due to binding to soil colloids and organic matter. But they can move laterally, particularly if heavy rainfall occurs shortly after application. Thus, irrigation will usually improve weed control and will help to prevent lateral movement.

3. Calibrate all application equipment.

Uniform application is critical to achieving good weed control.

4. If fertilizer/herbicide formulations are to be used, select a product that has uniform particle size and a sufficient number of particles that will ensure even, uniform application.

Also, be sure that the herbicide load is sufficient to apply the recommended rate of the product. There is good data that indicates that dithiopyr rates can be reduced if applied on a dry granular carrier. However, with most other preemergence herbicides the amount of active ingredient applied per acre should be the same either for sprayable or dry formulations.

5. Delay mowing until after a rainfall or irrigation event.

Studies have shown that mowing and bagging operations can remove significant quantities of a preemergence herbicide if conducted before the herbicide is moved into the soil by rain or irrigation water.

6. Properly maintain the turfgrass.

Following recommended cultural practices that promote normal turfgrass growth and development will enable the turfgrass to compete with weeds. The first line of defense against weed infestations has been, and probably always will be, a thick, healthy, properly maintained turfgrass. Adherence to recommended soil fertility and pH levels, proper irrigation, controlling other pests, and mowing at the correct height and frequency will improve the effectiveness of most chemical weed control programs. The use of herbicides in the absence of proper turfgrass maintenance practices may provide weed control but the eventual goal of a high quality, aesthetically appealing turfgrass will not be achieved.

Clearing-up Questions Regarding Spray Adjuvants

Clint Waltz – Extension Agronomist, and Alfredo Martinez – Extension Pathologist

To increase the effectiveness of pesticides, materials, called adjuvants, which have no pesticidal activity are sometimes added to spray mixtures. Because adjuvants effect factors such as spray particle size, spray pattern, and drift, these materials aid in increasing pesticide activity which through improved control can reduce environmental exposure.

Adjuvant Type	Description
Spreaders	By decreasing the surface tension of a spray droplet, spreaders increase the area a volume of spray will cover and improves the contact between the pesticide and the plant surface. All types of pesticides (fungicides, herbicides, and insecticides) generally benefit from the addition of a spreader, which is usually included in the formulation by the manufacturer.
Stickers	The oily consistency of stickers increases the adhesive properties of the spray solution. This improves pest control by prolonging the time the spray remains in contact with the leaf. The formulation of many contact fungicides and insecticides are sold with a spray sticker included.
Spreader-stickers	These adjuvants are combinations of spreaders and stickers. These are important additives for materials that serve as plant protectants, such as fungicides and insecticides.
Wetting Agent	They work by relieving the surface tension between the spray droplet and the waxy surface of a leaf. There are three types of wetting agents; anionic, cationic, and nonionic. Anionic and cationic agents are seldom used to control turfgrass pests. Nonionic wetting agents are more commonly used, especially with systemic herbicides, where the nonionic agent assists the herbicide to penetrate a weeds waxy leaf surface.
Crop Oils	These are light oils combined with another adjuvant which increase pesticide adsorption into leaves. An additional benefit of crop oils is that they slow down drying time which also increases plant adsorption of the pesticide. These oils are generally nontoxic to the plant.
Buffering / Acidifying Agent	These materials are added to spray mixtures to adjust the pH of the spray solution. A pH above 7.5 can reduce the efficacy of many pesticides. A buffering or acidifying agent is added to prolong a pesticide's activity by maintaining the spray solution within a pH range of 5 to 7.
Drift Control Agent	These adjuvants are added to spray mixtures to coagulate spray droplets into larger droplets which are less likely to drift. These agents are of particular use when a pesticide must be applied during windy conditions.

When deciding to use an adjuvant, always consult the pesticide label.



Date: _____

Reason for Contact: _____

SITE EVALUATION

TURFGRASS		OTHER WEEDS		MOWING - IRRIGATION		RECOMMENDED MOWING HEIGHT	
<div><div><div>_____Bermudagrass (common)</div><div>_____Bermudagrass (hybrid)</div><div>_____Centipedegrass</div><div>_____St. Augustinegrass</div><div>_____Tall Fescue</div><div>_____Zoysiagrass</div></div></div>		<div><div><div>_____Nutsedge</div><div>_____Wild garlic/onion</div></div></div>		<div><div><div>Mowing</div><div><div>_____Good</div><div>_____Too Short</div><div>_____Too High</div><div>_____Dull Blade</div></div></div><div><div>Irrigation</div><div><div>_____Good</div><div>_____Needs Water</div><div>_____Too Much</div></div></div></div>		<div><div><div>Cut at _____Inches</div></div><div><div>SITE AREA</div></div><div><div>_____Acres</div></div></div>	
GRASSY WEEDS		DISEASE		LIME HISTORY			
<div><div><div>_____None</div><div>_____Bahiagrass</div><div>_____Bermudagrass</div><div>_____Crabgrass</div><div>_____Crowfoot</div><div>_____Dallisgrass</div></div><div><div>_____Goosegrass</div><div>_____Orchardgrass</div><div>_____Sandbur</div><div>_____Smutgrass</div><div>_____Tall Fescue</div></div></div> <div>Other _____</div>		<div><div><div>_____Brown Patch</div><div>_____Dollar Spot</div><div>_____Fairy Ring</div><div>_____Gray Leaf Spot</div><div>_____Helminthosporium (leafspot/melt out)</div><div>_____Mushrooms</div></div><div><div>_____Pythium</div><div>_____Rust</div><div>_____Slime Mold</div><div>_____Spring Dead Spot</div><div>_____Yellow Patch</div><div>_____Powdery Mildew</div></div></div> <div>Other _____</div>		<div><div><div>_____Unknown</div><div>_____Pounds applied in past 3 years</div><div>_____Not Applicable</div></div><div><div>SOIL TYPE</div></div><div><div>_____Clay _____Loam _____Sand</div></div></div>			
BROADLEAF WEEDS		INSECTS		PREVIOUS MANAGEMENT PRACTICES			
<div><div><div>_____Bittercress</div><div>_____Carolina Geranium</div><div>_____Chickweed (common)</div><div>_____Chickweed (mouse-ear)</div><div>_____Clover (hop)</div><div>_____Clover (white)</div><div>_____Cudweed</div><div>_____Dandelion</div><div>_____Dichondra</div><div>_____Docks</div><div>_____Doveweed</div><div>_____Florida Betony</div><div>_____Florida Pusley</div><div>_____Ground Ivy</div></div><div><div>_____Henbit</div><div>_____Hydrocotyle</div><div>_____Lawn Burnweed</div><div>_____Oxalis</div><div>_____Parsley Piert</div><div>_____Penny Wort</div><div>_____Plantains</div><div>_____Purslane</div><div>_____Red Sorrel</div><div>_____Shepherd’s Purse</div><div>_____Spurge (Prostrate)</div><div>_____Violets</div><div>_____Virginia Buttonweed</div></div></div> <div>Other _____</div>		<div><div><div>_____Armyworm</div><div>_____Bermudagrass Mite</div><div>_____Billbug</div><div>_____Chinch Bug</div><div>_____Cutworm</div></div><div><div>_____Mole Cricket</div><div>_____Sod Webworm</div><div>_____Sugar Cane Beetle</div><div>_____White Grub</div></div></div> <div>Other _____</div>		<div><div><div>A. Fertilization _____</div><div>_____</div><div>B. Pesticides (rates and dates)_____</div><div>_____</div><div>_____</div></div><div><div>TURF DENSITY</div></div><div><div><div>Sun Areas</div><div><div>_____Dense</div><div>_____Average</div><div>_____Thin</div></div><div><div>Shade Areas</div><div><div>_____Dense</div><div>_____Average</div><div>_____Thin</div></div></div></div></div></div>			
THATCH DEPTH		SUMMARY COMMENTS					
<div><div><div>_____Under ½ Inch</div><div>_____Dethatching</div></div><div><div>_____Over ½ Inch</div><div>_____Core Aeration</div></div></div>							

PESTICIDE APPLICATION RECORDS

Georgia law requires that licensed pesticide applicators record and keep accurate records of all pesticide applications to turfgrass areas. Licensed commercial applicators not employed by or otherwise acting for a licensed pesticide contractor must also maintain accurate records of pesticide applications, whether applied by him or by persons under his supervision. Adequate record keeping systems are a necessary part of any successful business. The following form may be used to record pesticide application information. Users of this form are encouraged to modify or adapt the form to their particular needs. NOTE: Georgia rule, Chapter 40-21-5 requires that certain turfgrass areas be posted after the application of any pesticide. This rule does not apply to homeowners, public or private rights-of-way, and areas used for agricultural production or research. Contact the Georgia Department of Agriculture for additional information.

Company Name:

Applicator Name:

Applied For:

Name:

Address:

Location of Site:

Date of Application:

Time of Application:

Site Description:

Crop or Target Site:

Growth Stage:

Other Desirable Plants on Target Site:

Size of Area Treated:

Target Pest:

Target Pest (s):

Growth Stage:

Pesticide & Lot No Used:

Rate:

Application Equipment:

Carrier: (water, fertilizer, etc.)

Spray Volume: (gpa)

Spray Pressure:

Nozzle Size:

Speed: (mph)

Spreader Type and Settings:

Environmental Conditions:

Temperature: Air

Soil

Wind: Speed

Direction

Soil Moisture: Dry ☐ Good ☐ Wet ☐

Rainfall: Before

After

Soil Texture:

Sun: (bright, cloudy, etc.)

Miscellaneous:

Peculiarities or Application Errors: (spillage, drift, etc.)

Non-target Plant, Animal, or Human Exposure: Yes ☐ No ☐ (If yes, list corrective or emergency action taken.)

Pertinent Comments: (location detail, site comments, etc.)

Pesticide Disposal:

Name:

Concentration:

Quantity:

Manner of Disposal:

Information required by Georgia Department of Agriculture, Chapter 40-21-5, Record Keeping Requirements.

University of Georgia Turfgrass Team - 2019

Athens Campus

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Georgia County Extension Office Phone Numbers

Northwest District							
Bartow	770-387-5142	Crawford	478-836-3121	Haralson	770-646-2026	Pike	770-567-2010
Bibb	478-751-6338	Dade	706-657-4116	Harris	706-628-4824	Polk	770-749-2142
Carroll	770-836-8546	DeKalb	404-298-4080	Heard	706-675-3513	Rockdale	770-278-7373
Catoosa	706-935-4211	Douglas	770-920-7224	Henry	770-288-8421	Spalding	770-467-4225
Chattahoochee	706-653-4200	Fayette	770-305-5412	Lamar	770-358-5163	Talbot	706-665-3230
Chattooga	706-857-0744	Floyd	706-295-6210	Meriwether	706-672-4235	Troup	706-883-1675
Cherokee	770-721-7803	Forsyth	770-887-2418	Murray	706-695-3031	Upson	706-647-8989
Clayton	770-473-3945	Fulton	404-332-2400	Muscogee	706-653-4200	Walker	706-638-2548
Cobb	770-528-4070	Gordon	706-629-8685	Newton	770-784-2010	Whitfield	706-278-8207
Coweta	770-254-2620	Gwinnett	678-377-4010	Paulding	770-443-7616		
Northeast District							
Baldwin	478-445-4394	Gilmer	706-635-4426	Lincoln	706-359-3233	Rabun	706-960-9829
Banks	706-677-6230	Glascok	706-598-2811	Lumpkin	706-864-2275	Richmond	706-821-2350
Barrow	770-307-3029	Greene	706-453-2083	Madison	706-795-2281	Stephens	706-779-5501
Butts	770-775-8209	Habersham	706-754-2318	McDuffie	706-595-1815	Towns	706-896-2024
Clarke	706-613-3640	Hall	770-535-8293	Monroe	478-994-7014	Union	706-439-6030
Columbia	706-541-4011	Hancock	706-444-7573	Morgan	706-342-2214	Walton	770-267-1324
Dawson	706-265-2442	Hart	706-376-3134	Oconee	706-769-3946	Warren	706-465-2136
Elbert	706-283-2037	Jackson	706-367-6344	Oglethorpe	706-743-8341	White	706-865-2832
Fannin	706-632-3061	Jasper	706-468-6479	Pickens	706-253-8840	Wilkes	706-678-2332
Franklin	706-384-2843	Jones	478-986-3958	Putnam	706-485-4151		
Southwest District							
Baker	229-734-3015	Dooly	229-268-4171	Marion	229-649-2625	Taylor	478-862-5496
Ben Hill	229-426-5175	Dougherty	229-436-7216	Miller	229-758-4106	Terrell	229-995-2165
Berrien	229-686-5431	Early	229-723-3072	Mitchell	229-336-2066	Thomas	229-225-4130
Brooks	229-263-4103	Echols	229-559-5562	Peach	478-825-6466	Tift	229-391-7980
Calhoun	229-849-2685	Grady	229-377-1312	Pulaski	478-783-1171	Turner	229-567-3448
Clay	229-768-2247	Houston	478-987-2028	Quitman	229-334-4303	Webster	229-828-2325
Clinch	912-487-2169	Irwin	229-468-7409	Randolph	229-732-2311	Wilcox	229-365-2323
Colquitt	229-616-7455	Lanier	229-482-3895	Schley	229-937-2601	Worth	229-776-8216
Cook	229-896-7456	Lee	229-759-6025	Seminole	229-524-2326		
Crisp	229-276-2612	Lowndes	229-333-5185	Stewart	229-838-4908		
Decatur	229-248-3033	Macon	478-472-7588	Sumter	229-924-4476		
Southeast District							
Appling	912-367-8130	Charlton	912-496-2040	Jenkins	478-982-4408	Telfair	229-868-6489
Atkinson	912-422-3277	Chatham	912-652-7981	Johnson	478-864-3373	Toombs	912-526-3101
Bacon	912-632-5601	Coffee	912-384-1402	Laurens	478-272-2277	Treutlen	912-529-3766
Bleckley	478-934-3220	Dodge	478-374-8137	Liberty	912-876-2133	Twiggs	478-945-3391
Brantley	912-462-5724	Effingham	912-754-8040	Long	912-545-9549	Ware	912-287-2456
Bryan	912-653-2231	Emanuel	478-237-1226	McIntosh	912-437-6651	Washington	478-552-2011
Bulloch	912-871-6130	Evans	912-739-1292	Montgomery	912-583-2240	Wayne	912-427-5965
Burke	706-554-2119	Glynn	912-554-7577	Pierce	912-449-2034	Wheeler	912-568-7138
Camden	912-576-3219	Jeff Davis	912-375-6648	Screven	912-564-2064	Wilkinson	478-946-2367
Candler	912-685-2408	Jefferson	478-625-3046	Tattnell	912-557-6724		