SUSCEPTIBILITY OF WINTER BROADLEAF WEEDS TO TURF HERBICIDES

Weed	Atrazine/ Simazine	2,4-D	Mecoprop (or MCPP)	Dicamba	2,4-D + MCPP	2,4-D + 2,4-DP	2,4-D + MCPP + dicamba	2,4-D + triclopyr	Triclopyr + clopyralid
Betony, Florida	E-F[1]	F	F	F-E	F	F	F-E	—	—
Black Medic	—	P	F	E	F	E	E	—	E
Buttonweed, Va.	—	E-F	F	F	F	E-F	E-F	F-P	—
Chamberbitter	E	—	—	—	—	—	—	—	—
Chickweed	F	F-P	E-F	E	E	E	E	E-F	E
Clover, hop	E	F	E	E	E	E	E	E	E
Clover, white	E	F	E	E	E	E	E	E-F	E
Daisy, English	—	P	F	E	F	F	E	—	—
Daisy, oxeye	—	F	F	F	F	F	E-F	—	—
Dandelion	E-F	E	E	E	E	E	E	F-E	—
Dock, broadleaf & curly	F	F	F-P	E	F	F	E-F	F	E
Garlic, wild	—	E-F	P	E-F	E-F	E-F	E-F	—	—
Geranium, Carolina	—	E	E-F	E	E	E	E	—	—
Henbit	E	F-P	F	E	F	E-F	E	E	—
Ivy, ground	—	F-P	F	E-F	F	F-E	E-F	—	—
Parsley-piert	E	P	E-F	E-F	E-F	P	E-F	E	—
Pearlwort	—	E-F	E-F	—	E-F	E-F	E-F	—	—
Pennywort (dollarweed)	E	E-F	E-F	E-F	E-F	E-F	E-F	—	—
Pepperweed	—	E	E-F	E	E-F	E	E	—	—
Plantains	F-P	E	F-P	P	E	E	E	F-P	E
Shepherd's-purse	—	E	E-F	E	E-F	E-F	E	—	—
Speedwell, corn	E	F-P	F-P	F-P	F-P	F-P	F-P	—	—
Spurweed (lawn burweed)	E-F	F	E-F	E	E-F	F	E	E	E
Strawberry, Indian mock	—	P	F	E-F	F	P	E-F	—	—
Thistles	—	E-F	F	E	E-F	E-F	E	—	—
Vetch, common	—	G	G	G	G	G	G	G	G
Violets	—	F-P	F-P	E-F	F-P	F	F-P	F-P	E-F
Woodsorrel, yellow	F	P	P	F	F-P	F-P	F-P	—	E-F
Yarrow	—	F	F-P	E	F-P	F	E-F	—	—

[1] E = excellent (>89%) control; F = Fair to good (70 to 89%); G = good control sometimes with high rates, however a repeat treatment 1 to 3 weeks later each at the standard or reduced rate is usually more effective; P = poor (<70%) control in most cases. Not all weeds have been tested for susceptibility to each herbicide listed.

These are relative rankings and depend on many factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.

density is low in spring, a fertilization will be needed to increase density (to fill the space with turf).

Characterize your weed management.

Map and monitor weed populations (as well as turf species). This provides insight into the response of the turf and the weeds to different environmental conditions and management programs. For example, you may have decided to change a fertilizer program to a more water soluble source and notice from your mapping new patches of annual bluegrass. Following a dry year, you may notice more clover. Over time this information can assist with weed management programs.

Establish weed thresholds. As you might imagine, establishing thresholds can be subjective. Do you evaluate the visual quality from a distance, or by standing over the turf? What season do you determine threshold? Is there any tolerance for weed invasion or must the turf be 100% weed free? The same questions arise for functional quality. How many dandelions or prostrate knotweed plants can you have in a soccer field before the game is affected? How much clover is tolerated in a golf course rough area before you hear complaints of playability? How many crabgrass or broadleaf plantain plants can a lawn tolerate before soil movement is increased?

Viewing weed management from this perspective will challenge the turf manager to communicate with their clientele to assist in establishing thresholds. **LM**

Integrated plan needed for warm-season weeds

Winter broadleaf weeds are an opportunity or a headache for the turfgrass manager. If control is late, customers should expect multiple applications and slow results.

By BERT McCARTY, Ph. D.
Clemson University

For the professional turfgrass manager, late winter and early spring often rings in the new season with a deluge of irate customers calling about winter weeds.

By their nature, winter weeds usually do not die until hot temperatures of early summer. Until then, these weeds are an eyesore for homeowners and because of their maturity are difficult to control for the professional turfgrass manager.

Usually, multiple applications are required to control these, which really drive up labor costs. One also needs to be formulating and applying a strategy for preemergence crabgrass control at this time.

Have a program

Weed management is an integrated process involving intelligent selection and use of herbicides and good cultural practices.

Start with proper identification. Often, turfgrass managers are forced to identify weeds on the basis of the vegetative structures, such as ligules, leaves and stems. An excellent weed identification guide is *Weeds of Southern Turfgrasses*, a publication available through Clemson University for $8.00 per copy. Call 864/656-3261 for ordering information. Check also with Cooperative Extension Services in Georgia, Alabama and Florida.

Winter weeds germinate in late summer through early fall when daytime temperatures consistently drop in the 70s. They grow throughout the winter, and flower or produce seedheads during late winter and early spring. Winter weeds are sneaky in that they blend with the turf in the fall and early winter months and do not become noticeable until late winter, when growth spurts, along with seedheads and flowers, producing a ragged appearing turf.

Scouting for success

To control the weeds, you've first got to identify them by scouting. This will give you valuable information about where the weeds are so you can make informed decisions. Break the service area into logical sections or units and determine which weeds are present and at what level. Because of visibility, start in the front lawn, then go to the side yards and finally the back yard section. Section golf courses into tees, fairways, greens and roughs for each hole. Roughs receive least attention for weed

WINTER WEED MANAGEMENT SCHEDULE FOR WARM SEASON TURFGRASSES

LATE SUMMER
To build root carbohydrates, apply winterizing fertilizer which supplies adequate potassium and mow at the upper recommended mowing height. Apply preemergence herbicides for annual bluegrass if scouting the previous spring warrants it. Scout and map areas with crabgrass to pinpoint herbicide needs for the following spring.

EARLY/MID FALL
If needed, apply postemergence herbicides for annual bluegrass control.

MID FALL
If needed, apply postemergence herbicides for broadleaf weed control.

EARLY WINTER
Reapply postemergence herbicides for broadleaf weeds and annual bluegrass, if necessary.

WINTER
Calibrate and repair sprayers. Evaluate the previous year's weed control strategies. Plan for the upcoming year's strategy.

LATE WINTER
Apply preemergence herbicides for crabgrass control. Apply postemergence herbicides for broadleaf weed control for new customers.

EARLY SPRING
Apply preemergence herbicides for goosegrass control. Repeat broadleaf weed control application, if necessary, for new customers. Follow-up scouting for remaining winter weeds for formulating the upcoming fall control strategies.

SUMMER
Maintain optimum fertility, watering and mowing height and frequency to encourage healthy, thick turf stands which helps discourage weeds and other pests.

ESTABLISHED SOUTHERN TURFGRASS TOLERANCE TO POSTEMERGENCE HERBICIDES (REFER TO HERBICIDE LABEL FOR SPECIFIC SPECIES LISTING)

Herbicide	Bahiagrass	Bermuda-grass	Carpetgrass	Centipede-grass	St. Augustine-grass	Zoysiagrass	Overseeded Ryegrass	Tall Fescue
Broadleaf Weeds								
atrazine (Aatrex)	NR[1]	I-NR	I[3]	S-I	S-I	I	NR	NR
bentazon (Basagran)	S	S	S	S	S	S	S-I	S
bromoxynil (Buctril)	S	S	S	S	S	S	S	S
2,4-D	S	S	I	I	I-NR	S	S-I	S
2,4-D+dicamba	S	S	I	I	I-NR	S	S-I	S
2,4-D+2,4-DP	S	S	I	I	I-NR	S	I-NR	S
2,4-D+MCPP	S	S	I	I	I-NR	S	I-NR	S
2,4-D+MCPP+dicamba	S	S	I	I	I-NR	S	I-NR	S
2,4-D+MCPP+2,4-DP	S	S	I	I	I-NR	S	I-NR	S
dicamba (Vanquish)	S	S	I	I	I-NR	S	I	S
MCPA+MCPP+2,4-DP	S	S	I	I	I-NR	I	I-NR	S
MCPP	S	S	I	I	I-NR	S	I	S
imazaquin (Image)	NR	I-S	I	NR	S	S	NR	NR
simazine (Princep T&O)	NR	I-NR	I	S-I	S-I	I	NR	NR
Grass Weed Control								
asulam (Asulox)	NR	S-I[2]	NR	NR	S-I	NR	NR	NR
diclofop (Illoxan)	NR	S	NR	NR	NR	NR	NR	NR
DSMA, MSMA	NR	S	NR	NR	NR	I	NR	I
fenoxaprop (Acclaim)	I-NR	I-NR	NR	NR	NR	I	I	NR
metribuzin (Sencor)	NR	S-I	NR	NR	NR	NR	NR	NR
pronamide (Kerb)	NR	S	NR	NR	NR	NR	NR	NR
sethoxydim (Vantage)	NR	NR	NR	S	NR	NR	NR	NR

[1]S=Safe at labeled rates; I=Intermediate safety, use at reduced rates; NR=Not Registered for use on and/or damages this turfgrass.
[2]Asulam is labeled for 'Tifway' (419) Bermudagrass and St. Augustinegrass.
[3]Carpetgrass tolerance to herbicides listed has not fully been explored.
These are relative rankings and depend on many factors such as environmental conditions, turfgrass vigor or health, application timing, etc., and are intended only as a guide.

control while greens and tees receive the most. Weed cover patterns can be as elaborate as estimating the percent weed cover for each unit or, more realistically, just labeling areas as widespread, spotty or in a single patch. The owner or manager of the turf site will probably determine how many weeds will be tolerated.

Begin scouting for winter weeds in early fall (September/October) with a follow-up in early spring (March/April). The fall scouting allows early detection.

Herbicide Selection and Use

Preemergence herbicides are applied prior to weed seed germination and prevent development of the germinating seed. They should be activated by rainfall or irrigation after application.

Postemergence herbicides generally are effective only on visible weeds. Young (two to four-leaf stage) and actively growing weeds are the most susceptible and require least amount of herbicide. At this stage, herbicide uptake and translocation are favored and weeds have less developed, more tender root systems. Waiting later results in poorer translocation of applied materials in plants, more difficulty controlling mature plants and possible setback of turf during green-up.

Postemergence herbicides should only be used when weeds are actively growing. This primarily occurs with temperatures between 40° and 80°F. Applications outside this temperature range are either too slow to be effective or result in excessive turf damage. **LM**

Cool-season insect plan

By PATRICIA J. VITTUM, Ph.D.
University of Massachusetts

The key to successful management of turf insects is understanding their habits and life cycles. This determines when a particular management strategy is most appropriate. Each insect species has stages that are most vulnerable to control. That's when your control efforts have the greatest chance of success. In addition, each insect species has particular habits that have some bearing on insecticide decisions, such as soil dwelling or thatch dwelling, which must be considered.

Get 'em where they live

Most turf insects are active only in certain parts of the turfgrass community. Some insects occur in particular areas, preferring certain soil types or certain turf species.

I.D. them first, then kill them

Each white grub species has a slightly different life cycle and behaves differently in the soil. Thus, it's important to determine which species is present before attempting to control the grub problem. The same goes for any insect species.

Beware night munchers

When insecticides are used to control cutworms or webworms, the applications should be made as late in the day as possible so the material is still "fresh" when the caterpillars emerge to feed in the evening.

The time is right

The success of an insecticide treatment depends on the timing of application. Consider these rules of thumb:

- most insect eggs and pupae are not susceptible to insecticides, and
- the smallest (youngest) immature stages usually are most vulnerable to insecticides.

A turf manager needs to determine when the pests will be in the egg or pupa stage, and avoid the temptation to treat at that time. **LM**

Insect pests of cool-season turfgrass

WHITE GRUBS

Feed on roots of turfgrass. Early symptoms—turf resembles drought stress. Heavily damaged turf can be rolled back like a carpet because there are no roots remaining.

Cultural control: Provide adequate moisture to root zone. Avoid mowing too low. Minimize other agronomic stresses.

Chemical strategies: Use products which can penetrate thatch reasonably well. If treating when grubs are just emerging (often mid July to mid August), use a slower-acting but longer-lasting material. If spot treating after damage becomes evident, use a fast-acting material. Water in any application with at least 0.25 inch water as soon after application as possible to improve contact with grubs.

CHINCH BUGS

Suck plant juices from stems. Usually most severe or noticeable in sandy soils or sunny areas, especially in areas with thick thatch. Usually most active in summer months.

Cultural control: Reduce thatch. Avoid drought stress. Use endophytic cultivars of ryegrasses or fescues.

Chemical strategies: Many turf insecticides are labeled and effective. Consider using products that will remain in the thatch (e.g., Dursban). Apply in late spring or early summer if sampling indicates an infestation. Summer applications can also be very effective if necessary. Water in lightly, just enough to move the insecticide off the blades.

BILLBUGS

Perhaps the most misdiagnosed turf insect problem in the Northeast. Young larvae burrow inside plant stems, older larvae are very difficult to time, and once larvae are well established, the population is difficult to control. Timing of application is critical, and there are several billbug species that may be involved in any given location. Check with local extension specialists or private consultants for your area. Water in lightly, just enough to move the insecticides off the blades.

WEBWORMS, CUTWORMS

Caterpillars hide in thatch during the day and feed at night on tender tissue. Caterpillars sometimes emerge from burrow holes, nibble off a few blades and pull them back into the burrow to ingest during the day. May thin or kill patches of grass. Several species of both webworms and cutworms, each with different life cycles, often more than one generation per year.

Cultural control: Reduce thatch, avoid drought stress, use endophytic cultivars of ryegrasses and fescues.

Chemical strategies: Many turf insecticides are labeled and effective. Consider using materials which remain in the thatch or are relatively immobile like some of the new pyrethroids. Treat two or three weeks after peak moth flights. Treat as late in the day as possible. Water in lightly and avoid mowing for a day or two after application if possible.

Management outline for warm-season insect pests

If we provide conditions that they like, insects will always take advantage.

By RICK BRANDENBURG, Ph.D.
North Carolina State University

Insects are opportunistic creatures with an amazing ability to take advantage of what we set in front of them. Provide them with an adequate source of food in an appropriate environment and they will find it.

Here are the some of the common insect pests of warm-season turf:

CUTWORMS, ARMYWORMS

Hosts: all warm-season grasses
Field Diagnosis: Clip turf off at soil level. Severe infestations may leave large bare areas where turf has been consumed.
Control Practices:
▶ use "soap flush" to detect
▶ treat late in day
▶ do not mow and remove clippings for 1-3 days
▶ may be present from early spring to late fall

FIRE ANTS

Hosts: all warm-season grasses
Field Diagnosis: Ants create unsightly mounds which may also damage mowing equipment. Painful stings of concern in high traffic areas.
Control Practices:
▶ best controlled in spring and fall when workers are actively foraging for food.
▶ mound treatments generally most effective, but are labor-intensive
▶ controls must be continued once program is started (fire ants will return at higher levels if treatments are stopped)
▶ do not disturb mounds during treatment
▶ use baits prior to contact insecticides to allow workers to return baits to mound

MOLE CRICKETS

Hosts: prefers bahiagrass and close-cut bermudagrass
Field Diagnosis: Extensive tunneling is unsightly. Root feeding causes dieback, thin spots.
Control Practices:
▶ use "soap flush" to detect
▶ treat in June/July as soon as egg hatch
▶ follow-up treatments usually necessary
▶ look for adult activity in March/April to define areas of high risk for egg hatch

GROUND PEARLS

Hosts: most commonly attacks bermudagrass and centipedegrass
Field Diagnosis: Yellowing and then complete dieback of turf with no new regrowth the following season
Control Practices:
▶ no known effective control measure
▶ practice good turf management to increase turf tolerance
▶ irrigate during dry weather

SOUTHERN CHINCH BUGS

Hosts: all warm-season grasses, prefers St. Augustinegrass
Field Diagnosis: Feeding results in turf becoming yellow and eventually turning reddish-brown.
Control Practices:
▶ avoid over-fertilizing
▶ manage thatch
▶ irrigate during dry spells
▶ apply pesticides with plenty of water
▶ multiple treatments often necessary

TWOLINED SPITTLEBUGS

Hosts: all warm-season grasses
Field Diagnosis: Results in yellowing of infested turf and severe infestation have noticeable unsightly "spittle masses."
Control Practices:
▶ control adults on ornamentals like hollies
▶ treat on cloudy days when possible, since spittlebugs are higher up on turf
▶ begin monitoring in early summer

WHITE GRUBS

Hosts: all warm-season grasses
Field Diagnosis: Grubs feed on roots and cause drought stress and turf dieback. Grubs may attract moles and skunks which like to eat them.
Control Practices:
▶ attracted to low-cut, highly-maintained turf
▶ dig squares of sod 4-6" deep in late August to detect small grubs
▶ treatments most effective in late August/early September
▶ avoid ornamentals attractive to adult stages of Japanese beetles or green June beetles

BERMUDAGRASS MITES

Hosts: only bermudagrass
Field Diagnosis: Initial yellowing of leaftips, followed by shortening of internodes causing a tufted growth. May die under severe infestations.
Control Practices:
▶ irrigate during dry spells
▶ proper fertilization helps turf outgrow damage
▶ Resistant cultivars Floratex, Midiron and Tifdwarf
▶ multiple treatments often necessary

BEES/WASPS

Hosts: all turf types
Field Diagnosis: Holes, mounds, tunneling in turf area. Insects flying over turf area.
Control Practices:
▶ maintain a healthy, lush stand of turf. Most bees and wasps that live in the soil prefer a thin stand of turf
▶ mulch areas under shrubs, trees, etc. and keep mulch fresh to discourage nesting. **LM**

Cool-season disease tips

The goal of every turfgrass manager is to create a healthy turfgrass ecosystem.

By JOHN E. WATKINS, Ph.D.
University of Nebraska

Anyone that has ever taken a soil microbiology course comes away with a new appreciation of the abundance of microbes in the plant/soil rhizosphere.

One pound of soil and roots may contain over 900 billion organisms — bacteria, fungi, actinomycetes, nematodes, insects and other living creatures.

Turfgrass diseases result from the complex interaction of pathogen, host and environment. Turfgrass management practices can affect all three, greatly influencing disease development. Those practices that favor vigorous, but not lush, grass growth and are detrimental to growth of the pathogen result in less disease injury to the turf. Good turfgrass management is an effective disease deterrent.

The goal of every turfgrass manager should be to create a healthy turfgrass ecosystem. This is a challenge, since growing seasons in the northern latitudes are never the same. In 1996 the Northern Plains were relatively cool and wet. 1997, however, was just the opposite — hot, dry and windy. 1998 was the year of El Niño.

Because each season is different and because the relationship of host, pathogen and environment are so ecologically interwoven, disease predictions are difficult.

The chart below should provide some general information that can help you:

PREVENTIVE AND CURATIVE FUNGICIDE PROGRAMS FOR MAJOR DISEASES OF COOL-SEASON TURFGRASSES

Disease	Preventive/ Curative	Initial application	Products
Leaf spot/melting out	P	May	chlorothalonil, iprodione, mancozeb, propiconazole, vinclozolin
Stripe smut	P	April or October	cyproconazole, fenarimol, flutolanil, propiconazole, thiophanate-methyl, triadimefon
Necrotic ring spot	P	When soil temperatures reach 60°F at 2" depth	azoxystrobin, cyproconazole, fenarimol, iprodione, thiophanate-methyl
Fairy ring	C	At first symptoms of green ring	flutolanil
Dollar spot	P/C	June for ryegrass and bentgrass	chlorothalonil, cyproconazole, iprodione, mancozeb, propiconazole, thiophanate-methyl, triadimefon, vinclozolin
Brown patch	P/C	June for ryegrass and bentgrass	azoxystrobin, chlorothalonil, cyproconazole, flutolanil, iprodione, propiconazole, thiophanate-methyl, triadimefon, vinclozolin
Summer patch	P	When soil temperatures reach 65°F at 2" depth	azoxystrobin, cyproconazole, fenarimol, propiconazole, thiophanate-methyl, triadimefon
Pythium blight	P	June	azoxystrobin, chloroneb, ethazol, fosetyl-Al, metalaxyl, propamocarb
Rust	P/C	July	chlorothalonil, cyprocanazole, mancozeb, propiconazole, triadimefon
Typhula blight	P	October/November	chlorothalonil, cyproconazole, fenarimol, flutolanil, iprodione, PCNB, propiconazole, triadimefon, vinclozolin
Microdochium patch	P	October/November	azoxystrobin, chlorothalonil, cyproconazole, fenarimol, iprodione, PCNB, propiconazole, thiophanate-methyl, triadimefon, vinclozolin

This list is presented for information only and no endorsement is intended for products listed nor criticism meant for products not listed. Check with local specialists for specific recommendations and read and follow label instructions.

Warm-season solutions

Southern turfgrass diseases have distinctive symptoms.

By GARY W. SIMONE, Ph.D.
University of Florida

Some familiar foes to turfgrass managers in the South include the following diseases and their control strategies:

Anthracnose – Areas with disease are correlated to either poor fertility conditions or nematode populations. Minimizing stress conditions reduces development.

Bermudagrass decline – Pursue lab diagnosis to verify decline and separate this disease from similar appearing localized dry spots (fairy rings) and Rhizoctonia leaf and sheath spot disease. Raise mowing height by 50% to increase photosynthetic area and top-dress greens frequently.

Brown Patch – This spring/fall disease is most aggressive between 75-85°F. Disease is favored by thatch, excessive soil moisture and readily soluble N sources. Dethatch severely affected areas, apply slow release N, water deeply but infrequently.

Cottony Blight – Excessive rainfall in the fall through spring period results in a higher incidence of cottony blight in overseeded situations. Many greens and tees develop patches or streaks of greasy-green invaded turf as the fungus moves readily with surface water or traffic movement. Improve air circulation and drainage and

FUNGICIDE MANAGEMENT FOR WARM-SEASON TURFGRASSES

Disease	Common Fungicides	Comments
Algae	Chlorothalonil, mancozeb, maneb	Reduce watering and verticut algal mats
Anthracnose	Chlorothalonil, cyproconazole, propiconazole, triadimefon	Minimize thatch
Bermudagrass decline	Azoxystrobin, fenarimol, myclobutanil, propiconazole, thiophanate methyl, triadimefon	Preventative use and azoxystrobin has curative potential for golf course and sod farms
Brown patch	Azoxystrobin, chloroneb, chlorothalonil, cyproconazole, fenarimol, flutolanil, iprodione, maneb, mancozeb, myclobutanil, PCNB, propiconazole, thiophanate methyl, thiram, triadimefon	Mow into infested sites last and collect clippings to minimize mower spread
Cottony blight	Chloroneb, etridiazole, fosetyl aluminum, mancozeb, mefanoxam, propamocarb	Minimize traffic and irrigation on infested sites
Dollar spot	Chlorothalonil, cyproconazole, fenarimol, iprodione, mancozeb, maneb, myclobutanil, PCNB, propiconazole, thiophanate methyl, thiram, triadimefon	Minimize thatch and achieve a balanced fertility for long-term control
Fairy ring	Flutolanil	Some success with puffball caused rings from shallow depths
Gray leaf spot	Chlorothalonil, propiconazole	Repeated applications during rainy period needed
Helminthosporium spots	Chlorothalonil, iprodione, mancozeb, maneb, myclobutanil, PCNB, propiconazole, vinclozolin	Minimize thatch
Leptosphaerulina blight	Chlorothalonil, iprodione, vinclozolin	
Pythium root rot	Chloroneb, etridiazole, fosetyl aluminum, mefanoxam, propamocarb	Avoid excessive irrigation; Foliar fertilization may help
Rhizoctonia leaf and sheath spot	Chlorothalonil, flutolanil, iprodione, mancozeb, PCNB, thiram	Can be confused with decline and fairy ring or take all root rot
Rust	Cyproconazole, mancozeb, maneb, propiconazole, triadimefon	Usually not needed for control
Take all root rot	Fenarimol, myclobutanil, propiconazole, thiophanate methyl, triadimefon	Preventative use only

restrict traffic across infested sites.

Dollar Spot – Low fertility sites receiving excessive irrigation or under high moisture weather periods are prime sites for disease development. Achieve balanced fertility and minimize thatch.

Fairy Ring – Use of flutolanil for fairy ring suppression has been variable in performance. The species of fungus involved and the depth of the fungus colony in the soil may be two reasons for fungicide performance variation. Fairy ring on bermudagrass can be confused with decline and/or Rhizoctonia leaf and sheath spot. A clinical diagnosis can be helpful here.

Gray leaf spot – This common spot on St. Augustinegrass is most damaging during the hot, rainy summer period. Sites poorly adapted to turf often serve to sustain the fungus. Shady urban lawn sites with persistent leaf spot problems should be redesigned and converted to shade-tolerant ground covers, bedding plants or woody ornamentals. Affected lawns should be deeply watered in early morning hours. Avoid use of readily soluble N sources.

***Helminthosporium* blights** – Primarily damaging in spring and fall on ryegrass and bermuda and is favored by thatchy sites with low fertility and frequent irrigation. Can be mistaken for gray leaf spot on St. Augustine in late summer and early fall. Improve site fertility, reduce thatch, irrigate for longer periods with less frequency.

Pythium root rot – Occurs on all grasses and is caused by a group of related fungal species. Feeder root destruction occurs in sites with poor drainage or excessive irrigation causing turf yellowing and death with a bleached straw color. Improve soil drainage and restrict supplemental irrigation. Foliar fertilization may aid in recovery of slight to moderately damaged areas.

***Rhizoctonia* leaf and sheath spot** – A summer disease of bermuda only, until recent isolations from St. Augustinegrass. Can appear as a small ring, arc or patch. Lab diagnosis is important.

Rust – Disease develops in the cooler periods, especially in partially shaded turf. Affected turf is thin and chlorotic with obvious yellow to orange-red blisters on leaf surfaces. Collect infected clippings during mowing. Fungicides are infrequently used.

Take all root rot (patch) – Stress-related disease on urban St. Augustine-, centipede-, bahia- and zoysiagrasses. Develops in mid to late spring and continues through summer into early fall. Affected turf yellows, followed by a thinning to death. Fungal pathogen invades following stresses from disease, insects, nematodes, cultural or environmental factors. **LM**

Info center

VIDEOS AND LITERATURE FOR THE GREEN INDUSTRY

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PLCAA OFFERS TWO NEW BOOKS ON CUSTOMER SERVICE... by Dr. Richard Gerson of Gerson Goodson, Inc. in Clearwater, FL: *Great Customer Service for Your Small Business* and *Beyond Customer Service.* Prices are $29 and $19 for members, respectively, and $39 and $29 for nonmembers. Contact PLCAA at 800/458-3466 or website www.plcaa.org.

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HANDBOOK OF TURFGRASS INSECT PESTS... is available from the Entomological Society of America. The handbook outlines approaches that can prevent and control insect pest damage to turfgrass. It provides descriptions of insects, injury and specific pest management options, and contains photos, illustrations, growth charts and distribution maps. Cost is $25 for ESA members and $30 to nonmembers. Ask for ESATURF by phone 301/731-4535, fax 301/731-4538 or email sales@entsoc.org.

HORTICOPIA® TREES, SHRUBS AND GROUNDCOVERS EDITION II... has over 8,500 pictures covering nearly 3,500 plants, including more than 1,600 new plants. Shows date, pictures and information for each plant, fact sheets, searches and plant selection. Call 800/560-6186, fax 540/338-4580, email sales@horticopia.com or website www.horticopia.com.

IMAGINE YOUR LANDSCAPE... is a CD-ROM which allows landscape ideas to be applied to a scanned photo. The landscape features include trees, shrubs, flowers, fountains, brick walkways and rock walls as well as an option to view plantings at different stages of maturity. Designed for PCs with Windows95, CD-ROM drive and color monitor. Call 800/798-4727 or website www.visapp.com.

ALCA EXPANDS WEBSITE SERVICES... to include two databases: the "Landscape Professional Locator" for searches of landscape contracting companies by state and specialty; and the "Supplier Buyer's Guide" for searches for suppliers, including links to websites. Visit www.alca.org.

DISEASE AND DISORDERS OF ORNAMENTAL PALMS... features 208 full-color photos and discusses identification, prevention and control of palm diseases and disorders. The book (Item 41191) is available for $35 by calling 800/328-7560

TURFGRASS DISEASE CD-ROM... is available from the American Phytopathological Society. This interactive guide to identifying and managing more than 65 turfgrass diseases and disorders has over 350 images. The options include a diagnostic guide, image browser, pathogen index and management recommendations. The CD-ROM (Item 42198) is PC and Mac compatible and is available for $169 by calling 800/328-7560.

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TREE PRESERVATION DURING DEVELOPMENT... the International Society of Arboriculture offers "Trees and Development: A Technical Guide to Preservation of Trees During Land Development." Retaining trees on a site is more complex than simply not cutting them down and this book presents the steps needed for planning. The book is $35 for ISA members and $45 for nonmembers and can be ordered from 888/ISA-TREE.

OPERATING COST STUDY FOR THE LANDSCAPE INDUSTRY... allows landscape firms to compare financial performance with other similarly sized companies. Jointly published by ANLA and ALCA, this guide is based on survey results from landscape firms across the country. The report is presented in three sections: getting serious about profit, return on investment and ratio analysis and line of business analysis. The study costs $40 for ANLA or ALCA members and $60 for nonmembers. Order Item #A-40400 from ANLA by fax at 202/789-1893 or by mail ANLA, 1250 I St. NW, Washington, DC 20005. Order from ALCA call 800/395-2522 or fax 703/736-9668.

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