Volume 8, Number 5

TURFAX™

September–October 2000

of the International Sports Turf Institute, Inc.

The International Newsletter about Current Developments in Turfgrass

IN THIS ISSUE

- Updating Winter Overseeding Technologies
- Understanding Chill Stress Injury
- Dealing with Ticks and Chiggers in the Turf Environment
- Influence of Natural Organic Fertilizers on Soil Microbial Activity, Organic Matter, and Dollar Spot
- Trimmit® 2SC—New Trade Name for Paclobutrazol
- Research Summary: Virginia Turfgrass Survey Report
- JB Comments: Enhancing the Image of Turfgrass Professionals
- Ask Dr. Beard

Updating Winter Overseeding Technologies

Col. Samuel I. Sifers and James B Beard

The introduction of hybrid bermudagrass (*Cynodon dactylon* x *C. transvaalensis*) cultivars that can sustain high shoot densities at cutting heights of 1/8 to 1/10 in. (3.2–2.5 mm) has raised questions concerning potential problems in achieving successful winter overseedings. Basically, it relates to the very high shoot density, which increases the difficulty in placement of seed into the canopy at a depth where successful seed germination and seedling growth can be achieved. Detailed investigations were initiated by the International Sports Turf Institute to address this issue. The investigations were conducted in three distinctly different locations: (a) Indian Ridge Golf and CC in Palm Desert, California—a hot-dry climate, (b) Point Hilton at Tapatio Cliff in Phoenix, Arizona—a hot-humid inland climate, and (c) Bentwater CC in Montgomery, Texas—a warm-humid coastal climate. All three experimental sites consisted of Champion vertical-dwarf hybrid bermudagrass grown on a high-sand root zone. Representative cultural practices for putting greens were followed both pre- and post-winter overseeding, including a 1/8 in. (3.2 mm) height of cut during the winter playing season. The pre- and post-winter overseeding cultural practices utilized assumed that play would continue throughout this phase, except for a two-day period during the actual seeding process.

The species composition and planting rates for the twelve individual treatments included the following:

- 100% Winterplay rough bluegrass (*Poa trivialis*) at seeding rates of 2, 4, 8, and 18 lb/1,000 ft^2 (1, 2, 4, and 9 kg/100 m^2).
- 100% Charger II perennial ryegrass (*Lolium perenne*) at 25 lb/1,000 ft^2 (12.5 kg/100 m^2).
- 100% Penncross creeping bentgrass (*Agrostis stolonifera*) at 1 and 4 lb/1,000 ft^2 (0.5 and 2 kg/100 m^2).
- Four cultivar blends/species mixtures with the following composition:
  - an 80% blend of perennial ryegrass and 20% rough bluegrass mixture seeded at rates of 6 and 12 lb/1,000 ft^2 (3 and 6 kg/100 m^2).
  - an 80% rough bluegrass and 20% creeping bentgrass mixture at 12 lb/1,000 ft^2 (6 kg/100 m^2).
  - a 75% rough bluegrass and 25% creeping bentgrass mixture with an additional increment of rough bluegrass seeded one month later representing 10 plus 2 lb/1,000 ft^2 (5 + 1 kg/100 m^2).

Additional treatments involved comparisons of the timing of seeding methodology. This included a traditional calendar date timing, which was compared to use of a biological prediction model, which is when the soil temperature at a 4-in. (100 mm) depth was between 72 and 78°F (22–26°C).

Continued on page 2

...Winter Overseeding...

Continued from page 1

Species Composition and Seeding Rates

These studies conducted at three distinct locations with three replications at each site have provided the following definitive guidelines as to the methodology for winter overseeding of Champion high-density hybrid bermudagrass. The three top-ranked species/seeding rates were: a top-ranked mixture of **75% rough bluegrass and 25% creeping bentgrass followed in 30 days by an additional seeding of rough bluegrass representing a seeding rate of 10 plus 2 lb/1,000 ft^2 (5 +1 kg/100 m^2).** Ranking second most successful was a mixture of **80% rough bluegrass and 20% creeping bentgrass seeded at a rate of 12 lb/1,000 ft^2 (6 kg/100 m^2).** The third best seeding treatment was **100% rough bluegrass seeded at 8 lb/1,000 ft^2 (4 kg/100 m^2).** Those treatments containing perennial ryegrass ranked lowest in turf quality at all three sites.

Timing of Winter Overseeding and Spring Transition

A comparison of methodologies to achieve the most favorable timing for seeding revealed that the biological prediction model is far preferred. That is, **it is best to winter overseed when the soil temperature at a 4-in. (100 mm) depth is between 72 and 78°F (22–26°C).**

In terms of spring transition, all treatments transitioned successfully with good turf density and color sustained throughout that phase. **This transition was achieved strictly by cultural treatments which were initiated when the soil temperature at a 4-in. (100 mm) depth reached 62°F (17°C).** The spring transitional cultural program consisted of the following: (1) **doubling the nitrogen fertilization rate during the transition period,** (2) **a distinct lowering of the mowing height,** (3) **a one-time core cultivation,** and (4) a **weekly vertical cutting and light topdressing.** Note that the soil moisture level was maintained at a nonstress level throughout the transition period.

This research at multiple locations shows that the **new high-density bermudagrass cultivars used on putting greens can be successfully winter overseeded, providing that some modifications in the methodology are employed.**

Understanding Chill Stress Injury

James B Beard

The injury of grasses at low or suboptimum temperatures in the absence of freezing is termed chill injury. The chill-susceptible grasses are of subtropical and tropical origin. Chill stress typically occurs in the temperature range of 55 to 60°F (13–16°C), depending on the grass species. All stages of growth and development of the entire above-ground plant are susceptible, and this susceptibility limits the season of shoot growth.

Typical chill injury symptoms involve a rapid disruption of the chloroplast-chlorophyll complex, thereby causing the leaves to turn tan to white in color, but remain in an erect position. Certain cultural practices can be utilized to reduce the severity of chill injury. They include (a) maintaining a moderately high nitrogen nutritional level, (b) ensuring a moist soil condition, and (c) selecting chill-resistant species and cultivars.

Chill resistance is the ability of the grass plant to survive a chill stress of down to 50°F (10°C) without any loss of green color. Both species and cultivars within a species of warm-season turfgrasses may vary in chill resistance. In contrast, the cool-season turfgrasses are chill-insensitive. The relative chill stress resistances of 14 warm-season grasses are presented in the accompanying table.

Relative Chill Stress Resistance	Turfgrass
good	American buffalograss
	tropical carpetgrass
	serangoongrass
	St. Augustinegrass
	kikuyugrass
moderate	common carpetgrass
	seashore paspalum
	bahiagrass
	mascarene zoysiagrass
	hybrid bermudagrass
	centipedegrass
	dactylon bermudagrass
poor	manila zoysiagrass
	Japanese zoysiagrass

Dealing with Ticks and Chiggers in the Turf Environment

Daniel A. Potter

Encounters with ticks and chiggers can be annoying, painful and, in the case of ticks, life-threatening. Knowledge of their habits can help you to safeguard employees, golfers, and other turf users.

Chiggers

The maddening itch that accompanies chigger bites must be experienced to be fully appreciated. Adult chiggers are 8-legged mites, about 1/32 in. (1 mm) long, with a bright red, velvety appearance. Adults and nymphs live on or in the soil, where they prey upon small arthropods and their eggs. These older stages don't bite humans. Adults overwinter in the soil, becoming active and laying eggs in spring. **The eggs hatch into tiny, 6-legged larvae, the stage that bites humans. Larval chiggers are so small that they are barely visible to the unaided eye.**

Larval chiggers crawl up grass blades, weeds, or other low vegetation and soon grab onto a passing victim. They normally feed on rodents, ground-dwelling birds, or other wild hosts, but will also attack people. After feeding for a few days, the engorged chigger drops off and transforms into a free-living, soil-dwelling nymph, and later to an adult. The entire life cycle from egg to adult takes about 30 to 60 days, depending on temperature. Chiggers are most common in the southern half of the United States, where they may be active almost year-round, but they may be abundant in the summertime in northern states, too. There are 1 to 3 generations per year in temperate regions, and as many as six in the southern USA.

On humans, chiggers tend to crawl upward until they reach a place where clothing is pressed against the skin. **Bites are most common around the ankles, waistline, armpits, back of the knee, or groin area.** Chiggers do not burrow under the skin. They feed by sinking their mouthparts, often at the base of a hair, injecting saliva, which partially digests the subcutaneous tissues, and then sucking up the resulting soup. Most people react to chigger bites by developing dome-shaped, reddish welts within 24 hours. Reaction to the chigger's saliva causes intense local itching that lasts for a week or more. Scratching usually removes the chigger but can result in secondary infection, sometimes accompanied by fever. **Fortunately, the chigger species found in the USA do not transmit human diseases.**

People are most likely to encounter chiggers in vegetational transition zones such as high grass, weeds, or brushy areas bordering golf roughs or picnic areas, or around the edges of lawns. Regular, close mowing makes such areas less suitable for chiggers and their wild hosts. Chiggers can be controlled by spraying infested areas with a pyrethroid insecticide (e.g., DeltaGard®, Talstar®, Tempo®, or Sevin®). Thoroughly wet the ground and vegetation up to a height of 3 ft (1 m). High grass should be mowed before treatment to enhance penetration of the spray. **Tick repellents will help protect persons who must work in chigger-infested areas.** Products containing permethrin can be sprayed on clothing, but should not be applied directly to skin. Products containing diethyl toluamide (DEET) can be applied either to clothing or skin. Persons who suspect they may have been exposed to chiggers should take a hot, soapy bath as soon as possible, which will help remove any attached or unattached chiggers. Antiseptic, hydrocortizone, or anesthetic (benzocaine) ointments provide some relief from the itchy bites.

Ticks

Ticks, like chiggers, tend to be most abundant in tall grass, or weedy or brushy areas where wild hosts such as rodents and rabbits occur. They can be very abundant in out-of-play areas of golf courses, or in overgrown vegetation bordering lawns, parks, or sports fields. **Besides creating anxiety and discomfort, tick bites can transmit several serious diseases, especially Lyme disease and Rocky Mountain spotted fever.** They are active from early spring through September in the temperate states, or longer in the south.

Adult ticks have eight legs and lack wings or antennae, making them closely related to mites and spiders. All life stages except for eggs are blood-feeding, and most species feed on three different hosts to complete their life cycle. Mating usually takes place on the body of a host. The female tick then drops to the ground to lay a mass of eggs, which hatch into tiny larvae, or "seed" ticks. The larvae attach to a small animal, feed, and then drop off and molt to eight-legged nymphs. These then seek another host, feed, and drop off to transform to adults, which require a third blood meal before they reproduce. When hungry, ticks crawl up low vegetation to await a passing host, detecting it by vibration, body warmth, and exhaled

Continued on page 5

Influence of Natural Organic Fertilizers on Soil Microbial Activity, Organic Matter, and Dollar Spot

Peter H. Dernoeden

Composts, manure, and other natural organic sources of fertilizer are being used on turfgrasses in the hope that they can boost the activity of beneficial microbes in soil. Many natural organic fertilizers consist of composted poultry waste or sewage sludge. It is generally believed that enhanced soil microbial activity accorded by the use of natural fertilizers results in more competition with or antagonism of potential pathogens, thereby providing for fewer disease problems. **These composted materials may be helpful, but the few field studies that have compared natural organic to synthetic organic (i.e., manufactured) fertilizers have not provided a great deal of evidence that the natural fertilizers consistently are superior to other slow-release nitrogen (N) sources.** Furthermore, when natural and synthetic organics were shown to reduce diseases, such as brown patch *(Rhizoctonia solani)* or dollar spot *(Sclerotinia homoeocarpa),* the level of suppression was generally not commercially acceptable to superintendents or golfers throughout the entire "active disease" period.

There have been several successful field experiments using organic amendments to suppress turfgrass diseases. Nelson and Craft (1992) observed that sand topdressing amended with the organic fertilizers Ringer Compost Plus®, Ringer Greens Restore®, and Sustane® significantly suppressed the severity of dollar spot. Nelson and Craft (1992) also reported that selected composts prepared from turkey litter and sewage sludge as well as noncomposted blends of plant and animal meals also consistently suppressed dollar spot.

There also are reports indicating that organic amendments were not successful or were inconsistent in suppressing turfgrass diseases. Landschoot and McNitt (1997) examined N-sources to determine if dollar spot suppression in creeping bentgrass were greater with natural organic fertilizers compared to synthetic organic N-sources. They tested Ringer Commercial Greens Super®, Ringer Compost Plus®, Sustane®, Milorganite®, and Harmony®, all of which are derived mainly from natural organic sources. They compared the natural organic N-sources to ureaform (Nitroform®) and urea, both of which are synthetic-organic fertilizers. Their results showed that urea provided equal or better dollar spot suppression than the natural organic fertilizers. They also reported that on the majority of rating dates, dollar spot severity was correlated with turf color, indicating that as N-availability increased, disease severity decreased.

There has been little information regarding the relative contributions of nitrogen (N) and microorganisms from fertilizer applications to the suppression of turf diseases. Few studies have been designed to take into account the suppressive effects of N and microorganisms both together and independently (Landschoot and McNitt, 1997). For example, Nelson and Craft (1992) reported that dollar spot suppression in turf receiving certain composts was due to microbial effects. However, they did not take into account the turf response to N. Landschoot and McNitt (1997) reported on improved turf color and a reduction in dollar spot in response to N, but did not evaluate the possible effects of microbial suppression. Results from Liu et al. (1995) indicated that higher microbial populations associated with certain organic fertilizer treatments may have been related to dollar spot suppression. Liu et al. (1995), however, did not apply the amendments and fertilizers at a uniform rate. Consequently, disease suppression may have been the result of increased rates of N applied to the turf, which may have allowed the turf to outgrow or recover more rapidly from infections.

Davis (2000), recently completed a study to evaluate the influence of N-source on dollar spot severity and soil microbial activity. The study objectives were: (1) to elucidate the relationships among the N-sources and foliar tissue N, soil microbial activity, and the severity of dollar spot, and (2) to evaluate the N-sources for their impact on soil organic matter accumulation. Nitrogen from nine different sources, including urea, sulfur-coated urea (SCU), Milorganite®, Sustane Medium®, Ringer Earthgro 1881 Select®, Earthgro Dehydrated Manure®, Ringer Lawn Restore®, Com-Pro®, and Scott's All Natural Turf Builder®, was applied annually at a rate of 1.0 lb N/1000 ft^2 (50 kg N ha^{-1}) in September, October, November, and May for a total of 4.0 lb N/1000 ft^2/yr (200 kg N/ha/yr). The N-sources were applied annually between 1994 and 1999 to an established stand of "Southshore" creeping bentgrass (*Agrostis stolonifera* L.) grown on a sandy loam soil and maintained under golf course fairway conditions. Unlike other studies involving the effect of fertilizers on dollar spot severity, most of the N was applied at the recommended time for cool-season grasses in most regions of the United States (i.e., autumn), and not when the disease was active in late spring or summer. Dollar spot, turf

Continued on page 5

...Natural Organic Fertilizers...

Continued from page 4

quality, and soil organic matter data were collected in 1998 and 1999, but soil microbial activity and leaf tissue N were monitored only in 1999. **There were few significant differences in dollar spot levels among most N-sources in either year.** In 1998 and 1999, Ringer Lawn Restore® delayed dollar spot to within an acceptable threshold from May to early June, when disease pressure was in the low to moderately severe range. **None of the organic N-sources or composts, however, reduced dollar spot when compared to the synthetic organic N-sources (i.e., urea and SCU) in either year.** The composted sewage sludge product, Com-Pro® (1998 and 1999) and Earthgro Dehydrated Manure® (1999), however, generally enhanced dollar spot, when compared to most other treatments. Data showed that **none of the N-sources had a significant impact on dollar spot after disease pressure had become severe.** Turfs receiving urea and SCU generally exhibited the highest turfgrass quality on most rating dates in both years. The turf quality of the urea and SCU-treated bentgrass, however, did not generally vary significantly from plots treated with Milorganite, Ringer Lawn Restore, and Scott's All Natural Turf Builder. Lowest turf quality in both years was associated with plots treated with Earthgro Dehydrated Manure®, Com-Pro®, and nonfertilized turf.

No N-source was consistently associated with higher levels of general microbial activity, when compared to the nonfertilized plots. General soil microbial activity data, which were collected in 1999 only, indicated that there was no correlation between soil microbial activity and dollar spot severity. In May and June 1999, higher tissue N levels were observed in all fertilized turfs, when compared to Earthgro Dehydrated Manure® and the nonfertilized plots. When disease pressure was moderately severe (i.e., May and June), there was a strong negative correlation ($P \leq 0.01$) between the amount of foliar N and dollar spot severity. That is, **there was less dollar spot**

Continued on page 6

...Ticks and Chiggers...

Continued from page 3

carbon dioxide. Initial contact with people is usually made on the foot, ankle, or lower leg. The tick then crawls upward until constricted by skin folds or clothing. Ticks often attach at the base of the scalp, at the waist or armpit, or behind the knee. After feeding, the blood-engorged tick drops off the host.

Lyme disease is a potentially dangerous bacterial infection that is transmitted through the bite of a small tick call *Ixodes scapularis*. Adults of this tick are about 1/8 in. (2 mm) long, less than half the size of adults of the common dog ticks. The nymphs are even smaller. But, larvae and nymphs of many common ticks are fairly small, so **it's wise to save the tick to take to a physician or extension specialist if one suspects that it may be the Lyme disease carrier.** Most reported cases have been in the Northeast, upper Midwest, and in California, but incidence of the disease is spreading. The disease is hard to diagnose because the early symptoms mimic the flu (fatigue, headache, fever, swollen glands, pain or stiffness in the neck, muscles, or joints). The most definitive early sign is gradually expanding circular or oval red rash at the site of the bite. However, this rash only develops in about two-thirds of infected persons, and it may be overlooked. **Persons experiencing any of the above symptoms after being bitten by a small tick should see a physician immediately.** In its early stages, Lyme disease can be successfully treated with antibiotics, but therapy becomes more difficult as the disease progresses. Left untreated, Lyme disease can result in chronic arthritis, heart disease, and neurological disorders. **A new, preventive vaccine is available for persons who live or work in high-risk areas.**

Rocky Mountain spotted fever (RMSF) is a potentially fatal disease carried by common dog ticks and lone star ticks. Symptoms begin 2 to 12 days after the bite and include headache, chills, muscle aches, and very high fever. The most characteristic symptom is a rash that appears on about the second to fifth day on wrists and ankles, later spreading to other body regions. RMSF can be successfully treated with antibiotics in it's early stages, but can be life-threatening if left untreated. **For both Lyme disease and RMSF, the tick must remain attached for at least 12 to 24 hours for the pathogens to be transmitted. Thus, periodic body checks for ticks greatly reduce one's chances of being infected.**

Management strategies for ticks are generally the same as described for chiggers. To remove an attached tick, grasp its head with tweezers, close to the skin, and pull slowly and steadily until the tick is dislodged. If tweezers aren't available, grasp the tick with a piece of tissue, placing fingernails on or just behind the mouthparts. Try not to squeeze or crush the tick. Folk remedies such as coating the tick with nail polish or vaseline don't work. Squeezing the tick, or touching it with a hot match, may cause it to regurgitate infected fluids into the wound. After removing the tick, wash the bite site and your hands, apply antiseptic, and cover with a bandage strip. Place the tick in a bottle, preferably with alcohol, and save it for at least 3 weeks. Should disease-related symptoms appear, having the tick may help the doctor with diagnosis.

FEATURE ARTICLE

Trimmit® 2SC—New Trade Name for Paclobutrazol

Fred Yelverton

Paclobutrazol has been registered for use in highly maintained turfgrass systems for several years. The professional turf product line of The Scotts Company (now The Andersons) has marketed this plant growth regulator, which has been used primarily in cool-season turf. Traditionally, three paclobutrazol products have been sold in turf: (1) a sprayable product sold as TGR Turf Enhancer® 2SC, (2) a 0.42% granular paclobutrazol product formulated on a 31-3-9 fertilizer, and (3) a 0.34% granular paclobutrazol product formulated on a 15-0-29 fertilizer.

In June of 2000, **Zeneca Professional Products began marketing a sprayable paclobutrazol formulation with the trade name of Trimmit® 2SC**. Trimmit® is the same product as the sprayable TGR Turf Enhancer® that was sold by The Scotts Company. Currently, both products are on the market and are available for use. Over time, Trimmit® will most likely replace TGR Turf Enhancer® 2SC as the sprayable formulation of paclobutrazol. Currently, the granular paclobutrazol formulations are being marketed by The Andersons.

Several turfgrass managers have inquired about why Zeneca has suddenly started selling paclobutrazol. Zeneca has always been the basic manufacturer of all paclobutrazol products sold worldwide. In addition to the turfgrass uses mentioned above, paclobutrazol is marketed as an ornamental growth regulator in the ornamentals market by the trade name of Bonzi® (sold by Uniroyal Chemical), and in the industrial vegetation market as a woody plant growth regulator by the trade name of Profile® (sold by Dow AgroSciences). In many other countries, paclobutrazol is sold by the trade name of Coltar®. But again, all paclobutrazol products are manufactured by Zeneca. Until June 2000, when Trimmit® was available for use in turf, Zeneca had chosen to license all paclobutrazol products to other companies.

Paclobutrazol is one of three plant growth regulators registered for use in turfgrasses that temporarily inhibit gibberellin biosynthesis (GA inhibitors) in plants. The other two products that inhibit gibberellin biosynthesis are flurprimidol (sold as Cutless®) and trinexapac-ethyl (sold as Primo®). **Gibberellins are plant-produced hormones that are responsible for cell elongation as well as other plant functions. When gibberellin production is inhibited, plant cells do not elongate, internodes become shortened, and above-ground plant growth is reduced.** Therefore, use of these products can reduce mowing requirements of various turfgrass species. Research has shown that turfgrass growth can be reduced an average of about 50% when under growth regulation.

The most popular use of paclobutrazol is for annual bluegrass (*Poa annua*) control. **The majority of research has shown that paclobutrazol is the most effective product of the GA inhibitors for reducing annual bluegrass populations in bentgrass (*Agrostis* spp.) putting greens.** To date, annual bluegrass control is the most popular use of this product. Annual bluegrass infestations can be reduced with paclobutrazol because annual bluegrass is more sensitive to this product than is bentgrass. Therefore, paclobutrazol results in more relative growth reduction in annual bluegrass than bentgrass. This can lead to a shift in the plant population to more bentgrass and less annual bluegrass over time. This shift generally takes multiple applications at four-week intervals during periods of active growth. In the case of perennial biotypes of *Poa annua,* multiple years are required to obtain the shift in population to more bentgrass.

...Natural Organic Fertilizers...

Continued from page 5

when higher tissue N was detected. By mid-July, when disease pressure was severe, there no longer was a significant correlation between dollar spot severity and leaf tissue N. Hence, **during low to moderate disease pressure, N availability appeared to be more important in reducing dollar spot severity than soil microbial activity.** Presumably, N stimulates turf growth, enabling plants to recover more rapidly from dollar spot.

Organic matter levels were greater in the upper 1.0 in. (2.5 cm) of soil in plots treated with Sustane®, Earthgro Select®, Earthgro Dehydrated Manure®, Com-Pro®, and Scott's All Natural Turf Builder® in 1998. Following core cultivation in September 1999 and resampling in March 2000, all treatments were associated with increased organic matter levels in the upper 1.0 in. (2.5 cm) of soil, particularly in Com-Pro®-treated plots. This increase in organic matter was attributed to core cultivation, which improved aeration and downward movement of nutrients, thus promoting a greater root biomass. No treatment, how-

Continued on page 7

Research Summary

Virginia Turfgrass Survey Report

Sound research to develop information concerning the size of the turfgrass industry is quite important and has many applications. These include the basis for justifying government investments in research in support of the turfgrass industry, for documenting the size of the turfgrass industry when presenting requests for specific types of legislation at the local, state, and national level, and for an understanding of the relative size of the diverse components of the turfgrass industry and how each component expends monies in turfgrass establishment and maintenance.

This research summary represents the most current information on a state-wide turfgrass survey, having been published in May of 2000. It has added value since comparisons can be made with an earlier survey conducted in 1982 by the same agency. **The survey reveals a total annual maintenance expenditure for the turfgrass industry of $1.54 billion, which was four times the amount expended in 1982.** Obviously, turf has been a major growth industry in Virginia during the past 16 years. A summary of the relative amounts of money expended by eleven components of the Virginia turfgrass industry is shown in the accompanying table. **The total amount of acreage in Virginia devoted to turfgrasses was 1,360,500 acres,** with home lawns, general areas, and highway roadsides representing 89% of the total. It also is noted that this represents a 66% increase from 1982 to 1998. **There were 394,135 paid workers employed in the state of Virginia to maintain these turf areas in 1998.**

Virginia's Turfgrass Survey 2000, by **Agricultural Statistics Service**, P.O. Box 1659, Richmond, Virginia 23218-1659. 80 pp.

Turf Maintenance Expenses by Industry Component for 1998.

Industry Component	Paid Labor	Supplies	Equipment Parts and Repairs	Turfgrass Protectants	Total Expenses
Home lawns	$244,342,000	$319,165,000	$159,622,000	$101,990,000	$825,119,000
Lawn service companies	170,950,000	83,119,000	24,653,000	19,079,000	297,801,000
General areas	161,847,000	40,923,000	21,819,000	11,675,000	236,264,000
Golf courses	56,513,000	13,760,000	12,084,000	8,755,000	91,112,000
Highway roadsides	15,925,000	870,000	2,500,000	2,503,000	21,798,000
Schools	14,000,000	2,106,000	2,271,000	650,000	19,027,000
Cemeteries	12,809,000	975,000	1,814,000	194,000	15,792,000
Parks	9,386,000	2,898,000	1,722,000	273,000	14,279,000
Churches	8,654,000	1,498,000	2,494,000	362,000	13,008,000
Sod Farms	3,107,000	2,133,000	392,000	196,000	5,828,000
Airports	508,000	51,000	52,000	20,000	631,000
Total	$698,041,000	$467,498,000	$229,423,000	$145,697,000	$1,540,659,000

...Natural Organic Fertilizers...

Continued from page 6

ever, increased organic matter in the 1.0 to 2.0 in. depth (2.6–5.0 cm) soil zone in either year. Hence, **after 6 years of applying natural organic N-sources, there was no great impact on soil organic matter levels in the top 2.0 in. (5.0 cm) or soil.** While enhanced soil microbial activity has been linked to the suppression of some diseases, this research and that of Landschoot and McNitt (1997) indicates that N-availability is the most important factor in the suppression of dollar spot with N-sources.

References

Davis, J.G. 2000. Enhancing the effectiveness and sustainability of biological agents for turfgrass disease suppression. M.Sc. Thesis, Dept. Natural Res. Sci. & LA., University of Maryland, College Park, MD.

Landschoot, P.J. and A.S. McNitt. 1997. Effect of nitrogen fertilizers on suppression of dollar spot of *Agrostis stolonifera* L. *Intern. Turf. Soc. Res. J.* 8:905–911.

Liu, L.X., T. Hsiang, K. Carey, and J.L. Eggens. 1995. Microbial populations and suppression of dollar spot disease in creeping bentgrass with inorganic and organic amendments. *Plant Disease* 79:144–147.

Nelson, E.B. and C.M. Craft. 1992. Suppression of dollar spot on creeping bentgrass and annual bluegrass turf with compost-amended topdressings. *Plant Disease* 76:954–957.

TURFAX™
Introductory offer: $69.95 + shipping and handling
6 issues/year
Available by mail and/or fax

Ann Arbor Press
P.O. Box 20
Chelsea, MI 48118
Telephone: 800-487-2323; 734-475-4411
Fax: 734-475-8852
www.sleepingbearpress.com

JB COMMENTS

Enhancing the Image of Turfgrass Professionals

One of the key characteristics of a profession is a body of technical terms that are unique to the profession or specialty area. Turfgrass science-culture certainly has a unique group of words or terms that distinguishes this profession. Effective communication among turfgrass professionals relies on an understanding of and proper use of turfgrass terminology that has evolved. Many of the terms now in common use have been developed during the past four decades in concert with the emergence of turfgrass science. **Appropriate use of these terms by professional practitioners also enhances the perception of others as to the level of unique expertise of the turfgrass manager.**

Unfortunately, all too many professional turfgrass practitioners have shied away from the use of technical terms and scientific names. Those individuals should observe the approach used by doctors and lawyers. They have a unique set of terms in their medical and legal documents which they use freely and which readily distinguishes them from other professions. Turfgrass professionals can effectively use this approach as well. It should be recognized, however, when communicating key budgetary needs or turf cultural approaches, that certain terms need to be defined for the audience during oral presentations and written reports. I should note that **the scientific names of the turfgrass species and many pests are widely used by turfgrass practitioners in other countries throughout the world. Only in the English-speaking countries are common names widely used rather than the scientific names.** In your next report how about using terminology such as: "Creeping bentgrass (*Agrostis stolonifera*) growth on the putting greens has been slowed by the hot summer temperatures, especially in the soil"?

ASK DR. BEARD

Q *Should blending of bentgrass cultivars be considered for putting greens?*

A The principle benefit of blending 2 to 4 cultivars of an individual turfgrass species is to provide a greater diversity in tolerances (a) to environmental stresses and (b) especially to diseases of turfgrasses. However, the broad use of this strategy for a wide range of creeping bentgrass (*Agrostis stolonifera*) cultivars on closely mowed putting greens has not been adequately evaluated and proven through long-term research.

An important quality criterion on putting greens is a uniform canopy in terms of color, leaf width, growth habit, growth rate, and shoot density. Thus, **for blending to be successful, it is critical that there will be minimal to no segregation into genotypes that form patches varying in shoot density, growth habit, thatching, and even color.** Also, for a bentgrass blend used on greens to be successful, the cultivars need to be comparable in aggressiveness of growth, and no one cultivar should have substantial susceptibility to a disease or insect problem, in order to avoid a significant shift in the overall population to one genotype, thereby negating the beneficial goals of blending. Because of these concerns, **it is critical for any creeping bentgrass blend being considered for putting greens to have available positive research data under comparable environmental/soil conditions for a minimum duration of five years.** Unfortunately, most research on bentgrasses for putting greens is conducted with monostands of a single cultivar.

Ask Dr. Beard: TURFAX, c/o Ann Arbor Press
P.O. Box 20
Chelsea, MI 48118
Email: skip@sleepingbearpress.com