

is applied to foliage, it is a matter of only half an hour or so before the turf looks darker and greener. Iron sulfate is generally used, although other forms of soluble iron are available. If you desire a darker green turf, adding iron is a much safer way to get it than applying nitrogen. Adding excessive amounts of nitrogen will only encourage development of certain diseases, and you may be left with brown turf or bare ground instead of the lovely dark-green grass you envisioned.

Iron sulfate may be used to mask the symptoms of yellow tuft disease. While this won't control the problem, it will make turf infected with yellow tuft look better.

Soil pH

Most of the literature tells you that the soil pH should be maintained at the optimum level for turfgrass growth (between 6 and 7). This is really part of folklore and is based on research done on wheat and corn. Having a pH between 6 and 7 is important so the wheat and corn plants can have the phosphorus in the

soil available at heading time because it is difficult to run a fertilizer down the field when the corn is 6 feet high. On the other hand, you can run a fertilizer spreader over your turf every day if need be. It is much safer to add the fertilizer as needed than to try to lower the pH with sulfur and wind up with a black layer. In most instances it is also impossible to lower the pH of soils above 7.5 with sulfur because of the high buffering capacity of the soil.

Although some diseases do respond to changes in soil pH, it is not practical to combat turfgrass diseases by adjusting pH. For example, it is impossible to change the soil pH from 5 to 7 to fight one disease and then change it back again when a different disease comes along. Since the effect of pH on turfgrass diseases is usually related to the levels of nitrogen, phosphorus and potassium, it is much simpler to live with the pH you have, adjust the levels of phosphorus and potassium in the soil, and add nitrogen as needed.

Irrigation

Proper irrigation can help minimize turfgrass diseases. The best time to irrigate is in the afternoon, lightly and daily. It not only supplies the plant with water but helps cool it off, so it can better make it through the stress of midday. The worst time to irrigate turf is early to late evening. This wets the turfgrass plant and debris (mat and thatch) and allows foliar pathogens to germinate, grow and infect all night, since normally very little drying takes place before sunrise. Watering early in the evening also cools off the plants and promotes the formation of guttation water, which is rich in nutrients and encourages even more disease development.

If irrigating during the day is impractical, the second-best time to irrigate is just before sunrise. The water dilutes the nutrient-rich guttation water and, by breaking up the droplets, allows quicker drying after the sun rises.

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Cultural Management

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Drainage

Good drainage is just as important as proper irrigation. In the transition zone and the warm-season grass areas, *Pythium* blight requires chemical management, but in the northern region of the cool-season grass belt, *Pythium* blight indicates a drainage problem. If you correct the drainage problem, you will also clear up most of the *Pythium* blight. Other diseases that are made worse by poor drainage are brown patch and *Typhula* blight.

Air drainage is important, too. Diseases like *Microdochium* patch, *Pythium* blight, brown patch, powdery mildew and gray leaf spot are more severe where air drainage is poor. Removing or pruning some trees, especially the lower limbs, will increase the air circulation and make these diseases less severe.

Mowing

Grass should not be mowed shorter than its minimum competitive mowing height. (See Table B for mowing heights of some turfgrass species.) For some species, like creeping bentgrass, this can be as short as 1/8 inch, although 3/16 inch is more practical, especially if you want to prevent the creeping bentgrass from becoming annual bluegrass, and 1/2 inch would be preferable (but is not possible on greens). Other species — Kentucky bluegrass, for example — have a minimum competitive height of 1 inch, and certain cultivars must be cut even higher. It has been suggested that the “new” Kentucky bluegrasses could be cut shorter and still compete with other grasses such as annual bluegrass. Maybe they could if they didn’t have to sustain traffic, but traffic can’t be eliminated from a golf course fairway. There is no reason to mow home lawns so short. Turfgrass plants mowed shorter than their optimal height of cut are, in general, more susceptible to diseases.

Seasonal variation in mowing heights can be beneficial. A lower cutting height during cool weather retards thatch development, whereas higher mowing heights during warm weather may lower the

temperature around crowns and help the grass survive the stress period.

How often you mow depends on how much the turf is used. In any case, you must make sure that no more than one-third of the shoot growth is removed during a single mowing. A golf green needs daily mowing (at least six days a week), and fairways and tees require mowing daily to once a week (three times a week is common). For areas of general use such as parks, home lawns and athletic fields, mowing once a week is usually sufficient.

Mowing makes wounds through which pathogenic fungi can enter the plant and infect it. The more you mow, the more fresh wounds the grass will have. A dull mower inflicts more and bigger wounds than a sharp mower. Wounds made by a sharp mower are cleaner and heal faster than the tearing and shredding caused by a dull mower.

Clippings and Thatch

It is not clear what effect clippings have on disease development. There is little evidence to support the theory that clippings left on the ground increase inoculum levels and thereby encourage disease. In fact, clippings seem to have little direct effect on disease development, and they do not contribute to thatch. With some diseases, like melting-out, large amounts of inoculum may be present in the crown area and rootzone; however, there is little evidence that the disease is worse where clippings are left than where they are removed. Even when clippings are removed, there appears to be plenty of inoculum for an epidemic. If you want to prevent a melting-out problem, plant a resistant grass variety and leave the clippings debate to the plant pathologists.

Golf course greens have more diseases than other turfs although the clippings are removed. For diseases with airborne inoculum, like the rusts, smuts, powdery mildews and leaf spots in general, removing the clippings won’t affect the inoculum level.

Leaving the clippings does, however, affect the total nitrogen and potassium available to the plant. Turfs from which

the clippings are removed require more added fertilizer than turfs on which clippings are left.

Leaving the clippings on a higher-cut home lawn does not appear to cause any detrimental effects to the turf, assuming the turf is mowed frequently enough so that no more than one-third of the plant is removed at any one time. In fact, with the looming crisis of running out of landfill space, homeowners may find it impossible to dispose of their clippings and may have to resort to mulching mowers.

It is a different story on golf courses, where removing clippings definitely improves the quality of creeping bentgrass-annual bluegrass greens and fairways. On fairways, removing the clippings during the warm weather of summer has definitely improved the quality of the fairways. They remain much denser than fairways where clippings are not removed. No one seems to know exactly why, but it appears to be related to the rapid breakdown of the clippings in the warm weather, releasing toxic substances that thin the turf.

There has also been a noticeable increase in the creeping bentgrass content on fairways where clippings are removed. It appears that where the creeping bentgrass is not thinned by the toxins in the clippings, it gains a competitive advantage over the annual bluegrass during the warm weather.

The theory that collecting grass clippings can prevent thatch should rank with such fairy tales as Peter Pan, Goldilocks and the Three Bears, and Cinderella. God alone probably knows who started the tale, but few have spread as fast and as widely. Good experimental data have disproven the theory that grass clippings are a contributor to thatch development, but common sense should have disproven the theory long ago. Few areas have the thatch problems that a golf course green has, and yet clippings are removed there all the time! Collecting the clippings just removes valuable nitrogen and potassium. An additional one to two pounds of nitrogen per 1,000 square feet, as well as supplemental potassium, will have to be added each season where clippings are removed. Thatch is composed primarily of rhizomes, stolons and roots, which you don’t mow. What you do mow is the leaf blades, which are composed of materials, cellulose and hemi-cellulose that are broken down readily by microorganisms. The other plant parts have a high lignin content, are therefore not readily broken down by microorganisms and

Table B: Mowing Heights of Some Turfgrass Species

Species	Minimum Height (in.)	Preferred Height (in.)
Creeping bentgrass	1/8	1/4-1
Kentucky bluegrass	1	2-3
Fine-leaf fescue	1/2	2-3
Bermudagrass	1/8	1/2-3
St. Augustinegrass	3/4	2-3
Zoysiagrass	3/4	2-3
Annual bluegrass	1/8	1/4-1

consequently contribute to the development of thatch.

Many people say that thatch causes disease, but there is little evidence that it actually does so. It is suggested that thatch harbors the pathogens that cause turf diseases. However, many diseases are airborne, like the rusts and powdery mildew, and the rest do just as well in a soil environment as in a thatch environment. The one problem with turfs that are maintained in thatch is that they are more susceptible to drought than turfs that are maintained in soils. Consequently, diseases like necrotic ring spot, summer patch and stripe smut, which develop symptoms under conditions of drought stress, will be more severe. However, this is quite different from the theory that thatch is the place that harbors all these nasty pathogens, as proposed by many turfgrass experts. The suggestion that if we somehow eliminate the thatch all our disease problems would go away just isn't true. Believe me, that's not going to happen.

Removal of the clippings for a crown or root-rot disease, like necrotic ring spot and summer patch, has little effect on inoculum levels. There are enough air-

borne spores of the fungi that cause melting-out, rusts, powdery mildew and smuts to negate what little could be done by removing clippings. The perfect example again is golf course greens, where clippings are always removed, yet there are as many disease problems on golf course greens as there are anywhere else.

Should you dethatch your lawn? The answer to that question depends on how much weight you have gained during the winter. If you gained a lot of weight, the exercise of running the power rake might be good for you. On the other hand, if you are too far out of shape, it might kill you! But it will do nothing for your thatch problem. You will remove the winter-killed grass, which would break down anyway, but you will not remove that thatch or correct a thatch problem. Where severe thatch exists, the lawn should be cored (aerated) and the soil in the cores returned to help facilitate thatch breakdown. It may be necessary to repeat this operation several times where severe thatch problems exist.

Rust, red thread, melting-out and leaf spot can be managed by mowing.

Recommendations for managing these diseases call for increasing the nitrogen level. However, if you add nitrogen and do not mow, you will actually make the disease worse, not better. This has been demonstrated many times in the laboratory. In the field, where mowing occurs at least once a week, infected foliage is mowed off before the above-mentioned fungus has a chance to complete the disease cycle. Since these pathogens have a 10- to 14-day cycle from infection to sporulation, mowing once a week keeps it from becoming a serious problem. □

Dr. J.M. Vargas Jr. is a professor of botany and plant pathology at Michigan State University. This article is reprinted with permission from Advances in Turfgrass Science: Management of Turfgrass Diseases, Second Edition by J.M. Vargas Jr. Copyright: Lewis Publishers, an imprint of CRC Press, Boca Raton, FL. For information on how to obtain a copy of the book, contact CRC Press, Inc., 2000 Corporate Blvd., NW, Boca Raton, FL 33431.

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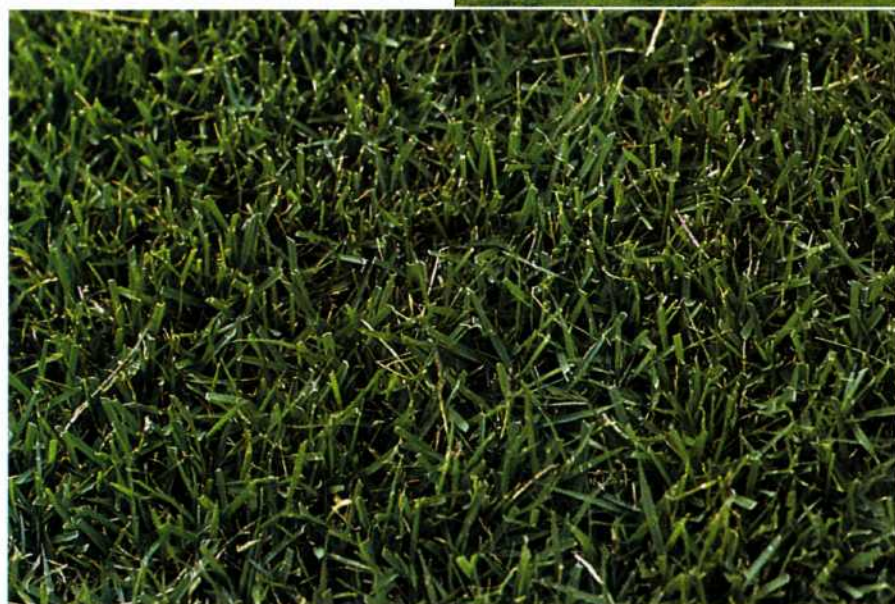
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Turf of the Month:

Zoysiagrass



Zoysiagrass from Bladerunner Farms of Austin, TX, was used to establish the turf at Retama Park, a new horse-racing track in San Antonio. Photo courtesy: Bladerunner Farms.

With proper management techniques zoysiagrass can stay green even in hot, dry conditions while using less water than other grasses.

By Mike Augsdorfer

As a sports turf, zoysiagrass is best described as a first-round draft choice with tons of potential but not quite ready for major-league play. Zoysiagrass brims with potential: It is heat- and drought-tolerant, wears well, requires less water and fertilizer than bermudagrass and other popular athletic turfs, and rarely has problems with weeds or disease. However, zoysiagrass is very expensive to establish due to its slow germination and spreading rate. “Sticker shock” has limited the application of zoysiagrass mostly to a few golf courses, which use zoysia on tee boxes and fairways.

Zoysiagrass is a popular turf for home lawns in warm climates and in the transition zone. Propagation is ordinarily

by sprigs, sod or plugs. For many years establishment of zoysia by seed was considered impractical because seed germination was very poor. However, extensive research produced a treatment for zoysiagrass seed that drastically improves seed germination rates. Now most zoysiagrass seed is treated, usually by chemical scarification, a process that involves soaking the seed in a 30-percent solution of potassium or sodium hydroxide. Treatment improves germination rates from as low as two percent to as high as 90 percent.

Zoysia is native to eastern Asia, and much of the commercial zoysia seed on the market is harvested from natural outcroppings of zoysia in China. Zoysia is adaptable to many different soils and demonstrates good shade, salt and drought tolerance. Recommended mow-

ing height is 1/2 to 1 inch. Zoysia is so dense that weeds are not likely to be a problem; in fact, overseeding is almost impossible. “It’s a broadly established, tenacious grass,” says Art Wick, head of research and development at LESCO, Inc., in Rocky River, OH. “It’s such a dense grass that once it’s established, it chokes out weeds.”

While zoysiagrass is generally resistant to most turfgrass diseases, pests can be a problem. “The problem with it here in the Southeast is mole crickets,” says Ray Jensen, president of Tifton Seed Farms in Georgia. “The sandier soils catch more damage. The insecticides we have at this time are not effective.” Nematodes also can present a serious threat to the turf.

When water is scarce, zoysia will enter a dormancy period, allowing the

grass to survive through drought conditions. When the grass receives rain again, it will green up and begin to grow again. With proper management techniques zoysiagrass can stay green even in hot, dry conditions while using less water than cool-season turfgrasses or hybrid bermudagrasses.

Kevin Morris, program coordinator for the National Turfgrass Evaluation Program, is among those who think zoysia has tremendous potential. "Seeded zoysias will have a place in the market over time," says Morris. "It's the best grass for making it through the summer."

Dr. Milt Engelke of Texas A&M University at Dallas has been involved with much of the research on zoysiagrass in the U.S. "From a sports-turf standpoint, zoysia will provide density and resilience at a reduced maintenance level," he says. "I believe zoysia will start working its way into sports fields very soon."

"Living Astroturf"

Frank Whitbeck of Windrock Grass Farms in Little Rock, AR, says he's seen zoysiagrass used from Bel Air, CA, to Long Island, NY, primarily in home lawn and golf course applications. "I think Meyer Z-52 zoysiagrass will be the premier sports turf within the next five years in the U.S.," says Whitbeck. "It survives and thrives in virtually all weather conditions, needs less management than virtually all other turfgrasses and is more wear-resistant. It has been called 'The Living Astroturf.' But very few people in the U.S. have tried it as a sports turf."

Whitbeck cites establishment time as the primary reason why the sports-turf industry resists the use of zoysiagrass. "After they build a sand base on a sports-turf facility, they want to put down a grass that grows very quickly, so they put down bermuda," he notes. Researchers, however, are developing methods to produce zoysiagrass just as quickly as bermuda. "I think a lot of the effort to find a faster-growing zoysiagrass is not going in the right direction," says Whitbeck. "People are trying to find a faster-growing zoysiagrass. We need to find a way to establish a slow-growing zoysia faster."

Whitbeck notes that zoysia has been used with great success on fairways and golf tees throughout the U.S., and he believes zoysia would be equally effective as an athletic turf. "A zoysia root

system would automatically firm up a football field and create less damage," he notes.

Mike Richardson, research agronomist for Turf Merchants in Oregon, agrees. "For less damaging-type sports such as baseball, zoysia is as good as bermudagrass."

Zoysia shares a number of characteristics with bermudagrass. "It's similar to bermuda in a lot of applications," says John Foster of West Coast

Turf in Palm Desert, CA. "It's very tough and takes a lot of wear." Foster cautions that establishment of zoysiagrass in a sports turf application can take up to a year and a half. "Most varieties of zoysia are slow growers," notes Foster. "We are now in research on several new varieties."

Tim Bowyer, Ph.D., of Southern Turf Nurseries in Georgia, admits that estab-

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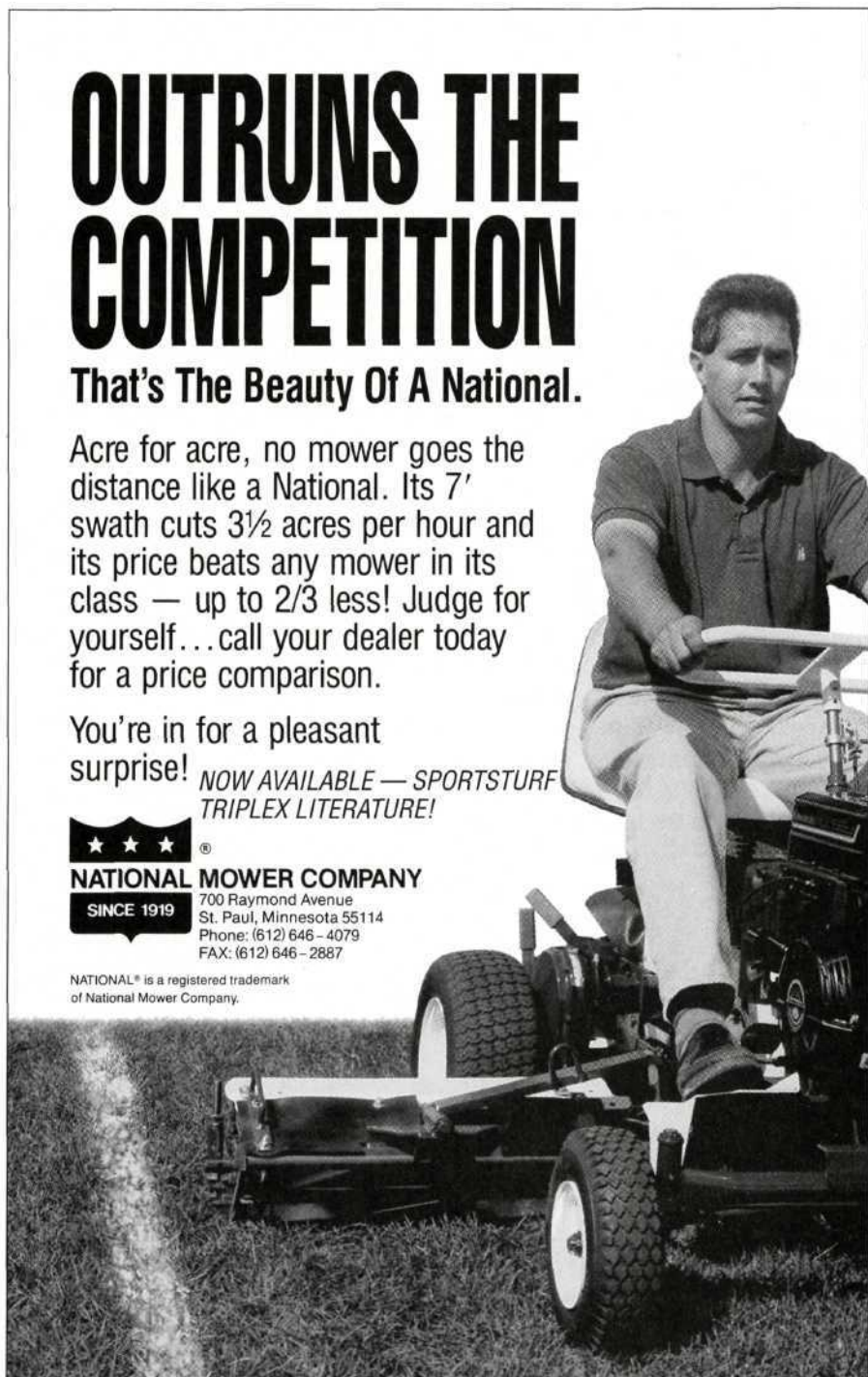
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Zoysiagrass

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ishment time contributes to the high cost of using zoysiagrass. "It's two to three times the cost of bermudagrass," notes Bowyer. "It is generally installed by sod, which increases cost. It also tends to be very slow to recover from injury and traffic damage."

Researchers are continuing to pursue methods of making zoysiagrass more economical to install. "We are trying about seven different treatment programs," says Dennis Combs, vice president of Fine Lawn Research in Lake Oswego, OR. The goal is to find a treatment process that will allow faster germination of zoysiagrass seed. "The majority of zoysia will continue to be sodded until the cost comes down," admits Combs.

Dr. Charles Murdoch, turf specialist at the University of Hawaii, says zoysia-grass is used extensively for home lawns on the islands but not as a sports turf. "The problem is it doesn't recover from wear quick enough," says Murdoch.

While zoysiagrass is generally resistant to most turfgrass diseases, pests can be a problem.

Although zoysia is ideally suited to the tropical climate and can sustain the heavy traffic that sports fields in Hawaii must tolerate, the extremely slow recovery rate of zoysiagrass restricts it to home lawn use.

Zoysia is one of the most environmentally sensitive turfgrasses available, according to Nat Emmons of Jacklin Seed. "Zoysiagrass is incredibly tough, and it's also very slow growing, which

means less clippings and lower maintenance," he explains. "It is one of the most efficient water and fertilizer users, and it gives a good surface at a high cut level."

Milt Engelke notes that careful turf management is the key to working with zoysiagrass. "Zoysiagrass does not like high bulk-density soils, and sports fields tend to get compacted," he relates. "Aerification is going to be extremely important."

Dick Stuntz, superintendent at Alvarado Country Club in Lawrence, KS, has used zoysiagrass extensively on the golf course. "We use it on fairways and tees predominantly," he says. "I just think it's an excellent grass for transition zone." Stuntz thinks that since zoysia performs so well as a turfgrass for golf, other athletic applications are natural. "For an athletic field, zoysia grass is very wear-tolerant, perhaps better than any other sports turf," he explains. Zoysia is so tough, says Stuntz, that only about one out of five golfers can take a divot that won't grow



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back from the base of the plant — and those are John Daly-type swings. Zoysia's only drawback, according to Stuntz, is that if the grass is seriously injured, it is very slow to recover.

Paul Thomas, head groundskeeper at Towson State University in Maryland, has experimented with zoysia on intramural fields at the school. "We seeded an intramural field with zoysia last summer," he relates. "It germinated over a period of 10 days to three weeks." Thomas had a goosegrass problem in some areas of the field, but the zoysia was able to compete with the goosegrass and establish itself in those areas as well.

Thomas expects to do less maintenance on the field with zoysiagrass than he would with another turfgrass. "I haven't done any irrigation on it," he notes. "It's more drought-tolerant than other turfgrasses." Thomas plans to install zoysia on another intramural field this summer but has no plans to use it on his varsity athletic fields. He explains that the wear and tear on the intramural fields is not as great as on a varsity field, which keeps the zoysiagrass from being exposed to serious injury.

Racing on Zoysia

Bladerunner Farms of Austin, TX, recently started distribution of a patented strain of zoysiagrass called ZoyBoy™. The new strain was used to establish the turf track at Retama Park, a new horse-racing track in San Antonio. "It's never been used before for race-tracks in the U.S.," explains David Doguet of Bladerunner Farms. "It has a real dense turf and a good rhizome system. We felt that it would hold up well under the stress of racing."

Doguet says zoysia has not been widely accepted as a sports turf because its slow establishment rate made the grass very expensive to produce. "Zoysia was very expensive to grow and sell," notes Doguet, "and the recuperative ability of the older varieties was very slow; but the new varieties (of which ZoyBoy is the first) are faster growing." Doguet says that ZoyBoy spreads much faster than other varieties of zoysiagrass. He admits that he was "a little worried" about the grass early in the season because the weather was cool, but the turf has performed well despite the cool weather.

The Retama Park racetrack was the very first application of ZoyBoy, and Doguet hopes to use the grass on some

athletic fields and golf courses very soon. Doguet thinks zoysia will be used more often for racetracks and other sports turf applications in the future. "I think as it proves itself at Retama, we'll see more activity," he says.

If the initial cost of establishing zoysia grass can be put in perspective as an investment, zoysia can be a sound choice economically because maintenance costs for zoysiagrass can be substantially lower than maintenance costs

for other turf types. Engelke believes the advantages of zoysiagrass outweigh some of the problems associated with the grass. "Biologically, the zoysiagrasses have the characteristics needed for environmentally sensitive turf," he notes. "I think it's a grass that will start to show its worth." As environmental awareness increases throughout the sports turf industry, zoysiagrass should establish a position among the top turfgrasses for athletic applications. □

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Guidelines for Summer Mowing



Highly maintained and well-irrigated professional sports fields, such as Yankee Stadium in New York, may require only minor adjustments in mowing frequency and height of cut during the summer.

By Joe McDonald

Like the changing of the seasons, the transition from spring to summer mowing can be gradual. In northern regions, cool-season grasses ease back on the frantic growth triggered by warm days, cool nights and plentiful rainfall. In southern areas, warm-season grasses assert their dominance as temperatures rise.

On highly maintained and well-irrigated professional sports fields, seasonal changes may require only minor adjustments in mowing frequency and height of cut; but summer mowing can be very difficult on the practice and game fields of municipal sports complexes, schools and park systems.

Whatever the summer weather conditions — hot, humid, wet or dry — one thing is certain: Sports turf fields face a constant barrage of activity in summer, often with multiple practice sessions and games six or seven days a week. Turf is subjected to heavy wear, frequently during less-than-ideal conditions.

As the summer workload accelerates, extensive activity brings more people, both players and spectators, to the facilities. Mowing schedules must be adjusted around this activity yet still keep turf in top condition and allow maximum field use. In addition, summer staffing often includes less experienced seasonal and part-time operators.

Safety Factors

An employee-training program can cover the basics of machine operation and safety procedures. To reinforce proper procedures, arrange for returning seasonal employees and long-time personnel to help with these sessions. Emphasize how to operate equipment properly to ensure safety, including directional mowing that channels discharge away from vehicles and how to travel around public gathering spots.

Make sure all safety systems are working properly. Pay special attention to the operator presence systems. With the added debris summer use brings to facilities, operators will be on and off machines more frequently. Make sure all shields are in place. Discharge chute shields are especially important with the combination of debris and people. Caution all workers to check these safety details before operating mowers.

Safety and efficiency are increased by assigning operators to specific units for the season. Operators can hear or “feel” operational changes in machines they use day after day.

As employees move up to more complex equipment, instruct them on operational and safety procedures for that unit. Arrange for the operator to work with the machine initially in flat, open areas so that a comfort level is achieved before moving to difficult terrain or tricky trimming.

Less experienced operators may be tempted to push ride-on units to top speed, posing a safety hazard as well as affecting the quality of cut. Faster speeds make spotting debris and other ground-level obstacles more difficult. Traveling too fast over uneven terrain or on hillsides can affect the stability of the machine. Supervisors may need to set speed limits for certain units or specific areas.

Heat and humidity can be hard on crew members. Remind employees to wear proper clothing, including hats. Suggest sunscreen. Remind employees, especially those operating walk-behind units, to watch their personal body-fluid levels and drink plenty of liquids. During extremely dry conditions, machine operators may need dust masks.

Quality of Cut

The basics of mowing remain the same throughout the year. Adjust height of cut and mowing frequency to remove no more than one third of the grass blade with any mowing. Match height of cut to the natural growth patterns of the grasses, weather conditions and turf use. Alter directional patterns with each mowing to maintain upright growth. Avoid mowing overly wet grass. Use equipment suitable to the size of the area to be mowed that delivers the required quality of cut for the desired aesthetic appeal.

Some things change with the seasons. As general conditions gradually change from wet to dry and the lushness of the grass declines, the ground speed of mowing equipment will increase. With walk-behind mowers, the ground speed is limited to the walking speed of the operator and generally remains at an acceptable level. With riding units, ground speed is limited only by the capabilities of the machine.

Mowing too fast for turf conditions can reduce the quality of cut. With thick grasses, the equipment engine may signal excessive stress by engine lug or heavy grass may plug the mowing unit. With slower-growing summer grasses, the mowed area may appear uneven or ragged.

Turning corners too fast is detrimental to wet or dry turf. Slow down on turns so that the inside tire doesn't spin or tear up turf. Wheels slip and spin on wet grasses, which in turn ooze more slippery juices. The grass will be flattened, compaction will be increased and skidding may damage the crowns of the grass plants. During dry conditions, the turf is more fragile and rooting less secure. Fast turns may break, rather than cut, the grass blades or uproot the entire plant.

Spotting deficiencies in the quality of cut is fairly easy when grass is lush. Dry conditions, however, make quality harder to judge. Operators must pay close attention to the results of mowing, especially with wider mowers and multiple-deck systems. Problems can develop along a section of the cut swath of a wide mower. Multiple-deck units can operate unevenly. Big bumps or hill shock load may even stop operation of one of the decks. Checking the swath just cut can prevent a poor-quality cut across an entire field or section of a park.

Because smaller mower decks traditionally deliver a higher quality of cut, mow high profile areas with the smallest practical deck size. Use larger decks for a faster cut in less heavily used areas where aesthetics are not quite as critical. Schedule mowing of difficult and high-profile areas early in the day when operators are fresher and efficiency is highest.

Keeping mower blades sharp is as important in hot weather as it is in the rapid-growing spring season. Ragged blade tips are unsightly to even the casual observer and may provide an entry for disease organisms.

Clean rotary mower decks frequently to ensure proper movement and dispersal of clippings. Check rotary deck height adjustment from side to side and front to rear. Improper adjustment will affect cut quality and produce extra "drag" on the machine.

Traction aids such as additional weights used in wet conditions probably will not be needed during dry periods.

Equipment Care

In dry, hot weather, airborne dust and grass clippings can pose a hazard to liquid-cooled machines. Other potential air intake blockers are the "fluff" produced by such plants as dandelion, milkweed and cottonwood trees. Clean intake screens frequently to allow proper air circulation and prevent the engine from overheating. Make sure machines are well-lubricated.

Remind employees that improper operating procedures can damage valuable equipment. Toward the end of a long, hot day, operators may be tempted to push or lift that picnic table or bench with the mower deck rather than get off the machine to move it properly. Some may succumb to the tendency to mow closer to obstacles and trees or underneath shrubbery rather than take the time for proper trimming. Unnecessary downtime for the machines costs everyone.

Establish a post-use equipment maintenance routine. Set up a system for operators to inform the maintenance staff of any operational problems with their machines. Allow equipment to cool before cleanup. Washing down hot equipment with cold water can cause damage. If possible, avoid high-pressure washers that force water into the machine. Always follow the washdown with greasing to force water out and reestablish grease levels. As always, follow the guidelines in the operator's manual for routine maintenance. If necessary, shorten maintenance intervals to compensate for heavy use.

Summer mowing sets the stage for both athletes and spectators. The competency and efficiency of your staff will be judged by how well this supposedly simple task is performed. Proper planning and attention to detail will ensure positive results. □

Joe McDonald is the product manager of market development for commercial mowing for John Deere. He is based in Horicon, WI.

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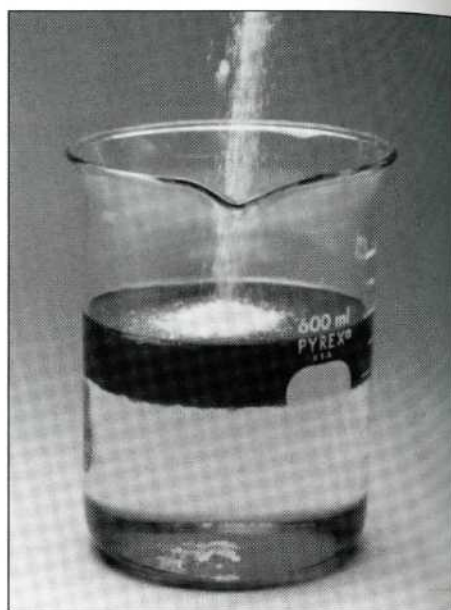
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