BERMUDAGRASS

TRAFFIC TOLERANCE—LATEST RESULTS

New soccer field at Purdue features Patriot bermudagrass.

By Cale A. Bigelow Ph.D.

Throughout the South and even now into the upper transition zone, bermudagrass is considered the primary choice for intensively used summer and fall use athletic fields. Although it could be argued that other species like Kentucky bluegrass may be more visually attractive, a successful athletic field surface is not necessarily one that looks the best but one that maintains persistent ground cover and forms a reliable turf. Therefore, when making a species selection decision, turfgrass functional characteristics such as recovery from use should be considered before appearance.

Compared to most other grasses bermudagrass is difficult to beat for its recuperative capacity. I would equate bermudagrass to the heavy-duty 4x4 pick-up truck of the turfgrass world. It is durable, tolerates regular, close (1/2-3/4 inch) mowing heights, and when properly maintained will provide more consistent seasonal performance than alternative species like Kentucky bluegrass or perennial ryegrass.

Compared to the cool-season turfgrasses bermudagrass is susceptible to far fewer summer diseases, and so requires fewer fungicides to maintain its best appearance. In terms of other pest problems, many turf managers treat annually with insecticides to protect their turf against white grub feeding. With bermudagrass this problem is virtually nonexistent. This is a big plus as the public is very concerned about pesticide exposure, particularly on recreational fields used by children.

Probably one of the main advantages to bermudagrass for athletic fields is its growth habit. It is a creeping grass and spreads by both above and below-ground creeping stems. Over time, this growth produces a durable mat of organic material at the soil surface which confers an additional level of wear tolerance. This is particularly helpful where cleated shoes are worn which may tear the turf.

A final advantage to bermudagrass is that it produces a deep, extensive root system that enhances the already very good heat and drought tolerance of this warm-season species. The abundance of stems and deep roots make bermudagrass a more reliable choice than cool-season grasses on fields where an in-ground irrigation system is absent or where irrigation head coverage is less than adequate.

With all the positive attributes of bermudagrass it is important to remember that no species is perfect all the time. Probably the biggest weakness for bermudagrass is

Moving goals is a good way to spread around traffic.

that as a species cold tolerance is highly variable, and many widely planted cultivars are prone to potentially severe winter-kill, especially when planted in climactic zones above the lower transition zone of the United States.

Additionally, when maintaining bermudagrass it responds and looks most attractive when mowed and maintained with a reel-type mower. For lower budget facilities this may be a limiting factor to successful bermudagrass fields. These mowers are more expensive and require more technical skill to properly maintain an even and effective cutting height. Discussions with a turfgrass equipment supplier may help answer some of these questions for your individual situation.

Overall, however, the positives factors for planting and maintaining bermudagrass for an intensively used summer and fall use athletic field far outweigh the risk of potential winter-kill. Additionally, advances in bermudagrass planting techniques and the rapid establishment of bermudagrass make this problem less of a concern.

Ohio River Valley problems

Like any potential management problem, the first approach to developing a solution is the old adage "right plant-right place", meaning choose grasses with superior genetics to achieve superior performance. For bermudagrass winter-kill concerns, this is best attacked by planting newer more cold tolerant cultivars. In addition, from a management perspective, intensive traffic during dormancy periods should be avoided.

Winter-kill is a complex problem and many factors besides cultivar and traffic may play a role in the severity of winter-kill. For example, during the spring of 2007 serious winter-kill was observed throughout much of the Ohio River valley, which includes southern Indiana, Ohio and northern Kentucky. In many cases the existing bermudagrass completely died. The exact reasons are not known but the primary factors affecting winter-kill level of plant dormancy, soil and plant moisture status, and the duration and intensity of low temperature exposure.

During the winter of 2007, December and January temperatures were often approximately 5 degrees or more above normal. By contrast, during the first 3 weeks of February temperatures were approximately 5-10 degrees below normal. With lows at or below zero and no snow cover in some regions, winter-kill was expected because during the time the plants were subjected to warmer temperatures they never fully went into winter dormancy and so were more sensitive to lethal cold temperatures. This was especially pronounced on older cultivars with less winter hardiness.

As anyone that manages turf knows, the weather in each individual year can be highly variable and extremely difficult to predict. To combat this, many turf managers are using lightweight protective covers

Tifsport on the left, Patriot on the right

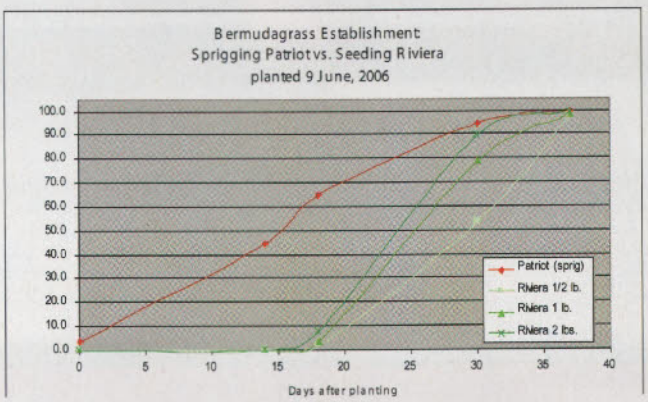
to insulate the turf, retain heat and also help protect the dormant turf from desiccating winter winds.

What's new in bermudagrass research?

Breeding programs continue to focus on selecting and improving bermudagrass aesthetic qualities, darker color, finer leaf texture, sod strength and resistance to the most damaging disease of bermudagrass, spring dead spot. They are also centered on introducing cultivars with the best possible cold tolerance so that the grasses have the widest range of adaptation.

A recent review article outlined the exciting research that has taken place in bermudagrass breeding (Anderson et al., 2008). Among the newer commercially available bermudagrass cultivars with excellent cold tolerance, three newer cultivars have risen to the top. Two are seeded: Yukon and Riviera; and the third is the vegetative cultivar, Patriot.

Among these, Riviera and Patriot have shown very good wear tolerance in our trials in West Lafayette, IN. Although there have been some differing reports by other researchers, differential cultivar responses are not uncommon and this could be due to differences in regional climactic conditions as well as many other management factors. Regardless, when selecting a cultivar for your particular location and intended use, it is best to do your homework. As always, one source of unbiased information is state turfgrass specialist as well as research and field plots often shown at regional turfgrass field day events.



Comparison of bermudagrass establishment rates under optimal planting times for West Lafayette, IN. Seeding rates are actual seed not pure live seed which would be approximately 50% less.

Our research program at Purdue continues to evaluate these and emerging cultivars. The objective of our studies is to take promising cultivars and evaluate the effect of management programs to help turf managers make better decisions regarding management requirements. We have focused our attention on fertility practices, plant growth regu-

lators to enhance mowing and traffic or wear tolerance.

To date the two best cultivars that we have evaluated are the seeded bermudagrass cultivar, Riviera, and the vegetative cultivar, Patriot. Both of these have strengths and weaknesses but are still far superior to many of the previously used bermudagrasses for our region. Probably the biggest advantage to these cultivars is their rapid establishment rate when planted during optimum growing conditions.

A paradigm shift for fertilization

The general rule of thumb regarding turfgrass fertilization is that they should only be fertilized when green tissue is present and modestly during periods of active growth. This ensures efficient nutrient uptake while minimizing unwanted shoot growth and maximizing carbohydrate or plant food accumulation. For fall use athletic fields, a field manager's goal is to promote growth and recovery from intensive use for the entire season which for many may continue well into early November.

Since bermudagrass is a warm-season turfgrass with maximum growth during midsummer, it is a widely held belief that bermudagrass should only be fertilized during the summer months because previously there had been concerns that late-season fertilizer applications would be detrimental to winter-hardiness. Our research at Purdue and that of other researchers working in the upper transition zone has shown that bermudagrass can be fertilized modestly (e.g. 1 pound of actual N monthly) into early October without negatively affecting winter survival. In fact, in many years where turf has received supplemental early fall N, the turf actually greened up faster the following spring.

Once the turf is dormant, however, N should not be applied because it will not be taken up and the N will be subject to leaching. This fertilization strategy stimulates growth later into the use season, helping to maintain turf cover. Even as durable and vigorous as bermudagrass can be, it is still a living plant and can be subject to stand decline and losses in density when overused. By the same token, overstimulation of growth through aggressive fertilization and irrigation can result in excess thatch resulting in shallow rooting, less stress tolerant plants and spongy surfaces prone to more frequent mower scalping. This is particularly true for newer aggressive cultivars like Patriot.

Other species?

Most of this article has focused on bermudagrass but it is not the only choice for athletic fields. In general, spring and early summer use fields perform best when planted to Kentucky bluegrass, perennial ryegrass and even certain cultivars of even some of the newer turf-type tall fescue cultivars. Of these species, Kentucky bluegrass may have an advantage over ryegrass or fescue in that it produces rhizomes which promote recovery into worn or thin areas. If not properly maintained, or simply overused, bunch type grasses like tall fescue or ryegrass will severely clump and result in a bumpy surface.

For now, the most vigorous and reliable turf species for summer and fall use athletic fields from the transition zone and South appears to still be bermudagrass.

Periodically the question comes up regarding the use of zoysiagrass for athletic fields. Although the industry standard for cold hardiness is Meyer, which is more reliable than many bermudagrass cultivars for winter hardiness, this species would probably not be a good species choice for athletic fields. The primary reason is that zoysia is inherently slow growing and does not recover from excessive wear very quickly. Additionally, zoysiagrass may be prone to severe disease problems from *Rhizoctonia* large patch (zoysia patch), a disease from which zoysiagrass is very slow to recover from. Like anything in the turf industry, only time will tell on the use of zoyisagrass for athletic fields. I have been told there are actually a few zoysiagrass fields intended for use in the Beijing Olympics in this summer. But again, a caveat for these fields, this world sporting event is only being held for a few weeks in the hottest part of the summer, August. Zoysiagrass may produce an acceptable surface during that short time period of active growth.

For now, the most vigorous and reliable turf species for summer and fall use athletic fields from the transition zone and South appears to still be bermudagrass. Although winter-kill may be a risk in some years, increasingly hot and dry summers are more likely to damage cool-season grasses in almost all years. The advantage for using bermudagrass is that the renovation period, summer, can be used to re-establish bermudagrass and seeding bermudagrass for bermudagrass occurs in what is often a quiet period during part of the summer is now even easier than before. By comparison, cool-season grasses are best must established in late-summer which coincides with periods of intensive athletic field use for recreational sports.

The future continues to look bright for this species and those that want to continue to manage a natural grass field. For some athletic field managers the advances in bermudagrass breeding and our understanding of establishment and maintenance requirements for this grass make it an ideal species.

Let's face it, if you are managing a natural grass athletic field regular turfgrass renovation and re-establishment is an on-going process. Players continue to prefer natural grass surfaces for many reasons. The idea of rotating traffic, limiting and taking areas out of use make it easier. One example would be for soccer fields, often the goal mouths become worn due to overuse. Altering practice locations by moving portable goals to the side-lines to create make two-half fields perpendicular to the game field or moving the portable goals out to the top of the penalty box are just some methods that can be employed to spread wear and promote recovery in the game-areas. I am confident that plant breeders will continue to improve all species and as turf researchers and managers we must learn to take advantage of the strengths of these new cultivars and truly put them to the test. ■

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