

USGA investment.

Training of a number of graduate students occurred.

Two clonally propagated and one seed propagated selection with improved characteristics for the golf industry were entered into the 2007 NTEP Bermudagrass trial.

A new germplasm from China has been introduced recently into OSU's program.

Incorporation of increased water use efficiency, leaf firing resistance under drought and

improved shade tolerance in Bermudagrass are future goals of OSU's development effort. **GCI**

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*Editor's note: Literature cited in this article can be found on GCI's Web site, [www.golfcourseindustry.com](http://www.golfcourseindustry.com), posted with this article.*

## IMPACT ON THE BUSINESS

### Turf trial and error

**New variations of Bermudagrass could benefit turfgrass managers working in the transition zone.** BY KATIE MORRIS

Superintendents rely on the health and beauty of the course to attract golfers. If the turf is brown and damaged from cold temperatures or drought, a facility can lose money. That's why it's important for superintendents to use reliable and effective turfgrass.

Bermudagrass is one of the most commonly used turfgrasses seen on golf courses in the South, but even it has its limitations. Superintendents in the transition zone, including Colorado, Tennessee, Oklahoma and Missouri are constantly searching for ways to keep their turf green and healthy.

#### BENEFITS

Turfgrass managers agree Bermudagrass has its advantages over other turfgrasses such as bentgrass, Kentucky bluegrass and St. Augustinegrass. Ken Bennett, golf course superintendent at McAlester (Okla.) Country Club, manages Yukon Bermudagrass on his fairways and tees. Bennett says the benefit of using Bermudagrass instead of other turfs is its

heat tolerance and recovery time.

"[With Bermudagrass], if the turf gets hot and brown, it comes back in a couple of days; or if there are divots on the tee box or on the fairway, Bermudagrass grows back a lot faster than any other turf," he says.

In addition to healing quickly, Bermudagrass adapts well to low mowing heights and is best used for tees, greens and fairways. Mike Larson, general manager at Boulder (Colo.) County Club, likes Bermudagrass because it's a hardier grass that's tightly wound, which makes the greens extremely smooth, fast and consistent.

"It's a marvelous grass for surrounds around the green and on fairways," Larson says. "The balls will stand real nice on it with the short cut."

Doug Estes, director of grounds maintenance at the Colonial Country Club in Cordova, Tenn., manages Tifway 419 Bermudagrass because it makes the course more playable.

"The golfers like Bermudagrass better than other turfs because

it makes for a firmer and faster course," Estes says.

#### SAVINGS

When it comes to whether or not Bermudagrass saves money on pesticide and fertilizer use, turfgrass managers are split. Estes says Bermudagrass saves him money especially during the summer season when the temperatures keep the grass growing so he doesn't have to fertilize as much. Larson, on the other hand, says Bermudagrass would save superintendents money if they didn't have to overseed in the winter.

"What Bermudagrass saves you in pesticides and fertilizers, you're going to spend back in your overseeding product," he says.

Overseeding with ryegrass is one way superintendents protect their turfgrass during the winter season. The problem superintendent's encounter is they don't know when the first frost is going to occur, and if they miss their window of opportunity, they're going to have a lot of damage to repair in the spring.

#### LIMITATIONS.

The main concern superintendents have with Bermudagrass is its lack of resistance to cold weather. Bermudagrass is ideal for golf courses in tropical and subtropical areas, but when it comes to areas susceptible to freezing conditions, superintendents are in need of a variation with cold hardiness.

"Bermudagrass does well in heat and humidity but not so well in cold climates such as ours in Colorado," Larson says.

Researchers in the turf Bermudagrass breeding and development program at Oklahoma State University strive to develop a higher quality Bermudagrass with a higher tolerance to cold and shade.

A new shade tolerant Bermudagrass would help Estes fix a lot of weak areas under trees where the grass isn't as dense.

And despite the expense of overseeding, Larson says that if Bermudagrass had a variation with a higher cold tolerance he would certainly use it. **GCI**



BY ALEJANDRO CANEGALLO, MS, AND BRUCE MARTIN, PH.D., CLEMSON UNIVERSITY

## Looking at large patch in seashore paspalum

Academics test fungicides on various paspalum cultivars to combat disease.

Seashore paspalum (*Paspalum vaginatum* O. Swartz), described as the environmentally friendly grass, is among the most salt- and sodium-tolerant turfgrass species. This halophytic, perennial warm-season grass, which undergoes winter dormancy in colder climates, produces a beautiful turfgrass surface during its growing season. It's used mainly in mild to warm climates when the soil salinity and sodicity are high, when drainage is a problem and the water quality is poor. It can be used as a turfgrass for lawns, athletic fields and golf courses but also to control erosion and stabilize dunes and coasts.

Typically, it's propagated vegetatively (by sod or sprigs). The species doesn't produce a large amount of viable seeds, and seed production generally isn't reliable. However, there's

a new cultivar, Sea Spray, which is established by seeds. Seashore paspalum produces a dense and high-quality turf. It has excellent drought resistance and dehydration avoidance, is fairly competitive against weeds and requires less nitrogen than other warm-season grasses.

Some authors consider seashore paspalum to be native to Asia, Africa and Europe and introduced to the Americas. Other botanists believe it originated in America and naturalized into the old world. Even though the true origin isn't clear, recent studies about gene diversity and genetic distance between populations from different regions support the theory that seashore paspalum was introduced to North and South America from South Africa. The diversity among the ecotypes from South Africa is the largest, while accessions from North America

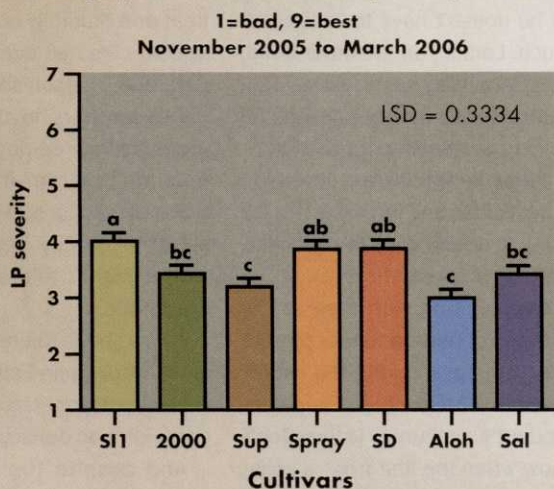
and South America are highly similar.

### INTRODUCTION TO THE U.S.

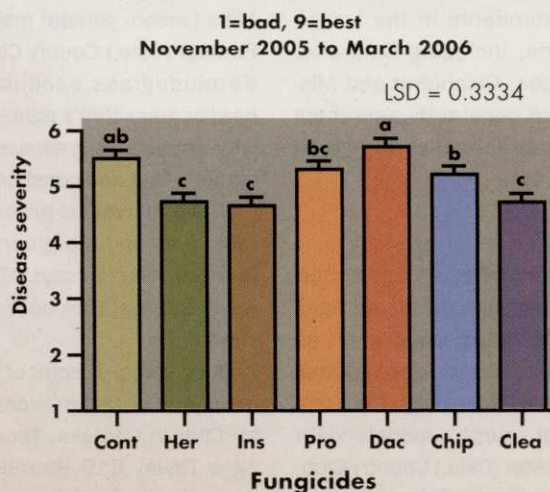
The wild, fine-leaf textured ecotypes of seashore paspalum found along the coast of the Atlantic Ocean, primary throughout coastal South Carolina and Georgia, are believed to have been introduced from Africa with the slave ships. The grass was used as a bed on the bottom of the ships that arrived to America during 1700s and 1800s.

During 1950s, O.J. Noer propagated an ecotype he found from fairway 13 at the Sea Island Golf Club in Georgia and distributed it to several people interested in this grass, including some in Hawaii. Australian cultivars Futurf and Adalyd were introduced into California during the 1970s. Although some research was con-

**Large patch cultivar susceptibility MRGC**



**Large patch fungicide control PDREC**





Symptoms of large patch on seashore paspalum fairways in South Carolina in December 2005. Photo: Alejandro Canegallo and Bruce Martin

ducted in California during the 1980s, the first formal breeding program for seashore paspalum was initiated at The University of Georgia by R.R. Duncan, Ph.D. in 1993.

#### CULTIVARS

All the cultivars being used as turfgrass are considered ecotypes, which means strains or selections within a given species adapted to a particular environment. Several collections of seashore paspalum have been assembled in Argentina with 28 Argentine-native ecotypes and in the U.S., first at the University of Florida Fort Lauderdale Agricultural Center and later between 1993 and 1999 at the University of Georgia, Griffin. Ecotypes from Rhodesia (now Zimbabwe), Mozambique, South Africa, Argentina, Hawaii, Australia, Guam, Brazil, Thailand, Israel, Uruguay, as well as Georgia, North Carolina, South Carolina, Florida, Texas, Arizona, California and Louisiana, have been assembled in the Georgia collection.

#### DISEASES

Seashore paspalum exhibits little disease incidence in its naturalized habitat; however, under the high maintenance programs on modern golf courses, several diseases have been found to cause severe damage under typical management and environmental regimes. Because seashore paspalum is a relatively new grass species for Southeastern U.S. golf courses, research information related to the occurrence and control of diseases on this grass is limited but is needed as interest in seashore paspalum increases in the Carolinas.

We've documented several diseases, includ-



ing large patch (caused by *Rhizoctonia solani* AG 2-2 'LP'), dollar spot (severe on several cultivars) and a necrotic superficial fairy ring. Also, we've isolated *R. zaeae* from seashore paspalum and suspect it's pathogenic, similar to its ability to cause disease in several cool- and warm-season turfgrasses. In this article, we will only discuss the description of large patch symptoms, identification of the causal agent, cultivar susceptibility to the disease and curative effects of fungicides on large patch.

Large patch has been diagnosed on seashore paspalum in South Carolina and from several sites in Florida (Martin, unpublished). Symptoms typical of large patch were observed, which included more or less circular patches of yellow-brown turf from 17 inches as big as 10 feet or greater. Diseased grass shoots at the margins of patches were yellow, and lesions could be observed that originated near the attachment of shoots to stolons.

Samples were collected from solid, large brown patches as big as several meters in diameter from a putting green at Old Collier Golf

Club, Naples, Fla., in February, 2005 (cultivar Sea Isle Supreme), from a practice putting green (cultivar Sea Isle 2000) at May River Golf Club in Bluffton, S.C., on March 31, 2005, and from a tee box at The Ocean Course on Kiawah Island, S.C., on May 9, 2005, (cultivar Sea Isle 1). Lesions on the basal leaf sheaths were observed under the stereo microscope at 70 X magnification and symptomatic leaves were easily pulled off from the plant and observed under a compound microscope. The mycelium observed at the base of the leaves was identified as a *Rhizoctonia* species based on hyphal characteristics: 90-degree hyphal branching, dolipore septa, septa near the side hyphal branches, and hyphal diameter about 10 micrometers.

Using standard isolation techniques, *Rhizoctonia* was easily isolated and purified in culture for further identification. Cultural characteristics of mature cultures turned brown and had abundant aerial mycelium with little to no sclerotia formation in culture. Nuclei in cells were stained with a fluorescent dye, called DAPI, that binds to DNA clearly showing a multi-



nucleate condition. The above characteristics placed the fungus into the species *Rhizoctonia solani*, and cultures were consistent with other isolates from large patch identified from other turfgrasses.

Three isolates of *Rhizoctonia solani* from seashore paspalum were paired with a tester isolate of *R. solani* AG 2-2 LP isolated from *Zoysia* spp. This isolate previously was used as a tester in a separate study. This pairing is called anastomosis testing and can be used to determine affinity of strains of *R. solani*. In our experiments, the strains from seashore paspalum fused with a tester from zoysia and clearly placed the fungus into *R. solani* AG 2-2 LP. Further inoculations onto seashore paspalum reproduced the symptoms of large patch, and the fungus was reisolated and shown to be identical to the inoculated fungus. This proved pathogenicity and showed the causal agent to be *R. solani* AG 2-2 LP and the disease on seashore paspalum to be large patch. This is the first formal report of large patch on seashore paspalum.

#### TESTING FUNGICIDES

An experimental putting green was built at the Pee Dee Research and Education Center in July

2005. The green was constructed following USGA specifications for putting greens. Seven cultivars of seashore paspalum (Sea Isle 1, Sea Isle 2000, Sea Isle Supreme, Sea Spray, Sea Dwarf, Aloha, and Salam) were planted in a randomized complete block design with three replications. The plots were 12 feet by 21 feet.

A natural and severe epidemic of large patch occurred during late September and early October 2005. So, every cultivar main plot on the green was divided into seven subplots, 3 feet by 12 feet, and fungicides were tested to see their curative effect on the natural epidemic. Six fungicides were tested: Heritage (2 fl. oz.), Insignia (0.9 oz.), Cleary 3336 50WP (4 oz.), Daconil Ultrex (3.2 oz.), Prostar 70WP (2.2 oz.) and Chipco 26GT (3 oz.). All currently are registered for control of large patch or brown patch. The fungicides were sprayed three times during the epidemic, 14 days apart: Nov. 2, 16 and 30, 2005. Plots were treated again on March 7, 2006. A shielded plot sprayer was used and was equipped with Teejet 8002ER flat fan nozzles and the volume was 2.1 gallons per 1,000 square feet.

At May River Golf Club, the putting green was built in 2003 under USGA specifications. Exist-

ing seashore paspalum was killed by fumigation with methyl bromide, courtesy of Hendrix and Dail Co. on July 22, 2005 and replanted with the same seven cultivars as on the Pee Dee REC green on August 11, 2005, in a randomized complete block design with three replications. The plots were 11 feet by 20 feet.

There were no symptoms of large patch at May River during the natural outbreak at Pee Dee REC. Every cultivar main plot was subdivided into six 3-foot-by-11-foot subplots for fungicide treatments. Four to five oat seeds infested with *R. solani* were placed 10 inches apart from every end of every subplot on every cultivar and every replication. The same fungicides were tested at May River, except for Chipco 26GT. After inoculation, patches developed from the inoculum, but a severe natural epidemic occurred on the putting green and on the fairways of Sea Isle 1 shortly thereafter.

The fungicides were sprayed three times during the epidemic, 14 days apart: Dec. 1, Dec. 15 and Dec. 29, 2005. Plots were treated again on March 9, 2006. Plots were rated for disease severity on a 0 to 10 scale, with 0 equaling no disease and 10 equaling 100 percent of plot area affected, during and after the epidemics, from

## IMPACT ON THE BUSINESS

### Getting objective about paspalum

BY PAT JONES

Let's face it: It's a little hard to get "jump up and down" excited about most turfgrass varieties. That said, if any one species could be described as a "sensation," it would have to be paspalum.

During the past five years, in particular, many in warm-season climates have jumped on the paspalum bandwagon. And why not? It's tolerant to many environmental stresses, including salt, heat and most heavy metals in effluent water. As potable water becomes less of an option for courses, paspalum is a marvelous alternative. Better yet,

newer, finer-leaved varieties have excellent playability characteristics and numerous courses love it as a putting surface.

That said, nothing is perfect and, as the article above points out, vulnerability to patch disease can be a problem.

#### IMPACT

Like many turf management choices, the decision to use paspalum comes with consequences. In this case, facilities likely will have to consider a preventative fungicide program similar to those used by Northern courses managing bent/

poa mix. On a 14-day rotation, disease management costs will likely be higher than with traditional Bermudas or even the improved bents increasingly grown in warm-season areas.

That, of course, presents some budget challenges. However, those potentially could be offset by lower inputs of fertilizer and/or reduced water costs for facilities able to secure less-expensive effluent water.

#### BOTTOM LINE

Paspalum has the potential to be a revolutionary turf for some

facilities. However, the trade-off will be more intense management practices – particularly through establishment. As a side note, the biggest issue associated with paspalum continues to be availability. Its newfound popularity and the relative difficulty of producing it in quantity (sod or seed) had made paspalum a scarce commodity. But, if you can find it, establish it and manage it under the right circumstances, you might well be able to ensure security for your course in a not-too-distant future when water options are exceedingly limited. **GC**



Severe symptoms of large patch on seashore paspalum fairways in South Carolina in February 2006. Large patch was so severe with coalescing patches the fairway turf resembled full dormancy. Photos: Alejandro Canegallo and Bruce Martin



October 2005 to March 2006. Turf quality was rated as well, on a 0 to 10 scale, with 0 being worst and 10 being best quality.

#### RESULTS AND DISCUSSION

Large patch symptoms in natural epidemics on seashore paspalum in South Carolina generally were similar to the disease as it's known in other warm-season turfgrasses. Patches varied in size from 12 inches to as big as several meters in diameter, coalescing frequently.

Isolates obtained from Florida or South Carolina were all identified as *R. solani* AG 2-2 'LP'. The identification was confirmed by culture characteristics, multinucleate hyphae and positive, high frequency anastomosis with a known tester isolate. Koch's Postulates were confirmed in the greenhouse inoculation trials on both cultivars of seashore paspalum.

#### FUNGICIDE CONTROL OF LARGE PATCH

There were significant differences in the reactions of cultivars of seashore paspalum to large patch and there were significant effects of fungicides on the disease. There was no interaction of

fungicides and cultivars, so main effects could be evaluated across fungicides or cultivars. Surprisingly, none of the fungicides tested provided complete control, although curative control of large patch in any grass is difficult.

At Pee Dee REC, the best control resulted from Insignia [mean of disease severity (MDS) = 4.66], Cleary 3336 (MDS = 4.68) and Heritage (MDS = 4.73). Plots treated with Chipco 26GT averaged a MDS of 5.16 and there was no significant difference with the plots treated with Prostar (MDS = 5.25). Plots treated with Daconil Ultrex (MDS = 5.65) had more disease than the control (MDS = 5.50) (LSD=0.3334).

At May River GC, Insignia (MDS = 3.0) and Heritage (MDS = 3.1) were most effective. There were no significant differences between plots treated with Daconil Ultrex (MDS = 3.46) and Prostar (MDS = 3.20). Control plots were the most severely affected with a MDS of 4.32 (LSD=0.4834).

#### PREVENTIVE APPLICATIONS

All the cultivars under the study were suscepti-

ble to large patch disease (*Rhizoctonia solani* AG 2-2 LP). There were some significant differences among the cultivars, with Sea Isle Supreme the least susceptible at both locations, and Sea Isle 2000 the most susceptible at Pee Dee REC and Sea Isle 1 at May River. Epidemics at Pee Dee REC were more severe than at May River. Generally, the colder winters in transition zone climate accounts for more severe large patch in several grasses. Nevertheless, large patch has been a recurring problem on seashore paspalum in the Naples, Fla., region.

The fungicides sprayed after severe epidemics didn't provide adequate control of the disease. The use of preventive applications of fungicides is highly recommended to control large patch on seashore paspalum. **GCI**

*Alejandro Canegallo, MS, and Bruce Martin, Ph.D., are from Clemson University in South Carolina. They acknowledge the assistance of the staff at May River Golf Club in Bluffton, S.C., and the staff at Pee Dee Research and Education Center in this research.*



BY JOHN WALSH

## A must have

Colorado superintendent relies on growth regulators for dollars and sense

For Mike McLaren, plant growth regulators are a tool he couldn't live without.

"I couldn't keep green speeds where they're at, and the membership wouldn't be satisfied," says the director of course and grounds at Boulder Country Club in Colorado. "I could mow greens down to a nub without PGRs, but you're risking a lot."

McLaren, who has been at Boulder eight years, works with a \$1.2-million maintenance budget and a \$250,000 annual capital budget to keep the course in the shape and in the condition the 500 golfing families expect. The 27-hole course (the nine-hole Les Fowler course and an 18-hole championship course), which was built in the early 1960s, features *Poa annua*/bentgrass greens, ryegrass/*Poa annua* fairways, bluegrass/

ryegrass tees and bluegrass/ryegrass rough.

Additionally, the club has an array of amenities including indoor/outdoor pools and tennis courts and an athletic center, which will go through a \$12-million renovation in about a year. The initiation fee for a nonequity membership is \$30,000.

"Members are paying a fair amount for dues, and they want their money's worth," McLaren says. "Those who are vocal about the condition of the golf course care a lot about the club. I'm happy here. The membership is wonderful."

As part of McLaren's \$55,000 chemical budget, which increases slowly each year because of the increasing cost of goods, \$21,000 is spent on growth regulators. He purchases mainly Primo but also uses Em-

bark and Proxy during the growing season.

Most chemicals are purchased via an early-order agreement made in the winter months through Golf Enviro Systems and the manufacturers. This ensures availability and locks in the previous years price. They're delivered by Golf Enviro Systems based on the timing of McLaren's operational needs.

McLaren applies PGRs on greens and fairways starting in the spring and ending sometime in September.

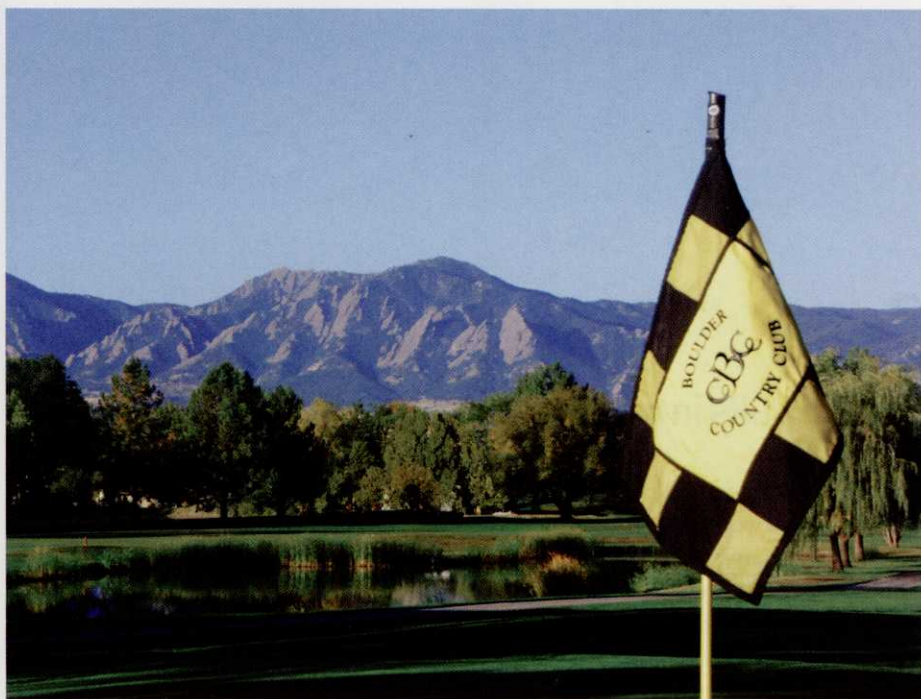
"I spray all playing surfaces except the rough," he says. "I use a little more than 10 gallons per month or 80 gallons a year."

McLaren's first greens application of Embark is in late March or early April at 0.8 to 1 ounce per 1,000 square feet. The second application, two weeks later, is made at 0.6

At Boulder Country Club in Colorado, Mike McLaren use three different plant growth regulators – Primo, Embark and Proxy – on greens, tees and fairways during the growing season. Photo: Boulder Country Club







At Boulder Country Club in Colorado, Mike McLaren use three different plant growth regulators – Primo, Embark and Proxy – on greens, tees and fairways during the growing season. Photo: Boulder Country Club

ounce per 1,000 square feet. He applies a total of four applications of Embark every 10 to 14 days.

Like Embark, McLaren's first application of Primo is applied in late March or early April at 0.15 to 0.25 ounce per 1,000 square feet. Then it's applied three times a month for the rest of the growing season on greens. Fairways are treated with Primo at 1 ounce per 1,000 square feet each month.

Additionally, McLaren makes three applications of Proxy on greens – 6 or 7 ounces per 1,000 square feet each application – starting in late May or early June.

All PGRs are tank mixed. Embark is mixed with Primo and fertilizer. In late May and early June, Embark is still in the grass when McLaren applies Primo and Proxy, so all three chemicals are in the plant at one time.

On fairways, McLaren sprays Primo mainly to reduce labor. He says superintendents normally should mow fairways every day of the week in Colorado, but with Primo, he mows them about three to four times a week mainly to break up divots. The labor money saved by mowing fairways fewer times each week pays for the Primo itself, he says. It

also saves on wear and tear on the mowers, capital replacements, fuel, wear on the bedknives and the mechanic's time working on the mowers.

McLaren also uses Primo because it helps provide denser turf, reduce the number of *Poa* seed heads, provide darker color and improve the overall health of the grass plant.

"I believe that if you don't have the top growth, there's still as much photosynthesis, and that energy is going to the crown and roots of the plants," he says.

Unlike fairways, greens are mowed every day to provide a much better playing surface. The advantage of using PGRs on greens is helping maintain speeds and consistency (quality of turf). Most of the time, McLaren shoots for a 10.3-to-10.6-range on the Stimpmeter.

"I've met with some of the top superintendents at the private clubs in Denver, and they're shooting for a 10 to 10.3 range," he says.

Aside from Primo, McLaren uses Embark to control *Poa* seedheads. He says that in the past superintendents would apply Embark based on air temperature but ended up with inconsistent suppression results. So, he

started applying the product based on soil temperatures (40 to 45 degrees) because there's more of a direct tie to what the grass is doing with soil than air – especially in Colorado where one day it can snow and the next day be as warm as 70 degrees in the afternoon.

"After using Embark for years, I started to incorporate Proxy to control *Poa* seed growth," he says. "Whatever seed head isn't controlled with Embark I 'melt the seed off the stalk' with Proxy. There are usually two *Poa* blossoms, one in the spring and one in the fall, but we don't get the second blossom in the fall because we use Embark.

"Throughout the years, everyone has tried to get rid of *Poa*," he adds. "I have to manage my *Poa*, and there are only a couple products I'm comfortable with. I'm most comfortable with Primo because I've played with it a lot to extremes, and I haven't been able to damage the turf. I've played with Embark but not to the extent of Primo. I haven't had the chance to play with Embark as much partly because I don't have the desire because my program is producing great results."

Embark has a long residual in turf plant, McLaren says.

"After the first application, it's like topping off the cup so to speak," he says.

For McLaren, PGR use all comes down to dollars and sense. With the manpower he saves by using PGRs, he can use those resources elsewhere for detail work, which includes walk mowing tees, greens, and approaches, more intricate mowing patterns, trimming property lines and waterways, planting and maintaining extensive beddings, and just plain tidiness around the course.

"It's this kind of detail that separates a course with less resources from a high-end country club," he says. **GCI**



BY JOHN WALSH

## The big three

Oregon superintendent benefits from PGRs in multiple ways

Darren Klein likes the results of using plant growth regulators, specifically the labor savings, consistent greens and seedhead control.

Klein, golf course superintendent at the private 18-hole Brasada Canyons, maintains the 1-year-old course that plays throughout the foot hills of Powell Butte, Ore. Klein has been growing in the course at Brasada, which has 240 members, for three years. He worked at Eagle Crest Resort outside Redmond, Ore., for 10 years before coming to Brasada. The layout features nine holes in canyons and on ridges. The fairways, rough and tees are an 80/20 mix of bluegrass and ryegrass. The greens are A-4 bentgrass.

Klein works with an annual maintenance budget of \$900,000, \$42,000 of which is allotted for chemicals and \$2,200 for plant growth regulators. He has a 22-person crew during the season and six full-timers.

Klein gets his plant growth regulator application rates right off the label.

For Klein, the biggest benefits of using plant growth regulators are the control of clippings on fairways and labor-saving costs as a result of being able to eliminate one mowing day per week. He mows fairways four times a week during the height of

growing season, and that tapers off to two or three times a week during the spring and fall. He sprays fairways with Primo once a month during the growing season, which is May, June, July and sometimes August in central Oregon.

"Once the course was grown in and we were up and mowing the fairways, we

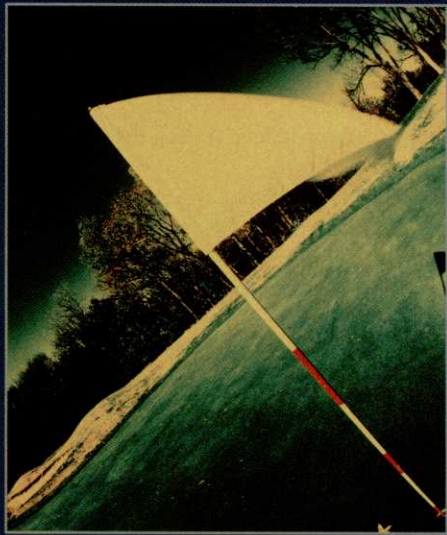
sprayed to help tillering and density," he says. "Now we use PGRs to control clippings in the fairways."

PGR use on greens helps give them consistent ball roll throughout the day. Green speeds run between 10 feet and 10.5 feet during the season and 12.5 feet during tournaments. He sprays greens,



Out of \$42,000 spent on chemicals annually, superintendent Darren Klein spends \$2,200 on plant growth regulators.





Darren Klein purchases plant growth regulators monthly because he doesn't like storing many chemicals on property.

which are mowed daily, every two weeks with Embark. The choice of Embark was influenced by a plan suggested to Klein for *Poa* control on greens from his distributor, Wilbur-Ellis. Klein says the A-4 bentgrass is dense enough to begin with, so he doesn't use PGRs to improve the density of the turf on the greens.

Klein doesn't use PGRs in the rough.

When applying PGRs, Klein uses the same TeeJet nozzles that he uses when applying fungicides. He doesn't tank mix the fungicides and PGRs when applying them, but he'll tank mix iron to mask any yellowing that might occur. He uses a granular fertilizer rather than a liquid fertilizer on the fairways, so the PGRs aren't tank mixed with fertilizer either. The PGR applications are timed between the fertilizer applications.

Klein has seen a little bit of *Poa annua* in the fairways but nothing on the greens so far.

"It's a losing battle," he says about eradicating *Poa*. It's about how slow you can let it move in."

Klein won't alter his PGR program even if *Poa* encroaches into the greens.



"We'll just have to live with it," he says.

Klein buys Primo and Embark through Wilbur-Ellis.

"I used to use Primo on everything, but the distributor recommended Embark," he says. "Embark used to be weather sensitive, but now it's been reformulated to be more user friendly."

When it comes to purchasing PGRs, Klein does it monthly, not in bulk at the beginning or end of the season.

"I don't like storing a lot of chemicals on property, plus Wilbur-Ellis is close by," he says. **GCI**





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## FROM THE FRONT LINES

**Q** During the PGA Championship and other summer events, I've noticed the grounds crew was hand-watering/syringing greens during play. Is this a normal practice and why?

**A** Most definitely. The temperatures in Tulsa, Okla., exceeded 100 degrees. The PGA Championship staff allowed the superintendent to syringe and quickly water the greens, which were stressed because of the heat and player/caddie traffic. This is done frequently and coordinated with the on-course rules officials, so not to interfere with the players and the PGA's pace-of-play system. Turf health is always a priority, even during a major championship.

**Q** The competitors in the PGA Championship were concerned with excessive spike marks on the putting greens and were vocal about it. What's the deal?

**A** The professional tours allow metal spikes to be worn. A player has the option to wear metal spikes or to consider spikeless alternatives. Countless research indicates the alternatives are as stance stable and traction worthy as metal spikes – and far better agronomically.

At this year's PGA Championship, a combination of metal spikes, high heat, humidity and increased player traffic contributed to the tufting and vertical oriented position of grass blades. A rolling ball will be deflected from its true course to a different direction by the tufted grass blades because of a player's

option not to wear spikeless alternatives. Ironically, the players are concerned with an issue they create and can rectify.

**Q** While watching the team of riding mowers cut fairways, I noticed each operator carrying a yellow tennis ball. Why?

**A** When you have a line of six or more riding mowers cutting in the early morning or late evening hours, it's difficult to see or hear a fellow operator call out to the operator in front of him if there's an issue with the forward cutting unit. By having a yellow tennis ball available, the operator who notices an issue, such as a hydraulic leak, low tire air pressure, improper cutting quality or gas leak, can throw the yellow ball up ahead so the line of mowers can immediately stop. They'll exit and remove themselves from the fairway to avoid any further damage, reel streaking, striping skips or, most importantly, gas and oil leaks.

**Q** After greens were mowed in the evening, crew members were fixing ball marks created by the day's play. I noticed they were pouring something into the ball mark after repair. What was in the bottle?

**A** Each crew member repairing ball marks was adding a sand/bentgrass seed mix back into the ball blemish to begin the healing process. Also, the added sand material helps smooth the surface for a better ball roll for the competitors. The key is to avoid soil or organic matter in the mix in case of a rain event. In that case, any soil in the ball-repair mix, which becomes wet, will streak across the green surface during the mowing process, causing much anxiety to the golf course superintendent and his mechanical staff.

**Q** Why did the PGA golf course set-up officials stretch tape across the put-

ting surfaces before setting the hole location?

**A** This is to provide as accurate as possible a front-to-back and side-to-side yardage measurement for the hole location sheets that are given to the competitors and caddies before each formal round of play. The accuracy and distance control the players have is amazing. They require exact yardages for their approach shots into greens.

Also, the PGA Championship staff will place a painted dot on what they will use as their putting surface front-and-back axis along their interpreted line. The players might use these center dots to determine their yardages, or they might create their own measurement methods during practice rounds.

**Q** Why does the crew spend so much time hand-raking sand bunkers? Wouldn't it be easier to use a riding, mechanical sand rake?

**A** It would be easier, on occasion, and usually quicker to maintain a sand hazard with a mechanical rake. However, with rapid raking, slight ridges of sand or tire tracking will remain. Additionally, the swirling of sand might create varying depths within the bunker, especially where the operator enters and exits the hazard.

Any raised sand or ground in a bunker that's touched by a player's club during their backswing is a penalty. Although hand-raking is time consuming, it reduces this potential for penalty and creates a smooth, consistent playing surface. Unfortunately, the industry has provided a reduced price for hitting into a hazard because of consistency efforts. A miss-hit that lands into a hazard should be a penalty, not a reward. **GCI**

*Editor's note: If you have a question about course set-up or maintenance as it relates to golf tournaments or events, e-mail Tim Moraghan at [tmoraghan11@comcast.net](mailto:tmoraghan11@comcast.net).*

