SOD CUTTER TRAILER

Bob Pruneau, equipment manager at the Halifax Golf & Country Club (Old Ashburn), Halifax, Nova Scotia, Canada, designed and built this Ryan Jr. Sod Cutter user-friendly trailer. When the tow bar is in the vertical position, the sod cutter is attached to the trailer with a 1-inch x 32-inch long round rod stock that slides through factory-drilled holes in the sod cutter, with holes drilled on each end of the rod for lynch pins to hold it in place. The tow bar is then lowered to the horizontal position and the sod cutter is cantilevered onto the trailer with a perfect weight balance. 2-inch x 2-inch x 1/8 inch thick square tube stock & 1/8-inch flat metal stock was all welded together and painted green and one recycled axle with 16.5-inch x 6.5-inch x 8-inch wheels and four-ply turf tires were used. The materials were all recycled and in inventory, except the primer and paint at $15, and the labor time was about six hours.

Terry Buchen, CGCS, MG, is president of Golf Agronomy International. He's a 41-year, life member of the GCSAA. He can be reached at 757-561-7777 or terrybuchen@earthlink.net.

Super Saver

Retrofitting irrigation nozzles not only saves water, but courses are learning it can have a dramatic impact on reducing water costs, too.

With U.S. golf courses using upwards of an estimated 476 billion gallons of water each year, management companies like American Golf Corp. are taking the lead in implementing innovative conservation strategies.

American Golf, based in Santa Monica, Calif., operates more than 110 private, resort and public courses across the country, with 60 in the drought-prone "golden" state of California.

One water-saving strategy that's delivered measurable results is American Golf's ongoing switch-out of plastic rotor nozzles to solid metal nozzles.

Just during the last three years, American Golf has retrofitted more than 20,000 nozzles on nearly 20 southern California courses with an estimated annual water savings of at least five percent per year.

With a typical southern California course using more than 100 million gallons annually, a five percent savings translates to five to 10 million fewer gallons per course – or hundreds of millions less for American Golf.

REBATES FOR SWITCH-OUTS

Driving the nozzle retrofit effort is the powerful Metropolitan Water District of Southern California (19 million customers), which has been offering rebates to courses in key counties for every set of Profile nozzles they install. Referring to them as "high-efficiency nozzles," MWD only accepts field-proven Profile nozzles in the rebate program.

"At American Golf we are committed to being good environmental stewards and to finding new ways to reduce water consumption," says Scott Bourgeois, American Golf's southern California director of maintenance.

"The MWD rebate program has been an excellent opportunity to participate in a beneficial partnership to help achieve water conservation goals," he says.

An obvious byproduct of the program from a customer perspective, says Bourgeois, is improved turf conditions through Distribution Uniformity, which enhances playing conditions.

DU rate is typically a barometer of turf condition and indicates whether a sprinkler is delivering uniform irrigation coverage. A low DU rate of 0.55 or less indicates that coverage is inconsistent, resulting in dry spots, donuts or over-watered areas. A high DU rate of 0.80 or better shows that irrigation is uniform, resulting in healthier turf and improved appearance. With a

Using retrofit irrigation nozzles not only provides better coverage distribution uniformity for turf, it actually saves the course money in energy costs. American Golf courses using retrofitted nozzles in the last three years had an annual water savings of at least five percent per year.

higher DU rate, sprinklers can be programmed for shorter run times, saving water and energy.

In just the last three years, numerous public and private courses in southern California have used the rebate program, "Save Water – Save a Buck."

ANNUAL SAVINGS

In promoting the program, MWD estimates that installing "high efficiency" Profile metal nozzles can result in annual water savings of up to 6.5 percent.

"Mostly used on golf courses and other open landscapes for long-range and close-in watering, high-efficiency nozzle retrofits provide a healthier and greener turf with improved water distribution," according to www.mwdsaveabuck.com. "These nozzles also save water, save energy and result in lower maintenance costs."

Made by Underhill International of Lake Forest, Calif., Profile are the only nozzles approved by MWD for rebates on large rotary golf course sprinklers.

The MWD program was implemented following a comprehensive study on Profile nozzle performance conducted by Dr. David Zoldoske at the Center for Irrigation Technology (CIT), California State University, Fresno.

After two years of rigorous testing at five representative California courses, CIT concluded that Profile metal nozzles retrofitted to Rain Bird or Toro golf rotors performed with consistently higher Distribution Uniformity. Each course in the study saved about 6 million gallons annually with the Profile nozzles.

One of the keenest observers of golf irrigation practices is Brian Vinchesi, president of Irrigation Consulting Inc. of Pepperell, Mass., and Huntersville, N.C.

Vinchesi became acquainted with Profile nozzles through both the CIT study and cross-country business travel, talking with superintendents who had installed the solid metal nozzles.

"What sets Profile nozzles apart is they are essentially 'custom made' for the industry's most popular golf heads," he says.

"They're not a product that can be mass produced and still perform at the same level of consistency. The precision required for uniform coverage is better accomplished by a smaller manufacturer with good quality control," he says.

In surveying irrigation systems at hundreds of courses in the U.S., Vinchesi concluded that older sprinklers deliver very poor Distribution Uniformity (DU), which is only minimally improved with maintenance.

PRACTICAL AND INEXPENSIVE SOLUTION

Sprinkler heads manufactured in the 1980s and 1990s were, in fact, never designed to deliver optimum DU, he says, as water use was not an issue.

The options for superintendents have been limited up to now. Typically, courses either replaced the internal mechanisms or the entire head, or resorted to daily hand-watering of dry patches during the summer.

"However, in this current economic climate, Profile metal nozzles have become a practical and relatively inexpensive solution to improving Distribution Uniformity without the expense of replacing a golf sprinkler or its internal mechanism," Vinchesi says.

That's exactly what Superintendent Logan Spurlock had in mind when he retrofitted the entire Jack Nicklaus-designed Sherwood Country Club in Thousand Oaks, Calif., with metal nozzles.

Although Rain Bird 700 Series rotors were installed in 2005, loose impediments, such as sand, were restricting flow through the nozzles, resulting in uneven water distribution. Nozzle cleanouts were becoming a routine.

The course, situated in a picturesque area north of Los Angeles, was once a popular location for early Hollywood adventure films. The original "Robin Hood" was filmed on what is now Sherwood's front nine. Because of the movie, the area became known as "Sherwood Forest."

Each December the course hosts the PGA Chevron World Challenge, benefiting the Tiger Woods Foundation.

After prepping the course for the 2009 tournament and battling the clogged nozzles, Spurlock looked for a better way.

Networking with fellow superintendents, he investigated Profile nozzles and learned his course qualified for the MWD

retrofit rebates. He ordered a sample set and after testing them on a fairway, Spurlock and his crew were convinced.

"The nozzles totally lived up to our expectations," he says.

"We decided to do a major switch-out and within three months our irrigation crew changed more than 500 heads, working on three to four fairways a day," he says. ""It was a hectic pace, but worth it. Right away, we could see better DU from close-in coverage out to the furthest reach of each head."

CONSERVATION AND WATER MONITORING

Spurlock has a mixed bag of water sources: 50 percent reclaimed, 25 percent well and 25 percent potable, only used on the greens.

"Even with our multiple water resources, conservation is a still a concern," he says.

Before installing the Profile nozzles, he ran the irrigation system for extra minutes to green up the course. Now he has shortened run times for a more efficient schedule and has implemented "cycle and soak" programs for healthier root growth and less run-off.

Profile retrofit nozzles have tiny notches pressed into the nozzle face along the stainless steel insert. The notches strip away a small amount of water from the main stream, dropping it closer to the sprinkler head, spreading the stream more uniformly.

Even while courses are enacting water conservation measures and adjusting scheduling, Vinchesi warns water monitoring by state and local water districts may be on the horizon.

"In areas of the country, especially in the west, there is no requirement to measure or report how much water a golf course is using," he says.

"In most eastern states, however, to pull water from the ground or from surface water, a water withdrawal permit is required. These permits are usually for diversions of 100,000 gallons or more on an average daily basis, which an irrigated golf course easily exceeds," he adds. "Measuring and monitoring your water use is also the responsible thing to do. If your water usage jumps up or your water use significantly decrease, it's a sign that something in the irrigation system has changed. So monitoring water use can be a troubleshooting tool, as well."

By anticipating coming trends in golf course water management, superintendents who implement conservation strategies now will be better able to work with new mandates while still maintaining "fast and firm" championship courses. **GCI**

Nancy Hardwick is head of Hardwick Creative Services in Encinitas, Calif.

REVOLUTIONARY CHOICES

We're like Burger King...we want you to **have it your way.** That's why our great content is available to you across so many **cool platforms.** From our award-winning flagship print publication to a brand new website to a stream of delicious Tweets, **GCI reaches more decision-makers** in more ways than any other publication in the market. And...ahem...we actually have **interesting** things to say.

GOLF COURSE INDUSTRY

DECLARE *YOUR* INDEPENDENCE

BY ROB GOLEMBIEWSKI, TOD BLANKENSHIP AND BRIAN MCDONALD

Can annual bluegrass putting greens be healthy and fast?

Oregon State University research shows that daily rolling, along with higher mowing heights, provides high-quality turf and excellent green speeds.

During the past 30 years the successful management of golf course putting greens in the U.S. has generally been associated with green speeds, which can be traced back to the introduction of the Stimpmeter in the late 1970s. The USGA's goal was to give superintendents a tool to assist them in creating consistent putting conditions across the entire golf course.

With the advent of the Stimpmeter, many cultural and chemical practices have been implemented through the years by superintendents in a quest for the "perfect" firm, fast greens. These include lowering mowing heights or increasing mowing frequency, reducing irrigation and fertilizer amounts to limit plant vigor, applying plant growth regulators to limit vertical growth or employing devices like rollers. Some or all of these practices may be implemented at any one time to optimize putting green speed, which is measured in terms of ball roll distance (BRD).

With the advances in mowing equipment, some golf course superintendents are now mowing greens as low as 0.075 inches in an effort to satisfy golfers' continuing desire for faster speeds. These low mowing heights are extremely dangerous to the overall health of the turfgrass plant. During the summer months, greens maintained at these low heights of cut often lose density, lack vigor, recover slowly from wear, and exhibit poor resistance to pest infestations. Dr. Thom Nikolai (Michigan State University) reported mowing heights on creeping bentgrass greens could be raised from 0.125 inches to 0.156 inches during the summer months, if combined with lightweight rolling, to maintain green speeds and an overall healthier turfgrass stand. Lightweight rolling is conducted to smooth and improve turf canopy uniformity on putting greens

REVOLUTIONARY STORIES

Looking to really know what's going on around you in the golf market? Look to GCI for stories no one else is telling told by the industry's best writers.

GOLF COURSE INDUSTRY.

DECLARE *YOUR* INDEPENDENCE

Table 1. Treatments for research trial.

Treatment	Roller
Mow Daily (Check)	—
Mow Daily (Check)	—
Mow Daily – Roll M, W, F	Gas
Mow Daily – Roll M, W, F	Electric
Mow Daily – Roll Daily	Gas
Mow Daily – Roll Daily	Electric
Roll Daily – Mow M, W, F, Sa	Gas
Roll Daily – Mow M, W, F, Sa	Electric
Alternate Mow & Roll Daily	Gas
Alternate Mow & Roll Daily	Electric

as well as to increase BRD.

Overwhelmingly, green speed research to date has focused on creeping bentgrass. The objective of this study was to investigate the effects of various mowing and rolling regimes on annual bluegrass (*Poa annua*) green speeds.

MATERIALS AND METHODS

The research trial was conducted at the Oregon State University Lewis Brown Research Farm located in Corvallis, Oreg., on a 100 percent annual bluegrass (*Poa annua cv. Northwest Poa Greens*) putting green. The treatments (Table 1) were chosen to compare the effects caused by different roller technologies and mowing and rolling frequencies on annual bluegrass putting green speeds. Each treatment plot (3.33 ft. x 15 ft.) was replicated three times for a total of 30 plots.

All mowing was performed using a walk-behind greens mower (Jacobsen PGM 22) set to a cutting height of 0.150 inches. Rolling treatments were performed with a Smithco gas roller (845 lbs.) or with a Smithco electric roller (1,140 lbs.). The plots were mowed at 8 a.m., and immediately following mowing operations, rolling was applied as a single pass across plots. In 2009, plots were fertilized (0.15 lbs. N/1000 ft2) and topdressed weekly. In 2010, plots were fertilized every 10-14 days and topdressed biweekly. Putting green speed was evaluated daily by measuring ball roll distance with a Stimpmeter at 9 a.m. and at 2 p.m.

EDITOR'S NOTE
This article originally ran in Green Section Record Vol. 49 (5), Feb. 4, 2011

RESULTS AND DISCUSSION

All ball roll distance data were averaged over the two-year trial length. The effect of rolling when averaged across all treatments was significant. Both the gas roller and electric roller provided approximately a one foot increase in BRD when compared to the non-rolled plots. It is interesting to note that no BRD differences were observed between the gas and electric rollers, even though the electric roller is 300 lbs. heavier than the gas roller. This illustrates the point that heavier is not necessarily better when it comes to BRD.

Since no differences were observed between the two rollers, mowing and rolling treatments were averaged across all roller treatments. The greatest increases in BRD were observed with mowing and rolling daily (+17.5 inches), followed by rolling daily and mowing four days each week (+12 inches). Mowing daily and rolling three days a week, along with alternating mowing and rolling, also resulted in positive BRD. The afternoon measurements were comparable to the morning, with an average decrease of two inches. Dr. Doug Karcher (University of Arkansas) and his research team determined golfers cannot distinguish between green speeds of 6-inch differences or less. Based on these findings, there was no distinguishable difference in green speeds from morning to afternoon. These data would indicate that superintendents can maintain desirable annual bluegrass green speeds throughout the day, following an appropriate mowing and rolling regime in the morning.

Based on the significant annual bluegrass BRD increases obtained with various mowing and rolling regimes, we compared the differences with those previously reported on creeping bentgrass. The data, while not identical, mirror the effects of the various mowing and rolling treatments for creeping bentgrass and annual bluegrass.

Annual bluegrass exhibited slightly lower green speed increases for all treatments compared to creeping bentgrass; however, in 2010, mowing at 0.150 inches and rolling daily provided an average BRD of almost 11 feet. This is significant because a survey conducted by the USGA during the summer of 2010 showed more than 90 percent of the respondents preferred putting greens with BRD ranging from 9 to 11 feet.

CONCLUSIONS

The results indicate annual bluegrass green speeds can be significantly increased by rolling in combination with higher mowing heights, and that the increases observed are not lost from morning through the afternoon. In addition, the quality and overall health of the putting green are greatly improved as a result of the higher height of cut. It is recommended that all golf courses consider raising mowing heights and implementing a rolling program, because this is a win-win situation for both the course and the golfers. **GCI**

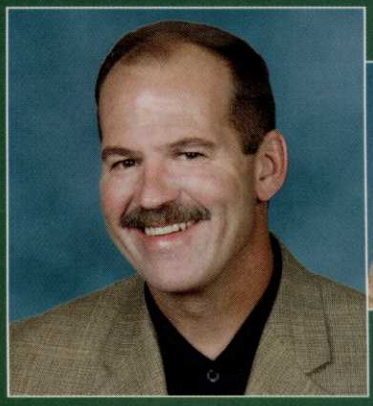
Rob Golembiewski, PH.D, assistant professor, horticulture; Tod Blankenship, CGCS, M.S. candidate, horticulture; and Brian McDonald, research technician, horticulture, at Oregon State University.

Annual bluegrass green speeds can be significantly increased by rolling in combination with higher mowing heights.

REVOLUTIONARY VOICES

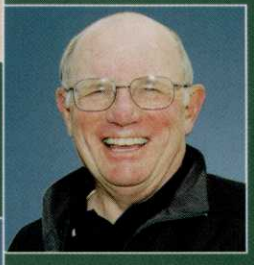
TIM MORAGHAN
Views from a legend of championship set-up

JEFF BRAUER
Practical design ideas and unique views on the market



PAT JONES
Tells it like it is

TERRY BUCHEN
Real-world ideas and tips from around the globe



MONROE MILLER
Common sense and uncommon wisdom

BRIAN VINCHESI
The global guru of golf irrigation design

In every edition, six unrivaled columnists deliver timely and challenging opinions about the issues and ideas that matter to you.

*What **other publication** does that?*

GOLF COURSE INDUSTRY

DECLARE *YOUR* INDEPENDENCE

TURF MANAGEMENT

(continued from page 52)

the more common mistake is to reduce the number of annual applications too soon. Regular monitoring, consisting of at least annual testing, is essential to ensure the success of the program year after year. Eventually, the program will be modified to maintain the physical properties you have achieved.

WHAT CAUSED WHOLESALE TURF LOSS?

I have had conversations and have observed more devastation on golf greens than I care to talk about. I am by no means a scientist but I have been around golf turf for more than 30 years. What I have is evidence that nighttime temperatures never dropped in some cases below 80 F for extended periods, never allowing drier sand-based root-zones to cool.

Fans at green sites have a substantial benefit in aiding the cooling effect due to the evaporative effect on the turf canopy. Fans surrounding the putting surface are a distraction to the aesthetics. With the ongoing cost to operate, you'll soon discover over a period of several years a small fortune can be spent to keep bentgrass turf healthy with artificial wind. Why must greens be designed and built in depressions with large trees blocking natural sunlight and air circulation? Many superintendents responded in a write-in portion of the survey that increased air circulation would have improved turf conditions.

Older sand greens have problems with drainage and gas exchange. Whether from a high percentage of organic material in the upper portion of the root-zone, poor topdressing sand, not enough topdressing applications or perhaps a degradation of calcareous sand, the take away here is water and gas exchange in most cases were severely compromised. Second only to air circulation; superintendent's sited drainage was the limiting cause for healthy turf on greens they managed.

Organic material was the culprit in many situations. Superintendents are being placed under increased pressure to skip or curtail vital core aerification procedures and routine topdressing to increase playable days and in turn maximize revenues.

In normal, less stressful summers, the impact of accumulated organic material in the upper 3 inches of the root-zone was not a critical factor. In 2010, golf course turf roots cooked in the soupy, low-oxygen mess of thatch and organic matter.

High content or straight sand greens suffered significantly more because the physical ability of sand to transfer temperature is greater than soil on mostly push-up type greens. Even sand greens that have limited amounts of organic material to buffer temperatures were affected. Greens that have a soil component or had limited sand topdressing on top of soil base fared better, in my opinion, due the temperature buffering ability of the soil fraction if the green was well drained.

A sand green root-zone after multiple heavy topdressings.

WHAT NEXT?

There are some fundamental questions that need be asked:

- Could maintenance and construction methods be changed to regulate/moderate the temperature in the root-zone?
- In older sand greens, do calcareous sands cause a reduction of drainage and air exchange?
- Can new bentgrass varieties be bred to withstand higher root-zone temperatures?
- Could a soil fraction in the root-zone be incorporated to create an environment to increase decomposition of organic matter and perhaps buffer soul temperature?
- Is the sand size specification optimum to support drainage and gas exchange as the green ages?
- With just several minor changes during the last 50 years, can new research improve sand-based root-zone systems?

We all know, and the research bears it out, that the sand-based root-zone green begins to change dramatically with age, and the hanging water column (perched water table) system begins to be non-functional after the onset of organic material accumulation. The American Society of Golf Course Architects recommends replacing greens at an interval between 15-30 years. With aggressive and proper care I have witnessed sand-based as well as soil greens last more than 20 years and sustain great turf stands.

Sand-based root-zones are not for every golf course, the sand root-zone is very costly to build and maintain and the benefits of these greens diminish substantially if not cultivated and topdressed religiously. Less expensive sand/soil blends can be built and maintained for far less money and perform nearly as well.

The surveys point out that fundamentally, if not aggressively managed, the root-zone is the area that failed during the summer of 2010. And, expensive sand-based greens designed and built to enhance root-zone management have performed less than adequately, actually reducing water and gas exchange in the all important root-zone if not managed to a high level.

A new look needs to be taken to engineer and or manage a more stable root-zone that can sustain an environment for optimum root growth and function without the high cost and down-time of the current sand root-zones. **GCI**

Michael Vogt is a consultant with the McMahon Group and a frequent contributor to GCI.