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Due to DEW

Summer means overnight humidity, dew and disease pressure. Here are ways to prevent that morning moisture from destroying your turf. By Katie Tuttle

As the summer weather starts to heat up, superintendents across the country are turning some of their focus to the turf diseases that come with the change in temperature and weather conditions; diseases such as dollar spot (*Sclerotinia homoeocarpa*) and brown patch (*Rhizoctonia solani*), which can be detrimental to the turf.

“All pathogenic fungi can facilitate themselves very well in moist conditions,” says Carmen Magro, Chief Agronomist at Agronomy Management Solutions. “Anytime there’s free moisture on the leaves, infections can take place as soon as there’s an opportunity for that infection to get in that plant.”

Because of this, it’s suggested that course superintendents

initiate a regular dew removal routine. There is plenty of research out there to support the idea that dew removal directly links to a potential decrease of diseases, such as dollar spot and brown patch. Because of this, it might be beneficial for superintendents to consider adding a dew removal program to their summer maintenance if they don’t already implement one.

There are multiple ways courses can remove dew from both the fairway and putting greens. The first is to use a surfactant. Another way is by syringing, or using a backpack sprayer with tap water to simulate irrigation. However, this may not be your best option.

“It seems kind of odd that you would remove water with water,” says Magro. “It’s not exactly environmentally the right





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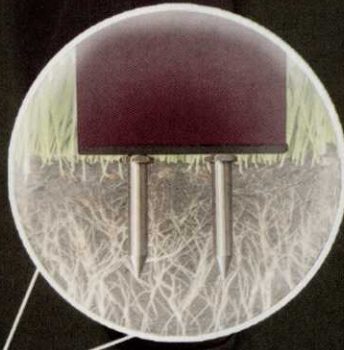


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Intelligent Irrigation



This image illustrates a dew layer on a putting green. Notice how the dew encapsulates the entire leaf blade in many parts. This layer allows a medium for pathogenic fungi to move around, reproduce and lead to increased disease pressure on the underlying turfgrass.

“On warm nights, when we have cooler weather and dryer weather, we see less disease pressure because diseases mainly thrive in warm or hot weather with moist conditions,”

– says *Carmen Magro, Agronomy Management Solutions.*

thing to do.”

A third technique courses can use to remove dew is by dragging rubber hoses across the fairway and putting greens.

While some courses also mow, and it's actually recommended as a technique, Magro says this might not be a good idea either. His reason is that the blades of grass grow a waxy layer used to seal off wounds and protect the plant from diseases.

“When we mow it, we cut into that layer and we open up a channel to get into the vascular system of the plant,” he says. “If there's a lot of moisture on the leaves, and if there are pathogens floating around, it's an entry point for that pathogen.”

These four techniques were all tested in a 1993 study out of the University of Kentucky. The testing was to determine which technique had the least amount of moisture remaining after treatment, and which technique resulted in a reduction of dollar spot on the turf. Another technique used in the study was to roll large, sponge-covered rollers over the grass, similar to the rollers used to remove water from tennis courts. The assumption was that they would be just as effective in dew removal.

The almost two month study found that rolling and mowing were the most effective at removing the dew from the turf. Despite what Magro said about mowing, the study

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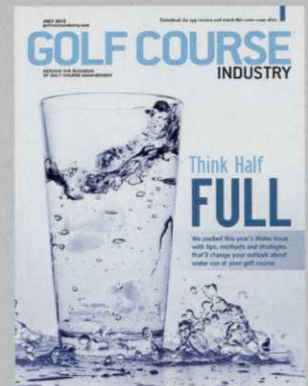
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also found that mowing the dew reduced dollar spot by 78 percent on the fairway and 43 percent on the putting green. On the putting green, the clippings were collected, whereas the clippings were returned on the fairway. The other four techniques tried also reduced dollar spot on the fairway, but not as significantly. On the putting green, the research didn't see a significant reduction in dollar spot from the other four techniques.

Of course, dollar spot as a result of dew also depends on the location of your golf course. A disease has to have an environment to thrive in, so if your course's envi-

ronment isn't ideal, you may not see this problem at all.

"On warm nights, when we have cooler weather and dryer weather, we see less disease pressure because diseases mainly thrive in warm or hot weather with moist conditions," says Magro. "[A course in Phoenix] could be growing the same creeping bentgrass that a course in New York is growing, but the same grasses will contract diseases in the eastern states that they'll never see out in Phoenix. It's not to say that you can't see them out there, it's just not as prevalent because the conditions aren't there for that



MANAGING DEW: Key techniques

As mentioned in the article, there are many different ways that courses can remove dew from fairways and putting greens. Below is a list comprised of techniques mentioned by Carmen Magro, the study by the University of Kentucky, and the study by Delvalle, Landschoot, and Kaminski.

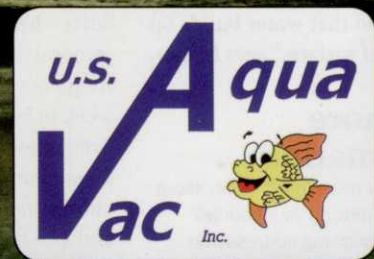
- Wetting agent – a nonionic surfactant was applied once per week during the experiments."
- Syringing – A backpack sprayer with tap water was used to simulate irrigation on these small plots."
- Dragging with hoses – Both the putting green and the fairway were dragged with a 3/8-inch-diameter rubber hose."
- Mowing – Clippings were collected on the putting green test but returned on the fairway test."
- Rolling – The plots were rolled with a sponge-covered roller to absorb leaf surface moisture. The roller drum was 24 inches in diameter and was covered with a 3/4 -inch-thick sponge, which was compressed at the top of the drum by a smaller solid roller to deposit the moisture into a catch pan in the interior of the drum."
- Dew was removed...by driving a Toro ReelMaster 5400-D across the dew removal treatment plots prior to mowing, with mowing units lowered and resting on the turf but reels disengaged."
- Going out and whipping off the dew with dew poles."

According to the University of Kentucky study, it might also be in your best interests to do a combination of these treatments on your course, such as dragging fairways with hoses or syringing early in the morning on the days that your staff doesn't mow.

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disease to grow."

It's not just dew that causes a problem. In fact, the largest problem is caused by guttation water, moisture which comes directly from the plant. Guttation water is the result of photosynthesis and contains a lot of sugars, which contains compounds that pathogens may use as nitrogen and carbon sources, causing bacteria and fungi to thrive. That's why it's beneficial to remove the dew before you mow, because it's not just plain, clean water.

"During [a plant's restoration period], the plant will exude, or release moisture through the leaves, through little pores in the leaves, and that water builds up on the leaf surface," says Magro.

For more information...

Looking for more information about managing dew on your course? Enter the following address into your Web browser to access these articles.

DEW THE RIGHT THING

Superintendents Often Remove Dew From Fairway Turf During The Early Morning As A Courtesy To Golfers, But Are There More Benefits To This Practice Than Golfer Satisfaction?

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DEW IT THIS WAY

Preparing fairway turf doesn't have to be a drag.

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"The combination of that and dew adds a lot of moisture for diseases to facilitate themselves and these pathogens can reproduce and grow."

A 2010 study done by Tanner Delvalle, Peter Landschoot, Ph.D. and John Kaminski, Ph.D found that not only can dew removal decrease diseases, but it can also result in an improvement of your fungicide program. This information may make it more tempting for superintendents to take the time and money to increase dew removal on their course, especially if the improvement in your fungicide program could result in money saved.

According to the study, "results showed that daily dew removal and increasing mowing frequency from 2 to 6 days per week in late summer resulted in a reduction of dollar spot and improvement in the performance of chlorothalonil, propiconazole, and iprodione fungicides." However, it also stated that "Daily dew removal in late summer reduced dollar spot regardless of mowing frequency or fungicide products."

"From a disease management perspective, removing dew appears to be more cost effective than increasing mowing frequency," the study says.

Something for superintendents to consider is that dew removal doesn't just affect disease control.

"It's likely most superinten-

Watch it

In this short video, the maintenance crew at Sun Valley's Trail Creek golf course, Sun Valley, Idaho, remove the dew from fairway No. 1 in preparation for a golf tournament. Using a specially prepared hose connected to the two vehicles the grounds workers drag each fairway to remove the thick dew.

Enter the youtu.be/4eMmKFjgpAM into your Web browser to watch the video now.

dents use this practice more for improving playing conditions (reduction in surface wetness) and dispersal of grass clippings and earthworm castings, than for disease suppression."

Another benefit could be an overall savings to the cost of your disease prevention programs, although the study states that it cannot guarantee that.


"Although results of this study do not provide enough information to establish a definite

economic benefit from dew removal practices, they do suggest that dollar spot severity can be reduced when daily dew removal is practiced on fungicide-treated turf...There is no guarantee this practice will pay for itself through a reduction in fungicide use, but it's likely you will have less dollar spot and improved playing conditions." **GCI**

Katie Tuttle is GCI's associate editor.



It's beneficial to remove the dew before you mow.



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Henry DeLozier is a principal in the Global Golf Advisors consultancy. DeLozier joined Global Golf Advisors in 2008 after nine years as the vice president of golf for Pulte Homes. He is a past president of the National Golf Course Owners Association's board of directors and serves on the PGA of America's Employers Advisory Council.

4 WAYS TO CONTROL WATER COSTS

There's an ancient Arab proverb that says, "It is wise to bring some water when one goes out to look for water."

The maxim holds true today as well as it did in ancient times, especially for managers and superintendents of golf courses. The search for water – at least the readily available and affordable type – can be a laborious and expensive process, so you better come prepared.

CONSIDER THE FOLLOWING:

- The cost of water per golf round – if one assumes an average of 30,000 rounds per year – ranges from \$8 to \$50 per round.

- Since 1970, the total annual cost of irrigating a golf course in the arid regions of the U.S. has increased from roughly \$12,000 to more than \$250,000.

Accessing adequate supplies of water and effectively managing its use is one of golf's biggest challenges. The scarcity of water, the difficulty accessing it and the uncertainty over its future availability and price leave

against three characteristics: 1) price per unit (gallon or acre foot), 2) total units consumed, and 3) cost per source. Then evaluate other supply alternatives. Water professionals follow a calculated process when conducting an audit. They review the current source and cost, compare costs with comparable benchmarks, identify and evaluate the cost of potential alternative sources and, finally, assess the financial and legal feasibility of making a change.

TRANSITION TO A CHEAPER SOURCE.

This is assuming that doing so is legal and permissible. Matt Payne, a water resource expert at WestWater Research, the Boise, Idaho-based water rights advisory firm, says: "Gaining water independence can improve supply reliability and eliminate exposure to the risk of increasing water rates. Most water users do not understand how to or even that they may shop water sources." Many golf courses receive water from a local utility or from the source most convenient when the original needed to secure an



law and regulations. Herrema and others with similar expertise advise their clients that possession of a secure and affordable water source is – in many cases – even more valuable than land. To confirm that your access to water is secure for the long term, you may want to employ the services of an expert. The team with the best players usually wins at this game too.

OPTIMIZE WATER ASSET MANAGEMENT

TACTICS. According to Clay Landry, the managing director at WestWater, which works with the U.S. Department of Interior and the Internal Revenue Service among others, observes: "Some courses hold large water rights that are not fully utilized. These rights represent potentially valuable assets." He advises clients to monetize water rights and excess capacity, noting that a course may own rights to excess capacity that can be very attractive on the open market.

Golf businesses are struggling with the high costs and restrictions for acquiring and using water. In many cases, the solutions are readily available but have not been fully explored. It's time for golf course owners, operators and superintendent to evaluate new solutions and options to manage their use of water. **GCI**

Golf businesses are struggling with the **high costs and restrictions** for acquiring and using water. In many cases, the solutions are readily available but have not been fully explored.

many courses in a virtual desert.

Many golf managers and superintendents understand full well the challenges water presents, but lack knowledge of how best to manage this critical element of their operation and budget. Here are four ways that courses can control or reduce water supply costs.

CONDUCT A WATER AUDIT. Compare your water bill to competing courses

irrigation source. That source may no longer be the best solution. Shopping the market may uncover new options, including buying a water right.

WORK WITH EXPERTS. The widespread issues surrounding water rights, availability and use have spawned a specialized category of experts. Attorneys such as Brad Herrema at Denver-based Brownstein Hyatt Farber Schreck specialize in water-use

PRESERVING HISTORY... AND WATER

Meadow Club's David Sexton details his high standards for water conservation. by Helen M. Stone

Tucked away in the mountains by the San Francisco Bay, the Meadow Club is a pristine hideaway near one of California's most developed areas. In 1927, Dr. Alister MacKenzie designed his first golf course in the United States in Fairfax, taking advantage of the wide-open native grasslands and breathtaking vistas. The British golf course architect, whose designs were considered among the finest in the world, had already designed courses on three other continents.

The course rapidly became a Bay Area institution, but the original design was gradually compromised as more and more trees were planted. Director of Grounds Management David Sexton, CGCS, ruefully admits to contributing to the overgrowth more than 30 years ago when he came aboard. "If I had it to do over, I wouldn't have planted as many trees back in the '80s because we're taking them out now," he says. "The Meadow Club was called that for a reason."

In 1998, under the direction

of golf course architect Mike DeVries, the club began a six-year restoration to MacKenzie's original vision. The slow renovation place allowed for members to keep playing the course and gradually become accustomed to the newly-opened landscape and unique bunkers. The current superintendent, Sean Tully, was hired as an assistant shortly before the renovation, and took the course helm when Sexton "semi-retired" in 2010.

During and after the restoration, water conservation was always in the forefront of Sexton's consciousness. "The irrigation system was upgraded, but it wasn't replaced," he says, noting the present irrigation system was installed in 1984. "We've kept very close records from year to year; now going on over 20 years. We've had the SitePro(R) and weather station and we've created a pretty good site-specific model."

Sexton takes full advantage of irrigation technology. "We probably have 80 or 90 various irrigation programs that we run and we have five TDR 300 moisture meters that we use all over the course."

Sexton sets high standards for his water conservation efforts. "I take the ETs I get from my weather station and compare that to the water we pump and purchase; I keep track from year to year and I come up with a value of how much I'm pumping in relation to the amount of ET that the course needs,"



"We've kept very close [water use] records from year to year; now going on over 20 years."

— David Sexton, Meadow Club

he explains. "So I have a true weather-adjusted value that I can compare year to year, with the goal to improve it every year. We managed to improve for eight years... last year was the first year that we didn't."

Sexton took that as a call to action. "That tells me I need to get in there and take a good look at all the sprinklers. So this year we're going in and doing a complete top-to-bottom cleaning and replacing parts," he says.

The pump controllers are slated for an upgrade, as well. "We're also changing the pumps to a variable frequency drive. It's about a \$55,000 job, but it should give me a smoother system with less water hammer

and run everything at a lower pressure," he explains. "I think it will be a very positive improvement and keep the replacement of the irrigation system in the far future. And we can get back on track and improve our water savings every year."

In addition to technology, intensively managed turf has been replaced with native species. "We've probably knocked off 15 acres of turf," Sexton notes. "We lead an annual nature walk on the course. We're in tune with the natural world and the members support that." **GCI**

Helen M. Stone is a freelance writer on the West Coast and a frequent GCI contributor.





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