



Pass the salt

By Jason Stahl

With more and more golf courses using reclaimed water for irrigation, salinity is becoming a bigger issue. Here is how you can effectively manage it.

Above: To determine the proper steps to take to handle salinity issues on the course, a site assessment must be done first.

Salt. We like it around the rim of a margarita glass, but not on our tees, fairways and greens.

The problem is, more and more of it is finding its way onto golf course turfgrass due to the industry's increasing use of reclaimed water, or former wastewater, for irrigation. Sometimes it's in the name of water conservation, while other times it's because it's the only water available.

"As you see more and more golf courses using reclaimed water, the concern for salinity goes way up because reclaimed water is going to be higher in salts," says irrigation consultant Brian Vinchesi. "Your body secretes salt when you urinate, and the treatment plant doesn't remove that salt."

The development of salt-tolerant turfgrasses has also allowed for the use of more saline water, and the increasing number of golf courses built on the coast or wetlands has resulted in salinity problems from a host of sources, such as wind-driven salt spray or salt-water getting into aquifers used for irrigation.

According to a study conducted by Dr. Robert Carrow of the Crop and Soil Sciences Department, University of Georgia, and Dr. Ron Duncan, retired professor, University of Georgia and independent consultant, the following problems can be attributed to salt: drought caused by inhibited water uptake, deterioration of soil that limits water movement and aeration, turfgrass nutrient imbalances and plant shoot and root ion toxicities.

The most effective way to tackle any single environmental issue such as salinity, which Carrow and Duncan say is often the most complex environmental challenge, is the Best Management Practice (BMP) approach.

Carrow and Duncan's salinity BMPs plan contains most every strategy a superintendent might use to counter salinity: plant selection, irrigation system design, irrigation scheduling and salt leaching, identification of water and soil amendments, proper amendment application, cultivation, topdressing and soil modification, drainage and sand-capping, nutritional practices, additional cultural

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practices such as managing drought and/or traffic stresses, supplemental amendments such as wetting agents and cytokinins, green management considerations and defining the role of products for salt-affected sites.

However, the researchers are careful to note that each course is unique and different and must determine how much salinity they're dealing with. Carrow and Duncan say even sites with small to medium salt levels can fall prey to problems over time if appropriate and timely countermeasures are not taken. The goal, according to Carrow and Duncan, is “an acceptable and sustainable level of saline and sodic site conditions and not total removal, which is impossible when saline irrigation water is routinely used.”

To determine the proper steps to take to tackle salinity via a BMP plan, superintendents must first perform a site assessment to gather the following information: soil physical conditions; identifying salt additions; soil chemical aspects; irrigation water quality assessment; and plant analysis.

Part of determining soil physical conditions is figuring out your irrigation system efficiency requirements. The best way to do this, says Vinchesi, is through an irrigation audit called a “cup test.” This measures the distribution uniformity of your irrigation system based on actual conditions. Cups are spread out on greens, tees or fairways and the water collected inside them from sprinklers gives you two numbers: how uniform or how evenly you're applying water, and the actual precipitation rate of your sprinklers.

“From a salinity standpoint, in terms of leaching, I would say it's more important that it give you the actual precipitation rate as opposed to the theoretical one, more so than the uniformity,” says Vinchesi. “Irrigation efficiency is how much water you're using versus how much you need. And leaching is on top of that. So the more inefficient your system, the more water you'll need to not only irrigate but to leach. When you leach, you really have to put a lot of water down. Plus, you're also irrigating, so every two or three months you're going to totally overwater this thing and basically drown it to push the salts down past the rootzone.”

Vinchesi believes such an audit is important for any golf course, but especially for ones with salinity issues.

“Certainly if you have salinity, you need to be testing your water and your soil more frequently,” he says.

The golf courses that seem to have the biggest salinity issues, Vinchesi says, are those with housing developments built around them with the water treatment plant on-site and where the disposal field for that plant is the golf course. He counts small golf communities in North Carolina, South Carolina and Arizona with on-site treatment plants as ones that are typically problematic. One such course not only has high salinity from the treatment plant, but also from the well water source they use to leach the soil. Naturally-occurring salinity, he says, is more of a prob-

lem in the Western United States – unless a course is using effluent or reclaimed water.

“If you're pumping out of the Colorado, you'll have more salt than say if you're pumping out of the Potomac,” says Vinchesi. “But you could be in Minnesota, and if you're using effluent water, you're going to have an issue.”

One of the problems with these treatment plants, says Vinchesi, is that their consistency of treatment can vary. Thus, in order to find out how consistent the salt in your water is, you need to conduct a water quality analysis every month to see if the saline levels vary.

“You will have to deal with it if it's not consistent,” he says. “Then, look at what you can do post-irrigation to your water for treatment and look at what you can do to your soil for treatment once the water is already on it.”

Vinchesi says there are a number of products coming to the market to deal with salt that can be put in the water before it hits the soil. Manufacturers include Aquatrols, VersaTurf and XMO. Gypsum, he says, has also been an effective in assisting the leaching process.

Products aside, one golf course Vinchesi



Salinity has become a bigger issue on golf courses as the use of reclaimed water rises, as well as a greater number of courses built along coasts or on wetlands.

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knows of has a unique way of pretreating its water. The Governors Club in North Carolina has both an effluent source of water and a saltwater source but the same piping system. When the superintendent is done irrigating his fairways and tees, he flushes the pipe out with freshwater so his greens never get effluent water.

“It’s a very ineffective way to do it because you’re wasting a couple hundred thousand gallons of water every time you flush out the pipe, but it is a management practice some people use,” says Vinchesi.

Vinchesi says if a golf course has both salty soil and salty water, there aren’t many options.

“You really have to manage that,” he says. “The more salt you have in the water, the more leaching you have to do and the more you have to use to leach because of the concentration of salt. You’re trying to push the salt out of the soil, and the more salty the water you’re using to push with, the longer it will take and the more water it will take.”

Looking at the broad scope of suggestions on managing salinity on golf courses, the task could seem difficult or even impossible. But if superintendents take one step at a time, starting with a site assessment and then proactively monitoring their progress, salinity is a manageable environmental issue. **GCI**

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Seashore Paspalum is one of many tools for dealing with very salty soil.

SALINITY SOLUTION?

Some golf courses with highly saline water have resorted to planting Seashore Paspalum, a turfgrass that is highly tolerant of salt conditions. Irrigation consultant Brian Vinchesi cautions that it should only be used by courses with very salty water, and that turf variety is only one of the solutions to salinity.

“I’ve seen it in places that aren’t salty, and boy does it not look good,” he says. “It doesn’t seem to like freshwater very much.

Interestingly, though, Steve Yarotsky, superintendent of Moody Gardens Municipal Golf Course in Galveston Island, Texas, says that Paspalum has worked out fine on his course despite his salt problems not being as great as some other courses.

“We have very sandy soil conditions, which help us as far as leaching the salts through,” Yarotsky says. “Plus, we have the unusual situation of having an RO plant here that treats our effluent water, so there’s not a lot of sodium in it. If we treated it one more little time, it would be potable.”

Still, Hurricane Ike proved to be a challenge as it “put the Gulf of Mexico up on the golf course,” as Yarotsky says, so it took some time and effort to flush the salts out from that incident.

This is the fourth year of Moody Gardens using Paspalum, having planted it in 2007, opening in 2008 but then closing for three months in 2008 after Ike hit. Still, Yarotsky says that it has been “so far so good” – except for the

contamination of Bermudagrass.

“There just isn’t a good chemical to control that,” he says. “Also, the Paspalum gets a little off color, a little pukey in winter, more so than Bermudagrass. But in spring, summer and fall it’s a pretty grass. It doesn’t like the salts but will tolerate it more than Bermudagrass. But I believe it still doesn’t like it.”

As far as his BMP, Yarotsky applies gypsum to help leach the salts through the soil. However, he said he doesn’t have to do that often because his irrigation water isn’t highly saline, and when it rains, the rain does a good job of leaching the salts through the very sandy soil. Still, a breeze off the Gulf almost makes up for the low salt level in his water.

“We had a pretty dry year in 2011, so the salt levels went up a little in our soil samples, but it wasn’t too bad,” adds Yarotsky.

Yarotsky says he would recommend Paspalum to other courses with salinity issues.

“There is definitely a learning curve with it though, which I’m still going through myself,” he says. “It just doesn’t need as much nitrogen as much as it does micronutrients – calcium, manganese, magnesium.”

As far as irrigation goes, Yarotsky waters less frequently, but a longer cycle and more at night. Still, compared to a golf course with clay-type soil, he has to water more.