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.

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 saltwater 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.”

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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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.