Too much salt for your grass?

by John Schmitz

More and more golf courses and other public recreation sites today are facing a serious health problem: too much salt in their diets, most of it coming from treated wastewater used for irrigation.

One prescription for the dilemma is to use salt-tolerant grasses. Another is over-irrigation, which some say flushes the offending salts away from the turf and root zones.

A number of grass seed companies are researching salt-tolerant grasses. One of the first to address the dilemma is International Seeds, Tangent, Ore. What prompted the research, says senior seed research scientist Steve Johnson, were complaints from golf course superintendents.

Non-tolerant grass shrivels up and dies when exposed to salty water, says Johnson. Groundsmen and landscape managers can't mistake it for disease because the discoloration doesn't occur in patches, he notes.

In the summer of 1993, ISI began a program to identify grasses that can withstand the devastating effects of inorganic salt-laden effluent from such sources as municipal sewage treatment plants and local factories. To date, ISI has analyzed some 20 cultivars for their capacity to grow in salty environments. So far, the variety showing the most promise is a slender creeping red fescue marketed as Marker by ISI.

Ancestors to the variety actually came from grass growing on and around Dutch dikes, which thrive in salty, ocean air. The variety is also used extensively for roadsides in the Midwest, where a lot of salt is used during the winter.

Dr. Eric Nelson, director of turfgrass research and product development at Medalist America in Albany, Ore., says that the use of effluent on golf courses and other public recreation spots is definitely a trend. "You'll see more recycling of water as treatment processes become better."

Nelson says that one benefit of using treated wastewater on turfgrass is that the plants are able to use the nitrogen and phosphorus, whereas the dumping of that same treated water in streams or oceans is harmful to fish and humans, as well as being against the law.

Different species of grass react differently to high salt concentrations, says Nelson. Some simply exclude salt from being taken up by plant roots while others can either exude it after being taken in or store it away from plant cells. Those plants having low tolerances for salt will become stressed and unable to take up water efficiently and eventually die.

Medalist America's Fults, an alkaligrass developed by Colorado State University, is being used successfully in mixtures for roadsides which are subjected to salt during and following snow storms. The variety was also used to seed a golf course in Chicago with a heavy amount of imported sewage sludge in its topsoil.

Nelson says that Fults will actually "fade" and become "non-competitive" without a certain amount of salt pressure. The variety grows best in slightly basic soil with a pH of around 8.0, he says.

Dr. Leah Brilman, research director for Seed Research of Oregon in Corvallis, says that extensive studies done at the University of Arizona show that "the turfgrass community..."

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nity" can actually clean effluent water, "so 
by the time it goes through the turfgrass 
and works its way down to the aquifer it's 
pretty much cleaned up of all the things 
that people don't like. "Turf is a great clean-
ning mechanism for water."

Although effluent can provide beneficial 
nutrients to grass plants, you must keep 
regular tabs on the amount of nitrogen 
being supplied, says Brilman. "You have to 
be careful you don't over-fertilize because 
you're essentially fertilizing with nitrogen 
and phosphorus every time you water."

Brilman says that salty effluent can 
come even more of a problem and adds 
more stress to plants as the water evaporates 
off and leaves behind a salt crust. The 
cure for this, especially in well-drained soils, 
is a healthy irrigation program that tends to 
keep the rootzone flushed.

In many grass species, the relationship 
between salt tolerance and drought toler-
ance is similar, says Brilman. "What you 
have is the water wanting to leave the plant 
instead of come into it. So, very often if you 
can identify a plant or group of plants with 
good drought tolerance, such as the alka-
ligrasses and some of the fine and tall fes-
cues, often they will have pretty good salt 
tolerances.

"We have some things that show good 
salt tolerance but I won't say that's what we 
were breeding for," says Brilman. "When we 
were looking for drought tolerance, we got 
salt tolerance with it."

Seed Research of Oregon is trying to 
identify good salt tolerators. It's screening 
erumgrass from species that grow in salty 
environments, such as near seashores. Also 
being looked at are "new" species of grasses, 
which Brilman explained as being other 
species of grasses that potentially could have 
good salt tolerance but haven't been looked 
at for their turf potential. "Any new varieties 
that look promising may be crossed with 
existing varieties having other characteris-
tics we want," she says.

For the past five years, Cactus Seed Co. 
in Arizona has been working with a promis-
ing salt-tolerant grass for use on the fringes 
of turfgrass areas. "It's very, very salt toler-
ant," says vice president and general manag-
er Ernie Milner of a grass he calls "Salt 
Grass." Samples of the grass were brought 
to Milner by two Tucson seed breeders who 
specialize in developing salt-tolerant grain 
and vegetable seed for use in places like 
Saudi Arabia. Milner has been able to 
identify the male and female grass plants and 
cross them to produce seed.

Salt Grass, which can be irrigated 
with ocean water, could be released next year, 
says Milner. It's presently being "bumped" 
in a small production field about 45 miles 
east of Yuma.

Milner says the grass, which is a bunch 
type that grows upright and spreads by 
sending out rhizomes two or three feet 
underground, is able to use the beneficial 
components of salty water while depositing 
the salt itself on the leaves. "It would make a 
good reclamation grass or contrast grass 
and requires very little maintenance. It only 
grows 18 inches high."

Plant breeder Crystal Rose Fricker of 
Turf Seed, Inc. in Hubbard, Ore. says that 
even effluent with low salt concentrations 
can become a problem over time. "It may 
seem okay in the beginning," she says, "but 
as you water, the salinity builds up in the 
soil over time, so it gets hotter and hotter 
and hotter, starts burning the grass."

This burning action actually attacks the 
grass in two places: above ground where 
the freshly mowed tips of the plant are 
exposed to the salt, and below ground where 
the roots can't take in needed water because 
of the presence of salt.

Managing effluent use should be guided 
pretty much by both the level of salt in irri-
gation water and the type of soil, particu-
larly drainage characteristics, says Fricker.

Seabreeze, a slender creeping fescue, 
and Dawson are the most salt tolerant of all 
cool-season grasses tested by Turf Seed, 
says Fricker. This September, Tee-2-Green 
will be releasing Seaside II, a Penn State-
developed creeping bentgrass ideal for fair-
ways, she adds.

Irrigation systems fight 
sodium build-up

• Landscape managers make informed 
purchasing decisions when they under-
stand irrigation options and how they 
relate to a system's primary role. One of 
the effects of proper watering is a reduc-
tion in sodium build-up in the soil.

• Sodium Absorption Ratio. Sodium 
causes a problem when more than 160 
mg/l is in the water, or if the SAR of the 
water is greater than six. The common 
result is plant stress.

• Bicarbonates. Bicarbonates can 
cause calcium and magnesium to precip-
itate," Landry explains. "That brings 
about an increase in sodium.

High bicarbonates initially cause pool-
ing. If this occurs, and soil extracts have 
high electrical conductivity, further test-
ing should determine if bicarbonates are 
the problem.

The ultimate effect on the turf is 
the death of the plant. One solution, Landry 
says, is to apply enough fresh water to 
leach the nutrients below the root zone. 
—James Holter