

A Healthy Ecosystem

In the concluding section the authors state, "University research shows that most pesticides used on golf courses have a negligible effect on the environment." This has been the cry of turf managers since the research has been completed.



Environmental Complacency: What Can We Learn From Rachel Carson and Dr. Seuss?

When Rachel Carson penned the now famous *Silent Spring*, she addressed an aspect of American life wrought with ignorance regarding pesticide use and environmental quality. The outrage stirred by *Silent Spring* provoked the anger created by the "cranberry scare" of 1959. Cranberry growers applied a pesticide during the growing season in defiance of Food and Drug Administration (FDA) restrictions. The pesticide found at low levels in the cranberry supply was suspected of causing cancer. These events had a profound and enduring effect on public consciousness. In many parts of the country, this concern persists today.

The turf industry experienced a similar "Silent Spring" event with publications from the United States government's General Accounting Office in 1988 asking the question, "Are the hazards of lawn care pesticides underestimated?" Then in 1989 the Attorney General of New York published "Toxic Fairways: The Risk of Groundwater Contamination from Golf Courses." Jay Feldman and his organization, National Coalition Against the Misuse of Pesticides (NCAMP), and other activists seized the moment to confront the turf industry.

The initial response from the industry was defensive. The 1992 GCSAA conference held a packed session for thousands for golf course superintendents to hear from Mr. Feldman and officials from the EPA. The following year the GCSAA invited Michael Fumento, author of *Science Under Siege*, who reported the results of topical searches he conducted on golf courses and cancer. "Golf courses fight cancer, as professional tournaments raise funds," Fumento proclaimed the results of his search. The crowd erupted and you could sense that the golf superintendents wanted this crisis over. Still, information was lacking regarding the fate of pesticides and nutrients applied to turf.

The United States Golf Association embarked on an important research initiative to more thoroughly understand the influence of turf management on environmental quality. The environment under investigation was air and water quality. Concurrently, Ron Dodson

was introducing a program to the turf industry that assisted with environmental management. Ron was also the driving force behind the Wildlife Links Research Program that investigated the influence of golf turf management on wildlife. The research information was on its way, and now there would be a mechanism for implementation.

Environmental Evolution

The USGA held a symposium at a 1998 meeting of the American Chemical Society to discuss the decade of USGA-funded environmental research. As a member of the Research Committee at the time, I had a unique experience hearing from the leading researchers in our field and then to have their work in a Symposium Book published in 2000. The opening chapter, authored by Mike Kenna and Jim Snow, provides an excellent overview of the research. In the concluding section they state, "University research shows that most pesticides used on golf courses have a negligible effect on the environment." This has been the cry of turf managers since the research has been completed.

Audubon International programs for new and existing golf courses have grown over the last decade, but still represent about 10% of all courses in the US. In fact the number of fully certified courses is well below 5% of all courses. Most courses are either not involved or if they have paid the entry fee of \$100, have not actively pursued full certification. Yet, in many states, the Audubon programs are actively embraced by government agencies as a means of insuring environmental quality when a new facility is proposed.

Many golf courses throughout the country continue to face public opposition to pesticide and fertilizer use. Several communities in California have banned the use of most pesticides and this trend is actively underway in NY (see feature article by Jennifer Grant beginning on page 1). The turfgrass industry has responded by mounting significant lobbying efforts to combat the legislative agenda of advocacy organizations. At the same time, the industry faces

new pest problems such as bentgrass deadspot and gray leafspot that require substantial pesticide inputs to maintain expected quality.

Another Level

Millions of dollars have been invested to research the environmental fate of applied chemicals. These studies attempt to determine the role that specific management practices may play in minimizing off-site movement and often use EPA concentrations to evaluate success. In general, these levels are established from toxicological research that determines concentrations that might cause human health concerns. But what if the levels we have been using were harmful to other species vital to aquatic ecosystems?

Environmental researchers from Canada published an assessment of nitrogen pollution influence on amphibians in a 1999 issue of *Environmental Health Perspectives*. The paper is a review of available water quality information for the Great Lakes region of the US and Canada. Of the over 8,000 water quality samples collected in areas surrounding the Great Lakes, 20% of them were found to have concentrations that cause sublethal effects in amphibians. Nitrate levels as low as 2.5 parts per million have been shown to affect amphibians.

The nitrate in the water appears to disturb the digestive process in tadpoles in a way similar to the mechanism in humans. The nitrate is converted by the bacteria in the infant's gut and then severely restricts the blood's ability to become oxygenated. There is a significant lack of information available on the toxicity levels relative to the different amphibian species, including influence on the predators and prey.

The review did not point the finger at the turfgrass industry, but rather to understand the influence of wastewater treatment, livestock, precipitation, and fertilizers on nitrate pollution. Clearly, as major users of fertilizers for turfgrass areas such as golf courses, we must be aware of best management practices to minimize off site movement. In addition, turf is an important vegetative buffer and biofiltration system to protect sensitive aquatic habitats. Now is the time to think about this bigger picture before another crisis occurs.

The Lorax

Kenna and Snow end the chapter in the ACS Symposium Book, "The USGA, and the

game of golf, need to keep asking questions and looking for new ways to maintain golf course grasses. More important, efforts should be increased to educate the golfer about environmental issues." The importance of these points cannot be overstated, yet I am regularly amazed at how many in our industry feel that the environmental crisis is over. I sense a complacency among organizations and industry leadership that image, labor issues, and expected turf quality are greater challenges, since they know the results of the USGA studies.

Theodor Geisel, known more commonly as Dr. Seuss, wrote a book in the early 1970's titled *The Lorax*. The story is about a once-ler who makes "Thneeds that everyone needs," and cuts down every "Truffula tree" to make the Thneeds against the warnings of the Lorax. Little by little the once-ler argues that Lorax worries too much, there are plenty of Truffula trees, and that people need Thneeds! Until all the creatures that use the trees are gone, the water is polluted, and the last Truffula tree is cut down. This book was a loud cry to young people to look beyond what they need today and as Seuss states, "Unless someone cares a whole awful lot, nothing is going to get better."

There is nothing more important to the well-being of the turf industry than environmental quality. Yes, the data is encouraging that as far as we can measure, there appears to be little negative influence, yet as we continue to ask questions we find new answers. At the same time, we need to look at turf management. Should we plant ryegrasses where gray leaf spot is going to be a problem? Can we justify intense pesticide use for new pest problems? Are we creating these problems from the conditions we create? Why do the golfers appear no more involved than they were a decade ago? Why isn't every course in the Audubon program?

As the human population grows, the concern for environmental quality will be even greater. As an industry, we cannot rest on our laurels, we must be vigilant in our efforts to inform golfers about the price of what they are demanding. In some cases, we may not know exactly, but shouldn't we err on the side of caution? The amphibian study is only one aspect of what we are a part of, as Carson states in *Silent Spring*: "the fabric of life, on one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways."

Frank S. Rossi

Of the over 8,000 water quality samples collected in areas surrounding the Great Lakes, 20% of them were found to have concentrations that cause sublethal effects in amphibians. Nitrate levels as low as 2.5 parts per million have been shown to affect amphibians.

I sense a complacency among organizations and industry leadership that image, labor issues, and expected turf quality are greater challenges, since they know the results of the USGA studies.

As the human population grows, the concern for environmental quality will be even greater. As an industry, we cannot rest on our laurels, we must be vigilant in our efforts to inform golfers about the price of what they are demanding.