A SCIENTIFIC VIEWPOINT: DR. THOMAS L. WATSCHKE, PENN STATE

Turfgrasses Can Safely Clean Our Water Supplies

Fears of adding to our pollution woes from homeowner or commercial lawncare are greatly unfounded and overstated based on the results of a three-year study of water quality impact conducted at The Pennsylvania State University.

In fact, the results show that well-managed turf areas have very little runoff and virtually no potential for chemical contamination. Applications of these findings to land-use, city planners and environmental interests are very promising.

Funded in large measure by the U.S. Geological Survey, this study was initiated in 1986 to examine the water quality impact of pesticides and nutrients used in the urban landscape. A total of nine test plots, with slopes ranging from nine to 14 percent were prepared for the study. Water runoff and leachate trapping and measuring devices were installed on each plot, followed by the installation of identical irrigation systems and soil preparation. A sophisticated array of scientific instruments and specialized computer apparatus were connected to monitoring devices to measure and record what was taking place on each test plot.

Three of the plots were seeded with a mixture of Kentucky bluegrass/ perennial ryegrass/fine fescue, while three others were seeded with a "contractor" mix of annual rye, common Kentucky bluegrass and creeping red fescue. The final three plots were covered with three-year-old turfgrass sod grown from a blend of 100 percent certified Kentucky bluegrasses.

The plots were mowed weekly at a height of two inches and given four annual treatments of pesticides and fertilizers in accordance with label recommendations. After establishment, irrigation was applied only when the need to collect runoff was scheduled (two days after the chemicals had been applied).

Runoff Results: To examine the potential effects of turf on water quality as a function of runoff, Penn State researchers used a carefully controlled irrigation system to uniformly apply known amounts of water to the test areas. After failing to obtain even the slightest amount of runoff from the sodded area with irrigation applications equal to a 3-inch per hour rain, the system was revamped to create a 6-inch per hour output in order to be able to collect runoff from sodded slopes for chemical analysis. According to rainfall probability data, a six-inch per hour storm in central Pennsylvania is not likely to ever occur.

The sodded test plots proved to be 15 times more effective than either of the seeded plots at controlling runoff.

Only 0.8% of all of the water applied was collected as runoff from the sodded areas while 13.4% ran off the "contractor" grade seeded area and 11.6% ran off the classic seed area. The 15-fold better runoff control advantage for the sodded slopes has significant environmental implications because there would also be less likelihood that the water would contain significant amounts of sediment, chemicals or other potential pollutants.

Leachate collection devices were also used to capture water percolating through the soil to determine its chemical composition.

Clean Runoff Discovered: When analyzing the runoff and leachate at one part per billion (equal to one teaspoon of sugar in 1.3 million gallons of coffee), researchers found almost no detectable amounts of the eight pesticides and nutrients that had been applied to the turf. In fact, in a vast majority of the tests, the chemicals were not even detected or were below the federal drinking water standard.

While there are no federal drinking water standards for many of the chemicals (indicated above by N/A), the runoff and leachate samples generally contained less potassium than the irrigation water that was used. This seems to further illustrate the grass plant's capacity to trap and hold many of the chemicals that a sound turf management scheme would require. It is also important to remember that the water samples analyzed were virtually collected in a situation analagous to "curb side". In a "real life" situation, considerable runoff water from other sources would already be in the street which would result in significant dilution of already low concentrations of chemicals.

Potential application of findings: When combined with the other known attributes of turfgrass such as conversion of carbon dioxide to oxygen, cooling effects, entrapment of particulate pollution and reduction of noise and glare, turf's water filtering capacities make it a very good candidate for additional environment improvement projects.

Directing urban runoff waters across turf and possibly into grass covered basins could provide not only a water cleansing effect, but also assist in:

A. Flood control and thereby a related reduction of waste water treatment facility requirements.

B. Pollution control from parking lot and/or animal feedlot runoff waters; and

C. Reduction of siltation and topsoil losses at construction sites, farm fields and highway rights-of-way.

While additional research is required to determine the surface areas of turfgrass needed to best serve its purposes on various soil types, grades and natural runoff amounts, considerable prograss is being made in recognizing the many unique capabilities of the seemingly simple grass plant.

What has been right under our feet for many years is beginning to be recognized for the contributions it can make to improving our environment. Just as it is man who is creating environmental problems, it will be up to man to better understand and properly use the tools of environment improvements we have available to us, particularly turfgrasses.