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Turfgrass Management Influence on Water Quality

Part 1: Pesticides

Concern about sources of agricultural pollution has raised questions about the contribution of turfgrass to water contamination and has motivated research on the role of pesticides and nutrients on contamination of water supplies. Turfgrass, while not the largest acreage crop, is in many cases the most intensively managed ecosystem. However, turfgrass management does not necessarily imply environmental degradation; in fact turf provides many benefits. The functional, recreational and aesthetic benefits provided to humans are unmatched by other crops.

Turf provides sediment reduction, runoff control, flood control, reduction in point- and non-point source pollution, water filtration, heat dissipation, and oxygen production. In many cases turfgrass has been used to remediate harmful chemicals leaving a site. Daniels and Gilliam found runoff transported from agricultural fields and flowing through a grass filter underwent significant sediment and chemical load reductions. In fact, the grass filter was more effective at reducing chemicals and sediments than the use of both a grass and a riparian filter.

Golf courses have been shown to be effective filters of surface water, especially for nutrients such as ammonium (NH_4^+-N) and, in some cases, nitrate (NO_3^--N). To be an effective filter, grass must produce a dense canopy, and deep, fibrous roots, which are capable of removing water from the soil at great depths. A dense canopy will slow and filter chemicals from runoff. Increased plant shoot density will reduce runoff and hence the chemical load leaving a site by creating a more tortuous pathway and increasing soil infiltration of water.

In any case, nutrients and pesticides found in water supplies can cause problems for both humans who rely on clean water for consumption, irrigation and recreation, and organisms that must have clean water for survival. The Environmental Protection Agency (EPA) has established maximum contaminant levels (MCL) for drinking water, above which human consumption is unsafe. The effect of these MCLs on aquatic organisms is generally much greater, suggesting that the use of aquatic toxicities may be a better indicator of water contamination. An in-depth review of the literature reveals a lack of work regarding the specific effect of pes-

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