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Environmental Impacts of Lawn Fertilizer

Fertilizers are used by homeowners to maintain and improve landscape beauty and quality. In recent years, increased use of home lawn and garden fertilizers has caused concern about pollution of lakes and groundwater. Proper fertilizer application can enhance plant growth without polluting the environment. Yet, misuse of fertilizer may not only harm the environment—especially ground and surface water—but may in fact result in injury to landscape plants as well (Rosen and White,1999).

Fertilizers and Fertilizer Ingredients

The two primary fertilizer nutrients are nitrogen and phosphorus. Fertilizers used in both agricultural and non-agricultural settings contain essentially the same ingredients. Phosphorus and nitrogen compounds are needed by all plants for vigorous growth. In a non-agricultural setting, the impact of fertilizers may seem small, isolated to one lawn or garden. However, the total area of lawns and gardens in urban environments may be significant, creating a cumulative effect that is effectively quite large (Rosen and White,1999).

Phosphorus

Phosphorus occurs naturally in rocks and other mineral deposits. During the natural weathering process, the rocks gradually release the phosphorus (Wilkes University, N.D.). Phosphorus is one of the nutrients necessary for plant growth. Although misuse or misapplication may pollute lakes, proper application poses no threat of lake pollution, and may reduce pollution possibility. Inorganic phosphorus moves very little in soil, and when applied as a fertilizer it is quickly bound by soil. If not mixed into the soil, phosphorus from lawn clippings and tree leaves left in the streets and gutters is soluble and a potential pollution source. (Rosen and White, 1999).

Nitrogen

Nitrogen is present naturally in soils as nitrate ion, ammonium ion, and as a component of soil organic matter. Ammonium is readily converted to nitrate is all but the wettest and driest soils. Nitrogen generally produces the greatest growth response in plants of all fertilizer nutrients. Unlike phosphorus, nitrogen in its nitrate form is completely soluble and highly mobile in soil. It thus can readily leach downward and contaminate groundwater supplies (Rosen and White, 1999).

The Effects on Groundwater

Lawn and garden chemicals, such as fertilizers enter the groundwater in two ways. In the first method, the chemicals can enter the groundwater by rainwater into a stream as runoff. This is especially problematic in urban environments where hard-surfaced roads allow rainwater to move over them without benefit of soil acting as a filter (Rosen and White, 1999). The water in streams replenishes groundwater, so the chemicals are absorbed into the groundwater as well. The second method of contamination is through leaching, which is the downward movement of a substance through the soil. The fertilizer may also dissolve into the surface water, which recharges the groundwater (Virginia Cooperative Extension, 1996).

Nitrate is highly soluble and readily leaches into groundwater. Water with over 10 parts per million nitrate-nitrogen can cause methemoglobinemia, an inability to use oxygen in infants.

Effects on Surface Water

The nutrient phosphorus harms clear, free water by creating algal blooms. This process, known as eutrophication, turns the water green, clouds the water, causes odor problems, and depletes the oxygen for fish and other species, effectively suffocating them (Lake Champlain Basin, 1998).

Fertilizer and Groundwater in Vermont

To ensure that the groundwater does not get so contaminated as to be unhealthy, in 1986 the Department of Food and Markets implemented the Pesticide Monitoring Program. The goal of this program is to test wells in agricultural areas to help farmers learn about practices that prevent pesticides from leaching into the groundwater, and to conserve the nutrients in fertilizers and manure in the soil. This program is funded by fees taken from companies that sell pesticides and fertilizers in Vermont (Vermont Department of Agriculture, Food and Markets, 1998).

Fertilizer and Surface Water in Vermont

Agriculture has been identified as a contributor to surface and ground water pollution in Vermont. In 1986, the St. Albans Bay Rural Clean Water Program Annual Report estimated that agriculture is responsible for 48 percent of the total phosphorus load entering the St. Albans Bay. Of this, they estimated 41.6 percent comes from cropland erosion, 16.9 percent from barnyards, 3.4 percent from stacked manure, 7.6 percent from milkhouse wastes, 27.1 percent from spread manure and 3.5 percent from other sources. In an effort to reduce the amount of phosphorus entering not only Lake Champlain, but all waters of Vermont, the Agricultural community has made great strides by the implementation of the "Accepted Agricultural Practices." (Vermont Department of Agriculture, Food and Markets Plant Industry Section, 1999).

Phosphorus comes from both point and non-point sources. Point sources account for 30% of phosphorus entering Lake Champlain. These sources include municipal wastewater treatment plants, and industrial discharges. Non-point sources comprise the other 70% of the phosphorus in Lake Champlain. These sources include lawn and garden fertilizers, dairy manure and other agricultural wastes, pet wastes, exposed or disturbed soil, localized malfunctioning septic systems and stream bank erosion (Lake Champlain Basin Program, 1998). In 1993, New York, Vermont, and Quebec signed a Water Quality Agreement committing the three entities to use a consistent approach to phosphorus management (Lake Champlain Basin Program, 1998)

Phosphorus harms the water in Lake Champlain by creating algal blooms. If this problem is not given attention in the long run, the fish and wildlife habitat in the lake will be altered, the water supplies impaired, and property values or the overall recreational appeal may decline in Lake Champlain (Lake Champlain Basin Program, 1998).

Actions In Other States

Lake Tahoe, Nevada is also experiencing problems with phosphorus from urban runoff. They are actively trying to reverse the problem. "Phosphorus loading has to be controlled or we will lose this lake," Charles Goldman said (Crawford, 1998)." Researchers there have developed an "integrated watershed model that will fit together all the available data in a computerized simulation so managers can predict the lake's response to different strategies for reducing nutrient loads" (Crawford, 1998). This type of model may work well for Lake Champlain.

What People Can Do

Other suggestions for slowing this pollution problem down include going straight to the sources. Before fertilizing, people should have their soil tested. It is very important to follow label instructions carefully and mix the fertilizer accurately (Appleton et.al., 1996). When watering one's lawn after fertilizing, one should not allow the water to run into streets or the lake (Rosen and White, 1999). One should clean up all spilled fertilizer and never apply fertilizer to the frozen ground. Because clippings contain phosphorus, debris should be removed and not directed into the street. One should be careful not to deposit fertilizer in the lake and when near a body of water leave a buffer zone. Also, fertilizer should be put 4 to 6 inches into the soil. Coring machines are suggested as well as slow release of fertilizer.

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