Executive Summary

Best Management Practices Projects
Nutrient and Irrigation Management to Reduce
Nonpoint Source Pollution of Surface and Ground Waters
in Colorado Urban Landscapes

Conducted by
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This is a summary of EPA Section 319 funded projects in cooperation with the Colorado Department of Public Health and Environment, Water Quality Control Division. This summary covers the following Colorado Nonpoint Source Management Program Contracts: WQC-920885, WQC-930976, WQC-9705089, and WQC-9808698. These contracts cover the years 1992 through 1995 and 1997 through 1999.

Through the various studies and demonstrations covered by these contracts, it has been learned that a healthy turfgrass lawn is beneficial to the environment. The thatch layer and the dense root system of healthy turfgrass will attract and hold onto the various chemical compounds and fertilizers and will minimize how much can be leached into the ground water or run-off into the surface waters. Turfgrass is now recommended as a way to treat water as in flows through a detention pond because it can filter and absorb fertilizers and chemical compounds before the water is discharged into natural drainage ways.

The project demonstration site was located in Loveland, Colorado with a heavy silty clay loam soil established with a turfgrass consisting primarily of three varieties of improved Kentucky bluegrass. The above projects focused on tracking nitrates, which come primarily from lawn fertilizers and a key nutrient to keeping a lawn healthy. They are highly soluble and mobile in the soil profile. In the years 1993-1995 the average was .43 pounds of nitrate per acre leached through the soil profile of the turfgrass bucket lysimeters. In 1996, there was no fertilizer applied at all during the growing season. However, the quality of the turfgrass deteriorated and there was 4.2 pounds of nitrate that leached through the soil. This would indicate that there are nitrates and other chemicals present and probably were released because the turfgrass was no longer in a healthy condition and able to keep the nitrates in place.

In 1997 a new project was started with an increased number of lysimeters and looking at five different fertilizer sources and evaluating the irrigation methods of watering at or close to need and over-watering the site. Because the project was new with additional lysimeters being installed, there was over 27 pounds per acre of nitrate leaching as an average of the five types of fertilizer. It ranged from a high of 37 pounds to a low of 20 pounds per acre of nitrate leaching, most of it occurring shortly after the lysimeters were installed and before any fertilizer was applied. This large release of nitrates occurred because of disturbing the soil and preparing it for the new grass. This is essentially the same process that a farmer goes through each year to plant a crop. After the lysimeters became established, the nitrate leaching amounted to 1.9 pounds per acre. Our method for tracking and measuring nitrates was improved with a more sensitive instrument to detect nitrates in the leachate. The years of 1998 and 1999 showed about 1 pound of nitrate leaching per acre.

Even when over-watering occurred as a typical homeowner would do, the amount of nitrate leaching increased slightly on the side that was excessively watered. A similar site was installed on very sandy soils in Greeley, Colorado and the amount of nitrate leaching was only slightly more than what occurred on the heavy clay soil site.

A bigger challenge in the urban setting is to help homeowners and professional landscapers alike understand that the method of applying fertilizers and chemicals is critical to protecting water sources. The biggest cause of pollution to the water supply caused by lawn care comes from applying fertilizers, chemicals and grass clippings to hard surfaces such as roadways, parking lots and sidewalks. The fertilizer and other chemicals can easily be pulverized by vehicles and washed into surface waters from rainfall or irrigation water that hits the hard surfaces. Better methods and more care in applying these fertilizers and chemicals can greatly reduce the potential or prevent pollution.

Recommended
Best Management Practices
For
Urban Turfgrass in Colorado

Select turfgrass species that will best meet the requirements and purposes of the lawn area. Areas that receive wear and tear will require a more aggressive grass species and one that is a sod–forming grass such as Kentucky bluegrass. Areas that are difficult to mow, or are only for visual appeal, could use other grass varieties that will require less inputs such as fertilizing, mowing, and watering. Such grasses include buffalograss or blue grama or other slower growing species.

Use turfgrass in areas that are large and relatively flat. This will help minimize the potential for run-off of water or where other fertilizers and chemicals would land on impervious surfaces and could easily be washed into surface waters and drainage areas.

Mulch mowing at 2.5 to 3.0 inches helps turfgrass develop deeper root systems and at the same time look neat and appealing. Mulched grass clippings can return approximately 25-30 percent of the needed nitrogen that grass requires to be healthy. This means a reduction of at least 1 pound of nitrogen per thousand square feet over the growing season. Mulch mowing also reduces the amount of trash that is put into the land fill. If grass clippings are caught, then recycle them by making compost that can be returned as a soil conditioner in the future. Avoid throwing grass clippings on to hard surfaces such as streets and sidewalks. They most often end up in our surface waters and are a source of nutrient pollution.

Apply fertilizer at the rate recommended by the manufacturer. With mulch mowing, an additional three pounds of nitrogen fertilizer per thousand square feet should be sufficient for the growing season. This means one less application of fertilizer in most situations. Fewer inputs reduces the run-off and or leaching potential of fertilizers throughout the growing season. Slowly available nitrogen is best. Fertilizers that have slow-release, controlled release, slowly soluble nitrogen or natural organic based fertilizer are examples of fertilizers that release the nutrients slowly over a period of weeks or months. If the fertilizers release slowly, then there is less potential for it to suddenly leach or move because of run-off. This protects our water resources, both surface and ground water. Read labels on the fertilizer bags, which will explain if they are slowly available or not.

Apply fertilizer when the grass needs it. Cool season grasses need to be fertilized when the growing season is cool. The following schedule works well based upon their growth cycle. Early April, late May, early September and mid October. Apply no more than 1 pound of nitrogen per thousand square feet at each application. Warm season grasses need less fertilizer and are best fertilized when the temperature is hot. One application about mid June with another at the beginning of August is usually sufficient.

Correct application of fertilizer and other chemicals is one of the best and easiest ways to protect our water resources. Fertilizer and other chemicals that land upon the turfgrass can be put to beneficial use. It is the fertilizer and other chemicals that end up on hard surfaces such as roadways, parking lots and sidewalks that are easily washed into surface waters by rainfall or improper irrigation and pollutes our water resources. Use a drop spreader to apply the fertilizers and other lawn care products when they are next to hard surfaces to keep them where they were intended to be used.

Proper irrigation can minimize how much fertilizer and other chemicals are leached past the root zone of the grass or washed away by run-off. Run-off occurs because the soil is unable to absorb the water being applied. Run-off is affected by the precipitation rate of the sprinkler, the length of time the sprinkler is left running and the slope of the terrain. Apply only enough water to replace what has been lost by evapotranspiration. Match the irrigation application to the slope, soil type and root depth. Frequent changes to the irrigation schedule are needed because of the constant changing of weather conditions that impact plant growth. Proper maintenance of the sprinkler system helps to make sure water is being applied to the turfgrass and not to hard surfaces. Fix broken heads and pipes immediately. **Conserving water resources** is one of the best ways to maintain high water quality. Don't use more than is needed.

Water quality hazards associated with proper turfgrass management have been shown to be significantly less than with other land uses. The high organic matter in the thatch and fibrous root system in the soils gives the grass the ability to attract and hold onto the fertilizers and other chemicals so that they can't move as easily through the soil profile as happens in bare or cultivated soils. Turfgrass managers can avoid negative environmental impacts and demonstrate a progressive response to public concerns by implementing best management practices. The positive or negative example that is set by turfgrass professionals has a long reaching effect upon the general public and specifically homeowners to copy what they see professionals do. The implementation of these BMPs will be rewarded by improved water quality that impacts everyone and a conservation of resources (time, money etc.) that impacts the professional directly.