Optimization of Vegetative Filter Strips for Mitigation of Runoff from Golf Course Turf: Site Establishment

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Objectives:

1. Screen eleven plant species for their ability to remove pesticides from contaminated soils.
2. Establish twelve runon vegetative filter plots (three unvegetated, three mixture of selected plant species, three succession of plant species, short to tall, three succession of turfgrass (bentgrass) cut at three different heights, short to tall).

Start Date: 2006
Project Duration: one year
Total Funding: $20,000

Joint greenhouse and field studies are being carried out to evaluate selected plant species for their effectiveness in removing pesticides and nutrients from golf course turfgrass runoff waters that enter the rhizospheres of plants in vegetative filter strips.

Eleven plant species (prairie cord grass, big blue stem, switchgrass, woolgrass, eastern gama grass, perennial rye, tall fescue, blue flag iris, black willow, sedge, cutgrass) and an unvegetated control have been evaluated in a greenhouse pot study to determine which species most effectively remove six pesticides (two insecticides: chloropyrifos, imidacloprid; two herbicides: pendimethalin, 2,4-D; and two fungicides: chlorothalonil, propiconazole) from contaminated soils (silt loam). Five species (blue flag iris, woolgrass, prairie cord grass ,big blue stem, and eastern gama grass) were determined to be most effective.

A runon plot, consisting of 12 vegetative filter strips (VFS, 4.6m x 0.9m x 1.8m), has been established at the UMASS Turfgrass Research Center, South Deerfield, MA. Native soil at the site (sandy loam) was used in the construction and silt loam was brought in for the surface horizon (0-15cm). All plots had a 5% slope and each was lined with an impermeable 36-mil polypropylene liner. At the end of each VFS, an aluminum collection device was inserted underneath 7.6 cm of soil for the last 30.5 cm of the strip to collect runoff water. An aluminum gutter with holes drilled at 5.1 cm intervals was placed on the front (top) edge of each VFS to evenly apply runon water. Stainless steel lysimeters (Soil Measurement System, LLC) were placed 1.5 m below the soil surface and 4.3 m from the front (top) end of each strip.

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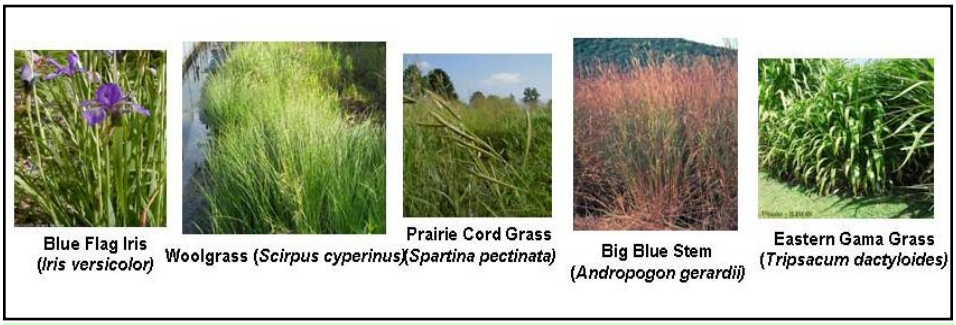
A bromide tracer study will be carried out in the spring of 2007 to determine any hydraulic differences between buffer strips prior to planting. VFS will be then established in replicates of three (unvegetated, random mixture of plant species, succession of plant species, and turfgrass cut to three heights). Application of six pesticides at 5% of their application rates in a runon water volume that would occur in a one- and five-year rain event will be applied over the next three years. Two groups of pesticides will be applied one month apart each year.



Of the 11 species tested, the 5 species above (blue flag iris, woolgrass, prairie cord grass, big blue stem, and eastern gama grass) were determined to be most effective in removing pesticides (chloropyrifos, imidacloprid, pendimethalin, 2,4-D, chlorothalonil, and propiconazole) from contaminated soil.

Summary Points

- Five plant species (blue flag iris, woolgrass, prairie cord grass, big blue stem, and eastern gama grass; given in increasing heights) have been shown to remove turfgrass pesticides from contaminated soil and have been selected for planting into our vegetative filter strips.
- A runon plot consisting of twelve identical buffer strips has been constructed at the UMASS Turfgrass Research Center.