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

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Objectives:
1. Screen 11 plant species for their ability to remove pesticides from contaminated soils.
2. Establish 12 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: two years
Total Funding: $40,000

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

Eleven plant species have been evaluated in a greenhouse pot study to determine which species most effectively removed six pesticides (chlorpyrifos, imidacloprid, pendimethalin, 2,4-D, chlorothalonil, and propiconazole). Our results revealed that the blue flag iris (*Iris versicolor*), eastern gama grass (*Tripsacum dactyloides*), big blue stem (*Andropogon gerardii*), wool grass (*Scirpus cyperinus*), and prarie cord grass (*Spartina pectinata*) were determined to be most effective.

These five plant species are currently being evaluated in vegetative filter strips. A runon plot, consisting of 12 vegetative filter strips (VFS, 4.6m x 0.09 m), 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 (0-15 cm). 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 at the top edge of each VFS to evenly apply runon water, which is delivered from a 250-gallon mixing tank. Stainless steel lysimeters were placed 1.5 m below the soil surface and 4.3 m from the top end of each strip.

A bromide tracer study was carried out to determine hydraulic characteristics and runoff flows on the 12 VFS prior to planting. Several storm events were simulated prior to planting to determine suitable rainfall and runon rates and to establish baseline runoff and infiltration rates on the VFS. The individual VFS were planted in replicates of three (unvegetated, random mixture of plant species, succession of plant species, and turfgrass rough mix).

Greenhouse-reared plugs of woolgrass, blue flag iris, prairie cord grass and eastern gamma grass were planted at a density of 25 plants per 9 sq. feet. Big blue stem was seeded at a similar rate, and will be thinned in spring 2008. Three VFS were

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planted with a rough mixture (80 % Kentucky blue, 20% Chewings Fescue) at a rate of 4 pounds per 1000 sq. feet. The rough mixture will be cut to three different heights (1.5", 2.0", and 2.5 ", top to bottom) over the growing season.

Application of the six pesticides at 5% of their application rates in a runon 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.

The first year (2008) will be used to evaluate the effectiveness of the VFS during the initial grow-in phase. This information will be useful in determining optimum VFS establishment times and their effectiveness during golf course construction phases.

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.

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