

Water Movement in Golf Course Putting Green Rootzones

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Objectives:

1. To document the process of water movement in various sand-based rootzones used for golf course putting greens and develop videos that can be used for instructional purposes.

Start Date: 2006

Project Duration: one year

Total Funding: \$29,998

Generations of soils and/or agronomy students have viewed the film "Water Movement in Soils" in their introductory soils course. This film, released in 1959, demonstrated unsaturated flow of water in several soil types and soils containing layers of different soil textures and amendments. The main concept that students glean through this visual learning tool is that water moves in a loamy soil in all directions and that gravity is not the only factor affecting water movement in soils.

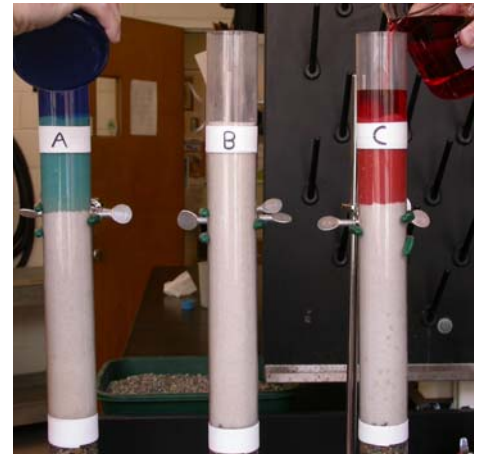
Soil texture, pore size, matric forces and textural discontinuities all play significant roles in how and where water moves. While segments of this film are excellent educational demonstrations which provide relevant information to sand-based putting green rootzones, recent research regarding putting green rootzones demonstrated that water movement in extremely coarse textured putting green rootzones is more than just downward and

two-dimensional.

High quality visual demonstration tools that illustrate some of these concepts are currently lacking. Students and industry professionals would find these demonstrations desirable in their effort to help answer relevant questions about sand-based rootzones.

There are many frequently asked questions regarding sand-based rootzones. For example, how does water actually move in a putting green, and how much water is actually retained at the interface between the sand and gravel layers? How much does a gravel blanket actually contribute to drainage? How does water move in saturated and unsaturated sand rootzones? How do organic matter sources and the various inorganic rootzone amendments affect water movement? How does the downward flow of water differ in a USGA green versus a California style putting green?

The answers to several of these frequently asked questions will visually demonstrated using simulated sand rootzone profiles and various tracker dyes.



Various tracker dyes (top) are being used to demonstrate water movement in unsaturated sands. The tracker dyes clearly demonstrate the zone of saturation that develops at the interface of the sand-gravel rootzone system (below).



Sand rootzone water movement will be conducted on a larger scale in translucent acrylic viewing boxes. Questions such as "What happens to water flow if sand migrates into the gravel layer during construction?" can be addressed with these boxes.

Summary Points

- Clear acrylic containers to construct various rootzone cross sections have been assembled.
- Methodologies for filling and filming water movement in sand-based rootzones were developed.
- Preliminary videos that demonstrate water movement in a contemporary USGA rootzone have been filmed.