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RESEARCH UPDATE

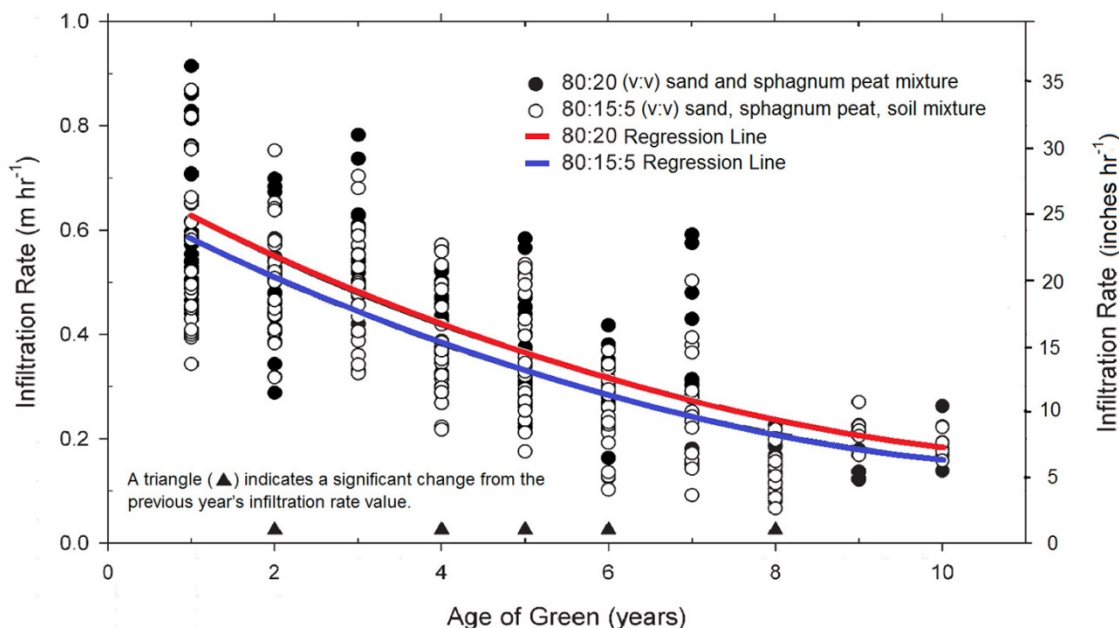


Aging USGA Putting Greens

Part of the challenge managing putting greens is how the soil physical properties of rootzones change as they age. The suitability of a root zone mixture for putting green construction is commonly evaluated by testing soil physical properties in a laboratory. Frequently, [USGA Recommendations For a Method of Putting Green Construction](#) – based on extensive research initiated in the 1950s – are used as guidelines to determine whether the physical properties of a soil are suitable for putting green construction. The USGA-recommended construction technique features a high-sand-content root zone. The resulting putting green is resistant to problems associated with compaction and has relatively high infiltration and percolation rates; but it also has reduced nutrient retention capacity, especially during establishment. However, the soil physical properties of a sand-based putting green root zone can change within two months of construction and will



The physical properties of soil change as putting greens age. Much of the change comes from the accumulation of surface organic matter.



The effect of age on water infiltration for two USGA-recommended putting green root zones at the University of Nebraska. Root zone effect was not significantly different after eight years.

continue to change with age. Changes in root zone soil physical properties during establishment may be due to establishment protocol. The changes in the soil physical properties over time have been attributed to several causes including fine particle migration, peat decomposition and surface organic matter accumulation.

Scientists at the University of Nebraska conducted a 10-year study to evaluate how putting green root zone properties change over time. The objectives were to define soil physical properties of sand-amended root zones as affected by root zone mixture, establishment protocols and putting green age. The USGA-recommended root zones were built and established with creeping bentgrass over four sequential years. Root zone treatments were 80 percent sand and 20 percent sphagnum peat, by volume; and 80 percent sand, 15 percent sphagnum peat and 5 percent soil, by volume. An accelerated establishment treatment applied 2 to 3 times more nitrogen, phosphorous and potassium than the control establishment treatment.

After 10 years, water infiltration of the 80:20 sand:peat and the 80:15:5 sand:peat:soil root zones remained adequate for regional rainfall and irrigation amounts; there were no significant negative effects from the addition of soil. The

change in soil physical properties was in part the result of fine sand accumulation from topdressing and an increase of soil organic matter in a mat layer near the surface. Placement of fine sand from topdressing partially accounted for increased capillary porosity and decreased air-filled porosity and infiltration rate. The reduction in infiltration rate over time, while statistically significant, remained adequate for location rainfall and still met USGA recommendations after 10 years. Capillary, air-filled and total porosity for both root zone mixtures still met USGA recommendations after eight years.

Adapted from: J. D. Lewis, R. E. Gaussoin, R. C. Shearman, M. Mamo, and C. S. Wortmann – [Soil Physical Properties of Aging Golf Course Putting Greens](#). 2010. *Crop Science*. September/October. 50(5): p. 2084-2091.

Additional Information:

[Soil physical and chemical characteristics of aging golf greens](#)

[Physical and chemical soil characteristics of aging golf greens](#)

[Surface organic matter in creeping bentgrass greens](#)

[The importance of organic matter dynamics](#)