# Grow-in and Cultural Practice Inputs on USGA Putting Greens and Their Microbial Communities

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**Goals:**

- *Evaluate grow-in procedure effects on putting green establishment and performance, and develop criteria and recommendations for new putting green readiness for play.*
- *Determine grow-in procedure impacts on root zone physical and chemical properties.*
- *Evaluate post grow-in cultural practice effects on putting green long-term performance.*
- *Determine temporal and spatial (by depth) patterns of rhizosphere community development in golf greens during accelerated and controlled grow-in of select root zone mixes and during long-term green maintenance.*

**Cooperators:**

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The overall goal of this project is to develop a better understanding of the impact of grow-in procedures on putting green establishment and performance. Impacts on the physical, chemical, and microbiological factors associated with the USGA root zones and rhizosphere are emphasized in the project.

The project is being conducted at the University of Nebraska's John Seaton Anderson Turfgrass Research Facility located near Ithaca, NE. The five year project is composed of three phases: Construction and Grow-in, Microbial Community Assessments, and Grow-in Procedure Impacts on the Long-term Performance of the Putting Green. The first two phases will span three-year periods, while phase three will involve experiments repeated over the five years of the project.

Materials for the gravel layer and rootzone mix were sampled from two local (Nebraska) sand and gravel suppliers with experience in golf green construction. The goal was to develop two separate USGA-specification root zone mixtures - one composed of sand and peat, and one a combination of sand, soil, and peat. Materials were tested for compliance with USGA green construction recommendations for physical characteristics and organic matter content. Based upon analytical results, a supplier was chosen. The putting green site was constructed and rootzone mixture plots established. Thus, year one construction objectives were met and plots are ready for creeping bentgrass establishment in spring of 1997.

In the spring of 1997, creeping bentgrass will be seeded into the year one plots. Year two plots also will be constructed and seeded. Grow-in procedure treatments effects on establishment will be evaluated in both year one and year two plots. An extensive microbiological survey of the year one and year two plots will be performed to determine temporal and spatial rhizosphere community patterns during grow-in. All of these studies will focus on the comparison of the accelerated versus controlled grow-in treatments.

To provide oversight for this project, an advisory committee of six golf course superintendents from the Nebraska Golf Course Superintendents Association was formed. Their input on a variety of management issues will be solicited and used in the development of grow-in procedures.

**Table 17. Physical and chemical properties of rootzone mixes under evaluation at the University of Nebraska.**

| | Supplier A | | | | | | | Supplier B |
|---|---|---|---|---|---|---|---|---|
| Analysis | 90:10 | 90:5:5 | 85:10:5 | 85:5:10 | 80:20 | 80:10:10 | 80:5:15 | Rootzone Mix |
| % Soil Separates | | | | | | | | |
| Sand | 98.8 | 97.9 | 95.8 | 96.3 | 98.9 | 95.6 | 97.4 | 98.4 |
| Silt | 0.8 | 1.5 | 3.2 | 2.8 | 0.8 | 3.4 | 2.2 | 1.0 |
| Clay | 0.4 | 0.6 | 1.0 | 0.9 | 0.3 | 1.0 | 0.4 | 0.6 |
| Particle Diameter (mm) % Retained | | | | | | | | |
| Gravel | 1.6 | 1.8 | 1.8 | 1.2 | 1.3 | 1.4 | 1.5 | 5.0 |
| Very Coarse | 8.0 | 8.1 | 8.8 | 7.6 | 8.0 | 7.2 | 7.8 | 29.2 |
| Coarse | 22.7 | 23.9 | 22.4 | 22.4 | 29.1 | 25.2 | 26.6 | 28.8 |
| Medium | 47.4 | 46.0 | 42.5 | 45.6 | 44.1 | 41.9 | 43.9 | 25.3 |
| Fine | 16.4 | 15.0 | 15.2 | 15.6 | 13.9 | 14.5 | 14.0 | 8.1 |
| Very Fine | 2.7 | 3.1 | 5.1 | 3.9 | 2.5 | 5.4 | 3.6 | 2.0 |
| Sphericity | medium | medium | medium | medium | medium | medium | medium | medium |
| Angularity | subrounded | subrounded | subrounded | subrounded | subrounded | subrounded | subrounded | subrounded |
| pH | 7.6 | 8.0 | 8.3 | 7.5 | 5.3 | 7.2 | 7.0 | 5.7 |
| $D_{85}$ | 0.80 | 0.80 | 0.85 | 0.75 | 0.80 | 0.78 | 0.82 | 1.5 |
| Cu | 2.2 | 2.3 | 2.9 | 2.6 | 2.4 | 3.0 | 2.6 | 3.7 |
| Particle Density, g/cc | 2.62 | 2.63 | 2.63 | 2.62 | 2.62 | 2.63 | 2.62 | 2.63 |
| Bulk Density, g/cc | 1.65 | 1.71 | 1.72 | 1.69 | 1.63 | 1.72 | 1.67 | 1.76 |
| Saturated Conductivity, in/hr | 17.7 | 11.3 | 3.8 | 5.0 | 13.3 | 4.8 | 8.9 | 7.6 |
| Porosity, % | | | | | | | | |
| Total | 36.9 | 34.8 | 34.4 | 35.5 | 37.8 | 34.6 | 36.2 | 33.2 |
| Aeration | 20.4 | 18.9 | 17.0 | 15.6 | 17.6 | 13.3 | 16.3 | 15.9 |
| Capilary | 16.5 | 16.0 | 17.4 | 19.9 | 20.2 | 21.3 | 19.9 | 17.3 |
| Organic Matter, % | 0.7 | 0.42 | 0.48 | 0.86 | 1.04 | 0.62 | 0.75 | 0.83 |