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# New Short Game Complex at North Shore Country Club

## Features Innovative Construction and National Creeping Bentgrass Evaluation

*Dan Dinelli, CGCS  
North Shore Country Club, and  
Tom Voigt  
Extension Turfgrass Specialist  
University of Illinois  
Urbana-Champaign, IL*

The United States Golf Association (USGA), the Golf Course Superintendents Association of America (GCSAA), and the National Turfgrass Evaluation Program (NTEP) combined resources to initiate a national research project to evaluate turfgrass varieties (cultivars) grown on USGA rootzones and maintained by host golf course facilities as in-play green surfaces.

Funding was made available to construct practice putting greens at 16 different golf courses across the United States. All of these experimental greens were constructed to USGA specifications. Northern locations sowed bentgrass varieties, southern locations Bermuda grass varieties, and in transition zone climates, both species were planted. Monitoring and evaluation will continue for at least five years, with annual reports being submitted to the NTEP who will issue annual reports of the results.

In conjunction with the University of Illinois, North Shore Country Club was selected as one of the sites for this unique study. In the summer of 1997, the officers and governors of North Shore Country Club (NSCC), lead by Mr. Van Salmans, green chairperson, approved the construction of a short game practice facility to augment the USGA putting green.

### Short Game Practice Facility

The short game practice facility consists of a 7,200 square foot putting green, a 14,098 square foot creeping bentgrass fairway measuring 55 yards long and 28 yards wide, and two greenside bunkers. It is understood by the membership of NSCC this is a functional complex with several research objectives.

General purposes of the short game practice facility include:

1. Maintain a functional short game practice facility and putting green to the standards expected at North Shore Country Club, while recognizing the research potential of such a site. Regular maintenance on the USGA green will include periodic straight sand topdressing and daily mowing at 120 to 130 thousands of an inch. The fairway will be mowed at one-half inch and will undergo regular mowing, aerification and established maintenance practices.
2. Monitor the performance of 21 different creeping bentgrass varieties for putting green use on USGA rootzone profiles, including 18 NTEP entries, and two blends.
3. Monitor the performance of a creeping bentgrass blend (L-93/SR-1119) grown on 20 amended putting green rootzones within the context of a USGA rootzone profile.
4. Monitor the impact of forced gas exchange in

*(continued on page 14)*



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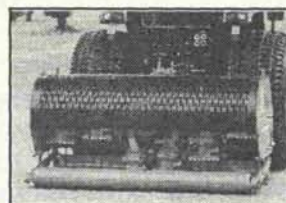
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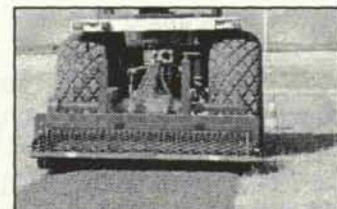
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## New Short Game Complex at North Shore

(continued from page 12)

- the putting green rootzone and turf canopy utilizing the SubAir system.
5. Monitor 13 bentgrass varieties at fairway height, grown on a yardwaste compost amended site.
  6. Compare and contrast organic soil amendments to native soil for fairway use.
  7. Evaluate a bluegrass blend for use on green surrounds.

The major emphasis of the practice facility is to observe turfgrass performance, integrating cultivars and rootzone amendments with management techniques. Field observations, along with detailed monitoring will help develop a better understanding of turfgrass science and ecology. Information gained will further IPM strategies and foster a holistic philosophy of turfgrass management towards maintaining high-quality playing conditions.

Disease susceptibility, nutrient requirements, infiltration rates, moisture stress, and moisture retention will be noted. Possible areas of interest and potential study include, but are not limited to: segregation with genetic dominance in varieties, color, texture, density, thatching tendency, recuperative potential, wear tolerance, heat and cold tolerance, ball roll speed, growth habit, localized dry spot severity, nematode assay (beneficial and plant parasitic), resiliency for desired ball bounce, microbial ecology, turfgrass-microbe interactions, stability of soil amendments, dynamics of percolation rates over time, fluctuations of soil and turf canopy gases, i.e., oxygen, carbon dioxide and methane, relative soil temperatures, *Poa annua* encroachment, inoculation potential of beneficial microorganisms, winter hardiness, fate of rootzone amendments over time, and root mass.

### Putting Green

The putting green site is unique. *Functionality:* This will be a functional green receiving approach shots and being used by the members for putting. This activity will produce ball marks, wear, and compaction and offer daily stresses seen on in-play greens at many golf courses.

*Comparison:* On one green, under consistent management and similar environmental conditions, field evaluations of bentgrass varieties and amended rootzone mixes can be made. The effects of the SubAir system can be documented.

(continued on page 16)



Off-site mixing for the green rootzones mixes at the Feltes Sand & Gravel Co.



All work is done by hand to prevent cross contamination of soil mixes.



All of the various rootzone cells are backfilled by hand.





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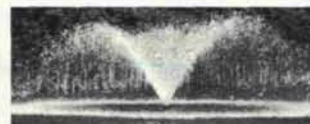
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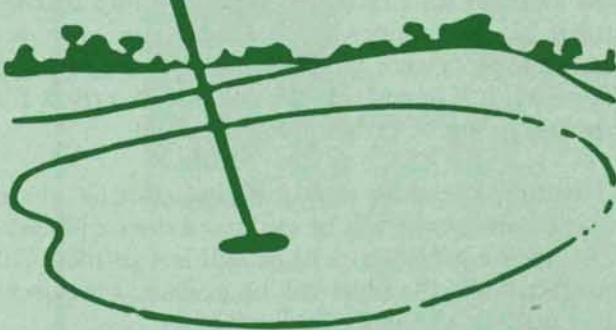
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**Unique Climatic Zone:** The test facility is located in USDA growing zone 5B. This represents the Chicago region, a unique region that is prone to weather patterns influenced by Lake Michigan.

**Bentgrass Blends:** Blends of turfgrass varieties are frequently thought of as advantageous, offering genetic diversity for adaptation potential. Blends of bentgrass with similar growth requirements and growth characteristics like texture, growth habit, and color will be grown and evaluated relative to their respective varieties in pure stands.

**Plot Size:** On the putting green, each variety was planted in a random order, replicated three times in 5 foot by 10 foot plots. Plots this large offer better sampling and ability to measure ball roll speeds via modified or standard stimpmeter readings.

**Putting Green Rootzone Evaluation:** Relative performance of creeping bentgrass varieties grown on two popular rootzones, native soil "push-up"-type rootzones, and USGA sand based rootzones within the same climatic environment and under similar management practices can be made. At North Shore Country Club, several bentgrass variety trials already exist, maintained to putting green standards in "push-up"-style rootzone profiles, with an amended upper 3-inch layer of high sand content via frequent sand top-dressing. In total, there are 17,852 square feet of "push-up" green, consisting of twenty-six varieties of creeping bent, one velvet bentgrass, seven blends of bentgrass, and one creeping species of *Poa annua* var. *reptans* (Hausskn.) Timm. The new USGA green has many of the same varieties.

## Variety Trial

**TABLE 1**

### Established varieties of bentgrass under USGA and "push-up"-type construction regimes.

#### Existing Variety Trials on "Push-Up" Rootzones

A2	Lopez
Biska	Penn A-4
Cato	Penneagle
Century (Syn 92-1)	Pennlinks
Cobra	<i>Poa annua</i> var. <i>reptans</i>
Crenshaw	Putter
G2	Regent
G6	South Shore
Imperial (Syn 92-5)	SR-1019
L-93	SR-1020

SR-1119	SRX-1120
SR-7200*	SYN 92-2
SRX Dinelli	SYN 92-4
SRX-1119	Viper

\* Denotes a velvet bent

#### Existing Variety Blends on "Push-Up" Rootzones (50/50 Ratio)

L-93 / SR-1019	SR-1019 / Penn A-4
L-93 / SR-1020	SR-1019 / Putter
SR-1019 / SR-1020	SR-1019 / Regent
SR-1019 / Cobra	

#### Varieties Established on a USGA Rootzone

Backspin	Penncross
Cato	Providence (SR-1019)
Century	Putter
Crenshaw	SR-1020
Imperial	SR-1119
L-93	SRX-1120*
LCB-103	SRX-1 BPCB*
Penn A-1	SRX-1 Dinelli**
Penn A-4	Trueline
Penn G-6	Viper
Penn G-1	

\* Denotes a velvet bent

\*\* Indicates variety not included in official NTEP trial

#### Variety Blends Established on a USGA Rootzone (50/50 Ratio)

L-93 and SR-1119	SR-1020 and SR-1119
------------------	---------------------

## Early Evaluations of the On-Site NTEP Study

On September 17, the green was evaluated for percent cover (Table 2). On September 24, seedling vigor was determined. A final evaluation was conducted on October 22 (Table 2). Table 2 shows that by October 22, the varieties had made dramatic improvement; some plots were approaching 100 percent cover by this date. It is hoped that the green will be ready for use in late spring or early summer of 1998.

During the next four growing seasons, these creeping bentgrasses will be evaluated once each season for spring greenup, density, and leaf texture. On a monthly basis, the plots will be evaluated for overall turf quality, and ball roll distance.

(continued on page 18)



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**TABLE 2**

**Evaluations following 1997 seeding of creeping bentgrasses at North Shore Country Club.**

Cultivar	Percent Cover 9/17/97a	Seedling Vigor 9/24/97b	Percent Cover 10/22/97a
L-93	18.3 c-e	5.0	85.0
Putter	23.3 e	5.7	78.3
Cato	8.3 ab	4.0	60.0
Crenshaw	18.3 c-e	5.0	78.3
LCB-103	8.3 ab	4.0	65.0
Penncross	20.0 de	5.3	81.7
Backspin	13.3 a-d	5.0	71.7
Trueline	15.0 a-e	4.7	73.3
Providence	15.0 a-e	4.3	75.0
SR 1020	6.7 a	3.7	68.3
SR 1119	6.7 a	3.7	63.3
Viper	8.3 ab	3.7	71.7
Century	11.7 a-d	4.7	71.7
Imperial	18.3 c-e	5.0	60.0
Penn A-1	10.0 a-c	4.7	73.3
Penn A-4	11.7 a-d	4.3	68.3
Penn G-6	6.7 a	3.7	66.7
Penn G-1	16.7 b-e	4.7	71.7
LSD 0.05	8.5	NS	NS

a. Percent cover is represented as mean of the three replications and is a visual estimate of the percent of the plot covered by living seedlings.

b. Seedling vigor is represented as mean of the three replications and is also a visual estimate of the percent of the plot covered by living seedlings combined with plant height representing the relative speed to a mature sod. It is based on a scale of 1-9 where 1 = completely open ground and 9 = maximum plot coverage.

**USGA Rootzone Trial**

A list of 20 different rootzone mixes used in the construction of USGA profile putting green plots, their composition and a brief explanation of each are shown below (Table 3). More detailed information on amendments is available. All amendments, unless noted, were professionally blended off-site at Feltes Sand & Gravel. With one exception, the same USGA approved sand was used in all mixes. For ease of construction and to minimize cross contamination, a non-replicated plot design was constructed, plot sizes 14 feet by 15 feet each. All quantities shown in Table 3 are for a single plot. Random sampling from these large plots may be performed for statistical

analysis. All 20 rootzones were permanently divided with a 80 mil high-density polyethylene, extending from the top of the pea gravel bed to the surface, creating a 12-inch deep rootzone. For identification, one-half inch rebar was permanently placed at each corner of the plot. The entire green was GPS mapped with differential. GPS is a satellite global positioning system that offers accuracy to within 18 inches of a permanent location. All plots were seeded with a 50/50 blend of L-93 and SR-1119 creeping bentgrass and sown at 2 lbs./1,000 sq. ft.

**TABLE 3**

**Rootzone amendments used for putting green construction.**

1. *Straight Unamended Feltes Sand*  
Meets USGA particle size and performance recommendations. This sand is the parent material used in the remaining rootzone mixes. One exception noted.
2. *85/15, Feltes Sand and Sphagnum Peat*  
This rootzone mix represents what would be typical of most spec greens mix. It was tested to meet USGA performance recommendations, C:N ratio of 65/1, pH 4.3, 8.3% humic acid, 8.6% fulvic acid, CEC 74.8 meq/100 grams.
3. *90/10, Feltes Sand and Dakota Peat*  
This rootzone mix meets USGA performance recommendations. This is the same rootzone mix for the NTEP bentgrass trials. Dakota Reed-Sedge Peat has a C:N ratio of 23:1, pH 6.6, 21.1% humic acid, 12% fulvic acid, CEC 118 meq/100 grams. Reports indicate a higher microbial activity for reed-sedge peat.
4. *90/10, Feltes Sand and Dakota Peat Plus Chip Humate (250 lbs.)*  
The chip humate was supplied by Soil Life Systems and is derived from Leonardite consisting of 80% humic acid, 15% humin, and 5% inert. Chip humate was tilled into the top 6 inches of the rootzone.
5. *90/10, Feltes Sand and Dakota Peat Plus 22.5% Profile (1750 lbs.)*  
Profile is a porous ceramic with a CEC of 33.6 meq/100g. Porosity 74%, capillary 39%, non-capillary 35%. Profile is marketed as a soil modifier, adding permanent pore space. Profile

(continued on page 20)





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may assist in balancing capillary pore space for holding moisture and non-capillary pore space for gasses.

6. *90/10, Feltes Sand and Dakota Peat Plus 15% (v/v) Profile and Zeopro (350 lbs.)*

Zeopro tilled into the top 6 inches (see description No. 7 for ZeoPro).

7. *90/10, Feltes Sand and Dakota Peat Plus 10% (v/v) Zeopro (1150 lbs.)*

ZeoPro is a zeoponic material developed from a clinoptilolite form of zeolite. A zeoponic material is a nutrient-charged zeolite combined with a synthetic calcium apatite. ZeoPro is marketed as a soil amendment/slow release fertilizer which modifies the physical characteristics, adds cation exchange capacity and adds an efficient nutrient release mechanism to the rootzone. It has a CEC of approximately 100 meq/100g (800-1200 meq/liter). It carries a nutrient charge of 0.1% exchangeable ammonium, 0.05%-0.5% phosphorous (as calcium apatite), and 0.6% exchangeable potassium.

8. *90/10, Feltes Sand and Dakota Peat Plus 10% Axis (600 lbs.)*

Axis is a calcined diatomaceous earth with 81% total porosity and a CEC of 27 meq/100g. Axis is marketed as a permanent soil amendment adding porosity with low bulk density (0.42 g/cc), and the capability of holding 142% of its weight in water.

9. *90/10, Feltes Sand and Dakota Peat Plus 10% Axis and Zeopro (350 lbs.)*

Zeopro tilled into the top 6 inches.

10. *90/10, Feltes Sand and Dakota Peat Plus OptiMil® (100 lbs.)*

OptiMil® is a agglomerated particle composed of 42.5% SAND-AID, a granular Sea Plant Meal (1-0-1), 42.5% Milorganite (6-2-0), and 15% sunflower hull ash. OptiMil® has an analysis of 3-1-4 and a C:N ratio of 12:1.

11. *90/10, Feltes Sand and Dakota Peat Plus OptiMil® (100 lbs.) and Emerald Isle Experimental Microbial Enhancement Material*

*Trichoderma harzianum* and an experimental

material produced by Emerald Isle, Ltd., were raked into the top 2 inches of the rootzone. The Emerald Isle experimental material is a vitamin B, amino acid bio-stimulant, and an endomycorrhizal fungi.

12. *90/10, Feltes Sand and Dakota Peat Plus SAND-AID (60 lbs.)*

SAND-AID is a granular Sea Plant Meal (1-0-1) with a C:N ratio 21:1 and a CEC of 300-500 meq/100g. SAND-AID can increase water holding capacity up to 12%.

13. *90/10 Feltes Sand and Dakota Peat Plus 60 lbs. SAND-AID and Emerald Isle Experimental Microbial Enhancement Compound*

*Trichoderma harzianum* and an experimental material from Emerald Isle (see rootzone No. 11 for a description of this material) raked into the top 2 inches of rootzone.

14. *90/10, Feltes Sand and Dakota Peat Plus Paramagnetic Rock (300 lbs.), Hard Rock Phosphate (40 lbs.), and Greensand (40 lbs.)*

Paramagnetism is a low-level energy, physical force that has been shown to have beneficial effects on life forms. The paramagnetic rock used is a very fine grained basalt of a volcanic origin from Havelock, Ontario, Canada. Paramagnetic reading of  $8700 \times 10^{-6}$  cgs (micro gauss). Chemical and physical characteristics of paramagnetic rock are shown below:

#### PARAMAGNETIC ROCK

Element	Oxide Form	
Silicon	SiO <sub>2</sub>	45.3%
Aluminum	Al <sub>2</sub> O <sub>3</sub>	22.3%
Iron	Fe <sub>2</sub> O <sub>3</sub>	9.8%
Calcium	CaO	8%
Sodium	Na <sub>2</sub> O	2.6%
Potassium	K <sub>2</sub> O	.5%
Magnesium	MgO	1.5%
Sulfur	SO <sub>3</sub>	0%

Resident inert material 1.6%

Solubility in water nil

Particle size gradation, 2.36mm (#8) 100 ave, 1.18mm (#16) 995 ave, 600um(#30) 69.1 ave, 300um (#50) 4.3 ave, 50um (#100) 2.4 ave, 75um (#200) 1.8 ave.

(continued on page 22)