

Results of 1997 Field Studies, Part 1:

Bent Variety Trial and PGRs for Greenspeed

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Now that another so-called "winter" has passed, let's take a look back at the '97 season. More specifically, I want to review some results and observations from my field studies of last year. Major projects from '97 that I will report on in this and later articles include: 1) the green-height bentgrass trial at Cantigny Golf, 2) PGRs and their purported effects on greenspeeds, 3) wetting agents for reduction of localized dry spots, and 4) suppression of take-all patch with fungicides. This article will focus on the variety trial and the PGR study.

Bentgrass Variety Trial

To review, the bent variety trial consists of 20 "entries" grown on 4-by 6-foot plots replicated three times on approximately 2,000 square feet of the experimental green at Cantigny. Varieties in the test include Pennlinks, Providence, four of the Penn A & G series and Lofts L-93. Pennncross is not in the trial, but a large block of Pennncross is on the green adjacent to the variety trial. The green receives the same care and management as that of other greens on the course, only there is no traffic from golfers. Fertility levels on the green in '97 were moderate, consisting of about 4 lbs. N for the season from slow release organic sources (e.g., Nature Safe 8-3-5, Scotts 18-9-18) or from spoon-feeding with solubles. The

green was mowed daily with walkers at .140 to .150 inches. The green was aerified and top-dressed June 9 and received three additional sand topdressings through the season. The green usually

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stimps at between 8 and 9 feet, but more about that later.

Spring Ratings

Spring of '97 got off to an early start, then settled in cloudy and cool for most of May. The newer bent varieties green up pretty well in early spring but can be set back by late spring frosts and cool, cloudy days. Spring of '96 wasn't much better than '97 temperature-wise, so I have two years of data for spring color and turf quality that are worth a look (Table 1). The April ratings are

for spring green-up only (not including texture and density), while the early June ratings are for color, texture, and density. The June ratings give an indication of how the varieties reacted to the late cold periods of May '96 and May '97.

The April and June ratings are combined in Table 1 to give an overall "early season ranking," or ESR, for each variety. You will note that most of the varieties in the top ten for ESR are also top ranked for the entire season (Table 2). You will also see some variability in ratings from one year to the next, especially in the April color ratings. April of '97 ratings are, in general, much lower, probably because of the crappy weather. Varieties that seem to handle Chicago winters and spring weather pretty well include the Penn series, L-93, Century and Imperial. Although Pennncross is not in the variety trial, it is apparent that most of the 20 newer varieties tested here have much better spring color than Pennncross.

Summer Ratings

Perhaps of more interest are the summer ratings, taken once plant growth (and the weather) are out of the spring doldrums. In Table 2, the varieties are ranked according to their performance over the three summer ratings of late June, mid-August, and early September of '97. The new Penn State releases and L-93 from Lofts head the rankings, as they did last

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year. These varieties have a fine leaf texture, upright growth habit and are very dense (high numbers of shoots per surface area). Most of these varieties also have very good color and perform very well in the heat of summer.

Speaking of shoot density, last fall I extracted 3/4-inch diameter plugs from each plot and counted shoot densities for each variety (last column of Table 2). As expected, the Penn varieties, L-93, Century and Imperial had the highest shoot densities. Obviously, there is a strong correlation between the shoot densities and the overall quality ratings. It is surprising to see how many distinct shoots some of these varieties can pack into a little over a half of a square inch. Penn A2 could have as many as 36,000 shoots per

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If you remember in '96, I let the dollar spot get a little out of hand on some of the susceptible varieties. There was high disease pressure on the plots again in '97, especially in mid-June. I took one dollar spot rating on the plot on June 9 (also Table 2) before controlling the disease with fungicides. The rest of the summer, we controlled the dollar spot on the variety trial with spot sprays to see if some of the susceptible varieties would rate better, which they did. The most susceptible varieties are 18th Green, Century, Imperial, Crenshaw, and SR 1020; this observation is based on last year's as well as this year's data.

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The most resistant varieties appear to be Penn A2, L-93, Providence, Putter and Pennlinks.

Comparison to Results of '93 NTEP National Bentgrass Test

The most recent NTEP bentgrass data available are the results from '96, published in summer of '97. Most of the varieties at Cantigny are also in the '93 NTEP trial. The '96 data is summarized in Table 3, the varieties in this table are listed according to their overall rank in the national test (NAR). I have also included rankings from six Midwest sites, three on soil (including U. of I.) and three on sand rootzones. Also, you can compare these data to my results from Cantigny in '96. You can see how wide the ranges of rankings are for many of the better varieties, which shows the importance of individual site and environmental conditions.

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Table 1.
EARLY SEASON RATINGS—1996-1997

ESR*	ENTRY NAME	SPRING GREEN UP RATING		SPRING QUALITY RATING**	
		4/96	4/97	6/6/96	6/5/97
1	Penn G2	7.0	6.8	6.8	7.2
2	Loft's L-93	7.0	6.7	6.7	7.0
3	Penn A2	7.0	6.3	6.5	7.2
4	Penn G6	6.3	6.8	6.5	7.2
5	Century	7.0	6.2	6.3	6.9
6	Penn A4	6.3	6.3	6.2	7.0
6	Imperial	7.0	6.0	6.3	6.5
8	Providence	6.7	6.0	6.2	6.6
8	Pennlinks	7.0	6.3	5.8	6.4
10	Cato	7.0	5.8	6.0	6.4
11	SR 1020	6.7	5.5	6.2	6.4
12	Southshore	6.7	5.5	6.0	6.4
12	Crenshaw	7.0	5.7	5.5	6.4
14	ProCup	6.0	6.3	5.7	6.5
15	Regent	6.3	6.2	5.5	6.1
16	Cobra	6.0	5.8	5.8	6.2
17	Putter	6.3	5.7	5.5	6.1
18	Viper	5.3	6.0	5.5	6.5
19	Lopez	5.3	6.2	5.3	6.4
20	18th Green	6.0	4.8	5.7	6.5
	(LSD)	(0.8)	(0.8)	(0.9)	(0.5)

* ESR = Early Season Ranking based on '96 to '97 green-up and spring quality only.

** Color and quality ratings were made on a 1-9 scale, 9 = best.

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Plant Growth Retardant, Greenspeed Interactions

In past years, superintendents applied giberellin-inhibitor plant growth regulators (primarily Cutless and Scotts TGR) to greens in spring and fall to slow the growth of *Poa annua* and (try) to increase bentgrass populations. However, these twice-a-year treatments were at fairly high application rates and caused turf discoloration and unevenness in putting quality. More recently, many superintendents have switched to a less aggressive approach of applying PGRs at lighter rates through the season, often on a two- to three-week schedule.

Although there is less of an effect on *Poa*/bent populations, there are several potential benefits of light rate PGR applications. These include increased stress tolerance, lower water use rates, better rooting, and other positive effects on plant health. Also, there are much less noticeable negative effects on the color and quality of treated greens. Finally, there is some evidence that mild growth inhibition can improve greenspeed (as measured by the stimpmeter), especially in the afternoon hours when greens begin to slow from leaf regrowth.

To test this theory, I began a study in late summer of '96 and continued it through '97 to examine the effects of three PGRs on greenspeed: Cutless (flurprimidol), Enhancer (paclobutrazole, TGR), and Primo (trinexapacetyl). Three different bentgrass cultivars on the Cantigny test green received five applications of PGRs in '97 on three-week intervals at the rates listed below (Table 4). The first treatment was applied on 21 June, after the weather finally warmed up.

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Table 2.
SUMMER/EARLY FALL RATINGS—1997

SQR*	ENTRY NAME	QUALITY RATINGS**			DOLLAR SPOT***	SHOOT DENSITY***
		6/24	8/13	9/9		
1	Penn A2	8.5	8.2	9.0	2.0	140.7
2	Penn A4	8.0	7.8	8.7	21.7	130.3
2	Penn G2	8.0	7.8	8.7	13.0	135.3
2	Penn G6	8.2	8.0	8.3	18.7	131.7
5	Loft's L-93	8.2	7.7	8.5	3.0	118.0
6	Century	7.5	7.8	8.3	54.7	126.0
7	Providence	7.3	7.5	8.3	1.7	102.0
8	Crenshaw	7.2	7.5	8.3	23.3	110.0
9	Southshore	7.5	7.3	8.0	3.3	105.7
10	Imperial	7.3	7.2	8.0	37.0	116.0
11	Cato	7.0	7.2	8.0	0.7	101.3
12	Sr 1020	7.0	7.2	7.8	9.3	95.7
12	ProCup	7.0	7.0	8.0	7.3	97.3
14	Cobra	7.2	7.0	7.7	2.0	85.7
15	Pennlinks	7.0	6.8	8.0	1.3	95.3
15	18th Green	6.8	6.8	8.2	40.3	106.0
15	Regent	7.0	6.8	8.0	3.0	92.0
18	Lopez	7.2	6.7	7.7	10.7	90.7
19	Viper	7.2	6.7	7.5	1.7	84.7
20	Putter	6.8	6.7	7.5	0.3	83.7
	(LSD)	(0.5)	(0.7)	(0.6)	(19.7)	(10.7)

* SQR = Summer Quality Rankings based on summer quality only; average of three reps.

** Quality ratings were made on a 1-9 scale, 9=best. Ratings were based on color, leaf texture and shoot density.

*** Dollar spot data is presented as average number of spots observed per plot. Shoot density is based on the average number of shoots counted from 3/4" diameter plug samples.

Table 3.
**1993 NTEP National Bentgrass Test;
1996 Regional Rankings vs. 1996 Cantigny Rankings**

NAR*	VARIETY NAME	SAND ROOTZONES			SOIL ROOTZONES			1996 CANTIGNY
		KY 1	MI 1	WI 2	IA 1	IL 1	WI 1	
1	Lofts L-93	T3	1	2	T7	T10	T5	3
2	Penn A-1	1	9	10	3	19	8	N/A
3	Penn A-4	T3	T3	1	T19	T16	T1	T5
4	Penn G-2	5	2	3	T14	T2	3	2
5	Cato	2	5	7	17	T2	13	9
6	Providence	6	T3	T20	T1	1	T16	8
7	Penn G-6	T8	7	4	25	T22	T1	4
8	Southshore	T8	11	T16	T4	T8	19	12
9	Century	T21	13	15	10	T22	15	T5
10	Imperial	T15	16	13	T7	T10	10	7

*NAR = North American Ranking for entire season over all sites.

NOTE: Several varieties in the '93 NTEP trial are not at Cantigny; only Penn A1 is included here. Penn A2, the numero uno at Cantigny, was not included in the '93 NTEP Trial.

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Stimpmeter readings (primarily in the late afternoon) were taken intermittently beginning after the second application (12 July) and continued into September. Other PGR application dates were 4 August, 23 August and 12 September. The varieties receiving treatments were Pennlinks, Providence and Putter.


Results

There were no visible growth effects of PGR treatments on plots until after the third and fourth applications (4 August, 23 August). Visible effects noted included yellowing at first, then a blueish or gray-green color of Cutless and Enhancer treated plots. Primo plots displayed minor symptoms that were hard to notice.

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**Table 4.
PGR Greenspeed Test Plot Setup in 1997.**

TREATMENT	FORMULATION	PRODUCT APPLICATION/ACRE
Check	—	—
Flurprimidol	Cutless 50 SP	0.5 lb.
Paclobutrazole	Enhancer 2SC	6.0 fl. oz.
Trinexapac-ethyl	Primo 1EC	5.4 fl. oz.



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Throughout the duration of this study in '97, there were very few measurable effects on green speed due to the multiple applications of PGRs, positive or negative (see Tables 5 and 6). Regardless of whether speeds were examined only a couple of days after a treatment or up to twenty days after a treatment, very little differences in stimpmeter readings were noted between treatments and check plots. On some days, it appeared that PGR applications reduced greenspeeds in the afternoon instead of increasing them. This phenomenon is more likely to occur seven to ten days or more after a treatment.

Retreating plots at low rates on a three-week interval did not appear to enhance afternoon greenspeeds on these bentgrass varieties in '97. A similar study on a mixed bent/*Poa annua* green may provide very different results, since *Poa annua* appears to be much more sensitive to these types of PGRs than creeping bentgrass. Also, perhaps I am not able to get enough pure speed out of this green to detect minor differences in treatments. This study will be repeated in '98 with cutting heights at .125 inch or lower to try to bring out treatment differences.

Again, I would like to invite everyone to come out to Cantigny to see these new bent variety trials and look at other research project there. We hope to have another "Fall Field Day" sometime in September. Hope to see you there!



Table 5.
"Typical" Morning and Evening Stimpmeter Readings From August 29, 1997 (cutting height = .140)

	AM POST-MOW DISTANCES (6 DAYS AFTER LAST TREATED)			
	PROVIDENCE	PUTTER	PENNLINKS	MEAN
Primo	7.5	7.7	8.0	7.73
Cutless	7.6	7.7	7.7	7.67
Enhancer	7.5	7.5	8.1	7.70
Check	7.8	7.8	7.5	7.70
(variety means)	7.6	7.7	7.8	NSD

	PM REGROWTH DISTANCES (6 DAYS AFTER LAST TREATED)			
	PROVIDENCE	PUTTER	PENNLINKS	MEAN
Primo	7.5	7.5	8.0	7.67
Cutless	7.7	7.9	7.7	7.76
Enhancer	7.8	8.2	8.0	8.00
Check	7.5	7.8	8.2	7.83
(variety means)	7.6	7.9	8.0	NSD

Table 6.
Summary of Evening Stimpmeter Readings to Show Effects of PGRs on Leaf Regrowth and Greenspeed.

	3-5 Days ALT* (average of three varieties)			
	7/15	8/26	8/27	9/15
Primo	7.9	7.7	8.0	8.4
Cutless	7.6	7.5	8.1	8.4
Enhancer	7.9	7.9	8.1	8.7
Check	7.6	7.9	8.2	8.3
LSD	NS	NS	NS	NS
(cut height)	(.150)	(.150)	(.140)	(.140)

	12-18 Days ALT (average of three varieties)			
	7/31	8/18	9/3	9/9
Primo	7.5	8.1	8.6	8.0
Cutless	7.5	8.2	8.6	8.1
Enhancer	7.7	8.2	8.7	8.2
Check	7.9	8.2	8.7	8.3
LSD	NS	NS	NS	NS
(cut height)	(.150)	(.140)	(.140)	(.140)

* ALT (After Last Treatment), Stimpmeter readings are in feet and tenths of a foot; readings are average of three ball rolls in opposite directions which were averaged using the formula $d = 2UD / (U + D)$ where U is the upslope distance and D is the downslope distance.