

Establishment on USGA Green Using Sybron Chemicals

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INTRODUCTION AND OBJECTIVE

Conventional turf fertilizers are being publicly scrutinized because of their potential to leach in sand based root zones during turfgrass establishment. The purpose of this study was to evaluate the effect of organic sources of nutrients and plant extracts for putting green establishment on a USGA green.

EXPERIMENTAL METHODS

The project was conducted on a research putting green constructed to USGA specifications in spring 1999 (USGA, 1993). The establishment project was conducted under both summer and autumn conditions.

Summer trial

On June 13, 2000 a 2500 sq. ft. area was prepared for seeding by stripping the top 1" of sand/silt and backfilling with fresh 80/20 (sand/peat) construction mix. On June 16 the area was seeded with 11b Penncross/1000M sq. ft. using a 3-foot Gandy drop spreader in two directions. The entire area was 48' x 48'.

The experimental design was a randomized, split-plot with four replications. Main plots were 12' x 12' and sub-plots were 12' x 4' (Fig. 1). Main plots were TS2 at 0, 12 (1X rate), and 24 oz/M (2X rate). Sub-plots were 0, 1 (0.5X rate), and 2 lb P₂O₅/M (1X rate). A tenth treatment was TurfVigor applied at 24 oz/ which was analyzed with the non-starter fertilizer TS treatments as a 2-way ANOVA. Each sub plot was 12' x 12' and each sub-sub plot was 12' x 4'. The fertilizer was 15-24-8 (Spring Valley) and was applied only at the beginning of the trial. TS2 and TurfVigor were applied as liquid sprays at 0, 7, 14, and 21 days after seeding. Liquid treatments were applied with 2 gal/M carrier volume using a CO₂-powered backpack sprayer equipped with XR 8005 Tee Jet nozzles. Starter fertilizer treatments were applied once, at time of seeding. Plots were irrigated four times daily for two minute periods. Plots were mowed twice with a walking greens mower (Jacobsen) set at .275" on July 7 and 22 before the termination of the study.

Percent turf cover was evaluated weekly to determine establishment rate. Pythium disease was controlled preventatively with 1 oz Subdue/M applied 7 July 2000.

Autumn establishment

A second trial was conducted during late summer/early autumn. The first trial was terminated on July 24 by spraying a 3% Roundup solution on the existing vegetation. Twenty-one days after spraying the Roundup, the remaining dead turf was removed with a sand pro and landscape rakes. The area was leveled with the sand pro and then hand raked to a final grade.

On August 21 the area was seeded with 1# Penncross with a 3-foot Gandy drop spreader in two directions.

The experimental design was a randomized complete block with four replications. Treatments were arranged and analyzed as split-plot factorial. Main plot treatments were TS2 48oz/M (2X), TS2 24oz/M (1X), TurfVigor 48oz/M (2X), TurfVigor 24oz/M (1X), and a control with no treatment. Each of these plots was then split to receive each of the following fertilizer treatments; 1lb P₂O₅ (1X), 0.5lb P₂O₅ (0.5X), or no fertilizer. Main plots measured 9'x10' and sub-plots measured 3' X 10'. The chemical treatments were sprayed every 7 days (for 28 days--a total of 5 sprays), while the fertilizer applications were on a 10-day schedule until the study was terminated on 10/7—seven weeks after seeding (see table 1). Treatments were again sprayed using a CO₂ powered backpack sprayer equipped with XR 8005 Tee Jet nozzles. A starter fertilizer, 15-24-8 (Spring Valley), was applied at 7-10 day intervals as is typically performed during grow-in. The fertilizer was applied using a 3ft Gandy drop spreader. With the spreader set at 31, we went 1 time over plots receiving 0.5X rate and 2 times over plots receiving 1X rate. The irrigation was again set to run 4 times daily for 2 minutes each time.

On 9/17 the plot area was mowed at _". Then on 9/21 the trial area was mowed at 0.22". Finally, on 9/24 the final mowing height of .156" was achieved. Subsequent mowings were performed 2-3 times weekly until the termination of the trial. All mowings were performed with a walking greens mower.

Table 1. Establishment of USGA creeping bentgrass green with Sybron chemicals, Verona, WI.

Chemical Application Dates	Fertilizer Application Dates
8/21/00	8/21/00
8/28/00	8/30/00
9/4/00	9/8/00
9/12/00	9/18/00
9/18/00	9/26/00

Weekly ratings were taken for percent cover to determine the rate of establishment. Other ratings included color and quality. A soil test analysis showed high pH (7.7), and low phosphorus (44 lbs./A) and potassium (30 lbs./A).

Data analysis

Data for comparing the TS2 treatments in the summer trial and all the treatments in the autumn trial were analyzed as a factorial arrangement (MSTAT, 1988). In the original plans, the TurfVigor treatment in the summer trial was not split for starter fertility, i.e., no starter fertilizer was used, due to spatial and budget constraints. For analysis, this treatment was compared only against the other treatments (TS2 and untreated control) which received no starter fertilizer and was analyzed as a 2-way ANOVA (MSTAT, 1988).

RESULTS AND DISCUSSION

Summer trial

Germination began on June 23. There were no significant differences in establishment rate among the TS2 and control treatments (main plots) (Table 2). In the sub-plots, both the 0.5X and 1.0X rates of starter fertilizer resulted in significantly better establishment than plots which received no starter fertilizer. There were no TS2 x starter fertilizer interactions.

In the TurfVigor/TS2 comparison, there were no statistically significant differences between any of the treatments and the untreated control (Table 3). There was a notable trend, however, of the TS2 and TurfVigor resulting in better establishment.

Early evaluation of the treatments resulted in the trial being terminated before complete cover was established. Due to the slow rate of establishment, it was deemed necessary to conduct another experiment using continual applications of starter fertilizer as treatments similar to conventional grow-in programs. It was also decided to increase the rates of TS2 and TurfVigor because there seemed to be some effect though it was not statistically significant and because the original rates were somewhat arbitrary. It was also determined to test both TS2 and TurfVigor at several rates of starter fertility, including a zero fertilizer control.

Autumn establishment

Sufficient germination to justify a rating occurred 11 days after seeding (Sept. 1). Establishment rate was rapid compared to summer, with percent turf cover increasing from approximately 10% to 50% in just an 11 day period (1 to 12 Sept.) (Table 4). This was likely due to the effect of regular fertility in some of the plots and cooler nights which decreased respiration, allowing more energy for growth.

Main plot effects were significant during the early part of the trial. TurfVigor at the 48 oz/M (2X) rate significantly improved establishment during the first three weeks compared to the untreated control. TurfVigor at the low rate (24 oz/M) and the TS2 treatments also increased establishment rate but results were not statistically significant ($p > 0.05$) compared to the untreated control. Sub-plot effects (starter fertilizer) were significant throughout the trial, with the 1X starter fertilizer rate providing significantly better cover than the 0.5X rate, and the untreated control resulting in significantly less cover than either of the two fertilizer treatments. There were no significant interactions between main and sub-plot treatments.

Turf color and quality were not significantly ($p > 0.05$) affected by any of the TS2 or TurfVigor treatments, although ratings for these treatments were always greater than the untreated control. As expected, color and quality were directly related to the amount of starter fertilizer applied. There were no interactions between TS2/TurfVigor and fertilizer treatments.

CONCLUSION

TurfVigor at 48 oz/M increased turf establishment rate by two to three weeks. TS2 had less of an effect, but this appears to be rate-related: higher rates may have significant effects. Indeed, higher rates of either TurfVigor or TS2 may result in significant interactions with starter

fertilizer treatments. Continued evaluation of TurfVigor and TS2 products at the same or higher rates than were evaluated during the autumn trial are warranted.

Literature Cited

MSTAT-C, Michigan State University. 1988. User's guide to MSTAT-C.

USGA. 1993. Recommendations for a method of putting green construction. USGA Green Section Record 31(2):1-3.

Table 2. TS2 effects on establishment of a USGA creeping bentgrass putting green, Verona, WI, 2000.

Treatment	Percent Cover Rating Means			
<u>Main Plots</u>	6/29	7/7	7/14	7/20
TS2 0X	10.4	23.8	27.9	37.5
TS2 0.5X	12.0	24.2	31.7	40.8
TS2 1X	6.8	20.8	29.2	37.1
LSD .05	ns	ns	ns	ns
<u>Sub Plots</u>				
No Starter	6.4	18.3	22.5	30.0
Starter 0.5X	11.6	24.6	31.7	40.0
Starter 1X	11.3	25.8	34.6	45.4
LSD .05	ns	6.2	5.0	6.1

ns = not significant at $p = 0.05$.

Table 3. Comparison of TurfVigor and TS2 for establishment of a USGA creeping bentgrass putting green, Verona, WI, 2000.

Treatment	Percent Cover Rating Means			
	6/29	7/7	7/14	7/20
Control	3.8	17.5	18.8	27.5
TS2 0.5X	8.0	20.0	23.8	30.0
TS2 1X	7.5	20.0	25.0	32.5
TurfVigor	10.0	20.0	25.0	36.3
LSD .05	ns	ns	ns	ns

ns = not significant at $p = 0.05$.

Table 4. Establishment of a USGA creeping bentgrass putting green using Sybron Chemicals, Verona, WI.

Treatment	% Cover					Color			Quality
	<u>9/1</u>	<u>9/12</u>	<u>9/18</u>	<u>9/26</u>	<u>10/6</u>	<u>9/12</u>	<u>9/18</u>	<u>10/6</u>	<u>10/6</u>
Main Plots									
TS2 1X	9.6	47.5	69.6	75.8	86.3	6.7	6.8	6.7	6.5
TS2 2X	9.6	48.3	68.3	76.7	85.4	6.9	6.9	6.7	6.4
Turfvigor 1X	10.0	45.4	67.5	75.0	86.3	6.7	6.9	6.6	6.4
Turfvigor 2X	10.0	53.8	76.3	79.6	89.2	7.1	7.3	6.6	6.6
Control	8.8	40.4	62.9	71.7	84.6	6.4	6.5	6.5	6.3
LSD 0.05	ns	8.3	8.2	ns	ns	ns	ns	ns	ns
<u>Subplots</u>									
No Starter	8.5	36.0	56.3	65.5	75.3	5.9	5.8	5.6	4.8
0.5X Starter	10.0	48.0	71.0	78.0	88.8	7.0	7.1	6.6	6.7
1X Starter	10.3	57.3	79.5	83.8	95.0	7.4	7.7	7.6	7.8
LSD 0.05	2.0	5.4	5.6	5.6	6.0	0.3	0.4	0.4	0.5
<u>Interaction</u>									
M x S	ns	ns	ns	ns	ns	ns	ns	ns	ns

ns = not significant at p = 0.05.



Figure 1. Autumn establishment on USGA putting green using Sybron Chemicals, 24 days after seeding, Verona, WI, 2000.



Figure 2. Close-up of Autumn establishment on USGA putting green using Sybron Chemicals, 24 days after seeding, Verona, WI, 2000.



Figure 3. Autumn establishment on USGA putting green using Sybron Chemicals, 24 days after seeding, Verona, WI, 2000.