Use of Turf Covers for Improved Overseeding Establishment on Hybrid Bermudagrass Greens

Principal Investigators: Wendy Gelernter, Ph.D. and Larry J. Stowell, Ph.D., CPPP, CPAg

Cooperators: Joe Foster, West Coast Turf; Rick Sall, Tamarisk Country Club; Craig Shafer, Turf Partners; Mark Smith, The Quarry

Sponsor: Hi-Lo Desert GCSA

Summary: In a replicated field trial conducted to determine methods for improving the establishment and uniformity of greens overseeding programs, the role of turf fabric covers and of different renovation methods was investigated. Key findings include:

1. All five turf covers tested resulted in improved ryegrass establishment and bermudagrass recovery when compared to uncovered turf. Protection from high winds (upt to 30 mph) and irrigation-induced movement of seed appeared to be the major benefit.

2. The best performing turf covers (Typar T-518 and Bunker liner fabric) shared the qualities of resistance to high winds without tearing, and sufficient light transmission to support the growth of emerging seedlings. In addition, the best performing covers appear to have maintained slightly higher temperatures underneath the covers, thus allowing more rapid growth of emerging seedlings.

3. Covers that did not perform as well either tore and blew away in high winds (Reemay fabric and seed blanket fabric) or were so dense that they blocked light to emerging turf seedlings (frost blanket). The poorer performing covers also did not have any effect on raising temperatures underneath the covers.

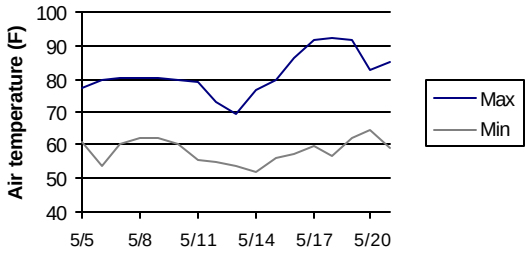
4. Chemical renovation with Scythe provided better ryegrass establishment and bermudagrass recovery than mechanical renovation.

Based on these results, the use of fabric covers, regardless of the renovation method used, should provide significant improvements in Fall overseeding programs on greens, especially where high winds and/or irrigation-induced movement of seed have in the past resulted in uneven and/or sparse distribution of overseeded cool season turf. Fabrics that are resistant to wind, but are at the same time transparent enough to allow significant sunlight through are the optimal materials to use for improved overseeding on greens.

Materials and Methods:

Location: Research plots were located at West Coast Turf's Indio, CA facility on Tifdwarf bermudagrass that was overseeded with a mixture of Sonoran Perennial rye blend (Apron treated) at 25 lb/1000 sq ft and Poa trivialis (6 lb/1000 sq ft). The trial was initiated on May 5, 1998, when air temperatures reached levels that are typical of the Fall overseeding period (90°F maximum and 60°F minimum). A graph illustrating the maximum and minimum temperatures at the initiation of the trial is printed in Figure 1 below.

Figure 1. Minimum and maximum daily air temperatures at CIMIS station #50 (Thermal) during the course of the turf cover trial.



Experimental design and application: Twelve different treatments were evaluated in a split plot design, with three replicates. Each plot measured 5 feet by 5 feet. The plot plan is illustrated in Figure 2 below. Scythe applications were made on 5/5/98 with a CO_2 backpack sprayer equipped with 8004 VS flat fan nozzles and delivering 0.98 gallons of water per 1000 square feet, with 30 psi at the boom. Calibration of

each nozzle was confirmed prior to application to be within 5% of the desired nozzle flow rate. Boom height was 17 inches above the ground.

The spray swath was 5 feet. Speed was 3 mph. Spray bottles were agitated by shaking 5 times prior to charging with compressed CO_2.

Treatments: Five different fabrics were evaluated (see Table 1 below), as were chemical renovation and mechanical renovation (see Table 2 below). Chemical renovation consisted of a single application of Scythe (pelargonic acid) herbicide on 5/5/98 at a 10% concentration, 24 hours prior to seeding. The Scythe plots were scalped on 5/6/98, 24 hours after application at 0.060 inches. On 5/6/98, mechanical renovation was achieved using a Jacobsen Green Kings 4 with veritcut reels and carbide tipped blades at a setting of +0.125, followed by scalping with a walking greens mower set at 0.070 inches.

On 5/6/98, following renovation, plots were overseeded with a mixture of Sonoran Perennial rye blend (Apron treated) at 25 lb/1000 sq ft and Poa trivialis at 6 lb/1000 sq ft. Seed was applied with Gandy drop spreader, with a 33 inch swath. Calibration to deliver 25 lb/1000 sq ft of rye resulted in a Gandy setting of 80, and delivery of 6 lb/1000 sq ft of Poa trivialis resulted in a Gandy setting of 37. The accuracy of calibration was confirmed to be within ± 5% of the desired rate by conducting 3 passes of 15 linear feet each at the specified setting, collecting the product in question and weighing it. Following seeding, plots were covered with the designated fabric and were irrigated for 30 minutes. This irrigation was followed by 15-20 minutes of irrigation every two hours throughout the day, from 5/6 to 5/14/98. Covers were removed on 5/14/98, and the irrigation schedule was changed to two hours per day for the duration of the trial.

Figure 2. Plot plan. West Coast Turf, Indio, CA. C = chemical renovation. M = mechanical renovation.

7	8
11	12
1	2
5	6
9	10
3	4
7	8
9	10
3	4
1	2
11	12
5	5
11	12
9	10
7	8
5	6
3	4
1	2
C	**M**

Table 1. Turf cover suppliers and relative costs. Contact suppliers for the most current prices.

Turf cover	Supplier	Phone	Cost/ 1000 sq ft
"Seed Guard" seed blanket	DeWitt Co., Sikeston, MO	800-888-9669	$16.23
Typar T-518 1.25 oz	Triangle Marketing & Sales, Cary, NC	800-455-3392	$38.00
Reemay 2006 0.6 oz	Triangle Marketing & Sales	800-455-3392	$25.00
2 oz. Frost blanket	Triangle Marketing & Sales	800-455-3392	

Table 2. Treatment List

Trt #	Fabric	Renovation Method
1	Seed blanket	Scythe
2	Seed blanket	mechanical
3	Typar T518 (1.25 oz)	Scythe
4	Typar T518 (1.25 oz)	mechanical
5	Bunker liner	Scythe
6	Bunker liner	mechanical
7	Reemay 2006 (0.6 oz)	Scythe
8	Reemay 2006 (0.6 oz)	mechanical
9	Frost blanket	Scythe
10	Frost blanket	mechanical
11	No cover	Scythe
12	No cover	mechanical

Table 3. Schedule of events in trial implementation.

5/5/98	Scythe applied to designated plots
5/6/98	Mechanical renovation
5/6/98	Overseeding of all plots
5/6/98	Plots covered with designated fabrics
5/12/98	High winds blow away fabric from treatments 7 and 8
5/14/98	Fabric removed
5/14, 5/21	Evaluations made

Evaluations: Success of the various treatments was evaluated using a variety of measurements which included:

- Visual assessment of turfgrass density (Rye/poa or bermudagrass) (on a 1 – 10 scale, with 1 = worst possible stand and 10 = best possible stand) made on 5/21/98.

- Rye/poa density, as determined by mowing a 10 foot square area in each plot at ½ on 5/21/98, and weighing the clippings.

- Percent light reduction under each fabric cover. This was determined by shining a 12 volt light source (Maxi-Lux camcorder light, model LT-3) 17 inches above a fabric square measuring 5 inches by 5 inches. To determine how much light was intercepted by the fabric, the light intensity (millivolts) was measured with and without the fabric between the light source and a pyranometer (Sol-A-Meter pyranometer, Matrix, Inc. Mesa, AZ). Three measurements were taken for each of the five fabrics tested in this trial. Percent reduction was then calculated using the following equation:

$$\text{Percent light reduction} = 100 \times \frac{(\text{Light intensity without fabric}) - (\text{Light intensity with fabric})}{\text{Light intensity without fabric}}$$

- Soil moisture under each of the five fabrics tested, as measured by determining the gravimetric water content. This was determined by pulling soil samples from each plot to a three inch depth, and weighing the sample while it was still moist. The sample was then re-weighed following incubation in a drying oven at 80°C for 24 hours. Gravimetric water content (the higher the gravimetric water content, the higher the soil moisture) was calculated using the following equation:

$$\text{Gravimetric water content} = 100 \times \frac{(\text{weight of wet soil}) - (\text{weight of dry soil})}{\text{weight of dry soil}}$$

- Temperatures under each of the five fabrics evaluated in this test. Temperatures were taken using a thermometer (mini-K thermometer, Grainger) and a bead thermocouple (Grainger). Four readings were taken underneath and over the top of each of the five fabrics.

All data was subjected to analysis of variance, and treatment means separated using Fisher's LSD, where $P<0.05$. Percent light reduction data was transformed to the arcsine (square root) of the proportion prior to analysis.

Results and Discussion:

Turf density (Table 4): All five turf covers resulted in improved rye/poa density and uniformity when compared to uncovered turf, primarily because the covers protected seed from being blown away by high winds (up to 30 mph). In uncovered plots, little or no rye or poa seed remained in the plots following episodes of high wind. There were significant differences among the different fabric covers, however. The best performing fabrics – the Typar and bunker liner covers – shared the qualities of good resistance to wind (neither of these fabrics tore or blew away during the course of the trial), and sufficient transmission of light to allow emerging seedlings to grow. In contrast, the worst performing fabrics were either too flimsy and blew away in high winds (Reemay and seed blanket covers), or interefered with light transmission to emerging seedlings (frost blanket; see Table 5). It should be noted that the use of extra staples (placed every square foot of material) would probably act to secure even the flimsier fabrics from blowing away during high winds. However, the staple spacing used in the study was placement approximately every 2 square feet.

In addition, bermudagrass under covered turf was also better protected than uncovered turf (Table 4), with significantly higher density under all five covers than when no cover was present. The Typar and bunker liner covers produced the highest density bermudagrass.

Table 4. Efficacy of turf covers and renovation strategies for improved overseeding establishment and uniformity of overseeded greens**.** Turfgrass density and uniformity (stand) was evaluated on 5/21/98 using a 1-10 scale, with 1 = worst possible stand and 10 = best possible stand. In addition, the rye/poa trivialis density was determined by mowing a 10 square foot area in each plot at 1/2" on 5/21/98, and weighing the clippings. In each column, values followed by the same letter are not significantly different (Fisher's LSD, P<0.05).

		5/21/98	**5/2198**	**5/21/98**
Turf cover	**Renovation strategy**	**rye/poa stand**	**Bermuda-grass stand**	**Rye/poa clipping wts (g)**
Typar 1.2 oz	Scythe	4.2 bc	8.2 bc	17.88 de
Reemay 0.6 oz	Scythe	0.8 a	6.3 a	1.97 ab*
Frost blanket	Scythe	2.7 b	7.8 b	9.49 bc
"Seed Guard" seed blanket	Scythe	4.0 bc	8.0 bc	13.93 cd**
Bunker liner	Scythe	4.5 c	8.7 c	24.58 e
No fabric	Scythe	0.0 a	6.3 a	0.42 a
Typar 1.2 oz	Mechanical	4.2 b	4.7 ab	12.90 bc
Reemay 0.6 oz	Mechanical	3.5 b	3.7 ab	8.21 ab*
Frost blanket	Mechanical	3.5 b	4.3 ab	9.07 b
"Seed Guard" seed blanket	Mechanical	3.8 b	4.3 ab	13.34 bc**
Bunker liner	Mechanical	4.2 b	5.3 b	17.81 c
No fabric	Mechanical	0.0 a	2.7 a	0.68 a

*Turf covers blew off on all three replicate plots during the course of the trial
**Turf covers blew off in one replicate plot during the course of the trial

Light reduction: To rule out the possibility that turf covers might inhibit seedling germination due to interference with transmission of sunlight through the cover, light intensity under each of the five turf covers was tested. As expected, each of the turf covers resulted in some reduction in light to the emerging seedlings. However, in all cases except that of the frost blanket, this reduction did not appear to interfere with plant growth. However, the significant light reduction under the frost blanket of almost 50%, did appear to play an important role in reducing the rye/poa stand under this cover (Table 5). Based on this data, turf cover selection should also be based on the degree to which the fabric interferes with sunlight light transmission. The percent light reduction that can be tolerated under a turf cover appears to be 36% or less, but additional testing is required to confirm this value.

Table 5. Percent light reduction from 5 different turf covers. Treatments followed by the same letter are not significantly different (P<0.05). For analysis of variance, percent light reduction data was transformed to the arcsine (square root) of the proportion prior to analysis.

Turf cover	% light reduction
Typar 1.2 oz	18.6 a
Reemay 0.6 oz	25.3 a
Frost blanket	49.3 c
"Seedguard" Seed blanket	18.2 a
Bunker liner	36.1 b

Soil moisture: The possibility that turf covers acted to preserve moisture, and thus increase turf vigor, was investigated. However, none of the covers tested produced any significant increases (or decreases) in soil moisture (Table 6) when compared against uncovered turf.

Table 6. Influence of turf covers on soil water content. Treatments followed by the same letter are not significantly different (P<0.05).

Turf cover	Renovation Method	Soil water content
Typar 1.2 oz	Scythe	8.95a
Reemay 0.6 oz	Scythe	9.54a
Frost blanket	Scythe	8.37a
"Seedguard" Seed blanket	Scythe	8.38a
Bunker liner	Scythe	9.48a
No fabric	Scythe	10.33a
Typar 1.2 oz	Mechanical	9.15a
Reemay 0.6 oz	Mechanical	8.48a
Frost blanket	Mechanical	9.29a
"Seedguard" Seed blanket	Mechanical	9.31a
Bunker liner	mechanical	10.91a
No fabric	Mechanical	10.75a

Temperature changes underneath fabric covers: The best performing turf covers (Typar and bunker liner) also appeared to cause a small, but significant increase in temperature underneath the turf covers (Table 7). This increase may have contributed to the improved stand of rye/poa as well as of bermudagrass underneath these covers.

Table 7. Temperature changes underneath fabric covers. Fabrics that resulted in significantly (P<0.05) higher temperatures underneath the fabric are denoted with an asterisk (*).

	Mean temperature (°F)	
Turf cover	Under fabric	Above fabric
Typar 1.2 oz	93.75*	91.78
Reemay 0.6 oz	94.00	91.98
Frost blanket	91.95	92.95
"Seedguard" Seed blanket	90.50	89.38
Bunker liner	92.15*	89.98