

# Performance of fertility programs on creeping bentgrass fairway turf

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The objective of this research project was to determine the effects of the sponsor's fertilizer programs on dollarspot disease and general performance of creeping bentgrass putting green turf maintained at fairway height.

Data collected included the duration and strength of the color response following application(s) of the tested products, turf quality, uniformity, and density, and resistance of the turf to disease and drought stress.

## MATERIALS/METHODS

This trial included three treatments (fertility programs as per Table 1). An unfertilized check treatment will also be included. Treatments were applied to 1 x 2 m plots of creeping bentgrass turf maintained as a fairway at the Guelph Turfgrass Institute (mowing at 10 mm, irrigation to prevent stress) (Figure 1). Treatments were replicated four times in a randomized complete block design.

Color response of the turf to treatments was assessed regularly using canopy reflectance (normalized-difference vegetation index). Uniformity of the color response was assessed visually. Plots were rated regularly for turf quality, density and uniformity. Spring greenup will be assessed in April 2009.

All data were analysed statistically using the SAS package of statistical software.

An anecdotal photographic record was kept of the progress of the trial.

## RESULTS

*Turf performance – visual ratings.* Visual color and quality ratings of treated plots indicated high

quality turf throughout most of the trial period. The only date when the differences were significant, 18 days after application, saw two among the treatments, with the TruPrill and microprill urea treatments having higher quality than the Clubgreen and untreated control (Table 2).

*Turf performance – canopy reflectance.* The canopy reflectance data showed a very similar pattern to the visual quality data, with significant differences among the treatments on all observation dates except one (Table 3). The values of the NDVI were very close among all the treatments, but the TruPrill and microprill urea treatments had higher absolute index values (Figure 2). When the data were corrected to remove the background variation (by subtracting the control plot means), the treatment response became more evident (Figure 3). The overall season means of NDVI were in the order TruPrill > microprill urea > Clubgreen > untreated control.

The uniformity of the turf can be assessed by examining the coefficients of variation of the NDVI values. There were no statistically significant differences among the treatments in uniformity.

*Dollarspot disease.* There was a little bit of dollarspot across all treatments in the first two weeks after the first application (Table 2). At the peak of with infection there was less dollarspot present in the TruPrill treatments than in the control or Clubgreen treatment.

Table 2. Fertilizer performance trial: treatments

Treatment	Product rate	Program
1 Granular Tru-prill 17-0-15	14.4 g m <sup>-2</sup>	August 22, 2008
2 Clubgreen 16-4-20	15.3 g m <sup>-2</sup>	August 22, 2008
3 Microprill Urea 46-0-0	5.3 g m <sup>-2</sup>	August 22, 2008
4 Control	—	—





Figure 1. Plot area September 4, 2008.

Table 2. Visual ratings of treated plots.

Treatment	Days after treatment application					
	12	18		28	48	
	Color	Color	Quality	Quality	Quality	DS lesions
Tru-prill 17-0-15	8.0 <sup>a</sup>	9.0	8.5 a	8.3	8.3	18.3 <sup>b</sup> b
Microprill Urea 46-0-0	8.5	9.0	8.5 a	8.0	8.3	25.8 ab
Clubgreen 16-4-20	8.3	9.0	7.5 b	7.5	7.3	33.0 a
Control	7.8	9.0	7.5 b	7.8	7.3	34.8 a
lsd p=0.05	NS	NS	0.89	NS	NS	9.93

<sup>a</sup> Visual rating 0-10, 6=acceptable.

<sup>b</sup> Count of dollarspot lesions per 2 m<sup>2</sup> plot.

Means of 4 replicates; means within columns followed by the same letter are not significantly different (Fishers protected LSD, p=0.05).

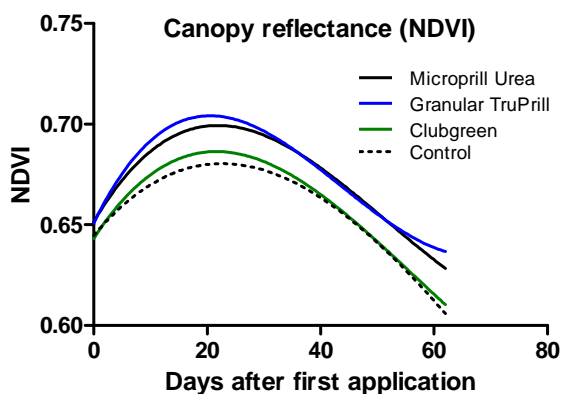


Figure 2. NDVI measurements in treated plots. Curves are cubic polynomials fitted to plot means ( $R^2$  values vary from 0.52 [Control] to 0.62 [Clubgreen])

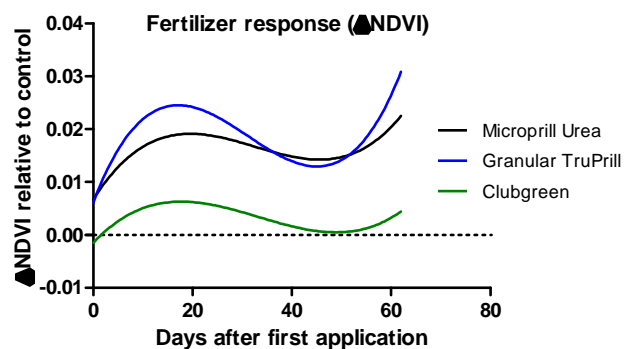


Figure 3. Fertilizer response as estimated by NDVI measurements in treated plots, corrected to remove background variation (Control=0). Curves are cubic polynomials fitted to plot means ( $R^2$  values are 0.06 [Clubgreen], 0.09 [Microprill Urea], and 0.16 [TruPrill]).

Table 3. Canopy reflectance in treated plots.

Treatment	Days after treatment application										
	0	1	2	3	4	5	6	7	8	9	10
Tru-prill 17-0-15	0.599 <sup>c</sup> ab	0.641	0.670 ab	0.698 a	0.683 a	0.673 a	0.695 a	0.667 a	0.701 a	0.708 a	0.698 a
Microprill Urea 46-0-0	0.594 bc	0.640	0.674 a	0.698 a	0.680 a	0.670 a	0.692 a	0.664 ab	0.696 b	0.700 b	0.695 b
Clubgreen 16-4-20	0.602 a	0.640	0.661 c	0.687 b	0.662 b	0.652 b	0.669 b	0.662 b	0.678 c	0.682 c	0.678 c
Control	0.594 c	0.641	0.667 b	0.690 b	0.664 b	0.650 b	0.671 b	0.651 c	0.675 c	0.678 d	0.675 d
lsd p=0.05	0.0055	NS	0.004	0.0032	0.0036	0.0041	0.0037	0.0039	0.0031	0.0034	0.003
	11 <sup>a</sup>	11 <sup>b</sup>	12	13	14	15	17	18 <sup>a</sup>	18 <sup>b</sup>	19	20
Tru-prill 17-0-15	0.699 a	0.710 a	0.691 a	0.706 a	0.720 a	0.694 a	0.682 a	0.723 a	0.713 a	0.701 a	0.670 a
Microprill Urea 46-0-0	0.691 b	0.703 b	0.687 b	0.702 b	0.714 b	0.688 b	0.681 a	0.715 b	0.703 b	0.690 b	0.658 b
Clubgreen 16-4-20	0.677 c	0.690 c	0.679 c	0.687 c	0.701 c	0.687 b	0.671 b	0.701 c	0.695 c	0.687 b	0.650 c
Control	0.671 d	0.681 d	0.672 d	0.684 d	0.690 d	0.677 c	0.664 c	0.697 d	0.688 d	0.682 c	0.646 d
lsd p=0.05	0.0044	0.0038	0.0028	0.0031	0.0033	0.0037	0.0034	0.0032	0.0032	0.0038	0.0033
	21	24	25 <sup>a</sup>	25 <sup>b</sup>	26	27	28 <sup>a</sup>	28 <sup>b</sup>	31	32 <sup>a</sup>	32 <sup>b</sup>
Tru-prill 17-0-15	0.701 a	0.709 a	0.710 a	0.693 a	0.687 a	0.702 a	0.693 a	0.690 a	0.681 b	0.687 a	0.694 a
Microprill Urea 46-0-0	0.692 b	0.700 b	0.706 b	0.695 a	0.683 a	0.704 a	0.691 a	0.684 b	0.682 b	0.685 a	0.693 a
Clubgreen 16-4-20	0.682 c	0.687 c	0.691 c	0.673 b	0.675 b	0.683 b	0.678 b	0.675 c	0.695 a	0.679 b	0.681 b
Control	0.677 d	0.680 d	0.680 d	0.670 b	0.665 c	0.678 c	0.674 b	0.671 d	0.695 a	0.673 c	0.679 b
lsd p=0.05	0.0029	0.0039	0.0041	0.0045	0.0043	0.0045	0.0042	0.0042	0.0041	0.004	0.0039
	33	34	35 <sup>a</sup>	35 <sup>b</sup>	38	40	42	45 <sup>a</sup>	45 <sup>b</sup>	48	49
Tru-prill 17-0-15	0.681 a	0.676 a	0.689 a	0.675 b	0.697 a	0.674 a	0.677 a	0.679 a	0.674 b	0.659 a	0.650 a
Microprill Urea 46-0-0	0.682 a	0.678 a	0.685 a	0.681 a	0.699 a	0.674 a	0.674 a	0.679 a	0.679 a	0.658 a	0.651 a
Clubgreen 16-4-20	0.671 b	0.664 b	0.675 b	0.670 c	0.679 b	0.666 b	0.659 b	0.660 b	0.662 c	0.648 b	0.636 b
Control	0.668 b	0.661 b	0.675 b	0.671 c	0.681 b	0.662 b	0.660 b	0.657 b	0.662 c	0.645 b	0.634 b
lsd p=0.05	0.0043	0.0041	0.0049	0.0046	0.004	0.0042	0.0037	0.0048	0.0045	0.0041	0.0044
	53 <sup>a</sup>	53 <sup>b</sup>	54	55	62	Mean					
Tru-prill 17-0-15	0.665 a	0.660 a	0.653 a	0.661 a	0.607 a	0.683 a					
Microprill Urea 46-0-0	0.662 a	0.660 a	0.648 b	0.655 b	0.603 a	0.680 b					
Clubgreen 16-4-20	0.647 b	0.646 b	0.635 c	0.635 c	0.589 b	0.668 c					
Control	0.643 b	0.643 b	0.635 c	0.636 c	0.587 b	0.665 d					
lsd p=0.05	0.0047	0.0051	0.0048	0.0047	0.0055	0.0009					

<sup>a</sup> Pre-mowing measurements.

<sup>b</sup> Post-mowing measurements

<sup>c</sup> Normalized-difference vegetation index (0-1); higher values indicate better turf quality, color, N status. Means of ~50 readings x 4 replicates; means within columns followed by the same letter are not significantly different (Fishers protected LSD, p=0.05).

## DISCUSSION AND CONCLUSIONS

There were consistent and significant differences among the treatments in turf color and quality as estimated by canopy reflectance. Generally the TruPrill and microprill urea treatments were significantly better quality than either the Clubgreen treatment or the control.

The mean performance over the course of the trial was in the order TruPrill > microprill urea > Clubgreen > untreated control.

Sponsor: Plant Science