# PEAT MOSS TOPDRESSING TO IMPROVE TURFGRASS QUALITY AND DROUGHT TOLERANCE OF HOME LAWN TURF

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## OBJECTIVE

The objective of this research project is to determine the performance of sphagnum peat moss topdressing on mixed Kentucky bluegrass home lawn type turf on a sandy loam rootzone.

## EXPERIMENTAL DESIGN / METHODS

The treatments consist of peat moss topdressing material and aerification. One peat moss treatment was topdressed (10 mm depth of expanded peat moss – 1.75 bales per 8 $m^2$ plot) after aerification with typical homeowner rental equipment (Bluebird aerifier with 20 mm hollow tines to produce cores on a 100 mm spacing – Figure 1); the other topdressing (10 mm depth of expanded peat moss) was applied and raked over the turf area without incorporation into the rootzone (Figure 2). An untreated check was also included. Treatments were applied to 2 x 4 m plots of mixed Kentucky bluegrass turf maintained as a home lawn on research range 12 at the Guelph Turfgrass Institute (sandy loam soil, fertility of 1.5 -2 kg actual N $m^{-2}$ $yr^{-1}$, mowing at 75 mm). Treatments were replicated four times in a randomized complete block design. Treatments were applied July 3, 2003 according to the recommended program.

Figure 1. Core aerification of plots. Two passes of the aerification equipment (left) gave an appropriate level of aerification (right). Cores were left in place in all treatments.

Figure 2. Application of peat moss topdressing. Bales were divided (left), broken up, distributed, and raked into the appropriate plots (right).

Turf was irrigated normally (to prevent stress) for the first 6 weeks of the experiment, following which irrigation was withheld to determine differences in drought stress tolerance and recovery.

Pretreatment data was collected for thatch thickness, weed presence (cover by species), and turf functional features (color , quality, uniformity, and density). Soils are being assessed for soil strength/compaction (penetrometer), soil moisture, and sampled for organic matter content determination. Plots are rated for turf color, quality, density and uniformity. Other stresses are measured as they occur (disease, insects). During drought stress periods, regular measurements are taken of drought stress response (chlorophyll index, canopy temperature, soil moisture and temperature, visual estimation of wilt). At the beginning of the season in 2004, weed presence, thatch thickness, soil strength/compaction, and soil organic matter content will be measured. Spring greenup will be assessed in April 2004, along with soil characteristics.

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

An anecdotal photographic record is being kept of the progress of the trial.

## RESULTS

There was a uniform distribution of grass, weed, and bare soil cover across the plots prior to treatment (Table 1). Thatch development was minimal at this point. These characteristics will be recorded again in April 2004 to determine the effects of the treatments. The peat topdressing at the rate applied (10 mm) had a generally very slight depressive effect on turfgrass performance in the short term, reflected particularly in the turf density (Table 2). However, there was some indication that this effect might be replaced with longer term benefits. While visual color ratings showed no difference among treatments, the chlorophyll index measurements of turf color indicated a significant increase in the topdressed treatments (Table 3), as did the color measurements using the full spectrum colormeter (Table 4).

There were no consistent significant patterns among the treatments in the soil characteristics, either compaction as measured by soil strength (Table 5), or volumetric water content (Table 6). Again, these effects are more likely to appear in the longer term.

## CONCLUSIONS

The short term response of the turf plots to the three treatments indicated some value for topdressing with peat moss, particularly in the improvement in turf color, but also some detrimental effects on turf density. The latter effect is probably the result of a topdressing depth (10 mm) which was to large for a single application.

Observations of spring greenup, turf color, quality, density and uniformity in spring 2004 , as well as measurements of rootzone characteristics (soil strength and soil moisture) and weed pressure, will provide better information on the value of the topdressing program. The opportunity exists to follow the plots through the 2004 season and examine other features of interest, for example the development of thatch and drought tolerance in the turf.

**Table 1. Pretreatment cover by grass, weed and bare soil; thatch thickness.**

| Treatment | Grass | Weed | Soil | Thatch thickness |
|---|---|---|---|---|
| | – – – – % cover – – – – | | | mm |
| Aerified | 84.8 | 5.5 | 9.8 | 0.3 |
| Aerified and topdressed | 86.8 | 2.3 | 11.0 | 2.5 |
| Topdressed | 87.3 | 4.5 | 8.3 | 0.5 |
| Control | 94.8 | 1.0 | 4.3 | 0.8 |
| lsd p = 0.05 | NS | NS | NS | NS |

**Table 2. Visual ratings of turfgrass performance. All ratings are on a scale of 0 to 10, with 10 being best and 6 acceptable.**

| Treatment | 18-Jun | 03 - Jul | 25-Aug |
|---|---|---|---|
| | | **Colour** | |
| Aerified | 7.3 | 6.8 | 7.8 |
| Aerified and topdressed | 7.3 | 7.3 | 7.5 |
| Topdressed | 7.0 | 7.3 | 7.3 |
| Control | 7.5 | 6.5 | 7.5 |
| lsd p = 0.05 | NS | NS | NS |
| | | **Quality** | |
| Aerified | 6.5 | 6.8 | 7.3 |
| Aerified and topdressed | 6.8 | 6.8 | 6.8 |
| Topdressed | 6.8 | 6.8 | 7.0 |
| Control | 7.3 | 7.0 | 7.5 |
| lsd p = 0.05 | NS | NS | NS |
| | | **Uniformity** | |
| Aerified | 6.5 | 6.3 | 7.3 |
| Aerified and topdressed | 6.5 | 6.5 | 6.5 |
| Topdressed | 7.0 | 6.3 | 6.8 |
| Control | 6.8 | 6.8 | 7.3 |
| lsd p = 0.05 | NS | NS | NS |
| | | **Density** | |
| Aerified | 6.5 | 6.5 | 7.5 a |
| Aerified and topdressed | 6.5 | 6.3 | 6.5 b |
| Topdressed | 6.8 | 6.3 | 6.5 b |
| Control | 7.0 | 7.0 | 7.8 a |
| lsd p = 0.05 | NS | NS | 0.9 |

**Table 3. Chlorophyll index of treated plots.**

| Treatment | 3-Jul | 3-Sep |
|---|---|---|
| Aerified | 298.0 a* | 375.2 ab |
| Aerified and topdressed | 279.7 b | 392.5 a |
| Topdressed | 285.2 ab | 388.8 a |
| Control | 276.7 b | 361.3 b |
| lsd p = 0.05 | 15.2 | 19.8 |

* The Spectrum CM1000 chlorophyll meter measures absorption of light at 700 and 840 nm by the turfgrass canopy to give a relative index from 0 (complete reflection) to 1000 (complete absorption). A higher reading indicates higher chlorophyll content and generally correlates with a darker green color. Numbers are means of 5 readings x 4 replicates.

**Table 4. Full spectrum color in treated plots, measured with Minolta CR310D colormeter**

| Treatment | Lightness[1] | Chroma[2] | Hue angle[3] |
|---|---|---|---|
| Aerified | 44.1 a[4] | 14.0 a | 121.9 b |
| Aerified and topdressed | 42.5 b | 11.7 b | 127.4 a |
| Topdressed | 43.7 a | 13.4 a | 125.5 a |
| Control | 44.5 a | 13.8 a | 119.7 c |
| lsd p = 0.05 | 0.8 | 0.7 | 2.1 |

[1]Lightness varies from 0 (black) to 100 (white).
[2]Chroma (color saturation) varies from 0 (grey – no color) to 60 (fully saturated vivid color)
[3]Hue angle measures a spectrum of colors through 360 degrees. In the range measured here, a higher hue angle is greener and a lower angle is yellower.
[4]Means of 10 observations x 4 replicates; color measured Sept. 03, 2003

**Table 5. Penetrometer readings in treated plots.**

| Treatment | 20-Jun | 3-Jul | 6-Aug | 19-Aug |
|---|---|---|---|---|
| | | **0 cm depth** | | |
| Aerified | 1182.1* a | 531.6 ab | 275.4 | 36.8 |
| Aerified and topdressed | 796.1 b | 387.7 b | 157.8 | 31.6 |
| Topdressed | 583.4 b | 733.4 a | 233.3 | 8.8 |
| Control | 859.8 b | 417.5 b | 282.4 | 50.8 |
| lsd p = 0.05 | 320.5 | 216.3 | NS | NS |
| | | **2.5 cm depth** | | |
| Aerified | 1296.1 | 950.9 | 659.6 | 252.6 |
| Aerified and topdressed | 956.3 | 824.7 | 475.5 | 182.5 |
| Control | 1054.9 | 866.7 | 645.6 | 140.3 |
| Topdressed | 991.3 | 952.7 | 547.4 | 122.7 |
| lsd p = 0.05 | NS | NS | NS | NS |
| | | **5 cm depth** | | |
| Aerified | 1322.5 | 994.8 ab | 940.4 | 1110.6 ab |
| Aerified and topdressed | 1267.7 | 886.0 b | 930.0 | 1068.5 ab |
| Topdressed | 1221.63 | 1149.2 a | 922.85 | 949.2 b |
| Control | 1256.6 | 849.2 b | 938.5 | 1236.9 a |
| lsd p = 0.05 | NS | 188.3 | NS | 200.1 |
| | | **7.5 cm depth** | | |
| Aerified | 1506.7 | 1166.8 | 1064.9 | 1335.2 |
| Aerified and topdressed | 1561.6 | 1186.2 | 1070.3 | 1243.9 |
| Topdressed | 1429.9 | 1538.7 | 1052.7 | 1156.1 |
| Control | 1432.1 | 1108.8 | 1128.2 | 1363.4 |
| lsd p = 0.05 | NS | NS | NS | NS |
| | | **10 cm depth** | | |
| Aerified | 1688.8 | 1821.2 | 1312.5 | 1596.8 a |
| Aerified and topdressed | 1782.9 | 1658.1 | 1291.3 | 1417.6 bc |
| Topdressed | 1655.9 | 2086.0 | 1242.2 | 1354.5 c |
| Control | 1682.1 | 1489.6 | 1294.8 | 1507.0 ab |
| lsd p = 0.05 | NS | NS | NS | 138.5 |

*Soil strength in Kpa, measured with cone penetrometer. Means of 5 readings x 4 replicates. Soil strength readings can be strongly affected by soil moisture content.

**Table 6. Volumetric water content and canopy temperature in treated plots.**

| Treatment | Volumetric water content (%) | | | | | Canopy °C |
|---|---|---|---|---|---|---|
| | 20-Jun | 3-Jul | 13-Jul | 6-Aug | 19-Aug | 19-Aug |
| Aerified | 25.7 | 28.9 a | 34.0 a | 26.1 | 19.1 | 26.9 |
| Aerified and topdressed | 27.3 | 27.8 a | 30.9 c | 26.0 | 20.5 | 29.7 |
| Topdressed | 25.9 | 23.9 b | 31.6 bc | 27.0 | 19.2 | 28.9 |
| Control | 25.0 | 24.1 b | 32.9 ab | 26.8 | 18.1 | 28.1 |
| lsd p = 0.05 | NS | 3.5 | 1.7 | NS | NS | NS |