# TURFGRASS MATTERS

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## Eliminating the Guesswork of Shade

**New technology documents benefits of tree removal or pruning**

Trees are intrinsic to the character of most golf courses, and revered to a fault by most golfers. The conflict between trees and high quality turfgrass, however, is well known among golf course superintendents. From root competition for moisture and nutrients to air stagnation, to excessive shade limiting the photosynthetic capabilities of turfgrasses to survive the stress of intensive management and heavy play, trees and turfgrass are at odds. The conflict between club members and superintendents who suggest tree removal as a means of improving turf condition is even better known.

Newly-enhanced computer technology is available that allows superintendents to document the contribution of specific trees to the shading of golf greens, and then recommend or request removal or pruning on the basis of scientific analysis, rather than conjecture. For those superintendents who have used the service, both the compliance with their recommendations and the improvement of their turf have been gratifying.

Proprietary sun-locating technology was launched two years ago to assist golf course superintendents in quantifying the effect of specific trees or groups of trees on the shading of problematic golf greens. This technology is augmented with new mapping software to graphically demonstrate patterns of sun and shade over time and perform various "what if" scenarios of tree removal and/or pruning.

**The process**

Without getting too crazy into the underlying science, let's take a quick look at what happens during the process:

- The first step is to "map" the green and surrounding trees using an instrument that is sort of a combined transit, compass and telescope mounted on a tripod. The instrument is set up in the center of the green and oriented toward magnetic north. An assistant walks the perimeter of the green, with measurements taken every 3-15 feet depending upon degree of curvature of the green perimeter. Each measurement includes the differential from true north (expressed in degrees) and the distance (in feet) from the center of the green. This data is entered into a computer, which then uses trigonometry to calculate the area of the green (±3%) and determine its location in three-dimensional space. It's important to note this is not GPS satellite data.

- The same process is performed with the trunk and major limbs of trees (or groups of trees) surrounding the green. A unique ID# is assigned to each tree. Groups of trees with intermingled canopies that can't be separated are treated as one entity.

- Each tree is evaluated as to density of the canopy (% of light passing through), and rated from sparse to dense.

- Each tree is also assigned a crown shape (elliptical, columnar, etc.) so the computer can fill in those spaces not specifically pointed at with the instrument.

- The computer then "crunches the numbers" and determines in which segment of the 360° vista of the green the "blocking horizon" occurs so it can be recorded as well. The blocking horizon is the area behind the already-identified individual or groups of trees that might block some portion of the sun's path and contribute to the shading of the green.

- Once the data for positioning of the green, surrounding trees and the blocking horizon are entered, the computer uses astronomic algorithms to determine the location (and path) of the sun on that specific green at any hour of any day of the year. The sun's position is then compared to the location of the trees (and major branches) relative to the surface of the green to quantify to what extent each tree blocks the sunlight from that green (calculated in square-foot hours).

Historically, the data generated from these complex computer calculations was presented in a tabular spreadsheet format for analysis. With the recent introduction of the mapping software, the data analysis takes on new life as full-color gradient maps showing sunlight duration or shading patterns, and bar charts indicating the number of "square foot hours" of shade contributed by each tree.

The "really cool" part of the software is the ability to run various "what if" scenarios

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to anticipate the effect of pruning or removal of a tree or combination of trees. "Before and after" maps can be generated to graphically show the benefit of tree removal in terms of additional hours of sunlight (or reduced square foot-hours of shade). Shade patterns after pruning or tree removal can also be predicted.

The new software also allows the consultant to "grow the course" to project what the tree and shading situation will be any number of years into the future. Again, this is done on a factual, scientific basis by measuring the lateral and vertical growth rate of each tree in question. This information is again entered into the computer, the numbers crunched, and an entirely new "what if" scenario generated to reflect the future shade situation - whether full, partial, or no pruning or removal is performed.

As an indication of how sophisticated these calculations can be, generating just one graphical map of the sunlight exposure of a green (taking into consideration surrounding trees and sun location on a specific date and time of day) involves about 45,000 calculations - which can take today's fastest personal computer up to 15 minutes to perform.

**Success Stories**

John Gasper, CGCS, has used this new technology three times in the past two years at Oak Hill Country Club in Rochester, NY, and has met with "100% compliance and approval" of his requests for tree removal to date. "You must be judicious in balancing the recommendations for removal with the aesthetics, history and playability of the course," said Gasper. "We may not follow all of the recommendations indicated by the sunlight survey, but the documentation has been convincing enough to get approval for everything we have asked for so far." "We have taken quite a few trees down here," Gasper continued, "and selectively pruned many more. This data really lets you work intelligently. If you get five hours of sunlight now, you'll know you will get eight if you remove that tree, for example. Once the trees are down, we have seen an absolute, immediate improvement in the turf. There is an unbelievable response of roots to additional sunlight."

Larry Pakkala, CGCS, has been struggling with two heavily shaded greens since he started at Woodway Country Club in Darien, CT, sixteen seasons ago. The 4th and 13th greens at Woodway are positioned atop a heavily wooded knoll populated with stately 80+ year old oak trees, each in the range of 24-36" caliper.A sunlight analysis was performed this spring on the most problematic green, the 4th, focusing on maximizing morning sunlight. Ultimately 17 trees were recommended for removal along the east and south side of the green. Pakkala and his green committee met for an hour and a half on the green site itself. The committee approved a 2-step implementation of the recommendations, starting with the removal of eight trees this coming winter. "We expect at least a 50% increase in sunlight from removing those 8 trees,"

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commented Pakkala. "The committee wants to see what the green complex will look like with those trees removed, and also evaluate the degree of turf improvement before proceeding with the removal of the rest."

One of the Woodway green committee members wanted Pakkala to estimate the degree of turf improvement to be expected from the tree removal. "That's very difficult to do," he explained. "Those greens look very good right now (in June), so they may not improve very much from their current condition at this time of the year. However, I expect them to decline less and be much less subject to late season disease problems than they otherwise would be, all with a much more reasonable maintenance program. You might say 'the peaks might not get much higher, but the valleys will definitely be less deep'."

This new technology is being licensed to arborist in various regions and locales.

*This article was submitted by John Tribbett of Renoscapes, Inc. Portions of the article were reprinted with permission of Peter McCormick at TurfNet.*

## 1999 MAAGCS Calendar

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| March | Educational Seminar | |
| April 12 | Fountain Head CC | Ken Keller |
| May 11 | Turf Valley Resort<br>Supt/Pro Tournament | Mike Gilmore |
| June 15 | Chevy Chase Club<br>Supt/Club Official | Sean Remington |
| July | Westwood CC | Walter Montross |
| August 10 | Mayo Beach/South River<br>Annual Family Picnic | John Newcomb |
| September 14 | Woodmont C C | Mike Larsen |
| October 12 | Lowes Island GC<br>Annual Championship | Byron Lash |
| November 9 | Southview GC | Steve Cohoon |
| December | Turf Valley Resort<br>Annual Meeting & GCSAA Seminar | Mike Gilmore |

*All dates and locations are subject to change.*