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ROLLING - EFFECT ON GREEN SPEED
Rolled vs. Control (before rolling)

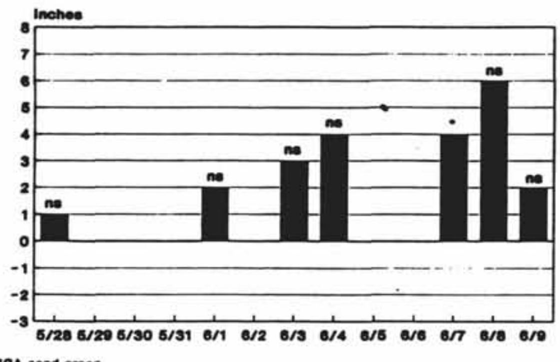

Figure 3

Comparison between rolled and non-rolled control plot preceding the rolling treatment (USGA sand green). ns= not significant, *= significant at the 0.05 level.

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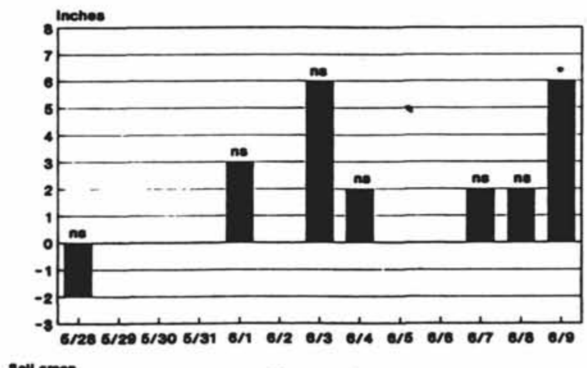

Figure 4

Comparison between rolled and non-rolled control plot preceding the rolling treatment (native soil green). ns= not significant, *= significant at the 0.05 level.

In conclusion, rolling over a short duration increases the green speed as measured by the stipmeter. However, the longevity of the increased green speed is short. Rolling had no apparent negative impact on water infiltration rates during the duration of this experiment. However, the turf went slightly off-color and wear signs were apparent at the conclusion of the study. Preliminary results appear to show that rolling for a short duration is a means of increasing putting green speed with minimal detrimental agronomic affects. However, long term use of rolling may be detrimental to the turf.

**Trade name and company name of equipment used in this study are included for the benefit of the reader and does not imply any endorsement or preferential treatment of the product by the Ohio State University.

*****Partial research support for this study provided by the Ohio Turfgrass Foundation.**

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Credit: Mountain State Greenletter, 7/93

REMEMBER TO WEAR YOUR NAME BADGES AT OUR MEETINGS.

Lightning and Golf Safety

by Richard Kithil, President
American Lightning Protection

Golf is an absorbing, usually competitive game, Golfers share the reluctance to quit that sometimes also keeps baseball, softball, or football players on the field longer than is safe during thunderstorms.

Today the proliferation of liability lawsuits relating to public safety has now reached out to include golf course owners and management as well. Even balanced against the attitudes and behaviors described earlier and in spite of the historical belief that lightning is considered an "Act of God", the fact that protection against its harm is possible and available now places a new responsibility on golf courses.

For example, the widow of a golfer who was killed along with two other golfers who were injured by a lightning strike at Quail Chase Golf Course in Jefferson County, Kentucky filed a suit against the course owners charging negligence due to "failure to install and operate adequate warning systems." In another case, a golf course was found negligent by a jury and held liable for the lightning deaths in an unprotected shelter building. The couple's minor children were awarded damages sufficient to pay for their care and education.

To address and resolve these liability considerations and to address the "Duty to Warn" precedent that appears to be developing, there are five steps a golf course's management can take to provide safety for the players and at the same time, protect the course itself from liability in the face of possible lightning casualities.

Step 1. Any golf course in an area of potential lightning strikes should offer golfers a lightning safe club house. For a small course, it may be the only publicly occupied structure; the one reachable safe haven.

Step 2. A thunderstorm warning system should be installed. In some parts of the U.S., lightning warning services are available on a subscription basis. A more preferable step would be to install a reliable warning system on the course itself. In general terms, these devices measure the intensity of the atmospheric electric field. In clear weather, this field is constant between the clouds and the earth. As a storm builds, this constant level (gradient) begins to increase. When these voltage gradients reach a level where a lightning strike is imminent, a preset sensor is triggered and an alarm is sounded. This warning can then be relayed by sirens, etc., to players on the course.

Step 3. Any shelter building on the golf course can become a "lightning trap" because it concentrates potential victims at a time of prime vulnerability during a storm and because its small size places occupants within side flash distance of a lightning strike to the structure. Typically built of wood or concrete block, such structures are poor conductors compared to the human body and should be protected in order to safeguard the occupants.

Step 4. Lone trees and prominent trees in groves are handy shelters from the discomfort of rain. A golf course should be evaluated to determine which trees need to be equipped with special tree lightning protection systems.

Step 5. Printed instructions for golfers on where and how to take shelter during thunderstorms may avert casualities and their consequences when handed out prior to teeing off. In addition, prominently posted signs describing lightning safety measures also are recommended.

Trees and Night Lighting

by Kim D. Coder, Extension Forest Resources Dept.
The University of Georgia

Having light around the house at night is comforting. It provides security and is essential for getting around in the dark. Some lights are used to emphasize evening landscapes and house architecture. Unfortunately, these nightlights can disrupt the growth of trees.

Table 1. Sensitivity of selected trees to night-light pollution.

Sensitive		Tolerant
Maple	Yellow-Poplar	Ash
Birch	Cottonwood	Holly
Catalpa	Sumac	Sweetgum
Dogwood	Black Locust	Magnolia
Sycamore	Hemlock	Bradford Pear
Elm		Oak
Zelkova		Arborvitae
Redbud		Pine
Basswood		Hickory
Honey locust		Walnut
Goldenrain-tree		Gingko
Silverbell		Spruce

This leads to increased winter dieback. Continuous lighting also inhibits the formation and maintenance of chlorophyll in leaves. Yellowing or bleaching of foliage can occur and leaves will be more sensitive to air pollution.

A night-light shining down on one side of a tree may cause all of the branches on that side to grow much more than the rest. The crown becomes misshapen and the branches look long and spindly.

Night-lights can also change the amount of flowering, the timings of flowering, and can lead to no flowers being produced at all. For example, some trees require short days to produce flower buds. With the tree constantly in the light it may never produce flowers.

Night lighting will disrupt the growth habit of many different types of trees. Some trees are very susceptible to light pollution and some are tolerant. (See Table 1.)

Trees that are sensitive to light pollution may expand their buds early. These buds can be damaged by frosts and attacked by pests. Branches continue to grow longer and longer. This growth disrupts internal branch control. In time, the tree will lose its natural form.

Trees under night lighting need extra care. Timely and proper branch pruning, plus extra water and proper fertilization, will be required. Trees under night-lights work twice as hard as normal trees and need extra care to remain healthy.

Proper placement of night lighting can eliminate most problems with trees. Special lenses and light shields can be used to direct light to targets, like driveways. If trees will be illuminated all the time, use a lamp with a "safe" spectrum. A light source disrupts growth in a tree because of its red light content. For example, high pressure sodium and incandescent-folament lamps greatly alter growth responses of many trees because they are rich in red light. Mercury vapor lamps emit so little red light that they disrupt growth on only the most sensitive trees. (See Table 2).

(continued page 28)

Bird Watching Pays Off

by Dudley Smith

The MAGCS "Charles Bartlett Award" was presented to Peter Leuzinger, CGCS, Superintendent at St. Charles C.C. at the Chicago District Golf Association Seminar at Drury Lane Theater on March 24, 1994.

The Award named for the former sports columnist and golf writer of the Chicago Tribune, has been achieved ten times since 1967. Mr. Bartlett, an ally of the greenskeeper, proclaimed if the superintendent wanted more "respect" then he must: Speak at public functions, be a prolific writer, and be a master at public relations. Midwest members that have achieved this award include: Julius Albaugh, Mike Bavier, Ray Gerber, Norman Kramer, Oscar Miles (twice), Paul Voykin, Robert Williams, and Ken Zanzig.

Peter Leuzinger was the first in Illinois to be certified by the New York State Audubon Society. His 45 minute talk at the U.S.G.A. Educational Session in Dallas on February 7, 1994 was outstanding. Peter told of the fifty acres of nature preserve he has created at St. Charles C.C. The lecture had audience participation, humor, some personal Leuzinger anecdotes, and colored slides of school children and garden club members walking the nature trail enjoying the bullfrogs and wildflowers.

What a shame Paul Harvey was not present to hear Leuzinger relate how a greenskeeper attempts to preserve the environment!

Peter Leuzinger is a past president of MAGCS and the Illinois Turf Foundation, a Horticulture graduate of the University of Illinois, and has been at St. Charles C.C. sixteen years. His wife DeAnn and daughter Megan are low handicap golfers. Son Jeffrey is also an Illinois graduate and is currently the assistant superintendent at the Glenview Club.

Congratulations Peter Leuzinger on a job well done.

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(Trees & Night Lighting continued)

Table 2. Light given off by selected lamps in the red (580-700 nm.) wavelengths as a percentage of total visible light produced.

Lamp	Red light
Incandescent filament (Standard frosted)	66%
High-pressure sodium	65%
Metal halide	50%
Florescent (cool white)	34%
Mercury (clear)	7%

Mercury lights are the best for trees. These lights may not be the best where trees and humans coexist. Metal halide lamps may represent a compromise. Metal halide lamps produce red light but they do not attract insects the way the rich blue colored mercury lights do. Insect activity around a lamp can be a problem. Also, some lamps are more energy efficient than others.

Degree Days as a Pest Management Tool

Insect development takes place at approximately the same rate as plant development. This makes sense if you consider that if this did not occur, the insects would be left without a reliable food source.

The temperature at which growth starts for woody plants in the midwest is approximately 45-50 degrees Fahrenheit. To standardize the calculations, the base temperature has been arbitrarily set to 50 degrees. To calculate DD the following formula is used:

$$\frac{\text{Maximum + Minimum Temp.}}{2} - \text{Base Temperature (50)} = \text{DD}$$

Example: If the maximum temperature on March 1 is 60 and the minimum is 50, then the DDB50 for March 1 is:

$$\frac{60 + 50}{2} = \frac{110}{2} = 55\text{ F} - 50\text{ F} = 5\text{ DDB50}$$

Degree-days values are totaled daily, and accumulate as the season progresses. For any days when the temperatures average below 50, the degree day accumulation is zero. Temperatures averaging lower than 50 are not subtracted from the total.

The degree day method takes into account the average daily temperature accumulations which influence insect and plant development. For each day that the average temperature is one degree above the base temperature (which in this case is 50), one degree daily accumulates. Due to temperature differences, insect development varies from year to year, and among locations; therefore, the calendar method for timing insect activity is less accurate than using degree-days. For example, at the Chicago Botanic Garden, which is close to Lake Michigan, temperature accumulation is typically around 100 degree-days (base 50) behind suburbs that are further west, such as Lisle, where the Morton Arboretum is located.

The use of degree days in conjunction with phenology data, such as that found in **Coincide**, by Don Orton increases the accuracy of timing pest controls. For example, birch leaf miner is listed as being in the young larval stage at the same time that Robinia pseudoacacia (Black locust) is in bloom. The corresponding degree-day range is 275-500 DDB-50. By observing the actual degree-day values that occur when Robinia is in bloom, and birch leaf miner larvae are present, you can arrive at a more accurate time for treatment in your geographic area. If you don't have the indicator plants around, you can begin monitoring shortly before the beginning number of degree days listed in the range.

Leaves, Limbs Needles & Boughs

by Fred Opperman

Tree trivia question: Can you name the tree that has an oil throughout its system that is resistant to electricity? It makes this tree much less likely to sustain lightning damage than any other tree on your course. A hint: Westmoreland C.C. has the greatest number of these trees that I know of in the area.

It has taken me quite awhile to get around to this tree that is so prevalent on all of the courses. Some say it is over planted, but they say that about so many of our trees today.

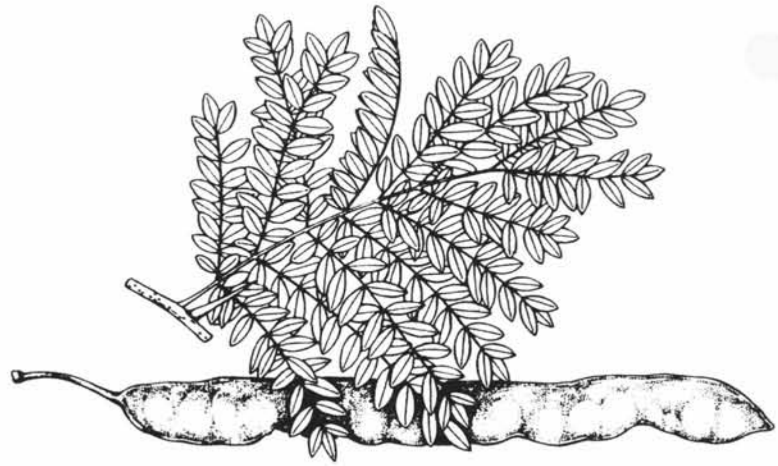
Gleditsia triacanthos var. inermis — Thornless Common Honeylocust.

Growth: Medium tree up to about 70' tall and with a spread of about the same. Trunk diameter of 3'.

Bark: Dark brown, deeply furrowed, broken up into long narrow scaly ridges.

Twigs: Slender, angular, reddish brown, zigzag with enlarged nodes.

Leaves: Alternate, often doubly pinnately compound, with many leaflets.



Fruit: Elongated legumes or pods, up to 18'' long and 2'' wide flat, often twisted or curved, purple-brown, with oval seeds that are very hard and dark brown.

Culture: Easily transplanted and withstands a wide range of conditions. Likes moist bottomlands or on soils of a limestone origin.

Wood: Strong, hard, reddish brown and coarse grained.

Cultivars: Many different cultivars to choose from in the area. Each has a little different growth pattern and form. The more common ones being: Moraine, Halka, Majestic, Skyline, Shademaster, and Sunburst.

Trivia answer: Beech