

B, NO_3 as well as soluble salts and pH. The chemical analysis provided no apparent clues.

Electron Microscope

Several particles of sand from both LDS and healthy areas were viewed with a scanning electron microscope. This provided the first real clues. Under high magnification, sand particles from non hydrophobic areas appeared clean and relatively smooth-sided. In contrast, sand from LDS or hydrophobic areas appeared to have a covering or coating over much of the particle. A similar observation was made several years ago by researchers at Ohio State University. The coating is believed to be an organic acid termed "fulvic acid." Fulvic acid is produced by certain microorganisms in the breakdown of soil organic matter. When this material is dry it becomes extremely hydrophobic. As the fulvic acid is formed it appears to actually drape around as well as get caught in the cracks and crevices of individual sand grains. This hydrophobic material causes the individual sand particles to become water repellant. It should be pointed out that the breakdown of soil organic matter, resulting in the production of fulvic acid as well as several other organic acids, is a completely natural phenomenon. Unfortunately, when the process takes place in a predominantly sandy soil it often results in that soil becoming hydrophobic.

Preliminary Control Studies

Several laboratory and some field studies have been conducted to determine if the coating could be removed or altered or if the physical properties of the soil could be changed to reduce the degree of hydrophobicity.

Before attempting to change the physical nature of the hydrophobic soil, it was important to determine if a particular particle size present was more prone to becoming hydrophobic than another. This was determined by passing a hydrophobic soil through a series of soil sieves. Each of the resulting fractions were then tested to determine the degree of water repellency. In general, the larger the particle size, the less hydrophobic. Very coarse and coarse sand fractions showed the least tendency to be water repellant. It should also be noted that regardless of size, all soil particles in the top inch were extremely hydrophobic. However, and without question, coarse textured soils (sands in general) are much more likely to become hydrophobic than fine textured soils such as silts or clays.

With this in mind, a small study was conducted in which a fine textured soil (silty clay) was added in varying amounts to a very hydrophobic sand. A 90/10 or an 80/20 sand/silt mix showed no improvement in the degree of hydrophobicity. A 70/30 mix showed some improvement while a 60/40 mix showed even more. A 50/50 mix of the hydrophobic sand and the silty clay showed the most dramatic results. This combination resulted in almost an 80% reduction in hydrophobicity. Of course, all the possible ramifications of adding a fine textured soil to a predominately sand based green should be remembered. We hope to further evaluate this control measure under field conditions.

Another laboratory study suggested that the coating could be completely or partially removed with various treatments. For example, very high rates of Aqua Gro appeared to remove the coating almost completely and restore the water holding capacity of the soil. Lower rates of Aqua Gro improved the water holding capacity of the soil temporarily but did not affect the coating.

(cont'd. page 22)

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(Dry Spots cont'd.)

A solution of laundry detergent also appeared to remove the coating as did hydrogen peroxide. In fact, large quantities of water applied as a drench apparently dislodged much of the coating and reduced the hydrophobic nature of the soil. However, before specific recommendations can be made, these treatments have to be fully tested under actual field conditions.

In the fall of 1985, several treatments were applied to LDS areas on the experimental green at the UGA Turf Plots. Data is still being collected and analyzed. However, preliminary indication suggest that none of the treatments work as dramatically under field conditions as when tested in the lab. As this particular study is completed and data is fully analyzed the results will be reported in **The Georgia Turfgrass News**.

I would like to thank the Georgia Golf Course Superintendents Association for their financial support of this research. Without this support, the progress that has been made would have been impossible.

Credit: The Georgia Turf Grass News

How Well Does the American Golfer Play?

National Survey Reveals Answer for the First Time

JUPITER, Fla. — The typical American golfer reports that he plays an 18 hole round of golf in 25 strokes over par, or an average score of 97. This, and other information has been provided for the first time by a survey of American golfers conducted by the National Golf Foundation. The survey, titled the Golf Consumer Profile, was recently published by the NGF and contains never before available information on how golfers view themselves as players, consumers, media observers, and much more.

Two-thirds of all golfers, according to the Golf Consumer Profile, report they normally break 100 on a regulation 18 hole golf course. Only one-third regularly complete play in under 90 strokes, and the elite group that posts scores in the 70s accounts for only eight percent of all golfers.

Men do a little better than the scoring norm, averaging 23 strokes over par per round. Women average 35 strokes over par on average.

Senior golfers who are a little short off the tee should take heart in their accuracy, for the statistics show seniors over 60 checking in with average scores of 24 strokes over par, one better than the national average for all golfers.

How far do golfers claim to hit the ball? The average male golfer says he realizes about 199 yards off the tee, while the average female's tee shot is approximately 131 yards. Only about 17 percent of males and 2 percent of females boast tee shots of 250 yards or more. When the men and ladies select five irons for approach shots, the men average 137 yards with that club, the ladies average 91 yards.

The Golf Consumer Profile survey was conducted by mail using the Golf Consumer Mail Panel maintained by the NGF and Market Facts, Inc. An eight-page questionnaire was sent to a national representative sample of 1,973 golfers in the summer of 1986. 1,212 usable questionnaires were returned. The return sample was weighted to match U.S. Census statistics on key demographic variables.

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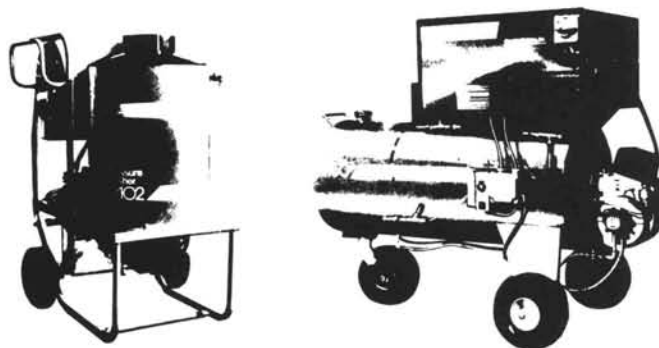
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LESCO, Inc., Rocky River, OH, in conjunction with Ciba-Geigy Corp., has contributed to three university research programs through an industry allowance plan.

Funds were provided for support of turfgrass insect and disease research to University of Massachusetts, the Pennsylvania State University and Michigan State University. Dr. Pat Vittum, University of Massachusetts; and Dr. Paul Heller, PSU, received funds to support continuing research on turf insects. Dr. Joe Vargas' work on several turfgrass diseases received funding at Michigan State.

According to LESCO's Greg Richards, the grants are part of an annual program in cooperation with Ciba-Geigy to further university turfgrass research.

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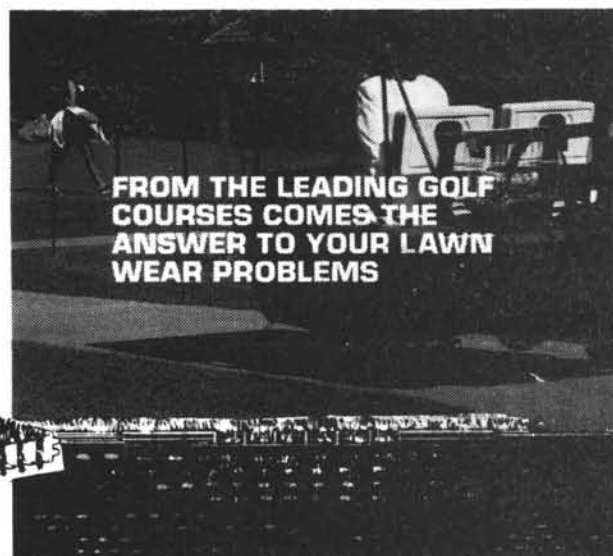
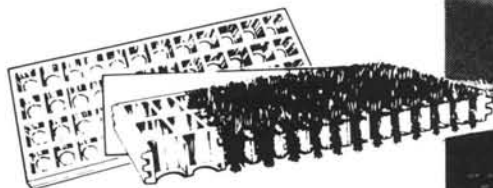
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