Localized Dry Spots

by Keith J. Karnok
Dept. of Agronomy, University of GA

The term localized dry spot(s) (LDS) is used to describe the occurrence of an irregular area of turfgrass that for no apparent reason begins to show typical signs of drought stress. Common symptoms include a loss of turgor (rigidity) of the plant to a point that "footprinting" or the inability of the plant leaves and stems return to an erect or normal position occurs following compression by footsteps. Footprinting is often followed by a dark blue/green color of the leaves and stems which is usually followed by severe wilting and eventual death of the tissue. What can be perplexing to the superintendent or other turfgrass managers is LDS symptoms may occur even after a normal irrigation.

There are several possible causes of LDS including excessive thatch, compacted soil, poor irrigation coverage, a steep-sloping grade or hydrophobic soil. If a turfgrass manager is experiencing LDS it's important that he try to determine the cause. Once the cause is known, the situation may be corrected.

However, there is one cause that may be difficult to correct. That is, LDS caused by hydrophobic or water repellent soils. Over the past several years the occurrence of LDS on golf course putting greens seems to be increasing. This is particularly true of greens constructed primarily of sand and established to bentgrass. It is now believed that in many cases, these LDS are the result of hydrophobic soil. The scientific literature shows that water repellent soils have been reported to occur in citrus groves, forests and grassland areas. The only published research on LDS as caused by hydrophobic soils in turf was done in 1978 on an experimental putting green at Ohio State University.

With these facts in mind, research in this area was initiated 2½ years ago in the Department of Agronomy at the University of Georgia. The primary objective was to try and determine the cause of these hydrophobic areas on sand putting greens. Most of the research was conducted by Mr. Kevin Tucker who was in pursuit of an M.S. degree. Kevin's advisory committee consisted of Drs. Keith Karnok, Gil Landry, David Radcliffe of the Division of Agronomy and Drs. Ron Roncadorri and Ed Brown of the Division of Plant Pathology.

The study began in the summer of 1984 of four golf courses (Fairfield Plantation, Hidden Hills C.C., Peachtree G.C. and Summit Chase C.C.) and the experimental putting green at the UGA Turf Plots. Each of these locations had a history of LDS on one or more of their bentgrass putting greens. The remainder of this article will describe the various experiments and results we have now completed.

Experimental Procedures and Results

The first step involved a careful soil sampling of both LDS and immediately adjacent healthy areas from each of the test locations. These samples were taken back to UGA for a thorough laboratory analysis.

The moisture content of LDS soil was significantly lower at all locations sampled than soil taken from immediately adjacent healthy areas. The moisture content of the LDs averaged approximately 3% while the moisture content from adjacent healthy areas averaged almost 21%. A water droplet penetration time test verified that the cause of the LDS was in fact due to a hydrophobic condition of the soil. This test is conducted

(cont'd. page 20)

COUNTRY CLUB
PROFESSIONAL TURF PRODUCTS
Distributed by
Turf Products, Ltd., West Chicago
668-5537

Ask for information regarding Turf Product's new BULK BAGS, 1000#, and the new GREENS GRADE 14-3-18 homogenous/SCU.

Lebanon
TOTAL TURF CARE
BETTER TURF CARE FROM THE GROUND UP.

ROSEMAN
2620 CRAWFORD AVE. 864-1842
EVANSTON, ILLINOIS

TURF EQUIPMENT HEADQUARTERS

ROSEMAN GANG MOWERS — FORD TRACTORS
TILLER RAKES — DEDOES AERIFIER
LELY SPREADERS — LOADERS
SEEDERS — LEAF MULCHERS
ROTO TILLERS — ROTARY MOWERS
HOMELITE CHAIN SAWS — HOMELITE PUMPS

SALES • SERVICE • PARTS • RENTALS

CENTURY CONTRACTORS, INC.
6401 W. 75 St., Bedford Park, IL (312) 496-0450

GOLF COURSE EXCAVATING
GREEN CONSTRUCTION

Will tailor any project to include your personnel to keep your costs down.

(Dry Spots cont'd.)

by placing a small (.01 ml) drop of water along the length of intact soil cores at ½ inch intervals. The length of time (seconds) required for the droplet to penetrate into the core is recorded. Usually penetration times greater than 10 to 15 seconds indicate a hydrophobic condition. Soil from each of the LDS from all golf course locations showed penetration times greater than 20 second down to the 2 inch depth. At depths greater than 2 inches, the degree of water repellency usually decreased. The average water droplet penetration times from adjacent healthy areas down to the 2 inch depth was less than 3 seconds.

The results of the water droplet penetration time test and soil moisture content clearly demonstrated the presence of a hydrophobic condition. The next question — why was the soil from LDS areas hydrophobic while soil immediately adjacent to these LDS was not? Was there a soil chemical or a soil physical property difference between the two areas?

Soil Physical Analysis

A physical analysis of the soil from each of the sampling locations was conducted. Healthy areas were compared to LDS. Although the soil tested from all locations was predominately sand (92%) there was no significant difference between LDS and healthy areas in terms of sand particle size, silt, clay or organic matter content. The physical analysis provided no apparent clues.

Soil Chemical Analysis

A complete chemical analysis of soil from LDS and healthy areas showed no significant difference in the quantity of the major or minor nutrients present including P, K, Ca, Mg, Zn, Mn,

GOLF COURSE IRRIGATION SALES CO.
Div. of Halloran & Yauch, Inc.
2040 Lehigh Ave., Glenview, IL 60025

CUSTOM PUMP HOUSE CONSTRUCTION & REMODELING!
IRRIGATION INSTALLATION & REMODELING!
GOLF COURSE DRAINAGE SYSTEMS!

Call Us For Your Golf Course Irrigation Needs!

(312) 729-1625

Priced Competitively... Quality Products...
Known For Service!
You get fast, courteous, service from Arthur Clesen. We've staked our reputation on it. Try us and see the difference.

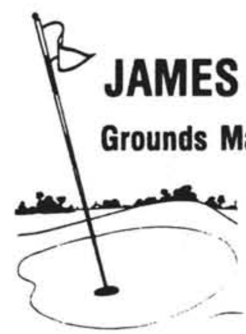
Immediate Delivery of...
- Chemicals
- Decorative Mulches
- Fertilizers
- Grass Seed & Mulches
- Hose & Fittings
- HPI Evergreen Greens Covers
- Ice Melt
- Marking Paint
- Oil Absorbents
- Soil Conditioners
- Hand Tools
- Soil Stabilizers
- Sprayers
- Spreaders

Arthur Clesen, Inc.
543 Diens Dr. • Wheeling, IL 60090
Call 312-537-2177

TENNIS COURTS
Construction — Resurfacing

M-C Sport Systems, Inc.
Addison, IL

John Maniscalco 312/628-0500



JAMES R. BURDETT
Grounds Maintenance Supplies

Post Office Box 52
Lombard, Illinois 60148
(312) 620-5558
Car Phone 802-5656

NATIONAL CHEMSEARCH CORP.
1001 Craig Road
St. Louis, Missouri 63146

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 hydrophobocity. 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)

The finest golf courses and lawns in America are fertilized with Naturally Organic Milorganite.

- Iron is the element (along with nitrogen) that will keep your lawn summer green when your neighbor's fades away this summer.
- Naturally organic Milorganite does not require watering in, so lawns require less water in the heat of summer. Naturally organic Milorganite improves water holding capabilities of most soils for improved drought resistance.
- Proven superior by over 50 years of university testing.

★ THE MILORGANITE EXTRAS ★

SUPPLIES HUMUS: In addition to being the ideal fertilizer, Milorganite also adds large quantities of organic matter (humus) to the soil. Naturally organic Milorganite actually improves the plant growing capabilities of all soils and has been perceived to reduce disease incidence and the build-up of harmful thatch.

NO WATERING-IN REQUIRED: Naturally organic Milorganite does not require watering in, so lawns require less water in the heat of summer. Naturally organic Milorganite improves water holding capabilities of most soils for improved drought resistance.

NATURALLY RICH IN IRON AND CANNOT BURN.

RANSOMES

Motor 180

Excellent for fairway, tees

Catchers available

ASK FOR A DEMONSTRATION NOW!

OLSEN DISTRIBUTING COMPANY
969 N. Pepper Road
Barrington, Illinois 60010
1-312-381-9333

(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 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.

BIGTREES INC.
Serving northern Illinois

Please, call us today! Whatever your tree needs . to buy, relocate, or transplant . . .
312/481-5224
Formerly DeVries Tree Movers Member of: ILCA, ISNA

OMNI WEATHER
We offer reliable weather forecasts to assist both the club pro and the course superintendent. Our consultation can save you thousands during the season by improving your scheduling of course maintenance. Daily forecasts assist you in:
* Watering needs * Disease control * Lightning
* Scheduling or canceling events
DuPage Airport (312) 584-9503

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.