
TIMELY TURF TOPICS

from the USGA Green Section

THE TROPICAL EARTHWORM

The name "tropical earthworm" (*Pheretima hupeinsis* Michaelson) describes a pest of putting greens which previously has been known as stinkworm, eelworm, African earthworm and exotic earthworm. Prof. Gates of Rangoon, Burma, a world authority, identified this insect in 1936. Fleming and Hadley confirm the identification.

The tropical earthworm differs from the common earthworm (*Lumbricus terrestris* Linn) in that it usually is smaller. Each body segment has minute bristles which form a continuous ring, and the body is more round and firm. It is extremely energetic and often whips about like an eel.

When the worms are active during moist warm weather, they throw casts on the greens nearly continuously; this necessitates constant poling to break up or remove the castings. The combination of the castings and the continuous poling greatly impairs the putting surfaces" and greatly increases labor costs.

The tropical earthworm further is distinguished from the common earthworm in that it cannot be controlled with the treatments which have been successful against the common earthworm.

Detailed Study Needed

Records of the introduction of this pest into America are lacking. The Green Section called attention to it in the early 1930's. Its presence is being felt along the Atlantic seaboard from Connecticut to Virginia, and it is suspected that the worms are distributed as far south as Florida.

Preliminary work by the Green Section on courses in the Middle Atlantic District in 1946 indicated that detailed studies would have to be made because of the extreme difficulty in effecting any measure of control. Subsequent tests have confirmed

this observation, and mercury compounds, lead arsenate, DDT, Chlordane, Toxophene, Parathion and benzene hexachloride all have been unavailing. The economic significance of the destruction and the interruption of play caused by this pest demands coordinated effort to find a control.

Following a rapid-fire correspondence between H. Alfred Langben, of the Sleepy Hollow Country Club, Scarborough, N. Y., who is a member of the USGA Green Section Committee, and the USGA Green Section office, the seriousness of the problem was brought to the attention of Dr. John C. Schread, Connecticut Agricultural Experiment Station, New Haven, Conn., and Dr. G. H. Ahlgren, Rutgers University, New Brunswick, N. J.

As a result, a meeting was held at the Pelham Country Club, Pelham, N. Y., on the afternoon and evening of July 13, 1948. The meeting was arranged through the efforts of Mr. Langben and Warren E. Lafkin, of the Golf and Lawn Supply Corporation, White Plains, N. Y., cooperating with the New York-Connecticut Turf Improvement Association and the Connecticut, New Jersey and New York Experiment Stations.

Following an examination of damage on greens at the Pelham Country Club, with Arthur Twombly, Superintendent, and a thorough discussion of the problem, the group decided to establish a fund to support needed research on control measures and the life history of the tropical earthworm.

There was initiated on that date the "Tropical Earthworm Research Project," sponsored by the New York-Connecticut Turf Improvement Association with the cooperation of the USGA Green Section, the Metropolitan Golf Association, the New Jersey Golf Association and the New York, New Jersey and Connecticut Agricultural Experiment Stations.

Members of the Sponsoring Committee designated to raise the necessary funds are: H. Alfred Langben, Chairman, Sleepy Hollow Country Club, Scarborough, N. Y.; Glen H. Van Buren, Siwanoy Country Club, Bronxville, N. Y.; David M. Goodstein, Quaker Ridge Golf Club, Scarsdale, N. Y.; and Harold LeFurgy, Treasurer, Winged Foot Golf Club, Mamaroneck, N. Y.

Members of the Research Committee designated to outline and direct the project are: Dr. G. H. Ahlgren, Chairman, Rutgers University, New Brunswick, N. J.; Dr. J. A. Adams, New York State Agricultural Experiment Station, Geneva, N. Y.; Dr. J. H. Schread, Connecticut Agricultural Experiment Station, New Haven, Conn.; and Dr. J. F. Cornman, Cornell University, Ithaca, N. Y.

The greenkeeping profession is represented by Carlton Treat, Montclair Golf Club, Montclair, N. J.; Ben Zukosky, Links Club, Roslyn, N. Y., and Lloyd Scott, Woodway Country Club, Springdale, Conn.

Mr. LeFurgy is receiving contributions

from golf clubs to defray the expenses of this research project. The USGA Green Section urges clubs to contribute to the program because of its importance and because sufficient funds are not available from the USGA or experiment stations. Contributions should be sent to Harold LeFurgy, Winged Foot Golf Club, Mamaroneck, N. Y.

Greenkeepers and superintendents who suspect the presence of the tropical earthworm are invited to send specimens to Dr. G. H. Ahlgren, Rutgers University, New Brunswick, N. J., who will have them identified by the Zoology Department. The worms may be mailed in a closed bottle containing moist soil. Dr. Ahlgren will welcome correspondence concerning observations on possible control measures or other pertinent information which may assist the Research Committee in its work.

(Acknowledgment: We acknowledge with thanks the material prepared by Ralph E. Engel and Gilbert H. Ahlgren of Rutgers University, which was drawn upon freely in the preparation of this report.)

STEEL SPIKES vs. LUG SOLES FOR GOLF SHOES

A Report on 1948 Trials by USGA Green Section

By FRED V. GRAU and MARVIN H. FERGUSON

Varying reports had reached the Green Section office on the merits and demerits of lug soles on golf shoes. The matter came to a head following a talk with Richard Watson, Superintendent at Chevy Chase Club in Washington, D. C., who reported that lug soles were being prohibited at some courses because of damage to the greens.

W. E. Kavenagh, Goodyear Tire and Rubber Co., Inc., Windsor, Vermont, was contacted by Mr. Watson, who approached the Green Section for an impartial test. Shoes were furnished by Mr. Kavenagh, one pair fitted with standard steel spikes, the other with lug soles.

Tests were conducted on an area of five-year-old bent putting-green turf which was growing on native soil (silty clay) and had had no special preparation. Tests were be-

gun August 12, 1948. In order to simulate heavy foot traffic, single paths were laid out lengthwise on the turf area, which was 12 feet by 30 feet:

PATH No. 1
Lug sole shoe. Average weight of man 145 pounds

PATH No. 2
Steel spike shoe. Average weight of man 170 pounds

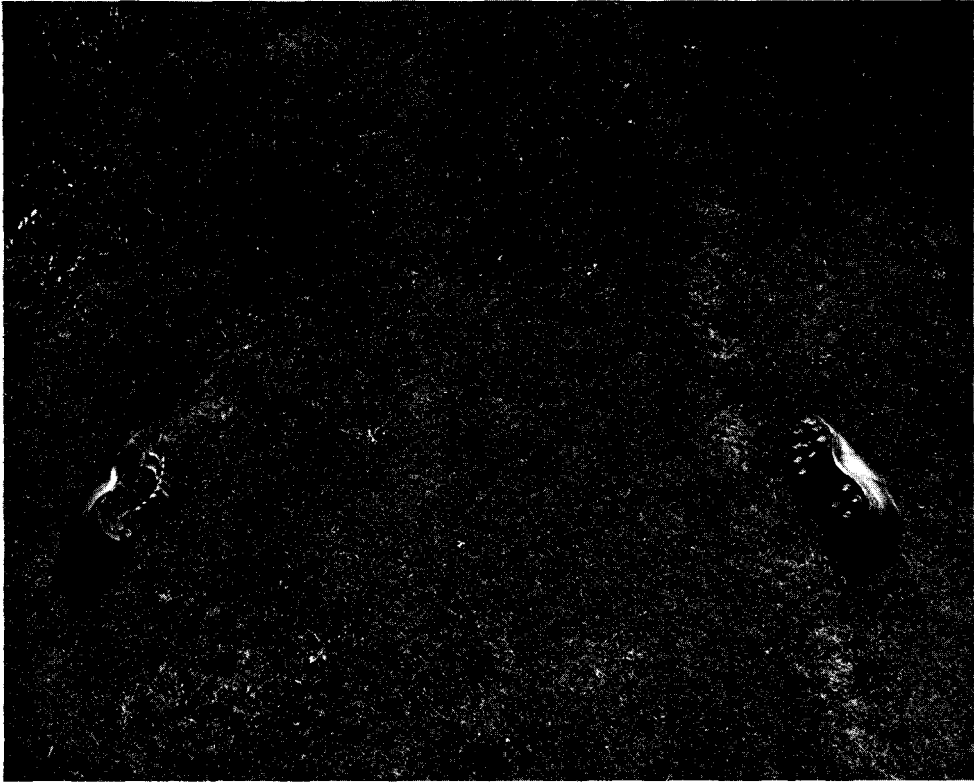
PATH No. 3
Steel spike shoe. Average weight of man 145 pounds

PATH No. 4
Lug sole shoe. Average weight of man 170 pounds

Each path (two footprints wide) was walked for 25 round trips each day on August 12, 13, 16, 17, 18, 23, 24, 25, 26. On August 12 the walking was done by Mr. Kavenagh and Dr. Grau. Thereafter the walking was done by Charlie Wilson, James Wilfong and Alexander Radko of the USGA Green Section.

On August 12 the turf was soggy from

Lug Soles Cause Less Damage Than Steel Spikes



Bureau Of Plant Industry, Soils and Agricultural Engineering-Photo by W. J. Mead

Relative wear produced by two types of golf shoes on bent putting turf. The shoes are lying alongside their respective paths. Photo was taken one month after wear test ended.

heavy rains. Mr. Wilfong, formerly Superintendent at Congressional Country Club, stated that if the green were on his course it would be closed to play. This indicates that the tests were made under the worst possible conditions for the grass. The soil is of such a nature that it becomes soggy when wet and very hard and compact when dry. No irrigation was done on this area at any time during the season.

At the end of the fifth round trip of walking on August 12 the lug soles began to show damage, whereas the steel spikes began to show visible injury only after the eighth round trip.

Damage from the lug soles appeared to be worse than from the steel spikes after the third day of walking.

From then on until the end of the test period, the damage from the steel spikes was greater than from the lug soles.

Spikes Cause Greater Damage

Damage to turf was greatest on path No. 3 (steel spikes, average weight 145 pounds). In diminishing order were No. 2 (spikes, 170 pounds) ; No. 4 (lugs, 170 pounds), and No. 1 (lugs, 145 pounds).

The difference in average weight did not appear to be a significant factor. Path No. 3 (145 pounds) produced worn-out turf before Path No. 2 (170 pounds) because it was lower and the soil remained soggy for a longer period.

Scuffing the shoes on the turf produced no apparent injury to the turf with lug

Continued on page 15

TURF FIELD DAY AT BELTSVILLE

The first annual national open invitation Turf Field Day at the Beltsville Turf Gardens on Friday, October 15, 1948, was, according to the weather, perfect. The attendance was 175, and, according to the comments of the guests, it was an unqualified success. The USGA Green Section and the Bureau of Plant Industry, Soils and Agricultural Engineering, cooperating, were hosts.

Dr. Fred V. Grau, USGA Green Section director, opened the meeting at 9:30 A.M. at the flag pole in front of the Administration Building. Dr. R. M. Salter, Chief of the Bureau, greeted the group warmly and expressed friendly, open cooperation to the specialized uses of grass. H. E. Allanson, Assistant Chief of the Bureau and Chairman of the Station Committee (for developing the lawns and grounds) echoed Dr. Salter's sentiments, expressed appreciation for the cooperation of the USGA Green Section, and regretted that he had only one more year of active service.

Introductions included E. W. Van Gorder, from Palo Alto, Cal.; Prof. H. B. Musser, Pennsylvania Experiment Station, who is Editor of the new USGA book on "Turf Management for Golf Courses" and is in charge of the largest turf experimental set-up in the United States; three graduate students from Penn State—James Watson, Neal Wright, John Stanford; and Dr. Kenyon T. Payne, in charge of the turf grass breeding at Purdue University. The USGA was represented by Sherrill Sherman, Utica, N. Y.

Raymond Knight, Maintenance Foreman for the Bureau's Station Committee, had a display of the machinery used on the grounds. A tour of the Turf Gardens included:

Stop No. 1. Alta fescue lawn one year old, growing on sand, gravel and clay. Root growth was good. Turf is coarse and open but provides good appearance and setting for buildings. This area is designed for appearance only.

Stop No. 2. Ureaform trials on Alta fescue. Walter Armiger explained the manufacture and expected future of Ureaform fertilizers, which will feed turf more slowly and more evenly over longer periods of time than will inorganic nitrogen fertilizers.

Stop No. 3. *Zoysia japonica* planted vegetatively into existing bluegrass turf May 3, 4, and 5, 1948. Roger Peacock, professional, won a dollar bill for first finding two plugs of *Zoysia*. Z-52 establishes more easily than does Z-9.

Stop No. 4. Soil material from steam line excavations particularly unfavorable to good grass production.

Stop No. 5. Weed control plots: Dr. Chappell. Materials giving good results at other stations have not been impressive under Beltsville conditions.

Stop No. 6. The coffee at the cafeteria seemed to be appreciated by nearly everyone.

Stop No. 7. U-3 Bermudagrass sprigged vegetatively in July, 1947, had been aerified and overseeded with cool-season grasses in the fall of 1947. There has been no irrigation. Mowers are set at $\frac{1}{2}$ inch. The best-looking turf was produced with (1) a mixture of bent-grasses and (2) B-27 bluegrass. Roger Peacock hit eight-iron shots from different areas. No. 1 choice was the U-3 Bermuda and B-27 bluegrass combination. Divots were smaller and flew to pieces; turf was firmer. Divots

Continued on page 16

Steel Spikes vs. Lug Soles

Continued from page 14

soles, but the steel spikes tore the turf badly. Twisting the shoes for a stance damaged the turf more with the steel spikes than with the lugs.

After the walking ended, the turf on the paths where the lug soles were used recovered more rapidly than where the steel spikes had been used. The accompanying photograph shows the relative extent of injury and recovery 30 days after the walking stopped.

It is admitted that this test was not repeated a sufficient number of times on different grasses and under different soil and climatic conditions. It represents results at Beltsville on one grass on one soil type. It is believed, however, that this test was sufficiently representative to serve as a guide to further testing.

On the basis of the trial we can say that, under these conditions, there is no valid reason for barring lug soles from golf courses because of damage done to the turf.

Experts Tour Beltsville Turf Gardens



Bureau of Plant Industry, Soils and Agricultural Engineering—Photo by W. J. Mead

Field Day group of 175 experts addressed by Dr. R. M. Salter, Chief of the Bureau of Plant Industry, Soils and Agricultural Engineering, in front of Administration Building.

Turf Field Day at Beltsville

Continued from page 15

from the bent-Bermuda turf were larger and came out as solid chunks of turf. U-3 Bermudagrass is in use on tees in Washington. Healing of divots is complete in from three to four weeks where nitrogen fertilizer is adequate. This experimental area received $6\frac{1}{4}$ pounds of nitrogen to 1,000 square feet.

Stop No. 8. Bentgrass evaluation studies. Out of 100 bentgrasses, only a few were outstanding under no-fungicide and no-irrigation management and with $\frac{1}{4}$ inch and $\frac{1}{2}$ inch heights of cut. Best were Arlington (C-1), Congressional (C-19), C-114 from Atlantic City, and C-102 from Hershey, Pa. These bents will be furnished to cooperating experiment stations (Pennsylvania, Purdue, Rhode Island) for breeding work. At Beltsville these good bents will be increased vegetatively and will be exhaustively tested alone and in combination with Bermudagrasses and with Zoysia grasses.

Stop No. 9. Steel spikes and lug soles on golf shoes were tested on bent turf. After 25 round trips in the same path for nine days, the injury was greater from spikes than from lugs. Most significant comment was that, when greens are wet and soft, a heavy man wearing lugs would create depressions in turf especially near the cup where a putt would be deflected.

Stop No. 10. A number of southern grasses in small plots was observed.

Stop No. 11. First range of 10'x90' plots (summer-growing grasses) for observation only. Mowing heights of approximately $\frac{1}{2}$ inch, 2 inches, 4 inches, and mowed once only

when seed is ripe. Most significant observation: summer grasses go dormant sooner at higher mowing heights. Zoysia grasses resist weed invasions to a high degree.

Stop No. 12. "Nurse grass" tests newly established, using ryegrass, redtop, timothy and Alta fescue to observe effects on permanent seedings.

Stop No. 13. Q-10 creeping red fescue nursery to check uniformity of progeny from this promising grass.

Observed newly-established plots sown to seed of Z-52 strain of *Zoysia japonica* which had been winter-harvested in greenhouse from sod taken in when dormant period began in November, 1947.

New seedings of B-27 and common bluegrass for studies of combinations with Zoysia and Bermuda.

Stop No. 14. Lunch at Bureau of Plant Industry cafeteria.

Immediately after lunch, by popular request, the Aerifier was operated on a bluegrass-fescue sod.

Stop No. 15. A study of management for seed production on the Z-52 strain of *Zoysia japonica* grown vegetatively in greenhouse, then planted in increase nursery in S-foot rows in May, 1948.

Stop No. 16. The bentgrass fairway area was established to a mixture of creeping strains together with seed of Highland Colonial, Astoria Colonial and seaside bent. Mower set at $\frac{1}{2}$ inch. No artificial irrigation. Urea-form fertilizers are being studied on this turf. *Zoysiagrasses* and Bermudagrass will be introduced into this turf for further study.

Stop No. 17. Selected strains of *Zoysia japonica* (Z-9) and *Zoysia matrella* (M-1) in turf cut at 1/2 inch. This turf is weed-free.

Stop No. 18. Fescue trials. Illahee creeping red fescue and Penn State Chewings had highest rating for 1948. Mowing height 3/4 inch.

Stop No. 19. Common *Zoysia japonica* turf was established by vegetative planting in 1946. Turf was aerified and overseeded with various cool-season grasses in fall of 1947. Mowing heights of 1/2, 3/4, and 1 inch. Best ratings on freedom from weeds on B-27 Kentucky bluegrass and on bent and bent mixtures. No artificial irrigation.

Roger Peacock hit eight-iron shots from various areas. He chose the combination of *Zoysia* and B-27 bluegrass cut at 1 inch as most nearly ideal for tee and fairway shots. Full shots failed to take a divot, yet a perfectly controlled shot resulted. *Zoysia* and bent had excellent appearance but full shots took big divots. At the 1-inch cut only a "floater" ball could be played. Best control of the ball was at the 1/2-inch cut on the bent-*Zoysia* combination.

Stop No. 20. *Zoysia* progeny nursery. A study of uniformity of seedlings from seed of *Zoysia* strains.

Stop No. 21. *Zoysia* seed yield strain trials. Seed will be harvested in 1949.

Stop No. 22. *Zoysia* seeding tests. No irrigation, no weed control. Mowed at 1/2 inch. July best month to sow *Zoysia* seed. Complete control of crabgrass in one year in crabgrass-infested soil.

Common *Zoysia japonica* turf mowed at 1/2 inch, fertilized with 2 pounds of nitrogen to 1,000 square feet three weeks previously, staying green and healthy. Unfertilized turf at same height is growing off color. At 2 inches, unfertilized turf is completely brown.

Stop No. 23. Observation of 10'x90' plots. All important grasses cut at heights of 1/2 inch, 2 inches, 4 inches, and mature.

Other projects, not seen, included evaluation of SO strains of Bermudagrass in a bluegrass lawn, studied for combining ability with Kentucky bluegrass ; evaluation of selected Alta fescue plants, and Q-10 creeping red fescue plants in bluegrass turf.

(Acknowledgments: A sound jeep was furnished by the Engineer School, Fort Belvoir, Va., Lt. Meredith in charge. Flagpoles and flags were furnished by the J. S. Connolly Co., Bethesda, Md., George Cornell, Manager.)

(NOTE: Next National Turf Field Day was set for Wednesday, October 19, 1949.)

Kentucky Bluegrass-Bent Tests

"Effects of Soil Acidity and Available Phosphorus on Population Changes in Mixed Kentucky Bluegrass-Bent Turf." H. B. Musser. *Journal of the American Society of Agronomy*, Volume 40, No. 7, page 614. Summary and conclusions :

"Results are reported on two series of seedlings of Kentucky bluegrass and bent grasses in four mixture combinations under varying conditions of soil acidity and available phosphorus with uniform nitrogen and potassium treatments.

"Data presented indicate that differences in the quantities of bent grasses in the seed mixtures, ranging from 5 to 20 percent, had no significant effect upon the proportions of the various species in the turf population.

"Both soil acidity and available phosphorus materially influenced establishment of Kentucky bluegrass in the turf. Proportions of the total turf contributed by this grass were significantly higher under conditions of low acidity and high phosphorus.

"The bent grasses showed a wide range of tolerance to the differential acidity and nutrient conditions of the experiment.

"Kentucky bluegrass percentages in the turf mixture declined steadily throughout the four-year period of the second series under all treatments used.

"Strong competition by the bent grasses is suggested as the explanation for failure of

the Kentucky bluegrass to maintain itself in the mixed turf. The practical bearing of these results upon the question of the desirability of seeding mixtures of these species for intensively maintained turf is noted."

CONFERENCE DATES

December 13-16.....New York
American Association of Economic Entomologists, Hotel New Yorker, New York City.

E. N. Cory, University of Maryland, College Park, Md.

January 13-14, 1949..Maryland
Mid-Atlantic Association of Greenkeepers, at Lord Baltimore Hotel, Baltimore, Md.

E. N. Cory, University of Maryland, College Park, Md.

February 7-11..California
Greenkeeping Superintendents' Association, Alexandria Hotel, Los Angeles, Calif.

A. L. Brandon, St. Charles, Ill.

February 21-24.. Pennsylvania
H. B. Musser, Pennsylvania State College, State College, Pa.

March 7-9.....Indiana
G. O. Mott, Purdue University, Lafayette, Ind..