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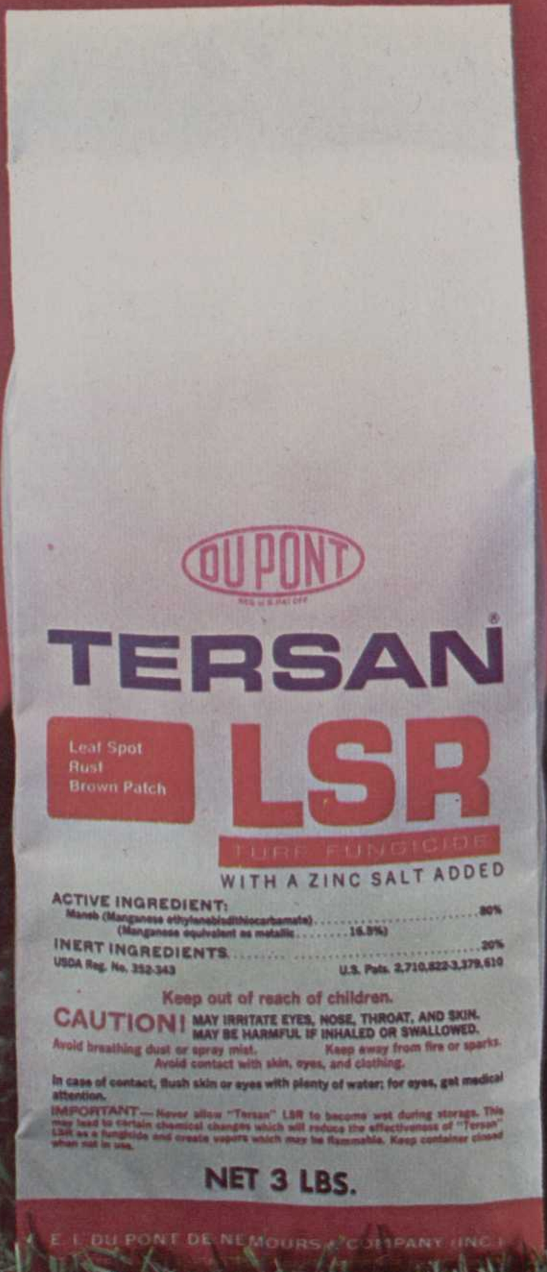
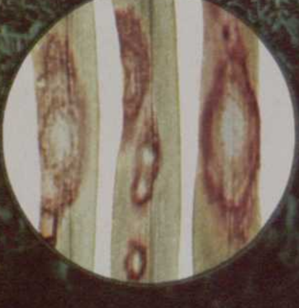
Your first step to healthier turf



1 Spring is the time to take it



Leaf Spot problems caused by overwintering spores of Helminthosporium spp. can spoil the health and beauty of your turf this spring. So can Rust and Rhizoctonia.

But if you apply TERSAN® LSR now, you can break the Helminthosporium spp. cycle before it becomes a costly problem. You stop Leaf Spot before the "melting" or "fading" out stage. And Rust and Rhizoctonia don't get a chance to damage your turf.

The application of TERSAN LSR to tees, greens and fairways in the spring is the first step in the Du Pont TERSAN 1-2-3 Disease Control Program. The program that prevents or controls all major turf diseases on all common grasses throughout the entire year.

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With any chemical, follow labeling instructions and warnings carefully.

DU PONT TURF PRODUCTS

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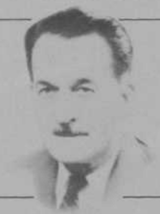
FRED V. GRAU



ANSWERS TO TURF QUESTIONS

INNOVATIONS

Someone said to me recently, "Watch a lazy person and you will probably learn how to do a hard job the easy way." There must be some logic in that remark, but I cannot subscribe wholeheartedly to the concept. Some of the innovations in the profession of maintaining turf had to be originated by people with drive and ambition. The lazy person might be able to get through a job the easy way, but the question to be asked is, was the job done professionally?

In 1935, before there were combs for putting green mowers, I helped a man put together three stiff stable brooms so that they could be pulled across the green ahead of the mowers. In this way the "nap" (grain or thatch) would be raised, be cut off and removed. This method provided a smoother putting surface and avoided some "thatch" troubles. Later, we had combs and brushes to do the same job simultaneously with mowing after we had power mowers. Twenty years later the principle of vertical mowing was galvanized into action. These developments required creative thought and action and plenty of energy to get them built, tested, demonstrated and sold.

I can visualize the energy that brought about the innovation of Dr. William Daniel's Purr-Wick greens and what it took to get the first greens built. Also I recall what it took to get greens built to USGA Green Section specifications. There isn't a lazy one in the bunch!

The Soil Modification Plots at Penn State are the product of straight thinking and a tremendous amount of energy. In 10 years the research results will be valuable to golf course architects and builders throughout the world. There is still no place here for the lazy person.

Was a lazy person responsible for developing soil cultivation tools, hydraulic seeders and mulchers, machines that scarify and drop seeds into the grooves, so that they are in intimate contact with the soil? What about the many thousands of plots that proved the efficacy of a myriad of weed killers, pesticides and fertilizers? Lazy people didn't do these jobs.

One of my favorite energy-driven people always has been Dr. K.G. Clarke, who developed ureaform fertilizer. I could name others who are driven by their desires to accomplish something worthwhile. Perhaps I have over-reacted to the idea of "lazy people" getting things done the easy way. Maybe the lazy ones have benefited by taking advantage of labor-saving machines that have been built for them. Just the same I'll put my chips on the people with restless, creative energy. They see that something needs to be done, then they go ahead and do it.

Q—*We are rebuilding the greens at this Army installation and plan to plant Penncross bent. Everyone says to use two pounds to 1,000 square feet. I say that this is too much. Also they want me to put bermudagrass on the banks. Would you comment on this matter?* *(Kentucky)*

A—I have to go along with you on the rate of seeding Penncross bent. I, too, consider two pounds excessive. One pound is maximum in my book. More seed is thought by some to compensate for a poor seed bed, low fertility and the like. No such thing! Bermudagrass may be okay for the banks, but I am very partial to zoysia. It does not need mowing as often, it chokes weeds better, takes less fertilizer, and is easier to control at the edges of the bent greens and bunkers. There is a lot of good zoysia in your part of Kentucky. Set in some plugs and overseed with a good turf-type perennial ryegrass, such as Pennfine or Manhattan. The zoysia spreads slowly, but surely. Be sure to specify Greens Quality Penncross. All Penncross is Blue Tag Certified. Greens Quality is higher quality, less inert, zero *Poa annua*.

Q—*We heard about the new way of building greens, called Purr-Wick. Is it a practical method? What kind of putting surface does it present? Are many in use?* *(Michigan)*

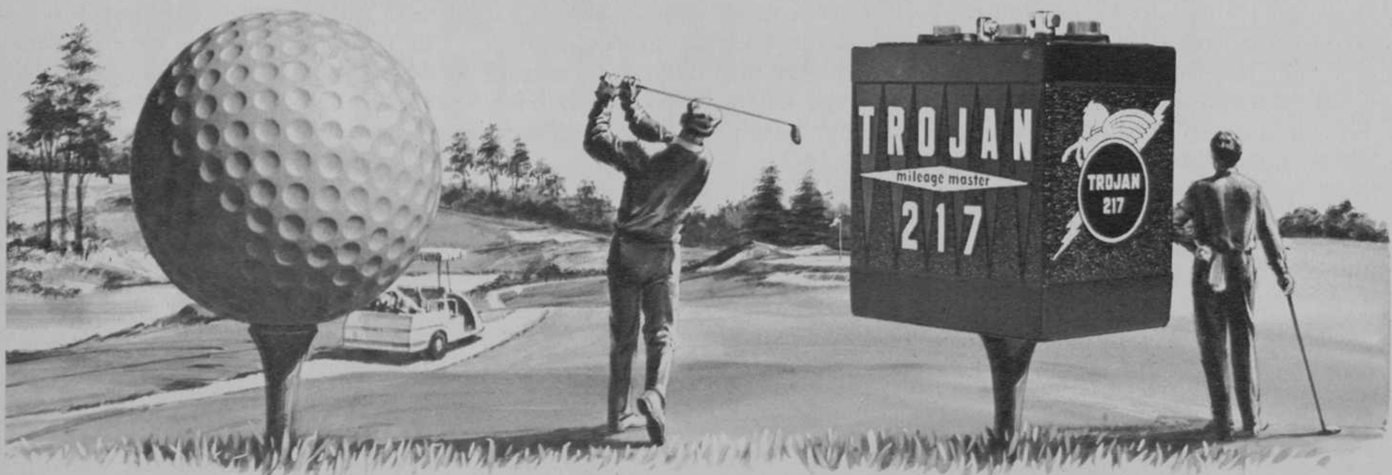
A—Dr. William Daniel of Purdue is credited with the new idea. He tells me that there are more than 70 greens in play in nine states. "Consistency" is the word he uses to describe the playing qualities. Player response has been good. In chip tests the ball responds predictably. Yes, it seems to be a practical method. For full details write to: Dr. William Daniel, Purdue University, Lafayette, Ind. 47907. □

Questions for Dr. Grau may be sent to Fred V. Grau, GOLFDOM *Magazine, 235 East 45th Street, New York, N.Y. 10017.*

CORRECTION

An error inadvertently appeared in Dr. Grau's March column on page 96 in the answer part of the question from West Virginia, next to last sentence. That sentence should read: "Remove all *screens* to avoid clogging."

Longer driving starts here...........and here!



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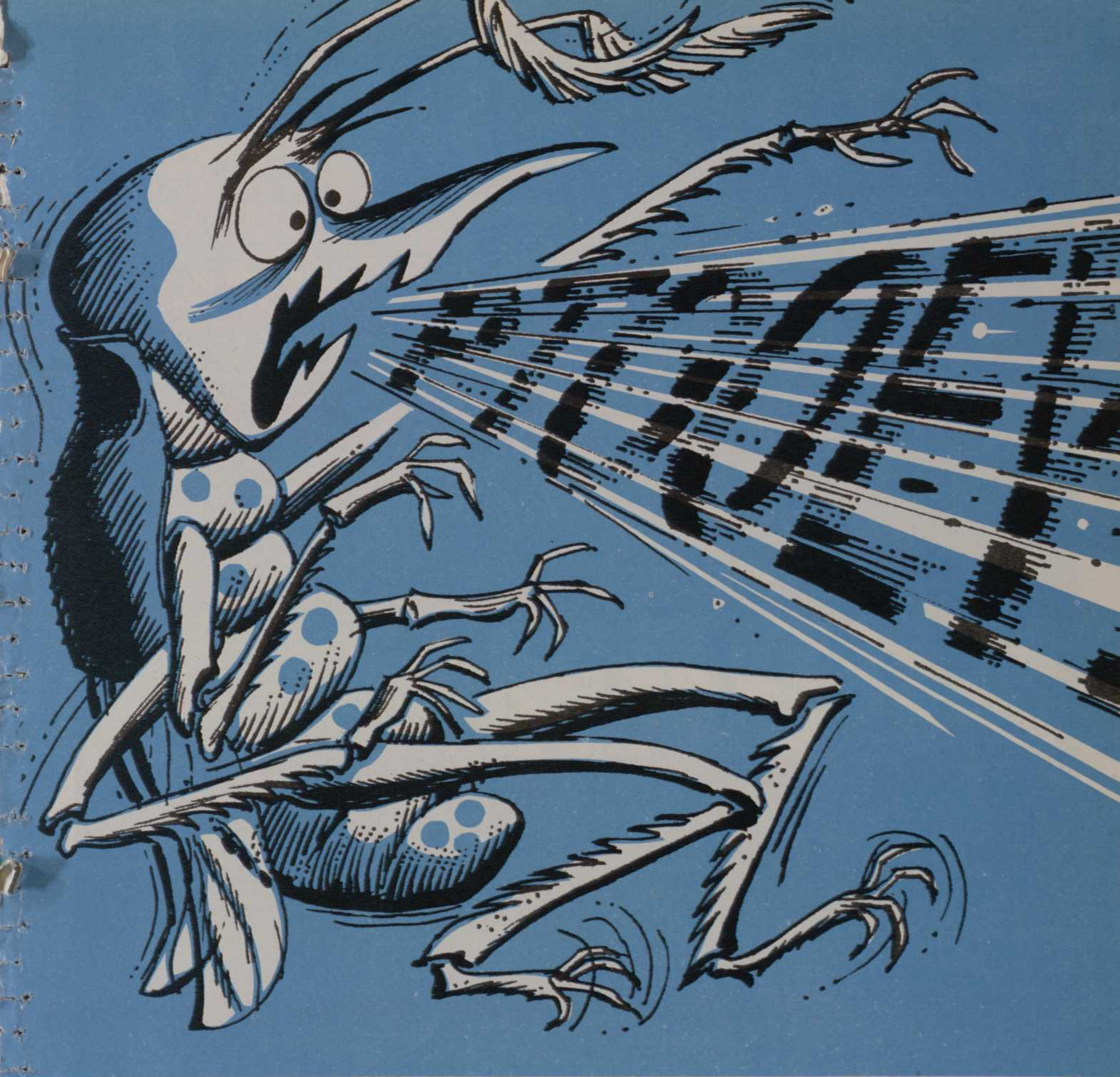

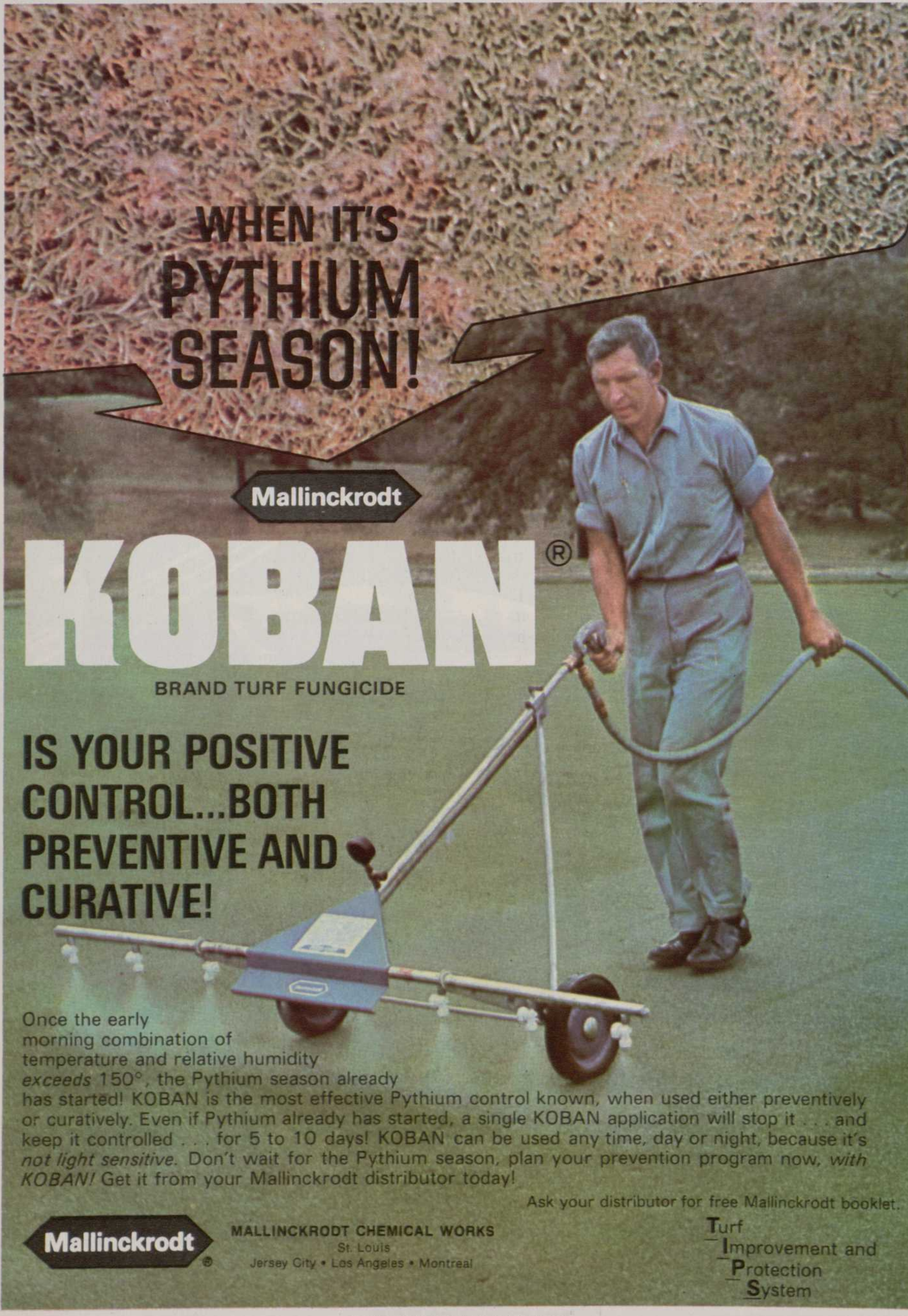

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DR. JAMES B. BEARD

TURFGRASS RESEARCH REVIEW

WARM WATER: MILD EFFECT ON SOIL TEMPERATURE

Effects of irrigation water temperature on soil temperature. *P.J. Wierenga, R.M. Hagan and E.J. Gregory. 1971. Agronomy Journal. 63(1):33-36. (from the Department of Water Science and Engineering, University of California at Davis, Calif. 95616).*

The objective of this study was to compare the effects on soil temperature from irrigating with water of different temperatures. The experiments were conducted at two field sites in the Central Valley of California. The water temperature treatments utilized included 52, 58 and 81 degrees F. Soil temperature measurements were taken at 30-minute intervals following irrigations made between 8 a.m. and 11 a.m. and between 7 p.m. and 10 p.m. Soil temperature measurements were taken at depths of 4, 12, 18 and 24 inches. Soil temperatures were also monitored on a comparable, unirrigated site. The air temperature was also monitored at two feet above the soil surface in a shaded, ventilated shelter.

Results of this study reveal that irrigation water temperatures ranging from 50 to 80 degrees F had a relatively small influence on the soil temperature, the effect lasting for a very short duration. For example, differences in soil temperatures resulting from irrigations with water of 80 degrees F versus water of 58 degrees F applied to a soil having a surface temperature of 58 degrees caused a temperature increase that lasted less than 24 hours at the two and four-inch soil depths and for 60 hours at the 12-inch soil depth. There was little effect on soil depths over 18 inches.

Although the effects of the irrigation water temperature on the soil temperature were small and of short duration, irrigation did cause a significant decrease in the soil temperature. For example, maximum soil temperature comparisons between unirrigated and irrigated soils four days after irrigation revealed that the irrigated plots were 12 degrees F cooler at two inches below the soil surface, eight degrees F cooler at the four-inch depth and four degrees F cooler at the 12-inch depth.

Comments: The question is often raised whether the source of irrigation water, such as wells, ponds, rivers or water impoundments which may be warmed as a result of industrial activity, has any effect on the soil temperature and growth of turfgrasses. Data reported in this paper confirm two earlier investigations that show that the temperature of irrigation water has a relatively small effect on soil temperature. These conclusions are valid for temperatures in the 45 to 85 degree F range, which would be the most typical.

Actually, overhead sprinkler irrigation in which the water is broken up into fine droplets, will have essentially no effect, because the temperature of the droplets reaching the ground will be approximately the same or slightly cooler than the air temperature, if the droplets have traveled through the air 15 feet or more. Thus, applications of water by surface or sprinkler methods will not increase soil temperatures significantly above that for soils irrigated with water of a comparable temperature. The authors suggest that the only way to significantly alter soil temperatures through irrigation with water of a specific temperature is by a subsurface system.

Although the application of water having a substantially cooler temperature than the atmosphere does not cause any significant decrease in the soil temperature, it does have an indirect effect on turfgrass cooling. This occurs through the evaporative cooling process in which water remaining on the leaf surface after irrigation evaporates to the gaseous state, causing a cooling of the leaf. An additional benefit from this process is the delay in the normal diurnal warming of the soil and tissues, which is initiated shortly after daylight and reaches a peak between 1 and 2 p.m.

These data also show that irrigation significantly changes the soil temperature through increased evaporation and improved heat transfer. The soil temperature of irrigated sites will be significantly cooler as will the adjacent atmospheric microenvironment. The magnitude and duration of the cooling effect on the soil varies with the time of year and location.

In summary, these data show that the use of cooler water from deep wells will have no long term effect on cooling of the turf in comparison to irrigating with water of warmer temperatures. It also answers some questions arising from contemporary activities of urban and industrial sites; for example, irrigation water warmed through industrial cooling or electrical generation uses may not be as great a concern in turfgrass culture as some individuals have suggested.

Retardation by carboxin of low temperature induced discoloration in zoysia and bermudagrass. *R.M. Sachs, R.W. Kingsbury and J. DeBie. 1971. Crop Science. 11:585-*

continued on page 20

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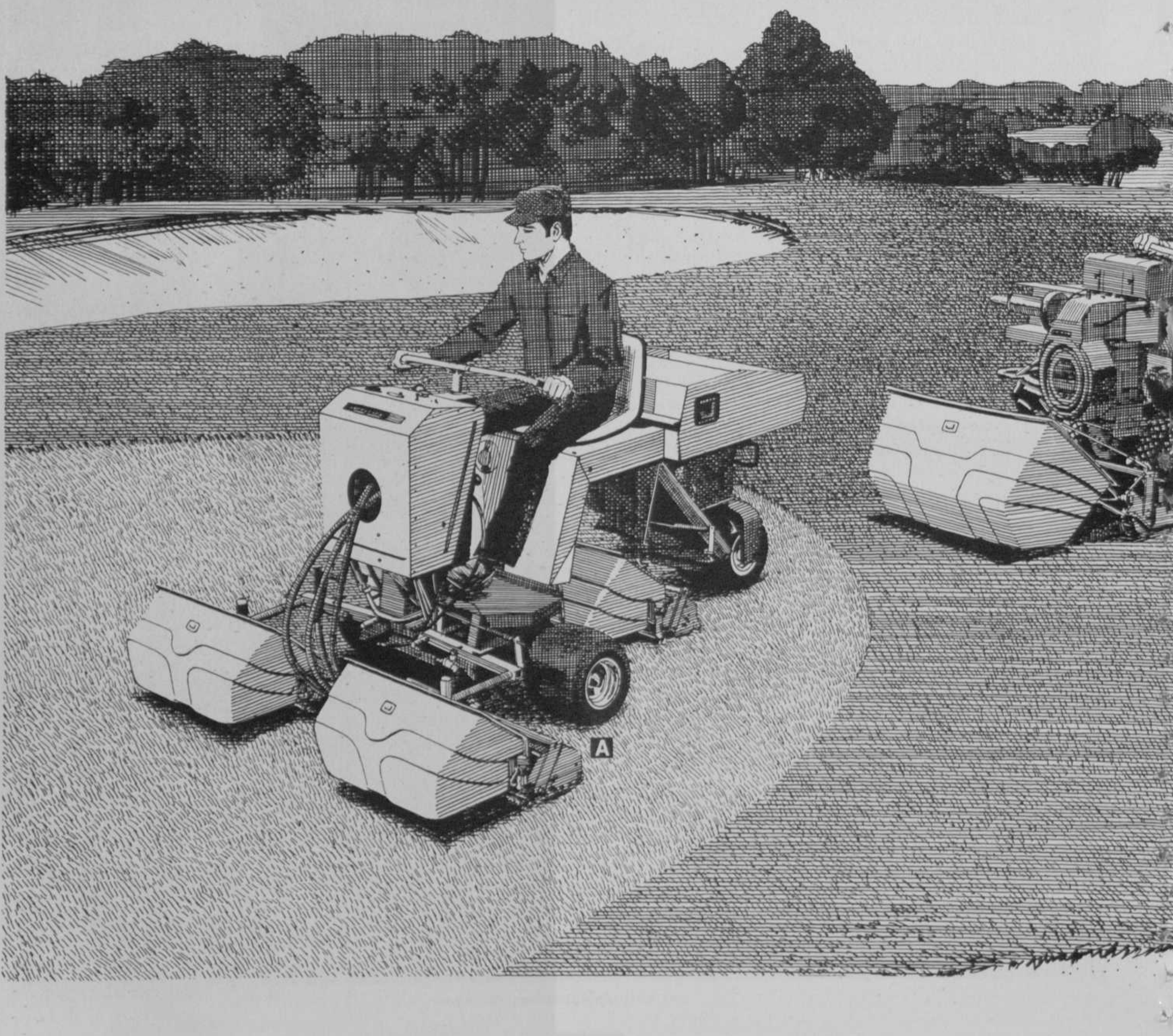

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BEARD *from page 17*

586. (from the Department of Environmental Horticulture, University of California at Davis, Calif. 95616).

The objective of this investigation was to study methods of chemically retarding the low temperature induced discoloration of warm season turfgrasses, such as zoysiagrass and bermudagrass. The three species utilized in this study were *Zoysia japonica* var. Meyer, *Zoysia matrella* var. Flawn. and *Cynodon dactylon*. Plugs of each species were grown in quart containers under greenhouse conditions at a minimum temperature of 65 degrees F. After establishment, the four-inch plugs had adequate turf density, with no visual deficiency symptoms.

The replicated treatments included in the study were an untreated check and an application of carboxin (5, 6-dihydro-2 methyl-1, 4-3 carboxanilide) at a 0.3 per cent concentration. Earlier preliminary studies indicated that concentrations of 1 per cent or more cause phytotoxicity. After treatment, the containers were placed in a greenhouse for three days, then transferred to a controlled environment chamber under chilling conditions. The turf plugs were held at this cold treatment temperature until almost complete foliar discoloration occurred on the untreated plants. Leaf samples were taken at periodic intervals during discoloration and after complete discoloration. These tissues were analyzed for chlorophyll content.

Results of this study reveal that the application of carboxin, a systemic fungicide, retarded the low temperature induced discoloration of zoysiagrass and bermudagrass. For example, zoysiagrass plants sprayed with carboxin solutions retained their green color under chilling conditions of 36 to 40 degrees F four to six weeks longer than the untreated plants. The color of the treated turfs was comparable to unchilled plugs growing at temperatures above 65 degrees F, whereas the untreated plants growing under chilled conditions became distinctly yellowish-brown. These observations were supported by the chlorophyll analyses. The carboxin treated plants contained three times as much chlorophyll as the untreated plants after four weeks of chilling. Also, regrowth of the plants when placed under favorable growing conditions was substantially greater for those treated compared to the untreated plants.

These results suggest that the carboxin treated plants were able to continue photosynthesis and the production of carbohydrates, because the plants were capable of retaining chlorophyll in a functioning condition. This in turn resulted in superior recovery and regrowth after chilling treatments.

These results indicate that it is possible to delay the low temperature induced discoloration of turfgrasses. In more moderate climates, such as southern Florida, where discoloration may last for only a few weeks, the possibility exists for practical utilization of this concept. However, further studies under field conditions are needed to confirm these results. □