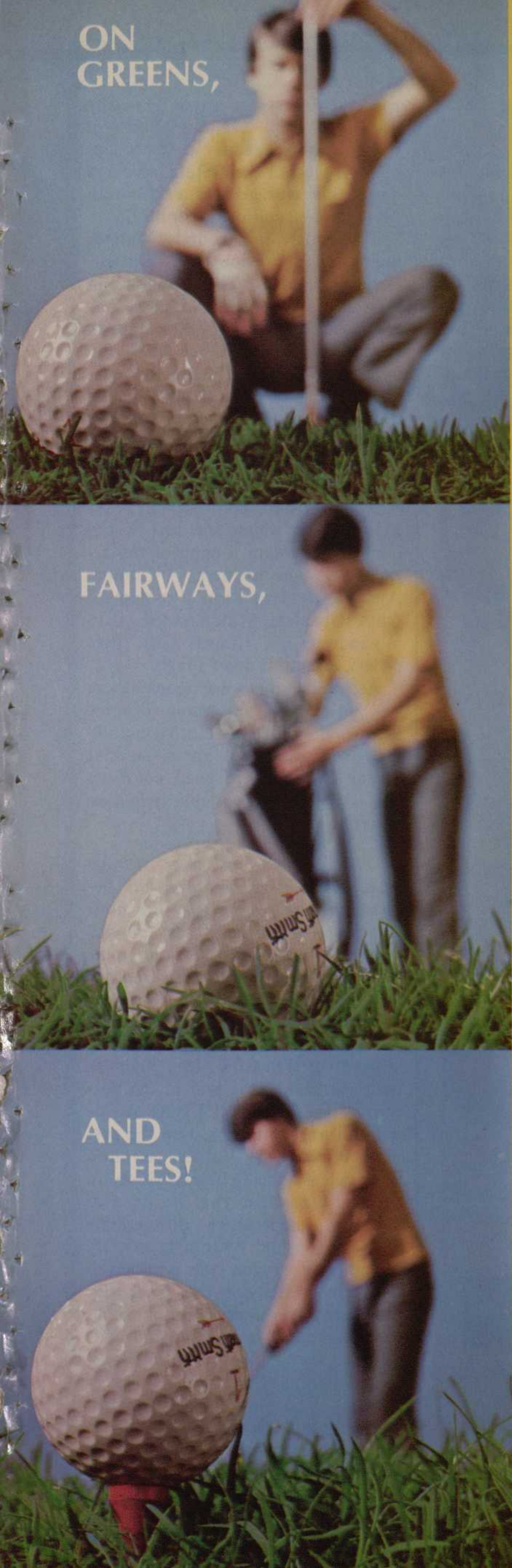

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GRAU *from page 10*

supply. In addition to providing water it can also provide, with each acre-inch applied, two to four pounds of N, one to two pounds of P, and three to four pounds of K. Use of sewage waste water for irrigation also serves as an anti-pollution measure for our streams and lakes, particularly with respect to the eutrophication hazard. The principal obstacles to its more extensive use are the sanitary or health aspects and the resistance of the public from a psychological or aesthetic standpoint. Departments of health of some states permit use of chlorinated, pond polished or secondary treated effluent for areas subject to human traffic. Other states do not permit such use or have no stated policy, but consider each request on its own merits. With proper chlorination of a secondary effluent, it should not be difficult to reduce maximum total coliform numbers below 5,000 per 100 ml. and maximum fecal coli below 1,000 per 100 ml., two indices which have been recommended for water used primarily for irrigation. Examination of chlorinated secondary effluent applied to plots at Penn State indicated a monthly average over a six month period of 680 coliforms per ml."

The article in Grounds Maintenance, cited previously, is particularly intriguing. The Desert Inn started the system in 1952. The water costs $.05 for 1,000 gallons compared to $.06 to $.09 for pumped water and $.16 for purchased water. Other courses using reclaimed water include Paradise Valley CC and Winterwood CC, both in the Las Vegas Valley. There is much more.

Anyone who comtemplates using effluent water for turf would do well to obtain a copy of the article, "Sewage Effluent, A Coming Answer to Irrigation Problems?" from Grounds Maintenance, 1014 Wyandotte St., Kansas City, Mo. 64105, attention: Joe Clough.

As long as there are people, there will be sewage and water to carry it away. Golf courses generally are near residential areas, so that in the future, there need not be a real shortage of available irrigation water.

Q—*The lakes and water storage areas on our golf course has become impure with algae. We have fish in the ponds and they do not seem to be thriving. We don't want to use chemicals if there is another way. Have you any other suggestions or alternatives? (Ohio)*

A—I have been reading about the system of releasing tiny bubbles from aeration lines laid in the bottom of the lake. Bill Lyons at Canal Fulton, Ohio, has used the system effectively. Valved aeration lines release the bubbles, which, in rising, circulate the water and equalize temperature differentials between top and bottom layers. By introducing oxygen, the productivity of the water for fish is greatly increased. Aerobic conditions help to break down impurities and conditions are improved for snails, worms, crayfish and mayfly nymphs. The only system that has come to my attention, thus far, is that developed by the Hinde Engineering Company, Highland Park, Ill. □

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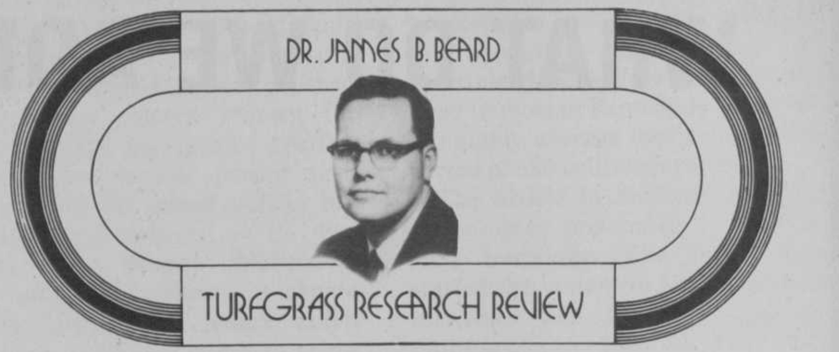

ACHIEVING PYTHIUM CONTROL

1972 **Pythium** ***control results in South Florida.*** *R.E. McCoy. 1972. Florida Turf. 4(6):3. (from the Agricultural Research Center, University of Florida, Ft. Lauderdale, Fla. 33314).*

The objective of this investigation was to assess the comparative *Pythium* blight control achieved by four fungicides under southern Florida conditions. The experiment was conducted at the University of Florida Agricultural Research Center in Ft. Lauderdale. Weather conditions during the 1971 to 1972 winter season were warmer than normal, which accentuated *Pythium* blight development on the ryegrasses.

The plot size was five by 18 feet, with three replications arranged in a randomized block design. Italian ryegrass (*Lolium multiflorum*) was overseeded at a rate of 45 pounds per 1,000 square feet into a Tifgreen bermudagrass turf maintained at a 0.25 inch cutting height. The overseedings were accomplished on December 6, 1971, with seedling emergence occurring on December 10th. The first disease readings and spray applications were made on December 14th. The five fungicide treatments included in the experiment were: (a) Cleary 3336® at two and four ounces per 1,000 square feet, (b) dexon wettable powder at three ounces per 1,000 square feet, (c) koban at two and four ounces per 1,000 square feet, (d) chloroneb (Tersan-SP®) at four ounces per 1,000 square feet and (e) an untreated control plot. The application rates for Cleary 3336® and koban were increased from two to four ounces per 1,000 square feet at the time of the fourth application. Seven spray applications were made at five-day intervals throughout the experimental period using a backpack sprayer, which applied the equivalent of five gallons of water per 1,000 square feet. The dexon treated plots were irrigated with one-sixteenth inch of water immediately following application to wash the compound into the soil and prevent photochemical decomposition. Evaluations of the extent of disease development were taken at three-day intervals throughout the test period.

Extensive *Pythium* development occurred during the experimental period due to (a) the unseasonably warm temperatures averaging 70° F combined with (b) seven days in which measurable precipitation occurred during the 32-day experimental period. A summary of the results revealed that dexon at three ounces per 1,000 square feet, koban at four ounces per 1,000 square feet, and chloroneb at four ounces per 1,000 square feet gave good control of the *Pythium* blight. No significant differences in the degree of control occurred among these three fungicides. Koban did not give control during the initial four-week period when applied in a two ounce rate per 1,000 square feet. The fourth material evaluated, Cleary 3336®, gave no control of *Pythium* blight when applied at rates of two and four ounces per 1,000 square feet.

Comments: Pythium blight, sometimes called cottony blight, is a disease most commonly caused by either *Pythium ultimum* or *Pythium aphanidermatum*. This disease can be a serious problem on bermudagrass putting greens during the winter season when over-

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BEARD *from page 14*

seeded with cool season turfgrasses, particularly the ryegrasses. It is basically the same organism that caused such extensive damage to the bentgrass-annual bluegrass fairways in the warmer portions of the cool humid regions of the United States during the summer of 1972.

Disease development symptoms involve a water-soaked appearance on the leaf followed by the formation of light brown, somewhat circular spots that may coalesce into larger irregular patches of damaged turf. Conditions favoring development of this disease include hot, humid, wet weather and an excessive thatch accumulation.

The ubiquitous development of *Pythium* blight on winter overseeded bermudagrass greens in the southern United States usually necessitates the use of an appropriate fungicide for seedling disease control. It is important to maintain adequate moisture at the soil surface during seedling establishment in order to ensure proper seed-soil-moisture contact for rapid, uniform germination and establishment. This same practice also enhances disease causing organisms, particularly the *Pythium* fungi. Putting greens maintained at higher nitrogen levels and having an excessive thatch accumulation also provde a more favorable environment for *Pythium* disease development. Thus, under these conditions, it is usually necessary to make an appropriate fungicide application immediately after overseeding. Additional fungicide applications may be required, depending on the environmental conditions during the establishment period. This usually requires a regular day to day check for signs of impending disease development.

Chloride uptake by various turfgrass species and cultivars. *W.E. Cordukes and E.V. Parups. 1971. Canadian Journal of Plant Science. 51:485-490. (from the Plant Research Institute, Canada Department of Agriculture, Ottawa, Ont., Can.).*

The objective of this investigation was to evaluate the relative tolerance of 12 turfgrass cultivars to various chloride concentrations when grown under relatively constant plant nutrient levels. The turfgrasses included in the experiment were (a) Kentucky bluegrass, cultivars Fylking, Merion and Windsor; (b) red fescue, cultivar Pennlawn; (c) colonial bentgrass, cultivar Highland; (d) timothy, cultivar Climax; (e) Italian ryegrass; (f) perennial ryegrass, cultivar Norlea, and (g) tall fescue, cultivar Kentucky 31.

The 12 turfgrasses were seeded into six-inch diameter plastic pots containing a growing medium of 50 per cent by volume vermiculite and 50 per cent No. 6 silica sand. The pots were established into a greenhouse having a day-night temperature regime of 68° and 60° F, respectively. The grasses received a daily application of nutrient solution throughout the 35-day establishment period. The pots were flushed weekly with water to avoid salt accumulations. At the end of 35 days, six differential nutrient solutions containing constant cation levels and variable amounts of chloride, sulphate and carbonate

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