Proper Watering Key To Bluegrass Disease Control

Kentucky bluegrass has a built-in potential for good biological control of some fungal diseases that attack it, according to a plant pathologist at the University of California, Riverside.

Dr. R. M. Endo says that what turfgrass needs to provide this disease control is proper watering. Reseach conducted by P. F. Colbaugh, a graduate student working with Dr. Endo, shows that a damaging disease of bluegrass caused by a fungus called *Helminthosporium sativum* can be controlled if turfgrass litter is kept moist.

Turfgrass litter that accumulates on the soil surface supports thousands of different kinds of microorganisms, which not only decompose the litter but also suppress fungal parasites, reasons Endo. "The trick is to keep the litter moist so that the competing microorganisms are kept active. This doesn't mean that bluegrass should be kept sopping wet, for this would favor the fungal parasites."

For an area with a dense canopy, once-a-week deep watering may be sufficient to keep both the soil and litter moist. For a turfgrass that is thinned out, several short morning waterings may be necessary, in addition to the weekly deep watering, to maintain both the litter and soil in a moist condition.

Researchers have relied on natural disease development for evaluating the effectiveness of chemical fungicides, as most attempts to create a fungal disease artificially in the field have failed.

"The factors responsible for this failure and the erratic development of disease are probably biological in nature," Dr. Endo said.

Earlier findings by other researchers have shown that low soil moisture may increase certain turfgrass diseases. Following in this research, Colbaugh has been studying the effects of drought stress on turfgrass and has found that disease activity of *Helminthosporium savitum*, the fungus that causes leafspot and foot rot of Kentucky bluegrass, is increased in dried-out areas.

"Severe foot rot and spore production by the fungus on lawn litter and on infected plants were observed in drought-stressed turf," Colbaugh said, "but not in areas receiving adequate water; only occasional leafspots were found there. It is the foot rot stage of the disease which is lethal."

Earlier research by other scientists has shown the fungus to be a very weak competitor in the presence of other microorganisms. Colbaugh's investigation has produced evidence which strongly supports the idea that microbial activity is involved in suppressing the ability of the fungus to develop on the moist litter.

"It appears," Dr. Endo said, "that the inhibitory property on turfgrass litter is active only when the litter is moist and when microorganisms are present and active. Colbaugh has shown that drought lowers both microbial numbers and their activities and that upon rewetting the dried litter it releases abundant food in the form of sugars and proteins. The parasite is greatly favored during the initial rewetting period because of the absence of inhibitory factors and the presence of abundant food."

Drought stress also stops plant growth. "When growth stops," Dr. Endo explained, "infections starting from the leaf sheath of the bluegrass plant tend to spread rapidly and develop into the lethal foot-rot stage. However, if growth is continuous, as in the presence of moisture, such infections tend to develop into harmless leaf blade infections.

"The goal of our investigations," Dr. Endo and Colbaugh said, "is to understand the nature of fungal parasites and all the factors that influence their growth and activity."

The UCR scientists plan to study the influences of temporary drought on other fungal parasites affecting turfgrass, because they believe that drought serves as a trigger which frees some fungal parasites from the restraining influence of the microorganisms in the soil and litter.

Both Endo and Colbaugh emphasized, however, that biological control may fail when any factor suppresses the activity of competing microorganisms more than it suppresses the activity of the parasites. For example, low and high temperatures, below 50 degrees and above 100 degrees Fahrenheit, also may exert this same effect. These studies will allow them to propose meaningful control programs based on an understanding of the factors responsible for "triggering" turfgrass fungi into activity.