

The C-15 Problem: The Association of Bacteria
With Diseased Toronto Creeping Bentgrass

David L. Roberts and J. M. Vargas, Jr.
Botany and Plant Pathology, M.S.U.

Toronto creeping bentgrass (C-15) has many desirable characteristics that has made its use quite popular for golf course putting greens for many years. Recently, C-15 has received its share of criticism for an unknown disease, known to many as the C-15 problem. In 1975 Meyers and Turgeon described a disease on 'Toronto' called red leaf spot caused by Helminthosporium erythrospilium and in 1979 Larsen at Ohio State described leaf blight and crown rot caused by Helminthosporium catenaria. Red leaf spot, leaf blight and crown rot, and perhaps other unknown maladies, have been implicated as the C-15 problem which more properly is termed the C-15 complex or syndrome.

A disease of 'Toronto' of unknown origin occurred at the Butler National Golf Course in Oak Brook, Illinois in the summer of 1979 and recurred in May of 1980 several weeks in advance of the PGA tour. Many experts and turfgrass specialists were called into Butler, but no definite conclusion resulted except that it was the C-15 Problem. No characteristic symptoms were present and no control was achieved by pesticides or cultural practices.

Small patches of brown turf were evident where some disease had selectively destroyed the C-15 but left the annual bluegrass and other cultivars of bentgrass unharmed. The disease seemed to be favored by periods of heavy rainfall followed by cool nights and warm days. As the plants were observed more closely, the leaf tips were wilted, appearing twisted and shriveled. The wilt was so rapid that leaf tips remained green indicating that the green chlorophyll had not yet decomposed. Leaf blades eventually turned brown. The roots appeared of general good health until later stages of the disease, at which time they would soft rot and decompose.

Samples of the Butler disease were brought back to the lab and analyzed for pathogenic fungi and/or nematodes or anything else which may have caused the problem. Typical isolation procedures for isolation of disease causing fungi failed. As a last resort the samples were looked at using an electron microscope. An electron microscope is a very sophisticated piece of equipment costing hundreds and thousands of dollars. In comparison to a light microscope which magnifies small objects 500-1000 times, an electron microscope will magnify an object 100,000-300,000 times. Very small objects can be observed under an EM.

When very thin sections of diseased Toronto creeping bentgrass were observed with a transmission electron microscope, thousands of bacteria were observed in the xylem vessels. Xylem vessels are responsible for conduction of water, minerals and fertilizer nutrients to the leaves of plants. The obvious plugging of the xylem vessels would explain the wilt symptoms. Bacteria were not found in symptomless plants.

The significance of the bacteria in diseased C-15 strongly suggests a solution to the disease problem at the Butler National Golf Course. It also suggests an answer to the C-15 Problem which has not been effectively managed by normal fungicide applications. Because of symptoms and the discovery of bacteria in diseased C-15, we have elected to call the disease "bacterial wilt" of Toronto creeping bentgrass, the first bacterial disease of a turfgrass species.