The Black Layer Problem on Greens

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There have been an increasing number of reports from golf courses around the State of a black layer which forms below the soil surface on greens. In a worst case, those areas which develop a black layer can suffer significant turf loss. The turf research group at MSU has observed the problem on many golf courses and are beginning several research projects to determine more about the cause and cure for this problem.

At the present time, we have formed the following hypothesis on the development of the black layer. We are certain that the black layer is in an anaerobic state (no oxygen present - waterlogged) and this waterlogged condition is responsible for loss of turf. An anaerobic condition can develop whenever the ground becomes saturated with water which displaces the oxygen in the soil and prevents normal gas exchange with the atmosphere. In many greens which are constructed according to the USGA greens mix and are predominantly sand, the formation of an anaerobic condition may seem contradictory because sandy soils normally have excellent drainage. However, where layers develop in a soil profile, these layers retard downward water movement and under certain conditions anaerobic areas may form.

It is our belief that the black layer forms when a layering problem causes an anaerobic condition following heavy rains or irrigation. Under anaerobic conditions an entirely different group of microorganisms become active. These organisms produce products quite different from anaerobic respiration. Gasses produced under anaerobic conditions include carbon monoxide (CO), methane (CH_4), ammonia (NH_3) and hydrogen sulfide (H_2S). Many of these anaerobic respiration products are toxic to plants. In particular H_2S is the poisonous gas responsible for the deaths of over 1,500 people in Cameroon recently. The hydrogen sulfide produce by anaerobic organisms can react with metal ions such as iron or copper to form insoluble black precipitates. These metal sulfides are probably responsible for the color of the black layer. Indeed, the Black Sea derives

its name from the production of vast quantities of these black metal sulfides. The precipitated materials seem to enhance the layering problem and thus once the black layer is formed it is very difficult to dry out.

What to Do

It is clear from our observations that once the black layer forms, it is difficult to destroy. Prevention of the formation of the black layer is therefore very desirable. Attempts should be made to alleviate or prevent the formation of any layers in the soil profile. Core cultivation is the best method to disrupt layers and improve downward water movement. Topdressing programs should be done correctly to prevent layering. Watering should be restricted to syringing to help dry out the black layer. In addition, because roots are usually killed by the gasses released in the black layer, the root system is so shallow that syringing is needed to maintain the turf. Our current research is aimed at developing treatments to disrupt the black layer and improve drainage. Wetting agents should be helpful in preventing the black layer from forming by improving water percolation. However once the black layer forms, wetting agents would be of limited benefit.

We stress that the above explanation is only a hypothesis, but one we feel describes the current problem. Research is underway to prove or disprove this hypothesis.

Credit: Patch of Green 2/87

New courses are starting to pop up all over in the Chicago area. Five to ten years ago, the news was that housing developments were replacing the golf courses. Now it is just the opposite. Here are a few course that are in the stages of being built or in the planning stages: Lake Street Links & Tees in Addison, Terrace Hills G.C. in Algonquin, Canterbury G.C. in Crystal Lake, Marengo Ridge G.C. in Marengo, Wynstone C.C. in North Barrington, Cantigny Links in Wheaton, White Eagle C.C., and Tamarak C.C. in Naperville, The Burn in Norway, and Glendale Lakes in Glendale. That list ought to get the musical chairs going and some change of address for a few assistants and superintendents.

For Sale: 1978 Jacobsen F-10 Fairway Mower, 10 Blades, Nice Shape & Clean. Call Ted Mochel at Idlewild C.C. (312) 798-4927.

Doctors Shurtleff, Fermanian and Randall have come out with a new book. "Controlling Turfgrass Pests" is available from Prentice-Hall, Inc., Englewood Cliffs, NJ 07632 Att: College Publicity Department, enclose a check for $25.95 (cloth) plus your state tax.