

THE BLACK LAYER PROBLEM AT GRAND TRAVERSE RESORT

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The existence of a black, anaerobic layer at the Grand Traverse Resort golf course was first noticed in the spring of 1985. It began as a shortening of roots and thinning of turf on one green located near a creek with some shading and considerably poor air movement. As the season progressed, a black layer was evident just below the crowns which seemed to coincide with the thinning. This past season, the layer and resultant thinning became more pronounced and appeared in several other locations, ultimately causing the loss of an entire green.

In July, 1986, number 12 green exhibited the worst thinning and took on a reddish hue. The most severe turf loss occurred in the traffic areas where golfers walked onto the greens surface. A typical soil problem profile revealed an extremely short root system lacking density. A closer inspection showed a black band just below the crown extending from 1/4 to 1 inch into the greens mix. I began to check with other turf managers and researchers and found that this problem was quite widespread across the state, and ultimately discovered that it was occurring internationally. Unfortunately, little was known of its causes or cures, and there were many varied opinions and theories to deal with.

On the advice of a friend, I checked one of my sand bunkers in the fall and discovered a similar black layer near the surface of the sand. This mirrored an observation he had made at his club in Ohio, and it was apparent that the layer did not need organic matter to form. Samples were sent to a Texas lab for analysis and it was discovered that the sand particles had segregated into layers from the constant washing and flooding due to heavy rains. We wondered if this same condition could be happening in our greens mix.

Later in the fall, the layer was discovered on the older greens of the original golf course, but it was deeper and seemed to come from the bottom of the profile towards the top in an irregular pattern. We increased our coring operations as this seemed to be the only thing that controlled the spread of the layer. Just before the snow fell, we experimented with a Ransomes Vertigroove machine purchased by the Musser International Turfgrass Foundation for use by Michigan State and interested turf managers. While the results were somewhat radical for a putting green, the effect was to physically remove a 3/8 inch wide by 6 inch deep strip of soil containing the black layer allowing oxygen to diffuse into the anaerobic area. An interesting observation was made with the discovery of the effect of coring on the black layer. The layer had receded in a cone shaped pattern around each aerifier hole as the air had penetrated from the surface. Where the layer had receded, root growth was initiated filling the holes with root fiber.

As we evaluate the status of the layer at Grand Traverse Resort today, we are not confident that the same problems experienced last year will not

appear this season. Michigan State has offered an opinion that the layer is sulfuric in origin and becomes toxic when anaerobic conditions are brought about by perched water tables. This has been the result of tests run on our greens this past fall by Ron Detwiler and Lee Berndt from Dr. Vargas' lab. Others such as Dr. Hodges of Iowa State, Dr. Shearman of the University of Nebraska, and Dr. Couch of Virginia Tech., are working on the theory that algal organisms are primary to the problem. Superintendents I have talked to across the nation all have their own theories and observations based on some years experience with the layer. All agree more work needs to be done and a coordinated effort will be necessary to find the answers. Major funding is needed through the USGA and GCSSA to get this work underway and communicate the results to the turf industry. We must do all we can as individuals to assist in this endeavor.