stop #8

BLACK LAYER RESEARCH

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Black layer research at the Hancock Turfgrass Research Center in 1989 involved a study conducted on a Penncross creeping bentgrass turf. The objective of the study was to examine whether sulfur, nitrogen or iron would affect black layer formation and intensity, and thus turf quality. A flowable sulfur formulation was applied to 4′ x 6′ plots monthly at rates of 0, 1, or 5 pounds S per 1000 square feet (lbs S/M), with and without iron as ferrous sulfate at 2 oz/M. Nitrogen rates of 1/4 lb N/M were applied weekly. Half of each plot was treated with nitrate N (i.e., potassium nitrate), while the other half was treated with organic N (i.e., sewage sludge). Throughout the season, irrigation was applied several times daily to saturate the turf. This was done intentionally to induce initial black layer formation.

Severe black layer was first noticed during early May, and visually appeared to increase in intensity as the season progressed. But because plots had not been sampled for black layer at the time of this writing, the only data available to discuss regarded visual quality of the turf. An initial green-up occurred in spring as a result of S application, but the response subsided relatively quickly as the turf responded to N. Organic N gave a superior color to turfgrass in spring and early summer, probably because nitrate leached from the rootzone as a function of irrigation frequency. It was also possible that the nitrate was nitrified under anaerobic conditions also generated by excess water. However, as the season progressed, turfgrass treated with organic N thinned severely compared to turf treated with nitrate, regardless of level of S. The thin turf became covered with algae, which in certain plots presumably led to severe turfgrass loss. Turfgrass treated with nitrate N had no significant thinning, algal accumulation or turf loss, even though the soil profile was saturated on a daily basis. Direct cause of the thinning and loss has not yet been established. The only significant negative effect of S was noticed in mid August when plots treated at the 5 lb/M/Mo S rate began to wilt. Wilt was severe enough to produce turfgrass loss in several plots. Direct cause of the wilt was not identified.

Citing preliminary conclusions for this study was not considered appropriate at the time of writing. Thus, the rest of this article will review black layer management strategies. The best black layer control is prevention. Prevention of black layer centers around keeping the oxygen flux into the soil at a maximum rate, which may entail manipulating cultivation, irrigation and nutrient addition. Core aeration is an effective means to enhance oxygen flux. Adding nitrate is also an effective means of adding oxygen to the soil without cultivation. Laboratory research suggested that addition of nitrate to soil systems prevented formation of black layer, but did not dissipate it. We recommend either potassium nitrate or calcium nitrate for this purpose. If black layer is already a problem do what is possible to add oxygen to the soil, and do not add organic sources of N or supplemental sulfur. These compounds act as oxygen sinks at the expense of the turfgrass. It is also advised to keep very close track of the amount of irrigation applied to black layer afflicted turf. The turf manager may not be able to control heavy rains, but he can control irrigation. Lastly, the turf manager should spoonfeed nutrients, such as P and K, to black layer afflicted turf. These nutrients will help to encourage rooting which should help to alleviate some of the stresses imposed on turfgrass by the black layer.