

Plant Pathology Fact Sheet

Sudden Deterioration of New Creeping Bentgrass Putting Greens

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With the onset of hot weather in early summer, new creeping bentgrass putting greens sometimes suffer sudden and extensive turf loss that is related to deterioration of root function. This brief fact sheet summarizes our current thinking regarding many of these situations.

Symptoms

Under the microscope, the seedling roots and adventitious roots of these plants exhibit deterioration of the outer tissues. Specifically, the cortex, epidermis, and root hairs become disorganized, collapse, and slough off from the stele (the interior “plumbing” of the root). To the naked eye, these roots still appear more or less viable, since one can find light tan “roots” that go three inches deep or more. However, the outer tissues of these “roots” have lost their integrity, resulting in a significant reduction in water-absorbing surface area. Once this deterioration of root cortex occurs, the greens wilt and rapid death of tillers occurs.

Possible Causes

In many cases, we have not found infectious microorganisms to be associated with this condition. Pythium root dysfunction is always suspected in new greens. We although we have conclusively diagnosed Pythium root dysfunction in some circumstances and have seen a response to a fungicide regimen, this disease does not appear to be involved in many cases of sudden turf loss on new greens in Kentucky. We believe the rapid loss of root cortex in new greens is often due to an environmental condition.

At this time, we cannot say for certain which factors are directly responsible. We strongly suspect several factors, which perhaps interact. During hot weather, photosynthetic efficiency of cool-season grasses declines, yet cellular respiration increases. Bentgrass must “go to the bank” and withdraw food reserves from stolons and crowns. These closely mowed new greens probably suffer from a rapid energy deficit during the hot

weather. Bentgrass tillers on new greens are very upright and have few stolons, especially when seeded at a heavy rate of 1 to 2 pounds per 1000 square feet and initial establishment is very rapid. Because they are young in age, individual tillers may not have enough leaf surface to maintain adequate photosynthesis, and they may have insufficient stolon and crown development to provide an energy bank for cellular respiration during hot weather. Although we observed that some of the largest tillers are among those that die, those tillers that remain alive are usually among the larger ones with robust pseudostems and sometimes attached to a significant stolon.

A key factor that may be involved is the observation of some layering in these greens. Frequent topdressing and irrigation can create a surface layer about 3/8" to 1/2" that holds water readily, compared to the root zone mix below. Test the green for yourself: Remove a core from a new green with a cup cutter, pour water through it, wait five minutes, gently tear open the core, then tear out some of this top layer with thumb and forefinger and squeeze.

New greens that experience sudden turf loss in hot weather often retain excessive water in the topmost soil horizon, even though they have a very high percolation rate. Compare this to some of the root-zone mix, and it is usually already at field capacity. New greens with a tendency to "pond" water in the top half-inch can create significant problems for young plants in at least two ways.

1. A great deal of water in the uppermost soil horizon may create an oxygen-poor environment during hot weather, by sealing the root zone from the air above. Microbial activity in the root zone and root respiration may deplete the roots of oxygen during weather in which their oxygen demand is quite high.

2. Layering and the resulting "ponded" water may result in increased soil temperatures in the root zone. Preliminary observations suggest that this condition can result in mid-afternoon soil temperatures at a one-inch depth that are 10°F higher than in similarly constructed greens without layering that remain healthy through hot weather. Indeed, this makes sense, since wet soil is a much better conductor of heat than is soil at field capacity or below. Air in pores create an insulating effect, whereas water-filled soil pores conduct heat right into the root zone during a hot afternoon.

Many new greens are constructed with sand that does not completely stabilize for a year or two. When these new greens become very wet from frequent watering and when much of the root system is lost during hot weather, the lack of structural stability is very obvious as one walks on the green. The physical injury that occurs to the root system from soil abrasion probably places additional stress.

It is very possible that these factors interact. A low energy reserve, reduced oxygen and elevated temperatures in the root zone, and high respiratory demand caused by hot weather may cause roots (a "sink" for photosynthate) to lose out to leaves, which may not have enough to share.

What to Do?

We don't fully understand this condition at this time, which justifies more attention from research and diagnostic activities. It is difficult to promote recovery of creeping bentgrass during summertime once roots have lost cortical tissues.

In any case, we feel that the following recommendations will provide the best chance of recovery for creeping bentgrass greens in which roots have suffered loss of

the cortex and associated tissues. It may also be possible to prevent this condition.

CURATIVE

Use a curative fungicide program in cases where Pythium root dysfunction has been diagnosed (Koban drench followed by a Aliette/Fore application). However, in the absence of such a diagnosis, don't go crazy with fungicides, since infectious fungi often don't appear to be involved. These greens must be allowed to grow new roots at a time of year when roots don't really grow well.

Aerify the greens (solid tines, 1/4 inch hollow tines, a Hydroject with the platform raised, whatever will punch holes with as little damage as possible).

Raise the mowing height and reduce the mowing frequency, to allow for as much photosynthesis as possible. A 3/16 inch to 1/4 inch height is recommended until the turf recovers and cooler weather returns.

Re-seed bentgrass. Mid-summer is not a good time to try to get creeping bentgrass established, but the general management of plants without roots will tend to favor the new seedlings.

Provide light/frequent irrigation, preferably hand-watering. "Spoon-feed" the green with soluble fertilizer (1/8 to 1/10 pound nitrogen every 10 to 14 days). Use preventive Pythium control to protect the new seedlings during sustained periods with nighttime temperatures above 70°F.

PREVENTIVE

When establishing new greens, make sure they are well-aerified by Memorial Day. Leaving aerification holes open in early summer may allow for better exchange of oxygen and of heat.

Resist the temptation to lower the mowing height quickly during the first summer. Depending on surface smoothness, 3/16 inch to 1/4 inch may be advisable during the first summer.

Use of such stress-reduction techniques as spikeless shoes, fans around greens with poor air circulation, etc., may also help.

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