JB Comments

Spring Turfgrass Cultural Strategies

Spring is the season between winter and summer, which is defined in the northern hemisphere by the period from the March ~ 21 equinox and the June ~ 22 solstice. The initial seasonal appearance of green grass shoots as the spring temperature and moisture conditions become favorable for growth, which thereby breaks winter dormancy, is termed **spring greenup.**

Cool-Season Turfgrass Responses. **The temperature of the soil is the primary factor affecting the initiation of new root and shoot growth of cool-season turfgrasses in the spring.** Cell division in the roots of certain cool-season turfgrasses, such as Kentucky bluegrass (*Poa pratensis*), has been noted to occur at temperatures as low as 34°F (1°C). However, other species, such as creeping bentgrass (*Agrostis stolonifera*), require higher temperatures. **Significant root growth of most species does not occur until soil temperatures are above 42°F (5°C).** The roots formed at suboptimal temperatures tend to be thick, white, less branched, and shorter than at more optimum root growth temperatures of 50 to 65°F (10–18°C). Typically, rhizome growth occurs at comparable temperatures to that of root growth in case of perennial, C_3, cool-season turfgrasses.

Shoot growth tends to be initiated at somewhat warmer soil temperatures than are observed for root and rhizome growth. Typically, the optimum temperatures for tillering of cool-season turfgrasses are somewhat lower than the optimal for shoot growth. Also, tiller growth at suboptimal temperatures tends to be more horizontal in nature. The rate of new leaf appearance is the most rapid during the spring growing period.

This is followed by a rapid leaf extension rate that dictates the need for timely mowing to avoid removing no more than one-third of the leaf tissue at any one time. **If an excessive amount of leaf growth is allowed to occur that is subsequently defoliated severely at any one mowing, it typically results in a cessation in root growth and possibly even dieback of the root system.** This is caused by the physiological process of carbohydrate partitioning. The severed defoliation causes plant hormonal activity that results in carbohydrates being directed principally to recovery of leaf growth. If there are not enough carbohydrates available, the result may be a slowing of root growth or even root death. If for some unavoidable reason an excessive amount of shoot growth occurs during the spring period, a return to the original cutting height should be accomplished by lowering the height gradually over a series of mowings.

During the period of peak leaf growth in the spring at temperatures of 60 to 75°F (16–24°C), the carbohydrate reserves tend to be depleted or even exhausted in case of cool-season turfgrasses. Accordingly, it is important to minimize the application of nitrogen fertilizers in this peak shoot growth period, as excessive amounts of nitrogen force even greater shoot growth to the detriment of the carbohydrate reserves and the root system.

Warm-Season Turfgrass Responses. Typically the roots of perennial, C_4, warm-season grasses remain white and apparently functional throughout the winter dormancy period when the aboveground leaves have died and turned tan to brown due to chill stress injury. **The initiation of new green shoots from the meristematic areas on the lateral stems typically occurs when soil temperatures at a 4-inch (100 mm) depth reach 64°F (18°C). If there is a continued rapid rise to higher soil temperatures at this time there is a great likelihood that spring root decline (SRD) will occur in the warm-season turfgrass species.** SRD is characterized by the death of the roots of perennial, C_4, warm-season turfgrasses during rapid soil warming after winter dormancy. It is associated with very rapid shoot growth that causes a partitioning of carbohydrates away from the roots. Typically all the roots die, with new replacement roots originating from the meristematic nodes on the grass crowns and lateral stems. Root regrowth may not occur for two to three weeks after the occurrence of SRD. **Accordingly, the implementation of cultural practice such as (a) close mowing, (b) nitrogen fertilization, or (c) severe vertical cutting of shoots after spring root decline has occurred will significantly delay replacement of the root system.** Should spring root decline occur, it is very critical that frequent, timely irrigations be practiced to minimize the chance of shoot loss by desiccation.

As optimum shoot growth of warm-season turfgrasses does not usually occur until temperatures are in the 80 to 95°F (27–35°C) range, peak shoot growth typically does not occur during the spring period.

Strategy for Spring Turfgrass Culture. With the rapid shoot growth and minimal environmental stresses of cool-season turfgrasses in the spring, turfgrass managers can be falsely lulled into a secure mind-set that problems will be minimal. However, **the very rapid leaf growth makes it critical that the proper frequency of mowing and a very modest to minimal use of nitrogen fertilization be practiced in order to sustain proper carbohydrate reserves for root growth.** A similar type strategy is important in relation to vertical cutting and nitrogen fertilization of warm-season turfgrasses, especially if spring root decline occurs. Also, an application of iron can prove beneficial during the spring greenup period for warm-season turfgrasses. Maintaining high potassium levels during the spring growth period is important, especially in terms of

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root growth and lateral stem development of both warm- and cool-season turfgrasses.

In the case of cool-season turfgrasses, a pre-greenup application of water soluble nitrogen at a controlled rate can stimulate earlier spring greenup. A similar increase of approximately two weeks in early spring greenup can be achieved through the application of gibberellic acid. This strategy generally should not be utilized unless there is a critical need for early spring greenup, such as on baseball fields.

In terms of timing the application of preemergent herbicides, it is important that they not be applied until after root initiation and downward extension to a depth of 2 to 3 inches (50–75 mm) has been achieved. This strategy can be especially important with creeping bentgrass and the warm-season turfgrasses.

Ask Dr. Beard

Q. *Concerning the USGA Method of high-sand root zone construction, is it better to include the intermediate coarse-sand layer or to eliminate it?*

A. Research has shown that either method can be used. From a personal standpoint, I definitely prefer to include the intermediate layer. The interest in eliminating the intermediate layer on the part of certain individuals is primarily a cost-driven issue. In this approach there also is a mind-set that if you can eliminate the intermediate layer one also can be more "flexible" in varying the underlying gravel layer and the above high-sand root zone. Point in fact, **it is more critical to be well within the specifications for these two root zone layers if the intermediate layer is not included and that greater attention is needed in accomplishing proper construction.**

Also we must remind ourselves that the USGA Method guidelines involve a set of ranges and not absolute single values. It is important that the constructions materials used and the specified depths are within this range. Otherwise it is not a USGA Method construction. Frequently I encounter the term "modified USGA construction," wherein the materials or depths used are outside the guideline ranges. In many cases these fail to perform adequately. **The point is that there is no such thing as a valid "modified USGA construction" in terms of successful long-term performance.** Construction utilizing materials and techniques outside these guidelines greatly increase the probability of failure. One of the problems in this regard, is that the failure may not appear until four to six years later. The original decision maker with minimal technical knowledge cannot relate the subsequent failure to the original decision to not follow the USGA Method guidelines.

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