

ROOTS, ROOTS, ROOTS! FOR THE HOME TEAM

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Firm footing and positive traction are desirable for turfed athletic fields. Root mass and root density are important parameters in this regard. Studies have shown that soil compaction and improper nitrogen fertilization negatively affect turfgrass rooting. Certain diseases can parasitize roots resulting in significant root dieback. Any other conditions negatively affecting plant health are bad for roots, as well.

It is important to note the soil-temperature ranges for optimum root growth shown below. Roots will begin to senesce abnormally when the upper limit is exceeded; this effect increases further as soil temperatures rise. This phenomenon should be of particular interest on fields used in July and August by professional baseball teams, summer sports camps, and football teams in pre season practice and conditioning. Beyond the lower limit, root growth slows, but it is not known when it stops.

Sports fields should be regularly aerified via core cultivation to alleviate soil compaction. When possible, cores should be removed particularly with high sand rootzones to remove organic matter that can otherwise infiltrate and seal off soil macropores, thus reducing hydraulic conductivity and soil aeration. On finer textured soils, the cores can also be harvested, particularly if coupled with a sand-topdressing, which over time, will increase macroporosity and lessen the propensity for soil compaction.

Timely, adequate fertilizations are critical practices for the sports turf manager. Nitrogen (N) is a critical element and should be applied as necessary to increase turfgrass growth and recovery especially when the field is worn or under heavy traffic. So far, there does not appear to be any other nutrients that directly affect turfgrass rooting. Research on cool-season grasses has shown that single applications of water-soluble nitrogen exceeding 1.5 pounds N per 1,000 square feet cause rooting reduction. In my M. S. research, I one-time applied ammonia nitrate at 0.5, 1, 2, and 4 pounds N per 1,000 square feet to hybrid bermudagrass and found no differences on roots among treatments. Heavy N use increases leaf succulence and predisposed the turf to wear damage. For this reason, many managers feel that they are having success by withholding N to harden off the turf. They will keep the turf lean until field uses dictate otherwise. Irrigation is usually done as soon as possible following heavy uses. Water is often withheld well before contests to improve footing and increase the field's ability to accept a rainfall event.

While any pathogen could weaken a turfgrass plant and therefore its root system, it is those having ectotrophic root hyphae that can cause debilitating diseases of turfgrasses. On Kentucky bluegrass, the preferred cool-season species for athletic fields, these diseases are necrotic ring spot and summer patch. When Penn State's Beaver Stadium field failed in 1993, the culprit was *Leptosphaeria korrae*, the causal agent of summer patch disease. This pathogen has never been

detected on Kentucky bluegrass in Michigan, but it can be hosted by annual bluegrass, often an appreciable component of athletic fields everywhere.

Kentucky bluegrass growing on Michigan's home lawns are often inflicted with necrotic ring spot (NRS) caused by *Magnaporthe poae*. These lawns have often been established from sod, as are many varsity competition fields. However, this author has seen NRS on seeded lawns and at least one high school football field that had been established with seed. This disease is systemic and ongoing, but its above ground symptoms can be masked by implementing MSU's integrated program for necrotic ring spot management, which is detailed below and are applicable throughout the growing season.

- Light, daily irrigation of 1/10 to 1/6 inch per day, depending on soil type,
- Monthly fertilizer applications that provide one pound of nitrogen per one thousand square feet, with a majority of the nitrogen being in a slow-release form, preferably a natural organic,
- Aggressive aerification in turf established from sod, and
- Reestablishment with resistant cultivars, such as, 'Monopoly' 'Eclipse', 'Mystic', 'Baron', 'Glade', and 'Midnight'.

This past August, wilted, circular patches of turf, a sign of NRS, were found on two highly visible sports venues. First at Comerica Park, home of the Detroit Tigers, and then at the Allen Park training facility of the Detroit Lions. Samples taken to Dr. Joe Vargas' lab at MSU showed runner hyphae growing on the roots. This is an indicator of one of the ectotrophic root diseases and, since it was in Michigan, the diagnoses were NRS. When U of M's football field at Michigan Stadium began to fail this past fall, I asked that a sample to be sent to MSU for testing even though Penn State had given the turf a clean bill of health. Sure enough, runner hyphae were found indicating that the disease was probably NRS. Crown rotting anthracnose was also detected, which is a primary disease of annual bluegrass but one that can also attack Kentucky bluegrass, particularly if annual bluegrass is present in the polystand, which it was at Michigan Stadium.

Therefore, for those concerned about NRS on their sports fields and especially those who choose to sometimes withhold fertilizer and irrigation, here is a fungicide program based on MSU's recommendations for summer patch and take-all patch on golf courses. It should work well on NRS, as well. I have chosen Banner Maxx because it is by far the least expensive fungicide for this use.

- When soil temperatures at a 2-inch depth reach 75° F at 2 p.m. for 4 straight days,
- Apply Banner Maxx at 2 fl. oz. per 1,000 sq. ft.
- REPEAT APPLICATION 30 DAYS LATER.

For curative treatments when aboveground symptoms are present, thiophanate-methyl can be effective as a drench in 5 gallons of water per 1,000 square feet. Use a 6 ounces or 6 fluid ounces rate, depending on the formulation. Products containing thiophanate-methyl include Clearys 3336, Fungo, and Systec 1998. Other fungicides applied to prevent or cure other diseases have no effect on NRS. This was the case at both Comerica Park and Michigan Stadium where *Pythium* blight and brown patch were primary disease concerns.