Control of bluegrass in bentgrass fairways & efficiency of foliar feedings

Editors' note: Send your turfgrass questions to our Management Forum panel for quick response. *See page 12 for details.*

Q: Is there a selective way to remove bluegrass from a bentgrass fairway? We are mowing the fairway at 5/8-inch and the collars of greens even lower. But, the bluegrass still is out competing the bent, even at the low height. What can be done?

Dr. Richard Hull at the University of Rhode Island's Department of Plant Science says that the first question that needs to be answered is which bluegrass species is invading the bentgrass fairways? If it is a perennial form of Poa annua (Poa annua var. reptans), then there is no surprise that it can tolerate close mowing. However, it could be rough bluegrass (Poa trivialis), especially if the fairways are somewhat shaded.

If the culprit is Poa annua, there are few, if any, herbicides that will selectively remove it from bentgrass without damaging the bent. However, some plant growth regulators (PGR) have been found to discourage Poa annua in bent, but this requires a prolonged effort.

If rough bluegrass is present, it can readily be identified by its stoloniferous growth habit, lack of rhizomes and a 2-6 mm pointed ligule. Its control will also present a problem but it is less likely to be the grass in question.

The question sort of suggests that the invading grass is Kentucky bluegrass (Poa pratensis). If it is Kentucky bluegrass, it is undoubtedly a prostrate type that can tolerate close mowing. Again, there is no effective herbicide that will selectively remove Kentucky bluegrass from bent.

Most grass herbicides are more likely to be toxic to bentgrass than to Kentucky bluegrass. Even PGRs are less likely to be effective in preferentially weakening this bluegrass. In short, this problem has no clear solution. I would suggest that the superintendent check the mowing height to be sure the cut is 5/8-inch. If it is, try lowering it a bit and see if the bluegrass is discouraged. A lower cutting height should not seriously weaken the bentgrass. The cutting height might be gradually lowered until at some point the bluegrass should give up and let the bentgrass take over.

"Most grass herbicides are more likely to be toxic to bentgrass than to Kentucky bluegrass." — R. Hull

Dr. Joseph Neal at North Carolina State University replies: First, an accurate ID is always helpful in developing a weed management plan; although in cooler regions of the country, I have seen Kentucky bluegrass tolerating 1/2-inch mowing and other bluegrasses that tolerate close mowing even better than Kentucky bluegrass.

Selectively removing one perennial turfgrass from another is always a challenge. I suggest two approaches that may work.

- **Option #1:** If the bluegrass grows a little taller than the bentgrass at any time of year you could skip one mowing then wipe the taller grass with Roundup. We have used this technique in the past to remove weedy grasses from bluegrass variety trials.
- **Option #2:** Spot renovate in early fall. Spray the bluegrass patches with glyphosate and reseed areas with bentgrass.

"Selectively removing one perennial turfgrass from another is always a challenge." — J. Neal

How efficient is foliar feeding?

Given that grass is a root feeder, what is the mechanism for foliar feeding? Foliar fertilization works, of course, but is it as efficient as root feeding? Is it better for quick-hit feeding? For normal fertilization, are you wasting a lot of nutrients (and money) by going the foliar route?

Dr. Richard Hull responds: Plant leaves are not designed for nutrient uptake from nutrient solutions applied to their surfaces. The leaf is engineered to absorb light and resist water loss from its surface. This latter property is not conducive to effective nutrient absorption by leaves. However, the wax impregnated cuticle and surface epicuticular wax layer are penetrated by numerous very small water lined pores.

These transcuticular pores have a diameter of less than 1 nm (a billionth of a meter) but are abundant (~ten billion per sq-cm). These pores are readily permeable to small solutes such as urea but not to large molecules such as metal chelates. The pores are lined with negative charges so they are attractive to cations (ammonium, potassium, magnesium, etc.) but tend to repel anions (nitrate, phosphate, sulfate, etc.).

Uncharged molecules can be transported readily through these pores. Nitrogen fertilizers based on urea or ammonium ions can be transported through the pores. Also, a large concentration gradient along the pores can overcome repulsion of anions by the fixed negative charges. Foliar applied solutions of negatively charged nitrate and phosphate can be absorbed readily if the ion concentration is reasonably high.

Foliar penetration of fertilizer solutions does not occur through the leaf's stomates. The inner walls of guard cells are covered with cuticular wax making their substomatal surfaces mostly impermeable to water soluble materials. The fact that stomates do not play a role in foliar absorption of nutrients is supported by the fact that foliar absorption is actually greatest at night when stomates are closed.

The rate of foliar penetration by nutrient ions does increase as the number of stomates increases, but that is due to the fact that micropores in the cuticle (over the cell walls between guard cells and their neighboring cells) are more numerous and appear to be more permeable than other micropores elsewhere on the leaf surface. Unlike their brethren, these stomate micropores can even allow the passage of metal chelates and other larger (pesticide) molecules.

After having crossed the surface wax and cuticular layers of the leaf epidermal cells, nutrient uptake into the cell protoplasts is much the same as nutrient uptake by root cells.

The only real difference between the two organs is that light increases absorption of nutrients by leaf cells but has no impact on uptake by roots. Apparently some of the energy required for nutrient transport across the cell membranes of leaf cells is directly supplied by photosynthesis.

Intact leaves rarely exhibit light stimulated nutrient uptake because of the high resistance offered by the slow diffusion through cuticular micropores.

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Foliar fertilization is not very efficient. Uptake by leaves is much less than that by roots although this can vary depending on the nutrient status of the foliage, concentration of the foliar spray, age of leaves, etc. Consequently, foliar feeding would never be recommended as a general fertilization strategy.

Foliar applications do have a place for providing some micronutrients when a quick response is desired. Foliar applications of iron chelates make sense because the leaching of iron into the root zone and transport from roots to leaves takes time (several days or weeks)

A urea application to leaves will correct a nitrogen deficiency more quickly than a granular treatment even if watered into the turf. The time of response will not be very

much more rapid but when preparing for a big event, it may be worthwhile.

Finally, foliar burning is always a potential problem following fertilizer spray applications and this should be considered when deciding if foliar feeding is desirable. Over application of soluble fertilizer with the expectation of later absorption by roots as the solution is washed off leaves is probably not a good strategy because of the high potential for foliar burn that this approach creates.

SEND US YOUR QUESTIONS

Do you have tough turf questions and need expert advice? Please send your questions to TurfGrass Trends and we'll have our panel of experts find the answers. Our Management Forum panel includes several distinguished experts in the field of turf:

- **Dr. Richard Hull**, Plant Physiology, University of Rhode Island
- **Dr. Karl Danneberger**, Agronomy, The Ohio State University
- **Dr. Noel Jackson**, Plant Pathology, University of Rhode Island
- **Dr. Joe Neal**, Weed Science, North Carolina State University
- **Dr. Rick Brandenburg**, Insects, North Carolina State University

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