CONTROLLING *POA ANNUA* IN SPORTS TURF

BY **DR. NICK CHRISTIANS**

Much of my career has been spent on trying to kill annual bluegrass, better known as *Poa annua* in golf course turf. While it does occur in other turf areas, such as lawns, it has always been on the golf course where this species has presented the biggest problem.

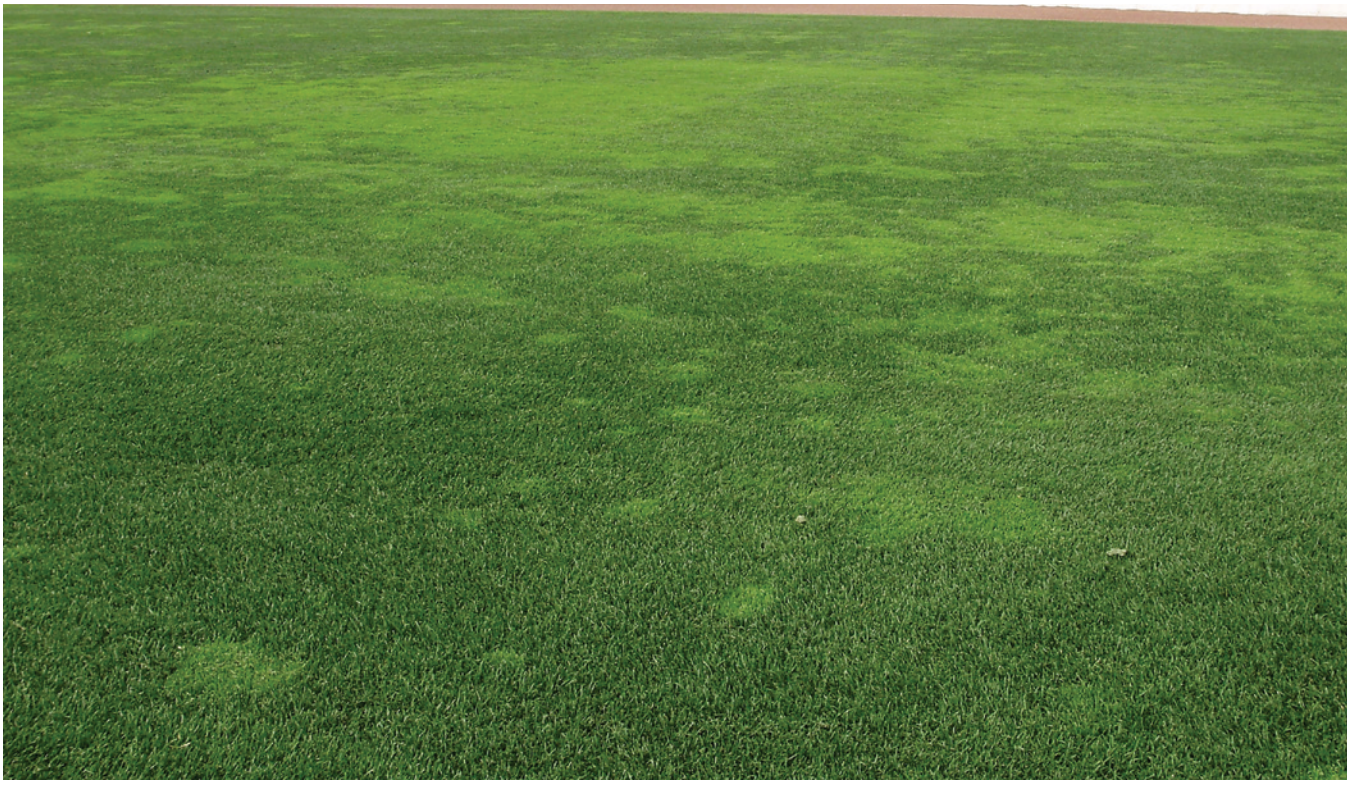
The very low mowing height and intense management regimes used on golf courses provide an ecological advantage to *Poa annua* and it easily outcompetes other preferred grass species.

This weed could always be found in sports turf areas, but the less-extreme management conditions that predominated on most sports turf through the 1900's meant that *Poa annua* was usually not a major problem in athletic fields in most climatic zones. This has changed in the 2000's, and the greater intensity with which modern fields are managed is resulting in *Poa annua* becoming a common complaint among sports turf managers. **Figure 1** is from the Burlington Bees baseball field in Burlington, IA. The Burlington field sits in a low area along the Mississippi River and is surrounded by trees and a fence that results in a microclimate that is very conducive to *Poa annua* infestation. Add to that the high level of maintenance initiated by Certified Sports Field Manager T.J. Brewer, and *Poa* has become an increasing problem in recent years.

Once it gets a foothold in cool-wet weather, *Poa* does what it does best in stress periods; it simply dies. **Figure 2** is from a sports field at Iowa State University. The clear outline of the *Poa annua* can be seen as lighter colored patches in the darker colored Kentucky bluegrass (*Poa pratensis*). So, now that it is here, how do you kill it?

Fig.2. *Poa annua* in a sports field at Iowa State University. Courtesy of Tim Van Loo, CSFM, Iowa State.

Fig.1. *Poa annua* is becoming more common in sports fields each year as management levels of these areas intensifies. Courtesy of T.J. Brewer, CSFM, Burlington Bees, Burlington, IA.



This is a subject that I have often written about for the golf industry, but this is a first specifically for sports turf managers. A recent article appeared in *Canadian Groundskeeper* (http://www.kenilworth.com/publications/cg/de/201411/files/6.html) and parts of the basic information in this article also appear in the Canadian article.

To understand *Poa annua*, it is best to begin with its biology. This species appears in the botanic literature as a winter annual, which means that it germinates late in the summer and into the fall, lives through the winter as a mature plant, and in the spring it produces a seed crop and simply dies. It is better adapted to low mowing heights than most of our turf species and tends to crowd them out at low mowing heights. It thrives under an intense management system. Lots of fertilizer and water helps it get a foothold, whereas turf that is subjected to moisture stress and lower fertility levels rarely develops a problem. It can produce a quality stand of turf in cool and wet conditions, but the fact that it dies in mid-season can be a real problem for summer sports, such as baseball (**Fig.3**).

Fig.3. What happens to *Poa annua* in sports fields when it gets hot. Courtesy of Tim Van Loo, CSFM, Iowa State.

It can also produce seed at any time of year when it is actively growing, even at the lowest mowing heights. Most of the other grasses that are used in sports turf cannot do this. This ability to produce seed gives *Poa* an ecological advantage over other grasses and it slowly takes over intensely managed turf.

If all *Poa annua* were a true winter annual, we could control it with preemergence herbicides, but much of it is a weak perennial that can survive the summer. Even where it survives, it is still an annoyance in sports turf because of its difference in color and texture from other grasses. Patches are easily picked up on high definition TV signals, even if it still healthy. It really stands out when it is dead (**Fig. 4**).

I began my career 40 years ago as an optimist concerning the control of this species. Each turf show launched a new herbicide for *Poa annua* control and it appeared that it would only be a matter of time until this species would no longer be a problem. That turned out to be incorrect. Four decades later, we are still searching for that herbicide or management strategy that will provide a solution. My years of experience have left me less confident that we will ever find an answer to the problem. It is likely that we will never see a completely effective "magic bullet" that will eliminate it.

Fig.4. Baseball field with dead *Poa annua* in summer. Courtesy of T.J. Brewer, CSFM, Burlington Bees, Burlington, IA.

The earliest attempts to control *Poa annua* was to simply cut it out when it appears. This still works, but it is very labor intensive and only those with the highest budgets can generally follow this procedure. Preemergence herbicides have long been proposed as the solution and they can provide some control. However, the seed for *Poa* can live for years in soil and plants will emerge every time there is an opportunity for germination, such as in a cleat mark on a sports field. If it were a true winter annual, preemergence herbicides could work, but there are also many perennial biotypes in most areas, and the living plants are not affected by preemergence materials.

Plant growth regulators (PGR) have also been promoted as possible controls. The first attempt was to use the Type I materials, like Embark (mefluidide) to inhibit seedhead formation. No seedheads, no *Poa* was the concept. While Embark was an excellent seedhead inhibitor, this strategy was not effective. Again, seed can live in the soil for years, and while Embark will inhibit seed production for a while, *Poa* can produce seedheads under nearly all conditions throughout the season. Embark was also highly variable and could result in phytoxicity to the desirable grass.

The next phase was the use of Type II PGR's, or gibberellic acid (GA) inhibitors, such as Trimmit (paclybutrazon), and Cutless (flurprimidol). These products are effective in selectively slowing the growth of the *Poa* in creeping bentgrass fairways. Their use can be an effective as part of an integrated management program designed to discriminate against the *Poa annua*. The Type II PGR's do provide some relief in creeping bentgrass turf on golf courses, but this is usually not a sports turf grass and their effectiveness is more limited in sports turf situations.

Many experimental and commercially available postemergence, selective herbicides have been developed over the

years. I have conducted research on most of these. While some appeared promising, and I occasionally got excited about the results, every one of them has had the same problem. They work on some biotypes of *Poa annua* and not on others. There are literally thousands of biotypes of this species. While these biotypes are all genetically classed as *Poa*, they vary widely in their response to postemergence herbicides. It's not unusual to see multiple types on the same golf course and it is assumed that this is also the case on sports turf. This is *Poa annua*'s strength and our downfall. It always has a way of getting around us. If a product is found that controls 99% on a given site (I rarely see more than 80% control) the remaining *Poa* that is resistant to the herbicide will produce seed and simply turn over the population.

This is the primary reason why I wrote earlier that I do not think that we will ever see the "magic bullet" herbicide that will completely take out *Poa*. This genetic variability is the best guarantee of survival that a weed can have.

These postemergence herbicides can also be quite variable in their effect on desirable turf species. One of the most effective postemergence herbicide that I worked with has been Prograss (ethofumesate). This product is very effective at killing most *Poa* biotypes from perennial ryegrass. The catch is the perennial ryegrass. It easily damages Kentucky bluegrass and other species commonly used in sports turf areas. If your field is perennial ryegrass only, Prograss may be the product that you need, but this is rare.

Tenacity (mesotrione), a recent postemergence material from Syngenta, can also be effective in some situations. This product, though, is limited to use in Kentucky bluegrass. It will kill bentgrass and can damage perennial ryegrass and tall fescue. This product does hold some promise for Kentucky bluegrass sports fields, but again, the biotype problem with the *Poa* is a concern. I have seen some promising trials and some that were less promising (**Fig. 5**). With Tenacity, persistence is important and more than one application within the limits of the label will be necessary.

Fig.5. Tenacity (mesotrione) turning *Poa annua* white in Kentucky bluegrass turf. Courtesy of Tim Van Loo CSFM, Iowa State.

Xonerate (amicarbaxone) is an herbicide used primarily for the removal of *Poa annua* from both cool- and warm-season perennial grasses. While the golf market was the primary thrust of its development, it is labeled in many states for other turf areas, including sports fields. Its use in the golf market has been somewhat limited because of phytotoxicity problems with creeping bentgrass. For use on sports fields, follow the label very carefully. It should not be applied to Kentucky bluegrass when air temperatures are expected to exceed 85 F within 3 weeks of its application. It can also damage seedling Kentucky bluegrass and should not be applied to Kentucky bluegrass areas that are less than 12 months from establishment. It also should not be applied to turf that has been treated with Embark within the past 3 months. It is best applied for *Poa annua* control in the spring, when it can be applied at 2 oz/acre in 14 to 21 day intervals, or split into 4 one oz/acre applications separated by 7 day intervals.

Dr. Shawn Askew of Virginia Tech reports that a combination of Tenacity at 4-5 oz/A in a tank mix with Xonerate at 1 to 1.5 oz/A is proving to be a good combination for control of *Poa annua* in Kentucky bluegrass sports fields.

Velocity (bisprybic-sodium) is another postemergence herbicide that shows promise for *Poa annua* control in creeping bentgrass turf on golf courses. It can cause discoloration of creeping bentgrass and there are clearly biotype differences in the response of *Poa*. It is generally limited to use on creeping bentgrass, or on perennial ryegrass. It can also be used on bermudagrass turf overseeded with perennial rye. These are very limited situations in athletic fields, and its use in sports turf is quite limited.

The newest postemergence, selective product is PoaCure (methiozolin). This product is also known in the industry in the US as the "Korean product" because it comes from Moghu Research Center in South Korea. PoaCure has a new mode of action and works by inhibiting cell wall formation. This product has been very promising in early testing in golf course turf. It has been used under an experimental use permit (EUP) for limited testing in 34 states this year in the US. They hope to begin marketing in 2016. It has provided the best results of any new product that I have seen for many years. However, as more results are being reported, it is evident that there is variability in its control of various *Poa* biotypes. This product is generally more effective in fall than in spring. It can be used for control in Kentucky bluegrass turf, although Dr. Askew reports variations in phytotoxicity among different cultivars of Kentucky bluegrass in tests conducted in Virginia. Research on sports fields will be an important issue once it has reached the market for golf course use. The company has not tested it in the US on sports turf, but they report that it is widely used in Korea to take *Poa* from Kentucky bluegrass soccer fields.

To this day, the most effective solution to the problem has been the development of Roundup (glyphosate) Ready creeping bentgrass. This method involves the genetic manipulation of creeping bentgrass. Scientists from O.M. Scotts Co., Marysville, OH, and Monsanto, St. Louis, have successfully inserted a gene into creeping bentgrass that makes the grass tolerant of glyphosate. Creeping bentgrass is normally susceptible to glyphosate, as are most weeds found in bentgrass turf. The susceptible species include *Poa annua*, and this makes it possible to remove the *Poa* without damaging the bentgrass. My students and I did a lot of work at Iowa State on

the concept and found it to be highly effective. The sale of glyphosate tolerant creeping bentgrass is still under review by regulators in the US federal government and to date, it has not been released. This process is not without draw backs. For instance, *Poa annua*could develop resistance to the glyphosate over time.

However, this remains the most promising technology that I have worked with in my career and hopefully it will be released in the future.

Scotts is currently developing glyphosate tolerant Kentucky bluegrass. These cultivars are still under development, but they may provide one of the best opportunities for the selective control of *Poa* in Kentucky bluegrass sports turf areas that have been available to date. It is likely to be a few years before these cultivars are ready for the market.

Fig.6. Fraze mower used to remove grass and the upper layer of soil from practice sports field at Iowa State.

A potential 'non-chemical" method that can offer some relief to the problem in Kentucky bluegrass fields is fraze mowing, which quickly removes the upper layer of soil, including *Poa annua* seed, followed by reestablishment with Kentucky bluegrass seed (**Fig. 6**). In 2014, CSFM Tim Van Loo performed a successful test of this procedure on one of Iowa State's practice fields. While the objective of this was not to control *Poa*, it is apparent that this procedure can potentially be used on older *Poa*-infested fields.

It is apparent that the removal of *Poa annua* from any turf area is a very complex issue. The solution varies with a series of factors, including the primary grass species on the field, climate, weather, soil type, and location. There is no single solution. The solution may require some experimentation by the sports turf manager to find the right solution for their particular situation. ST

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