

Annual bluegrass control

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Annual bluegrass (*Poa annua*) remains as one of the most problematic weeds for golf courses, athletic fields, and irrigated homelawns. Chemical controls have evolved over the years and can be effective, but controlling a grass in a grass is difficult because of similar physiology and lack of selectivity in herbicides. Plus annual bluegrass is a formidable weed. Annual bluegrass is genetically “plastic” ranging from short-lived annuals to long-lived perennials and thus easily adapts to almost any turf management system. *Poa annua* var *annua* is a true annual, usually a lighter green, has coarser leaves and produces massive amounts of seedheads compared to the perennial, *Poa annua* var *reptans*. Annual bluegrass is one of the most widespread plants in the world and has been found from the Arctic Circle to near the tropics. Viable seeds of annual bluegrass near 110 seeds/sq. inch in soil under greens and 70 seeds/sq. inch in fairways, compared to the typical seeding rate for cool-season grasses of about 12 seeds/sq. in. Most of this seed in greens can germinate almost immediately while about 20% of it will persist over a season or more before germinating (Lush, 1988). On the other hand, seed from fairway or rough height annual bluegrass will not germinate for at least 4.5 months unless it is chilled, which is a reflection of its variability (Lush 1999). Its adaptability has allowed it to survive and thrive in many environments.

To effectively control annual bluegrass in golf or sports turf, turf managers will have to shape the entire management program to discourage it. If only one or two management factors are modified to discourage annual bluegrass, then one can hope at best for only modest decreases in the annual bluegrass population annually. Even when successful at controlling annual bluegrass, a turf area may be just days away from a reinfestation of annual

bluegrass after an episode of winterkill, grub damage, disease, herbicide misapplication, etc. So if it seems impossible to control annual bluegrass, what is the justification for trying it? Compared to annual bluegrass, creeping bentgrass, Kentucky bluegrass, or tall fescue all have reduced water requirements, increased flexibility in irrigation timing and amount, reduced labor requirements (less “babysitting” like with the shallow-rooted annual bluegrass during summer), reduced fungicides inputs, improved and more consistent aesthetics and playability, and reduced threat of winterkill. In many cases, controlling annual bluegrass is easily justified.

Controlling annual bluegrass starts with cultural controls. Chemical controls will only be effective in the short term without solid cultural controls aimed at limiting annual bluegrass reinfestation. Since annual bluegrass has been found to germinate in complete darkness (shaded by the canopy) (McElroy et al., 2004), a dense turf will not prevent germination, but will likely out-compete the seedling annual bluegrass. The cultural controls are listed in Table 1 and can be adapted to almost any turf setting. The rest of this publication focuses on chemical control of annual bluegrass, but assumes that cultural controls are already optimized.

Preemergence herbicides

Preemergence herbicides applied in early fall are highly effective on the annual biotypes of annual bluegrass, as long as they are applied in early September prior to the germination window (Dernoeden, 1998). The longer lasting herbicides prodiamine, dithiopyr, or pendimethalin will work for this, and a second application in Nov., Dec., or March may be required to insure control of spring-germinating annual

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bluegrass. This second application may not provide season-long crabgrass control, but a third application of a preemergence herbicide may exceed label recommendations and may affect root growth of the desired turf. Therefore, consider using a post emergence herbicide like quinclorac as needed for crabgrass in June or July. Bensulide is the only preemergence herbicide labeled for greens and is limited to a single application per year on greens.

Postemergence herbicides

Three fall applications of Prograss (ethofumesate) spaced two weeks apart has been the industry standard, but it is often inconsistent at rates safe on Kentucky bluegrass or creeping bentgrass (Dernoeden and Turner, 1988). Uptake of Prograss is primarily foliar, so inconsistency could be caused by poor uptake because of environmental conditions at or shortly after application (Kohler and Branham, 2002). We also know that Prograss affects the waxes on the annual bluegrass leaves (Kohler, 2003) and thus should be more effective on open, windy winters. Fall applications are usually most effective, but earlier work at UNL showed spring applications also work (Shearman, 1986) and work in Kentucky showed additional spring applications following fall applications improved control (Woosley et al., 2003). Furthermore, combining fall Prograss use with season-long paclobutrazol (Trimmit, TGR) applications or using the prodiamine in the fall plus three applications of Prograss in the fall improves control (Rossi, 2001).

The most recent postemergence herbicide for annual bluegrass is Velocity (bispyribac-sodium) by Valent. Velocity is effective for controlling annual bluegrass in fairway height creeping bentgrass and lawn height tall fescue or perennial ryegrass, but is not safe on many cultivars of Kentucky

bluegrass cultivars. It may soon be labeled for use on greens. Turf safety and efficacy of Velocity increases with temperatures over 70F and thus applications should start in late May or June (McCullough and Hart, 2006). Though a wide range of application rates and frequency can be effective, two to four applications two weeks apart are generally most effective on annual bluegrass (McDonald et al., 2006). Adding very low rates of Fe and N (0.03 to 0.09 lbs/1000 sq ft) to the tankmix will improve turf safety and have no effect on control (McDonald et al., 2006). If it becomes too effective on annual bluegrass, overseeding with desired turf can occur two weeks after the final application of Velocity, or Velocity can be applied over newly-seeded creeping bentgrass two weeks after emergence (Rutledge et al., 2010).

Syngenta's newly-released Tenacity (mesotione) will control annual bluegrass, but it is currently not on the Tenacity label. Three fall applications starting in late September and spaced two weeks apart have been most effective in work at Purdue and Univ. of Illinois, but control can be very inconsistent (like most annual bluegrass controls). Tenacity is extremely safe prior to seeding or over new seedlings and will fit in nicely during overseeding Kentucky bluegrass into fairways or athletic fields. Research is currently underway on Tenacity and hopefully annual bluegrass will eventually be listed on the label.

Arysta's amicarbazone is under development and we have been working with it for a number of years with varying success. It is currently labeled for rice and thus likely would not be difficult to label in turf. Determining the application season, rate, and frequency for control of annual bluegrass while maintaining safety on desired turf is proving difficult. It is too early to tell if and when it will be released to the industry.

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Growth regulators

Paclobutrazol (Trimmit, TGR) and flurprimidol (Cutless) selectively inhibit growth of annual bluegrass while minimally affecting creeping bentgrass growth. Though these growth regulators were previously recommended only during the summer, recent experience suggests applications every two or four weeks throughout the spring, summer, and fall are most effective in limiting annual bluegrass while encouraging spread of creeping bentgrass (Woosley et al., 2003). Trinexapac (Primo or T-NEX) will not help to control annual bluegrass, but will actually improve the health and summer performance of the grass. Research from New York on fairways indicates that any annual bluegrass reduction with preemergence herbicides or Prograss is reversed by using trinexapac (Rossi, 2001). Trinexapac should not be used in an annual bluegrass control program, but is essential in an annual bluegrass encouragement/management program. Legacy is a combination of flurprimidol and trinexapac and the flurprimidol controls annual bluegrass growth while the trinexapac tends to reduce the off-color expected by flurprimidol. Early data suggests that this combination should still reduce annual bluegrass spread (Bigelow et al., 2007). Mefluidide (Embark) and ethephon (Proxy, Ethephon) are growth regulators that can control annual bluegrass seedheads when applied shortly after green-up of annual bluegrass in the spring. During seedhead production, this strategy can improve visual quality of any turf area as well as increase smoothness of putting greens, but it tends to strengthen the annual bluegrass allowing it to better survive summer weather (Gaussoin and Branham, 1989)

Controlling annual bluegrass in roughs and homelawns

Turn off the irrigation in July and/or August

to force the desired grass into dormancy, which should kill the annual bluegrass. Apply any of the labeled preemergence herbicides (other than siduron) and start regular irrigation to bring the desired turf out of dormancy. The desired turf should recover fairly quickly whereas the preemergence herbicide will prevent the annual bluegrass from germinating. A second application may be needed later in the fall or early next spring to maximize annual bluegrass control. Since some seed will remain viable, continue the late summer preemergence herbicide application for two to three years or until annual bluegrass is no longer a problem. This strategy gets more complicated if the annual bluegrass was so dense that reseeding is required. If so, start this program as early in the summer as possible (early to mid-July if possible), reseed as soon as the area enters dormancy (late July or earlier), and start watering immediately to encourage germination of the desired turf. The annual bluegrass likely will not germinate until average air temperatures return to 70F (Kaminski et al., 2007), so a preemergence herbicide should be applied as soon as the label allows after emergence of the desired species. Dithiopyr has the most flexible label for applications over new seedings. Annual bluegrass in roughs and lawns can also be controlled selectively by Prograss. Though this product is not available to homeowners, it can be used by professionals on residential turf. Generally three applications in the fall are most effective, but be sure to follow label precautions.

Controlling annual bluegrass in sports fields

Annual bluegrass control in sports fields is difficult because the turf is constantly worn, opening voids where annual bluegrass can infest. Soil compaction, frequent fertilization, and frequent light watering to encourage germination and establishment of regular overseedings further encourages

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annual bluegrass. A late summer preemergence herbicide and/or Prograss can be used in the fall on spring-use baseball fields. On heavily used fall-use fields that require overseeding, perennial ryegrass can be seeded into a Prograss application with no delay or Prograss can be applied to newly-seeded perennial ryegrass 2 weeks after emergence. However, Prograss is not nearly as safe on Kentucky bluegrass and seeding must be delayed at least 6 weeks after the final Prograss application, or Prograss can be applied to newly-seeded Kentucky bluegrass 8 weeks after emergence. This virtually eliminates either fall applications of Prograss or fall overseeding of Kentucky bluegrass. However, Kentucky bluegrass can be dormant-seeded into fields treated previously with Prograss with no consequences. So consider overseeding with perennial ryegrass during the fall as needed to maintain turf density and playability, make three applications of Prograss in September through October to control annual bluegrass, and then dormant seed with Kentucky bluegrass in November or December after the playing season. Fall-use fields are where Tenacity herbicide may have a good fit because it is safe before or after seeding Kentucky bluegrass or perennial ryegrass, but annual bluegrass is currently not on the Tenacity label.

Controlling annual bluegrass in fairways

Creeping bentgrass fairways: A low impact approach uses paclobutrazol or flurprimidol applied spring, summer, and fall to help shift the balance in favor of creeping bentgrass over annual bluegrass. Secondly, an additional preemergence herbicide application in early Sept and again in December or March will help limit germination. To make this strategy even more aggressive, apply Prograss in fall or fall+spring in addition to the growth regulators and preemergence herbicides. This approach may provide complete

control, but be sure to follow label precautions for Prograss use before or after applying growth regulators. Summer applications of Velocity can also aggressively remove annual bluegrass. Start applications once temperatures are regularly higher than 70F in late May or early June. Multiple applications are needed every two to four weeks and the rate will be dictated by how aggressively you want to control the annual bluegrass. Applications can be continued into the fall until desired annual bluegrass reduction is reached and fall preemergence herbicides should be used to prevent reinfestation. Multiple years of this strategy will likely be needed.

Kentucky bluegrass fairways: Growth regulators will likely not selectively reduce annual bluegrass in Kentucky bluegrass and Velocity will damage many of the Kentucky bluegrass cultivars. Therefore, fall or fall+spring applications of Prograss combined with fall preemergence herbicides is currently the best strategy. Tenacity may be an option in the future for annual bluegrass control in Kentucky bluegrass fairways.

Controlling annual bluegrass in greens

Fewer options exist for controlling annual bluegrass on low-mowed greens. A fall application of bensulide will help prevent germination of annual bluegrass, but has no effect on established plants. Currently there are no postemergence herbicides for *Poa annua* that are labeled for greens. Growth regulators may have the most potential because they work well at fairway height where the creeping bentgrass can effectively outgrow the regulated annual bluegrass. However, this approach is not well-documented on greens-height turf. The ability for creeping bentgrass maintained under the low-mowed greens environment to outgrow annual bluegrass is greatly reduced compared to fairway height, regardless of differential growth regulation. Much of the research with growth

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regulators used successful on greens was done in the Southeast U.S. with tremendous pressure from summer weather to help push the balance in favor of the bentgrass over annual bluegrass. Furthermore, much of the research on greens was done ten years ago or more when only a few yearly applications were made as opposed to our now typical every-other-week applications of growth regulators. Practical experience suggests that paclobutrazol or flurprimidol applied every two weeks during the growing season can reduce annual bluegrass on greens, but there is no research data in the upper Midwest to support this. Current work at the University of Nebraska, Purdue, Michigan State, and Kentucky will provide insight on annual bluegrass control on greens with growth regulators or herbicides, but preliminary data already suggest control is inconsistent.

Control of annual bluegrass is difficult at best. However, a combination of cultural and herbicidal practices can be successful producing a turf that requires less inputs and performs more consistently and reliably year around.

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Literature Cited

1. Bigelow, C. A., Hardebeck, G. A., and Bunnell, B. T. 2007. Monthly flurprimidol applications reduce annual bluegrass populations in a creeping bentgrass fairway. Online. Applied Turfgrass Science doi:10.1094/ATS-2007-0508-02-RS.
2. Dernoeden, P. H. 1998. Use of prodiamine as a preemergence herbicide to control annual bluegrass in Kentucky bluegrass. HortScience. 33(5):p. 845-846.
3. Gaussoin, R. E., and B. E. Branham. 1989. Influence of cultural factors on species dominance in a mixed stand of annual bluegrass/creeping bentgrass.. Crop Sci. 29(2):p. 480-484.
4. Kaminski, J. E., and P. H. Dernoeden. 2007. Seasonal *Poa annua* L. seedling emergence patterns in Maryland. Crop Sci. 47(2):p. 775-781.
5. Kohler, E. 2003. Taking control: A plan for attack for *Poa*. Grounds Maint. 38(4):p. 32-34, 36.
6. Lush, W.M. 1988. Biology of *Poa annua* in a temperate zone golf putting green (*Agrostis stolonifera*Poa annua) I. The above-ground population. Journal of Applied Ecology. 25:977-988.
7. Lush, W.M. 1988. Biology of *Poa annua* in a temperate zone golf putting green (*Agrostis stolonifera*Poa annua) II. The seed bank. Journal of Applied Ecology. 25:989-997.
8. Lush, W. M. 1989. Adaptation and differentiation of golf course populations of annual bluegrass (*Poa annua*).. Weed Sci. 37(1):p. 54-59.
9. Lycan, Darren W.; Hart, Stephen E. 2006. Seasonal effects on annual bluegrass (*Poa annua*) control in creeping bentgrass with bispyribac-sodium. Weed Technology. July-September. 20(3): p. 722-727.
10. McCullough, Patrick E.; Hart, Stephen E. 2006. Temperature influences creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) response to bispyribac-sodium. Weed Technology. July-September. 20(3): p. 728-732.
11. McDonald, Steven J.; Dernoeden, Peter H.; Kaminski, John E. 2006. Creeping bentgrass tolerance and annual bluegrass control with bispyribac-sodium tank-mixed with iron and nitrogen. Applied Turfgrass Science. August 11. p. [1-7].
12. McElroy, J. Scott; Walker, Robert H.; Wehtje, Glenn R.; Van Santen, Edzard. 2004. Annual bluegrass (*Poa annua*) populations exhibit variation in germination response to temperature, photoperiod, and fenarimol. Weed Science. January/February. 52(1): p. 47-52.
13. Rossi, F.S. 2001. Annual bluegrass population dynamics in response to growth regulators and herbicides. International Turfgrass Society Research Journal. 9(Part 2): p. 906-909.
14. Woosley, Paul B.; Williams, David W.; Powell, A. J. Jr. 2003. Postemergence control of annual bluegrass (*Poa annua* spp. *reptans*) in creeping bentgrass (*Agrostis stolonifera*) turf. Weed Technology. October-December. 17(4): p. 770-776.

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Table 1. Summary of practices to favor or culturally control annual bluegrass.

Practice	To favor annual bluegrass	To control annual bluegrass
Mowing height	Lower the better	Higher the mowing height will favor the desired species
Irrigation	Shallow and frequent irrigation to keep the upper 1 inch of the soil profile damp for the shallow rooted annual bluegrass.	Keep the area as dry as possible. Allowing dormancy of the desired turf should thin or kill annual bluegrass.
Aerification	Aerification in spring and/or fall to bring seedheads to the surface and encourage germination	Aggressive aerification to minimize compaction. Primarily done in the summer when annual bluegrass will not be germinating
Nitrogen	Spring and fall nitrogen, especially late fall when annual bluegrass is still growing aggressively.	Primarily in summer. Aggressively growing annual bluegrass in spring and fall will respond favorable to spring and fall N.
Phosphorus	Regular phosphorus increases availability to limited root system of annual bluegrass and should aid in seed production.	Low phosphorus fertilization in theory reduces seedhead production.
Seedhead management	The growth regulators Embark, Proxy or Ethephon are most effective seedhead limiters. Limiting seedheads will conserve carbohydrates for better summer and potentially winter survival. These will also eventually limit seed stores in the soil.	Constant mowing with clippings caught during seedhead production will help long-term to limit supply in soil. Gaussoin and Branham (1988) reported that removing clippings can reduce annual bluegrass populations up to 20% over three years.
Fungicides	Regular fungicides targeted for summer patch and anthracnose in addition to the typical dollar spot, brown patch, and pythium controls.	Avoid any fungicides that will control summer patch or anthracnose when treating for dollar spot, brown patch, or pythium controls in the desired turf.
Preemergence herbicides	Apply at typical timing to control crabgrass and concentration in soil should allow annual bluegrass germination near Labor Day.	Labor Day applications will minimize annual bluegrass germination in fall, and likely will require a second application again in late fall or very early next spring
Postemergence herbicides		Velocity and Prograss are effective on mature annual bluegrass. Certainty and a number of others will control young annual bluegrass. Some will try low rates of glyphosate. Tenacity and Arysta’s amicarbazone are still being evaluated for cool-season turf.
Growth regulators	Trinexpac (Primo, T-Nex) will help improve stress tolerance and help to make annual bluegrass healthier.	Paclobutrazol (Trimmit, TGR) or flurprimidol (Cutless, Legacy) will limit growth of annual bluegrass allowing desired turf to out compete annual bluegrass