

Annual Bluegrass Control Programs for Georgia Lawns



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Annual bluegrass (*Poa annua*) is the most problematic winter weed of lawns in Georgia. Plants have a light green color, coarse leaf texture, and produce unsightly seedheads. Annual bluegrass germinates in fall, overwinters in a vegetative state, and resumes active growth in spring. Competitive growth of populations causes stand thinning of desirable turfgrasses that may predispose lawns to invasion by summer annual weeds, such as crabgrass (*Digitaria* spp.). Annual bluegrass typically dies out by May in Georgia, but cool temperatures in spring and regular irrigation may extend survival of populations into early summer.

Annual bluegrass can be identified from the bunch-type growth habit that spreads to larger clumps (Figure 1) in lawns. The leaves are flat with a boat-shaped tip, and are wrinkled towards the base. The ligule of annual bluegrass is membranous, about 1 to 2 millimeters in length, and slightly pointed (Figure 2). The collar is divided, hairless, V-shaped, and without auricles. The seedhead is a key characteristic for annual bluegrass identification in spring. Plants produce a light-colored, branched panicle that produces hundreds of viable seed (Figure 3). Perennial types of annual bluegrass (*Poa annua* var. *reptans*) are also found in turf. These plants generally have a dark green color, produce fewer seedheads than annual types, and have short stolons. Perennial types are predominantly found on golf greens but may also persist in irrigated lawns that have limited turfgrass competition.



Figure 1. Annual bluegrass growing in a bermudagrass lawn.



Figure 2. Annual bluegrass ligule.



Figure 3. The panicle seedhead of annual bluegrass.

Cultural control of annual bluegrass

Cultural practices that promote turfgrass density can reduce annual bluegrass infestations. This is particularly important for grasses with limited selective herbicides available for control, such as tall fescue. Overwatering, especially in shady areas, promotes annual bluegrass establishment in lawns. Withholding irrigation until turfgrasses exhibit initial symptoms of drought stress can reduce annual bluegrass growth and competition. Core aerifications should be conducted during active turfgrass growth and favorable periods for quick recovery. Voids left in turf with exposed soil following aerifications may permit annual bluegrass invasion during periods of peak germination. Warm-season grasses should have enough time to recover from summer aerifications to promote turf density prior to annual bluegrass germination in fall.

Nitrogen fertilization should be reduced during peak annual bluegrass establishment in fall and periods of vigorous growth in spring. High nitrogen at these times encourages annual bluegrass spread and survival in polyculture with turfgrasses. Fertilizing dormant turf when annual bluegrass is actively growing, especially with “weed and feed” products, may also exacerbate infestations. Warm-season grasses do not recover from scalping as quickly in fall compared to summer, which may enhance annual bluegrass establishment. Regular mowing or adjusting the height of cut may help reduce scalping if weather precludes mowing operations in fall. While

returning clippings is recommended to recycle nutrients to the soil, removal of clippings may be useful when annual bluegrass is present and producing seedheads. Removal of clippings at this time can reduce the spread of viable seed in lawns.

Annual bluegrass control in tall fescue lawns

Preemergence herbicides applied in late summer or fall may prevent annual bluegrass establishment in tall fescue (Table 1). Dinitroaniline (DNA) herbicides are widely used for preemergence control of annual bluegrass in turf. The DNA herbicides include pendimethalin (Pendulum), prodiamine (Barricade), and oryzalin (Surflan). These herbicides are relatively cheap, broad spectrum, and safe to use on established tall fescue. However, the exclusive use of DNA herbicides over the years has led to the spread of resistant biotypes in Georgia. Dithiopyr (Dimension) is a pyridine herbicide that inhibits mitosis at a different site of action than the DNAs. Annual bluegrass with resistance to DNA herbicides in Georgia has also shown cross-resistance to Dimension (Figure 4). Therefore, it is recommended that turf managers select other herbicides for controlling annual bluegrass if DNA resistance is a concern.

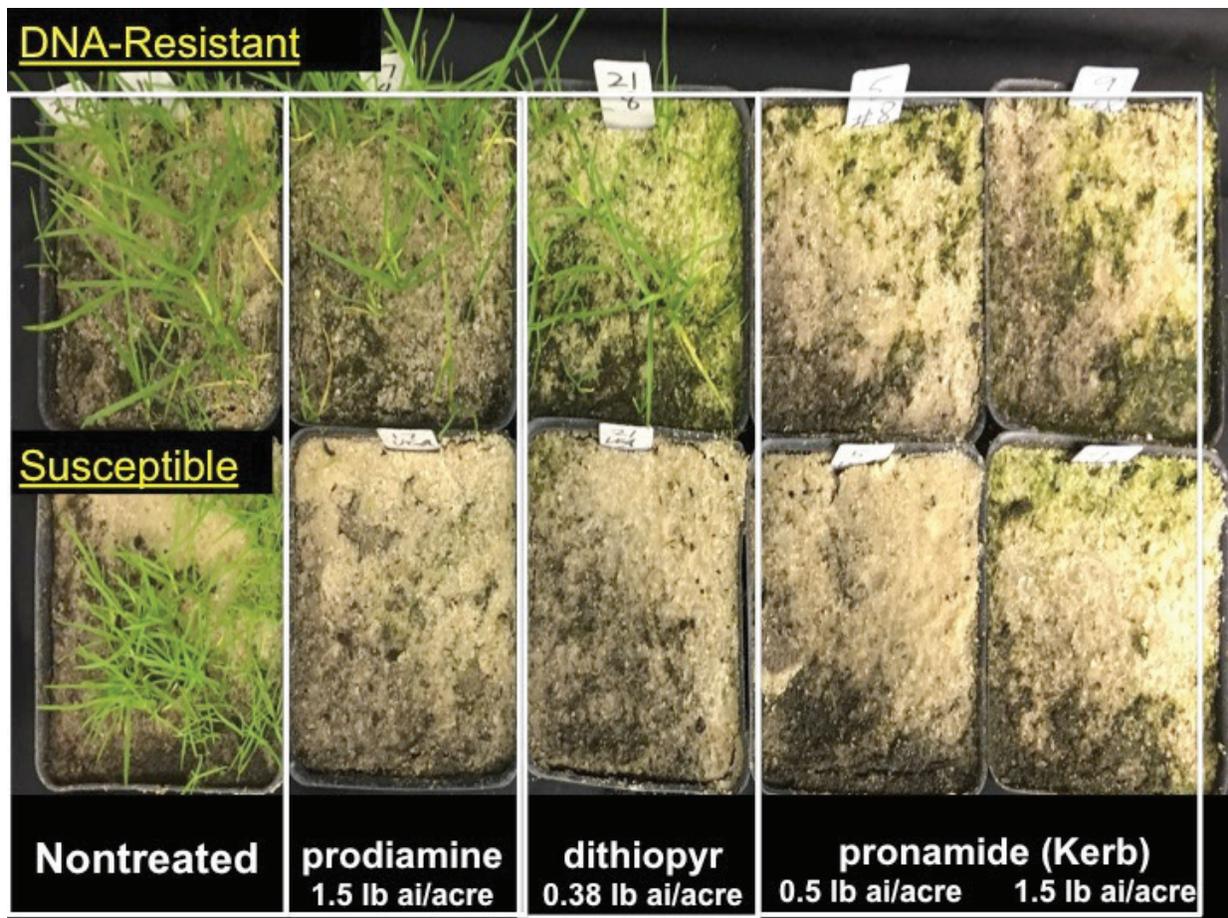


Figure 4. Preemergence control of dinitroaniline-resistant annual bluegrass with Kerb after six weeks.

Turf managers have several alternatives to DNA herbicides for preemergence control of annual bluegrass (Table 1). Oxadiazon (Ronstar 2G) and bensulide (Bensumec 4L) offer different modes of action than the DNAs for preemergence control of annual bluegrass in tall fescue. When applied to susceptible weeds, Ronstar inhibits chlorophyll and Bensumec inhibits lipid biosynthesis. However, Ronstar is labeled for nonresidential turf and Bensumec can only be used in residential lawns. These herbicides should be considered for use in rotation programs with DNA herbicides for annual bluegrass control in tall fescue.

Table 1. Alternatives to dinitroanilines and other mitotic inhibitors (Group 3 herbicides) for annual bluegrass control in tall fescue.

Group Number ^a	Herbicide	Timing ^b	Rate	Control ^c	Comments on annual bluegrass control
5	Xonerate 70WG (amicarbazone)	POST	2 to 4 oz/acre	G	Make sequential treatments in late March/early April.
8	Bensumec 4L (bensulide)	PRE	3 gal/acre	F-G	Use in residential tall fescue lawns only.
16	Prograss 1.5EC (ethofumesate)	PRE + early POST	0.5-1 gal/acre	F-G	Must be applied sequentially in fall. Do not use in spring.
14	Ronstar 2G (oxadiazon)	PRE	3 lb ai/acre	G-E	Use in nonresidential tall fescue lawns only.
27	Tenacity 4SC (mesotrione)	PRE	5-8 fl oz/acre	F-G	Use during tall fescue establishment from seed.

^aGroup Number: 5 = Photosystem II inhibitors, 8 and 16 = lipid synthesis inhibitors, 14 = protoporphyrinogen oxidase inhibitors, 27 = 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD) inhibitor.

^bPRE = preemergence, POST = postemergence

^cControl rankings: Excellent (E) = ≥90 percent, Good (G) = 80 to 89 percent, Fair (F) = 70 to 79 percent

Ethofumesate (Prograss 1.5EC) also provides preemergence control of annual bluegrass in residential and non-residential tall fescue (Table 1). Beginning in late fall, two applications of Prograss at 0.5 to 1 gallon per acre can control annual bluegrass seedlings and provide residual control during periods of peak germination. Turf managers may also use Prograss during establishment of tall fescue, but applications provide erratic control of annual bluegrass in spring. Mesotrione (Tenacity 4SC) controls annual bluegrass during establishment of tall fescue from seed. Tenacity at 8 fl oz per acre provides a competitive growth advantage of tall fescue during establishment over annual bluegrass. To enhance control of annual bluegrass in fall, a sequential application at 5 to 8 fl oz per acre after three to four weeks is recommended. Tenacity does not control mature annual bluegrass at labeled use rates in turfgrass.

Amicarbazone (Xonerate 70WDG) provides selective postemergence control of annual bluegrass (Table 1). Applications must be made in early spring to maximize selectivity in established tall fescue. Xonerate should be applied once temperatures have reached approximately 60 to 65 degrees Fahrenheit during the daytime in early March. Sequential applications of 2 to 4 oz of product per acre applied at 14- to 21-day intervals have shown effective control of established annual bluegrass in Georgia. Tank-mixing Tenacity at 5 fl oz per acre has synergistic activity with Xonerate for controlling annual bluegrass and other winter annual weeds in spring. Tall fescue can be reseeded within two weeks after Xonerate applications in spring at labeled use rates.

Annual bluegrass control in warm-season lawns

Turf managers have more herbicides for selective annual bluegrass control in warm-season lawns (bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass) compared to tall fescue. However, herbicide-resistant annual bluegrass has become more widespread in these lawns than in tall fescue, and selective control can be difficult. The dinitroaniline herbicides (pendimethalin, prodiamine, others) have been overused for preemergence control of annual bluegrass in Georgia. We have identified populations of annual bluegrass that exhibit resistance to the DNA herbicides and Dimension (Figure 4). Root development of these plants are unaffected by DNA herbicides, such as prodiamine, and plants are able to establish in treated areas (Figure 5). Resistance develops

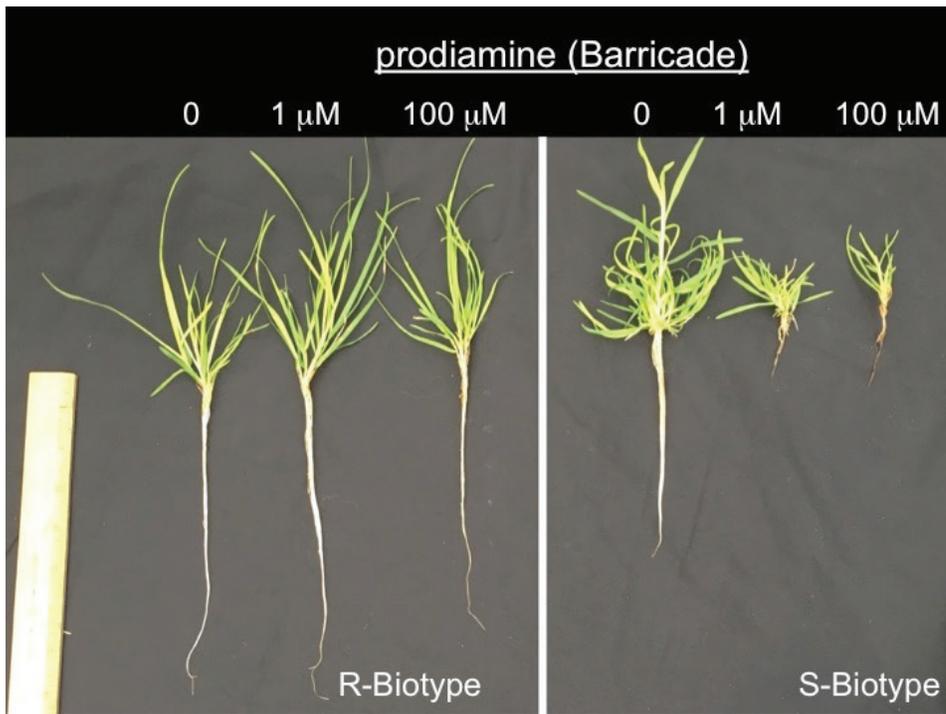


Figure 5. Dinitroaniline-resistant and susceptible annual bluegrass after three weeks of growth in hydroponic solutions with various concentrations of prodiamine.

in annual bluegrass populations when the same herbicide or mode of action has been sprayed repeatedly over years. Plants that survive these applications are able to spread and eventually become the predominant biotype of the population. This type of selection pressure has shifted annual bluegrass populations to resistant biotypes, particularly in warm-season grasses throughout Georgia.

Turf managers should consider using indaziflam (Specticle Flo 0.62L) in warm-season lawns as an alternative to DNA herbicides (Table 2). It has a different mode of action than the DNA herbicides (cellulose biosynthesis inhibition) for pre- and early postemergence control of annual bluegrass in warm-season turfgrasses. Specticle Flo should be applied in September in north Georgia or October in south Georgia from 6 to 10 fl oz of product per acre for preemergence annual bluegrass control. It should only be used on established turfgrasses under optimal growing conditions. Specticle has some risk for turf injury on sandy soils with low organic matter and stressed turfgrass. Adjusting the rate or making split applications can reduce potential turfgrass injury from these treatments.

Specticle also provides early postemergence control of seedling annual bluegrass in warm-season grasses. However, this is not a standalone treatment for annual bluegrass control in late October and early November (Figure 6). Tank-mixtures of Specticle with atrazine or simazine at 1 lb of active ingredient per acre are recommended for applications made later than the conventional preemergence timings in Georgia (Table 2). This combination provides pre- and postemergence control of immature annual bluegrass with residual activity until spring. Moreover, these combinations are safe for warm-season turfgrasses and should be considered for lawn care operators treating lawns at late fall timings. Specticle can also be tank-mixed with other herbicides, such as the sulfonylureas, for enhancing early postemergence control of annual bluegrass (Table 2).

Bensulide (Bensumec) and oxadiazon (Ronstar) may also be used in warm-season turf for preemergence annual bluegrass control as alternatives to the DNAs (Table 2). Bensumec is labeled for residential lawns only, while Ronstar can only be applied to nonresidential lawns. These herbicides must be applied in early fall prior to annual bluegrass germination to maximize efficacy. Tank-mixtures with postemergence herbicides should be considered for any preemergence herbicide applied in October for north Georgia or in November for south Georgia. Do not apply Ronstar to centipedegrass lawns due to excessive injury potential.

Pronamide (Kerb) may be used for pre- and postemergence control of annual bluegrass in nonresidential warm-season lawns (Table 2). Kerb is a mitotic inhibitor (Group 3 herbicide) that must be absorbed by roots. It is

critical that applications receive rainfall or irrigation within 24 hours to maximize efficacy. Although Kerb is a mitotic inhibitor, it has a different site of action than the DNA herbicides. We have found Kerb provides effective preemergence control of annual bluegrass with resistance to DNA-herbicides and Dimension (dithiopyr) in Georgia (Figure 4). Kerb should be applied at 1 to 1.5 lb of active ingredient per acre between November and early December in Georgia. A concern with pronamide is the potential for lateral movement to susceptible (cool-season) turfgrasses. Applicators should avoid treatments on slopes or to saturated soils if cool-season grasses are adjacent to targeted areas.

The sulfonylureas (acetolactate synthase inhibitors, ALS-inhibitors) and triazines (Photosystem II inhibitors) are widely used for postemergence control of annual bluegrass in bermudagrass and zoysiagrass lawns. Flazasulfuron (Katana), foramsulfuron (Revolver), trifloxysulfuron (Monument), and the combination product Tribute Total (thiencarbazone + foramsulfuron + halosulfuron) are examples of ALS-inhibitors. The triazine herbicides, atrazine (Aatrex, others) and simazine (Princep, others), have been extensively used in centipedegrass and St. Augustinegrass lawns for decades. Applications of these herbicides in late fall typically provide the best control of annual bluegrass after peak germination (Figure 7). Turf managers using Celsius (thiencarbazone + iodosulfuron + dicamba), metsulfuron (Manor, MSM, others), and sulfosulfuron (Certainty) may control seedling annual bluegrass, but applications do not provide acceptable control of mature plants.



Figure 6. Annual bluegrass control on January 20, 2011 treated with Specticle in October (early-postemergence timing) or November 2010 (late postemergence timing) in Griffin, GA.



Figure 7. Annual bluegrass control from Katana (flazasulfuron) and Monument (trifloxysulfuron) on March 13, 2015 following treatments on October 30, 2014.

Annual bluegrass resistance to sulfonylureas and triazines is concerning in bermudagrass, centipedegrass, St. Augustinegrass, and zoysiagrass lawns throughout Georgia. Resistance could eventually preclude the exclusive use of these herbicides without tank-mix partners for annual bluegrass control. Segregation of annual bluegrass populations after applications of these herbicides should be monitored to determine if resistant biotypes could be present in a lawn (Figures 8 and 9). If resistance is a concern, tank-mixing two herbicides with different modes of action will enhance the potential to control annual bluegrass with herbicide resistance. For example, applying a sulfonylurea (ALS-inhibitor) with simazine (PSII inhibitor) or glyphosate (EPSP synthase inhibitor) in dormant bermudagrass. The additional mode of action in tank-mixtures increases the potential to control the resistant biotypes while controlling the susceptible population.



Figure 8. Resistant and susceptible annual bluegrass biotypes following treatments of a sulfonylurea herbicide in zoysiagrass.



Figure 9. Segregation of an annual bluegrass population following a sulfonylurea herbicide application due to the presence of a resistant biotype.

Sureguard (flumioxazin) is a chlorophyll synthesis inhibitor (PPO-inhibitor) that was labeled for turfgrass in 2012 (Table 2). It offers an alternative mode of action to the DNAs, sulfonylureas, and triazine herbicides for pre- and postemergence control of annual bluegrass in lawns. Sureguard 51WG is labeled for use in dormant bermudagrass only. Applications to actively growing bermudagrass cause turf discoloration for several weeks. Sureguard should be used at 10 to 12 oz of product per acre in late November or early December to control immature annual bluegrass after emergence. This application timing can also provide residual control of annual bluegrass until March.

Dormant bermudagrass may be treated with nonselective herbicides, such as glyphosate (Roundup, others) and diquat (Reward) (Table 2). These herbicides provide alternative modes of action to sulfonylureas and triazines for postemergence annual bluegrass control. However, end-users should only spray at peak dormancy when no green turfgrass foliage is present. We have confirmed annual bluegrass resistance to glyphosate in Georgia turf. Therefore, tank-mixing glyphosate and another herbicide with a different mode of action will enhance the potential for controlling populations with suspected resistance. Incorporating other modes of action in sequential programs can delay the onset of resistance to multiple modes of action as well. Most labels have the herbicide Group Number on the front page to identify the mode of action. Turf managers should have an understanding of herbicide classifications when selecting products for annual bluegrass control. However, costs, efficacy, and turfgrass injury potential may be significant limitations to rotating modes of action in many turfgrass species.

Table 2. Herbicide alternatives to exclusive use of dinitroanilines (Group 3 herbicides), sulfonylureas (Group 2 herbicides), and triazines (Group 5 herbicides) for annual bluegrass control in warm-season grasses.

Group Number ^a	Treatments	Timing ^b	Rate	Control ^c	Comments
2 + 5	Sulfonylurea herbicide ^d + atrazine/simazine	PRE + POST	See labels	E	Apply in Nov/Dec to bermudagrass or zoysiagrass
3 ^e	Kerb 50WP, Kerb 3.3SC (pronamide)	PRE + POST	1 to 1.5 lb ai/acre	G-E	Apply in Nov/Dec to nonresidential warm-season lawns
8	Bensumec 4L (bensulide)	PRE	3 gal/acre	F-G	Apply to residential lawns only
9	Roundup, others (glyphosate)	POST	0.38 lb ae/acre	G-E	Apply to dormant bermudagrass only
9 + 5	Roundup, others (glyphosate) + atrazine/simazine 4L	PRE + POST	0.38 lb ae/acre + 1 lb ai/acre	E	Apply to dormant bermudagrass only
14	Ronstar 2G, others (oxadiazon)	PRE	3 lb ai/acre	G-E	Apply to nonresidential lawns only Do not apply to centipedegrass
14	Sureguard 51WG (flumioxazin)	PRE + POST	10-12 oz/acre	F-G	Apply to dormant bermudagrass in early winter
22	Reward 2L (diquat)	POST	2 pt/acre	F-G	Apply to dormant bermudagrass or zoysiagrass
29	Specticle Flo (indaziflam)	PRE	6-10 fl oz/acre	G-E	Apply in Sept/Oct
29 + 5	Specticle Flo (indaziflam) + atrazine/simazine	PRE + POST	6-10 fl oz + 1 lb ai/acre	E	Apply in Oct/Nov to warm-season lawns

^aGroups: 2 = acetolactate synthase inhibitors, 3 = mitotic inhibitors, 5 = Photosystem II inhibitors, 8 = lipid synthesis inhibitors, 9 = EPSP synthase inhibitor, 14 = protoporphyrinogen oxidase inhibitors, 22 = Photosystem I disruptors, 29 = cellulose synthesis inhibitors.

^bPRE = preemergence, POST = postemergence

^cControl rankings: Excellent (E) = ≥90 percent, Good (G) = 80 to 89 percent, Fair (F) = 70 to 79 percent

^dExamples of sulfonylureas are flazasulfuron (Katana), foramsulfuron (Revolver), rimsulfuron (TranXit, Rimsulfuron, others) and trifloxysulfuron (Monument).

^eKerb is mitotic inhibitor with a different site of action than dinitroaniline herbicides. In Georgia, Kerb has shown to provide preemergence control of annual bluegrass biotypes with resistance to dinitroaniline herbicides.

All photos by Patrick McCullough.

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