Annual bluegrass: its biology and control

By Dr. Joseph C. Neal

Annual bluegrass, *Poa annua*, is one of the most persistent and difficult to control weeds of high maintenance cool and warm season.

It is well adapted to close, frequent mowing, high fertility management practices, frequent irrigation, and compacted soils. is one of the first and primary weeds to infest damaged or thinned turf areas. It resists efforts to control its spread so successfully that many turfgrass managers have given up and now manage it as a desireable species. Even though it is a member of the bluegrass family it is considered a weed in intensively managed turfgrass stands because it is highly subject to moisture and heat stress as well as to almost all of the diseases of turf. It produces prolific quantities of seed heads in the spring, and its growth habit makes it highly visible when mixed with other turfgrass species.

The biology of *Poa annua*

Before one can understand how to control annual bluegrass, one must be able to identify it and understand its life cycle. *Poa annua* has been classified into two distinct biotypes: the annual biotype (*Poa annua ssp. annua*) and the perennial biotype (*Poa annua ssp. reptans*). The primary differences between the two biotypes are root system, growth habit, and life cycle. (See Table above.)

Additionally, even within a biotype, there is a substantial amount of variation. These variations compound the difficulty of controlling annual bluegrass.

Control of annual bluegrass

Annual bluegrass is genetically very closely related to the desirable bluegrass species and it thrives under the same conditions that promote optimum growth of desirable turfgrass species. Therefore, cultural controls of annual bluegrass have met only with moderate success.

There are five general kinds of cultural practices that have been effective in limiting annual bluegrass infestations. They are:

- the prevention or reduction of soil compaction,
- limiting supplementary moisture applications,
- limiting supplementary nitrogen fertilization,
- removing clippings,
- raising cutting height to stimulate competition.

Reducing compaction can be accomplished by regular hollow tine core aeration. This practice actually stimulates bentgrasses, bluegrasses, and ryegrasses to be more competitive by stimulating root production in the desirable species. At the same time, hollow tine core aeration makes annual bluegrass less competitive. Preventing soil compaction, by controlling site and equipment usage, is the best way to limit annual bluegrass infestations by limiting compaction before it develops.

Limiting supplementary irrigation can help stress the annual biotype of *Poa annua* to the dieback stage because of its weak, shallow root system. In areas with poor subsoil drainage, the use of soil wetting agents may facilitate water movement away from the shallow root system, making the site less supportive. Better soil drainage improves the soil structure allowing the desirable varieties to be more competitive.

Reducing nitrogen input to below four pounds of nitrogen per thousand square feet per year will limit its ability to compete with desired species. In some seasons, such as in early spring and in late fall, substituting supplemental iron applications for nitrogen can also limit competitiveness.

Removing clippings by catching them before they are returned to the turf helps to reduce the number of seeds that can germinate. This can be particularly effective when used against the annual biotype, but if continued long enough, over a period of years, can also be effective against the perennial biotype. Clipping removal also helps lower total

Comparative morphology of *Poa annua* biotypes

Annual biotype	**Perennial biotype**
Shallow root system	Strong fibrous root system
Erect growth	Prostrate growth
Seedhead in May & June	Produces seedheads several times
One season life cycle	Several season life cycle
Seed requires dormant period	Seed can germinate anytime

nitrogen input, by removing the leaf tissue that would release nitrogen while it decomposes.

Raising cutting height also reduces annual infestations by increasing the desirable variety's competitiveness. This then reduces the stress imposed on closely-cut turf and increases plant-produced nutrients from increased leaf tissue surfaces.

Chemical controls fall into three categories

When changes in cultural practices fail to limit the spread of *Poa annua* infestations, then chemical controls are often warranted. Chemical products for annual bluegrass control fall into one of three categories: pre-emergent herbicides, post-emergent herbicides, and growth regulators.

Most pre-emergent herbicides, used to control the germination of annual grassy weeds, such as crabgrass and goosegrass, will prevent the establishment of newly germinated annual bluegrass seeds if the herbicides are applied with that purpose in mind. The pre-emergent herbicides are divided into two groups: those with short-soil residuals and those with long-soil residuals. The long-residual pre-emergent herbicides, like pendimethalin, dithiopyr and prodiamine, can be applied in the late spring in time to control germinating crabgrass and still have enough of a residual to kill the germinating annual biotype in the fall. Shorter residual herbicides, like benefin and bensulide, offer some protection against germination if a second application is made in the mid to late summer.

Annual bluegrass

Post-emergent herbicides work by either selectively controlling germinating seedlings and mature plants or by total vegetation control. The two selective controls, calcium arsinate and ethofumesate, work by controlling immature and mature plants or by controlling immature and reducing the growth rate of mature plants.

Glyphosate works by killing all vegetative growth and requires that new seed be introduced into the area. This can be a difficult task if there is a substantial reserve of ungerminated seeds waiting to compete with the desirable varieties. Generally, it is better to avoid having to use broad-spectrum herbicides in all but the worst *Poa annua* infestations and to try to stimulate the desirable turfgrass species.

The third class of chemicals for annual bluegrass control are the plant growth regulators. They work by reducing seed head formation, thinning the stand, and reducing growth and competitiveness so that the area is allowed to convert to the desirable varieties. The timing of these applications varies by product and depends on the mechanism of action.

There are two other chemicals that have some effects on annual bluegrass populations, but they are not considered to be herbicides. The first is the fungicide fenarimol, whose trade name is Rubigan. Total applications of eight fluid ounces per 1000 square feet of this fungicide per year divided among several applications will dramatically thin annual bluegrass stands. Second, the liquid form of the wetting agent AquaGro has been reported to reduce or eliminate seed-head formation if applied after spring green-up but before the new seed head emerges from the leaf sheath.

Poa annua control takes a coordinated effort

Despite the fact that there are numerous chemical and cultural control strategies, none of the current management strategies are completely successful on their own. The most effective *Poa annua* control is best achieved through the coordinated use of as many of these methods as possible.

If the area has a light infestation and should not require over-seeding, such as a home lawn or commercial property, then the repeated use of pre-emergent herbicides to cover the germination period, combined with the best beneficial practices to stimulate desirable turf conversion, is a valid approach.

In areas where the perennial biotype predominates or where the site usage dictates annual overseeding, then plant growth regulators combined with hollow tine aeration and site improvements have shown that these practices can reduce or eliminate *Poa annua* in sites with less than a 50% population. In areas heavily infestated with the annual biotype or resistant perennial biotype populations, the best approach is a total area kill in the late fall with a non-selective herbicide like glyphosate, followed by sodding of the area and follow-up applications of long residual pre-emergent herbicides in the following years.

The key to good *Poa annua* control is identifying which biotype is present and then designing the maintenance program to take site usage and historic tendencies into consideration. ■