

POA ANNUA: TO ENCOURAGE OR CONTROL?

Before the golf course superintendent can decide whether to encourage or control annual bluegrass (*Poa annua* L.), he must determine how much *Poa* is present in a specific turfgrass area and be able to identify the type. Usually, the superintendent determines only the amount of annual bluegrass evident during the spring seed forming stage. This method is not necessarily reliable, because he may underestimate the actual amount. (Four vegetative characteristics commonly used to identify annual bluegrass are summarized in Table 1.)

HOW TO IDENTIFY POA ANNUA

Annual bluegrass originally was native to Europe, but now is widely disseminated throughout the world. Generally classified as a turfgrass weed, it frequently dominates other turfgrasses on a golf course unless the superintendent initiates control practices; these practices will be discussed later in this article.

Annual bluegrass forms a very finely textured, high density, uniform, quality turf under proper cultural and environmental conditions. Moreover, it tends to be more diminutive in growth, softer and somewhat lighter green in color than most Kentucky bluegrasses and bentgrasses. Yet its rooting depth is quite similar to that of Kentucky bluegrass and bentgrass.

It propagates and disseminates primarily by seed and is a prolific seed producer even at a daily cutting height of 0.25 inches. (A single annual bluegrass plant, researchers reported, produced 360 viable seeds between May and August in western British Columbia.)

In addition to being prolific, it has the unique capability to ripen viable seeds in the seed head within one to two days after pollination. Counts made by researchers of vi-

able annual bluegrass seeds in the surface inch of soil on a green showed that there were 72 seeds present; approximately 50 per cent of them were within the first quarter inch.

There are many types of annual bluegrass (Table 2). One extreme is the classical annual type, which has an upright, bunch-type growth habit and prolific production of dormant seeds. This type contrasts with the other extreme, a perennial type, which has creeping stolons and a limited production of non-dormant seeds. (Figure 1). The golf course superintendent should not only ascertain the total quantity of annual bluegrass present in a turf, but also whether it is predominantly of the annual or the perennial type, because these two factors determine the method of control.

For example, experiments with certain herbicides reveal that the perennial type is more difficult to control than the annual type and is more dominant on turfs that have been intensely irrigated for many years. The perennial type is less prone to injury from environmental stresses. Most likely, there will be an intergradation of many types of annual bluegrass growing on one golf course rather than only an annual or perennial type. This means that the superintendent must check a number of different locations to assess the quantity and type of annual bluegrass in a turf. This approach is similar to that used in collecting soil samples for soil testing.

UNDESIRABLE CHARACTERISTICS

Whether to encourage annual bluegrass or to control it will depend on the specific environmental and soil conditions in a given locality. These criteria must then be balanced against the advantages and disadvantages of this turfgrass as a golf

One of the country's leading agronomists puts this continuing, but important, controversy into perspective
by DR. JAMES B. BEARD

course turf.

These disadvantages are:

1. Lacks adequate tolerance to environmental stress (cold, heat, drought, wilt, submersion, salinity, ozone, smog or PAN and wear);
2. Objectional degree of seedhead formation;
3. Susceptible to numerous diseases (dollar spot, brown patch, *Pythium* blight, *Fusarium* patch, *Typhula* blight, red thread, *Helminthosporium* spp. and stripe smut.

Do the soil and environmental conditions on the golf course under evaluation present particularly favorable conditions for the stress and diseases to which annual bluegrass is susceptible? How significant have these problems been in the past? These are the assessments the superintendent must make.

DESIRABLE CHARACTERISTICS

The disadvantages of annual bluegrass must then be balanced against its advantages as a golf course turf:

1. Well adapted to a) close, frequent mowing (0.25 to one inch); b) intense irrigation (moist soils); c) high fertility levels (0.5 to 1.0 pound of N/1,000 square feet per growth month); d) compacted soils compared to other species; e) near neutral soils (pH of six to seven), and f) shade;
2. Capable of forming a high quality, dense, finely textured turf;
3. Good recuperative potential resulting from the extensive production of dormant seed even at close, frequent mowings.

This summary shows that annual bluegrass is one of the best turfgrass species available for a golf course because it is adaptable to the cultural conditions under which most courses are maintained. It forms a very attractive, quality surface for greens and fairways under close, frequent mowings, intense irriga-

tion, high fertility and compacted soils. Its extensive production of dormant seed permits it also to readily invade other turfs weakened by divots or ball marks.

THREE APPROACHES TO THE POA PROBLEM

The superintendent can choose one of three basic approaches to the annual bluegrass problem: He can 1) encourage it, 2) partially control it by cultural methods or 3) control it chemically with herbicides.

Encouraging annual bluegrass. This turfgrass is most aggressive and competitive at a) a cutting height of one inch, b) high fertility levels, particularly a nitrogen rate of 0.5 to one pound of nitrogen per 1,000 square feet per growing month, c) intense irrigation that maintains moist to wet soil conditions at all times, and d) soils that have a high phosphorus level and a soil reaction in the neutral to slightly alkaline range. It also is able to persist and compete more successfully than Kentucky bluegrass or bentgrass on compacted soils that have restricted soil aeration. Annual bluegrass will perform better on well-aerated coarsely textured soils, but is capable of persisting and competing more effectively than the other species on finely textured, compacted soils.

It is also important that the superintendent protect the annual bluegrass or utilize cultural practices that will protect it against loss should environmental stresses occur. Of the above mentioned cultural practices, irrigation is the key prac-

tice used to encourage annual bluegrass in golf course turfs.

Cultural control of annual bluegrass. The type of surface needed for playing golf dictates cultural practices that tend to favor annual bluegrass invasion and persistence. Those practices that encourage



Figure 1. A single annual bluegrass plant exhibiting a strong stoloniferous growth habit.

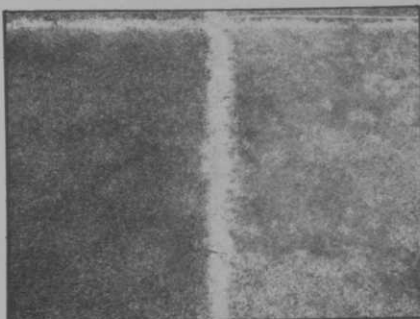


Figure 2. A comparison of the degree of annual bluegrass invasion into two 10-year-old creeping bentgrass turfs: (left)-a vigorous, highly competitive cultivar with no annual bluegrass and (right) a much weaker cultivar that has permitted extensive annual bluegrass invasion.

and/or restrict its invasion and growth are:

1. Judicious, infrequent irrigation that permits the soil to dry occasionally;
2. Ensure adequate nitrogen nutrition in the early spring;
3. Provide soil aeration by cultivation and/or soil modification;
4. Avoid excessive phosphorus levels and alkaline soils;
5. Adjust the cultural practices for optimum, competitive growth of the desired species (bermudagrass, creeping bentgrass or Kentucky bluegrass).

Irrigation usually is the most critical factor affecting annual bluegrass invasion. The author recognizes that it is much easier to talk about limiting irrigation and permitting the turf to wilt occasionally during midsummer than to actually accomplish this on a golf course where the membership demands a green, always succulent-appearing turf. This is a very difficult decision for the superintendent to make. Restricting annual bluegrass by cutting down on irrigation should be initiated only with the knowledge and support of the green committee and general membership.

Other key practices include keeping an adequate level of nitrogen available in the early spring in the case of cool season turfgrasses. The existing Kentucky bluegrass and bentgrass plants in the turf begin growing much earlier in the spring than does annual bluegrass; thus the likelihood of crowding out and restricting annual bluegrass invasion is increased, providing no nutrient

Continued on page 60

HOW TO IDENTIFY POA

TURFGRASS SPECIES	BUD SHOOT	LIGULE	LEAF APEX	LEAF BLADE CROSS-SECTION
Annual bluegrass	Folded	Large	Boat-shaped	V-shaped
Bermudagrass	Folded	Pubescent	Pointed	V-shaped
Creeping bentgrass	Rolled	Large	Pointed	Flat
Kentucky bluegrass	Rolled	Minute	Boat-shaped	V-shaped

Table 1. Vegetative characteristics utilized to distinguish annual bluegrass (*Poa annua* L.) from bermudagrass, creeping bentgrass and Kentucky bluegrass.

CHARACTERISTICS: ANNUAL VS. PERENNIAL BLUEGRASS

POA ANNUA VAR. ANNUA	POA ANNUA VAR. REPTANS
(a) annual	(a) perennial
(b) upright, bunch type growth	(b) creeping, stolon type growth
(c) few adventitious roots	(c) many adventitious roots
(d) prolific seed producer	(d) minimal seed producer
(e) seeds have dormancy	(e) seeds lack dormancy

Table 2. Comparative characteristics of the annual and perennial type annual bluegrasses.

PRODUCTS *continued*

washer in its 1973 line that is designed to speed up the job of cleaning member's clubs, thus reducing labor costs. The unit has rotating, interlocking nylon brushes for cleaning irons without damage. Contoured wood cleaning brushes clean sole plates, faces, toes and heels in simple operation. Wittek's super club washer requires only 1½ square feet of floor space and operates on a regular 110-volt outlet. All working parts are rust resistant, and the tank holds 2½ gallons of water and has a drain outlet. The cabinet has a baked enamel finish. The unit sells for \$290 for the standard model, and with a coin-operated device is \$365.

Circle No. 113 on reader service card



F. E. MYERS & BRO. COMPANY, Div. of McNeil Corp., launches a new field sprayer, Model F42, which according to the company, effectively covers up to 300 acres a day with a two-side, 80 foot spray swath (40 feet each side), and features a 42 inch axial flow fan, 500-gallon tank and Myers 2C95 two-stage centrifugal pump, which delivers 200 pounds pressure.

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POA *from page 47*

deficiencies exist. Germination and establishment of annual bluegrass from seed most commonly occurs in late summer. The superintendent, therefore, should accomplish most soil cultivation and vertical mowing operations, which disrupt the surface shoot density, in the spring when annual bluegrass seed germination is minimal. Using the more competitive cultivars also should be considered (Figure 2).

The cultural practices utilized by the superintendent to restrict annual bluegrass may not be totally effective, but if used properly they can go a long way toward limiting the annual bluegrass population.

Chemical control. A number of herbicides are phytotoxic to annual bluegrass, including benefin (Balan), bensulide (Betasan), calcium arsenate, endothal and DCPA (Dacthal). (Lead arsenate effectively controls annual bluegrass on bentgrass greens with better selectivity than the above five, but is not economical for extensive fairway turfs.) Unfortunately, all five herbicides lack the selectivity desired on bentgrass fairways for successful use. The margin of safety of the rate of herbicide needed for controlling annual bluegrass and the rate at which toxicity to the desirable species occurs is fairly good for Kentucky bluegrass and bermudagrass, but very narrow for creeping bentgrass.

The specific soil, environmental and cultural conditions that affect the degree of phytotoxicity to the desirable species is not well understood for these herbicides. We know that injury to the desirable species from inorganic arsenicals is more likely to occur (a) at acidic soil reactions, (b) under poor drainage conditions, especially finely textured, compacted soils (c) high soil phosphorus levels and (d) where creeping bentgrass is the dominant species. Unfortunately, similar information is not available for the other herbicides, because they have not been used as extensively or for as long a time as the arsenates.

Because of the uncertainties of potential phytotoxicity to desirable species, the following approach should be followed by those superintendents contemplating the chemical control approach for annual blue-

grass. The superintendent should test one or more of the herbicides on a small plot on one or more selected fairways that represent the conditions existing on the golf course. A 50- to 100-foot width across several different fairways will serve this purpose. This limited trial program should be conducted for three to four years to (1) give the superintendent the chance to learn how to properly use the herbicide, (2) obtain information concerning the effectiveness of the herbicide in selectively controlling annual bluegrass under the specific conditions on the golf course and (3) assess the potential phytotoxicity problems that may occur to the existing perennial species.

His evaluations over three or four years, will allow the superintendent to decide which one of the herbicides is most effective in controlling annual bluegrass without phytotoxic injury to the desirable species.

It is impossible to give a specific recommendation about whether to encourage or to control *Poa annua* that will apply to all golf courses. The previous discussion was presented to provide a basis for the superintendent's decision. If the superintendent chooses to use chemical control, he must bear in mind that the lack of information about selectivity and the extent of phytotoxicity suggests that an extensive chemical control program should not be initiated at this time on golf course fairways in the cooler regions where the dominant species is bentgrass.

On bermudagrass and Kentucky bluegrass fairways, a chemical control program should not be initiated without a small plot trial evaluation period under the specific conditions on the golf course under consideration. Also, renovation or reestablishment should be considered as an alternative by the superintendent on turfs containing predominantly annual bluegrass before the selective preemergence herbicide program for annual bluegrass control is initiated.

Most probably, the approach used by the majority of golf course superintendents is a combination involving cultural practices, which discourage annual bluegrass to a certain extent, but concurrently taking steps to minimize extensive loss of the existing annual bluegrass environmental stress. □