HALTING THE POA INVASION

Poor drainage or overwatering can cause loss of perennial grasses leaving the way open for a Poa *invasion.*

A past president of the Golf Course Superintendents Assn. of America offers his observations on the nature and control of *Poa annua*

by SHERWOOD A. MOORE

I have been associated with turf now for more years than I care to remember, and it seems to me that superintendents have always been talking about *Poa annua*—whether to live with it or eliminate it.

Annual bluegrass, Latin name *Poa annua*, is distributed widely throughout North America, from Florida through Canada to Alaska, from Massachusetts to Oregon. It is easily identified by its characteristic bluegrass leaf—folded bud and boat shape tip, yellow to dark green in color and its absence of rootstocks or stolons. During its flowering and seeding stage it is whitish in appearance. During the summer, if it does not receive enough water or if temperatures get too high, it appears brown.

Annual bluegrass has some advantages, and, although superintendents generally curse its presence, there are times when they are glad to have it around. When properly maintained it is a pleasing green color. It grows vigorously. It can be cut closely. A closely-cut *Poa annua* turf, when not seeding, produces excellent putting qualities and good lies in fairways. Because of its quick germination and rapid growth during the active growing season, divot scars and other injuries heal in a relatively short time. *Poa* has the ability also to grow in compacted soil, though the

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root growth is somewhat superficial, and gives a grass cover to an otherwise barren soil. Contrary to the popular belief that *Poa annua* is a shallow-rooted plant, H.B. Sprague and C.W. Burton in their study published in 1937, entitled, "Annual Bluegrass and its Requirements for Growth," showed that annual bluegrass develops a substantial root system. Lastly, *Poa* is a grass on which superintendents can blame a lot of their management problems.

The disadvantages of *Poa annua,* however, outweigh its advantages. Its vigorous growth and abundant seed production allow it to invade areas where perennial grasses are established. The pollen from *Poa annua* causes an allergic reaction in many people, golfers included, who suffer from hay fever and other allergies.

Annual bluegrass is very susceptible to many of the major turf diseases—the leafspots, dollarspot, large brownpatch and snow mold—and requires continual spraying to maintain it. It is also very susceptible to winter injury. During the winters of ice cover and dessication, *Poa* suffers first.

The major disadvantage of *Poa* is its intolerance to high temperatures; it is very unpredictable during the summer months. This factor alone is enough to discourage the proponents of annual bluegrass. Still, there is much controversy concerning annual bluegrass. There always will be superintendents who say, "*Poa* is a friend, I will live with it." Others regard it as an enemy that must be eliminated. I think that if a superintendent had his choice he would prefer the perennial grasses over *Poa.*

The reasons *Poa annua* can dominate golf course turf includes:

☐ Compacted soil caused by traffic, machinery or poor drainage. Perennial turfgrasses cannot survive under these conditions so they make way for *Poa* and weeds;

☐ Disease and insects;

☐ Turf injury caused by players or maintenance equipment abuse, both of which result in the loss of perennial grasses;

☐ Chemical injury to perennial grasses caused by misapplications of fertilizers, fungicides, insecticides, herbicides or other protective chemicals;

☐ Poor drainage;

☐ Improper turf management—over - watering, over - fertilization, and excessive phosphorus in soil.

MANAGEMENT CONTROLS

The superintendent can control the degree of *Poa* he wants by his management practices and by chemicals. Unfortunately, many superintendents' turf maintenance programs, which support the desirable blue or bentgrasses, also encourage *Poa.* By knowing the characteristics and growing habits of *Poa*, superintendents can encourage, maintain, control or eliminate it. Jack Martin, superintendent at Suburban CC, Union, N.J., says, "If you have a majority of *Poa* and you do not want to inconvenience your membership by burning it off the fairways or thinning it, you can maintain *Poa* during the summer months with precise water scheduling, disease prevention and proper fertilization." Light, frequent water applications are necessary during the summer to maintain *Poa.*

Thirty-five years ago it was noticed that artificial watering systems favored the invasion of *Poa.* Fairways that were over-watered were heavily infested with annual bluegrass. Sprague and Burton found that soils kept at 30 per cent of their water-holding capacity produced very little growth of annual bluegrass. Those kept at 40 per cent supported fair growth and those kept at 50 to 60 per cent permitted maximum growth. To discourage *Poa* and encourage permanent grasses, soils must be kept on the dry side. Water less frequently, but thoroughly. During the drought years of the mid-1960s, superintendents in Westchester County, N.Y., were curtailed from using any water on the fairways. Surprisingly, the fairways did not fall apart; they actually improved!

Mowing practices also go a long way toward determining the amount of *Poa* in turf. Superintendents cannot always mow grass at the height that they would like to or at the height the grass would like to be cut. But, they can change the direction of the mowings, straddle wheel marks of previous mowings, regulate the speed of mowings, change the time of mowing during the summer months to early morning and late afternoon, instead of during the hot periods of the day. Superintendents should also raise slightly the height of cut during periods of extreme stress and keep the mowers sharp and properly adjusted. Both large and small equipment should be turned at different places instead of concentrating turns in the same areas.

Fertilization plays an important role in the *Poa* content of turf, although there is less research and more controversy along this line concerning *Poa.* To maintain *Poa* during the summer months do not apply heavy applications of nitrogen, because this will produce more clippings, make the turf more succulent, produce a poor root to top ratio and result in the more rapid loss of *Poa* during periods of stress. Sprague and Burton claimed that the use of organic fertilizers only produced thin turf and permitted incroachment of annual bluegrass, but then I have known golf courses that have been using organics for years and they have some of the most beautiful perennial turfgrass I have seen. Some say the practice of fertilizing turfgrasses during their dormant stage favors annual bluegrass because this is when the *Poa* is growing best over the perennial grasses. But other opinions favor dormant feeding.

Heavy fertilization will have the same effect on perennial grasses with the resultant thinning and weakening of the desirable grasses. I have been harping for years that superintendents do more damage to turf by over-fertilization than by under-feeding. In the Northeast, two pounds of nitrogen per 1,000 square feet of established fairway turf is more than ample. It is also well known that annual bluegrass favors a liberal supply of available phosphate in the soil. If soil tests show an adequate supply of phosphorus, eliminate this nutrient from the fertilizer mix.

Temperatures are an important factor in *Poa annua* survival. There

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is little the superintendent can do to keep soil temperatures down except through watering practices and in the construction of greens. Douglas T. Hawes, who wrote his master's thesis at Cornell on the effect of temperatures on *Poa,* says, "*Poa annua* grown at a 55 degree night temperature and cut at one-quarter inch produces good turf even when exposed to day temperatures ranging from 85 to 105 degrees. The less frequently it receives cool (55 degrees F) night temperatures the poorer the turf becomes and the shorter the root system becomes."

In his opinion, the superintendent should keep a record of the low night temperatures and not worry as much about the high temperatures of the day. During the summer when the low night temperatures consistently fail to go below 65 degrees, one can expect trouble—even losses—with annual bluegrass even though it has been syringed frequently.

In the construction of greens, remember, greens pitched away from the sun will be cooler than greens facing the sun. Trees help shade greens and keep soil temperatures down. Irrigation with cool water rather than warm also aids in keeping soil temperature down.

pH is also another factor that influences the maintenance or elimination of *Poa*. Turf made strongly acidic by the use of sulfate of ammonia or other acid-forming fertilizers do not allow entry of annual bluegrass because of its low tolerance for high acidity. But perennial grasses can also be affected by high acidity, so this way of controlling annual bluegrasses is entirely unsatisfactory. So, maintain the pH favorable for the perennial grasses and forget about controlling *Poa* with low acidity or high alkalinity. A pH of about 6.5 is considered most desirable for over-all nutrient availability.

CHEMICAL CONTROLS

Controlling diseases, insects and weeds that could damage perennial grasses, thus allowing a *Poa* takeover, is important, but fungicides, insecticides and herbicides can shock perennial grasses and restrict their root growth.

Because management practices alone will not control *Poa*, superintendents need some help from chemicals. In this article I would like to stick strictly to my experience with arsenicals for *Poa annua* control.

(Editor's note: As Sherwood Moore points out, when dealing with arsenicals superintendents must be sure that their spraying equipment is calibrated precisely. A fraction too much of an arsenical can destroy more *Poa* than a superintendent wants, leaving him with no turf and irate members. Also, as Moore later points out, a superintendent must have the complete backing of club officials and the green chairman when undertaking a program of *Poa* prevention or control.)

Lead arsenate is a long-range program. Yearly in March I apply five pounds of arsenate of lead per 1,000 square feet to the greens. It is also effective when applied to fairways, but is usually too expensive for this practice.

If conditions warrant such drastic measures as a scorched earth policy then there is sodium arsenate. If the membership is willing to undertake such a program then by all means renovate. However, a renovation program that is limited only to the destruction of weeds, clover and *Poa* is of little value. The basic causes for the turf weakness and weed invasion must first be corrected. Ordinarily, weed control is only one part of a renovation program. Sodium arsenate can also be applied as a post-emergent spray to discourage *Poa annua* plants and destroy the seeds. When Paul Weiss was superintendent at Lehigh CC, Allentown, Pa., he controlled crabgrass and *Poa* by using one pound of sodium arsenate per acre starting in mid-August, when most of the seedhead was exposed from the sheath, and followed by another spray in early September and a final spray 10 days later.

Another arsenical that is being used extensively is calcium arsenate. I am now on a calcium arsenate program at Woodway CC, Darien, Conn. In my first year at Woodway we did no large scale applications of calcium arsenate. We did apply 5, 8, 10 and 16 pounds per 1,000 square feet to 10 plots. We observed these plots closely the first year and found the five pound rate to be to our liking, or so we thought. It set the *Poa* back, made it look sick, but did nothing for the wholesale removal of it. Anything over five pounds removed annual bluegrass. The higher the rate, the greater the loss of *Poa*.

On April 15, 1969, we applied five pounds of calcium arsenate per 1,000 square feet to all 18 fairways. Then on June 3d we sprayed all fairways with Banvel 1-D, one pint in 100 gallons of water per 2½ acres. This was done to control clover and knotweed, but it also proved to be to our undoing. We eliminated a lot more *Poa* than we wanted to. During September we aerated, aerothatched, seeded and fertilized the fairways.

The following spring we applied five pounds of calcium arsenate per 1,000 square feet to our fairways. Again we lost too much *Poa,* but in this case it was due to an infestation of the hyperodes weevil and not the spraying program. Again we aerated and overseeded. In 1971, still convinced we were on the right track, we applied our third application of calcium arsenate. Twenty-two inches of rain in 60 days caused us again to lose more *Poa* than we wanted at this stage. This spring I again applied five pounds of calcium arsenate per 1,000 square feet.

I hope I have not painted too bleak a picture of our program. It is a big undertaking and should not even be contemplated without serious thought. One must be convinced that the program *really* will eliminate *Poa*. The superintentent's job could be a stake, even with the initial cooperation of the green committee and the membership. If something goes wrong, they can easily forget. □

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