

Selective Postemergent Controls for *Poa Annua* and Enhancement of Desirable Turf¹

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There are multitudes of excuses for high populations of annual bluegrass in our turf, but this weedy grass is not necessary and we should not complacently accept it as fate. Before exploring methods of postemergence control, let us gear our thinking to some of the reasons why it is so dominant on a significant portion of our turfgrass facilities.

1. **Overirrigation.** The majority of golf course superintendents apply excessive water. Annual bluegrass proliferates under conditions of excess moisture. Bentgrasses, fescues and ryegrasses perform better with good drainage and some moisture stress. As we all know, annual bluegrass will not withstand much stress from moisture, heat or cold. Most of us are not willing to extensively sample the soil to determine whether irrigation can be delayed a day or more. It is easier to irrigate. And, of course, some use the excuse that greens become too firm although there is no sign of stress. If you use this excuse, you are admitting your own shortcomings and not addressing the main problem. Many acres of turfgrasses are overwatered simply to catch a few dry spots that will not be rewet through normal watering practices. Continually moist surfaces provide an optimum environment for germination of annual bluegrass as well.
2. **Excessive fertilizer.** Applications of nitrogen and phosphorus are the two main offending elements. Annual bluegrass can withstand a wide range of nitrogen nutrition, but flourishes under high nitrogen fertility. Adequate quality can be maintained with the other desirable turfgrasses with lesser amounts of nitrogen. High nitrogen predisposes desirable turfgrasses to heat, cold and drought stress and can also cause a decrease in the

root system. Excessive phosphorus is of absolutely no value to the desirable turfgrasses although it will enhance seed production of annual bluegrass while there are no seed being produced by desirable turfgrasses. Great quantities of seed produced by annual bluegrass insure its re-establishment.

3. **Improper timing of aerification and verticutting.** When these mechanical practices are carried out at the time of optimum germination of *Poa annua* (during late summer and early fall chiefly) we are assured of excellent germination and establishment of annual bluegrass.
4. **Loss of turf to pests.** With our northern cool season grasses, desirable turfgrass loss due to diseases is probably more significant than all other pest causes. If we cannot adequately protect our turfgrasses through fungicidal applications then we should be prepared to overseed these areas with desirable grasses early in the season to prevent annual bluegrass from dominating.
5. **Loss of turf from puddled and compacted surfaces and traffic.** We can prevent this type of problem on putting greens by building them properly with sand, increasing drainage activity, or initiating and maintaining a sand topdressing program. Traffic control is another matter and must be dealt with in each situation.
6. **Loss of turf from various stress factors.** Hydrophobic soils on putting greens (particularly sands) can result in the loss of all grasses. Aerification and the judicious use of soil surfactants will help to eliminate this problem and prevent overirrigation to the major areas. Heat stress can be partially corrected through light syringing and desiccation losses can be mini-

mized by employing protective measures that we already know.

SELECTIVE POSTEMERGENT CONTROL OF ANNUAL BLUEGRASS

A number of selective postemergent and also preemergent chemicals have been tested at Washington State University's research station at Puyallup, Washington over a large number of years. From the period of 1975 through 1979 extensive investigations were made with endothall turf herbicide as the disodium salt. Tom Cook, currently of Oregon State University, was the project leader on the initial investigations. Endothall was tested at various rates on all of the common cool season genera and was found to be most effective on all except the fine leaved fescues. It is extremely toxic to the fine leaved fescues at all but the lowest rates which were not adequate to give good annual bluegrass control. Therefore, we do not recommend the use of endothall turf herbicide on the fine leaved fescues. Investigations with the various bentgrasses indicated that the velvet bentgrasses were not tolerant to endothall, and therefore we do not recommend use on the velvet bentgrasses.

The labelled rates of endothall as early as 1975 even with repeat applications at two week intervals did not give adequate control of annual bluegrass while continued use caused excessive discoloration and thinning of desirable turfgrasses. It was subsequently found that a single application of higher concentrations resulted in a better kill of annual bluegrass with only minor color loss of the desirable grasses. In general, our applied rates resulted in a color loss of the desirable grasses about 2 points on a scale of 1 to 9. This small loss of color is little price to pay for effective annual bluegrass control.

It is very important to achieve

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complete wetting of the turfgrass plants when applying endothall. The more thorough the cover the better the kill in a single application to annual bluegrass. Our work was accomplished with water and herbicide rates of approximately 100 gallons per acre. Although smaller volumes under most circumstances will control the weed, higher volumes gave a more consistent kill.

TIMING AND APPLICATION RATES OF ENDOTHALL

Kentucky Bluegrass. Applications were most effective when applied between early-June and mid-September when turfgrass plants were not under moisture nor heat stress. Avoid applications if daytime temperatures normally exceed about 85°F. The best suggested guideline for applications on Kentucky bluegrass and turf-type perennial ryegrass when overseeding is not necessary is as follows:

Nitrogen. Apply 1 lb available N per 1000 sq ft the middle of May.

Bensulide. Apply 10 lb of active ingredient per acre at the time of fertilization or within one week.

Endothall. Apply 2.5 lb per acre in late May or early June.

Repeat nitrogen application 10 days to two weeks after endothall application to stimulate new growth and recovery from endothall.

It is not advisable to make a repeat application of endothall for at least 8 weeks following the first application. The system that worked good at Puyallup was to apply all treatments the same as listed above beginning in early August. For most areas, the program would allow adequate time for recovery and fill in of turfgrasses before reduced growth rates in fall.

Creeping and Colonial Bentgrasses. Applications are most effective between late April and mid-June and again during early to mid-September provided environmental stresses do not prevail. Summer applications are acceptable during mild periods when temperatures are below 80°F and moisture stress is not a factor. Endothall should not be applied when frost is likely to occur as excess discoloration and injury to desirable grasses may occur.

A suggested program for endothall applications to colonial and creeping bentgrass turf can be described as follows:

Nitrogen. Apply about 1 lb of available nitrogen per 1000 sq ft between mid-April and the 1st of May.

Bensulide. Apply 10 lb active ingredient per acre one week after the

nitrogen application.

Endothall. Apply 1 to 1.25 lb active ingredient per acre approximately one week after the bensulide application.

Repeat the nitrogen application within 10 days to 2 weeks following the endothall treatment.

Fairway bentgrasses can be treated in the same manner for the putting greens described above but the rate of endothall should be increased to approximately 1.75 to 2.0 lb active ingredient per acre. A repeat application may be made on either putting greens or bentgrass fairways 8 weeks after the initial treatment provided that environmental stresses are not a factor.

USE OF ENDOTHALL WITHOUT PREEMERGENCE HERBICIDES

Endothall has virtually no soil activity and only a very short foliar residual activity. After the death of mature annual bluegrass plants the seed which has previously been shed readily germinate and reestablish their areas.

It may be too dangerous to apply preemergence herbicides in conjunction with endothall where turfgrass stands are dominated by **Poa annua**. Fill in rate of desirable grasses may be too slow and could result in large bare areas for extended periods of time. An alternative to the use of preemergence herbicides at least in the initial one to two years we suggest the following program:

1. Apply nitrogen and endothall in the manner described previously.
2. Immediately overseed with slicer-seeder and broadcast applications preceded by spiking, aerification, etc.
3. Topdress to maintain smooth, uniform conditions on putting greens and delete this operation on larger turfgrass areas.
4. Raise the mowing height on putting greens to a height of 5/16 inch. We all know this is an objectionable height but with light, frequent sand topdressing the putting greens can be played even during the period of reestablishment.
5. Keep the surface moist at all times to insure rapid and uniform germination of the applied seed.
6. Within a period of 4-6 weeks gradually reduce mowing height in small increments until the desired putting green height is achieved while continuing the light, frequent sand topdressings.

It is possible to make two such treatments in a single year although

one treatment will probably give significant results and can be repeated in subsequent years as desired. In the second year if it is determined that an adequate population of bentgrass has been achieved on the putting green than I would strongly recommend the use of bensulide preceding the endothall treatment and do not practice subsequent overseeding. It has been found that endothall applications are approximately 60-80% effective in the removal of annual bluegrass and therefore additional applications are necessary. When the annual bluegrass population has been reduced to very low levels repeated applications can be made at the discretion of the superintendent.

OVERSEEDING METHODS FOLLOWING ENDOTHALL OR ENDOTHALL/BENSULIDE TREATMENTS

Investigations were made by Dr. John Roberts (currently at the University of New Hampshire) and R.L. Goss at Washington State University's research station at Puyallup during 1978 and 1979 on reestablishment of bentgrass turf on putting greens following endothall or endothall/bensulide applications. It was found that when endothall was used alone or when applied one week following the application of bensulide there was a significant control of annual bluegrass in a mixed population of Highland bentgrass and **Poa annua**. Approximately 80-80% of the initial annual bluegrass population was destroyed following the endothall treatments.

The most effective overseeding technique involved two passes with a spike air cultivator followed by a Rogers seeder and a subsequent mowing height of 5/16 inch when endothall was applied at 1 lb active ingredient per acre. When bensulide was applied preceding the endothall application the best germination and establishment of overseeded bentgrass occurred when the area was aerified and seed was placed with a drop seeder. Rogers (slicer-seeder) seeding following bensulide/endothall application resulted in thinner stands of bentgrass but were yet a significant means of establishment of bentgrass through bensulide.

CONCLUSIONS

In conclusion we might reiterate that good maintenance practices of proper water control, adequate but controlled fertilization, good pest management, and judicious timing

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WHERE THERE'S SMOKE - STAY LOW AND KEEP COOL!

When you check into a large hotel, as you may during GCSAA's 53rd International Turfgrass Conference and Show in New Orleans January 31-February 5, one small precaution may save your life. When you enter your room, take a moment to glance down the hallway and note the location of the stairwells. It will only take a second and you may not get another chance.

Fires in large hotels have become frighteningly familiar news stories lately, especially with two disastrous fires in Las Vegas hotels in a relatively short time. Unfortunately, most people think disasters of that type are something that only happens to other people. With more than 5,000 hotel fires in a year, the odds may catch up with you.

In a hotel fire, the flames are not the killers. Smoke, usually coupled with panic, is. That's why you should memorize the location of the stairwells as well as the layout of your room. You may not be able to see them very well later. If you do smell smoke in the middle of the night, don't be in a hurry to flee. Call the hotel desk and report it to the fire department. They may have everything under control and if they don't, at least someone will know where you are. If you do leave your room, stay low and stay calm. Crawl to the stairwell and make your way down, keeping a firm grip on the handrail.

Not everyone may be as calm as you, and you could be trampled. Don't try to take the elevator down and unless you're on the lower three floors, don't try to jump. If you run into a dense area of smoke be sure to prop the door open so you won't be locked out. Many people have remained unharmed in their rooms while others died trying to escape. It's a judgment call, but if you decide to stay in your room, several precautions can increase your chances of survival.

1) Turn on the bathroom vent. Fill the tub with water for firefighting purposes. Stuff wet towels under the door. If the door and walls are hot, keep throwing water on them. Keep everything wet and don't worry about the mess. 2) If your room has a window or sliding door, open it, but keep an eye on it. There may be more smoke outside than inside. If there is fire outside the window, get rid of the draperies and anything nearby that might be combustible. Keep pouring water around the window. 3) If you swing a wet towel around the room, it will help clear the smoke. Another wet towel tied around your nose and mouth will filter the air you breathe.

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of all applications will materially assist in **Poa annua** control. The use of reasonable levels of sulfur (3.5 lb per 1000 sq ft or more per year) and reduction of phosphate to perhaps 1/2 and not exceeding 1 lb P_2O_5 phosphorus per 1000 sq ft per year will give bentgrasses and advantage over annual bluegrass. Bluegrasses can be treated in much the same manner as the bentgrasses with the exception that high sulfur levels may not be necessary above the actual nutritional requirements.

I believe we have clearly demonstrated that endothall is a viable postemergent control chemical for annual bluegrass and if used with discretion along with good cultural and fertility programs, we can go a long way toward controlling and possibly eliminating annual bluegrass in desirable turfgrass areas.

¹Presented at the 32nd Annual Canadian Turfgrass Conference and Show, Vancouver, British Columbia, March 1-4, 1981.



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