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Suppression of Early Spring Seeding of *Poa annua L.*

Most of the Poa annua *biotypes inhabiting the golf courses of northern Illinois have a "winter annual" life cycle (Figure 1). Winter annuals germinate in autumn, overwinter in a vegetative state, set seed in the spring and then die during the heat of summer. Fortunately, most of the* Poa *north of I-80 survives the summer and behaves like a true perennial, thanks to better understanding of the plant's biology and careful management by superintendents.*

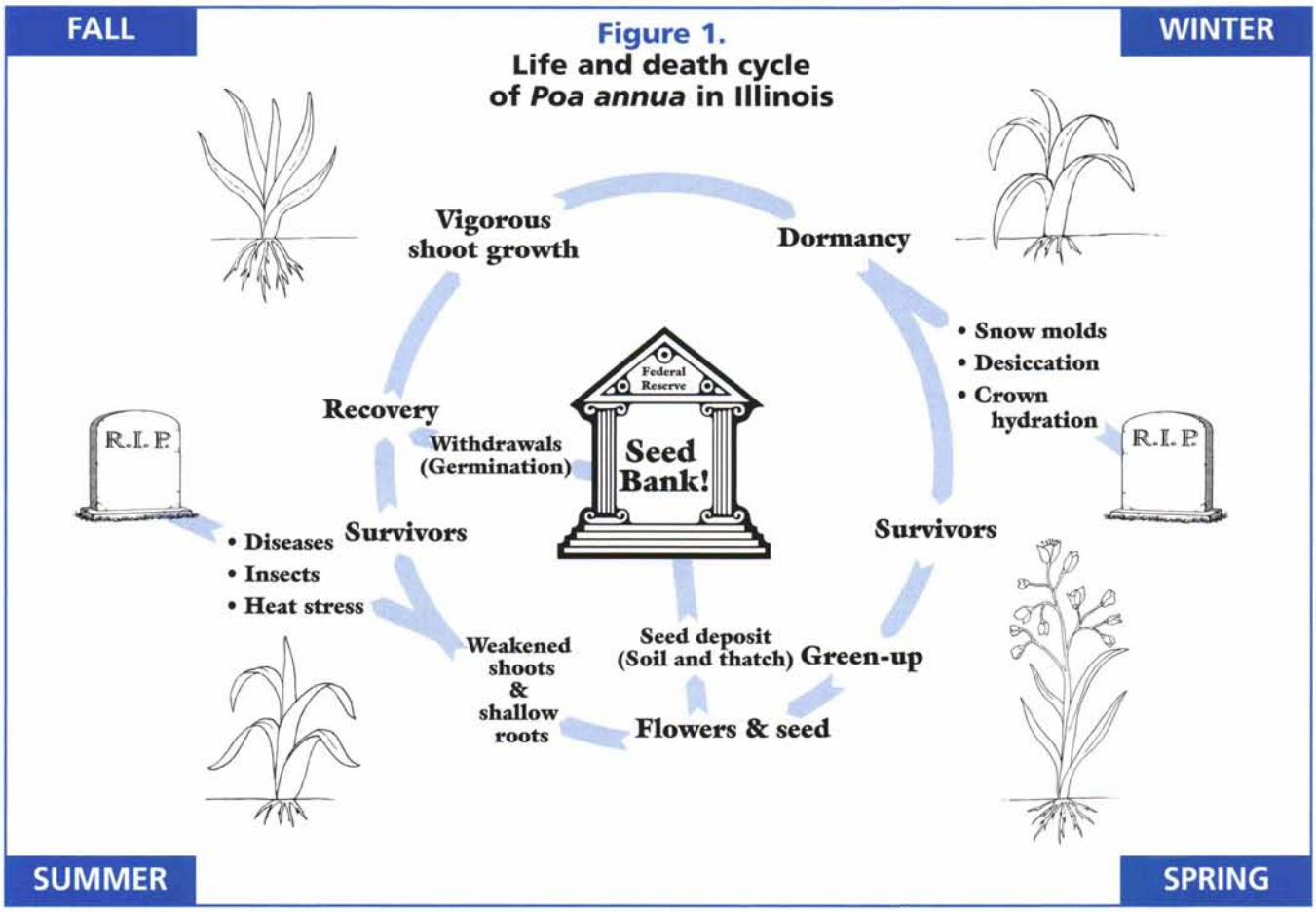
Several herbicides and plant-growth regulators are known to inhibit Poa *seeding . . . However, most products have problems with consistency of seedhead suppression, length of time seedheads are suppressed or phytotoxicity.*

Biotypes of *Poa annua* common to northern Illinois often seed profusely in late April through May, which can become objectionable for several reasons. First, profuse seeding can turn a *Poa*-contaminated green or fairway almost white in color, prompting questions about the health of the grass. Second, putting greens with significant *Poa* populations provide very poor putting surfaces in spring, because ball roll (speed and direction) can be adversely affected by seedheads (just ask Johnny Miller). Third, heavy seeding may not be beneficial for the long-term survival of *Poa*. Several theories suggest that seed production in *Poa* diverts too much photosynthate from vegetative tissues (i.e., leaves, roots), and a few studies do show reduced root depth and shoot growth after seeding. *Poa annua* that doesn't set seed (e.g., in treated plots) is usually better able to survive summer stresses.

So, how do you reduce or suppress *Poa annua* seeding in spring? Several herbicides and plant-growth regulators are known to inhibit *Poa* seeding, including older products like maleic hydrazide, endothall and mefluidide, or relative newcomers like paclobutrazole (Table 1). However, most products have problems with consistency of seedhead suppression, length of time seedheads are suppressed or phytotoxicity. Also, application timing and stage of plant growth is critical for best seed inhibition, and calendar dates for application may vary widely from year to year.

I first became interested in *Poa* seedhead suppression after writing an "Ask the 'Expert'" column for the May '96 issue of *On Course*. The best success was found using Embark (mefluidide), but timing and phytotoxicity problems were limiting its use. Several superintendents were using the wetting agent Aqua-Gro L to good effect, with more variable results but somewhat lessened phytotoxicity concerns. Also, many superintendents using gibberellin inhibitor PGRs (Cutless, TGR) reported some

Figure 1.
Life and death cycle of *Poa annua* in Illinois



seedhead suppression following early season treatments, although seedhead suppression was not the primary goal of that program.

I finally decided to try an onsite test to see if Aqua-Gro could consistently suppress seedheads compared to Embark. Also, I had heard that ethephon (Proxy) had shown good activity for *Poa annua* seedhead suppression in 1999 trials, and should be included in the study. Proxy is a "new" PGR for the turf market that may be safer and have more timing flexibility than Embark, and looks like a potential substitute for Aqua-Gro, which is no longer manufactured (and supplies are dwindling!). Also, last spring I was fortunate to receive a USGA Regional Research Grant-in-Aid thanks to Paul Vermeulen and the USGA Turfgrass and Environmental Research Committee, and additional monetary support from Aquatrols. These funds helped support the study described below (to be repeated and refined in spring 2001).

Table 1.
Chemicals that have been used for *Poa annua* seedhead suppression:

Common Name	Trade Name
maleic hydrazide	'MH'
chlorfluorenol	'Maintain'
endothall	'Endothal'
ethofumasate	'Prograss'
mefluidide	'Embark'
paclobutrazole	'Enhancer,''Trimmit'
ethephon	'Proxy'
flurprimidol	'Cutless'
trinexapac-ethyl	'Primo'
(wetting agent)	'Aqua-Gro L'

Needless to say, I had no trouble finding three superintendents in the Aurora-to-Oak Brook corridor who had *Poa*-infested greens and wanted to participate in my study (thanks to Dan Anderson, John Gurke, Dave Blomquist). The first treatments were applied April 18 (Aurora C.C., Fox Valley C.C.) and April 26 (Naperville C.C.), after much hand-wringing and GDD model-cranking to see if the "window" for applications was open. If you remember, last spring started and stopped several times beginning in February, so determining a spray date (especially for Embark and Aqua-Gro) was difficult.

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The products tested, application rates and intervals are summarized in Table 2, along with the results. The new wetting agent Cascade was included in the study for comparison to Aqua-Gro, which was applied on a seven-day interval (twice at 8 fl. oz. or three times at 8+4+4 fl. oz.). The plant growth retardants Enhancer (a.k.a. Trimmit) and Primo were also tested, since both have anti-gibberellin modes of action that stunt seed stalks but do not inhibit flower production. Embark was included as a standard of comparison, and because a new, lower-concentrate formulation is available that may make applications a little safer (Embark "Lite"—still no greens height label). Proxy was included at 5 and 7.5 fl. oz. rates after consultation with Professor Bruce Branham, who is also testing (on campus) Proxy and several other products for *Poa* seedhead suppression.

Results

Note that data from Naperville C.C. is not reported; only wetting agents were tested there, few seedheads were produced on the green and no treatment effects were observed. Seedhead suppression was estimated using a somewhat subjective visual rating scale beginning in early May and continued for about a month (five-six ratings). Table 2 shows the "high" or worst rating, "low" or best rating, and the average rating ("mean") for each treatment at Aurora and Fox Valley C.C.s. A rating of less than 1 (less than 2% seedheads) was an effective treatment compared to the check plots. Only Proxy and Embark provided that level of seedhead suppression in May 2000.

Enhancer- and Primo-treated plots had more visible seedheads than untreated check plots, although I am convinced no more seeds were produced by *Poa* plants on these plots. The greens in this study were mowed daily, so some seedheads were probably removed from check plots over time. Stunted seedheads on Primo and Enhancer plots were removed less by mowing, thus giving the elevated ratings. Wetting agent treatments showed little seedhead suppression, with the possible exception of the 8+4+4 fl. oz. Aqua-Gro regime at Fox Valley. This approach is used by John Gurke at Aurora, and he also noted little effectiveness on seedheads on the rest of his course in 2000.

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Seedhead suppression was estimated using a somewhat subjective visual rating scale beginning in early May and continued for about a month (five-six ratings).

Table 2.
Visual rating of *Poa* seedhead production in test plots at Aurora C.C. and Fox Valley C.C., spring 2000.

Rating (scale below) of % *Poa* seedheads measured between May 1 and June 8, 2000

Product (Formul.)	# Appl.	Rate/M	Aurora C.C. High	Aurora C.C. Low	Aurora C.C. Mean	Fox Valley C.C. High	Fox Valley C.C. Low	Fox Valley C.C. Mean
Untreated Check	—	—	2.3	1.0	1.6	2.3	0.8	1.4
Aqua-Gro L	2	8 + 8	2.3	1.3	1.7	1.5	0.7	1.1
Aqua-Gro L	3	8+4+4	2.8	0.7	1.6	1.3	0.4	0.8*
Cascade L	2	4 + 4	2.2	1.2	1.6	2.0	0.8	1.3
Enhancer 2 SC	2	0.25, 0.18	2.8	2.3	2.5	2.7	1.8	2.2
Primo 1 EC	1	0.5	2.1	1.5	1.8	2.3	1.4	1.9
Embark 0.2SLT&O	1	1.8	1.2	0.1	0.5*	0.7	0.1	0.4*
Proxy 2 SL	2	5.0	0.9	0.1	0.5*	0.7	0.1	0.3*

Rating Scale	Estimated % *Poa* seedheads
0	0-2%
1	2-10%
2	10-25%
3	25-50%
4	50-75%
5	75-100%

Signature have been added to early spring fungicide treatments to improve spring green-up, control cool-season pythium and help with the early spring stresses of excess moisture, compaction and desiccation.

In some cases, treatments are needed immediately after the snow cover melts. However, the turf may be too wet to support spray equipment. In this case, consider applying granular products like fungicide X (Iprodione), fungicide IX (Chloroneb and Thiophanate-Methyl) and fungicide V (Chloroneb).

Hope for a quick thaw and that your preventive measures protect the turf. Good luck in identifying the snow mold and treating it accordingly.

References

Diseases of Turgrasses, III Edition, "Winter Patch Diseases," Krieger (pp. 74-79).

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www.ianr.unl.edu/pubs/PlantDisease/g824.htm, "Snow Mold Diseases of Turfgrass," Watkins, Extension Plant Pathologist (Nebraska).

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A Note on Phytotoxicity

All of the products tested can cause yellowing or tip burn on fine turf under the right/wrong conditions. Embark and Proxy showed the most activity on seedheads, but (unfortunately) also showed the highest levels of discoloration and thinning of turf. Embark caused a substantial amount of browning and thinning to bentgrass clones in the mixed bent/*Poa* chipping green that was treated at Aurora CC. Proxy showed less damage to the bentgrass, but turned the *Poa annua* light green to yellow and caused noticeable thinning. The higher 7.5 fl. oz.-rate of Proxy was applied at Aurora C.C. (probably too high). Much lower levels of yellowing and thinning were noted at Fox Valley C.C., for both Embark and Proxy treatments.

Final Note

There is good evidence that tank-mixing chelated iron or using follow-up Fe treatments will "safen" or counteract the damage caused by Embark, and possibly Proxy. I did not include any Fe treatments in this initial study; however, I believe I have some circumstantial evidence to support the +Fe "safener" idea. As part of his normal fertility program, Dan Anderson applied chelated Fe (Sprint 330, 10% chelated DTPA Fe) to all the greens at Fox Valley on April 25 and May 8, and had other low-rate applications of Fe in his fertility program. John at Aurora did not apply Fe to the chipping green in spring of 2000 (and when I asked him if he wanted me to, he said, "no, let's see what the worst case scenario is . . ."). So, if you want to try Embark or Proxy for seedhead suppression, be aware of possible phytotoxicity, treat small test areas or the chipping green first and include some chelated Fe. (Note: non-chelated Fe forms interfere with the activity of Embark.)