



**Ethephon Use on Arizona & California Golf Courses:
Comments on EPA Proposed Interim Decision, Case no. 0382
Prepared by Alfred Fournier, David Kopec & Peter Ellsworth
Comments submitted by the Arizona Pest Management Center
University of Arizona**

EPA Docket ID: EPA-HQ-OPP-2010-0098
September 22, 2017

Summary

- The Arizona Pest Management Center is submitting these comments on behalf of stakeholders in response to EPA's Ethephon Proposed Interim Registration Review Decision (PID, case #0382).
- To address children's post-application risk, EPA is proposing that all turf uses except for golf courses be terminated, and that applications to golf courses would be allowed only to tees, greens, and fairways. The registrants have also agreed to limit applications to a maximum of four per year (currently labeled for up to six applications) at a maximum single application rate of 3.4 lbs a.i./A, and a retreatment interval of 28 days.
- Turf experts and other stakeholders in Arizona and California agree with most aspects of EPA's proposed interim decision for ethephon, except for the limitation of 4 applications per year. Given the climate and year-round warm temperatures in our region, experience shows that 6 applications per year are typically needed to prevent seedhead formation of *Poa annua* on overseeded bermudagrass greens year-round, on bentgrass greens and on tees and fairways.
- Ethephon, tank-mixed with trinexapac-ethyl, is the only effective treatment available for full seed head prevention of *Poa annua* in overseeded bermudagrass turf. Other available plant growth regulators (PGRs) suppress seedheads, while ethephon acts by preventing seedhead stems from forming inside the base of the plant itself.
- Other registered alternatives do not provide sufficient control of *Poa annua* seedheads. Another PGR, mefluidide (Embark), which was the best alternative to ethephon for the prevention of seedhead formation, is no longer available for use on AZ and CA golf courses.
- We fully agree with the need to protect young children from exposure to any potentially harmful chemicals, and the elimination of uses of ethephon in situations where young children are likely to become exposed. We believe the risk of exposure of young children (ages 1-2) to ethephon on professional golf courses is extremely minimal.

- Golf courses provide economic and recreational benefits to society. The Arizona golf industry is a strong contributor to the state economy with a total economic contribution of \$3.9 billion in sales in 2014, including golf facility operations, golf tourism, and golf-related businesses (Duval et al. 2016). California golf courses often host charitable tournaments of the Professional Golfers Association of America (PGA), which have raised over \$120 million for charity in Northern California since 1937, including \$10 million in 2017 alone (Mahady letter, attached).
- We urge EPA and the registrants to reconsider the unique climatic situation in Arizona and southern and coastal California and to retain ethephon labels in these states that allow 6 annual uses.

Who We Are

The Arizona Pest Management Center is host to the University of Arizona's expert integrated pest management (IPM) scientists including Ph.D. entomologists, weed scientists and plant pathologists with expertise in the strategic tactical use of pesticides within IPM programs that protect economic, environmental and human health interests of stakeholders and the society at large.

Dr. Peter Ellsworth is Director of the APMC, State IPM and Pesticide Coordinator for Arizona and Professor of Entomology / Extension IPM Specialist with expertise in developing IPM systems in cotton and other crops and measuring implementation and impact of IPM and pest management practices. Dr. Al Fournier is Associate Director of the APMC / Adjunct Associate Specialist in Entomology, holds a Ph.D in Entomology, and has expertise in evaluating adoption and impact of integrated pest management and associated technologies. He serves as a Comment Coordinator for the Western IPM Center, representing stakeholders in the desert Southwest states. Dr. David Kopec is Turfgrass Extension Specialist with University of Arizona. He works extensively with the golf and other recreational turf industries in the state.

These comments are the independent assessment of the authors and the Arizona Pest Management Center as part of our role to contribute federal comments on issues of pest management importance and do not imply endorsement by the University of Arizona or USDA of any products, services, or organizations mentioned, shown, or indirectly implied in this document.

Ethephon use on Arizona & California Golf Courses

The Arizona golf industry is a strong contributor to the state economy with a total economic contribution of \$3.9 billion in sales in 2014, including golf facility operations, golf tourism, and golf-related businesses (Duval et al. 2016). California golf courses often host charitable tournaments of the Professional Golfers Association of America (PGA), which have raised over \$120 million for charity in Northern California since 1937, including \$10 million in 2017 alone (Mahady letter, attached). One reason that the golf industry thrives in Arizona and California is our warmer winter climates, which result in a large winter tourism industry keeps courses in active play year-round.

Annual bluegrass, *Poa annua*, or Poa, is one of the most common and troublesome weeds of golf course greens and fairways. Poa is the most prevalent winter annual grassy weed of turf in our region. In areas which have year-round cool season turfgrasses (such as high-elevation courses in Arizona and the coastal and northern areas of California, Poa is largely managed with pre-emergence herbicides, but in warmer areas where bermudagrass gets overseeded with ryegrass, Poa annua becomes a companion problem. It is a prolific seeder, producing about 100 seeds per plant just a few days after pollination. This quality enables seed production even on frequently-mowed turf such as golf courses. Poa seedheads reduce the smoothness of the turf surface, and are extremely disruptive to play. They also provide seed for years to come, exacerbating the problem and need for future applications. For irrigated turf, where temperatures are moderate, Poa can persist all year (LeStrange et al. 2012). In California, seedhead production can occur continuously from January through September (Mahady letter, attached).

Ethephon is listed in the Pest Management Strategic Plan for Turfgrass in the Low Desert Regions of Arizona, Southern California, and Southern Nevada-Southern Utah (Umeda et al. 2008) as a post-emergent treatment for control of annual winter grasses, specifically, Poa annua. Ethephon is used to prevent actual seed head formation of Poa annua after the Poa has germinated. Research trials in the late 1990's showed ethphon to be highly effective for control of Poa annual seedheads, with 93% control at 28 days after application (Mahady letter, attached). Ethephon (Proxy) is the only active ingredient currently registered in California specifically for the suppression of *Poa annua* seedheads.

In Arizona, ethephon is used in a tank mix with trinexapac-ethyl (Primo) to prevent seedhead formation of Poa Annua on bentgrass greens and other golfcourse areas where bermudagrass is overseeded with perennial ryegrass. Proxy is applied at the rate of 5 oz. per 1,000 ft², equivalent to the proposed EPA rate of 3.4 lbs. A.I. per acre. It has excellent safety on turfgrasses and can be applied in the winter months in the desert. Importantly, in 2016, another plant growth regulator (PGR), mefluidide (Embark) went out of production. It was the best alternative to ethephon for the prevention of seedhead formation. **With the loss of mefluidide, the Proxy/Primo tank mix is the only effective treatment available for full seed head prevention of Poa annua in overseeded bermudagrass turf.** Other PGRs available for use in turf suppress seedheads, while ethephon acts by preventing seedhead stems from forming inside the base of the plant itself.

Because of the long growing season for Poa under growing conditions in coastal California and throughout the southwest desert (AZ and southeastern CA), up to 6 applications of ethephon are needed to effectively manage Poa throughout the year (see letters from Mahady & Whitlark, attached), unlike golf courses in more temperate regions, which can get by with fewer applications. The Pest Management Strategic Plan mentioned above lists December through May as months when post-emergence treatments with plant growth regulators occur (Umeda et al. 2008). According to Dr. Kopec, Arizona Turfgrass Extension Specialist, the limit of 4 applications per year (at 28 day intervals) will not provide sufficient seedhead control in late spring in Arizona, when the Poa tends to flower profusely. Prior to the discontinuation of the availability of Embark (mefluidide), a turf manager in Arizona could achieve sufficient control of Poa with 4 applications of ethephon, tank mixed with Primo when it is colder, then switch over to Embark when temperatures increase. Lacking access to the mefluidide alternative, 6

applications of ethephon remain the only entirely effective control option. The Proxy label includes white clover control as well. There are plenty of other products which control legumes, but the unique overseeded turf tolerance and seedhead prevention properties of Proxy substantiate the continued use and benefits of this unique active ingredient.

Based on input from Arizona Turfgrass Extension Specialist, David Kopec, and golf course stakeholders in Arizona and California, we agree with all aspects of EPA's proposed interim decision for ethephon, except for the limitation of 4 applications per year. Given the climate and year-round warm temperatures in our region, experience shows that 6 applications per year are typically needed to prevent seedhead formation of *Poa annua* on overseeded bermudagrass greens year-round, on bentgrass greens and on tees and fairways. Other registered alternatives do not provide sufficient control of seedheads. We fully agree with the need to protect young children from exposure to any potentially harmful chemicals, and with EPA's decision to eliminate uses of ethephon in situations where young children are likely to become exposed. We believe the risk of exposure of young children (ages 1-2) to ethephon on professional golf courses is extremely minimal. Furthermore, golf courses provide economic and recreational benefits to society. We urge EPA and the registrant to reconsider the unique climatic situation in Arizona and southern and coastal California and expand ethephon labels in these states to allow 6 annual uses.

References*

Duval, D., A. Kerna, G. Frisvold, K. Umeda and R. Li. 2016. Contribution of the Golf Industry to the Arizona Economy in 2014. University of Arizona Cooperative Extension. <https://cals.arizona.edu/arec/sites/cals.arizona.edu/arec/files/publications/AZ%20Golf%20Economic%20Contribution%202014.pdf>

M. LeStrange, P. M. Geisel, D. W. Cudney, C. L. Elmore and V. A. Gibeault. Pest Notes: Annual Bluegrass. UC ANR Publication 7464. University of California Agriculture and Natural Resources. <http://ipm.ucanr.edu/PMG/PESTNOTES/pn7464.html>

Umeda et al. 2008. Pest Management Strategic Plan for Turfgrass in the Low Desert Regions of Arizona, Southern California, and Southern Nevada-Southern Utah.

*See also attached letters from Mark M. Mahady & Associates, on behalf of golf course superintendents in California and from Brian Whitlark, on behalf of turf managers in California.

MARK M. MAHADY & ASSOCIATES, INC.

Consultant To The Turfgrass Industry

August 30, 2017

VIA EMAIL

Docket No. EPA-HQ-OPP-2010-0098

Jill Bloom

Lead Environmental Protection Specialist

Risk Management & Implementation Branch V

Office of Pesticide Programs Environmental Protection Agency

1200 Pennsylvania Ave. NW.

Washington D.C. 20460-0001

Re: Support to Maintain the Yearly Maximum Use Rate of Proxy at 30 ounces/1000 ft²

Dear Lead Environmental Protection Specialist, Jill Bloom:

I write to you today on behalf of golf course superintendents in California regarding the use of Proxy (ethephon) for control of seedheads on *Poa annua* (or Poa).

In 1999 our turfgrass research firm was the first group in California to evaluate the use of Proxy for suppression of *Poa annua* seedheads. Proxy is a highly effective agronomic tool for control of *Poa annua* seedheads (Table 1: red highlights 93% control 28 days after application).

Table 1: Percent cover and (percent control) of seedheads on a *Poa annua* putting green following a single Proxy application. The Links at Spanish Bay, Pebble Beach, CA. Mark M. Mahady & Associates. 1999.

Treatments	Rate	7/23/99	7/30/99	8/13/99	8/22/99
		7 DAT % Cover (% Control)	14 DAT % Cover (% Control)	28 DAT % Cover (% Control)	39 DAT % Cover (% Control)
1) Untreated Check	*	73.8 a ¹ (0%)	72.5 a (0%)	53.8 a (0%)	62.5 a (0%)
2) Proxy (ethephon)	5.0 oz/M	42.5 c (42%)	3.0 c (96%)	4.0 c (93%)	43.8 b (30%)
3) Proxy	10.0 oz/M	43.8 c (41%)	2.5 c (97%)	2.3 c (96%)	20.0 c (68%)
4) Proxy + Ferromec + Surfside	5.0/3.0/2.0 oz/M	42.5 c (42%)	4.3 c (94%)	5.3 c (90%)	37.5 b (40%)
5) Proxy + Ferromec + Surfside	5.0/3.0/2.0 oz/M	42.5 c (42%)	5.5 c (92%)	4.3 c (92%)	37.5 b (40%)
5) Surfside 2 WAT	2.0 oz/M				
6) Embark + Ferromec + Surfside	4.0 oz-A/3.0/2.0 oz/M	62.5 b (15%)	52.5 b (28%)	31.3 b (42%)	68.8 a -(10%)
6) Surfside 2 WAT	2.0 oz/M				
7) Primo Liquid 1E	0.12 oz/M	52.5 c (29%)	45.0 b (38%)	47.5 a (12%)	72.5 a -(16%)
8) Primo + Ferromec + Surfside	0.12/3.0/2.0 oz/M	53.8 c (27%)	51.3 c (29%)	47.5 a (12%)	71.3 a -(14%)
8) Surfside 2 WAT	2.0 oz/M				

¹ Means followed by the same letter do not significantly differ (p=.05 Duncan's New MRT)

In California *Poa annua*, also known as annual bluegrass, is the dominant turf type on golf course putting greens. *Poa annua* seedheads can appear over an extended growth window with continual emergence often occurring from January through September.

Poa annua seedheads cause a reduction in the surface quality, surface smoothness and visual quality of *Poa* putting greens (compare Photograph 1 and Photograph 2) below.

Photographs 1 and 2. Primo MAXX (trinexapac-ethyl) shows no control of *Poa annua* seedheads (above), while Proxy shows high levels of *Poa annua* seedhead control (below). Mark M. Mahady & Associates, Inc. 2000.



As presented in Table 1, the 5.0 oz/1000 ft² application rate exhibited high levels of *Poa annua* seedhead suppression (93% control) 28 days after application (DAA) with a significant reduction in seedhead suppression 39 DAA (30% control). For these reasons, the 5-ounce rate and 28-day application interval became a label and recommended industry standard.

Since *Poa annua* seedheads can emerge and appear over an extended 9-month growth period, the 30 ounce/1000 ft² yearly maximum use rate presented on the label allows golf course superintendents with an opportunity to deploy six 5 oz/1000 ft² applications over the course of this potential 9-month seedhead emergence window.

This 30 ounce/1000 ft² maximum yearly use rate is an essential component of a sound and high quality agronomic program for *Poa annua* seedhead suppression. If the maximum use rate was decreased to 20 total product ounces per year, this would result in the available use of only four Proxy applications at the 5 oz/1000 ft² rate per year with the very real potential for widespread breakouts of *Poa* seedheads and the corresponding effects of a dramatic reduction in surface quality, surface smoothness and visual quality of *Poa* putting greens (Photograph 1).

The condition and surface quality of *Poa annua* putting greens in Northern California do have a dynamic economic impact in this region. PGA tournaments are some of the largest charitable events in all of California every year. Since 1937 over \$120 million has been raised for charity in Northern California through these events with over \$10 million in 2017 alone.

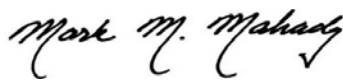
There are presently no alternatives to Proxy currently registered in California for suppression and control of *Poa annua* seedheads.

The safe, accurate and appropriate use of all plant growth regulator products is of paramount importance to applicators and the general public. Since Proxy is used primarily on putting greens in California and putting greens represent only 3% to 5% of the total turf surface area on golf courses, the potential for off-site movement and risk to children and the general public is extremely low.

Thank you for your consideration of this request to maintain the present maximum use rate of 30 ounces/1000 ft² per year for Proxy.

Please contact me if you have questions or if you need additional information.

Kind Regards,



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September 13, 2017

Dr. Al Fournier
IPM Program Manager and Associate Specialist
University of Arizona

Dear Dr. Fournier:

This letter is written to your attention regarding the proposal to limit the use of Proxy herbicide (ethephon). The proposal suggests limiting the use of ethephon to 4 (four) applications annually at the 5 ounce per 1,000 square feet rate. Through years of experience and consulting with Dr. David Kopec, Turfgrass Specialist from the University of Arizona, a total of 6 (six) applications is required to control seed heads in *Poa annua* (annual bluegrass).

Proxy has been used in its current capacity to block seed head production in *Poa annua* for nearly 18 years. During much of that time, there was another option for seed head control for turf practitioners, that being Embark (mefluidide). This product is no longer available, and therefore ethephon is the only product on the market capable of yielding the desired results.

With only 4 applications, the potential for seed head production increases substantially and therefore, *Poa annua* will continue to proliferate as a weed in overseeded bermudagrass. There are other plant growth regulators commercially available that may *suppress* *Poa annua* seed heads, but only ethephon will *prevent* seed heads from forming.

In summary, I am writing on behalf of the turf practitioners in the state of Arizona to recommend continuing the current label allowing for 6 (six) ethephon applications annually.

Sincerely,

Brian Whitlark, Agronomist
USGA Green Section, West Region