Title: Evaluation of Cumyluron and Methiozolin Herbicides for Pre- and Postemergence Control of Annual Bluegrass on New Creeping Bentgrass Putting Greens in California

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Justification:

California's Mediterranean climate is ideal for annual bluegrass (*Poa annua*). However, under intensive management this species is highly susceptible to several biotic and abiotic stresses including heat/drought/cold, disease, and nematodes. As a result, a growing number of golf courses are resorting to conversion to creeping bentgrass, which has better stress tolerance and putting traits (e.g., no seedheads under low mowing). The challenge facing golf course superintendents in California and abroad is keeping annual bluegrass from re-infesting new bentgrass greens. In California especially, the window of Poa germination and infestation is much broader compared to other regions. Currently, paclobutrazol and flurprimidol are used for *Poa* suppression, but these PGRs cannot be used year round due to temperature constraints. Cumyluron (Marubeni Corp., Japan) and methiozolin (Moghu Research Center, South Korea) are currently under development in the U.S. for selective control of annual bluegrass in bentgrass putting greens and other turf areas.

Objectives:

1. Evaluate effective timing and total active ingredient of cumyluron and methiozolin required to provide effective preemergence control of annual bluegrass in new creeping bentgrass putting greens in northern and southern California.
2. Evaluate postemergence activity of these herbicides as *Poa* infests the greens.

Locations:

The study will be conducted on four golf courses with new creeping bentgrass putting greens installed within the last 6 months. Two golf courses are located in southern California in the Los Angeles area: Brentwood Country Club (cultivar Tyee/007) and Bel-Air Country Club (cultivar Pure Distinction). The northern California golf courses include: Tournament Players' Club at Harding Park, San Francisco (cultivar Tyee/007) and Monterey Peninsula Country Club, Pebble Beach (cultivar Pure Distinction). All greens have little to no *Poa* at the start of the experiment.

Treatments:

No.	Treatment	Rate (oz/1,000 ft^2)	Timing	Total (oz/1,000 ft^2)
1	Control	--	--	--
2	Cumyluron	1.0	ABCDEFGHIJ	10
3	Methiozolin	0.6	ABCDEFGHIJ	6.0
4	Cumyluron	1.5	ACEGI	7.5
5	Methiozolin	0.6	ACEGI	3.0
6	Cumyluron	3.0	ADGJ	12
7	Methiozolin	1.2	ADGJ	4.8
8	Cumyluron	3.0	AG	6.0
9	Methiozolin	1.2	AG	2.4
10	Cumyluron	6.0	A	6.0
11	Methiozolin	1.2	A	1.2
12	Cumyluron	6.0	G	6.0
13	Methiozolin	1.2	G	1.2

Timing
A = February
B = March
C = April
D = May
E = June
F = July
G = August
H = September
I = October
J = November

Design:

Randomized block with 4 replications. Plot size will be 4 ft x 6 ft with 2-ft alleys between rows. Total area needed per location is 30 ft x 52 ft. Treatments will be applied using a CO_2-powered backpack boom sprayer with TeeJet 8004 flat fan nozzles calibrated for 2 gal/1,000 ft^2 spray output. Treatments will be irrigated with 0.02 inches (cumyluron) or 0.1 inches (methiozolin) of water immediately following each application.

Ratings:

Visual annual bluegrass cover and bentgrass phytotoxicity (0-100%) will be assessed monthly from February 2016 through December 2017. Rootzone samples will be collected for root mass and/or winRhizo analyses in May and October 2016 and March 2017.

Expected Completion Date:

Final report will be completed by January 2018.

Expected Results:

Prevention is the best strategy for managing annual bluegrass invasion into putting greens. To date, almost all field studies involving these herbicides have focused on postemergence annual bluegrass control. This study will identify which herbicide, rates, and frequency of application provide optimum preemergence control of annual bluegrass in new creeping bentgrass putting greens. The study will also examine postemergence control of these herbicides. The study will be repeated in very different climates in northern and southern California and results will be adaptable to the remainder of the U.S.

Other Funding Sources:

This study will be funded in part by the chemical companies, the California Turfgrass & Landscape Foundation (CTLF), and HATCH funds.