Progress Report

Title: **Selective Control of Annual Bluegrass (*Poa annua* L.) in Creeping Bentgrass Putting Greens**

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Objectives: Evaluate existing and experimental herbicides for selective removal of annual bluegrass that persists in creeping bentgrass putting green turf.

Evaluate herbicides and herbicide combinations for potential bentgrass injury prior to inclusion in experiments on golf courses throughout the State.

Location: UCR Turfgrass Research Facility, Riverside CA

Soil: Loamy sand amended with sand topdressing

Experimental Design: Randomized complete block; three replications

Plot Size: 3 ft x 6 ft

Species/Cultivars: Creeping Bentgrass (*Agrostis stolonifera* L.) 'Cobra'

Mowing Height: 0.180 inches; 3 days/wk

Irrigation: 80% ETo (historical from previous week)/DU

Cultivation: alternate bi-monthly verticutting/solid-tine aeration; topdressing monthly

Sprayer: Bicycle with two 8003VS nozzles
20-inch spacing
35 psi
510 ml/nozzle/30 sec = 80 GPA
Metronome = 50 beats = 1 mph

Application Dates: **A =** May 13 and June 10, 2010
B = May 13, 20, 28 and June 4, 2010
C = Bi-weekly beginning May 13, 2010
D = June 10, 2010
E = Scheduled for September 1, 2010

Data Collected: *Poa annua* control (0-100%) based on initial *Poa* cover in each plot
Bentgrass quality (1-9, 1 = dead; 6 = minimally acceptable)

Results:

- ✓ From May 13 to July 14, average minimum and maximum air temperatures were 59.1 F (45.7 F low) and 85.0 F (99.2 F high), respectively; average minimum and maximum relative humidity was 35% (8% low) and 80% (85% high), respectively; average soil temperatures ranged from 62.5 F to 76.0 F (73.3 F average); total CIMIS ETo was 2.78 inches; no precipitation.
- ✓ More than one application of amicarbazone applied at 2.0 oz/A or greater caused severe injury or death to bentgrass turf (Figure 1; Table 1). Preliminary results from studies in Northern California indicate that these rates can be safely applied in cooler climates or during cooler periods of the year, but they are too high for late spring/early summer in Riverside.
- ✓ Maximum air temperatures occurred between the July 6 and July 14 rating dates. Furthermore, the green was vertical mowed on July 7. The combination of both stresses resulted in the lowest overall bentgrass quality ratings on July 14, and plots treated with higher rates of HM 0814 began showing significant turf injury relative to the control.
- ✓ MRC-01 provided the best combination of *Poa* control and bentgrass safety during this phase of the experiment (Table 2); however, there appeared to a minimum total dosage required to achieve optimal control. Hence, the 3.0 oz/1,000 ft^2 rate (surfactant vs. no surfactant) was added on to the treatment list later during the experiment.

- ✓ The Riverside study will continue along with ongoing studies on golf courses Northern California, and new studies to be initiated on golf courses in Southern California. Focus will be on refining application rates and frequencies of MRC-01, evaluation of tank-mix partners with MRC-01 and with amicarbazone at 1.0 oz/A, and evaluation of higher rates and/or more frequent applications of other herbicides in this study to achieve maximum *Poa* control with minimal bentgrass injury.

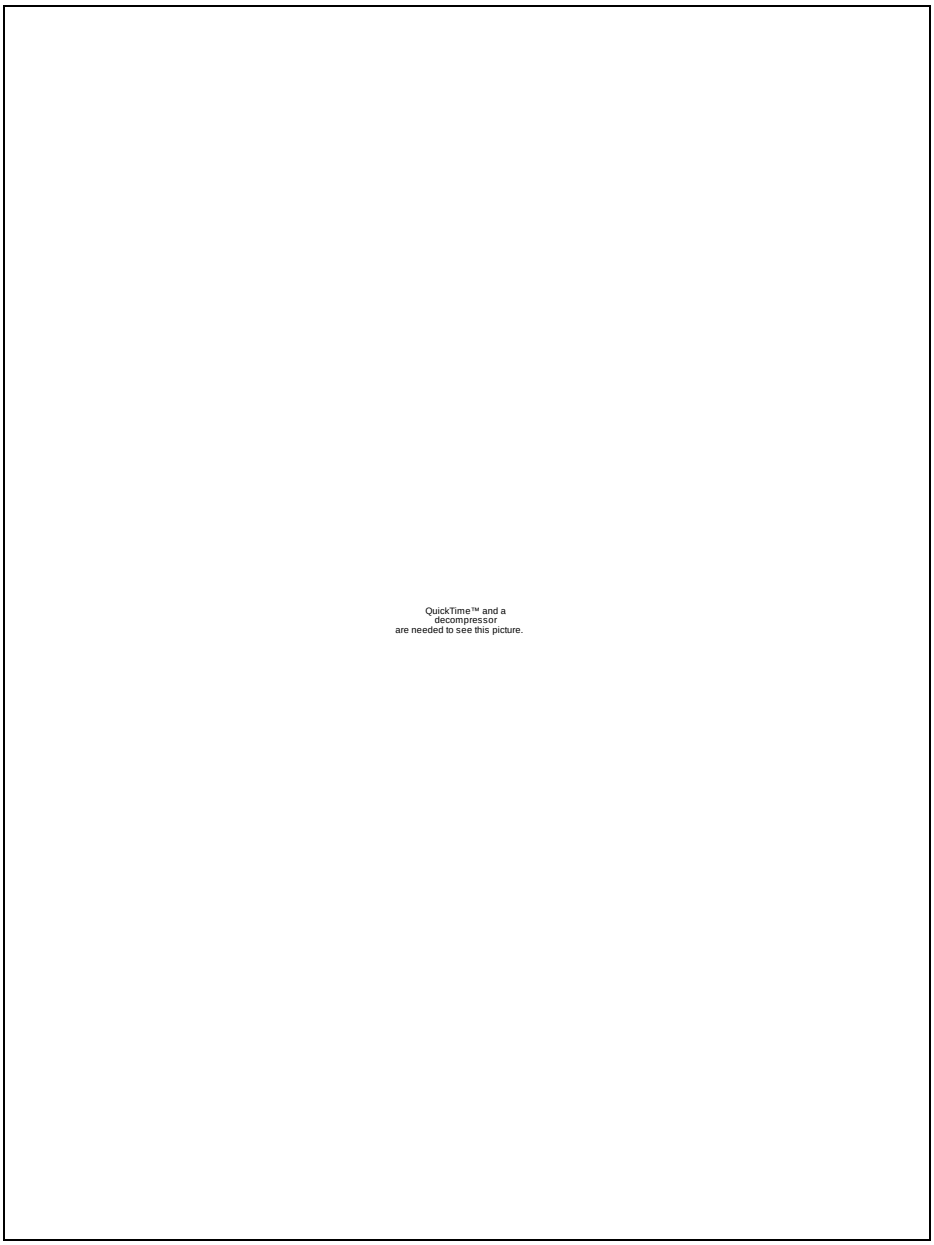

Figure 1. Bentgrass injury on July 6 following four weekly applications of amicarbazone at 2 oz/A from May 13 to June 4, 2010. Riverside, CA.

Table 1. Creeping bentgrass quality (1-9, 1=dead, 6=minimally acceptable) following application of herbicides. Riverside, CA. 2010.

Trt	**Rate**	**Timing**	**5/20**	**5/28**	**6/6**	**6/19**	**6/25**	**7/6**	**7/14**
Velocity	4 oz/A	A	7.0	7.7	7.7	8.0	9.0	9.0	8.0
Velocity + Trimmit	2 oz/A + 8 oz/A	A A	7.0	8.0	8.0	8.0	9.0	9.0	8.0
Amicarbazone	1 oz/A	A	8.0	8.0	8.0	8.0	8.0	9.0	7.3
Amicarbazone	2 oz/A	A	7.7	7.7	8.0	6.7	6.0	8.3	8.0
Amicarbazone	4 oz/A	A	7.0	6.0	6.3	2.7	2.3	2.7	3.0
Amicarbazone + Trimmit	2 oz/A + 8 oz/A	A A	7.0	6.7	7.3	5.0	4.7	6.0	7.7
MRC-01	1.25 oz/1,000ft^2	A	8.0	8.0	8.0	9.0	9.0	8.7	7.0
Prograss	8 oz/A	A	8.0	8.0	7.7	8.7	9.0	9.0	7.7
Prograss + Amicarbazone	6 oz/A + 2 oz/A	A A	8.0	8.0	8.0	7.7	7.0	8.7	7.7
HM 0814	3 oz/1,000ft^2	A	8.0	8.0	8.0	8.3	8.7	8.0	6.7
HM 0814	6 oz/1,000ft^2	A	8.0	8.0	8.0	8.3	8.0	8.0	6.7
HM 0814 + Trimmit	2 oz/1000ft^2 + 8 oz/A	A A	8.0	8.0	8.0	8.3	8.3	8.0	7.3
Trimmit	10 oz/A	A	8.0	8.0	8.0	8.0	8.3	9.0	8.3
Trimmit	16 oz/A	A	8.0	8.0	8.3	9.0	8.3	9.0	8.7
Bensumec 4 LF	9.4 oz/1000ft^2	E	8.0	8.0	8.0	8.7	9.0	9.0	7.0
SureGuard	6 oz/A	E	8.0	8.0	8.0	9.0	9.0	9.0	7.7
Amicarbazone	1 oz/A	B	7.7	7.7	6.0	6.7	6.7	8.3	8.0
Amicarbazone	2 oz/A	B	7.3	6.0	2.0	1.7	1.3	2.7	3.7
Amicarbazone + Trimmit	1 oz/A + 2 oz/A	B B	8.0	7.7	5.0	6.3	6.7	8.0	8.0
$FeSO_4$[1]	16 oz/1000ft^2	C	9.0	8.0	8.0	9.0	9.0	9.0	9.0
MRC-01	0.75 oz/1000ft^2	B	8.0	8.0	7.7	9.0	9.0	8.7	7.7
MRC-01	3 oz/1000ft^2	D	8.0	8.0	8.0	8.7	8.7	9.0	7.3
MRC-01[2]	3 oz/1000ft^2	D	8.0	8.0	8.0	8.3	9.0	9.0	7.7
Untreated Control	-	-	8.0	8.0	8.0	9.0	9.0	9.0	8.0
LSD (0.05)*			**0.3**	**0.4**	**0.6**	**0.8**	**1.0**	**1.0**	**1.1**

*Treatment mean differences in columns greater than or equal to LSD are significantly different, Fisher's Protected LSD, *P*=0.05.
[1]$FeSO_4$ applied in 320 GPA of water; all other treatments applied in 80 GPA. [2]No surfactant added; all other treatments applied with 0.25% non-ionic surfactant.

Table 2. Annual bluegrass control (0-100%) following application of herbicides. Riverside, CA. 2010.

Trt	**Rate**	**Timing**	**5/28**	**6/6**	**6/19**	**6/25**	**7/6**	**7/14**
Velocity	4 oz/A	A	28	33	48	57	70	65
Velocity + Trimmit	2 oz/A + 8 oz/A	A A	31	25	40	34	73	48
Amicarbazone	1 oz/A	A	29	44	57	60	47	64
Amicarbazone	2 oz/A	A	37	52	96	99	80	92
Amicarbazone	4 oz/A	A	70	87	100	100	100	100
Amicarbazone + Trimmit	2 oz/A + 8 oz/A	A A	40	71	100	100	94	89
MRC-01	1.25 oz/1,000ft^2	A	20	61	84	75	82	87
Prograss	8 oz/A	A	12	32	52	44	36	37
Prograss + Amicarbazone	6 oz/A + 2 oz/A	A A	38	45	90	88	78	68
HM 0814	3 oz/1,000ft^2	A	10	20	25	21	23	30
HM 0814	6 oz/1,000ft^2	A	21	18	54	48	51	54
HM 0814 + Trimmit	2 oz/1,000ft^2 + 8 oz/A	A A	19	9	31	22	52	63
Trimmit	10 oz/A	A	10	14	24	19	47	33
Trimmit	16 oz/A	A	18	24	32	28	51	62
Bensumec 4 LF	9.4 oz/1,000ft^2	E	4	18	51	30	39	54
SureGuard	6 oz/A	E	17	10	34	27	21	17
Amicarbazone	1 oz/A	B	32	84	87	78	61	74
Amicarbazone	2 oz/A	B	69	98	100	100	100	100
Amicarbazone + Trimmit	1 oz/A + 2 oz/A	B B	21	82	100	97	87	76
$FeSO_4$	16 oz/1,000ft^2	C	20	23	26	28	49	40
MRC-01	0.75 oz/1,000ft^2	B	32	86	97	98	76	74
MRC-01	3 oz/1,000ft^2	D	10	20	50	45	56	98
MRC-01[2]	3 oz/1,000ft^2	D	23	25	34	27	62	91
Untreated Control	-	-	17	11	22	19	11	30
LSD (0.05)[*]			**21**	**23**	**21**	**24**	**29**	**29**

[*]Treatment mean differences in columns greater than or equal to LSD are significantly different, Fisher's Protected LSD, *P*=0.05.
[1]$FeSO_4$ applied in 320 GPA of water; all other treatments applied in 80 GPA. [2]No surfactant added; all other treatments applied with 0.25% non-ionic surfactant.