

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

**Investigators:** Jim Baird, Brent Barnes, Alea Miehls, and Vanessa Ferrel  
Department of Botany and Plant Sciences  
University of California, Riverside

**Sponsors:** Golf Course Superintendents Association of Northern California  
Northern California Golf Association  
San Diego Golf Course Superintendents Association  
Sierra Nevada Golf Course Superintendents Association  
Southern California Golf Association  
Southern California Golf Course Superintendents Association  
Southern California Section, Professional Golfers Association

**Cooperators:** Todd Bunnell, SePro  
Gary Custis, PBI Gordon  
Doug Houseworth, Arysta LifeScience  
Suk-Jin Koo, Moghu Research Center  
Bob Mack, Helena Chemical  
Todd Mayhew, Valent  
Dean Mosdell, Syngenta  
Chris Olsen, Bayer Environmental Science

**Objectives:** Evaluate existing and experimental herbicides and PGRs 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  
1 mph  
510 ml/nozzle/30 sec = 80 GPA

**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 = July 23 and August 13, 2010  
F = September 3, 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:

- ✓ More than one application of amicarbazone applied at 2.0 oz/A or greater caused severe and sustained injury or death to bentgrass turf that remained (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.
- ✓ Onset of higher air temperatures occurred between July 6 and July 14 rating dates. Furthermore, the green was vertical mowed on July 7. The combination of both stresses exacerbated injury from herbicide treatments, and plots treated with higher rates of HM 0814 began showing significant turf injury relative to the control.
- ✓ Beyond July 14, it was difficult to identify and rate *Poa annua* cover in the study, even in the untreated control (Table 2).
- ✓ MRC-01 provided the best combination of *Poa* control and bentgrass safety during this phase of the experiment; however, there appeared to a minimum total dosage required to achieve optimal control. Subsequently, higher and more frequent applications of MRC-01 were applied which increased bentgrass injury, especially as summer stress increased. Thus far, MRC-01 has demonstrated to be a promising new herbicide for selective *Poa* control in bentgrass greens both in Riverside and Northern California, but there is a rate limit for maintaining bentgrass safety.
- ✓ The Riverside study will continue along with ongoing studies on golf courses Northern California, and new studies are soon to be initiated on golf courses in Southern California. Focus will be on refining application rates and frequencies of MRC-01 and amicarbazone, evaluation of tank-mix partners with MRC-01 and with amicarbazone, and evaluation of various rates and/or more frequent applications of other herbicides or PGRs included in this study to achieve maximum *Poa* control with minimal bentgrass injury.

Selective Control of *Poa annua* in Creeping Bentgrass Putting Greens.  
 UCR Turf Research Facility; Plot 12E-22; Plot size: 3 ft x 6 ft with 5 ft alleys between  
 replications.

**North**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

16	17	7	28	25	22	2	26	24	13	8	14	3	19	11
29	27	5	21	1	20	30	4	18	10	6	12	23	9	15

11	16	9	30	2	24	13	26	27	20	7	25	21	29	3
1	6	5	19	10	23	14	12	22	18	28	17	15	4	8

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

Trt	Product(s)	Rate(s)	Timing	5/20	5/28	6/4	6/6	6/19	6/25	7/6	7/14	7/29	8/8	8/25	9/3
1	Velocity	4 oz/A	A	7.0	7.7	8.0	7.7	8.0	9.0	9.0	8.0	8.7	7.7	8.0	7.3
2	Velocity + Trimmit	2 oz/A + 8 oz/A	A	7.0	8.0	8.0	8.0	8.0	9.0	9.0	8.0	8.0	7.7	7.7	8.0
3	Amicarbazone	1 oz/A	A	8.0	8.0	8.0	8.0	8.0	8.0	9.0	7.3	8.0	7.7	7.7	8.0
4	Amicarbazone	2 oz/A	A	7.7	7.7	7.7	8.0	6.7	6.0	8.3	8.0	8.3	7.7	7.7	7.3
5	Amicarbazone	4 oz/A	A	7.0	6.0	6.3	6.3	2.7	2.3	2.7	3.0	4.3	5.3	5.7	6.0
6	Amicarbazone + Trimmit	2 oz/A + 8 oz/A	A	7.0	6.7	7.0	7.3	5.0	4.7	6.0	7.7	8.0	7.3	6.7	7.0
7	MRC-01	1.25 oz/1,000ft <sup>2</sup>	A, E	8.0	8.0	8.0	8.0	9.0	9.0	8.7	7.0	7.3	7.3	7.3	6.3
8	Prograss	8 oz/A	A	8.0	8.0	8.0	7.7	8.7	9.0	9.0	7.7	8.0	7.3	7.7	7.0
9	Prograss + Amicarbazone	6 oz/A + 2 oz/A	A	8.0	8.0	8.0	8.0	7.7	7.0	8.7	7.7	8.3	8.0	7.7	8.7
10	HM 0814	3 oz/1,000ft <sup>2</sup>	A	8.0	8.0	8.0	8.0	8.3	8.7	8.0	6.7	6.3	6.7	7.0	7.3
11	HM 0814	6 oz/1,000ft <sup>2</sup>	A	8.0	8.0	8.0	8.0	8.3	8.0	8.0	6.7	6.3	6.0	6.7	6.0
12	HM 0814 + Trimmit	2 oz/1000ft <sup>2</sup> + 8 oz/A	A	8.0	8.0	8.0	8.0	8.3	8.3	8.0	7.3	7.3	7.3	6.7	7.3
13	Trimmit	10 oz/A	A, E	8.0	8.0	8.0	8.0	8.0	8.3	9.0	8.3	8.7	8.0	8.0	9.0
14	Trimmit	16 oz/A	A, E	8.0	8.0	8.0	8.3	9.0	8.3	9.0	8.7	8.3	8.0	8.0	9.0
15	Bensumec 4 LF	9.4 oz/1000ft <sup>2</sup>	F	8.0	8.0	8.0	8.0	8.7	9.0	9.0	7.0	9.0	7.3	7.3	7.3
16	SP 5114 <sup>2</sup>	14.5 oz/A	E	8.0	8.0	8.0	8.0	9.0	9.0	9.0	7.7	8.0	7.7	8.0	9.0
17	SureGuard	6 oz/A	F	8.0	8.0	8.0	8.0	9.0	9.0	9.0	7.7	9.0	8.0	8.0	8.0
18	Untreated Control	-	-	8.0	8.0	8.0	8.0	9.0	9.0	9.0	8.0	8.7	8.0	7.7	8.0
19	Amicarbazone	1 oz/A	B	7.7	7.7	6.7	6.0	6.7	6.7	8.3	8.0	8.7	8.0	8.0	8.7
20	Amicarbazone	2 oz/A	B	7.3	6.0	4.0	2.0	1.7	1.3	2.7	3.7	4.7	5.0	5.0	5.3
21	Amicarbazone + Trimmit	1 oz/A + 2 oz/A	B	8.0	7.7	6.0	5.0	6.3	6.7	8.0	8.0	8.7	7.7	7.7	7.7
22	FeSO <sub>4</sub>	16 oz/1000ft <sup>2</sup>	C	9.0	8.0	9.0	8.0	9.0	9.0	9.0	9.0	8.7	9.0	9.0	9.0
23	MRC-01	0.75 oz/1000ft <sup>2</sup>	B, E	8.0	8.0	8.0	7.7	9.0	9.0	8.7	7.7	8.3	7.7	7.7	8.0
24	MRC-01	3oz/1000ft <sup>2</sup>	D	8.0	8.0	8.0	8.0	8.7	8.7	9.0	7.3	8.3	7.7	8.0	8.0
25	MRC-01 <sup>2</sup>	3 oz/1000ft <sup>2</sup>	D	8.0	8.0	8.0	8.0	8.3	9.0	9.0	7.7	7.3	7.0	7.7	6.7
26	SP 5114 <sup>2</sup>	29.0 oz/A	E	8.0	8.0	8.0	8.0	9.0	9.0	9.0	7.7	7.0	7.3	8.0	9.0
27	SP 5412 <sup>2</sup>	24.6 oz/A	E	8.0	8.0	8.0	8.0	9.0	9.0	9.0	7.7	7.7	7.7	7.7	8.7
28	SP 5412 <sup>2</sup>	49.2 oz/A	E	8.0	8.0	8.0	8.0	9.0	9.0	9.0	8.0	8.0	7.7	8.0	9.0
29	SP 5410 <sup>2</sup>	20.5 oz/A	E	8.0	8.0	8.0	8.0	8.7	9.0	9.0	7.7	7.7	7.7	8.0	9.0
30	SP 5410 <sup>2</sup>	41.0 oz/A	E	8.0	8.0	8.0	8.0	9.0	9.0	9.0	8.0	7.3	7.3	8.0	9.0
	LSD (0.05)			0.3	0.4	0.3	0.6	0.8	1.0	1.0	1.1	1.4	1.1	1.5	1.7

\*Treatment mean differences in columns greater than or equal to LSD are significantly different, Fisher's Protected LSD,  $P=0.05$ .

<sup>1</sup>FeSO<sub>4</sub> applied in 320 GPA of water; all other treatments applied in 80 GPA. <sup>2</sup>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	Product(s)	Rate(s)	Timing	5/28	6/4	6/6	6/19	6/25	7/6	7/14
1	Velocity	4 oz/A	A	28	47	33	48	57	70	65
2	Velocity + Trimmit	2 oz/A +8 oz/A	A	31	36	25	40	34	73	48
3	Amicarbazone	1 oz/A	A	29	29	44	57	60	47	64
4	Amicarbazone	2 oz/A	A	37	35	52	96	99	80	92
5	Amicarbazone	4 oz/A	A	70	66	87	100	100	100	100
6	Amicarbazone + Trimmit	2 oz/A + 8 oz/A	A	40	56	71	100	100	94	89
7	MRC-01	1.25 oz/1,000ft <sup>2</sup>	A, E	20	30	61	84	75	82	87
8	Prograss	8 oz/A	A	12	25	32	52	44	36	37
9	Prograss + Amicarbazone	6 oz/A + 2 oz/A	A	38	26	45	90	88	78	68
10	HM 0814	3 oz/1,000ft <sup>2</sup>	A	10	5	20	25	21	23	30
11	HM 0814	6 oz/1,000ft <sup>2</sup>	A	21	23	18	54	48	51	54
12	HM 0814 + Trimmit	2 oz/1000ft <sup>2</sup> + 8 oz/A	A	19	7	9	31	22	52	63
13	Trimmit	10 oz/A	A, E	10	5	14	24	19	47	33
14	Trimmit	16 oz/A	A, E	18	16	24	32	28	51	62
15	Bensumec 4 LF	9.4 oz/1000ft <sup>2</sup>	F	4	10	18	51	30	39	54
16	SP 5114 <sup>2</sup>	14.5 oz/A	E	13	15	19	33	19	13	26
17	SureGuard	6 oz/A	F	17	14	10	34	27	21	17
18	Untreated Control	-	-	17	11	11	22	19	11	30
19	Amicarbazone	1 oz/A	B	32	61	84	87	78	61	74
20	Amicarbazone	2 oz/A	B	69	83	98	100	100	100	100
21	Amicarbazone + Trimmit	1 oz/A + 2 oz/A	B	21	57	82	100	97	87	76
22	FeSO <sub>4</sub>	16 oz/1000ft <sup>2</sup>	C	20	22	23	26	28	49	40
23	MRC-01	0.75 oz/1000ft <sup>2</sup>	B, E	32	64	86	97	98	76	74
24	MRC-01	3oz/1000ft <sup>2</sup>	D	10	10	20	50	45	56	98
25	MRC-01 <sup>2</sup>	3 oz/1000ft <sup>2</sup>	D	23	7	25	34	27	62	91
26	SP 5114 <sup>2</sup>	29.0 oz/A	E	12	12	12	30	7	30	22
27	SP 5412 <sup>2</sup>	24.6 oz/A	E	6	6	17	11	6	17	28
28	SP 5412 <sup>2</sup>	49.2 oz/A	E	15	4	24	24	8	14	32
29	SP 5410 <sup>2</sup>	20.5 oz/A	E	16	12	12	27	11	28	52
30	SP 5410 <sup>2</sup>	41.0 oz/A	E	14	18	18	19	14	19	36
	<b>LSD (0.05)*</b>			<b>21</b>	<b>23</b>	<b>23</b>	<b>21</b>	<b>24</b>	<b>29</b>	<b>29</b>

\*Treatment mean differences in columns greater than or equal to LSD are significantly different, Fisher's Protected LSD,  $P=0.05$ .

<sup>1</sup>FeSO<sub>4</sub> applied in 320 GPA of water; all other treatments applied in 80 GPA. <sup>2</sup>No surfactant added; all other treatments applied with 0.25% non-ionic surfactant.