

Effects of Dimension 1EC on Creeping Bentgrass Establishment and *Poa annua* Competition During Fall Fairway Renovation

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Objective

To determine optimum seeding date and Dimension 1EC application strategy to prevent *Poa annua* germination without injuring creeping bentgrass seedlings during fall fairway renovation.

Rationale

Poa annua is the most problematic weed golf course superintendent's deal with because of its difficulty in controlling once it invades a turf area. *Poa annua*'s persistence in the soil limit many control options during renovation. Re-establishment with a non-selective herbicide and reseeding of the area is often used to minimize *Poa annua* infestations in fairways. Without controlling the surviving *Poa annua* seed in the soil, this method could result in higher infestations than before the renovation. Soil fumigants are successful in eradicating *Poa annua* in the soil, but they are not practical on large areas such as fairways. A greenhouse trial performed in Jan. 2000 demonstrated Dimension 1EC successfully controls *Poa annua* germination. Also, prior research conducted at Purdue suggests that Dimension 1EC could be applied 10 days after emergence (DAE) with no injury to creeping bentgrass seedlings. Our theory is that Dimension 1EC can be used shortly after emergence of creeping bentgrass while minimizing *Poa annua* competition during fall fairway renovation.

How It Was Done

The experiment consisted of three studies. The first study determined the safety of Dimension 1EC on creeping bentgrass in the absence of *Poa annua*. The second study examined the effect of Dimension 1EC on *Poa annua* emergence in the absence of creeping bentgrass. The third study observed *Poa annua* competition during creeping bentgrass establishment. All fieldwork was identical in all three studies except creeping bentgrass was not seeded into the second study (the effect of Dimension 1EC on *Poa annua* emergence).

Field work was initiated in Aug. 2000 and then repeated starting in Aug. 2001 at the William H. Daniel Turf Research and Diagnostic Center and on #15 and #16 fairways of the Purdue University Ackerman Hills Golf Course. Three weeks prior to seeding, a 2% Round-up solution was applied to kill existing turf. The area was verticut, cleared of debris, fertilized with 1.5 lbs P₂O₅/1000 ft², and seeded with 1 lb/1000 ft² of 'Providence' creeping bentgrass. The area was irrigated to encourage germination and thereafter to prevent stress. Seedling emergence was defined as 50% of creeping bentgrass, seeded in the creeping bentgrass safety study, had emerged on each untreated plot. Four weeks after emergence, 1.5 lbs P₂O₅/1000 ft² was applied. Treatments included two seeding dates (August or September), two application strategies at 0.25 lbs ai/A (single or sequential 4 weeks after initial), and five initial application timings (none, 0, 7, 14, and 21 ± 1 DAE). Seeding and application dates are listed in Table 1. Visual ratings of percent cover were taken weekly from August through November. Ratings resumed again in April and continued through June until final transect data were taken. The transect method consisted of a PVC frame with 81 intersections and was placed over each individual plot. If the species of interest

(creeping bentgrass or *Poa annua*) was under or touched the intersection, it was recorded as a 'hit'. The number of 'hits' per 81 intersections was then converted to percent cover.

Results

Data presented focuses on November and June data. November data represents treatment effects going into the winter, and June data represents effects at the beginning of the playing season. *Poa annua* spring data is presented to demonstrate Dimension's residual effect over the winter.

Creeping bentgrass:

- The 0 DAE timing reduced cover of the August seeded creeping bentgrass, whereas all The August seeding produced higher creeping bentgrass cover than September seeding when rated in November and June regardless of application (Table 2).
- Timings reduced cover of September seeded creeping bentgrass when rated in November of both years (Table 2 and 3).
- Sequential effects had marginal effects on creeping bentgrass. In 2000, sequential applications reduced creeping bentgrass by 4% prior to the winter. By June 2001, sequential applications did not have an effect.
- In 2001, sequential applications reduced creeping bentgrass by 8% and 5% in Nov. 2001 and June 2002, respectively.

Annual bluegrass:

- Dimension 1EC had inconsistent effects on *Poa annua*. In November, April, and May of 2000, only the 0 DAE treatment reduced *Poa annua* (Table 4). In Nov. 2001, all timings reduced *Poa annua* cover (Table 5).
- The residual effects of Dimension 1EC could not be determined in 2000 because *Poa annua* cover was greater than 90% going into the winter. However, residual effects were observed in June 2002. *Poa annua* was reduced up to 37% depending on timing.
- The inconsistency in *Poa annua* control between the two years may be attributed to the biology of *Poa annua* and the location of the studies.
- *Poa annua* control was marginal, inconsistent, and largely affected by location.

Creeping bentgrass+annual bluegrass:

- Dimension had limited effects in reducing the *Poa annua* in the presence of creeping bentgrass (Table 6). Therefore, the risk associated with Dimension 1EC applications shortly after emergence cannot be justified given the potentially small benefit in *Poa annua* control.

Summary

Our data suggest Dimension applications made between 14 and 21 DAE of creeping bentgrass are safe on the bentgrass while marginally minimizing *Poa annua*. We would further recommend dithiopyr be reapplied later in the fall (6 weeks after the first application) to insure maximum *Poa annua* control. The most important factor in a successful fairway renovation to creeping bentgrass is seeding in August rather than waiting until September.

Table 1. Seeding, seedling emergence and application dates of all studies in 2000 and 2001.

	2000		2001	
	Seeding month		Seeding month	
	Aug	Sep	Aug	Sep
Seeding	Aug 18	Sep 15	Aug 20	Sep 17
Seedling emergence	Aug 25	Sep 29	Aug 28	Sep 28
<u>Applications (DAE)</u>				
none	-	-	-	-
0	Aug 25	Sep 29	Aug 28	Sep 28
7	Sep 1	Oct 6	Sep 4	Oct 5
14	Sep 8	Oct 14	Sep 11	Oct 12
21	Sep 15	Oct 20	Sep 18	Oct 19
none + 28 d	Sep 22	Oct 27	Sep 25	Oct 26
0 + 28 d	Sep 22	Oct 27	Sep 25	Oct 26
7 + 28 d	Sep 29	Nov 3	Oct 2	Nov 2
14 + 28 d	Oct 6	Nov 10	Oct 9	Nov 9
21 + 28 d	Oct 14	Nov 17	Oct 16	Nov 16

Table 2. Effects of Dimension 1EC on 'Providence' creeping bentgrass cover during the safety study initiated in 2000.

	Nov 2000			June 2001		
	Aug	Sep	mean	Aug	Sep	mean
Timing	% cover ^a					
None	97	81	90	100	99	99
0	53	16	33	69	45	57
7	92	46	72	98	78	90
14	95	53	77	100	83	95
21	96	66	84	100	92	98
Mean	89	52		97	83	
Application						
Initial	92	52	75	97	83	91
Sequential	87	52	71	97	83	91
Anova						
Month (M)		**			**	
Timing (T)		**			**	
Application (A)		*			NS	
T*A		**			NS	
M*T		**			**	
M*A		NS			NS	
M*T*A		NS			NS	

^a Backtransformed means from arcsine transformation of original data.

Table 3. Effect of Dimension 1EC on 'Providence' creeping bentgrass cover during the safety study initiated in 2001.

	Nov 2001			June 2002		
	Aug	Sep	mean	Aug	Sep	mean
Timing	% cover ^a					
None	99	86	94	98	100	99
0	71	18	43	87	67	78
7	90	37	66	95	82	90
14	94	18	58	99	77	92
21	96	61	80	97	98	97
Mean	91	44		96	88	
Application						
Initial	93	49	74	97	93	95
Sequential	89	38	66	96	83	90
Anova						
Month (M)		*			**	
Timing (T)		**			**	
Application (A)		*			**	
T*A		NS			NS	
M*T		**			**	
M*A		NS			NS	
M*T*A		NS			NS	

^aBacktransformed means from arcsine transformation of original data.

Table 4. Effects of Dimension 1EC on control of *Poa annua* during the sixteen fairway study initiated in 2000.

	Nov 2000			April 2001			May 2001			June 2001		
	Aug	Sep	mean	Aug	Sep	mean	Aug	Sep	mean	Aug	Sep	mean
Timing	% cover ^a											
None	96	99	98	98	99	99	100	100	100	95	97	97
0	79	93	86	86	93	90	92	98	96	81	96	90
7	90	96	93	92	97	95	94	100	98	86	99	95
14	95	97	96	94	99	97	97	100	99	92	97	95
21	93	99	97	91	100	97	97	100	99	95	99	97
Mean	91	97		93	98		97	100		91	98	
Application												
Initial	94	98	96	95	99	97	98	100	99	94	97	96
Sequential	89	96	93	90	97	94	95	100	98	86	98	94
Anova												
Month (M)	NS			NS			NS			NS		
Timing (T)	**			**			**			NS		
Application (A)	NS			*			*			NS		
T*A	NS			NS			NS			NS		
M*T	NS			NS			NS			NS		
M*A	NS			NS			NS			NS		
M*T*A	NS			NS			NS			NS		

^aBacktransformed means from arcsine transformation of original data.

Table 5. Effects of Dimension 1EC on control of *Poa annua* during the fifteen fairway study initiated in 2001.

	Nov 2001			April 2002			May 2002			June 2002		
	Aug	Sep	mean	Aug	Sep	mean	Aug	Sep	mean	Aug	Sep	mean
Timing	% cover ^a											
None	70	5	33	96	38	72	96	70	86	99	83	93
0	14	0	4	40	2	17	53	5	25	79	32	56
7	7	1	3	29	3	13	42	11	25	74	45	60
14	23	4	12	55	9	30	72	18	44	83	55	70
21	13	3	9	46	14	29	59	32	45	83	65	75
Mean	23	3		55	11		67	25		85	57	
Application												
Initial	30	3	13	69	17	42	77	34	56	91	66	80
Sequential	17	3	9	42	6	21	56	16	35	79	47	64
Anova												
Month (M)	**			**			*			*		
Timing (T)	**			**			**			**		
Application (A)	NS			**			**			**		
T*A	NS			NS			NS			NS		
M*T	**			NS			NS			NS		
M*A	*			NS			NS			NS		
M*T*A	NS			*			NS			NS		

^a Backtransformed means from arcsine transformation of original data.

Table 6. Effects of Dimension 1EC on *Poa annua* cover when seeded with 'Providence' creeping bentgrass during the 2000 and 2001 studies.

	June 2001			June 2002		
	Aug	Sep	mean	Aug	Sep	mean
Timing	————— % cover <i>Poa annua</i> ^a —————					
None	16	31	23	22	9	15
0	36	54	45	34	22	28
7	17	51	33	30	17	23
14	12	42	26	24	19	21
21	17	38	26	20	16	18
Mean	19	43		26	17	
Application						
Initial	20	43	31	28	18	23
Sequential	18	43	30	23	15	19
Anova						
Month (M)		*			NS	
Timing (T)		**			NS	
Application (A)		NS			NS	
T*A		NS			NS	
M*T		NS			NS	
M*A		NS			NS	
M*T*A		NS			NS	

^aBacktransformed means from arcsine transformation of original data.