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This publication includes lecture notes of papers presented at the 2017 GREEN EXPO Turf and Landscape Conference. Publication of these lectures provides a readily available source of information covering a wide range of topics and includes technical and popular presentations of importance to the turfgrass industry.

This proceedings also includes research papers that contain original research findings and reviews of selected subjects in turfgrass science. These papers are presented primarily to facilitate the timely dissemination of original turfgrass research for use by the turfgrass industry.

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Dr. Ann Brooks Gould, Editor
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POST-EMERGENCE FALSE-GREEN KYLLINGA CONTROL WITH DISMISS AND DISMISS NXT, 2017

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The objective of this experiment was to evaluate Dismiss and Dismiss NXT for post-emergence control of false-green kyllinga (*Kyllinga gracillima*).

MATERIALS AND METHODS

This experiment was conducted at Stone Harbor Golf Club in Cape May Courthouse, NJ. The site consisted of a 4-inch layer of sand with 9% organic matter content (likely as a result of >10 years of turfgrass growth) atop a >6-inch layer of sand with <0.9% organic matter and a natural infestation of false-green kyllinga. Kyllinga cover was between 60 and 75% at the beginning of the experiment and was evaluated on an individual plot basis. The site was located on a driving range and contained primarily creeping bentgrass (*Agrostis stolonifera*). The site was mowed weekly with a rotary mower at 2.5 inches and irrigated as necessary to prevent wilt.

Treatments (Table 1) were arranged in a randomized block design and replicated four times. The treatments were applied on 13 June 2017 to 4 x 7-ft plots using a CO_2-powered sprayer calibrated to apply 44 GPA through a single 9504EVS nozzle at 44 PSI. A 12-inch wide, non-treated buffer strip was maintained between each plot providing a 3 x 7-ft treated area.

False-green kyllinga injury and cover were evaluated visually on a 0 (no injury, no cover) to 100% (complete necrosis, complete cover) scale relative to the non-treated control. False-green kyllanga injury was assessed 3, 9, 16, 23, and 30 days after treatment (DAT) (Table 2). False-green kyllinga control and cover were evaluated weekly from 4 to 12 weeks after treatment (WAT) (Tables 3, 5). "Control" was evaluated by visually estimating the percent cover of false-green kyllinga in each plot and transforming this value to indicate the percent reduction in kyllinga cover relative to the non-treated control plot in the same replicate on each evaluation date. "Percent cover reduction" (Table 4) is also presented and was calculated by transforming the kyllinga cover for each plot on each rating date relative to percent cover from the same plot at 0 DAT. Turfgrass injury was evaluated, but may not have any practical relevance as creeping bentgrass was maintained at rough height. For the same reasons, turfgrass quality was not evaluated.

Data were analyzed subjected to ANOVA in ARM (v2017) and Fisher's Protected LSD ($p \leq 0.05$) was used to separate means. A separate statistical analysis was conducted in SAS (v9.4) where kyllinga control data were analyzed in a factorial treatment arrangement. Herbicide (Dismiss NXT and Dismiss) and rate (low, medium, and high) were evaluated as main effects. The non-treated control, Celero, and Sedgehammer were not included in the analysis.

RESULTS

No creeping bentgrass injury was observed at any time (data not presented).

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False-green Kyllinga Injury

All treatments containing Dismiss NXT or Dismiss caused more injury than the non-treated control, Celero, and Sedgehammer at 3 and 9 DAT (Table 2). Dismiss and Dismiss NXT caused similar false-green kyllinga injury; injury was not affected by application rate.

False-green Kyllinga Control

At 4 WAT, Dismiss provided between 21 and 57% control, which was similar to that provided by Dismiss NXT (21 to 50%) (Table 3). The highest rate of Dismiss and Dismiss NXT provided 57 and 50% control, respectively at 4 WAT. Celero and Sedgehammer provided >97% control at 4 WAT. However, from 5 to 12 WAT, Dismiss applied at 8 oz per acre provided control similar to Sedgehammer. The 8 oz per acre rate of Dismiss provided more control than the 6 and 4 oz per acre rates from 5 to 12 WAT as well. Control was similar across all rates for Dismiss NXT, although there was a non-significant trend that application at 10 oz per acre provided more control than 8 and 5 oz per acre. Control provided by Dismiss at 4 and 6 oz per acre was similar to the non-treated control from 8 to 12 WAT.

At the conclusion of the experiment (12 WAT), Dismiss NXT and Dismiss applied at the highest rates (10 and 8 oz per acre, respectively) provided 49 and 55% control, which was similar to that provided by Sedgehammer (67%), but less than that provided by Celero (98%).

Trends among false-green kyllinga cover reduction and cover data were generally similar to control data except that reductions provided by both Dismiss at 4 and 6 oz per acre and Dismiss NXT at 5 and 8 oz per acre were not different from the non-treated control from 8 to 12 WAT, whereas in control data only Dismiss at 4 and 6 oz per acre were similar to the non-treated control from 8 to 12 WAT (Tables 4 and 5).

This research demonstrates that in a single application program Dismiss and Dismiss NXT should be applied at the highest label rate (8 and 10 fl oz per acre, respectively).

In a separate statistical analysis to compare Dismiss and Dismiss NXT in a factorial treatment arrangement, there was no difference between Dismiss NXT and Dismiss when averaged across three rates on any date (Table 6). The effect of rate was significant from 7 to 10 WAT where the highest rate provided more control than the medium (6 and 8 oz per acre) and low rates (4 and 5 oz per acre).

ACKNOWLEDGMENTS

We thank Stone Harbor Golf Course Superintendent Kevin Tansey for hosting this experiment.

Table 1. Herbicide treatments applied for post-emergence control of false-green kyllinga (*Kyllinga gracillima*) in creeping bentgrass (*Agrostis stolonifera*) turf at Stone Harbor Golf Club in Cape May Court House, NJ. Treatments were applied on 13 June 2017.

Treatment	Product	Active Ingredient	Product Rate (oz per acre)	Active Ingredient Rate (lb per acre)
1	Non-treated	–	–	–
2	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	5 fl oz	0.13 + 0.01
3	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	8 fl oz	0.19 + 0.02
4	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	10 fl oz	0.25 + 0.03
5	Dismiss 4SC	sulfentrazone	4 fl oz	0.13
6	Dismiss 4SC	sulfentrazone	6 fl oz	0.19
7	Dismiss 4SC	sulfentrazone	8 fl oz	0.25
8	Sedgehammer[1]	halosulfuron-methyl	1.33 oz wt	0.06
9	Celero[1]	imazosulfuron	8 oz wt	0.38

[1] Sedgehammer and Celero applied with non-ionic surfactant (Activator 90) at 0.25% v/v

Table 2. False-green kyllinga injury from post-emergence herbicide applications made on 13 June in Cape May Courthouse, NJ.

		False-green Kyllinga Injury (%)[1]				
Treatment	Herbicide	16 June 3 DAT[2]	22 June 9 DAT	29 June 16 DAT	6 July 23 DAT	13 July 30 DAT
1	Non-treated	0 b	0 d	0 d	0	0
2	Dismiss NXT (5 oz)	26 a	53 a	17 bc	38	0
3	Dismiss NXT (8 oz)	26 a	60 a	8 cd	35	4
4	Dismiss NXT (10 oz)	25 a	59 a	16 bcd	40	14
5	Dismiss (4 oz)	25 a	43 ab	26 ab	17	8
6	Dismiss (6 oz)	28 a	49 a	15 bcd	40	0
7	Dismiss (8 oz)	24 a	55 a	16 bcd	39	8
8	Sedgehammer[3] (1.33 oz)	0 b	20 c	25 ab	55	43
9	Celero[3] (8 oz)	0 b	28 bc	35 a	51	23
	LSD at 5% =	8	19	17	NS	NS

[1] False-green kyllinga injury evaluated on a 0 to 100% scale, where 0 = no injury and 100 = complete necrosis relative to the non-reated control. Means followed by the same letter are not sigificantly different according to Fisher's Protected LSD test ($p \leq 0.05$)

[2] DAT = days after treatment

[3] Sedgehammer and Celero applied with non-ionic surfactant (Activator 90) at 0.25% v/v

Table 3. False-green kyllinga control from post-emergence herbicde applications made on 13 June 2017 in Cape May Courthouse, NJ.

		False-green Kyllinga Control (%)[1]								
Treatment	Herbicide	13 July 4 WAT[2]	20 July 5 WAT	27 July 6 WAT	3 Aug. 7 WAT	10 Aug. 8 WAT	17 Aug. 9 WAT	24 Aug. 10 WAT	31 Aug. 11 WAT	7 Sept. 12 WAT
1	Non-treated	0 c	0 e	0 e	0 f	0 f	0 e	0 e	0 e	0 e
2	Dismiss NXT (5 oz)	36 bc	43 cd	50 bcd	50 cde	50 cde	42 cd	37 cd	34 cd	31 cd
3	Dismiss NXT (8 oz)	21 bc	56 bcd	61 bc	52 cd	44 cde	43 cd	40 cd	38 cd	33 cd
4	Dismiss NXT (10 oz)	50 b	65 bc	58 bc	65 bcd	58 bcd	54 bc	51 bc	49 bc	49 bc
5	Dismiss (4 oz)	21 bc	30 d	22 de	21 ef	20 ef	15 de	12 de	12 de	12 de
6	Dismiss (6 oz)	22 b	37 cd	36 cd	40 de	27 def	23 de	20 de	14 de	12 de
7	Dismiss (8 oz)	57 b	74 ab	77 ab	71 abc	69 bc	64 bc	59 bc	59 bc	55 bc
8	Sedgehammer[3] (1.33 oz)	97 a	100 a	99 a	87 ab	82 ab	80 ab	75 ab	71 ab	67 b
9	Celero[3] (8 oz)	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	98 a
	LSD at 5% =	40	30	31	31	31	29	28	29	28

[1] False-green kyllinga control was determined by the visual assessment of percent cover of false-green kyllinga in each plot and transforming this value to a percent of the cover in the non-treated control plot in the same replicate on each evaluation date. Means followed by the same letter are not sigificantly different according to Fisher's Protected LSD test ($p \leq 0.05$)

[2] WAT = weeks after treatment

[3] Sedgehammer and Celero applied with non-ionic surfactant (Activator 90) at 0.25% v/v

Table 4. False-green kyllinga cover reduction from post-emergence herbicide applications made on 13 June 2017 in Cape May Courthouse, NJ.

		False-green Kyllinga Cover Reduction (%)[1]								
Treatment	Herbicide	13 July 4 WAT[2]	20 July 5 WAT	27 July 6 WAT	3 Aug. 7 WAT	10 Aug. 8 WAT	17 Aug. 9 WAT	24 Aug. 10 WAT	31 Aug. 11 WAT	7 Sept. 12 WAT
1	Non-treated	60 bc	24 c	23 de	12 d	5 de	1 de	-2 de	-4 de	-8 de
2	Dismiss NXT (5 oz)	67 bc	41 c	54 bcd	42 bcd	39 b-e	26 cde	18 cde	15 cde	10 cde
3	Dismiss NXT (8 oz)	58 bc	55 bc	59 bc	39 cd	24 cde	22 cde	17 cde	15 cde	8 cde
4	Dismiss NXT (10 oz)	80 ab	73 ab	63 bc	59 abc	47 bcd	41 bcd	36 bcd	32 bcd	33 bcd
5	Dismiss (4 oz)	49 c	36 c	15 e	0 d	-6 e	-15 e	-20 e	-20 e	-22 e
6	Dismiss (6 oz)	62 bc	44 bc	39 cde	24 cd	5 de	-2 de	-7 de	-14 e	-18 e
7	Dismiss (8 oz)	81 ab	75 ab	76 ab	62 abc	57 abc	50 bc	43 bc	43 bc	37 bc
8	Sedgehammer[3] (1.33 oz)	99 a	100 a	98 a	84 ab	77 ab	73 ab	65 ab	61 ab	54 b
9	Celero[3] (8 oz)	100 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	98 a
	LSD at 5% =	26	32	32	43	46	44	43	43	42

[1] False-green kyllinga cover reduction was calculated by transforming the visual assessment of kyllinga cover for each plot on each rating date relative to percent cover from the same plot at 0 DAT. Means followed by the same letter are not sigificantly different according to Fisher's Protected LSD test ($p \leq 0.05$)

[2] WAT = weeks after treatment

[3] Sedgehammer and Celero applied with non-ionic surfactant (Activator 90) at 0.25% v/v

Table 5. False-green kyllinga cover following post-emergence herbicide applications made on 13 June 2017 in Cape May Courthouse, NJ.

		False-green Kyllinga Cover (%)[1]								
Treatment	Herbicide	13 July 4 WAT[2]	20 July 5 WAT	27 July 6 WAT	3 Aug. 7 WAT	10 Aug. 8 WAT	17 Aug. 9 WAT	24 Aug. 10 WAT	31 Aug. 11 WAT	7 Sept. 12 WAT
1	Non-treated	30 ab	58 a	59 a	68 a	73 a	75 a	78 a	79 ab	81 a
2	Dismiss NXT (5 oz)	24 ab	43 abc	34 bc	43 abc	45 a-d	54 abc	60 abc	63 abc	66 ab
3	Dismiss NXT (8 oz)	29 ab	31 bcd	29 bc	43 abc	53 abc	54 abc	58 abc	59 abc	64 ab
4	Dismiss NXT (10 oz)	14 bc	20 cde	28 bc	30 bcd	39 bcd	43 bcd	46 bcd	49 bcd	49 bc
5	Dismiss (4 oz)	36 a	45 ab	60 a	70 a	74 a	80 a	84 a	84 a	85 a
6	Dismiss (6 oz)	28 ab	40 a-d	44 ab	54 ab	68 ab	73 ab	76 ab	81 a	85 a
7	Dismiss (8 oz)	13 bc	18 de	16 cd	26 bcd	29 cde	34 cd	39 cd	39 cd	43 bc
8	Sedgehammer[3] (1.33 oz)[3]	1 c	0 e	1 d	11 cd	16 de	19 de	24 d	28 de	31 c
9	Celero[3] (8 oz)	0 c	0 e	0 d	0 d	0 e	0 e	0 e	0 e	2 d
	LSD at 5% =	18	23	24	32	33	32	31	31	29

[1] False-green kyllinga cover visually evaluated on a 0 to 100% scale, where 0 = no cover and 100 = complete cover. Means followed by the same letter are not sigificantly different according to Fisher's Protected LSD test ($p \leq 0.05$)
[2] WAT = weeks after treatment
[3] Sedgehammer and Celero applied with non-ionic surfactant (Activator 90) at 0.25% v/v

Table 6. False-green kyllinga control from post-emergence herbicide applications made on 13 June 2017 in Cape May Courthouse, NJ.

	False-green Kyllinga Control (%)[1]								
Factor	13 July 4 WAT[2]	20 July 5 WAT	27 July 6 WAT	3 Aug. 7 WAT	10 Aug. 8 WAT	17 Aug. 9 WAT	24 Aug. 10 WAT	31 Aug. 11 WAT	7 Sept. 12 WAT
Model	NS[3]	NS	NS	*	*	*	*	NS	NS
Main Effect									
Herbicide	–	–	–	NS	NS	NS	NS	–	–
Rate	–	–	–	*	*	*	*	–	–
Herbicide x rate	–	–	–	NS	NS	NS	NS	–	–
Herbicide									
Dismiss NXT	35	55	56	56	50	47	43	40	37
Dismiss	33	47	45	44	39	34	30	28	26
Rate									
Low	28	37	36	36 b[4]	36 b	28 b	24 b	23	21
Medium	21	46	48	46 b	35 b	33 b	30 b	26	22
High	53	69	67	68 a	63 a	59 a	55 a	54	51

1 Dismiss NXT and Dismiss were analyzed in a factorial treatment arrangement. Data for Celero, Sedgehammer, and the non-treated control were not included in the analysis.

2 WAT = weeks after treatment

3 NS, *, **, *** nonsignifcant and signifcant at the 0.05, 0.01, and 0.001 probability level, respectively

4 Means followed by the same letter are not sigificantly different according to Fisher's Protected LSD test ($p \leq 0.05$)