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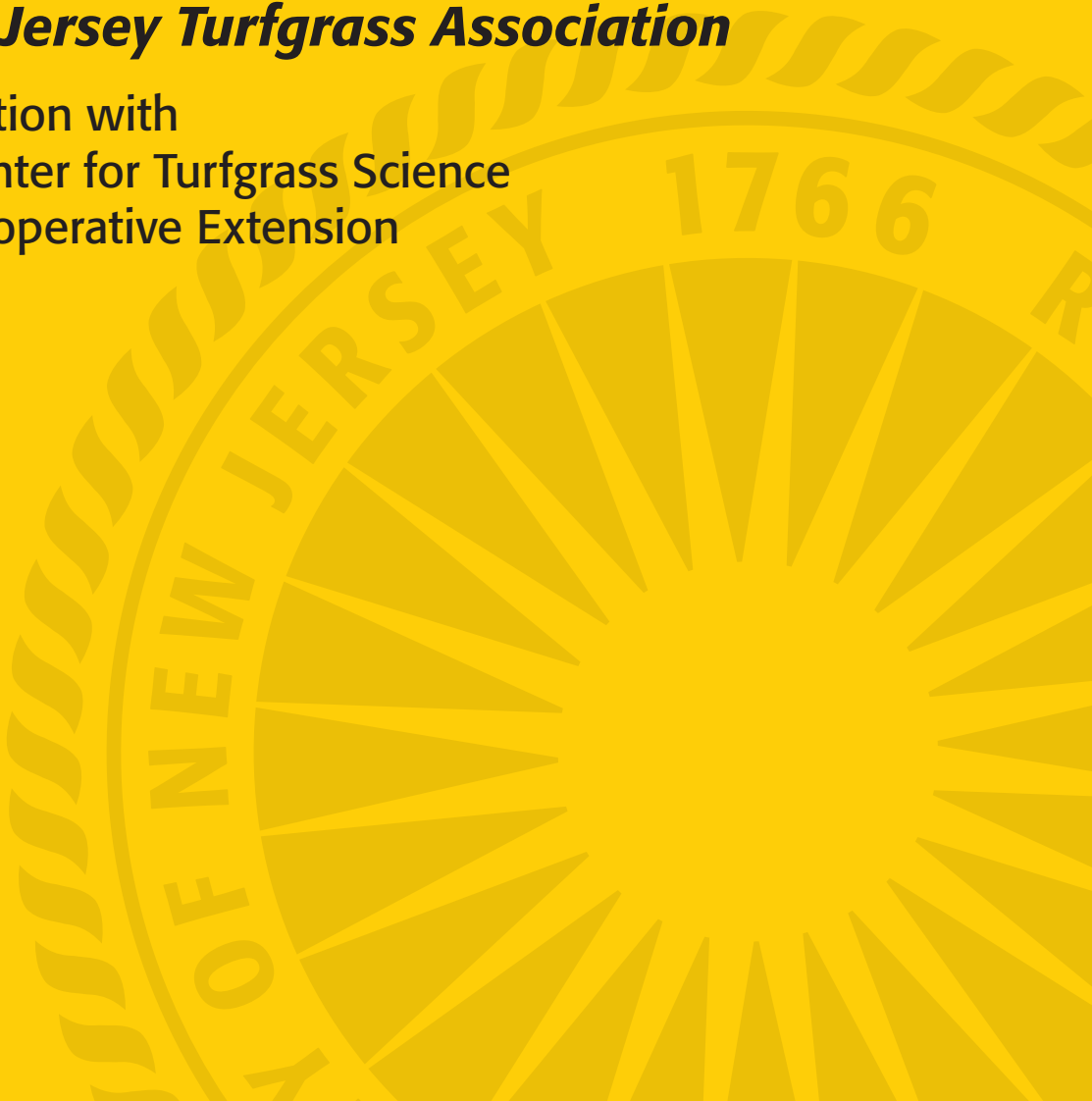

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The Rutgers Turfgrass Proceedings is published yearly by the Rutgers Center for Turfgrass Science, Rutgers Cooperative Extension, and the New Jersey Agricultural Experiment Station, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey in cooperation with the New Jersey Turfgrass Association. The purpose of this document is to provide a forum for the dissemination of information and the exchange of ideas and knowledge. The proceedings provide turfgrass managers, research scientists, extension specialists, and industry personnel with opportunities to communicate with co-workers. Through this forum, these professionals also reach a more general audience, which includes the public.

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
Dr. Bruce B. Clarke, Coordinator

POST-EMERGENCE FALSE-GREEN KYLLINGA CONTROL WITH SEQUENTIAL APPLICATIONS OF 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. 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. Kyllinga cover was between 40 and 60% at the beginning of the experiment and was evaluated on an individual plot basis.

Treatments (Table 1) were arranged in a randomized block design and replicated four times. The treatments were applied 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. Applications A and B were made on 13 June and 13 July 2017, respectively. 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. Weed injury was assessed at select dates (Table 2). False-green kyllinga cover and control was evaluated weekly from 4 to 12 weeks after initial treatment (WAIT) (Tables 3 and 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 days after treatment (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.

RESULTS

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

False-green Kyllinga Injury

All treatments containing Dismiss or Dismiss NXT caused more injury than Sedgehammer or Celero at 3 DAT (Table 2). By 9 DAT, most herbicide treatments caused similar injury. At 23 and 30 DAT, Celero and Sedgehammer caused more injury than all treatments containing Dismiss or Dismiss NXT.

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False-green Kyllinga Control

Single applications of Dismiss NXT and Dismiss provided ≤35% control from 4 to 12 WAIT (Table 3). With the exception of Dismiss NXT (5 oz) at 8 WAIT, control from single applications was not different from the non-treated control. Sequential applications of Dismiss provided more control than single applications from 6 to 8 WAIT. Sequential applications of Dismiss NXT did not improve control compared to single applications. Sequential applications of Dismiss provided 30 to 65% control from 4 to 12 WAIT. Sedgehammer and Celero provided more control than all Dismiss and Dismiss NXT treatments from 4 to 12 WAIT.

False-green Kyllinga Cover Reductions and Percent Cover

When data are presented as reductions in false-green kyllinga cover, trends are mostly similar except that a single application Dismiss NXT applied at 5 oz per acre provided more control than a single application at 4 oz per acre (Table 4).

Sequential applications of Dismiss reduced false-green kyllinga cover to as low as 27% at 5 WAIT, which was lower than the 72% cover observed in the non-treated control (Table 5). By 12 WAIT, kyllinga cover in these plots was between 59 and 60%, which was lower than the 86% cover observed in the non-treated control.

CONCLUSIONS

This experiment demonstrates that two applications of Dismiss can provide false-green kyllinga control for up to 12 weeks. However, this control may not be considered commercially acceptable at rates evaluated in this experiment. Control was ≤65% on all rating dates compared to >95% control provided by two applications of Sedgehammer or Celero.

ACKNOWLEDGMENTS

We thank Stone Harbor Golf Course Superintendent Kevin Tansey for hosting this experiment and Jennifer Sawyer for technical assistance.

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. Applications A and B were applied on 13 June and 13 July 2017, respectively.

Treatment	Product	Active ingredient	Product Rate (oz per acre)	Active Ingredient Rate (lb per acre)	Application Code
1	Non-treated	–	–	–	–
2	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	4 fl oz	0.10 + 0.01	A
3	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	5 fl oz	0.13 + 0.01	A
4	Dismiss 4SC	sulfentrazone	3 fl oz	0.09	A
5	Dismiss 4SC	sulfentrazone	4 fl oz	0.13	A
6	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	4 fl oz	0.09 + 0.01	AB
7	Dismiss NXT	sulfentrazone + carfentrazone-ethyl	5 fl oz	0.13 + 0.01	AB
8	Dismiss 4SC	sulfentrazone	3 fl oz	0.09	AB
9	Dismiss 4SC	sulfentrazone	4 fl oz	0.13	AB
10	Sedgehammer[1]	halosulfuron-methyl	1.33 oz wt	0.06	AB
11	Celero[1]	imazosulfuron	8 oz wt	0.38	AB

[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 and 13 July 2017 in Cape May Courthouse, NJ.

		False-green Kyllinga Injury (%)[1]					
Treatment	Herbicide	16 June 3 DAT[2]	22 June 9 DAT	6 July 23 DAT	13 July 30 DAT	20 July 7 DA-B	27 July 14 DA-B
1	Non-treated	0 b	0 c	0 e	0 b	0 d	0 c
2	Dismiss NXT (4 oz)	24 a	49 ab	25 bcd	6 b	8 d	0 c
3	Dismiss NXT (5 oz)	23 a	61 a	25 bcd	11 b	5 d	0 c
4	Dismiss (3 oz)	26 a	25 bc	35 bcd	5 b	13 cd	0 c
5	Dismiss (4 oz)	23 a	28 bc	32 bcd	8 b	5 d	0 c
6	Dismiss NXT (4 *fb*[3] 4 oz)	25 a	48 ab	40 b	5 b	40 b	35 b
7	Dismiss NXT (5 *fb* 5 oz)	24 a	44 ab	18 de	4 b	45 ab	55 a
8	Dismiss (3 *fb* 3 oz)	24 a	31 b	38 bc	10 b	30 bc	28 b
9	Dismiss (4 *fb* 3 oz)	24 a	34 ab	20 cde	4 b	61 a	56 a
10	Sedgehammer[4] (1.33 oz)	0 b	43 ab	70 a	40 a	0 d	0 c
11	Celero[4] (8 oz)	1 b	48 ab	71 a	58 a	0 d	0 c
	LSD at 5% =	6	28	18	27	19	17

[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] *fb* = followed by

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

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

Treatment	Herbicide	False-green Kyllinga Control (%)[1]								
		13 July 4 WAIT[2]	20 July 5 WAIT	27 July 6 WAIT	3 Aug. 7 WAIT	10 Aug. 8 WAIT	17 Aug. 9 WAIT	24 Aug. 10 WAIT	31 Aug. 11 WAIT	7 Sept. 12 WAIT
1	Non-treated	0 b	0 d	0 ef	0 ef	0 de	0 cd	0 c	0 c	0 bc
2	Dismiss NXT (4 oz)	27 b	29 bcd	6 def	6 def	7 cde	7 cd	7 c	8 bc	6 bc
3	Dismiss NXT (5 oz)	27 b	33 bcd	32 b-e	26 cde	35 bc	27 bcd	26 bc	21 bc	15 bc
4	Dismiss (3 oz)	9 b	30 bcd	11 def	3 def	7 cde	7 cd	7 c	6 bc	6 bc
5	Dismiss (4 oz)	2 b	15 cd	-15 f	-12 f	-8 e	-5 d	-4 c	-3 c	-2 c
6	Dismiss NXT (4 *fb*[3] 4 oz)	12 b	41 bc	28 cde	30 b-e	34 bc	29 bc	23 bc	21 bc	16 bc
7	Dismiss NXT (5 *fb* 5 oz)	1 b	30 bcd	37 bcd	36 bcd	27 bcd	23 bcd	19 bc	14 bc	13 bc
8	Dismiss (3 *fb* 3 oz)	40 b	63 b	65 ab	61 b	50 b	51 b	41 b	30 bc	30 b
9	Dismiss (4 *fb* 3 oz)	33 b	53 b	57 bc	49 bc	45 b	46 b	43 b	36 b	30 b
10	Sedgehammer (1.33 oz)[4]	97 a	100 a	99 a	100 a	98 a	100 a	100 a	100 a	96 a
11	Celero[4] (8 oz)	92 a	100 a	100 a	100 a	99 a	100 a	100 a	100 a	99 a
	LSD at 5% =	44	36	36	34	34	33	31	45	30

[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] WAIT = weeks after initial treatment

[3] *fb* = followed by

[4] 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 and 13 July 2017 in Cape May Courthouse, NJ.

		False-green Kyllinga Cover Reduction (%)[1]								
Treatment	Herbicide	13 July 4 WAIT[2]	20 July 5 WAIT	27 July 6 WAIT	3 Aug. 7 WAIT	10 Aug. 8 WAIT	17 Aug. 9 WAIT	24 Aug. 10 WAIT	31 Aug. 11 WAIT	7 Sept. 12 WAIT
1	Non-treated	-3 cd	-31 de	-32 de	-42 de	-48 d	-49 ef	-51 cd	-53 b	-55 b
2	Dismiss NXT (4 oz)	-17 d	-40 e	-89 f	-104 f	-111 e	-110 g	-113 e	-113 c	-126 c
3	Dismiss NXT (5 oz)	20 bc	9 bcd	7 bcd	-15 cde	-4 bc	-21 c-f	-25 bcd	-35 b	-50 b
4	Dismiss (3 oz)	10 bcd	9 bcd	-9 cde	-34 de	-41 cd	-43 def	-46 cd	-53 b	-54 b
5	Dismiss (4 oz)	4 bcd	-4 cde	-40 e	-51 e	-56 d	-54 f	-56 d	-56 b	-59 b
6	Dismiss NXT (4 *fb*[3] 4 oz)	12 bcd	21 bc	8 bcd	-5 cd	-1 bc	-13 b-e	-24 bcd	-30 b	-40 b
7	Dismiss NXT (5 *fb* 5 oz)	2 bcd	12 bc	20 bc	12 bc	-1 bc	-7 bcd	-13 bc	-31 b	-26 b
8	Dismiss (3 *fb* 3 oz)	34 b	46 b	45 b	38 b	18 b	22 b	4 b	-15 b	-17 b
9	Dismiss (4 *fb* 3 oz)	20 bc	28 bc	39 b	27 bc	12 b	10 bc	0 b	-12 b	-28 b
10	Sedgehammer[4] (1.33 oz)	96 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	95 a
11	Celero[4] (8 oz)	91 a	100 a	100 a	100 a	100 a	100 a	100 a	100 a	99 a
	LSD at 5% =	32	40	42	43	43	39	39	45	49

[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] WAIT = weeks after initial treatment

[3] *fb* = followed by

[4] 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 and 13 July 2017 in Cape May Courthouse, NJ.

		False-green Kyllinga Cover (%)[1]								
Treatment	Herbicide	13 July 4 WAIT[2]	20 July 5 WAIT	27 July 6 WAIT	3 Aug. 7 WAIT	10 Aug. 8 WAIT	17 Aug. 9 WAIT	24 Aug. 10 WAIT	31 Aug. 11 WAIT	7 Sept. 12 WAIT
1	Non-treated	58 a	72 a	73 a	78 ab	81 ab	83 a	84 a	85 a	86 a
2	Dismiss NXT (4 oz)	41 a	50 abc	65 ab	71 abc	75 abc	78 a	79 a	79 ab	81 ab
3	Dismiss NXT (5 oz)	44 a	48 abc	48 bc	56 bcd	53 cd	60 ab	62 ab	66 ab	73 ab
4	Dismiss (3 oz)	50 a	50 abc	60 ab	73 abc	75 abc	76 a	78 a	80 ab	81 ab
5	Dismiss (4 oz)	54 a	59 ab	78 a	84 a	86 a	85 a	86 a	86 a	88 a
6	Dismiss NXT (4 *fb*[3] 4 oz)	48 a	42 bc	49 bc	55 b-e	54 cd	59 ab	64 ab	66 ab	71 ab
7	Dismiss NXT (5 *fb* 5 oz)	58 a	51 abc	46 bc	51 cde	59 bcd	63 ab	66 ab	71 ab	74 ab
8	Dismiss (3 *fb* 3 oz)	34 a	27 c	28 c	31 e	41 d	40 b	49 b	58 b	59 b
9	Dismiss (4 *fb* 3 oz)	38 a	34 bc	30 c	38 de	44 d	44 b	48 b	54 b	60 b
10	Sedgehammer[4] (1.33 oz)	2 b	0 d	0 d	0 f	0 e	0 c	0 c	0 c	3 c
11	Celero[4] (8 oz)	5 b	0 d	0 d	0 f	0 e	0 c	0 c	0 c	1 c
	LSD at 5% =	24	26	22	24	27	27	25	27	26

[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] WAIT = weeks after initial treatment

[3] *fb* = followed by

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