2017 PGR Options for Tall Fescue Management

Tall fescue is a widely adapted cool-season grass that is a commonly used on roadsides and other turfed areas. Frequent mowing is the most common management regime for this grass used by departments of transportation. Plant Growth Regulators (PGRs) are potential tools to reduce turf growth and aid in keeping our roadways safe for travelers. PGRs are currently classified into six categories, Classes A – F, based on their mechanism of action. This trial includes examples of Class A, C, and D PGRs and was established to evaluate some PGR options for roadside management of tall fescue. Class A are late GA synthesis blockers, Class C are mitotic/cell division inhibitors, and Class D are herbicidal. Tall fescue seedhead suppression is an effective means to reduce mowing for the first cycle. PGRs for this are normally applied in the early spring. This trial was established to evaluate some PGR options for roadside management of tall fescue.

Materials and Methods

A trial was established in 2017 at the Spindletop Research Farm in Lexington, KY. The trial was arranged as a complete block design with 21 PGR treatments and three replications of each. Plots were 7 ft by 20 ft with running unsprayed checks (3 ft wide) between each of the plots. The treatments were five PGRs applied before the first mowing and one to two weeks after each of the three mowings plus an untreated control. Products tested were Embark 2S (mefluidide) [Class C]), Plateau (imazapic) [Class D], Opensight (aminopyralid + metsulfuron methyl) [Class D], Anuew (prohexadione calcium) [Class A], and Perspective (aminocyclopyrachlor + clorsulfuron) [Class D] (Table 1). All applications were made at 25 gallons per acre spray solution and included a non-ionic surfactant (Activator 90) at 0.25% v/v. Application dates were 4/26/2017, 6/1/2017, 8/8/2017, and 10/6/2017. Mowing dates were 5/22/2017, 7/26/2017, and 9/26/2017.

Tall fescue color was assessed every two weeks by comparison to the running check strips. The color rating ranges from 0 (dead) to 9 (full green). The color of the check strips was set at 8. Heading (%) was assessed before the first mowing. Canopy heights were measured every two weeks as well. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at $p = 0.05$.

Results and Discussion

14 DAT1 the first applications, all the PGR treatments had shorter fescue than untreated control and most had lower heading density, except for Embark (Table 2). At this assessment, only fescue in Opensight and Perspective plots was less green than the control. By 26 DAT1, all fescue in all the treated plots was still shorter than that in the control and fescue in the Class D PGR treated plots had lower heading (%) (8-20%) (Figure 1) than the control . The Class D treatments were also less green than the control (?). Embark and Anuew only seem to have only slowed heading. After mowing, all the treatments, except Anuew, had less green color and shorter fescue heights at 36 DAT1. Figure 2 summarizes the effects of PGR treatments on green color over the course of the season. There was no effect on color beyond 36 DAT1. Figure 3 summarizes the effects on turf height over the course of the season. Plateau consistently reduced

fescue plant height across two mowings, until 136 DAT1. The other treatments had less consistent effects on fescue height. Fescue in the Anuew treated plots was not shorter than the fescue in control plots after the first mowing.

After the first mowing and the second PGR application, fescue in all the treated plots was not as green and was shorter than the control fescue 15 and 36 DAT2 (Table 3). The fescue in the Embark, Anuew, and Perspective treated plots was still less green and shorter 55 DAT2. Fescue color had recovered somewhat in Opensight treated plots but it was shorter. Twenty days after the second mowing (75 DAT2), fescue color was not different between treatments. Fescue in the Anuew treated plots was the only one shorter than that in the control plots 75 DAT2. Figure 4 summarizes the PGR effects on fescue color. Figure 5 summarizes the treatment effects on fescue height. Note that fescue in the Anuew plots was consistently shorter until 89 DAT2.

After the second mowing and the third PGR application (21 DAT3), fescue in the Plateau and Opensight treated plots had lower green color and lower fescue height than the other PGR treatments (Table 4). Anuew did reduce fescue color ratings 32 DAT3 while all the other treatments did. Fescue was shorter in all the treated plots except those treated with Embark. Fescue color increased in the Opensight and Anuew plots but it was still less than in the plots with the other treatments 47 DAT3. Fescue height was reduced by all the PGRs except for Opensight at that assessment date. After mowing only (59 DAT3), fescue in the Embark and Perspective plots was less green (Table 4) (Figure 6). Embark was the only PGR that reduced fescue height at that date. Plots treated with Embark consistently had shorter fescue until the end of the season (93 DAT3) (Figure 7). The height reductions were inconsistent with the other treatments, except that Plateau did not reduce fescue height beyond mowing (Figure 7).

After the third mowing and the fourth PGR application (16 DAT4), fescue treated with Plateau, Opensight or Perspective was less green. Fescue treated with any of the PGRs was still shorter (Table 5). At the last rating in the season, the only fescue in treated plots that did not have less color was that with Anuew treatment (Table 5, Figure 8). All the PGR treatments resulted in shorter fescue at both ratings (Figure 9).

The effects of the PGR treatments were variable throughout the season. The Class D PGRs (Plateau, Opensight and Perspective) reduced seedhead density and height after the first application timing. In general, many of the treatments reduced fescue height along with fescue color but the color recovered. Anuew had less effect on fescue color than the other PGRs at most of the evaluations. Fescue growth (height) reduction was observed to extend beyond mowing cycles, especially with in Plateau that were treated early in the season. Plots that were treated late in the season (October 6) will be evaluated in 2018 for spring seedhead suppression.

Table 1. Herbicide Treatments, Active Ingredients and Application Rates.

Product (s)	Rate (per Acre)	Active Ingredient(s)	ai Rate (per Acre)
Embark 2S	24 fl oz	mefluidide	6 oz ae
Plateau	2 fl oz	imazapic	0.5 oz ae
Opensight	2.5 oz	aminopyralid + metsulfuron methyl	1.3 oz ae + 0.24 oz
Anuew	1 lb	prohexadione calcium	4.4 oz
Perspective	4.75 oz	aminocyclopyrachlor + chlorsulfuron	1.9 oz + 0.75 oz
Unsprayed Control			

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

Table 2. Herbicide Treatments, Turf Color, Fescue Heights and % Heading after First PGR Application

			May 10, 2017			May 22, 2017			June 1, 2017	
			Color (0-9)	Ht (in)	Heading (%)	Color (0-9)	Ht (in)	Heading (%)	Color (0-9)	Ht (in)
Product (s)	**Rate (per Acre)**	**Timing**	**14 DAT1[1]**			**26 DAT1**			**36 DAT1**	
Embark 2S	24 fl oz	before first mowing	7.9 a[2]	27 b	90 a	7.4 a	34 b	93 a	7.2 b	7.2 c
		after first mowing								
		after second mowing								
		after third mowing								
Plateau	2 fl oz	before first mowing	7.2 ab	20 c	15 c	6.2 b	18 d	10 bc	7.2 b	7.5 bc
		after first mowing								
		after second mowing								
		after third mowing								
Opensight	2.5 oz	before first mowing	6.5 b	19 c	9 c	6.2 b	21 d	8 c	7.3 b	7.7 bc
		after first mowing								
		after second mowing								
		after third mowing								
Anuew	1 lb	before first mowing	7.9 a	20 c	67 b	7.5 a	28 c	93 a	7.9 a	8.5 ab
		after first mowing								
		after second mowing								
		after third mowing								
Perspective	4.75 oz	before first mowing	6.8 b	22 c	12 c	6.2 b	20 d	20 b	7.3 b	7.3 bc
		after first mowing								
		after second mowing								
		after third mowing								
Unsprayed Control			8.0 a	31 a	100 a	8.0 a	39 a	100 a	8.0 a	9.0 a

[1] DAT1 = Days after treatment before first mowing

[2] Means within a column followed by the same letter are not different according to Fisher's LSD at P < 0.05.

Table 3. Herbicide Treatments, Turf Color, and Fescue Heights after Second PGR Application

Product (s)	Rate (per Acre)	Timing	June 16, 2017		July 7, 2017		July 26, 2017		August 15, 2017	
			Color (0-9)	Ht (in)	Color (0-9)	Ht (in)	Color (0-9)	Ht (in)	Color (0-9)	Ht (in)
			51 DAT1[1] (15 DAT2[2])		72 DAT1 (36 DAT2)		91 DAT1 (55 DAT2)		111 DAT1 (75 DAT2)	
Embark 2S	24 fl oz	before first mowing	7.7 ab[3]	11 bcd	7.8 ab	13 bcd	7.8 ab	14 abc	7.9 cd	11 abc
		after first mowing	7.2 bc	12 bcd	5.7 d	12 cde	6.3 d	12 c	8.1 abc	11 ab
		after second mowing								
		after third mowing								
Plateau	2 fl oz	before first mowing	8.2 a	11 bcd	8.0 a	12 cde	7.9 a	13 bc	7.7 d	10 c
		after first mowing	6.7 cd	10 cd	6.7 c	12 cde	7.5 ab	14 ab	7.9 cd	11 abc
		after second mowing								
		after third mowing								
Opensight	2.5 oz	before first mowing	8.2 a	13 abc	8.0 a	14 a	8.1 a	14 ab	7.9 bcd	11 ab
		after first mowing	6.3 d	10 d	7.3 bc	11 ef	7.5 ab	13 bc	8.3 ab	12 a
		after second mowing								
		after third mowing								
Anuew	1 lb	before first mowing	8.0 a	13 ab	8.0 a	13 bc	8.0 a	14 ab	7.8 cd	11 abc
		after first mowing	7.2 bc	11 bcd	7.2 bc	10 f	7.2 bc	13 bc	7.9 cd	10 bc
		after second mowing								
		after third mowing								
Perspective	4.75 oz	before first mowing	7.8 a	12 abcd	7.9 ab	14 ab	8.0 a	13 abc	8.1 abc	12 a
		after first mowing	6.5 d	10 cd	5.7 d	12 de	6.8 cd	12 c	8.3 a	11 ab
		after second mowing								
		after third mowing								
Unsprayed Control			8.0 a	14 a	8.0 a	14 ab	8.0 a	15 a	8.0 abcd	12 a

[1] DAT1 = Days after treatment before first mowing

[2] DAT2 = Days after treatment after first mowing

[3] Means within a column followed by the same letter are not different according to Fisher's LSD at P < 0.05.

Table 4. Herbicide Treatments, Turf Color, and Fescue Heights after Third PGR Application

Product (s)	Rate (per Acre)	Timing	August 29. 2017		September 9, 2017		September 24, 2017		October 6, 2017	
			Color (0-9)	Ht (in)	Color (0-9)	Ht (in)	Color (0-9)	Ht (in)	Color (0-9)	Ht (in)
			125 DAT1[1] (89 DAT2[2]) (21 DAT3[3])		136 DAT1 (100 DAT2) (32 DAT3)		151 DAT1 (115 DAT2) (47 DAT3)		163 DAT1 (127 DAT2) (59 DAT3)	
Embark 2S	24 fl oz	before first mowing	8.0 ab[4]	12 def	8.0 a	13 abcd	8.0 a	14 bcde	8.0 a	7 ab
		after first mowing	8.1 ab	12 defg	8.1 a	13 abcd	8.0 a	14 bcde	8.0 a	7 ab
		after second mowing	7.5 cd	11 fg	5.8 c	12 bcdef	6.5 d	11 f	7.3 c	6 b
		after third mowing								
Plateau	2 fl oz	before first mowing	7.9 abc	11 efg	8.0 a	11 def	7.9 ab	13 cdef	7.7 abc	8 ab
		after first mowing	8.0 abc	12 def	8.0 a	13 abc	8.0 a	14 bcde	8.1 a	8 ab
		after second mowing	6.8 e	11 efg	4.2 d	11 f	7.1 c	12 ef	8.0 ab	8 ab
		after third mowing								
Opensight	2.5 oz	before first mowing	8.0 abc	12 cde	8.0 a	13 abcd	8.0 a	16 ab	7.9 ab	8 ab
		after first mowing	8.1 ab	13 abc	8.0 a	14 a	8.0 a	15 abc	8.0 a	8 a
		after second mowing	7.3 de	11 efg	7.0 b	11 cdef	8.1 a	13 cde	7.7 abc	8 a
		after third mowing								
Anuew	1 lb	before first mowing	8.1 ab	14 ab	8.1 a	14 a	8.1 a	15 abcd	7.8 ab	8 a
		after first mowing	8.0 abc	12 defg	8.0 a	13 abcd	8.0 a	14 bcde	7.9 ab	8 ab
		after second mowing	8.0 abc	11 efg	7.8 a	11 ef	8.1 a	12 ef	7.7 abc	7 ab
		after third mowing								
Perspective	4.75 oz	before first mowing	8.0 abc	13 bcd	7.9 a	12 abcde	8.0 a	14 abcd	7.5 bc	7 ab
		after first mowing	8.4 a	11 efg	8.3 a	13 ab	8.1 a	17 a	7.8 abc	8 ab
		after second mowing	7.6 bcd	11 g	7.2 b	11 def	7.6 b	12 def	7.3 c	7 ab
		after third mowing								
Unsprayed Control			8.0 abc	14 a	8.0 a	13 ab	8.0 a	15 abc	8.0 a	8 a

[1] DAT1 = Days after treatment before first mowing *[2] DAT2 = Days after treatment after first mowing*

[3] DAT3 = Days after treatment after second mowing

[4] Means within a column followed by the same letter are not different according to Fisher's LSD at P < 0.05.

Table 5. Herbicide Treatments, Turf Color, and Fescue Heights after Fourth PGR Application

Product (s)	Rate (per Acre)	Timing	October 22, 2017		November 9, 2017	
			Color (0-9)	Ht (in)	Color (0-9)	Ht (in)
			179 DAT1[1] (143 DAT2[2]) (75 DAT3[3]) (16 DAT4[4])		197 DAT1 (161 DAT2) (93 DAT3) (34 DAT4)	
Embark 2S	24 fl oz	before first mowing	8.0 a[5]	11 bcd	8.0 a	13 ab
		after first mowing	7.9 a	10 cdef	8.0 a	12 abcd
		after second mowing	8.1 a	10 cdef	8.0 a	11 bcde
		after third mowing	7.8 a	10 cdef	7.7 b	11 bcde
Plateau	2 fl oz	before first mowing	8.0 a	10 bcde	8.0 a	11 bcde
		after first mowing	8.0 a	11 bcd	8.0 a	12 abcd
		after second mowing	8.1 a	10 bcde	8.0 a	12 abc
		after third mowing	7.0 b	9 efg	7.2 c	10 efg
Opensight	2.5 oz	before first mowing	8.0 a	11 ab	8.0 a	12 abc
		after first mowing	8.0 a	11 abc	8.0 a	11 cde
		after second mowing	8.2 a	12 a	8.1 a	12 bcd
		after third mowing	7.0 b	9 fg	7.3 c	9 g
Anuew	1 lb	before first mowing	8.0 a	11 bcd	8.0 a	12 abcd
		after first mowing	8.0 a	11 bcd	8.0 a	11 bcde
		after second mowing	8.1 a	10 bcde	8.0 a	11 bcde
		after third mowing	7.9 a	10 defg	8.0 a	10 defg
Perspective	4.75 oz	before first mowing	8.0 a	10 bcde	8.0 a	12 bcd
		after first mowing	8.1 a	11 abc	8.0 a	11 bcde
		after second mowing	8.2 a	10 bcde	8.0 a	11 cdef
		after third mowing	7.1 b	9 g	7.3 c	9 fg
Unsprayed Control			8.0 a	11 ab	8.0 a	14 a

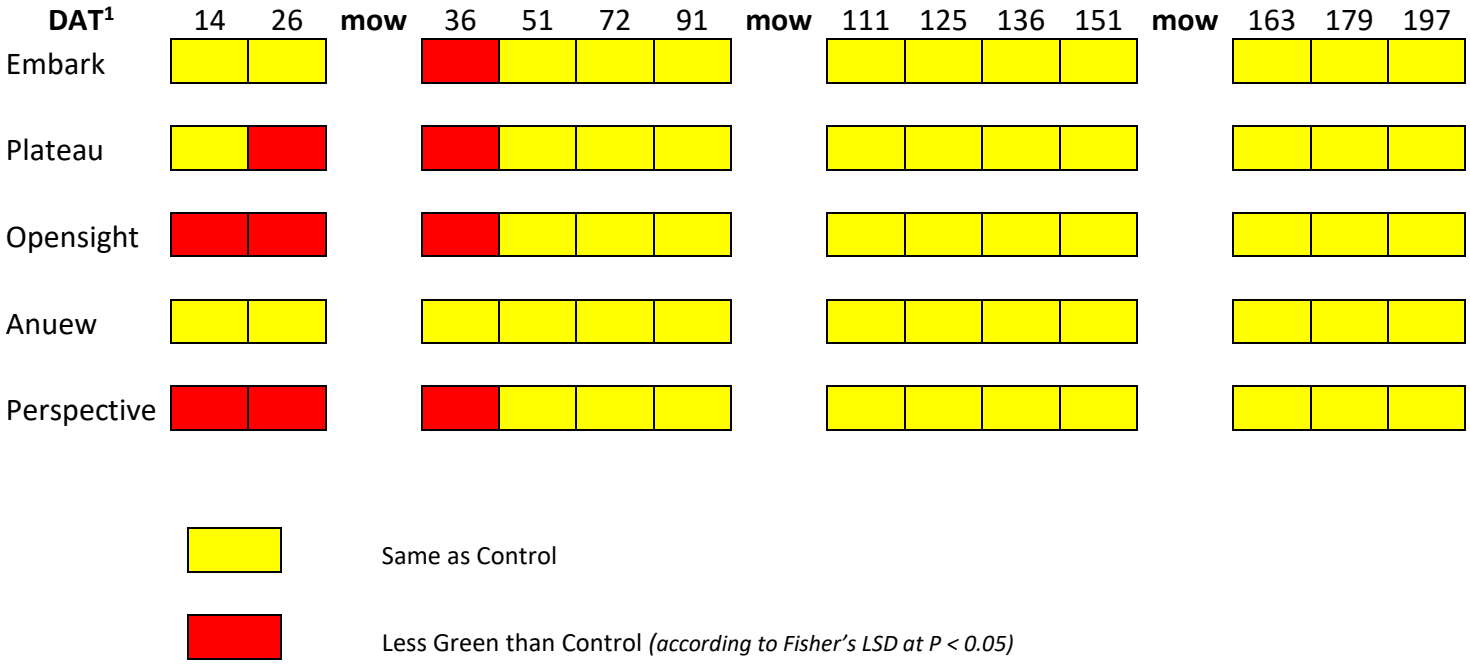
[1] DAT1 = Days after treatment before first mowing *[2] DAT2 = Days after treatment after first mowing*

[3] DAT3 = Days after treatment after second mowing *[4] DAT4 = Days after treatment after third mowing*

[5] Means within a column followed by the same letter are not different according to Fisher's LSD at P < 0.05.

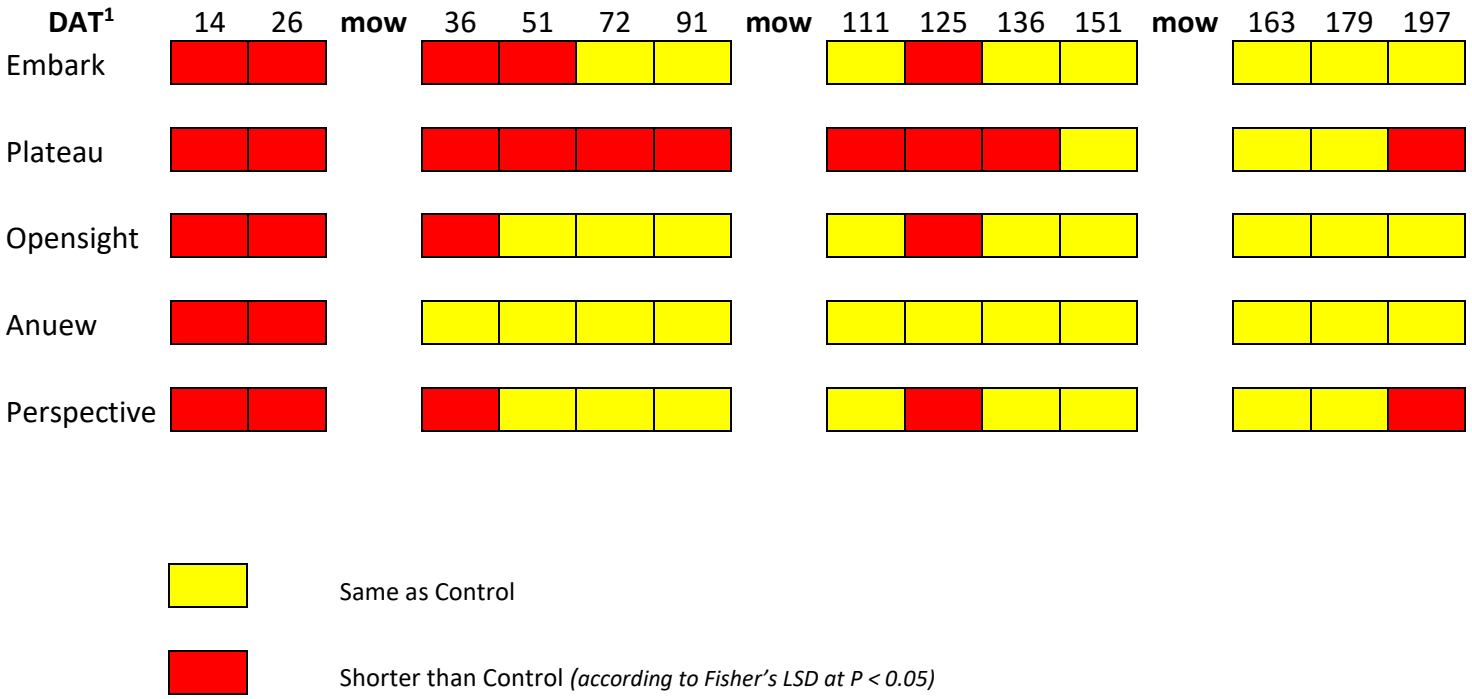
Figure 1. Example of plot with reduced tall fescue color, height, and seedhead density 26 days after the April 26 application.

Figure 2. Summary of Turf Color with PGR Application before First Mowing



[1] *DAT = Days after treatment*

Figure 3. Summary of Fescue Height with PGR Application before First Mowing

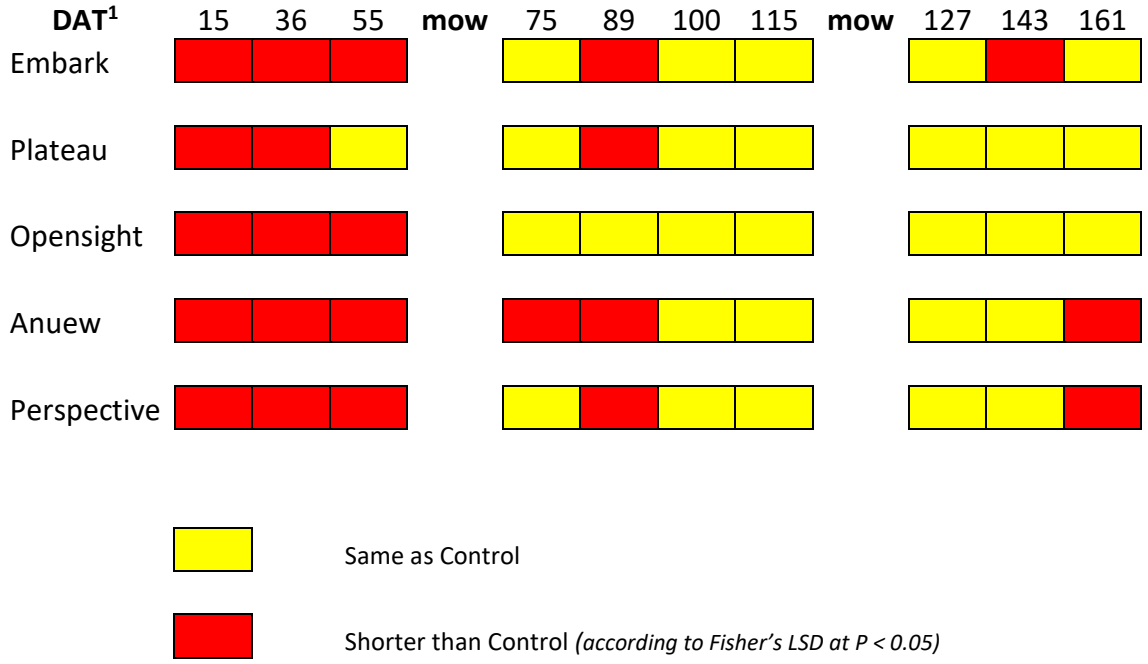


[1] *DAT = Days after treatment*

Figure 4. Summary of Turf Color with PGR Application after First Mowing

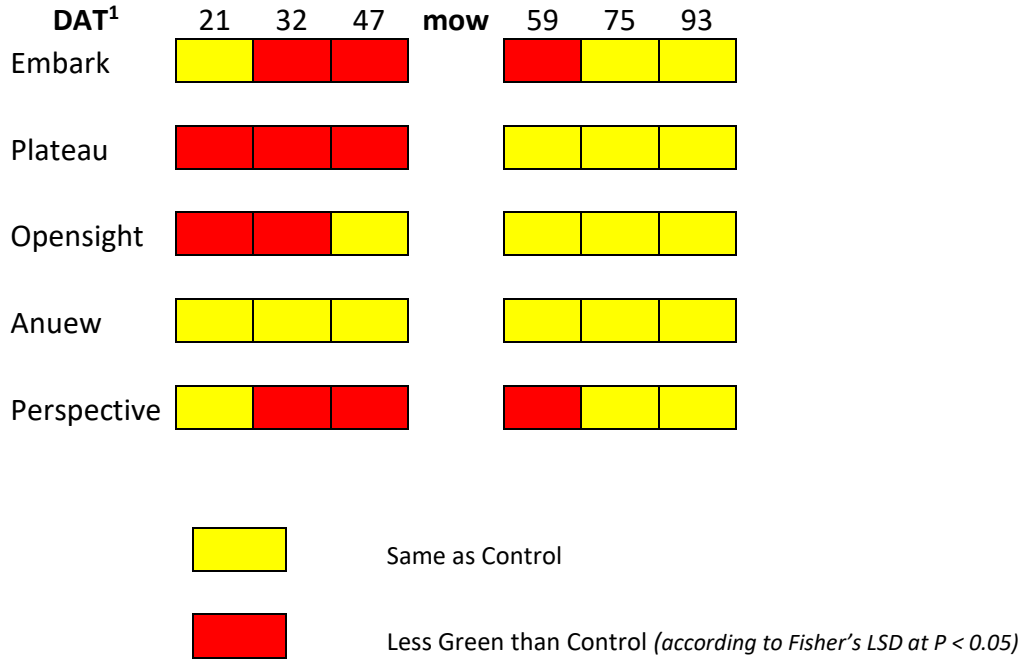
[1] *DAT = Days after treatment*

Figure 5. Summary of Fescue Height with PGR Application after First Mowing



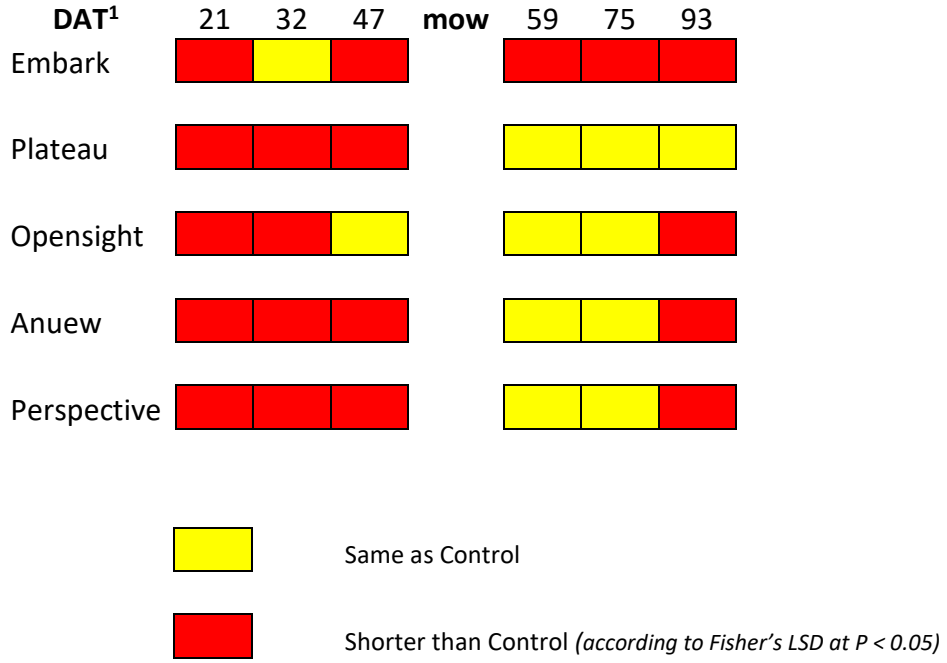
[1] *DAT = Days after treatment*

Figure 6. Summary of Turf Color with PGR Application after Second Mowing



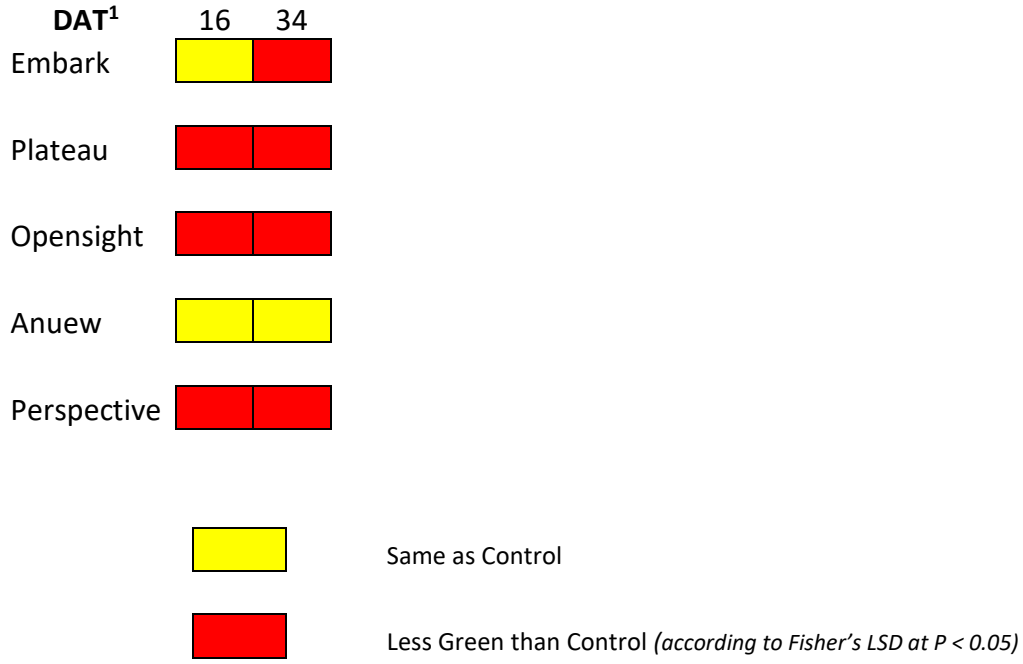
[1] *DAT = Days after treatment*

Figure 7. Summary of Fescue Height with PGR Application after Second Mowing



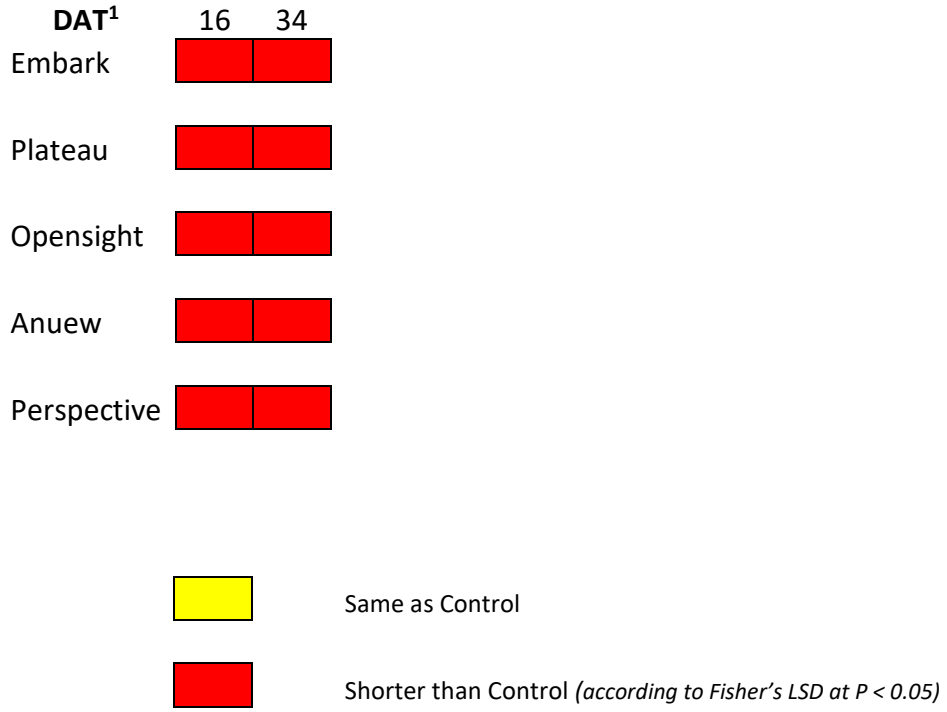
[1] *DAT = Days after treatment*

Figure 8. Summary of Turf Color with PGR Application after Third Mowing



[1] *DAT = Days after treatment*

Figure 9. Summary of Fescue Height with PGR Application after Third Mowing



[1] *DAT = Days after treatment*