

2016 Mowing x PGR Trial (2017 Assessments)

Introduction

Tall fescue is a widely adapted cool-season grass that is commonly used on roadsides and other turfed areas. Frequent mowing is the most common management regime for departments of transportation but reduced mowing schedules are being used to cut costs. To maintain highway safety, the zone next to the roadway (clear zone) might be mowed three times per season while the remaining right of way (selective zone) is only mowed once per season. Plant Growth Regulators (PGRs) could potentially reduce mowing while maintaining safe highway conditions. PGRs are currently classified into six categories, Classes A – F, based on their mechanism of action. This trial included examples of Class A, C, and D PGRs and was established to evaluate some PGR options for roadside management. Class A are late gibberellic acid (GA) synthesis blockers, Class C are mitotic/cell division inhibitors, and Class D are herbicidal. This trial was established to examine the interaction between different PGRs and mowing management regimes.

Seedhead suppression is an effective means to reduce mowing for the first cycle. PGRs for this are normally applied in the early spring but late fall applications can also suppress seedhead emergence and elongation.

Materials and Methods

This trial was established in 2016 at the Spindletop Research Farm in Lexington KY arranged as a split plot design with 3 mowing regimes, 16 PGR treatments, and three replications. Main plots were 20 ft wide and the three mowing regimes were: three times per season, once at the end of the season, and unmowed. Sub plots were 10 ft by 20 ft with running unsprayed checks (5 ft wide) between each of the plots. The treatments were five PGRs applied one to two weeks after each of the three mowings plus control. The plots with one mowing and no mowing also had the PGR applications at each of the three timings. Each set of plots only received one PGR application.

PGR products tested were Embark 2S (mefluidide [Class C]) at 24 fl oz/A, Plateau (imazapic) (Class D) at 12 fl oz/A*, Opensight (aminopyralid + metsulfuron methyl [Class D]) at 2.5 fl oz/A, Anuew (prohexadione calcium [Class A]) at 1 lb/A, and Perspective (aminocyclopyrachlor + clorsulfuron [Class D]) at 4.75 oz/A (Table 1). Growth regulator herbicides were included in the treatments, either as part of the product or added as 2,4-D, to act as “safeners” to reduce the fescue “yellowing” after application. However, it should be noted that application of even low volatility 2,4-D formulations later in the season carries the risk of damage to sensitive plants nearby. Plateau should have been applied at the recommended rate of 4 fl oz/A rather than the 12 fl/oz A rate that was actually applied, but the application error was not detected until after all the applications had been made. All applications were at 25 gallons per acre and included a non-ionic surfactant (Activator 90) at 0.25% v/v. Application dates were 5/24/2016, 7/19/2016, and 10/6/2016. Mowing dates were 5/16/2016, 7/11/2016, and 9/21/2016.

With the Plateau treatment rate error, it was decided to analyze the data for each mowing regime separately rather than as a split plot design. The plots were assessed for seedhead height and seedhead density (0 – 100%) the spring after all the PGR applications on three dates. These were 351 days after the first application (DAT1), 261 days after the third application (DAT3) on May 10, 2017 as well as 367 DAT1 (232 DAT3) (5/26/2017) and at 381 DAT1 (246 DAT3) (6/9/2017). Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at $p = 0.05$.

Results and Discussion

In 2016, the combination of three mowings plus treatments with either Embark, Plateau, or Perspective resulted in lower seedhead densities than the control (13 to 47%) 216, 232, and 246 DAT3 (Table 2). Although, these differences may not have been enough seedhead suppression to reduce the need for mowing. The height to seedhead was reduced with the Embark treatment applied after the third mowing 232 and 246 DAT3.

Plots that were mowed once in 2016 and that were treated with Embark, Plateau, or Perspective after the mowing had reduced heights to seedhead 216 DAT3 (Table 3). The Embark, Plateau, Anuew, and Perspective treatments had lower seedhead densities than the control 216 and 232 DAT3. Seedhead emergence was delayed in these treatments and, by 246 DAT3, only the Embark, Plateau* (note rate too high), and Perspective treatments still had lower seedhead densities than the control. The biological response in these plots (late season application after end of season mowing) may have delayed when the first mowing was necessary.

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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
Formula 40	2 qt	2,4-D amine	1.84 lb ae
Plateau *	12 fl oz	imazapic	3 oz ae
Formula 40	2 qt	2,4-D amine	1.84 lb ae
Opensight	2.5 oz	aminopyralid + metsulfuron methyl	1.3 oz ae + 0.24 oz
Anuew	1 lb	prohexadione calcium	4.4 oz
Formula 40	2 qt	2,4-D amine	1.84 lb ae
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.

* Rate should have been 4 fl oz per acre

Growth regulator herbicides included as “safeners”.

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Table 2. Herbicide Treatments, Seedhead Height, and Seedhead Density for Plots with 3 Mowing Cycles per Year in 2016

Product (s)	Rate (per Acre)	Timing	May 10, 2017		May 26, 2017		June 9, 2017	
			Ht (in)	Seedhead Density (%)	Ht (in)	Seedhead Density (%)	Ht (in)	Seedhead Density (%)
			351 DAT1 ¹ (216 DAT3 ²)		367 DAT1 (232 DAT3)		381 DAT1 (246 DAT3)	
Embark 2S Formula 40	24 fl oz	after first mowing	27 bcd ³	97 a	43 ab	100 a	45 abc	100 a
	2 qt	after second mowing	31 ab	100 a	43 ab	100 a	48 a	100 a
		after third mowing	23 d	38 b	34 d	35 b	36 d	30 c
Plateau * Formula 40	12 fl oz	after first mowing	29 abc	95 a	43 ab	93 a	47 abc	100 a
	2 qt	after second mowing	32 a	100 a	41 abc	100 a	47 abc	100 a
		after third mowing	25 cd	13 c	38 cd	25 b	41 cd	18 c
Opensight	2.5 oz	after first mowing	27 bcd	95 a	39 abc	100 a	42 abcd	100 a
		after second mowing	30 bd	100 a	44 a	100 a	48 ab	100 a
		after third mowing	29 abc	100 a	41 abc	92 a	44 abc	93 a
Anuew Formula 40	1 lb	after first mowing	29 abc	92 a	39 bcd	100 a	41 cd	100 a
	2 qt	after second mowing	28 abcd	100 a	39 abcd	100 a	41 cd	100 a
		after third mowing	29 abc	100 a	41 abc	100 a	42 bcd	100 a
Perspective	4.75 oz	after first mowing	29 abc	97 a	40 abc	100 a	44 abc	100 a
		after second mowing	29 abc	100 a	41 abc	100 a	47 abc	100 a
		after third mowing	24 d	42 b	37 cd	35 b	41 cd	47 b
Unsprayed Control			27 bcd	100 a	41 abc	97 a	45 abc	100 a

* Rate should have been 4 fl oz per acre

¹ DAT1 = Days after treatment after first mowing

² DAT3 = Days after application after third mowing

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

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Table 3. Herbicide Treatments, Seedhead Height, and Seedhead Density for Plots with 1 Mowing Cycle per Year in 2016

Product (s)	Rate (per Acre)	Timing	May 10, 2017		May 26, 2017		June 9, 2017	
			Ht (in)	Seedhead Density (%)	Ht (in)	Seedhead Density (%)	Ht (in)	Seedhead Density (%)
			351 DAT1 ¹ (216 DAT3 ²)		367 DAT1 (232 DAT3)		381 DAT1 (246 DAT3)	
Embark 2S Formula 40	24 fl oz	after first mowing	28 abcd	83 ab	40 ab	83 ab	42 abc	90 a
	2 qt	after second mowing	30 ab	90 ab	40 ab	100 a	44 abc	100 a
		after third mowing	24 de	11 d	38 ab	28 cd	42 abc	58 b
Plateau * Formula 40	12 fl oz	after first mowing	26 bcd	80 ab	39 ab	100 a	43 abc	100 a
	2 qt	after second mowing	31 a	75 ab	41 ab	72 ab	45 abc	100 a
		after third mowing	24 de	7 d	42 a	17 d	42 abc	12 c
Opensight	2.5 oz	after first mowing	27 abcd	90 ab	39 ab	82 ab	41 bc	100 a
		after second mowing	30 abc	88 ab	39 ab	93 a	45 abc	100 a
		after third mowing	25 cde	75 ab	41 ab	80 ab	45 abc	100 a
Anuew Formula 40	1 lb	after first mowing	27 abcd	70 bc	36 b	73 ab	42 abc	90 a
	2 qt	after second mowing	28 abcd	77 ab	42 a	87 a	41 bc	83 ab
		after third mowing	25 cde	42 c	38 ab	53 bc	38 c	73 ab
Perspective	4.75 oz	after first mowing	27 abcd	73 ab	39 ab	87 a	46 ab	100 a
		after second mowing	29 abc	100 a	43 a	100 a	49 a	100 a
		after third mowing	21 e	10 d	38 ab	33 cd	40 bc	57 b
Unsprayed Control			30 abc	87 ab	43 a	90 a	45 abc	100 a

* Rate should have been 4 fl oz per acre

¹ DAT1 = Days after treatment after first mowing

² DAT3 = Days after application after third mowing

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