

Japanese Stiltgrass Control Trial at Fort Knox

Introduction

Japanese stiltgrass (*Microstegium vimineum*) is an invasive sprawling, dense, mat-forming annual grass, native to Asia. It is very shade tolerant but will quickly take advantage of extra sunlight and is common in forest edges, roadsides, trail sides, and disturbed areas such as skid trails from timber harvest. It's a prolific seed producer and humans and machinery readily spread the seed. The seed remains viable in the soil for 3 years. Successful management of stiltgrass requires a combination of control of existing plants before they produce seed and new plants coming up from the seedbank. This trial examined the efficacy of some selective herbicide control options for stiltgrass.

Materials and Methods

The trial was established September 24, 2013 on a skid trail within the forested Hunt Area 19 on Fort Knox. The trial had 9 treatments with 3 replications arranged in a randomized complete block design with 5 ft by 20 ft plots. Application was at 20 gallons /acre. The height of the stiltgrass plants was 16 to 27 inches, with some seedheads emerged in the areas receiving more sunshine, at treatment. The early summer application was made on July 15, 2014 when the stiltgrass plants were 10 to 20 inches tall. Stiltgrass control was assessed 14 (10/8/2013), 294 (7/15/2014), and 393 (10/22/2014) days after treatment (DAT). Stiltgrass cover (%) was assessed (9/10/2015) 716 DAT. These assessments corresponded to 99 and 422 DAT for the early summer application (Treatment 8). Data on green vegetative cover (0-100%) were collected 294, 393 (99), and 716 (422) DAT. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at $p = 0.05$.

Table 1 lists the treatments, active ingredients and application rates. Treatments 1 to 7 were applied in fall 2013 while Treatment. 8 was applied in early summer 2014. All the treatments included products that had post-emergence and pre-emergence activity to control emerged stiltgrass and germinating seeds. The Fusilade II treatments would be the most selective with little damage to non-target broadleaf species. The expected period of pre-emergence activity varied among the treatments. The Pendulum AquaCap treatment (Treatment 8) was applied in early summer as its period of effectiveness is not as long as ProClipse (Treatments 5 and 7).

Results and Discussion

All of the fall applied treatments, except for Plateau (Treatment 1), controlled stiltgrass 96% or greater 294 DAT (Table 2). Control with Plateau at this point was 72%. This pattern persisted 393 DAT with all of the other treatments controlling stiltgrass better than Plateau (40% control). At this point, control with Fusilade II plus ProClipse (99%) was higher than with Milestone (78%) or Streamline (81%) but equivalent that from OustExtra (94%), Fusilade II alone (89%), Roundup ProMax plus Proclipse (97%), or Fusilade II plus Pendulum AquaCap (97%). Two years (716 DAT) after the initial application the stiltgrass cover was reduced more by the combination of Fusilade II with either ProClipse (7 % stiltgrass) or Pendulum AquaCap (8%

stiltgrass) with the exceptions of the OustExtra (33% stiltgrass) and Roundup ProMax plus Proclipse (25% stiltgrass) treatments. Treatments with

The Plateau, Fusilade II, and Fusilade II plus ProClipse (Treatments 1, 4 and 5) treated plots had the most green vegetative cover of the herbicide treated plots 294 DAT. OustExtra and Fusilade II plus Pendulum Aquacap treated plots had significantly less green vegetative cover at this rating day than all the other treatments except RoundUp ProMax plus ProClipse. One hundred days later (393 DAT), the OustExtra and Roundup ProMax plus ProClipse treatments resulted in lower green vegetative cover than the other treatments with the exceptions of Fusilade II plus ProClipse and Fusilade II plus Pendulum Aquacap.

There are a number of herbicide treatments tested in this study, with the exceptions of Plateau, Milestone VM, and Streamline, significantly reduced the stiltgrass population at this site more than 2 years after the initial applications. The inclusion of a preemergence herbicide, ProClipse or Pendulum AquaCap, with Fusilade II produced the best combination of stiltgrass population reduction without removing other plant species from the site.

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Table 1. Treatments and Active Ingredients for Japanese Stiltgrass Control Trial

Treatment	Product Name	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)
1	Plateau Activator 90	4 0.25	FL OZ/A % V/V	imazapic	1 oz ae
2	OustExtra Activator 90	3 0.25	OZ/A % V/V	sulfometuron + metsulfuron	1.69 oz + 0.45 oz
3	Milestone VM Activator 90	6 0.25	FL OZ/A % V/V	aminopyralid	1.5 oz ae
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	fluazifop	6 oz
5	Fusilade II ProClipse Activator 90	24 2 0.25	FL OZ/A LB/A % V/V	fluazifop prodiamine	6 oz 20.8 oz
6	Streamline Activator 90	4.75 0.25	OZ/A % V/V	aminocyclopyrachlor + metsulfuron	1.88 oz + 0.60 Oz
7	Roundup ProMax ProClipse Activator 90	22 2 0.25	FL OZ/A LB/A % V/V	glyphosate prodiamine	12.38 oz ae 20.8 oz
8	Fusilade II Pendulum AquaCap Activator 90	24 4.2 0.25	OZ/A QT/A % V/V	fluazifop pendimethalin	6 oz 63.8 oz
9	Untreated Check				

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Table 2. Results for Japanese Stiltgrass Control Trial

Treatment	Product Name	Rate	Rate Unit	Application Timing	% Stiltgrass Control			% Stiltgrass Cover	% Green Vegetation		
					14 DAT ¹	294 DAT	393 DAT	716 DAT	294 DAT	393 DAT	716 DAT
1	Plateau Activator 90	4 0.25	FL OZ/A % V/V	Fall	13 <i>De</i> ²	72 <i>b</i>	40 <i>d</i>	68 <i>ab</i>	57 <i>b</i>	75 <i>ab</i>	85 <i>ab</i>
2	OustExtra Activator 90	3 0.25	OZ/A % V/V	Fall	13 <i>de</i>	99 <i>a</i>	94 <i>abc</i>	33 <i>cde</i>	23 <i>c</i>	28 <i>e</i>	77 <i>bc</i>
3	Milestone VM Activator 90	6 0.25	FL OZ/A % V/V	Fall	33 <i>cd</i>	97 <i>a</i>	78 <i>c</i>	63 <i>abc</i>	35 <i>c</i>	63 <i>abc</i>	85 <i>ab</i>
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	Fall	40 <i>bc</i>	97 <i>a</i>	89 <i>abc</i>	48 <i>bcd</i>	60 <i>b</i>	57 <i>bcd</i>	82 <i>ab</i>
5	Fusilade II ProClipse Activator 90	24 2 0.25	FL OZ/A LB/A % V/V	Fall	25 <i>cd</i>	99 <i>a</i>	99 <i>a</i>	7 <i>e</i>	57 <i>b</i>	43 <i>cde</i>	75 <i>bc</i>
6	Streamline Activator 90	4.75 0.25	OZ/A % V/V	Fall	60 <i>b</i>	97 <i>a</i>	81 <i>bc</i>	70 <i>ab</i>	35 <i>c</i>	57 <i>bcd</i>	83 <i>ab</i>
7	Roundup ProMax ProClipse Activator 90	22 2 0.25	FL OZ/A LB/A % V/V	Fall	98 <i>a</i>	99 <i>a</i>	97 <i>ab</i>	25 <i>de</i>	22 <i>c</i>	30 <i>e</i>	67 <i>c</i>
8	Fusilade II Pendulum AquaCap Activator 90	24 4.2 0.25	OZ/A QT/A % V/V	Spring	0 <i>e</i>	0 <i>c</i>	97 <i>ab</i>	8 <i>e</i>	85 <i>a</i>	37 <i>de</i>	72 <i>bc</i>
9	Untreated Check				0 ³ <i>e</i>	0 ³ <i>c</i>	0 <i>e</i>	87 <i>a</i>	82 <i>a</i>	83 <i>a</i>	93 <i>a</i>

¹ DAT = Days after treatment

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

³ Treatment 8 was unsprayed at 14 and 294 DAT. Assessments at 393 and 716 DAT were 99 and 422 days after application for this treatment.