EFFECT OF VARIOUS HERBICIDES ON NEWLY ESTABLISHED BERMUDAGRASS

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Summary and Application

The effect of pasture herbicides on newly established bermudagrass [*Cynodon dactylon* (L.) Pers.] is not well documented. The objective of this study was to evaluate timing applications of 2,4-D amine, 2,4-D ester, and Weedmaster (dicamba + 2,4-D amine) and compare them to several new herbicide chemistries and mixtures Pasturegard (triclopyr + fluroxypyr), Surmount (picloram + fluroxypyr), Redeem R&P (triclopyr + clopyralid), Envoke (trifloxysulfuron), Cimarron Max (metsulfuron methyl + 2,4-D + dicamba), Fuego (triasulfuron + dicamba), Grazon P+D (picloram + 2,4-D), Roundup (glyphosate), and Plateau (imazapic) on newly established 'Coastal' and 'Tifton 85' bermudagrass sprigs. There was no visual injury to bermudagrass sprigs at any of the timing applications with any of the herbicides in this study, with the exception of Plateau and Roundup. The most effective timing application for all herbicides, except Plateau and Roundup, was 1 day after planting (DAP) due to >70% pre-emergent suppression of crabgrass (*Digitaria* sp). The most effective timing application for Plateau (1, 2, and 3 oz/A) and 8 oz Roundup was 14 DAP due to post-emergent control of annual grasses. Based on the results of this study, herbicides labeled for established bermudagrass pastures can also be safely used on newly established bermudagrass sprigs.

Introduction

A major concern in the management of Coastal and Tifton 85 bermudagrass is the lack of effective weed management tools during the establishment period (1). Competition from weeds can result in loss of stand or delay the establishment of bermudagrass. In either case, the cost and risk of establishment can be deterrent. If the chances of successful establishment and speed of establishment could be increased, this would allow for quicker utilization and increased production. Many herbicides labeled for established bermudagrass do not indicate if or when they can be applied during establishment, except Grazon P+D, which states that it can be used when the bermudagrass stolons are 6 in. long and growing conditions are good. The objectives of this study were to determine the effects of timing applications of new herbicides on newly established Coastal and Tifton 85 bermudagrass, and to compare them to herbicides currently labeled for application at sprigging (2,4-D amine, 2,4-D ester, and Weedmaster).

Methods and Materials

This was a two-year study in Stephenville, TX on a Windthorst fine sandy loam comprised of a split-plot randomized complete block design. Main plots consisted of application timings and subplots were herbicide rates. In 2001, there were four application timings of Plateau (1, 21, 45 and 60 DAP) with three replications. In 2002, there were four application timings (1, 14, 28, and 42 DAP) of several different herbicides (Table 1) and three replications.

Table 1. Product names, chemical names, amount applied, and timing of application of herbicides used in 2002 on newly established Coastal and Tifton 85 bermudagrass.

Product Name	Cost/A $	Chemical Name	Amount Applied	Timing (DAP)†
Plateau	2.50	imazapic	1 oz/A	1, 14, 28, 42
Plateau	5.00	imazapic	2 oz/A	1, 14, 28, 42
Plateau	7.50	imazapic	3 oz/A	14, 28, 42
Weedmaster	10.89	dicamba + 2,4-D	3 pt/A	1, 14, 28, 42
2,4-D amine	7.50	2,4-D amine	4 pt/A	1, 14, 28, 42
2,4-D LV6	12.50	2,4-D LV6	3 pt/A	1, 14, 28, 42
Surmount	NA‡	picloram + fluroxypyr	2 pt/A	1, 14, 28, 42
Grazon P+D	4.12	picloram + 2,4-D	1 pt/A	1, 14, 28, 42
Grazon P+D	8.24	picloram + 2,4-D	2 pt/A	1, 14, 28, 42
Redeem R&P	18.74	triclopyr + clopyralid	2 pt/A	1, 14, 28, 42
Redeem R&P	28.11	triclopyr + clopyralid	3 pt/A	1, 14, 28, 42
Cimarron Max II	8.50	metsulfuron + 2,4-D + dicamba	0.5 oz/A + 2 pt/A	1, 14, 28, 42
Fuego	6.48	triasulfuron + dicamba	1:8	1, 14, 28, 42
Envoke	NL§	trifloxysulfuron	0.3 oz/A	1, 14, 28, 42
Envoke	NL	trifloxysulfuron	0.4 oz/A	1, 14, 28, 42
Envoke	NL	trifloxysulfuron	0.5 oz/A	1, 14, 28, 42
PastureGard	NA	triclopyr + fluroxypyr	2 pt/A	14, 28, 42
Glyphosate	3.28	glyphosate	8 oz/A	14, 28, 42

† DAP = Days after planting,
‡ NA = Price not available
§ NL = Herbicide not labeled for bermudagrass pastures

All herbicides were applied with a CO_2 backpack sprayer at 15 gallons per acre (GPA). Plot size was 10 x 25 ft. In 2001, percent crabgrass and Texas panicum control were recorded 30 days after treatment (DAT). Stolon length was recorded 30 DAT, and percent cover was recorded 180 DAP. In 2002, percent visual injury, stolon length and percent crabgrass, Texas panicum, yellow nutsedge, and broadleaf signal grass control were recorded 30 DAT, and percent ground cover was recorded 90 DAP. Crabgrass and Texas panicum control was recorded for Coastal bermudagrass, while yellow nutsedge and broadleaf signal grass control was recorded for Tifton 85 bermudagrass.

Results and Discussion

In 2001, the rates of 2, 3, 4, 5, and 6 oz/A Plateau effectively controlled crabgrass in all timing applications at 30 DAT (Table 2). However, control of Texas panicum was ineffective at 1, 2, and 3 oz/A Plateau 21 and 45 DAP, with average percent control of 5, 37, and 56%, respectively. Only the highest rates of Plateau (4, 5, and 6 oz/A at 60 DAP) effectively controlled Texas panicum, with 90, 95, and 98% control, respectively. The most effective timing application was 21 DAP for Tifton 85, with all rates of Plateau (1, 2, and 3 oz/A) providing excellent percent ground cover (95, 99, and 95%, respectively).

Table 2. Effect of timing application of Plateau on newly established bermudagrass sprigs in 2001

		% Control 30 DAT†		Coastal		Tifton 85	
		Crabgrass	Texas panicum	30 DAT	180 DAT	30 DAT	180 DAT
Treatment	Timing			Stolon length (in.)	Cover %	Stolon length (in.)	Cover %
No herbicide	1 DAP‡	0	0	7	3	9	5
2 oz Plateau	1 DAP	90	77	5	30	4	80
3 oz Plateau	1 DAP	98	87	4	40	2	70
LSD		5	5	3	10	3	10
No herbicide	21 DAP	0	0	- *	-	17	5
1 oz Plateau	21 DAP	78	0	-	-	17	95
2 oz Plateau	21 DAP	90	15	-	-	15	99
3 oz Plateau	21 DAP	92	55	-	-	10	95
LSD		10	10	-	-	8	10
No herbicide	45 DAP	0	0	16	4	20	3
1 oz Plateau	45 DAP	55	10	17	25	14	45
2 oz Plateau	45 DAP	80	20	13	30	14	50
3 oz Plateau	45 DAP	95	33	12	30	13	50
LSD		10	20	4	10	2	10
No herbicide	60 DAP	0	0	-	-	15	4
3 oz Plateau	60 DAP	95	50	-	-	0	25
4 oz Plateau	60 DAP	99	90	-	-	0	15
5 oz Plateau	60 DAP	99	95	-	-	0	20
6 oz Plateau	60 DAP	99	98	-	-	0	10
LSD		5	8	-	-	0	15

† DAT = days after treatment
‡ DAP = days after planting
* No data available

In 2002, there was no visual injury to bermudagrass plants at the four timing applications with any of the above herbicides, except Plateau and Roundup. The rates of 1, 2, and 3 oz/A Plateau injured Tifton 85 by an average of 12, 23, and 32%, respectively, and Coastal by an average of 6, 13, and 24%, respectively (Table 3). The timing applications of 1, 14, 28, and 42 DAP averaged 19, 33, 17, and 19% Tifton 85 injury, respectively, and an averaged 16, 20, 16, and 13% for Coastal injury, respectively.

Table 3. The effects of various herbicides applied 1, 14, 28, and 42 days after planting (DAP) on percent injury 30 days after treatment (DAT) of newly established Coastal and Tifton 85 bermudagrass in 2002.

	Coastal				**Tifton 85**			
	% Injury 30 DAT				% Injury 30 DAT			
Herbicide	1 DAP	14 DAP	28 DAP	42 DAP	1 DAP	14 DAP	28 DAP	42 DAP
No herbicide	0	0	0	0	0	0	0	0
1 oz Plateau	5	10	5	5	5	27	8	8
2 oz Plateau	10	20	15	7	17	40	15	20
3 oz Plateau	- †	25	28	18	-	45	25	37
3 pt Weedmaster	0	0	0	0	0	0	0	0
4 pt 2,4-D Amine	0	0	0	0	0	0	0	0
3 pt 2,4-D LV6	0	0	0	0	0	0	0	0
2 pt Surmount	3	0	0	0	0	0	0	0
1 pt Grazon P+D	3	0	0	0	0	0	0	0
2 pt Grazon P+D	5	0	0	0	3	0	0	0
2 pt PastureGard	-	0	0	0	-	0	0	0
2 pt Redeem	2	0	0	0	2	0	0	0
3 pt Redeem	-	0	0	0	-	0	0	0
Fuego 1:8	0	0	0	0	0	0	0	0
Cimarron Max II	0	0	0	0	0	0	0	0
0.3 oz Envoke	-	0	0	0	-	0	0	0
0.4 oz Envoke	0	0	0	0	0	0	0	0
0.5 oz Envoke	0	0	0	0	2	0	0	0
8 oz Glyphosate	-	5	4	4	-	5	5	5
LSD	4	5	4	4	2	5	5	5

† Data not available

Roundup at 8 oz/A injured both Coastal and Tifton 85 by an average of 5%. There was no difference in stolon length (data not shown) for either Coastal or Tifton 85 in any of the four application timings; however, there were differences in percent ground cover, due to weed efficacy of the various herbicides.

The best timing application for the hormone herbicides was 1 DAP because they suppressed >70% of the crabgrass as a pre-emergent, which gave an average of 25% ground cover with Tifton 85 and 30% ground cover with Coastal compared to 5% ground cover in the untreated control (Tables 4 & 5). Since there was no suppression of crabgrass with the hormone herbicides as a post-emergent, however, and there were no broadleaf weeds present, the percent ground cover of all hormone herbicide treatments did not differ from the control. Thus, these herbicides should not be used as a post-emergent treatment unless broadleaf weeds are present.

The best timing for 1, 2, and 3 oz/A Plateau was 14 DAP, which gave 37, 38, and 52% cover for Tifton 85, respectively, and 22, 30, and 35% cover for Coastal compared to 5% cover in the untreated control. This was due to Plateau providing >70% control of crabgrass and broadleaf signalgrass (Table 5). The timing applications (1, 14, 28, and 42 DAP) averaged 32, 42, 28, and 11 % cover for

Tifton 85, respectively, and 24, 29, 25, 17% cover for Coastal, which illustrates that Plateau should be applied to small and actively growing weeds.

Table 4. Effects of various herbicides applied 1, 14, 28, and 42 days after planting (DAP) on percent ground cover 3 months after planting of newly established Coastal and Tifton 85 bermudagrass in 2002.

	Coastal				**Tifton 85**			
	% Cover 90 DAP				% Cover 90 DAP			
Herbicide	1 DAP	14 DAP	28 DAP	42 DAP	1 DAP	14 DAP	28 DAP	42 DAP
No herbicide	6	7	7	5	4	2	2	1
1 oz Plateau	22	22	22	14	32	37	28	8
2 oz Plateau	25	30	30	19	33	38	30	12
3 oz Plateau	-†	35	23	17	-	52	27	12
3 pt Weedmaster	37	7	9	8	30	2	2	1
4 pt 2,4-D Amine	27	10	6	8	15	7	3	2
3 pt 2,4-D LV6	32	15	6	9	18	7	2	1
2 pt Surmount	25	10	7	5	37	4	2	2
1 pt Grazon P+D	42	12	5	7	23	6	9	2
2 pt Grazon P+D	35	12	5	7	23	3	3	1
2 pt PastureGard	-	11	15	7	-	2	3	1
2 pt Redeem	25	11	10	10	33	4	1	2
3 pt Redeem	-	10	15	7	-	4	3	3
Fuego 1:8	40	12	5	7	15	9	4	2
Cimarron Max II	25	5	5	6	50	15	8	3
0.3 oz Envoke	-	10	5	8	-	83	33	14
0.4 oz Envoke	22	12	9	8	82	87	35	14
0.5 oz Envoke	18	17	20	8	88	77	58	27
8 oz Glyphosate	-	25	16	18	-	45	43	17
LSD	20	14	12	9	25	17	15	10

† - = No data available

Conclusions

Based on the results of this study, 2,4-D or Weedmaster should be applied to newly established sprigs before small-seeded grassy weeds emerge. After bermudagrass stolons are 6 in. long, bermudagrass is considered to be established, therefore any of the other pasture herbicides labeled for established bermudagrass could be used to control broadleaf weeds.

The reduced rates of non-labeled Plateau are not recommended at this time. Due to these results, further research of Plateau will be conducted on newly established bermudagrass sprigs, and a supplemental label may be available in 2004.

Literature Cited

1) Smith, A.E. and L.D. Martin. 1992. Crabgrass control in Coastal bermudagrass. Agron. J. 84:786-788.

Table 5. Effects of timing application and various herbicides on crabgrass, Texas panicum, broadleaf signalgrass, and yellow nutsedge control in 2002.

	Crabgrass				**Texas Panicum**				**Broadleaf Signalgrass**				**Yellow Nutsedge**		
	% Control 30 DAT														
Herbicide	1 DAP	14 DAP	28 DAP	42 DAP	1 DAP	14 DAP	28 DAP	42 DAP	1 DAP	14 DAP	28 DAP	42 DAP	1 DAP	14 DAP	28 DAP
No herbicide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 oz Plateau	82	71	50	40	10	0	2	0	30	70	33	47	20	73	37
2 oz Plateau	91	81	90	70	37	2	17	5	57	83	90	88	75	93	90
3 oz Plateau	-	90	99	90	-	27	29	25	-	83	93	98	-	95	90
3 pt Weedmaster	80	8	0	0	23	0	0	0	3	3	0	0	0	0	0
4 pt 2,4-D Amine	80	12	0	0	18	0	0	0	0	3	0	0	0	0	0
3 pt 2,4-D LV6	80	40	0	0	5	2	0	0	8	3	0	0	0	2	0
2 pt Surmount	85	42	0	0	25	0	0	0	13	0	0	0	0	0	0
1 pt Grazon P+D	82	3	0	0	10	0	0	0	3	0	0	0	0	0	0
2 pt Grazon P+D	85	28	0	0	25	0	0	0	3	0	0	0	0	0	0
2 pt PastureGard	-	5	0	0	-	0	0	0	-	0	0	0	-	0	0
2 pt Redeem	73	0	0	0	22	0	0	0	5	0	0	0	0	0	0
3 pt Redeem	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0
Fuego 1:8	60	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Cimarron Max II	30	0	0	0	0	0	0	0	3	2	0	0	0	3	0
0.3 oz Envoke	-	3	0	0	-	0	0	0	-	96	60	33	-	95	87
0.4 oz Envoke	27	10	5	0	0	0	0	0	92	99	58	48	90	98	95
0.5 oz Envoke	17	27	15	0	0	0	0	0	88	99	91	57	93	99	99
8 oz Glyphosate	-	57	90	85	-	17	7	50	-	91	73	72	-	0	12
LSD	12	12	15	10	11	5	9	5	12	7	10	10	9	5	10