

TOLERANCE OF TEN SEEDED PERENNIAL GRASSES DURING ESTABLISHMENT TO PLATEAU, CIMARRON, AND AMBER

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Summary and Application

Annual weeds compete with newly established perennial grasses that are typically slow to develop and establish. The objective of this study was to determine the tolerance of 5 native and 5 introduced perennial grasses to pre-plant application of Plateau (imazapic), pre-emergent applications of Cimarron (metsulfuron methyl) and Amber (triasulfuron), and post-emergent applications of all three herbicides at the 2-3 leaf stage. Plateau applied as a pre-plant was safe on 'Big Earl' big bluestem (*Andropogon gerardii* var. *gerardii* Vitman.), 'Woodward' sand bluestem (*Andropogon gerardii* var. *hallii* Hack), and 'Lometa' indiangrass [*Sorghastrum nutans* (L.) Nash], while damaging 'Haskell' sideoats grama [*Bouteloua curtipendula* (Michx.) Torr.], 'Alamo' switchgrass (*Panicum virgatum* L.), bermudagrass [*Cynodon dactylon* (L.) Pers.], kleingrass (*Panicum coloratum* L.), 'WW Spar' yellow bluestem [*Bothriochloa ischaemum* (L.) Keng. var. *ischaemum* Hack], 'WW B.Dahl' Old World bluestem [*Bothriochloa baldhi* (Retz) S.T. Blake], and 'Palar' Wilman lovegrass (*Eragrostis superba* Peyr.). Cimarron and Amber were safe when applied in the 2-3 leaf stage to all grasses tested. Cimarron applied as a pre-emergent was safe on big bluestem, sand bluestem, and sideoats bermudagrass, Old World bluestem, and Wilman lovegrass grass. Amber applied, as a pre-emergent was safe on all grasses, except indiangrass and switchgrass.

Introduction

Perennial grasses provide hay and forage for livestock as well as habitat for wildlife. However, establishment of perennial grasses from seed is often difficult due to competition from annual weeds. Application of pre- and post-emergent herbicides such as Plateau, Cimarron, and Amber may improve the establishment of native and introduced perennial grasses by reducing weed competition.

Plateau was recently labeled (Jan. 2002) for the establishment of native indiangrass, little bluestem, big bluestem, and sideoats grama either pre-plant or once these grasses have reached the 5th leaf stage. Plateau controls many annual grassy weeds when applied at 2-6 oz/A. Research suggests that major prairie grass species such as big bluestem and indiangrass may benefit from pre-emergent Plateau application as shown by increased seedling density and yield compared to areas where no herbicide was applied (1, 3). Post-emergent applications of Plateau, however, have been less successful in increasing density and coverage of native grass seedlings as compared to non-treated plots (3). Other authors have reported that major prairie grass species exhibited good tolerance to Plateau as seedlings and as mature plants (2).

Cimarron (a.k.a. Ally) is labeled for the establishment of native and introduced Old World bluestem, kleingrass, lovegrass, and wheatgrass in pastures, rangeland, and Conservation Reserve Program (CRP) land

either as pre-emergent or early post-emergent at 0.10 oz/A for the control of annual broadleaf weeds (2-3 inches tall). Amber is an experimental herbicide not yet labeled for perennial grass establishment until 60 days after emergence. The hormone herbicides (2,4-D, Weedmaster, Grazon P+D, etc.) have some pre-emergent activity on seeded grasses, and should **NOT** be used during establishment (label states “do not use for at least 60 days prior to establishment”). After seedlings are approximately 60 days old or in the 5th leaf stage, they are considered to be established so that all pasture herbicides (Amber, 2,4-D, Weedmaster, Grazon P+D, etc.) can be safely used to control broadleaf weeds, if there is no environmental stress.

Our objective was to determine the tolerance of five native perennial grasses and five introduced perennial grasses to pre-plant applications of Plateau, pre-emergent applications of Cimarron and Amber, or post-emergent applications of all three herbicides at the 2-3-leaf stage. The native grasses in this study include Big Earl big bluestem, Lometa indiagrass, Woodward sand bluestem, Haskell sideoats grama, and Alamo switchgrass, and the five introduced perennial grasses include Giant bermudagrass, Selection 75 kleingrass, Palar Wilman lovegrass, WW Spar yellow bluestem, and WW-B. Dahl Old World bluestem.

Methods and Materials

The strip-plot design experiment with three replications was established on 15 April 2002 on a Windthorst fine sandy loam in Stephenville, TX. The 10 grasses were seeded on 16 April 2002, in strips. Plateau (2 fl. oz/A) was applied 1 day before planting, and Cimarron (0.15 oz/A) and Amber (0.56 fl. oz/A) were applied 1 day after planting. All herbicides were applied again at the same rate once all seedlings

reached the 2-3-leaf stage (15 May 2002). A non-ionic surfactant (0.25% v/v) was added to all herbicide treatments; however according to label only the post-emergent treatments require a surfactant. Herbicides were applied across all 10 seeded grasses using a CO₂ backpack delivering 15 gallons per acre (GPA). Plant injury ratings (visual) were taken 30 days after treatment (DAT) and plant heights were taken 60 days after planting (DAP). The establishment period from April – June received 12.9 in rainfall compared to 10.8 in for the 30 yr average for the same time period.

Results and Discussion

Plateau

Plateau was selective on the native grasses as well as the timing (Table 1). When Plateau was applied pre-plant, indiagrass, big bluestem (Figure 1), sand bluestem were tolerant with only 0, 15, and 15% visual injury, respectively, while sideoats grama (Figure 2) and switchgrass were injured, 90 and 95%, respectively.

When Plateau was applied to seedlings in the 2-3-leaf stage, indiagrass, big bluestem, sand bluestem, sideoats grama, and switchgrass were injured 10, 10, 10, 5, and 80%, respectively.

Plateau controls annual grassy weeds like crabgrass, foxtail, and field sandbur, and it suppresses Texas panicum, broadleaf signalgrass and nutsedge. If these species are problematic, Plateau may be used to help establish these tolerant native grasses.

Plateau injured bermudagrass, kleingrass (Figure 3), yellow bluestem, Old World bluestem, and Wilman lovegrass (Figure 4) by 99, 99, 99, 99, and 95%, respectively, when applied as a pre-plant, and 99, 99, 99, 99, and 50%, respectively, when applied in the 2-3 leaf stage. Therefore, Plateau should not be used when trying to establish these introduced grasses.

Cimarron

Cimarron was selective on both native and introduced grasses but degree of damage changed with timing application (Table 1). When Cimarron was applied pre-emergent, big bluestem, sideoats grama, sand bluestem, bermudagrass, Old World bluestem, and Wilman lovegrass were tolerant with 15, 10, 20, 25, 15, and 25% visual injury, respectively. Indiangrass, switchgrass, kleingrass, and yellow bluestem were injured 99, 50, 50, and 99%, respectively. When Cimarron was applied to seedlings in the 2-3 leaf stage, all species evaluated exhibited herbicide tolerance, with 0% injury recorded for each species.

Cimarron controls annual broadleaf weeds like annual broomweed, bitter sneezeweed, marehail, pigweed, and woolley croton if they are small and actively growing. However, Cimarron does not control many perennials like horsenettle and western ragweed.

Based on the selectivity when applied as a pre-emergent and slight injury that occurred, it is recommended that Cimarron be applied post-emergent once the annual broadleaf weeds are present for all native and introduced grasses.

Amber

Amber was selective on the native grasses but degree changed with timing (Table 1). When applied as pre-emergent, big bluestem, sideoats grama, and sand bluestem were tolerant to Amber with 0, 0, and 5% visual injury, respectively. Indiangrass and switchgrass were injured 99 and 50%, respectively.

Since there was no injury with Amber to all species applied at the 2-3 leaf stage, it has the potential to become labeled for establishing perennial grasses. Because it is not presently labeled for establishment, it is not recommended at this time.

Conclusion

If annual grassy weeds (such as crabgrass) and nutsedge are known to exist in fields, Plateau can be used to control these weeds to improve the establishment of Lometa indiangrass, Big Earl big bluestem, Woodward sand bluestem either as a pre-plant application or post-emergent once these plants reach the 2-3-leaf stage. However, Plateau applications should be delayed until the 2-3-leaf stage if Haskell sideoats grama is present in the mixture.

Plateau should not be used when establishing Alamo switchgrass, Giant bermudagrass, Selection 75 kleingrass, WW Spar yellow bluestem, WW B-Dahl Old World bluestem, or Palar Wilman lovegrass. If grassy weeds are present in fields of these grasses, flash grazing or mowing may be used to suppress them.

If annual broadleaf weeds are present, Cimarron can be used to control these weeds when they are small and actively growing. If broadleaf weeds are still present once the grasses reach the 5th leaf stage, the other hormone-type pasture herbicides (2,4-D, Weedmaster, Grazon P+D) may be used to control these weeds.

Literature Cited

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- 2) Horton, C.E., J.G. Vollmer, and J.L. Vollmer. 1999. Use of imazapic for establishment and release of native warm season grasses. *Proc. So. Weed Sci. Soc.* 52:158.
- 3) Washburn, B.E. and T.G. Barnes. 2000. Native warm-season grass and forb establishment using imazapic and 2,4-D. *Native Plants J.* 1:61-69.

Table 1. Tolerance of ten seeded grasses to three herbicides applied at two timings in Stephenville during the 2002 growing season.

		Native Grasses									
Herbicide Treatment	Timing [§]	Big bluestem		Indiangrass		Sideoats grama		Sand bluestem		Switchgrass	
		Height in [†]	Injury [‡] %	Height in	Injury [‡] %	Height in	Injury [‡] %	Height in	Injury [‡] %	Height in	Injury [‡] %
No Herbicide		10		5		4		11		13	
2 oz Plateau	Pre-plant	8	15	5	0	1	90	8	15	0.25	95
2 oz Plateau	2-3 leaf	10	10	5	10	4	10	10	5	2	80
0.15 oz Cimarron	Pre-emergent	6	15	0	99	3	10	6	20	5	50
0.15 oz Cimarron	2-3 leaf	9	0	5	0	4	0	8	0	9	0
0.56 oz Amber¶	Pre-emergent	7	0	0	99	3	0	6	5	5	50
0.56 oz Amber	2-3 leaf	9	0	5	0	4	0	9	0	9	0
		Introduced Grasses									
Herbicide Treatment	Timing	Giant bermudagrass		Kleingrass		W.W. Spar		W.W. B-Dahl		Wilman lovegrass	
		Height in	Injury [‡] %	Height in	Injury [‡] %	Height in	Injury [‡] %	Height in	Injury [‡] %	Height in	Injury [‡] %
No Herbicide		20		24		22		10		30	
2 oz Plateau	Pre-plant	0	99	0	99	0	99	0	99	0	99
2 oz Plateau	2-3 leaf	0	99	0	99	0.5	99	0.25	99	1	70
0.15 oz Cimarron	Pre-emergent	16	25	15	50	0	99	6	15	22	25
0.15 oz Cimarron	2-3 leaf	19	0	25	0	21	0	9	0	24	0
0.56 oz Amber	Pre-emergent	19	0	26	0	19	0	5	15	29	0
0.56 oz Amber	2-3 leaf	20	0	25	0	20	0	8	0	30	0

† Plant heights were taken 60 DAP (days after planting)

‡ % Visual injury ratings were taken 30 DAT (days after treatment)

§ Plateau pre-plant treatments were applied one day prior to planting, while pre-emergent treatments were applied one day after planting

¶ Experimental herbicide not yet labeled for perennial grass establishment until 60 days after emergence or once plants reach 5th leaf stage.



Figure 1. No herbicide, pre-plant, and 2-3 leaf stage application timing of Plateau on big bluestem.



Figure 2. No herbicide, pre-plant, and 2-3 leaf stage application timing of Plateau on sideoats grama.



Figure 3. No herbicide, pre-plant, and 2-3 leaf stage application timing of Plateau on kleingrass.



Figure 4. No herbicide, pre-plant, and 2-3 leaf stage application timing of Plateau on Wilman lovegrass.