

# Eastern Gamagrass Response to Accent (nicosulfuron), Basis (rimsulfuron), and Plateau (imazapic) Herbicides in Comparison to a Few Common Corn Herbicides

Paul R. Salon<sup>1</sup> and Martin van der Grinten<sup>2</sup>

## INTRODUCTION

Eastern gamagrass [*Tripsacum dactyloides* (L.) L.] is a native perennial, productive and digestible warm season grass being used for forage production. It can be used in areas of low pH and will provide better forage production than cool season grasses and legumes during hot dry summers. It is longer lived than most forage legumes. Eastern gamagrass establishes slowly and competes poorly the first year with annual grasses and broadleaf weeds. It is frequently sown in 30-36 inch rows with a corn planter to facilitate mechanical harvest, this allows space for weed proliferation. This row spacing and the inherent slow first year growth prevent canopy closure until the second year. Eastern gamagrass requires a herbicide to reduce weed competition for consistent successful establishment. Follow up weed control for annual and perennial weeds may be necessary the second year depending on the density of the planting.

Eastern gamagrass is tolerant to many herbicides used in corn production. Dicamba and 2,4-D are labeled for pastures and hayland but no residual herbicides are registered for use on annual grasses. A study by Fick (1995) compared preemergence applications of Ally (metsulfuron), Glean (chlorsulfuron), Pursuit (imazethapyr) and Arsenal (imazapyr) on eastern gamagrass. Ally is labeled for broadleaf control in pastures and Glean is labeled for broadleaf control in small grain. There was no seedling density reduction found with these 2 products at their highest rates tested 48 g ha<sup>-1</sup> and 120 g ha<sup>-1</sup> respectively. The Pursuit and Arsenal are in the imidazolinone (IMI) family, there was a stand reduction with the 35 g a<sup>-1</sup> rate during a dry year. The following year the eastern gamagrass tolerated the IMI herbicides at 140 g a<sup>-1</sup> but grass weeds were not controlled at that rate. This study compares two, new, low rate corn herbicides with good annual grass control, Accent (nicosulfuron) (Dobbels and Kapusta 1993; Mekki and Leroux 1994), and Basis (rimsulfuron) (Mekki and Leroux 1994) with Plateau (imazapic) a herbicide for native prairie restoration (Becker and Miller 1998) and a few standard corn herbicides. A spray chamber study was also conducted comparing Accent, Basis and Plateau herbicides postemergence on eastern gamagrass.

---

<sup>1</sup> USDA-NRCS Big Flats Plant Materials Center, Box 3266A, State Route 352, Corning, NY 14830.

## **MATERIAL AND METHODS**

### Field Study

The study was conducted at the USDA-NRCS Big Flats Plant Materials Center in Corning New York (42°07'N and 76° 57' W, 271-m elevation). "Pete" eastern gamagrass was planted on 5/22/97 after 8 weeks of stratification using a Tye drill with 32 inch row spacing. The seed was planted at 7.8 lbs ac<sup>-1</sup> PLS. The soil type was a deep well drained Unadilla silt loam, (Typic Dystrochrepts). Soil test indicated a pH of 6.3, with 3.2% organic matter, high P and moderate K. No fertilizer was applied. The herbicide was sprayed with a bicycle mounted compressed air sprayer at 2 mph, with 25 gallons of water ac<sup>-1</sup> at 40 psi, 20 inches above the surface using nozzle 8002. The preemergence spray was done on 6/5/97 and the postemergence on 6/23/97. A nonionic surfactant at 1.0% v v<sup>-1</sup> was applied for postemergence applications. The gamagrass, pigweed [*Amaranthus viridis* L.], lambsquarters [*Chenopodium album* L.], and foxtail [*Setaria* spp] were 2-4 inches tall at the time of postemergence spraying. The gamagrass was at the 2-4 leaf stage. Bladex was applied preemergence to the Banvel and 2,4-D postemergence treatments to control annual grasses. The control was hand weeded on 6/27/97. The herbicides, application rates, and timing are listed in Table 1a. The plot size was 10 x 25 ft with 4 rows of gamagrass being sprayed. There were 4 replications per herbicide treatment.

Evaluations were conducted on 7/2/97 to determine gamagrass population and leaf height (cm). Three 2-meter rows were counted per replication for population. The height (cm) was measured as leaf length of the tallest leaf on 10 plants per replication. On 8/20/97 average tiller number of 5 plants per replication, a visual weed rating, and a leaf length on 5 plants per replication were measured. On 10/15/97 15 plants were dug up, dry weight of tops was measured for each replication and leaf number was counted on 7 of those plants.

### Spray Chamber Study

"Pete" eastern gamagrass was planted after an 8 week stratification on 3/31/97 in metromix. The seeds were planted in 65-celled, 7.5 by 13.5 inch Rootainers. There were three replications per treatment. An Allen track spray chamber was used with a 20 gallon ac<sup>-1</sup> rate of water, at 35 psi with an 8001 nozzle sprayed 20 inches above the canopy. The herbicides and application rates are listed in Table 2. The plants were sprayed postemergence on 4/25/97 at the 3 leaf stage. They were grown in a greenhouse then evaluated for plant height and leaf number on 5/5/97. A final visual evaluation was made on 6/6/97.

## **RESULTS AND DISCUSSION**

### Field trial

The weed control was not as effective as expected for the preemergence herbicides except for Bladex which worked excellently. This may have been due to a lack of rainfall for 7 days following spraying. The Bladex and the Bladex plus Banvel (post) and Bladex plus 2,4-D (post) had the best weed control in the study with 12.5, 11.7 and 35% weed cover when evaluated on 10/15/97. The control plots were hand weeded resulting in 55% cover when evaluated on 10/15/97. This was similar in percent cover to the other herbicide treatments.

Since the test germination of the seed lot was low (20%), 39 lbs ac<sup>-1</sup> of bulk seed was planted. A high average population was achieved due to a germination rate much higher than the test results. The population for Dual treatment was significantly lower (30.0 plants 2 m<sup>-1</sup>) than the Atrazine (39.0), Bladex (39.0) and control treatments (37.0). No plants were lost from the postemergence sprays. The Banvel treatment which followed a preemergence spraying of Bladex had a significantly lower population (29.0) than the control and Bladex alone although no mortality was observed from the Banvel.

The Plateau preemergence treatment caused some phytotoxicity especially at the 8 oz ac<sup>-1</sup> rate. This was characterized by yellowing, necrosis, delayed emergence, and stunting. This was apparent when looking at the tiller number (2.0) and tolerance rating (4.6) when compared to the control and Bladex tiller number (3.8 and 5.0) and tolerance rating (1.0 and 1.6) respectively. The Dual treatment also resulted in yellowing and stunting, this was shown by a low tiller number of 3.2 and a tolerance rating of 4.0.

There was some yellowing from all of the postemergence sprays but the plants recovered well with final dry weights not statistically different  $P < 0.05$  than the control. The Accent and Basis treatments were not significantly different than the control for tiller number or leaf number. The dry weights per 15 plants for the Accent, Basis (0.33 oz ac<sup>-1</sup>) and Plateau were not statistically different ( $P < 0.10$ ) than the control (47.1 g) but were less than Bladex (74.0 g). The Basis 0.66 oz ac<sup>-1</sup> rate resulted in the highest dry weight (78.4 g). There was no significant differences for leaf height for any of the treatments. See Tables 1a and 1b for a summary of the data for the field trial.

### Spray Chamber Study

The spray chamber study compared postemergence spraying of Accent, Basis and Plateau with a control. The Plateau herbicide resulted in severe injury to the gamagrass seedlings at all rates. There were significantly fewer and shorter leaves with Plateau treatments at all rates compared with the control (Table 2). The 12 oz ac<sup>-1</sup> rate resulted in 0% survival. The Accent and Basis showed some chlorosis but had no effect on plant height, leaf number, or vigor.

## **CONCLUSIONS**

The Plateau herbicide, post emergence, at all rates was phytotoxic to eastern gamagrass. When Plateau was sprayed preemergence at the 8 oz ac<sup>-1</sup> rate; stunting, delayed emergence, chlorosis, and necrosis was observed. Dry weight was among the lowest in the trial at both the 4 and 8 oz rate but was not statistically different than the control. Additional trials at the 4 oz ac<sup>-1</sup> rate is warranted. Dual, when sprayed preemergence, significantly reduced the stand. Accent, Basis, Banvel, and 2,4-D, when sprayed post emergence, caused some chlorosis early which was outgrown and had no significant effect on final biomass. The Basis herbicide treatment (0.66 oz ac<sup>-1</sup>) resulted in the highest dry weight measurement in the trial. The Atrazine, Bicep and Bladex treatments performed well with no apparent phytotoxicity.

## **REFERENCES**

- Becker, R.L and D.W.Miller. 1998. Warm season grass establishment systems. Proc. of the Western Society of Weed Sci. 51:127-128.
- Dobbels, A.F. and G. Kapusta. 1993. Postemergence weed control in corn (*Zea mays*) with nicosulfuron combinations. Weed Technology 7:844-850.
- Fick, W. H. 1995. Eastern gamagrass tolerance to four preemergence herbicides. Proc. North Central Weed Control Conf. 50:113-114.
- Mekki, M. and G.D. Leroux. 1994. Activity of nicsulfuron, rimsulfuron, and their mixture on field corn (*Zea mays*), soybean (*Glycine max*), and seven weed species. Weed Technology 8:436-440.

**TABLE 1a** Eastern Gamagrass Herbicide Field Study

Herbicide	Rate ac <sup>-1</sup>	10/15/97 DW <sup>1</sup>	leaf #	10/1/97 % Weeds	8/20/97 Tiller #	7/2/97 Tolerance <sup>2</sup>	7/2/97 Plants 2m <sup>-1</sup>
Accent 1x (Post)	0.66 oz	39.9	22.0	56.3	3.5	3.3	39
Accent 2x Post)	1.32 oz	45.6	22.5	67.5	4.1	4.5	35
Atrazine (Pre)	1.8 lb	65.6	27.3	75.0	4.3	1.6	39
Banvel (Post)	1.0 pt	54.0	22.8	11.7	3.0	3.6	29
Basis 1x (Post)	0.33 oz	55.7	24.0	65.0	4.7	4.3	44
Basis 2x (Post)	0.66 oz	78.4	24.8	75.0	4.2	4.8	42
Bicep (Pre)	3.0 qt	51.2	24.8	68.8	4.2	2.3	35
Bladex (Pre)	2.25 qt	74.0	24.5	12.5	5.0	1.6	39
Control		47.1	18.5	55.0	3.8	1.0	37
Dual (Pre)	2.5 pt	45.5	20.5	61.3	3.2	4.0	30
Plateau 1x (Pre)	4 oz	40.8	20.0	72.5	2.9	3.5	37
Plateau 2x (Pre)	8 oz	41.1	19.8	87.5	2.0	4.6	36
2,4-D (Post)	2.0 pt	43.2	23.3	35.0	3.3	2.6	36
LSD.05		23.7 <sup>3</sup>		34.6	1.26	1.9	7.3
P		0.09	0.34	0.0008	0.0015	0.0015	0.0130

<sup>1</sup> gram weight of 15 plants, <sup>2</sup> 1=best 9=worst, <sup>3</sup> LSD<sub>0.10</sub>

**TABLE 1b** Eastern Gamagrass Herbicide Field Study

Herbicide	Rate ac <sup>-1</sup>	7/2/97 ht (cm)	7/2/97 weed rating <sup>1</sup>	8/20/97 ht (cm)	8/20/97 weed rating <sup>1</sup>
Accent 1x (Post)	0.66 oz	12.4	4.5	36.2	5.6
Accent 2x Post)	1.32 oz	11.8	5.8	39.0	4.9
Atrazine (Pre)	1.8 lb	13.3	1.3	40.1	5.3
Banvel (Post)	1.0 pt	10.8	1.3	30.8	1.0
Basis 1x (Post)	0.33 oz	12.3	2.8	35.2	4.3
Basis 2x (Post)	0.66 oz	10.6	3.3	36.0	4.5
Bicep (Pre)	3.0 qt	12.3	1.7	38.1	3.3
Bladex (Pre)	2.25 qt	13.1	1.1	36.6	1.4
Control		12.2	1.0	35.4	3.8
Dual (Pre)	2.5 pt	10.9	3.5	33.2	3.8
Plateau 1x (Pre)	4 oz	11.4	3.0	32.8	5.9
Plateau 2x (Pre)	8 oz	10.1	3.3	33.3	5.0
2,4-D (Post)	2.0 pt	11.2	1.4	32.6	3.3
LSD.05			1.6		2.0
P		0.735	0.00001	0.650	0.0001

<sup>1</sup> 1=best 9=worst

**TABLE 2** Spray Chamber Study<sup>1</sup>

Herbicide	Rate ac <sup>-1</sup>	Ht (cm)	Leaf #
Plateau	4 oz	11.5	2.6
Plateau	8 oz	8.5	2.3
Plateau	12 oz	10.1	2.5
Accent	0.66 oz	22.6	4.1
Accent	1.32 oz	24.1	4.1
Basis	0.33 oz	23.1	4.0
Basis	0.66 oz	20.8	4.0
Control	*****	22.3	4.3
LSD <sub>.05</sub>		2.0	.45
P		0.00001	0.00001

1) Sprayed 4/25/97, Evaluated 5/5/97

**The United States Department of Agriculture (USDA) prohibits discrimination in all its programs on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).**

To file a complaint of discrimination, write the USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14<sup>th</sup> and Independence Avenues, SW. Washington, D.C., 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.