WEED MANAGEMENT AND BIOLOGY RESEARCH IN SUGARCANE

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Evaluation of New Experimental Herbicides

In 2014, twelve experiments were conducted with new experimental herbicides to evaluate sugarcane tolerance and weed control efficacy. Experiments included, spring and at-planting evaluation of a new Gowan herbicide, spring evaluation of a new herbicide formulation from United Phosphorus, Inc., six experiments evaluating two new herbicides from BASF, of which five were spring studies and one at-planting study, and three experiments evaluating two new herbicides from Syngenta, of which one was conducted in spring and two at-planting.

Eastern Black Nightshade

Eastern Black Nightshade Postemergence Study (2-3 inches)

A herbicide screening experiment was initiated in a plantcane sugarcane field at Linzay Farms in Cheneyville, LA. On March 10, 2014, herbicide treatments were applied. At the time of application, eastern black nightshade was 2-3 inches tall and had a 6 inch root system (picture 1), but sugarcane was not emerged. A randomized complete block (RCB) experimental design was used to evaluate herbicide treatments, and treatments were replicated 4 times. Treatments included Aatrex 4L (atrazine), TriCor 75DF, Brash 3.87L (2,4-D + dicamba), Callisto 4L (mesotrione) and were applied at 2 qt, 2 lb, 2 pt, and 3 oz/a (2 lb ai, 1.5 lb ai, 0.97 ae, and 0.094 lb ai/a), respectively. Induce, a nonionic surfactant, was added to all herbicide treatment at 0.25% v/v. A nontreated control was also included. Control of eastern black nightshade was evaluated at 1,2,3,4, and 6 week(s) after treatment (WAT). Both Brash and Callisto provided over 80% control of eastern black nightshade at 3, 4, and 6 WAT (Table 1). Aatrex and TriCor were ineffective in controlling eastern black nightshade. Maximum eastern black nightshade control for Aatrex was 53%, 2 WAT, and maximum control for TriCor was 44 %, 3 WAT.

Eastern Black Nightshade Postemergence Study (4-8 inches)

On March 10, 2014, the herbicide combination 1.5 pt/a of Weedmaster (2,4-D + dicamba) + 1.25 lb/a of TriCor 75 DF (metribuzin) + 2.5 qt/a of Pendimethalin 3.3 EC (pendimethalin) to a field of plantcane L 03-371 at Belmont Farms in Uncle Sam, LA. This herbicide combination was ineffective in controlling eastern black nightshade. A herbicide screening experiment was initiated on March 26, 2014, to control 4-8 inches tall eastern black nightshade. A randomized complete block (RCB) experimental design was used to evaluate herbicide treatments, and treatments were replicated 4 times. Treatments included Callisto 4L (mesotrione) at 3 oz/a (0.094 lb ai/a), Brash 3.87L (2,4-D + dicamba) at 2 pt/a (0.97 lb ae/a), Brash 3.87L (2,4-D + dicamba) at 5.6 pt/a (2.7 lb ae/a), Clarity 4L (dicamba) at 1 qt/a (1 lb ae/a), and Outlaw (2,4-D + dicamba) 2.54 L at 2 pt/a (0.635 lb ae/a). Induce, a nonionic surfactant, was added to all herbicide treatment at 0.25% v/v. A nontreated control was also included. Control of eastern black nightshade was evaluated at 5 weeks after treatment (WAT). All herbicide treatments yield partial control of eastern black nightshade and control ranged from 43 to 68% (Table 2).

Eastern Black Nightshade Postemergence Study (8-12 inches)
On March 10, 2014, the herbicide combination 1.5 pt/a of Weedmaster (2,4-D + dicamba) + 1.25 lb/a of TriCor 75 DF (metribuzin) + 2.5 qt/a of Pendimethalin 3.3 EC (pendimethalin) to a field of plantcane L03-371 at Belmont Farms in Uncle Sam, LA. This herbicide combination was ineffective in controlling eastern black nightshade. A herbicide screening experiment was initiated on April 9, 2014, to control 8-12 inches tall eastern black nightshade. A randomized complete block (RCB) experimental design was used to evaluate herbicide treatments, and treatments were replicated 4 times. Treatments included Callisto 4L (mesotrione) at 3 oz/a (0.094 lb ai/a), Brash 3.87L (2,4-D + dicamba) at 2 pt/a (0.97 lb ae/a), Brash 3.87L (2,4-D + dicamba) at 5.6 pt/a (2.7 lb ae/a), and Clarity 4L (dicamba) at 1 qt/a (1 lb ae/a). Induce, a nonionic surfactant, was added to all herbicide treatment at 0.25% v/v. A nontreated control was also included. Control of eastern black nightshade was evaluated at 4 weeks after treatment (WAT). All herbicide treatments yield minimal control of eastern black nightshade and control ranged from 23 to 35% (Table 3).

Eastern Black Nightshade At-Planting Preemergence Study
Evaluation of Authority MTZ, Valor SX, Dual Magnum, Callistio, and TriCor for eastern black nightshade control, at planting, was conducted on H.E. Harper Farms in Cheneyville, LA. The field was planted with HoCP 04-838 on August 20, 2014, and preemergence herbicide treatments were applied on August 21, 2014. Herbicide treatments were replicated 4 times, and a randomized complete block (RCB) experimental design was used. Treatments included Authority MTZ 45DF (sulfentrazone + metribuzin) at 16, 24, and 32 oz/a (0.45, 0.68, and 0.90 lb ai/a), Valor SX 51WDG (flumioxazin) at 6 and 8 oz/a (0.19 and 0.26 lb ai/a), Dual Magnum 7.62L (s-Metolclor) at 1.5 pt/a (1.43 lb ai/a), Callisto 4L (mesotrione) at 6 and 7.7 oz/a (0.19 and 0.24 lb ai/a), and TriCor 75DF (metribuzin) at 2 lb/a (1.5 lb ai/a). Control of eastern black nightshade was evaluated at 1, 2, and 4, week(s) after treatment (WAT). Eastern black nightshade was not observed, regardless of herbicide treatment and evaluation timing.

Large-scale Eastern Black Nightshade At-Planting Preemergence Study
Evaluation of Authority MTZ, Valor SX, for eastern black nightshade control, at planting, was conducted on H.E. Harper Farms in Cheneyville, LA. The field was planted with L 01-299 on August 21, 2014, and preemergence herbicide treatments were applied on August 27, 2014. The seedcane had large amounts of mature eastern black nightshade plants scattered throughout. Many plants were 4-6 feet in height, and had over 1200 berries per plant. A randomized complete block (RCB) experimental design was used to evaluate herbicide treatments, and treatments were replicated 3 times. Plot size was approximately 1 acre (5 rows wide x 1600 ft long). Treatments included Authority MTZ 45DF (sulfentrazone + metribuzin) at 32 oz/a (0.90 lb ai/a) and Valor SX 51WDG (flumioxazin) at 6 oz/a (0.19 lb ai/a). A nontreated control was also included. Both Authority MTZ and Valor provided complete control of eastern black nightshade 3 weeks after treatment (WAT). Numerous 2-4 leaf eastern black nightshade plants were scattered throughout the nontreated control. All plots were sprayed with Dimetric (metribuzin) at 2 lb/a (1.5 lb ai/a) on September 17, 2014. Dimetric provide complete control of seedling eastern black nightshade 2 weeks after treatment.

Sugarcane Seedling Herbicide Screening
Unlike commercial propagated sugarcane, it has been reported that seedling sugarcane plants, after planting, are less tolerant or non-tolerant to herbicides used in commercial sugarcane

production. The current herbicide standard used after the planting of seedling sugarcane plantlets at the LSU AgCenter's Sugar Research Station is pendimethalin at 1 lb ai/a and atrazine at 1 lb ai/a. This combination provides some grass and broadleaf weed control; however, in some years, pendimethalin only provides limited control of seedling johnsongrass (*sorghum halepense*). In late April and early May, two studies were conducted at the Sugar Research Station in St. Gabriel, LA to screen several herbicides in order to determine sugarcane seedling tolerance and weed control efficacy. In the first study, treatments included clomazone (1.24 lb ai/a) and metribuzin (2.25 lb ai/a) applied prior to transplanting of sugarcane seedlings, and metribuzin (0.75, 0.94, and 1.13 lb ai/a), s-metolachlor + atrazine (1.6 + 1.0 lb ai/a), pendimethalin + metribuzin (0.95 + 0.75 lb ai/a), and pendimethalin + atrazine (0.95 + 1.0 lb ai/a) applied following transplanting. The herbicide combination s-metolachlor + atrazine (1.6 + 1.0 lb ai/a) cause spotting on the leaves 1 week after treatment (WAT), but sugarcane plantlets quickly recovered. Clomazone caused whiting of leaves and persisted beyond 4 WAT. No injury was noted for other treatments. All herbicide treatments completely controlled johnsongrass, annual grasses, and broadleaf weeds.

Treatments evaluated in the second study were metribuzin (0.75 and 1.5 lb ai/a), pendimethalin + atrazine (0.95 + 1.0 lb ai/a), and pendimethalin + metribuzin (1.9 + 0.75 lb ai/a) applied prior to transplanting of sugarcane seedlings. Metribuzin (0.75, 0.94, and 1.13 lb ai/a), pendimethalin + atrazine (0.95 + 1.0 lb ai/a), and pendimethalin + atrazine (1.9 + 1.0 lb ai/a) were applied following transplanting. No injury was noted regardless of herbicide treatment and all treatments provided complete control of seedling johnsongrass.

Evaluation of Alternative Herbicides to Replace MSMA on Sugarcane Ditchbanks

The Environmental Protection Agency (EPA) ruled that MSMA could no longer be used on roadsides and ditchbanks after December 31, 2013. MSMA was used by some growers to promote ditchbank stabilization. MSMA is a selective herbicide which controls johnsongrass and itchgrass, but it is ineffective on bermudagrass. Several herbicides were evaluated at the Sugar Research Station in St. Gabriel, LA to find an alternative for MSMA. On June 5, 2014, herbicide treatments were applied using a Hypro Boom X Tender ® spray nozzle XT024. The experimental design used was a randomized complete block (RCB), and herbicide treatments were replicated 3 times. Herbicide treatments included Outrider 75WDG at 1.3 oz/a, Pastora 71.2WDG at 1.5 oz/a, Plateau 2L at 10 oz/a, and Roundup PowerMax at 10 and 56 oz/a. A nontreated control was also included. Outrider, Plateau, and Roundup PowerMax (10 & 56 oz) treatments provided over 80% control of johnsongrass 21 days after treatment. Bermudagrass control varied greatly among treatments. Outrider and Pastora had little effect on bermudagrass growth. Bermudagrass was visibly stunted by both Plateau and Roundup PowerMax at 10 oz/a, but no necrosis was evident. Roundup PowerMax at 56 oz/a controlled 88% of bermudagrass, leaving the soil surface mostly bare.

Table 1. Control of eastern black nightshade 2-3 inches tall at 1,2,3,4, and 6 week(s) after treatment (WAT) at Linzay Farms in Cheneyville, LA.[1]

			% Control[2]				
Treatment	Rate	Application	1 WAT	2 WAT	3 WAT	4 WAT	6 WAT
Aatrex 4L[3]	2 qt/a	POST	34 b[4]	53 b	50 b	43 c	19 b
TriCor 75DF	2 lb/a	POST	33 b	33 c	44 b	20 d	0 b
Brash 3.87L	2 pt/a	POST	51 a	65a	86 a	79 b	87 a
Callisto 4L	3 oz/a	POST	45 a	73 a	91 a	93 a	81 a
Nontreated			0 c	0 d	0 c	0 e	0 b
LSD (P=.05)			10	10	23	7	21

[1] Treatments applied March 10, 2014, to plantcane.
[2] Control based on a scale of 0 to 100% with 0 = no control and 100% = plant death.
[3] Nonionic surfactant added to all herbicide treatment at 0.25% v/v.
[4] Treatment means within each column followed by the same lower case letter are not significantly different (P≤0.05).

Table 2. Control of eastern black nightshade 4-8 inches tall 5 weeks after treatment (WAT) at Belmont Farms in Uncle Sam, LA.[1]

			% Control[2]
Treatment	Rate	Application	5 WAT
Callisto 4L[3]	3 oz/a	POST	60 a[4]
Brash 3.87L	2 pt/a	POST	43 a
Brash 3.87L	5.6 pt/a	POST	68 a
Clarity 4L	1 qt/a	POST	64 a
Outlaw 2.54L	2 pt/a	POST	59 a
Nontreated			0 b
LSD (P=.05)			36

[1] Treatments applied March 26, 2014, to plantcane L 03-371.
[2] Control based on a scale of 0 to 100% with 0 = no control and 100% = plant death.
[3] Nonionic surfactant added to all herbicide treatment at 0.25% v/v.
[4] Treatment means within each column followed by the same lower case letter are not significantly different (P≤0.05).

Table 3. Control of eastern black nightshade 8-12 inches tall 4 weeks after treatment (WAT) at Belmont Farms in Uncle Sam, LA.[1]

Treatment	Rate	Application	% Control[2] 4 WAT
Callisto 4L[3]	3 oz/a	POST	26 a[4]
Brash 3.87L	2 pt/a	POST	25 a
Brash 3.87L	5.6 pt/a	POST	35 a
Clarity 4L	1 qt/a	POST	23 a
Nontreated			0 b
LSD (P=.05)			13

[1] Treatments applied April 9, 2014, to plantcane L 03-371.
[2] Control based on a scale of 0 to 100% with 0 = no control and 100% = plant death.
[3] Nonionic surfactant added to all herbicide treatment at 0.25% v/v.
[4] Treatment means within each column followed by the same lower case letter are not significantly different (P≤0.05).

Table 4. Ditchbank control of johnsongrass and bermudagrass 21 days after treatment at the Sugar Research Station, St. Gabriel, LA.[1]

Treatment	Rate	Cost/a	% Control[2] Johnsongrass	% Control[2] Bermudagrass
Outrider	1.3 oz/a	$22.10	88 b[3]	3 de
Pastora	1.5 oz/a	$27.00	73 d	8 d
Plateau	10 oz/a	$14.07	83 c	50 b
Roundup[4]	10 oz/a	$1.96	96 a	40 c
Roundup	56 oz/a	$10.94	100 a	88 a
Nontreated			0 e	0 e
LSD (P=.05)			4.3	5.5

[1] Treatments applied June 7, 2014.
[2] Control based on a scale of 0 to 100% with 0 = no control and 100% = plant death.
[3] Treatment means within each column followed by the same lower case letter are not significantly different (P≤0.05).
[4] Roundup PowerMax

Picture 1.