Controlling Volunteer Cotton (two true leaves & 5-6 true leaves) in Grain Sorghum Trials 2023

Sponsor Name: Cotton Incorporated
Sponsor Award Number: 22-592TX

PI: Danielle Sekula – Texas A&M AgriLife Extension
Co pi: Josh Mcginty– Texas A&M AgriLife Extension

Hidalgo County, TX
Texas AgriScience, LLC. In Lyford, TX

Crop: PHY 480, cotyledon-two true leaves & 5-6 true leaves, irrigated

Location: Lyford, TX

Plot Size: 20 ft. x 2 rows

Experimental Design: Randomized Complete Block; 3 Replications.

Information:

- Cotton Variety PHY 480 was planted on March 31st, to be used for this study were cotyledon-two true leaves & 5-6 true leaves cotton was evaluated after sorghum herbicides used.
- Both cotyledon-two true leaves & 5-6 true leaves stages were sprayed with the same 6 herbicide treatment list provided below and put out at the same rates as previous year 2022. Each trial had a non-treated control as well, totaling 7 treatments evaluated after spray applications were made.
- For the cotton plant stage of cotyledon- two true leaves, counts for plants alive were done since no cotton is yet hostable at this stage**.** For the 5-6 true leaves stage cotton since this cotton has pinhead squares both a live plant count was done and then a hostable cotton plant count done. **Hostable cotton plants were considered as any cotton plants that had pin head squares that were still green.**
- **Cotyledon to Two true leaves stage**:
    - Plots were marked on April 18th, 2023, and preliminary counts averaged that each two row 20 ft plot had about 90-100 cotyledon seedlings before spray application.

- The trial was sprayed on April 20th at 10 am in the morning at 8-10 mph winds. Each treatment was replicated 3 times.
- Counts of how many cotton plants that were still alive/green (regrowth) as well as hostability (pinhead square) were taken on April 26th (7 DAT), May 4th (14 DAT), May 11th (21 DAT), May 18th (32 DAT), May 25th (39 DAT), June 12th (57 DAT), June 20th (65 DAT), July 6th (81 DAT), and July 20th (95 DAT (3 months)).

- **Five-six true leaves stage**:
  - Plots were marked on April 18th, 2023, and preliminary counts averaged that each two row 20 ft plot had about 90-100 cotton plants before spray application.
  - The trial was sprayed on May 2nd at 9 am in the morning at 7-10 mph winds. Each treatment was replicated 3 times.
  - Counts of how many cotton plants that were still alive/green (regrowth) as well as hostability (pinhead square) were taken on, May 11th (21 DAT), May 18th (32 DAT), May 25th (39 DAT), June 12th (57 DAT), June 20th (65 DAT), July 6th (81 DAT), and July 20th (95 DAT (3 months)).
- Received accumulated rainfall of 10.53 inches from March till July of 2023.
- We took one last count of how many cotton plants made it to harvest in both the cotyledon-two true leaf & 5-6 true leaves studies plots on July 20th, which was a good 3 months after the cotyledon-2 true leaves was sprayed and 2.5 months after the 5-6 true leaves stage was sprayed with the sorghum herbicide treatments. All plots to both trials did receive Liberty link and Roundup that was applied by Jacob in mid-May. Still, it was easy to see if the plots had no cotton plants or cotton plants that made it to harvest and generated some great data for cotton growers. See charts below.
- Cotton Growers can see from the data charts which grain sorghum herbicide treatments will control volunteer cotton in their crops. I was also able to show a price comparison of the treatments as well to see which one is the most economical treatment and at same time gives great control of volunteer cotton.

Evaluation: Evaluated cotton plants using (SAS 9.4 using Anova, lsd of .05).

Results: Herbicide Spray treatments used for both trials:

	Herbicide Treatment rate/acre	≈Prices trt/acre
1	Atrazine 4L @ 2pt/a + COC @ 1%	$6.41
2	Aim @ 0.5 fl oz + NIS @ 0.25%	$3.47
3	Peak @ 1 oz + NIS @ 0.25%	$18.52
4	Callisto Xtra @ 24 fl oz + COC @ 1%	$9.06
5	Starane NXT @ 21 fl oz + NIS @ 0.25%	$16.23
6	Huskie FX @ 19 fl oz + NIS @ 0.25%	$16.00
7	Nontreated Control	$85.00
*NIS stands for Non-Ionic Surfactant		
*COC stands for Crop Oil Concentrate		
**As per TDA & TBWEF, for the non-treated control (hostable volunteer cotton in a commercial field) growers are fined $5/acre every week for the first 5 weeks if their cotton is hostable, on the 6th week the fine goes up to $7.50/acre for being hostable to boll weevil, and fines stop once stalks are controlled & destroyed.		

(**Note prices for herbicide treatments were “ballpark” figures given by local chemical reps in the area and are not the exact final price but give a good idea of prices per treatment overall. Also Nontreated Control was calculated based on the weekly fine totaled for untreated cotton stalks established by TDA & the TBWEP).

- The same list of Herbicide treatments was used for both trials, and from looking at the two trials in general it showed that spraying at cotyledon-two true leaf stage had a better kill and residual control of the volunteer cotton plants than at the 5-6 true leaves (pinhead square cotton) stages. It seems that the “sweet spot” in controlling volunteer cotton is right at two true leaf stage not letting the cotton plant grow bigger than this stage to control volunteer cotton plants in this situation of planting sorghum and having rogue volunteer cotton plants come up. Last year’s 2022 data showed the same results that applying herbicide at the two true leaf stage was successful in control of volunteer cotton plants in sorghum. This is encouraging to see that the sorghum herbicides on the market that we currently utilize give us this control as I’m sure some volunteer cotton plants come up that get overlooked and probably never become an issue due to growers applying herbicides to control other weeds as part of their standard management program.
- **Treatment 1 (Atrazine 4L)** gave good control (≈ 95% kill) in the cotyledon-two true leaf stage 7 days after treatment and after 35 days after treatment all cotton seedlings were completely dead rendering them non-hostable. In the 5-6 true leaves leaf stage it gave a 75% kill 7 days

after treatment and remined alive and hostable with about 70% of the cotton plants still alive and hostable well after a month and a half after initial treatment. Atrazine 4L is a good treatment for volunteer cotton in sorghum if the grower can spray when the cotton is no bigger than two true leaf stage, it however is not a good treatment and should not be recommended for spraying 3 true leaves and on as the cotton plant matures it loses its effectiveness. The 2023 data for Atrazine mirrored that of the 2022 data and thus concluding that Atrazine is a good early control option for volunteer cotton plants in sorghum but not later mature stages.

- **Treatment 2 (Aim)**, showed an excellent kill of cotton seedlings and 5-6 true leaf stage(pinhead) in both studies with 100% kill 7 days after the initial treatments were applied to their respective stages and the cotton plants continued to be dead/non-hostable 2-3 months later. Treatment 2 (Aim), also was the most affordable treatment at about $3.47/acre.
- **Treatment 3 (Peak)**, showed an excellent kill of cotyledon-2 true leaves kill after 14 days after treatment and after 30 days only 11% of the cotton plants were alive but none were hostable. Now when we sprayed Peak on the 5-6 (pinhead square) true leaves stage we noticed that it took longer for the plants to die, a lot of the cotton plants were able to live, about 12-14% were alive after 1 month, but majority of the volunteer cotton plants were non-hostable or had no viable pin head square, however the longer the cotton plants were out in the field the more regrowth it had over time.
- **Treatment 4 (Callisto Xtra)**, showed a complete kill of cotton after 14 days, with zero plants hostable or alive in the cotyledon-2 true leaves stage. When we applied Callisto Xtra to the 5-6 true leaves stage we saw similar results with all cotton plants dead and non-hostable by 16 days after treatment. According to the data from this 2023 year and from 2022, Callisto Xtra is also one of the best herbicide treatments to use like Aim for controlling volunteer cotton plants and it came in 3rd cheapest at $9.06/acre.
- **Treatment 5 (Starane NXT)**, also showed great control of volunteer cotton plants in both trials as it had complete kill of cotyledon-2 true leaf stage after 7 days and they continued to be dead 3 months after treatment. Starane NXT also rendered 97% of cotton plants sprayed at 5-6 true leaves non-hostable after 41 days but is a bit pricier at ≈ $16.23/acre for treatment.
- **Treatment 6 (Huskie FX)**, also showed excellent control on both trails (cotyledon-2 true leaves & 5-6 true leaves stages) giving a complete kill following 7 days after treatment and remained dead well after 2-3 months.

Volunteer Cotyledon-2 true leaves cotton sprayed with Sorghum herbicides trial 2023/ Sponsor Name: Cotton Incorporated
PI: Danielle Sekula – Texas A&M AgriLife Extension/ Co pi: Josh Mcginty– Texas A&M AgriLife Extension
Hidalgo County, TX/Texas AgriScience, LLC. In Lyford, TX

Volunteer Cotyledon-2 true leaves stage cotton sprayed with Sorghum herbicides trial 2023

Volunteer Cotyledon to 2 true Leaf cotton sprayed with sorghum herbicides trial 2023												
	Treatment	**Mean # of cotyledon/2 true leaf cotton plants still alive & not hostable either**										
	Sprayed on April 20th on PHY 480	26-Apr	4-May	11-May	18-May	25-May	12-Jun	20-Jun	6-Jul	20-Jul		
		7 DAT	**14 DAT**	**21 DAT**	**32 DAT**	**35 DAT**	**53 DAT**	**61 DAT**	**77 DAT**	**91 DAT (3 months)**		**Prices trt/acre**
1	Atrazine 4L @ 2pt/a + COC @ 1%	5.00 c	0.67 c	0.33 c	0.33 b	0.33 b	0 b	0 b	0 b	0 b		$6.41
2	Aim @ 0.5 fl oz + NIS @ 0.25%	0 c	0 c	0 c	0 b	0 b	0 b	0 b	0 b	0 b		$3.47
3	Peak @ 1 oz + NIS @ 0.25%	80.33 b	18.00 b	15.33 b	11.33 b	5.00 b	5.33 b	1.00 b	1.00 b	1.00 b		$18.52
4	Callisto Xtra @ 24 fl oz + COC @ 1%	6.33 c	0.33 c	0 c	0 b	0 b	0 b	0 b	0 b	0 b		$9.06
5	Starane NXT @ 21 fl oz + NIS @ 0.25%	0 c	0 c	0 c	0 b	0 b	0 b	0 b	0 b	0 b		$16.23
6	Huskie FX @ 19 fl oz + NIS @ 0.25%	0 c	0 c	0 c	0 b	0 b	0 b	0 b	0 b	0 b		$16.00
7	Nontreated Control	106.67 a	106.67 a	106.67 a	106.67 a	106.67 a	106.67 a	106.67 a	106.67 a	106.67 a		$62.50

Means within a column followed by the same letter are not significantly different (P>0.05; PROC ANOVA; Mean comparison by LSD [SAS 9.4]

*NIS stands for Non-Ionic Surfactant

*COC stands for Crop Oil Concentrate

Volunteer 5-6 true leaves cotton sprayed with Sorghum Herbicides trial 2023/ Sponsor Name: Cotton Incorporated
PI: Danielle Sekula – Texas A&M AgriLife Extension/ Co pi: Josh Mcginty– Texas A&M AgriLife Extension
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Volunteer 5-6 true leaves cotton sprayed with Sorghum Herbicides trial- Cotton plants alive chart 2023

Volunteer 5-6 true leaf cotton (barely squaring) sprayed with sorghum herbicides trial									
	Treatment	**Mean # of 5-6 true leaf cotton plants still alive**							
	Sprayed on May 2nd on PHY 480	11-May	18-May	25-May	12-Jun	20-Jun	6-Jul	20-Jul	
		9 DAT	**16 DAT**	**23 DAT**	**41 DAT**	**49 DAT**	**65 DAT**	**79 DAT**	**Prices trt/acre**
1	Atrazine 4L @ 2pt/a + COC @ 1%	75.67 b	55.00 b	52.00 b	51.33 b	70.67 b	69.33 b	69.33 b	$6.41
2	Aim @ 0.5 fl oz + NIS @ 0.25%	0 d	0 d	0 d	1.00 d	2.00 d	2.00 d	2.00 d	$3.47
3	Peak @ 1 oz + NIS @ 0.25%	81.33 ab	38.67 c	12.33 c	14.00 c	30.00 c	25.00 c	25.00 c	$18.52
4	Callisto Xtra @ 24 fl oz + COC @ 1%	38.33 c	0 d	0 d	0d	0 d	0 d	0d	$9.06
5	Starane NXT @ 21 fl oz + NIS @ 0.25%	8.00 d	2.67 d	3.00 cd	3.00 cd	6.00 d	6.00 cd	6.00 cd	$16.23
6	Huskie FX @ 19 fl oz + NIS @ 0.25%	0 d	0 d	0 d	0 d	0 d	0 d	0 d	$16.00
7	Nontreated Control	97.00 a	97.00 a	97.00 a	97.00 a	97.00 a	97.00 a	97.00 a	$85.00

Means within a column followed by the same letter are not significantly different (P>0.05; PROC ANOVA; Mean comparison by LSD [SAS 9.4]

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Volunteer 5-6 true leaves cotton sprayed with Sorghum Herbicides trial- Hostable cotton plants chart 2023

Volunteer 5-6 true leaf cotton (barely squaring) sprayed with sorghum herbicides trial							
	Treatment	**Mean # of 5-6 true leaf cotton plants still hostable**					
	Sprayed on May 2nd on PHY 480	12-Jun	20-Jun	6-Jul	20-Jul		
		41 DAT	**49 DAT**	**65 DAT**	**79 DAT(2.5 months +)**		**Prices trt/acre**
1	Atrazine 4L @ 2pt/a + COC @ 1%	51.33 b	40.67 b	30.00 b	30.00 b		$6.41
2	Aim @ 0.5 fl oz + NIS @ 0.25%	1.00 c	0 c	0 c	0 c		$3.47
3	Peak @ 1 oz + NIS @ 0.25%	8.33 c	2.67 c	0.67 c	0.67 c		$18.52
4	Callisto Xtra @ 24 fl oz + COC @ 1%	0 c	0 c	0 c	0 c		$9.06
5	Starane NXT @ 21 fl oz + NIS @ 0.25%	3 c	0 c	0 c	0 c		$16.23
6	Huskie FX @ 19 fl oz + NIS @ 0.25%	0 c	0 c	0 c	0 c		$16.00
7	Nontreated Control	97.00 a	97.00 a	97.00 a	97.00 a		$85.00

Means within a column followed by the same letter are not significantly different (P>0.05; PROC ANOVA; Mean comparison by LSD [SAS 9.4]

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