REPORT: Herbicide-Resistant Weed Management in Corn 2025

Project duration: 7/1/2025 – 5/15/2026

Principal Investigator: Vijay Singh (Associate Professor and Extension Weed Specialist)

Eastern Shore AREC, Virginia Tech

33446 Research Dr, Painter, VA 23420

Contact: v.singh@vt.edu, cell: 479-713-0094

Tables and graphs are followed by plot pictures in the end.

Project 1. Weed Management in Corn with Reduced Rates of Atrazine

Objective 1. To evaluate the effectiveness of preemergence herbicide tank mixes using reduced rates of atrazine

Objective 2. To evaluate the effectiveness of early postemergence herbicide applications using tank mixes with reduced rates of atrazine

Atrazine, besides being an important and widely used herbicide for the control of broadleaf and grass weeds in corn and other row crops, is also a surface water and groundwater contaminant that can enter waterways through runoff from agricultural fields. In the regions where higher levels of atrazine have been reported in watersheds, the US Environmental Protection Agency (EPA) has proposed certain restrictions on the use of atrazine including avoiding its aerial application, prohibiting application in saturated soils and restricting annual application rates to a maximum of 2lb/A of active ingredient. The majority of corn growing belts of the Delmarva region will be affected by these changes. There is a need to design more environmentally sustainable herbicide programs which can be equally effective but far less dependent on atrazine. A multi-location field trial was conducted in Virginia, Delaware and Maryland to determine the effectiveness of new herbicide programs with reduced atrazine rates. Preemergence applications of atrazine alone as well as atrazine in combination with *S*-metolachlor, pyroxasulfone and *S*-metolachlor + mesotrione, as tank mixes were tested in corn. Apart from it, postemergence applications of various premixes including Acuron Flexi, Halex GT and Acuron GT with and without atrazine were tested. Results from the study conducted in Virginia indicated that the preemergence application of atrazine at the reduced rate of (20 fl oz/A) when tank mixed with *S*-metolachlor, pyroxasulfone or *S*-metolachlor + mesotrione provided an excellent, near 100% weed control which was significantly better as compared to reduced rate of atrazine (20 fl oz/A)

alone. Also, results from postemergence treatments indicated that glyphosate + glufosinate treatments were marginally inferior (90%) to treatments that included atrazine and/or Halex GT and/or Acuron GT/Flexi, which provided season-long excellent control. This study would provide a prospective for future research to convince farmers of the region to move away from traditional dependence on atrazine.

Treatment list for objective 1 and 2

Trt #	PRE	POST **
1	Untreated Check	Untreated Check
2	atrazine @ 0.63 lb ai/A + S-metolachlor @ 1.2 lb ai/A	Roundup PowerMax 3 @ 26.7 fl oz/A + Liberty 280 SL @ 32 fl oz/A
3	atrazine @ 1 lb ai/A + S-metolachlor @ 1.2 lb ai/A	
4	atrazine @ 0.63 lb ai/A + pyroxasulfone @ 0.1 lb ai/A	
5	atrazine @ 1 lb ai/A + pyroxasulfone @ 0.1 lb ai/A	
6	atrazine @ 0.63 lb ai/A + mesotrione @ 0.2 lb ai/A + *S*-metolachlor @ 1.2 lb ai/A	
7	atrazine @ 1 lb ai/A + mesotrione @ 0.2 lb ai/A + *S*-metolachlor @ 1.2 lb ai/A	
8	atrazine @ 0.63 lb ai/A	Acuron Flexi Premix[1*] @ 2qt/A + Roundup PowerMax 3 @ 26.7 fl oz/A + Liberty 280 SL @ 32 fl oz/A
9	S-metolachlor @ 0.8 lb ai/A	Halex GT Premix[2*] @ 3.6 pt/A + NIS @ 1 qt/100 gal
10		Halex GT Premix[2*] @ 3.6 pt/A + atrazine @ 0.63 lb ai/A + NIS @ 1 qt/100 gal
11		Halex GT Premix[2*] @ 3.6 pt/A + atrazine @ 1 lb ai/A + NIS @ 1 qt/100 gal
12		Acuron GT Premix[3*] @ 3.75 pt/A + atrazine @ 0.63 lb ai/A + NIS @ 1 qt/100 gal

** Adjuvant in POST treatments: Dry Ammonium Sulfate @ 8.5 lbs/100 gal
1* Acuron Flexi Premix: S-metolachlor + Mesotrione + Bicyclopyrone
2* Halex GT Premix: S-metolachlor + Mesotrione + Glyphosate
3* Acuron GT Premix: S-metolachlor + Mesotrione + Bicyclopyrone + Glyphosate

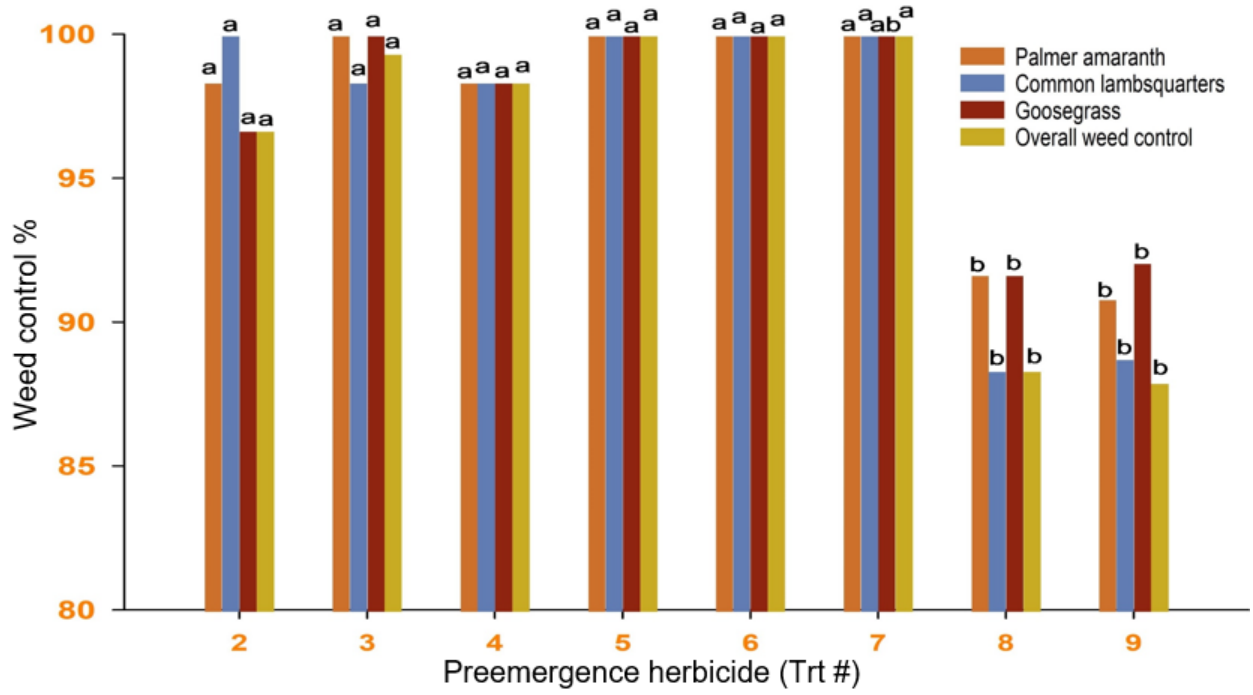

Fig. 1: Weed control at 4 weeks after PRE application

Fig. 2. Potential PRE herbicides with reduced rates of atrazine

- For PRE treatments, reduced rate of atrazine if combined with *S*-metolachlor, pyroxasulfone and mesotrione, can enhance weed control significantly, instead of atrazine application alone.

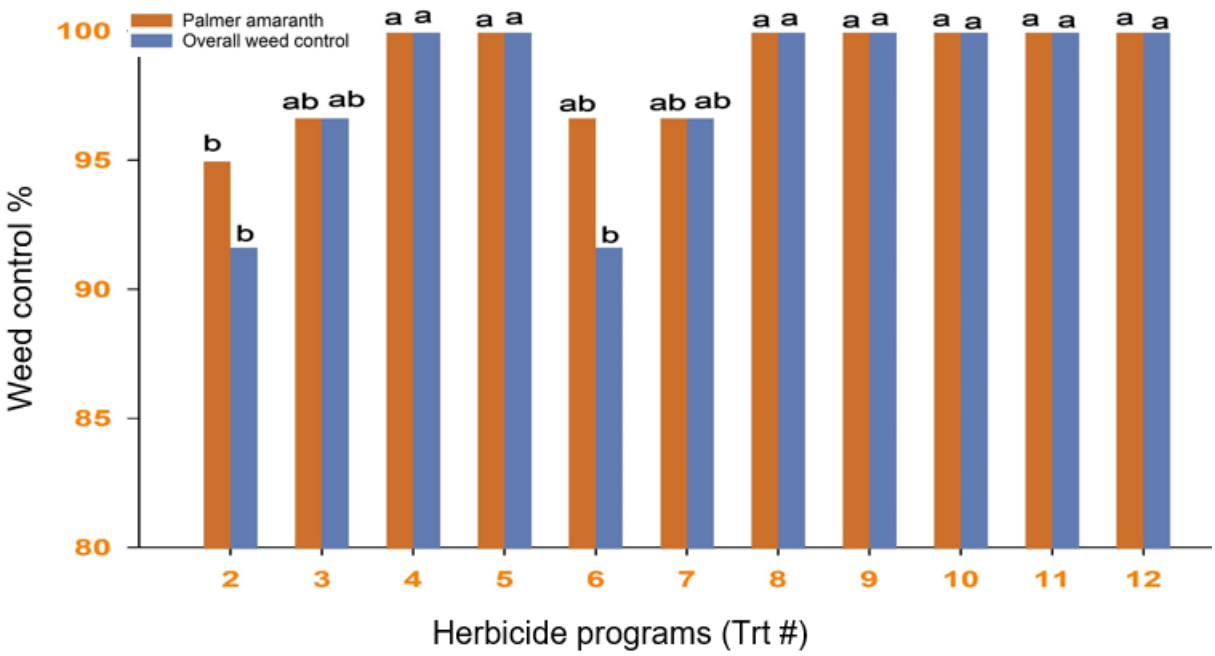

Fig. 3. Weed control at 3 weeks after POST application

- For overall herbicide programs, inclusion of premixes such as Halex GT, Acuron GT, Acuron Flexi at POST application, provides season long weed control.

Objective 3. Test new herbicide programs (with multiple herbicide combinations in premixes) for the control of herbicide-resistant and other weeds.

- Evaluate the effectiveness of new premixes for control of broadleaf and grass weeds
- Evaluate crop safety and yield

Experiment details

Corn planting date	May 7
Seeding rate	29000 seeds/ac
Variety	DKC110-10RIB (SmartStax)
Plot size	10 * 20 ft
Herbicide application timing	PRE: May 8; POST: June 17
Application volume	15 GPA

Treatments

Trt#	Treatment	Application timing	Rep. 1	Rep. 2	Rep. 3	Rep. 4
1	Untreated Check		101	202	306	405
2	Acuron 1.75 qt/A	PRE	102	206	303	406
	Halex GT@ 2 qt/A + N-Pak AMS 2.5 %v/v + NIS 0.25% v/v	POST	102	206	303	406
3	Acuron Flexi 1.5 qt/a	PRE	103	201	302	403
	Halex GT@ 2 qt/A + N-Pak AMS 2.5 % v/v + NIS 0.25% v/v	POST	103	201	302	403
4	Acuron 1.5 qt/A	PRE	104	205	304	402
	Resicore @ 1.25 qt/A + Roundup PowerMax3 @ 28 oz/a + N-Pak @ AMS 2.5 % v/v + NIS 0.25%v/v	POST	104	205	304	402
5	Acuron 1.5 qt/A	PRE	105	204	305	404
	Acuron 2 qt/A + Roundup PowerMax3 @ 28 oz/A + N-Pak @ AMS 2.5 % v/v + NIS 0.25%v/v	POST	105	204	305	404
6	Acuron Flexi 1.5 qt/A	PRE	106	203	301	401
	Kyro 60 oz/A + COC 1% v/v	POST	106	203	301	401

RESULTS

Table 2. Efficacy of preemergence herbicides at 14 DAT

Treatments	Trt code	Overall weed control (%)	Morningglory	Large Crabgrass	Common ragweed	Yellow nutsedge
PRE: Acuron 1.75 qt/A	2	98.75	99	100	100	99.25
PRE: Acuron Flexi 1.5 qt/A	3	98.25	97.5	99	100	100
PRE: Acuron 1.5 qt/A	4	97.5	97.3	98	99.8	99

Acuron (PRE) herbicide product line performed very well in controlling herbicide resistant weed at 14 days after treatment. Acuron Flexi (without atrazine) provided similar weed control as provided by product with atrazine in it. Even the lower rate of Acuron is sufficient to control herbicide resistant weeds (resistant to glyphosate, and ALS-inhibitors (group 2))

Table 3. Efficacy of postemergence herbicides at 21 DAT

Treatments	Trt code	Overall weed control (%)	Morningglory	Large crabgrass	Common ragweed	Yello nutsedge
PRE: Acuron 1.75 qt/A, **POST:** Halex GT@ 2 qt/A + N-Pak AMS 2.5 %v/v + NIS 0.25% v/v	2	99.5	98.8	100	100	100
PRE: Acuron Flexi 1.5 qt/A, **POST:** Halex GT@ 2 qt/A + N-Pak AMS 2.5 % v/v + NIS 0.25% v/v	3	99.8	98.8	100	100	100
PRE: Acuron 1.5 qt/A, **POST:** Resicore @ 1.25 qt/A + Roundup PowerMax3 @ 28 oz/a + N-Pak @ AMS 2.5 % v/v + NIS 0.25%v/v	4	99.5	99	100	100	99.8
PRE: Acuron 1.5 qt/A, **POST:** Acuron 2 qt/A + Roundup PowerMax3 @ 28 oz/A + N-Pak @ AMS 2.5 % v/v + NIS 0.25%v/v	5	99.8	99.3	100	100	100
PRE: Acuron Flexi 1.5 qt/A, **POST:** Kyro 60 oz/A + COC 1% v/v	6	96.5	97.8	97.3	100	100

The products tested in the study provided excellent control of major weeds. Acuron products (PRE) can be followed by Halex GT, Resicore and glyphosate, or Kyro for postemergence herbicide applications. Pictures taken indicating weed control at PRE (14 DAT) and POST stages (21 DAT) are placed below.

Preemeregence photos (14 DAT):

Figure 1 Untreated Check

Figure 2. Acuron 1.75 qt/A

Figure 3. Acuron Flexi 1.5 qt/A

Figure 4. Acuron 1.5 qt/A

Figure 5. Acuron 1.5 qt/A

Figure 6. Acuron Flexi 1.5 qt/A

Postemergence (21 DAT) photos: These treatments were followed after Acuron products

Figure 7. Untreated Check

Figure 8. Halex GT@ 2 qt/A + N-Pak AMS 2.5 %v/v + NIS 0.25% v/v

Figure 9. Halex GT@ 2 qt/A + N-Pak AMS 2.5 %v/v + NIS 0.25% v/v

Figure 10. Resicore @ 1.25 qt/A + Roundup PowerMax3 @ 28 oz/a + N-Pak @ AMS 2.5 % v/v + NIS 0.25%v/v

Figure 11 "Acuron 2 qt/A + Roundup PowerMax3 @

Figure 12. Kyro 60 oz/A + COC 1% v/v