



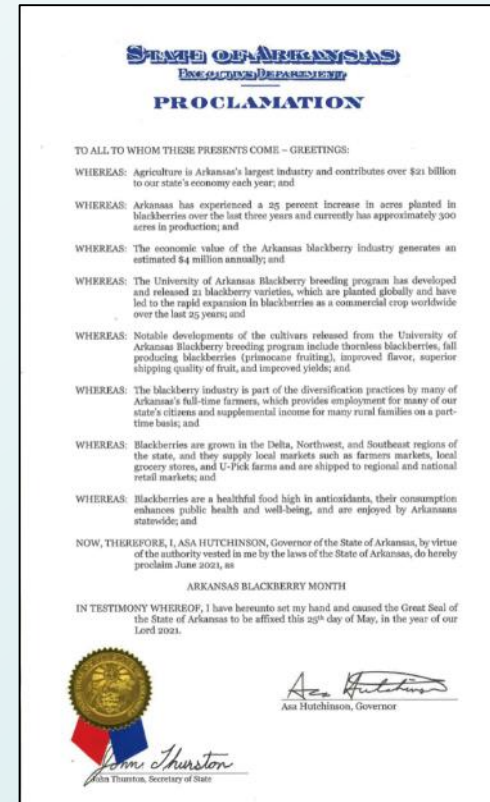
Blackberry Weed Management: New Chemistries and New Technologies

Introduction

- Background
 - Arkansas Blackberry
 - Standard recommendations for blackberry weed control
 - Preemergent herbicide trial
- 2,4-D choline and glufosinate trials
 - Objectives
 - Materials and Methods
 - Results
 - Conclusions

Arkansas blackberries

- Major economic value
- Organized commodity group
- Internationally-renowned breeding program



Best Practices for weed management

- Weed free strip width
 - (Basinger et al. 2014; Meyers et al. 2015)
 - 3 ft – new plantings
 - 4 ft – established plantings





What happened to Surflan?

GROUP 3 HERBICIDE



A.S. AGRICULTURAL
HERBICIDE



A preemergence surface-applied herbicide for the control of many annual grasses and certain broadleaf weeds in citrus, fruit and nut trees, berries, vineyards, Christmas tree plantations and established trees grown for pulp.

ACTIVE INGREDIENT:	BY WT.
Oryzalin: 3,5-dinitro- <i>N</i> ⁴ , <i>N</i> ⁴ -dipropylsulfanilamide	40.4%
OTHER INGREDIENTS:	59.6%
TOTAL:	100.0%

Contains 4 pounds of active ingredient per gallon.

EPA Reg. No. 70506-43

Field Study – PRE's

- Initiated in 2021 and repeated 2022
- 2 locations
 - Fruit Research Station, Clarksville
 - MJSREC, Fayetteville
- 8ft linear plot (4 plants @ 24")
 - 36" spacing between plots
 - 8ft between rows
- RCBD with 4 replications per site
- 7 treatments
 - 6 Preemergent Herbicides
 - 1 Weed-free, Hand weeded
- 1 blackberry variety ('Ouachita')



Plants were sprayed two times with these herbicides:

Late spring 2021 (May)

Early spring 2022 (March)

Sprays were directed to plant base, canopy interception occurred in first-year applications



Preemergent Study - Treatments

Treatment	Chemical	Trade name	Rate (product)	Rate (ai)
1	Weed Free			
2	Oryzalin	Surflan	3 qt/A	4.48 kg/ha
3	Napropamide	Devrinol	8 lbs/A	4.48 kg/ha
4	Pendimethalin	Prowl H2O	3.2 qt/A	3.36 lb ai/ha
5	S-metolachlor	Dual Magnum	1.5 pt/A	1.6 kg ai/ha
6	Flumioxazin	Chateau	6 oz/A	0.21 kg ai/ha
7	Mesotrione	Callisto	4.5 fl oz/A	0.16 kg ai/ha

Visual Injury – Mesotrione (L), Flumioxazin (R)

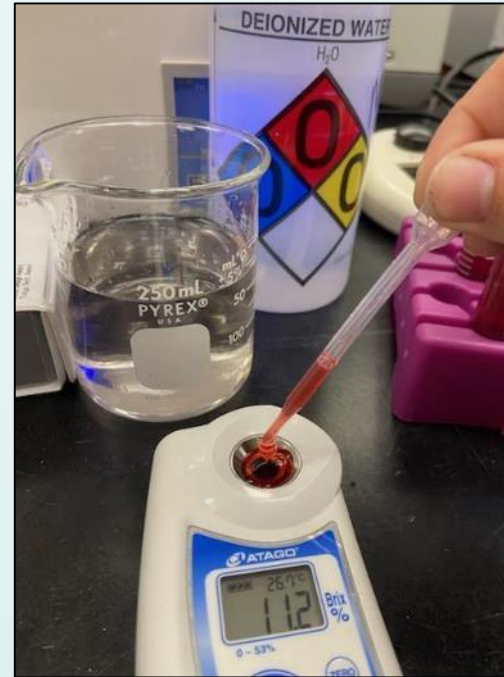


Preemergent Study - Yields

Herbicide	Marketable	Cull	Total
lbs/acre			
Mesotrione	8,844	984	9,828
Flumioxazin	9,764	1,393	11,157
Oryzalin	9,855	1,393	11,248
S-Metolachlor	10,852	1,145	11,997
Pendimethalin	10,331	1,257	11,588
Napropamide	10,775	1,060	11,835
Handweeded	10,163	1,127	11,290

Results – Postharvest Fruit Quality

- Neither pH or soluble solids (Brix) showed any substantial variation.



Implications

- Mesotrione would not be recommended for use in 1st year plantings (consistent with current recommendations!)
- Secured a 24(c) SLN for S-metolachlor (Dual Magnum) in blackberries in AR.
- Pendimethalin – Satellite Hydrocap (instead of Prowl H20)

Objective

- Determine injury and yield response of newly-planted blackberries treated with glufosinate
- Determine injury and yield response of established blackberries treated with 2,4-D choline

Glufosinate (Rely)

Table 1. Experimental materials applied in accordance with protocol					
Trade name	Herbicide	Formulated product rate	Active ingredient rate	Application placement & timing	Spray volume
		Per acre	lb ai/acre		GPA
Untreated	-	-	-	No experimental herbicides	-
Rely 280	Glufosinate AMS	96 fl oz	1.76	Directed spray to either side and across rows	20
		-	3.4		
Rely 280	Glufosinate AMS	192 fl oz	3.51	Directed spray to either side and across rows	20
		-	3.4		
Treevix	Saflufenacil MSO	4 oz	1.76	Directed spray to either side and across rows	20
		-	1% (v/v)		

Planting Material and Site Preparation

- Tissue-cultured plugs of 'Ponca' blackberries
- Site at Milo J Shult Research and Extension Center (Fayetteville, AR)
- Transplanted May 27, 2022
- 4 plant plots with 0.6 m spacing
- Soil: Capatina silt loam, 6.9 pH, 1.56% OM



Data and analysis

- Both trials
 - Blackberry injury after each herbicide application
 - Blackberry yield*
 - Marketable
 - Cull
 - Average berry size
 - Analyzed across all harvests
- Harvested 2x per week (8 total)



Experimental design and statistical analysis

- Both included a hand-weeded check
- Both trials were RCBD with 4 reps and conducted in 2022 and 2023
- Data were analyzed separately by year in each study
- Data were analyzed in SAS v. 9.4 using the GLIMMIX procedure to conduct ANOVA at a 0.05 significance level
 - Rep was a random effect
 - Herbicide was the fixed effect
- Means were separated using Tukey's HSD

Applied twice
June 21, 2022 (shielded)
August 20, 2022 (directed)



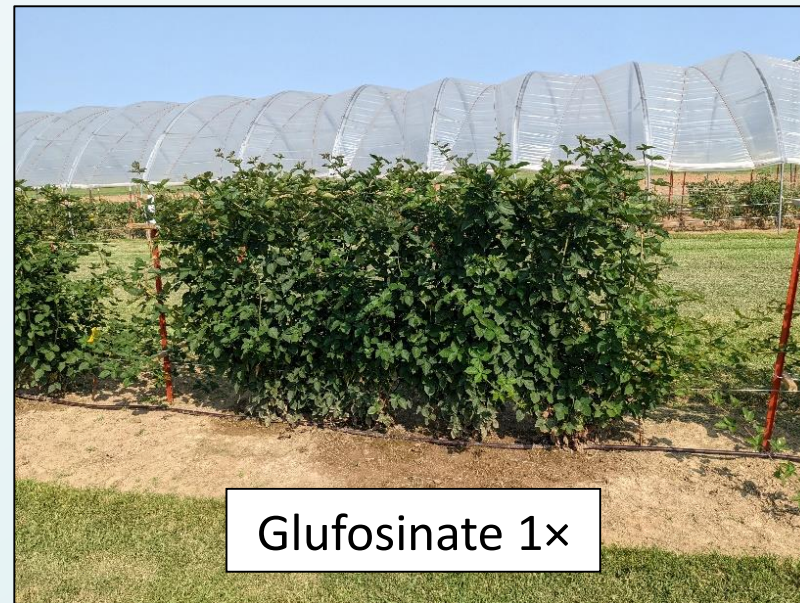
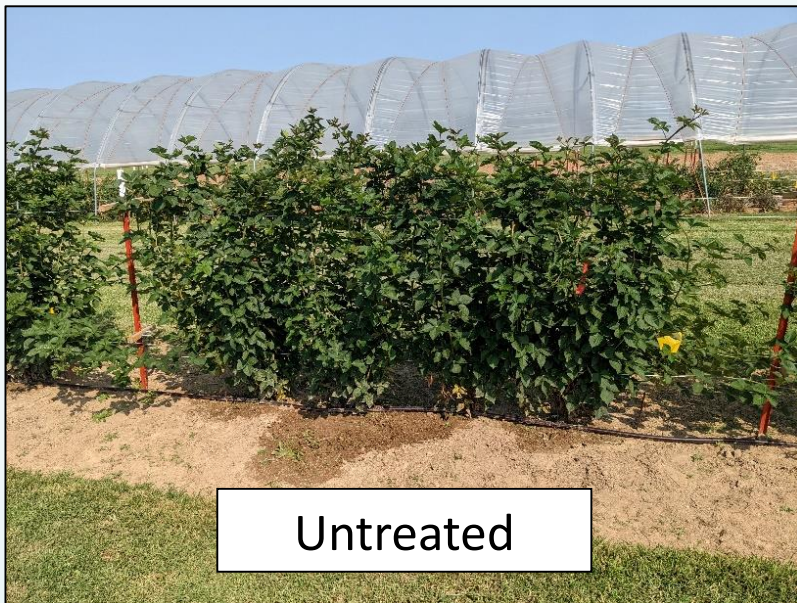
Year 1 – Blackberry Injury

		Blackberry Injury								
		Spray 1 (6/21/22)				Spray 2 (8/30/22)				
Herbicide	Rate	7 DAT	14 DAT	30 DAT	60 DAT	1 DAT	7 DAT	14 DAT	30 DAT	60 DAT
	kg ai ha ⁻¹	%								
Glufosinate	1.76	0	0	0	0	0	3.3	2.5 a	1.0 a	0
Glufosinate	3.51	2	1.5	0	0	0	3.0	2.5 a	0.8 ab	0
Saflufenacil	1.76	0	0.5	0	0	0	1.2	0.8 b	0.5 b	0
P value		0.4053	0.2740	NS	NS	NS	0.0691	0.009	0.0429	NS

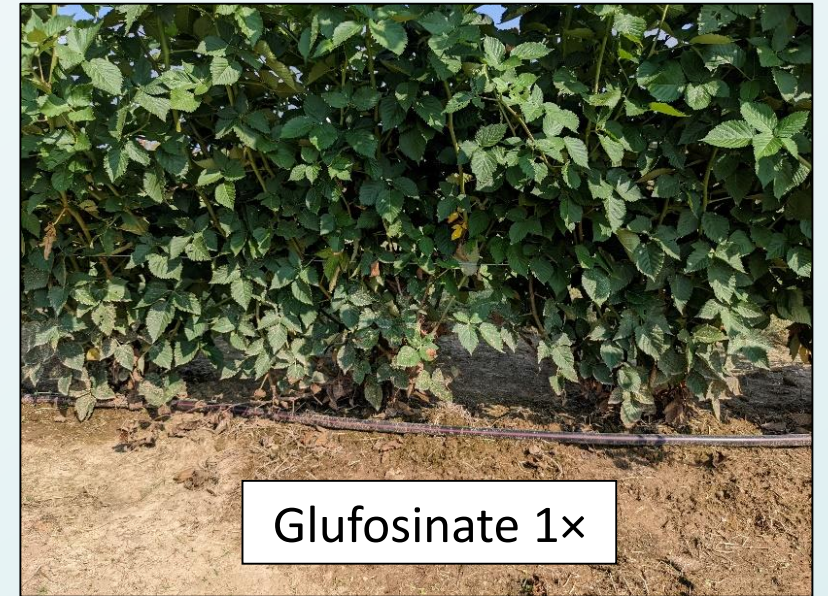
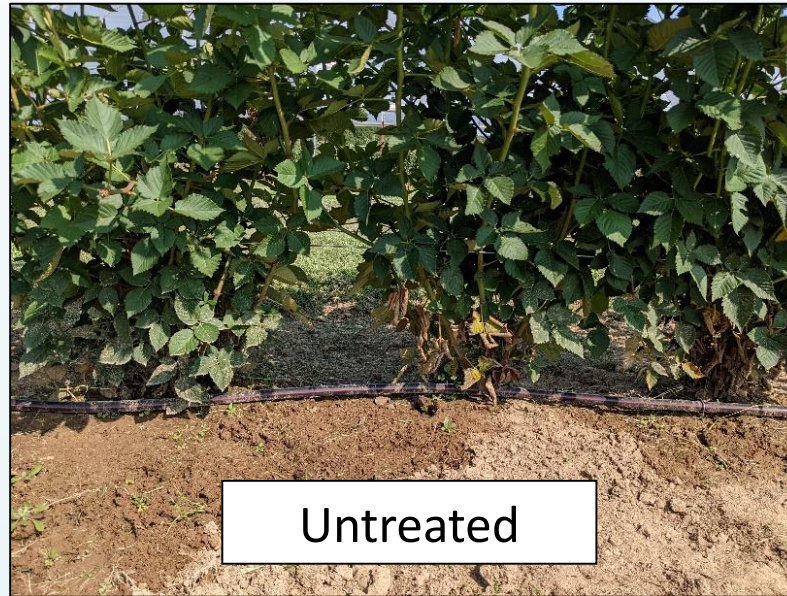
Rely experiment – 7 DAT



Rely experiment – 7 DAT (directed spray)



Rely experiment – 7 DAT (directed spray)





Applied twice

March 10, 2023 (banded)

August 7, 2023 (directed) <- after harvest = water off

Year 2 – Blackberry Injury

		Blackberry Injury						
		Spray 1 (3/10/23)			Spray 2 (8/7/23)			
Herbicide	Rate	7 DAT	14 DAT	30 DAT	7 DAT	14 DAT	30 DAT	60 DAT
	kg ai ha ⁻¹	%						
Glufosinate	1.76	0	0	15.0	0	3.8	0	0
Glufosinate	3.51	0	0	12.5	0	5.0	0	0
Saflufenacil	1.76	0	0	0	0	1.3	0	0
P value		NS	NS	NS	NS	0.2740	NS	NS

Early ratings impossible to distinguish

Little detectable injury later in season



14 DAT

(post-harvest spray)



2023 yield (floricane fruiting)

Herbicide	Rate	Blackberry yields		
		Marketable	Cull	Avg weight
	kg ai ha ⁻¹	kg plant ⁻¹		g
Glufosinate	1.76	2.55 a	0.35	7.86 a
Glufosinate	3.51	1.78 b	0.31	7.33 b
Saflufenacil	1.76	2.55 a	0.36	7.81 a
Nontreated	-	2.48 a	0.35	7.95 a
P value		0.0033	NS	0.0010

Conclusions - Rely

- Both rates of Rely caused no injury on shielded plants
- Both rates of Rely caused no substantial injury on directed plants
- Research will be repeated. Yield will be reported for next year's trial.
- *Rely is still NOT labeled in blackberries!*

Planting Material and Site Preparation

- Years-established 'Ouachita' blackberries
- Site at Fruit Research Station (Clarksville, AR)
- Trial initiated March 9, 2022
- 4 plant plots with 0.6 m spacing
- Soil: Silt loam, 6.3 pH, 1.6% OM



2,4-D Choline (Enlist)

Trt#	Product(s)	Active ingredient	Rate of formulated product/a	Rate of active ingredient (lb ae/a)	Application Placement & Timing	Spray Volume Range (GPA) ¹
01	Untreated –Weed free ²	N/A	N/A	N/A	N/A	N/A
02	Embed Extra (3.8 lb ae/gal)	2,4-D Choline	3 pt	1.43	Directed spray ³ followed by (fb) banded spray ⁴ fb post-harvest spray ⁵	≥10
03	Embed Extra (3.8 lb ae/gal)	2,4-D Choline	6 pt	2.85	Directed spray ³ fb banded spray ⁴ fb post-harvest spray ⁵	≥10



Applied three times

Directed spray

March 9, 2022

Banded spray

April 7, 2022

Directed spray

August 11, 2022

A photograph of a field with rows of young plants, possibly a nursery or research plot. The plants are green and have small yellow and red tags attached to them. A white pickup truck is parked on the right side of the field. The background shows a line of trees under a cloudy sky.

Applied three times

Directed spray

March 10, 2023

Banded spray

April 10, 2023

Directed spray

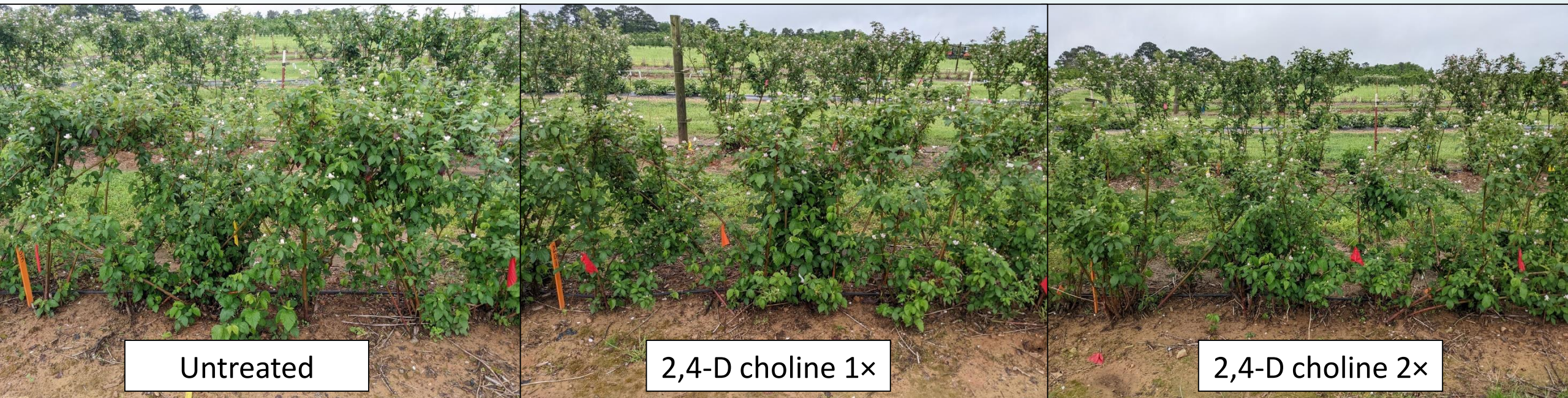
July 11, 2023

Mild symptoms – new growth

- Where visible, symptoms were mild and primarily in the lower canopy. Primarily restricted to new growth near the base of canes.



May 5, 2022 (30 DAT, second application)



Herbicide	Rate	Across all 2022 harvests		
		Marketable yield	Cull yield	Avg. berry weight
	kg ae ha ⁻¹	kg per plant		g
Nontreated	-	2.06	0.30 a	5.71
Embed Extra	1.6	1.96	0.19 ab	5.95
Embed Extra	3.2	2.48	0.21 b	5.71
P value		0.2986	0.0193	0.5294

Herbicide	Rate	Across all 2023 harvests		
		Marketable yield	Cull yield	Avg. berry weight
	kg ae ha ⁻¹	kg per plant		g
Nontreated	-	1.17	0.10	5.56
Embed Extra	1.6	1.34	0.08	6.07
Embed Extra	3.2	1.51	0.10	5.93
P value		0.4745	0.4912	0.3489

Conclusions – 2,4-D Choline

- Both rates of 2,4-D Choline caused no substantial injury on mature plants
- No reduction in marketable yield or berry size was observed
- *Product still NOT labeled in blackberries!*

Robot weeders!









SCRI Planning Grant
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Assess Novel
Autonomous Weed
Technologies in Perennial
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Acknowledgements

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THE IR-4 PROJECT

Pest Management Solutions for
Specialty Crops and Specialty Uses





Questions?