



Weed Management Research Update

ALI WRIGHT

RESEARCH AGRONOMIST

HOUMA, LA

Overview

- ▶ Herbicide Resistance
- ▶ Expanding our weed control toolbox



Herbicide resistance



- ▶ Definition: a weed is no longer controlled by an herbicide to which it was susceptible
- ▶ 267 weed species with herbicide resistant populations
- ▶ Resistance to 21 sites of action
- ▶ Weedscience.org

PSII Inhibitor Resistant Ryegrass



- ▶ AI identified ryegrass populations with PSII inhibitor resistance
- ▶ How resistant are these populations?
- ▶ What is the mechanism?
- ▶ What control options are left?

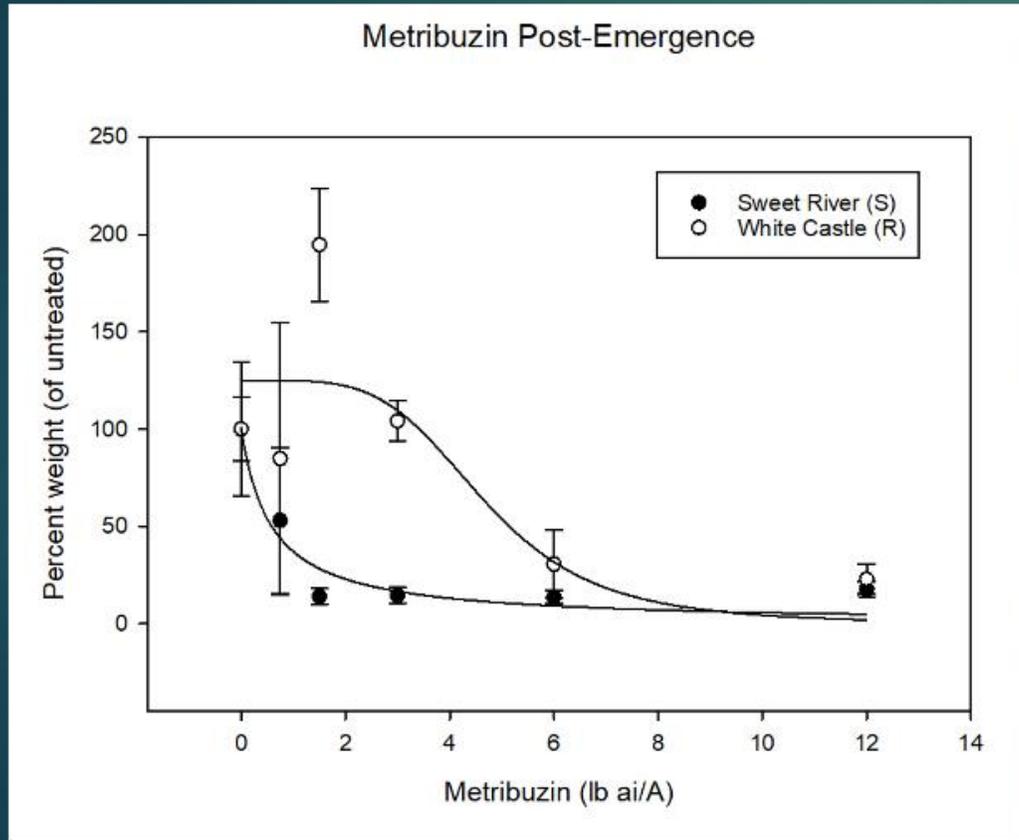


How do we investigate resistance?

- ▶ Collect plants and/or seed
- ▶ Grow seed in greenhouse
- ▶ Evaluate herbicide response in a controlled environment
- ▶ Know your weed species!



How resistant are these populations?



A

C

How resistant are these populations?

Percent injury for Louisiana ryegrass populations following treatment with metribuzin

Metribuzin (lb a.i./A)	Bunkie	St. Gabriel	Sweet River	White Castle
0	0	2.2 ± 2.2	0	6.7 ± 6.7
0.75	30 ± 15.3	21.2 ± 11.5	76.7 ± 16.1	30 ± 15.3
1.5	36.7 ± 23.3	25.6 ± 8	96.7 ± 3.3	0
3	100	31.1 ± 8.7	100	0
6	100	68.9 ± 11.2	100	90 ± 10
12	100	90 ± 7.1	100	86.7 ± 13.3

Percent (of untreated) dry weights for Louisiana ryegrass populations following treatment with metribuzin.

Metribuzin (lb a.i./A)	Bunkie	St. Gabriel	Sweet River	White Castle
0	100 ± 29.9	100 ± 16.4	100 ± 13.5	100 ± 34.4
0.75	33.5 ± 6.7	136.9 ± 33.2	35.2 ± 20.3	84.8 ± 69.8
1.5	41.6 ± 25.6	128.6 ± 54	27.3 ± 13.8	194.7 ± 29
3	29.4 ± 12.8	91.9 ± 18.5	17.6 ± 8.5	104.1 ± 10.3
6	15.2 ± 10.6	91.2 ± 36.6	18.6 ± 7.6	30.6 ± 17.4
12	30.3 ± 11.1	37.6 ± 8.5	18.4 ± 4	22.9 ± 7.7

How resistant are these populations?

Percent injury for Louisiana ryegrass populations following diuron treatment.

Diuron (lb a.i./A)	Bunkie	St Gabriel	Sweet River	White Castle
0	6.7 ± 6.7	0	0	1.1 ± 1.1
0.75	30 ± 17.3	1.7 ± 1.7	10 ± 6.8	7.8 ± 4.3
1.5	73.3 ± 26.7	30 ± 17.5	56.7 ± 14.8	32.3 ± 14
3	76.7 ± 23.3	20 ± 8.9	76.7 ± 15	38.9 ± 14.7
6	100	35 ± 20.6	100	46.7 ± 14.8
12	100	60 ± 18.6	100	61.1 ± 13.4
24	100	91.7 ± 8.3	91.7 ± 8.3	84.4 ± 11.4

Percent (of untreated) dry weights for Louisiana ryegrass populations following treatment with diuron.

Diuron (lb a.i./A)	Bunkie	St. Gabriel	Sweet River	White Castle
0	100 ± 69.9	100 ± 6.5	100 ± 27.3	100 ± 25.1
0.75	99 ± 79.1	58.8 ± 18.5	79.4 ± 25.5	93.6 ± 32.8
1.5	22.4 ± 19.5	91 ± 45.7	61.3 ± 43.3	68.9 ± 21.9
3	15.3 ± 15.3	31.1 ± 11	30.9 ± 8.9	117.7 ± 75.9
6	5.1 ± 5.1	34.5 ± 10.4	19.9 ± 4.7	108.7 ± 67.8
12	15.3 ± 4.7	44 ± 30.1	13.5 ± 2.7	24.4 ± 10.3
24	8.2 ± 1	12 ± 4	21.3 ± 7.3	14.2 ± 4.1

Pre-emergence Metribuzin



Bunkie



St. Gabriel



Sweet River



White Castle

Pre-emergence Metribuzin

Percent Injury for Louisiana ryegrass treated with metribuzin pre-emergence

Metribuzin (lb a.i./A)	Bunkie	St. Gabriel	Sweet River	White Castle
0	0	0	0	0
0.75	0	0	33.3 ± 33.3	0
1.5	100	0	83.3 ± 16.7	0
3	100	0	100	0
6	100	0	100	18 ± 11.1
12	100	97.5 ± 2.5	100	50 ± 20.4
24	100	100	100	100

Percent (of untreated) dry weights for Louisiana ryegrass treated with metribuzin pre-emergence

Metribuzin (lb a.i./A)	Bunkie	St. Gabriel	Sweet River	White Castle
0	100 ± 27.7	100 ± 18.1	100 ± 23.6	100 ± 9.9
0.75	10.5 ± 1.2	169.4 ± 23.9	3.1 ± 1.5	114.9 ± 36.3
1.5	0.7 ± 0.2	175.2 ± 54.6	1.8 ± 0.7	116.6 ± 21.5
3	0.5	84 ± 13.5	1.6 ± 1.2	53.1 ± 19.4
6	0.8 ± 0.3	40.4 ± 18.8	0.9 ± 0.2	21.6 ± 11.4
12	0.5	4.5 ± 1.9	1.3 ± 1	6.7 ± 3.2
24	0.5	1.4 ± 0.6	0.8 ± 0.3	2.3 ± 1

Dose Response Summary

- ▶ Terbacil controlled all populations
- ▶ Post-emergence
 - ▶ White Castle and St. Gabriel populations resistant to metribuzin and diuron
 - ▶ Atrazine ongoing
- ▶ Pre-emergence
 - ▶ Ongoing for atrazine, metribuzin, and diuron
 - ▶ Resistance to metribuzin

What is the mechanism?

- ▶ Samples shipped for sequencing *PsbA* in R and S populations
- ▶ Malathion studies planned
 - ▶ White Castle and St. Gabriel as R
 - ▶ Sweet River as S

Alternative chemistries



Alternative chemistries



Clomazone



S-metolachlor

Supplemental Weed Management Strategies

- ▶ In addition to herbicides
- ▶ Prolong efficacy of herbicides
- ▶ Two projects initiated in 2022
 - ▶ Living mulch
 - ▶ Field edge

Living mulch

- ▶ Targeting principally itchgrass
- ▶ Clover and/or hairy vetch
- ▶ Can we suppress weeds while maintaining sugar yields?
- ▶ Field and planter box experiments



Field Edge

- ▶ In collaboration with Dr. Hannah Penn
- ▶ Field edges can be a source of weed seeds
- ▶ Can we improve management of field edges to:
 - ▶ Suppress weeds
 - ▶ Increase beneficial insect populations
- ▶ Currently evaluating native plants
- ▶ Establishing test gardens this spring



Questions?

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