



Update to Herbicide Resistant Chickweed in CA Forages

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Anil Shrestha, Professor, Plant Science – CSU Fresno

September 29, 2023 @ KREC in Parlier, CA

Field Crops, Alfalfa and Forage Field Day

Acknowledging support and collaboration

- Fresno State
Dr. Anil Shrestha
Dr. Kate Waselkov
Jennifer Valdez
Paola Villicana
Kiera Searcy
Jonathan Ruiz
Kelsey Galvan
- UCCE
Walter Martinez
Dr. Brad Hanson
Dr. Mark Lundy
Jose Dias (now U. of AZ)
Pahoua Yang
Ruben Chavez
Konrad Mathesius
- Hanford High School FFA
**Jessalynn Soto (1st time
National championships 2023)**
- Industry
Colt Ellis, Simplot Grower
Solutions
Pedro Hernandez, Nichino
America
Brian Gogue, Helena Agri-
Enterprises
Matt Rackerby, FMC Corporation
Corteva Agriscience
Bayer Crop Science

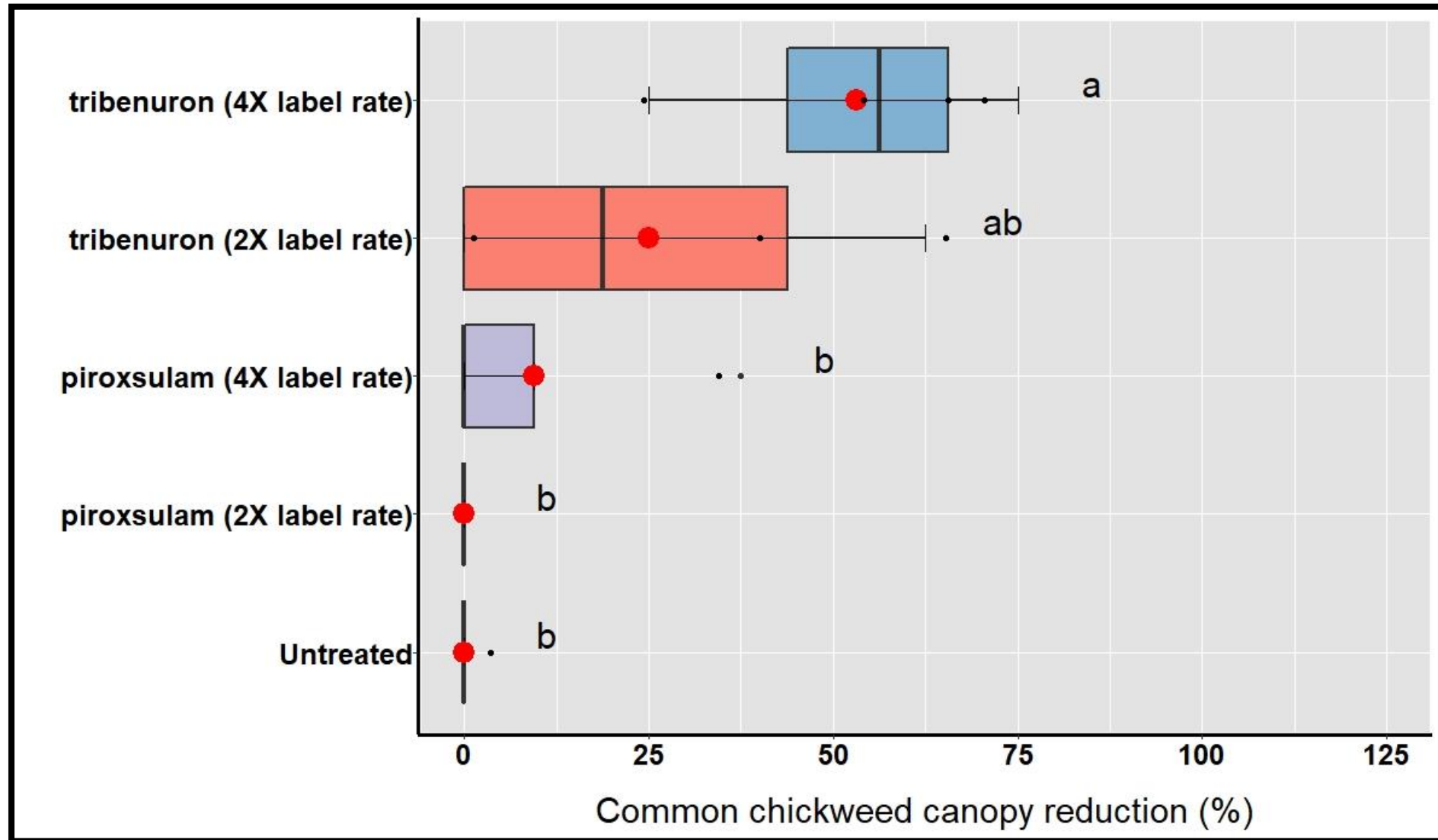




Early work to rule out herbicide resistance



Effect of herbicides on chickweed in wheat









Chickweed herbicide resistance reports in N. America

Country Province/State	Year	Crops	Active Ingredients	Sites of Action	Authors
US-California	2022	Wheat, triticale	Mesoflufuron-methyl, pyroxsulam, tribenuron-methyl	ALS inhibitors	Clark & Shrestha
US-Kentucky	2013	Wheat	chlorsulfuron, flucarbazone, thifensulfuron, tribenuron	ALS inhibitors	James Martin
US-Delaware	2012	Wheat	thifensulfuron, tribenuron	ALS inhibitors	Mark Vangessel
US-Pennsylvania	2010	Alfalfa, Spring Barley, and Wheat	pyroxsulam, thifensulfuron, tribenuron	ALS inhibitors	William Curran
US-Maryland	2009	Wheat	chlorsulfuron, mesosulfuron, thifensulfuron, tribenuron	ALS inhibitors	Ronald Ritter & M. Vangessel
Canada-Manitoba	2008	Peas	thifensulfuron, tribenuron	ALS inhibitors	Hugh Beckie
US-Virginia	2008	Wheat	thifensulfuron	ALS inhibitors	Scott Hagood
Canada-Saskatchewan	2005	Spring Barley, and Wheat	thifensulfuron, tribenuron	ALS inhibitors	Hugh Beckie
Canada-Alberta	1988	Cereals and Wheat	chlorsulfuron, ethametsulfuron, imazamethabenz, metsulfuron, sulfometuron, thifensulfuron	ALS inhibitors	Malcom Devine & Linda Hall

Greenhouse evaluations, 3rd run

- Same seeds as first run
- Planted late February, '23
- Sprayed on 3/24/23 (2 true leaves, < 3" tall)
- Evaluated weekly until 4/21/23
- 5 reps



What's new?

- 2nd run of Osprey
- 1st run of ALS herbicides registered for CA alfalfa
 - Pursuit (Imazethapyr)
 - 1X rate = 3 fl oz/acre
 - Beyond Xtra (Imazamox)
 - Previously called “Raptor”
 - 1X rate = 3 fl oz/acre

Osprey – UTC

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Osprey – 0.5X

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



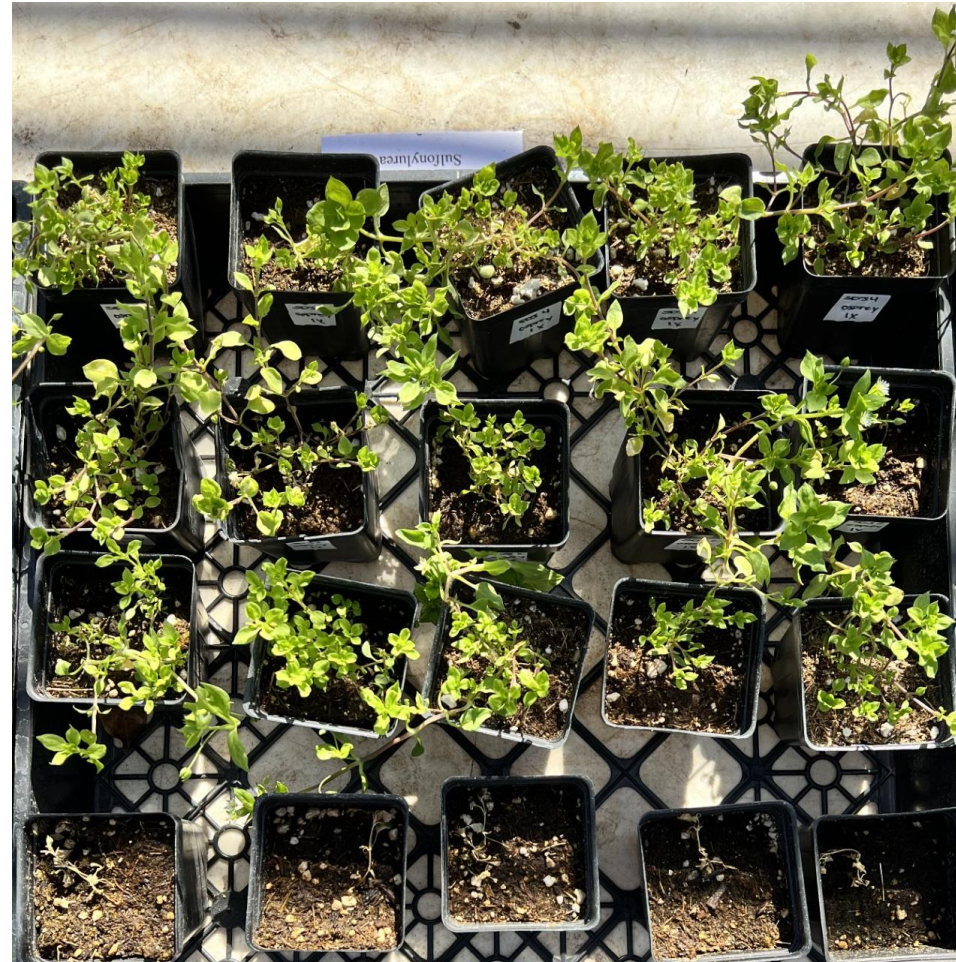
Osprey – 1X

PCA identified field 2
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PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Osprey – 2X

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Osprey – 4X

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Osprey – 8X

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Pursuit – UTC

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Pursuit – 0.5X

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PCA identified field 2
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PCA identified field 1
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Organic control
(ALS susceptible)



Pursuit – 1X

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PCA identified field 1
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Organic control
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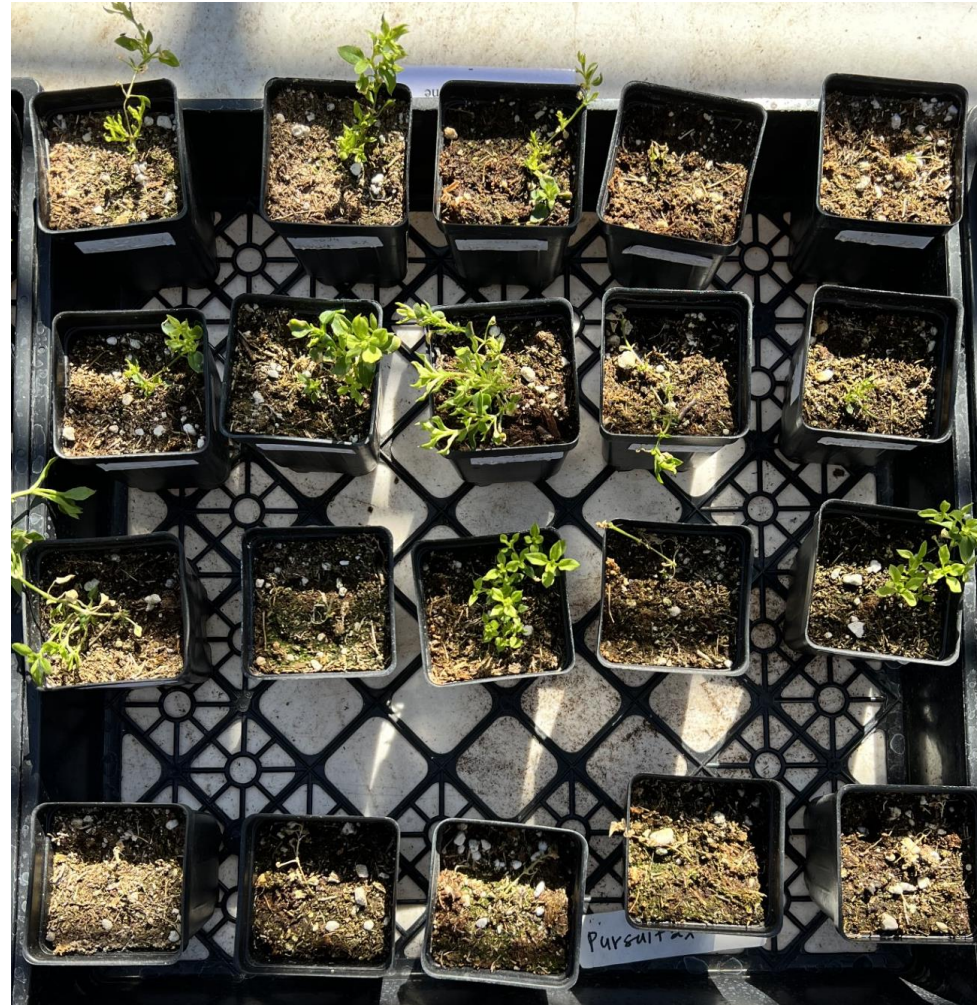
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Pursuit – 8X

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PCA identified field 1
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Organic control
(ALS susceptible)



Beyond Xtra – UTC

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Beyond Xtra – 0.5X

PCA identified field 2
(suspected resistant)

PCA identified field 2
(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)



Beyond Xtra – 1X

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(suspected resistant)

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(ALS susceptible)



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Organic control
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AI's (WSSA/HRAC code) registered in CA for alfalfa with noted activity on chickweed – **Check the label**

Active Ingredients ordered by WSSA/HRAC code. Ten unique modes of action registered in alfalfa.

Halosulfuron (2)	Diuron (7)
Imazamox (2)	EPTC (8)
Imazethapyr (2)	K N-methyldithiocarbamate (8)
Benfluralin (3)	Glyphosate (9)
Pronamide (3)	Norflurazon (12)
Trifluralin (3)	Flumioxazin (14)
Pendimethalin (3)	Carfentrazone (14)
MCPA (4)	Saflufenacil (14)
Hexazinone (5)	Paraquat (22)
Metribuzin (5)	

Ongoing Work – Jennifer Valdez

- Small grain and alfalfa yield and forage quality w/poorly controlled chickweed
- Genetic basis of ALS resistance in chickweed populations
- Repetition of alfalfa ALS herbicide bioassays with chickweed
- Biological studies of chickweed
 - Shade tolerance
 - Salinity tolerance at germination



THANK YOU

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