A Common Chickweed Problem in CA Small Grains

Nick Clark, CCA, Agronomy & Nutrient Mgmt. Farm Advisor – UC Cooperative Extension in Tulare, Kings & Fresno Counties. neclark@ucanr.edu; 559-852-2788

January 12, 2023 @ Robert J. Cabral Agricultural Center, Stockton

SJC and Delta Field Crops Meeting

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Outline

- SJV Small Grain Production
- Chickweed in SJV Small Grains
- Solutions and Outlook

Small Grain Production

Statistics from the San Joaquin Valley

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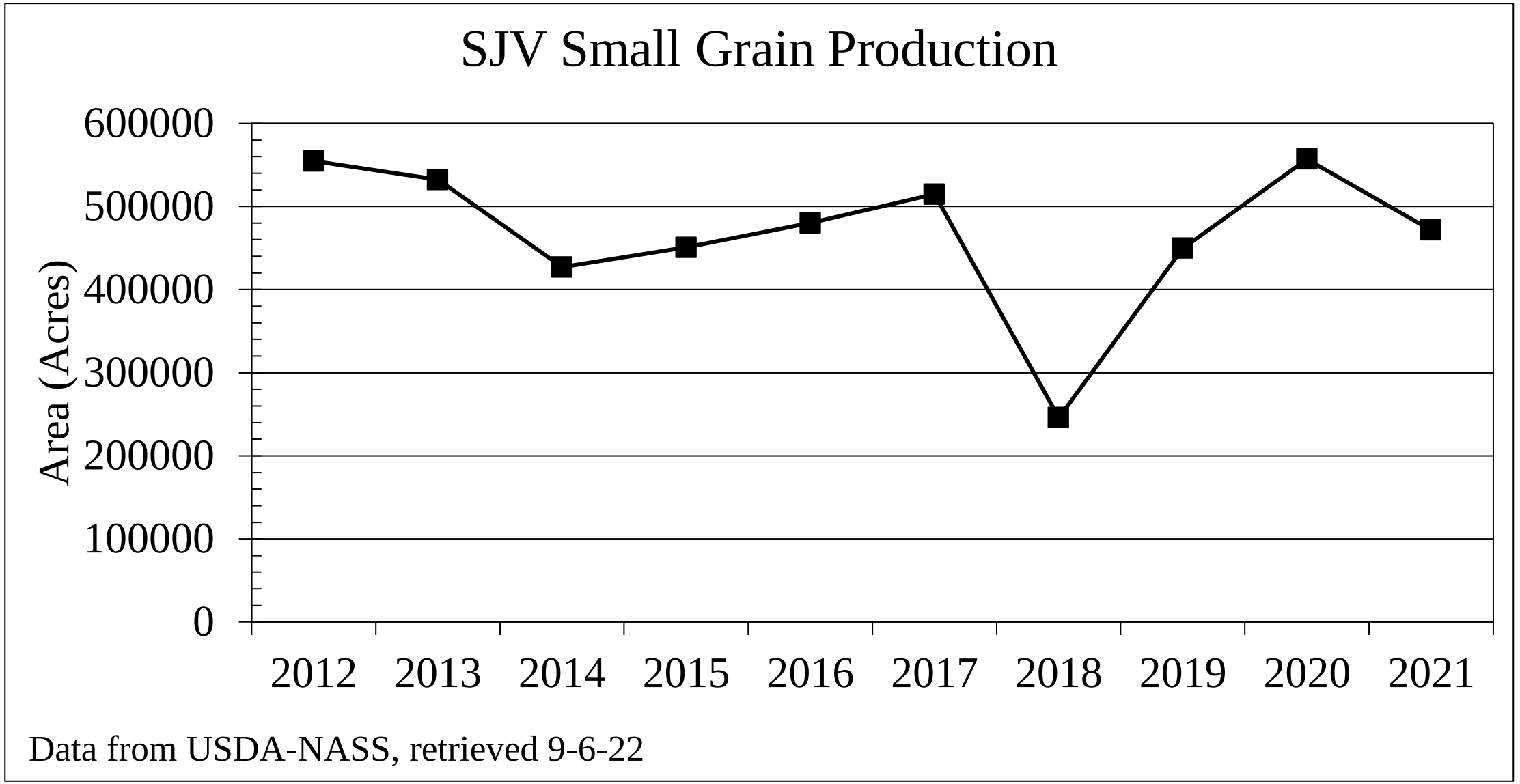
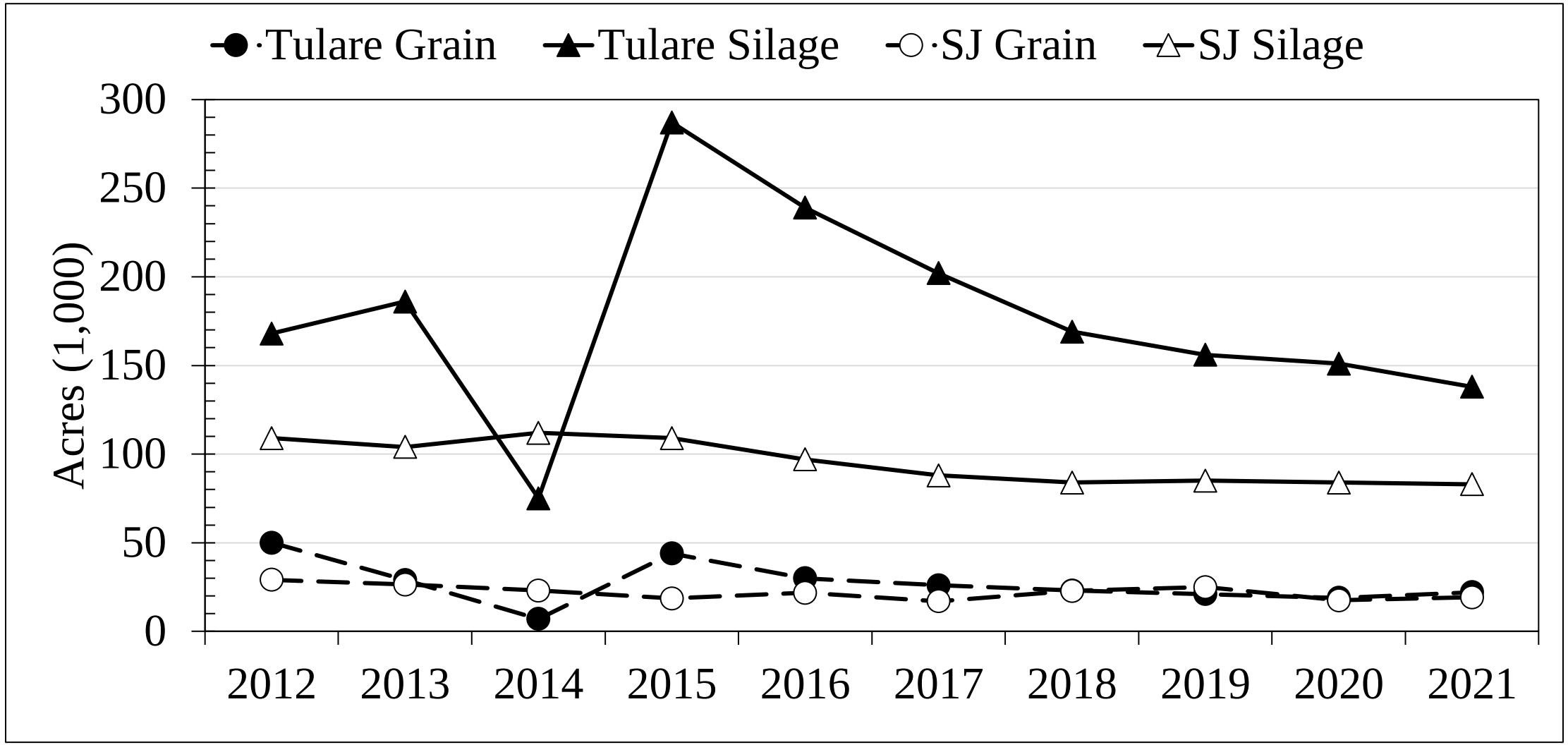


Data from USDA-NASS, retrieved 9-6-22

San Joaquin and Tulare Counties Harvested Small Grain Area



Data collected from Tulare and SJ County Ag Commissioners Annual County Crop Reports

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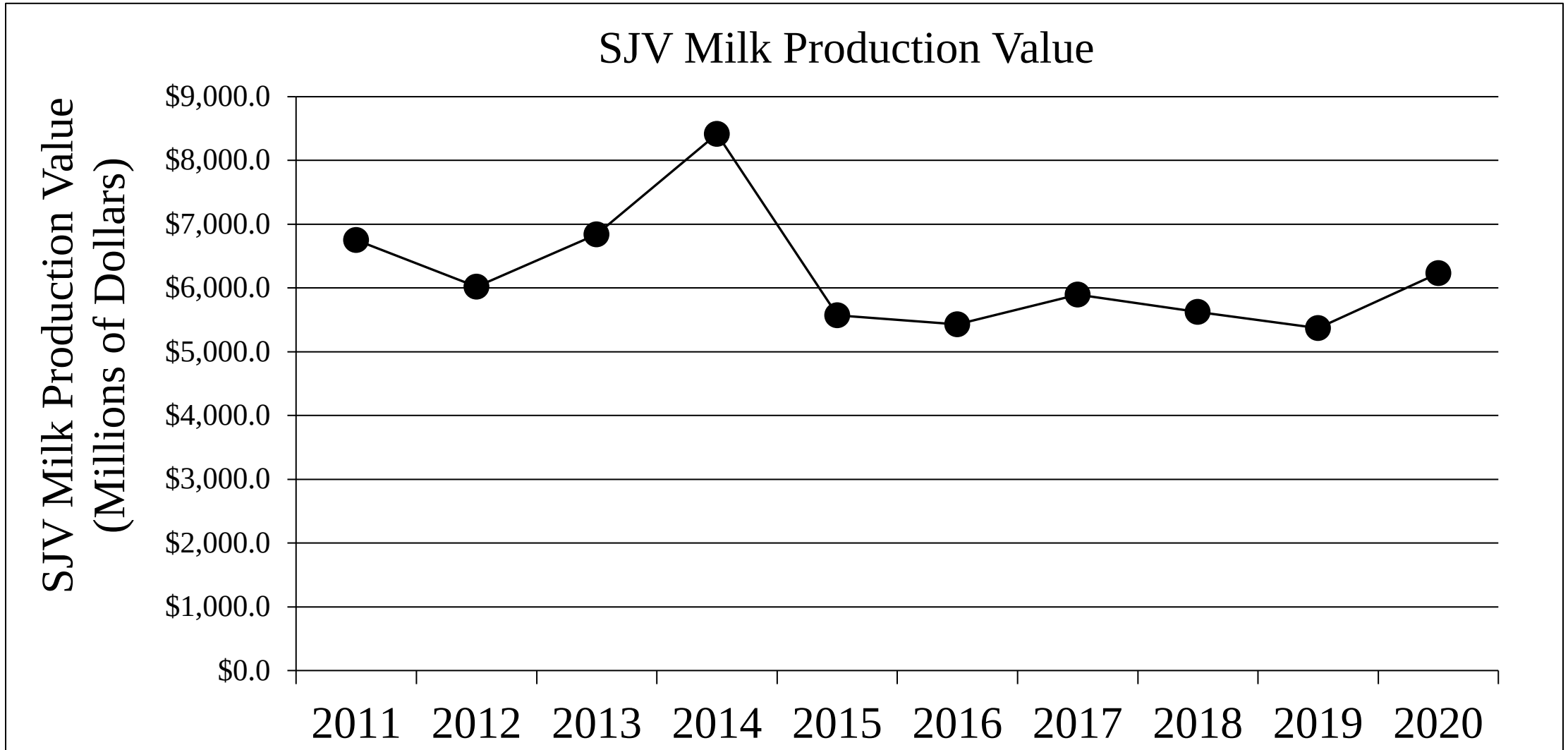

Data collected from the County Ag Commissioners' Annual County Crop Reports

Common Chickweed

An emerging problem in SJV small grains?

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Acknowledging support and collaboration

- Fresno State
  - **Dr. Anil Shrestha**
  - **Dr. Kate Waselkov**
  - **Paola Villicana**
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  - Jonathan Ruiz
  - Kelsey Galvan
- UCCE
  - **Walter Martinez**
  - **Dr. Brad Hanson**
  - **Dr. Mark Lundy**
  - Jose Dias
  - Konrad Mathesius
  - Pahoua Yang
  - Ruben Chavez
- Hanford High School FFA
  - **Jessalynn Soto**
- Industry
  - **Colt Ellis**, Simplot Grower Solutions
  - **Pedro Hernandez**, Nichino America
  - Brian Gogue, Helena Agri-Enterprises
  - FMC Corporation
  - Corteva Agriscience
  - Bayer Crop Science

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What PCA's reported

- 2-3 years in a row
- Chickweed escapes
- Pyroxsulam (Simplicity)
- Tribenuron (Express)

What UC and CSU checked

- Environmental conditions
- Other weeds present
- Unsprayed areas in field
- Application records
- Modified efficacy test, 2021*
- GH bioassays, 2022-23

*https://ucanr.edu/sites/deltacrops/files/362224.pdf

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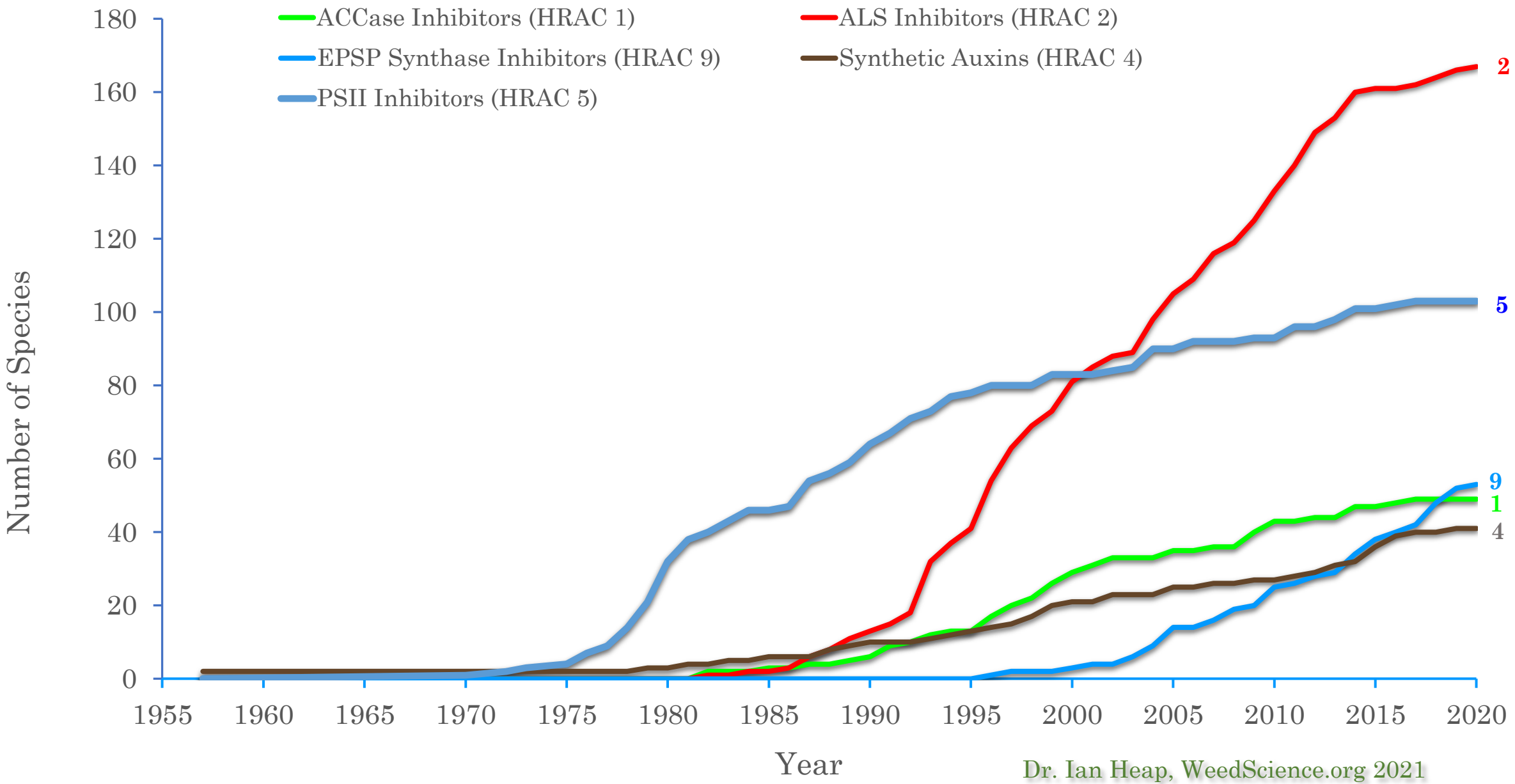
Common Chickweed herbicide resistance reports in North America

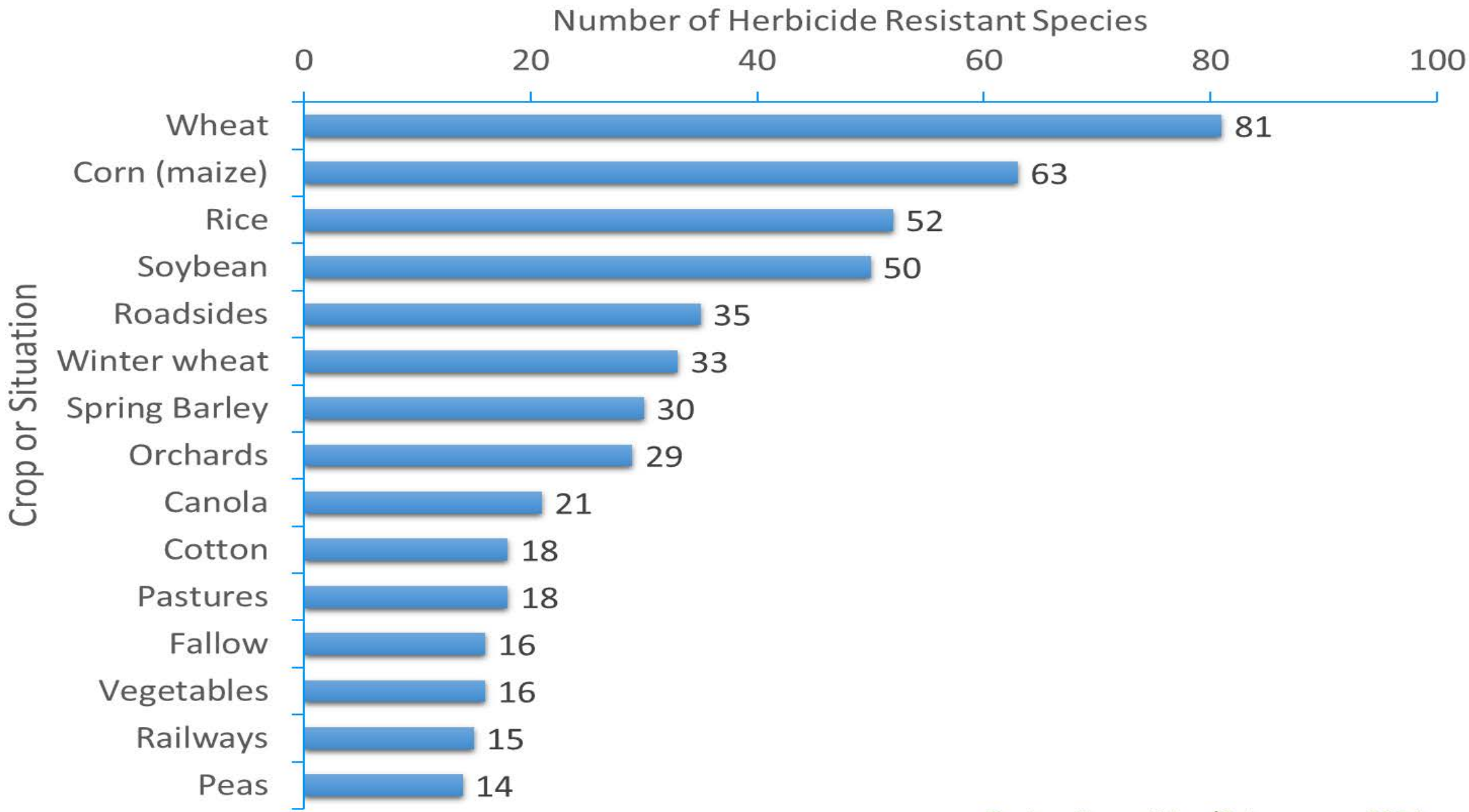
Country Province/State	Year	Crops	Active Ingredients	Sites of Action
US-Kentucky	2013	Wheat	chlorsulfuron, flucarbazone, thifensulfuron, tribenuron	ALS inhibitors
US-Delaware	2012	Wheat	thifensulfuron, tribenuron	ALS inhibitors
US-Pennsylvania	2010	Alfalfa, Spring Barley, and Wheat	pyroxsulam, thifensulfuron, tribenuron	ALS inhibitors
US-Maryland	2009	Wheat	chlorsulfuron, mesosulfuron, thifensulfuron, tribenuron	ALS inhibitors
Canada-Manitoba	2008	Peas	thifensulfuron, tribenuron	ALS inhibitors
US-Virginia	2008	Wheat	thifensulfuron	ALS inhibitors
Canada-Saskatchewan	2005	Spring Barley, and Wheat	thifensulfuron, tribenuron	ALS inhibitors
Canada-Alberta	1988	Cereals and Wheat	chlorsulfuron, ethametsulfuron, imazamethabenz, metsulfuron, sulfometuron, thifensulfuron	ALS inhibitors

Number Resistant Species for Several Herbicide Sites of Action (HRAC Codes)



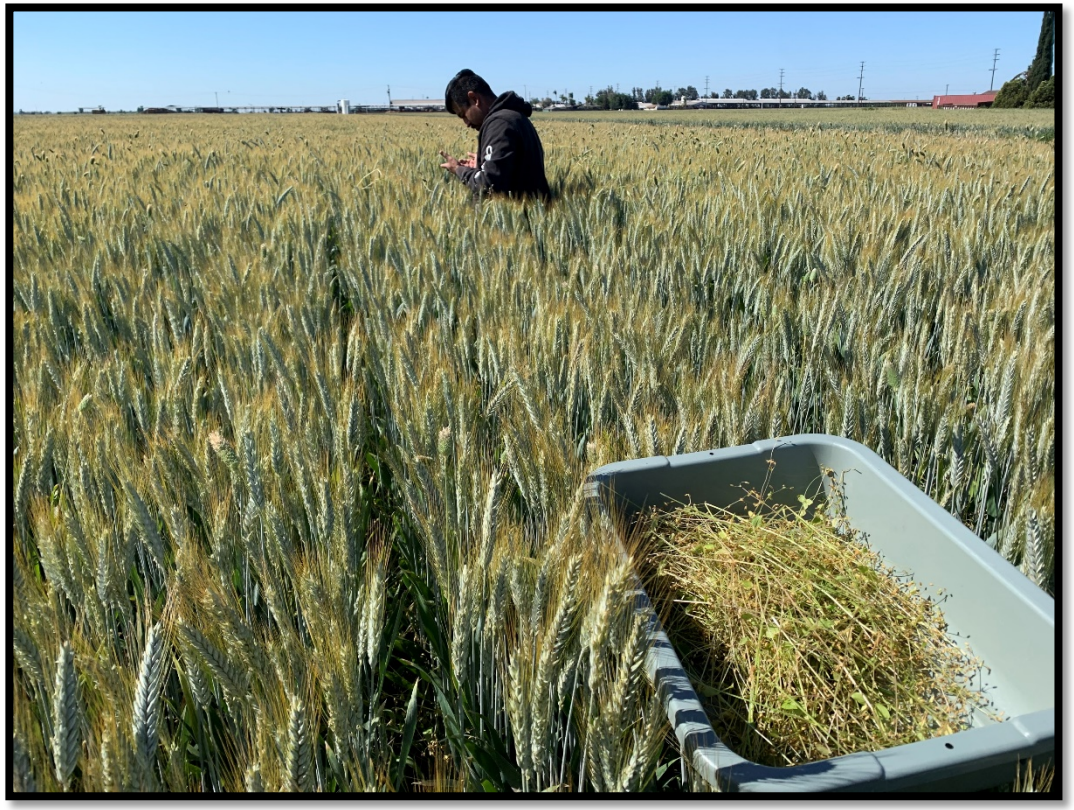
Dr. Ian Heap, WeedScience.org 2021

Number of Herbicide-Resistant Species by Crop



Dr. Ian Heap, WeedScience.org 2021

Couldn’t rule out resistance in the field – to the greenhouse: Round 1



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Greenhouse evaluations, 1st run

- Planted on 2/25/22
- Sprayed on 4/1/22 (2 true leaves, < 3” tall)
- Evaluated weekly until 5/29/22

Simplicity – UTC

PCA identified field 2
(suspected resistant)

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(suspected resistant)

PCA identified field 1
(suspected resistant)

Organic control
(ALS susceptible)

Simplicity – 0.5 X

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Organic control
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Simplicity – 1X

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Organic control
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Simplicity – 2X

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Organic control
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Simplicity – 4X

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Organic control
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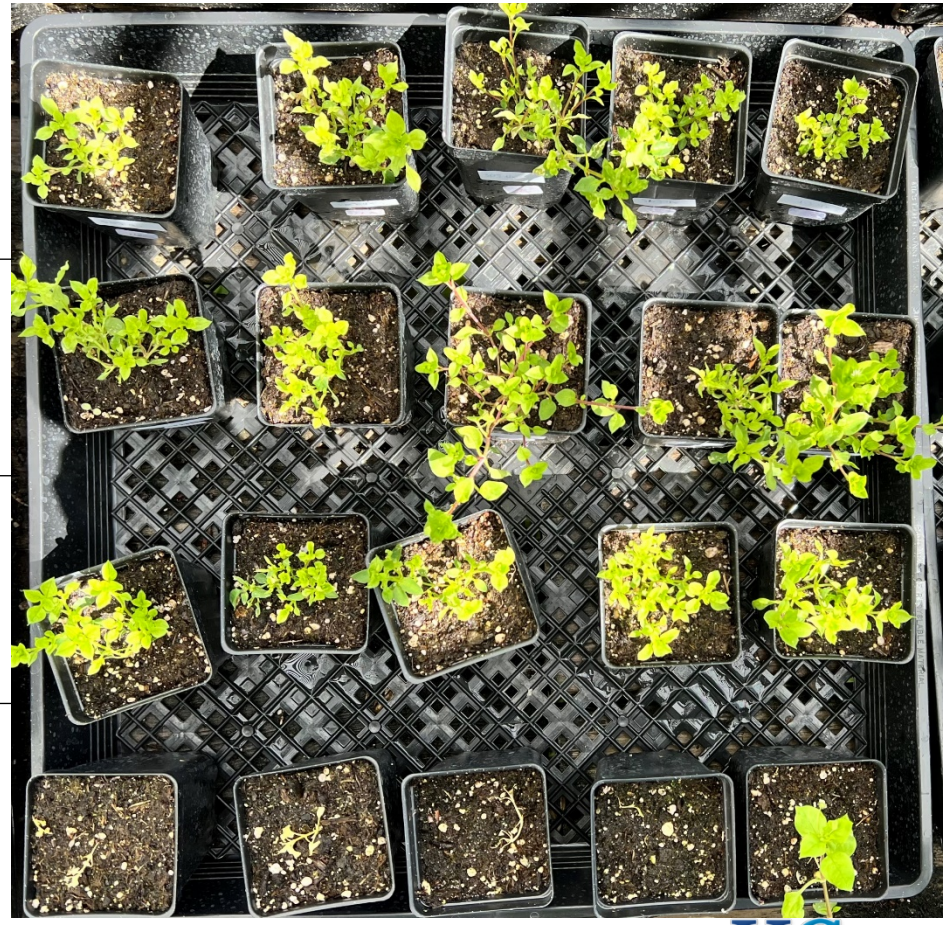

Simplicity – 8X

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Organic control
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Express – UTC

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Organic control
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Express – 0.5X

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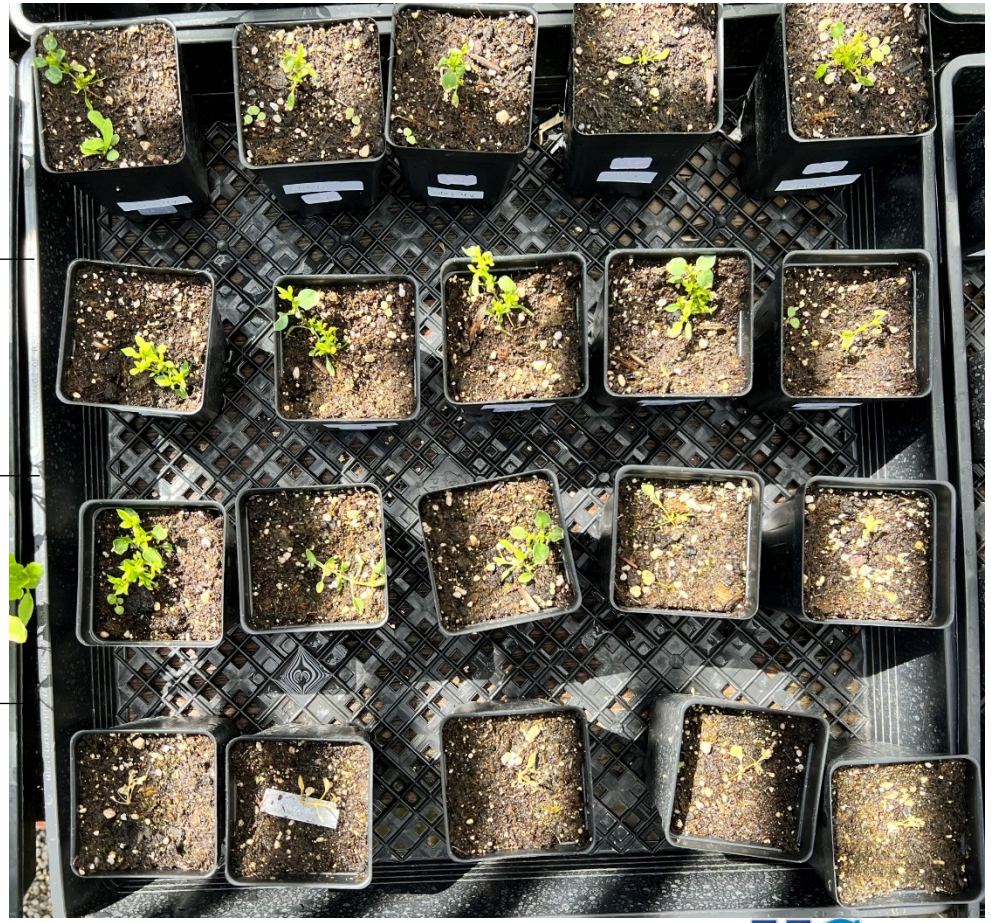

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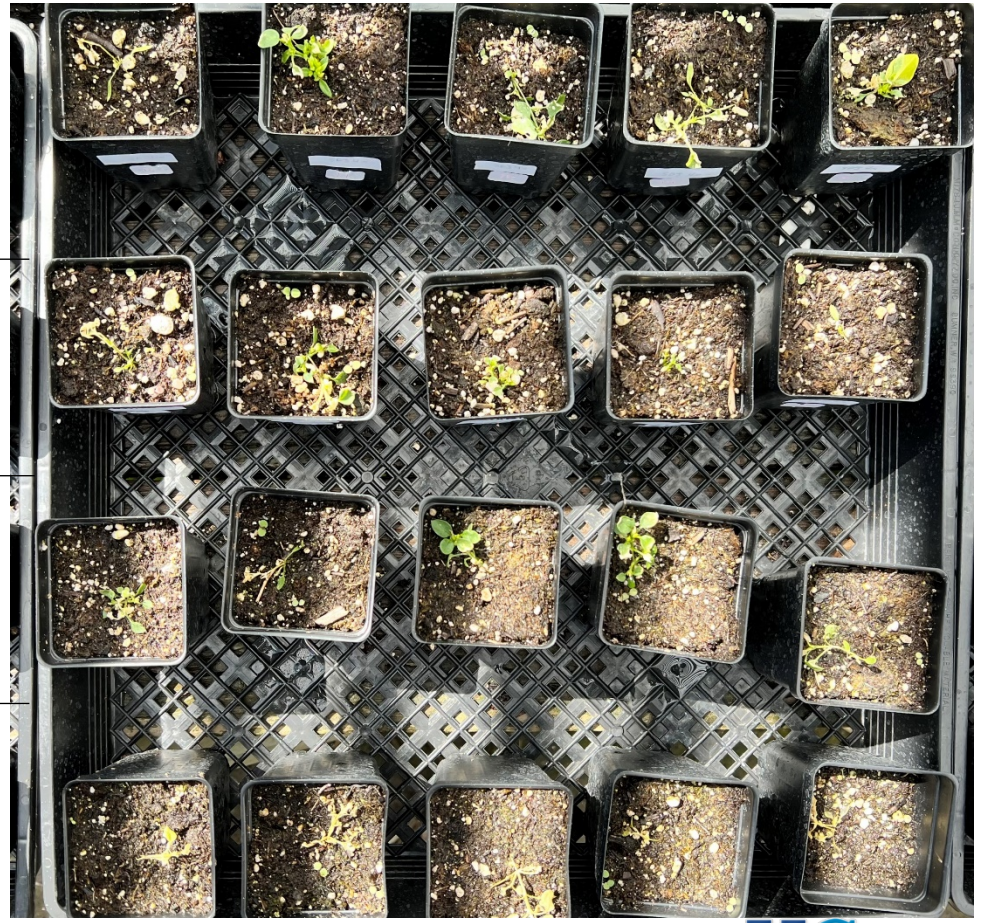

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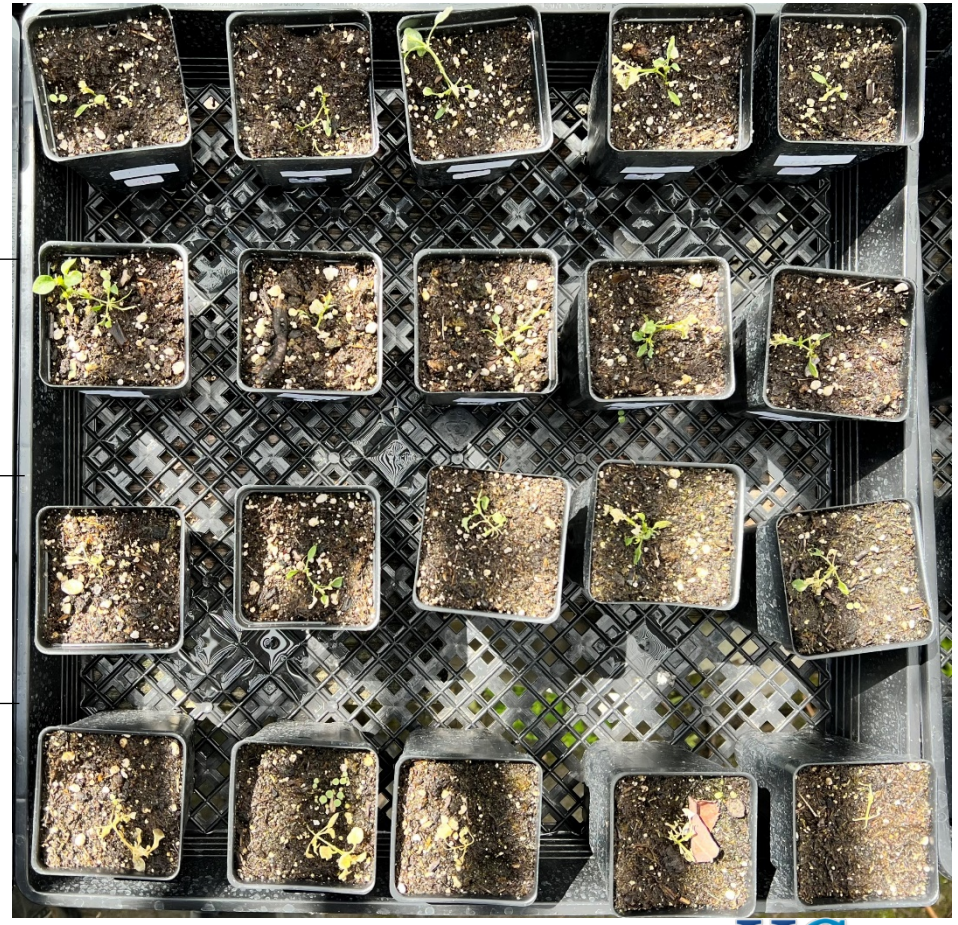

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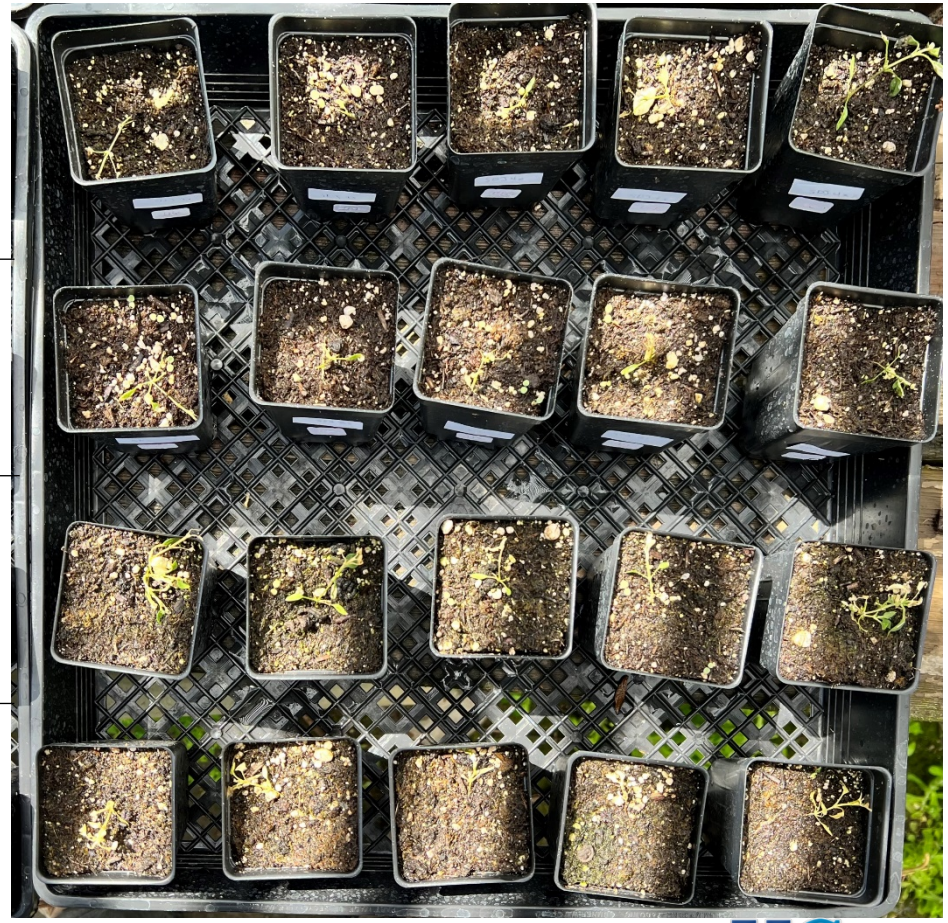
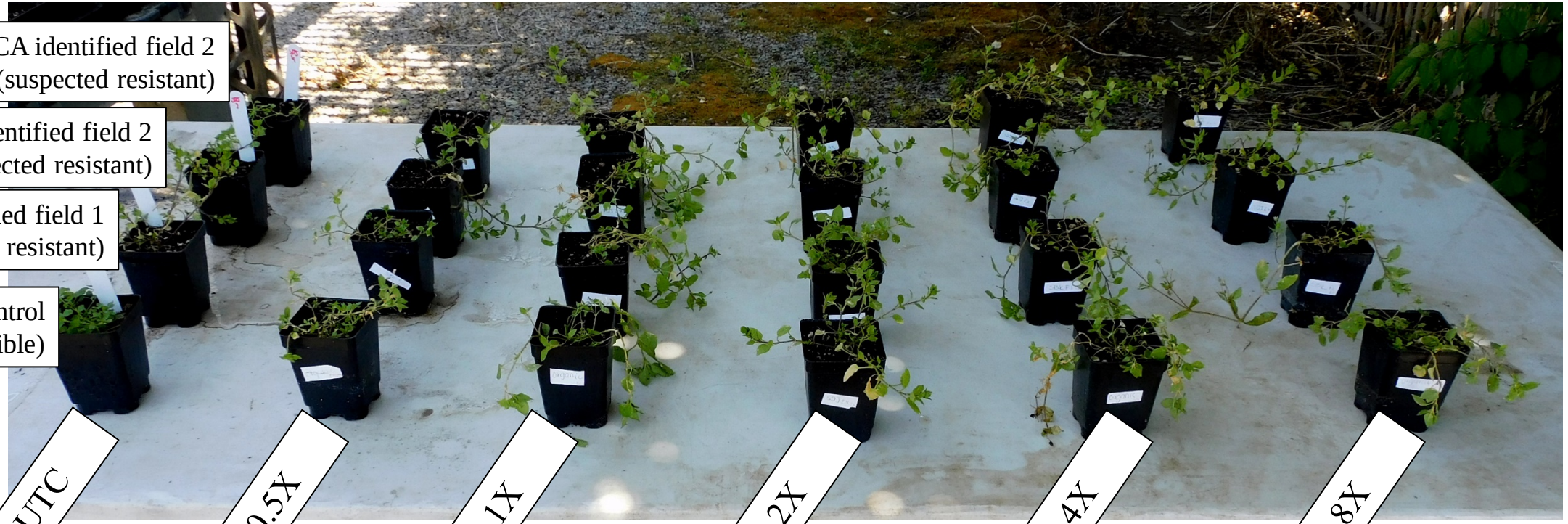


Mortality & Reproduction

Location	Herbicide	Rate	Mortality w1	Mortality w2	Mortality w3	Mortality w4	Flower
Organic	Express	0x	0%	0%	0%	0%	100%
		0.5x	0%	0%	90%	100%	0%
		1x	0%	0%	90%	100%	0%
		2x	0%	0%	90%	100%	0%
		4x	0%	0%	94%	100%	0%
		8x	0%	0%	90%	100%	0%
	Simplicty	0x	0%	0%	0%	0%	80%
		0.5x	0%	0%	10%	100%	20%
		1x	0%	0%	90%	100%	40%
		2x	0%	0%	90%	100%	40%
		4x	0%	0%	90%	100%	60%
		8x	0%	0%	90%	100%	0%
Escape	Express	0x	0%	0%	0%	0%	100%
		0.5x	0%	0%	9%	45%	40%
		1x	0%	0%	1%	26%	73%
		2x	0%	0%	0%	64%	47%
		4x	0%	0%	7%	86%	20%
		8x	0%	0%	9%	98%	0%
	Simplicty	0x	0%	0%	0%	0%	93%
		0.5x	0%	0%	0%	0%	100%
		1x	0%	0%	0%	0%	100%
		2x	0%	0%	0%	0%	100%
		4x	0%	0%	0%	0%	100%
		8x	0%	0%	0%	0%	100%

28 days after treatment – Osprey (late!)



Greenhouse evaluations, 2nd run

- Same seeds as first run
- Planted on 10/26/22
- Sprayed on 12/12/22 (2 true leaves, < 3” tall)
- Evaluated weekly until 1/9/23

Simplicity – UTC

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Organic control
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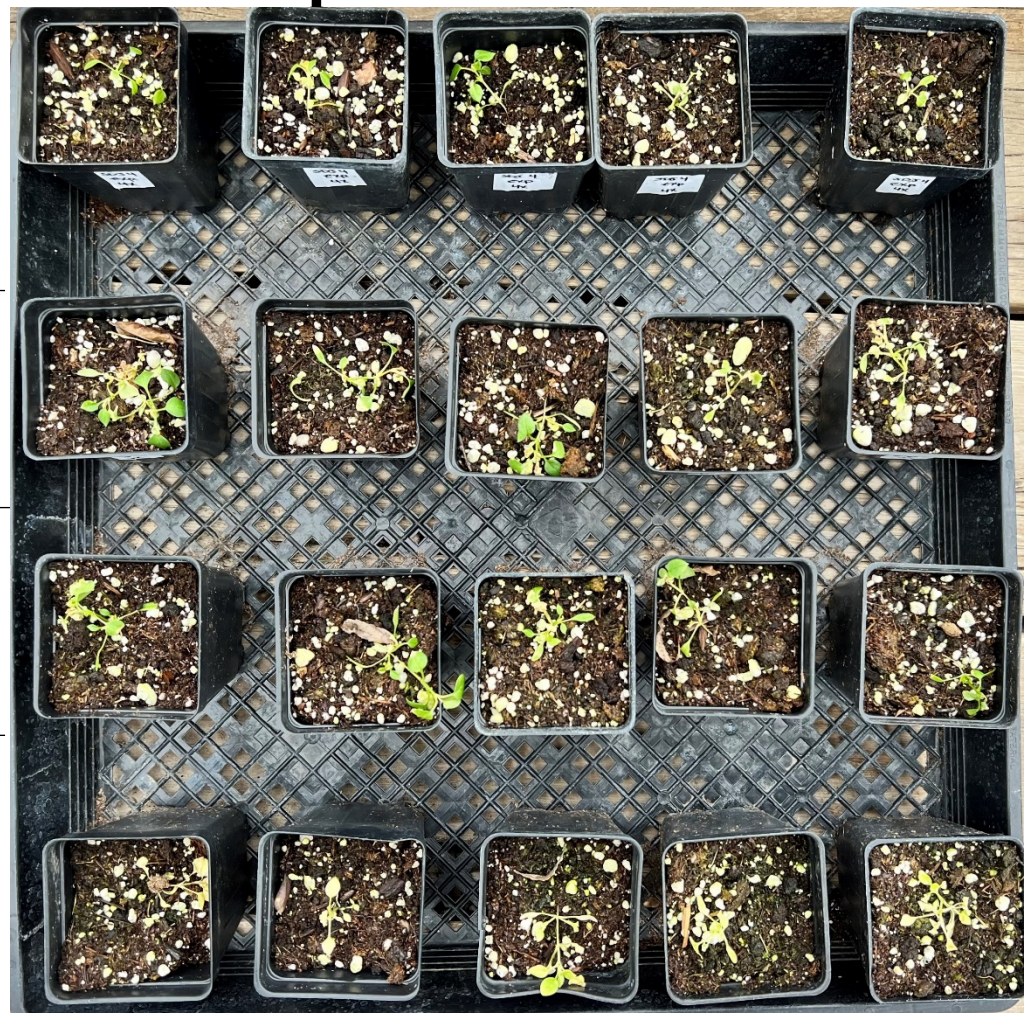

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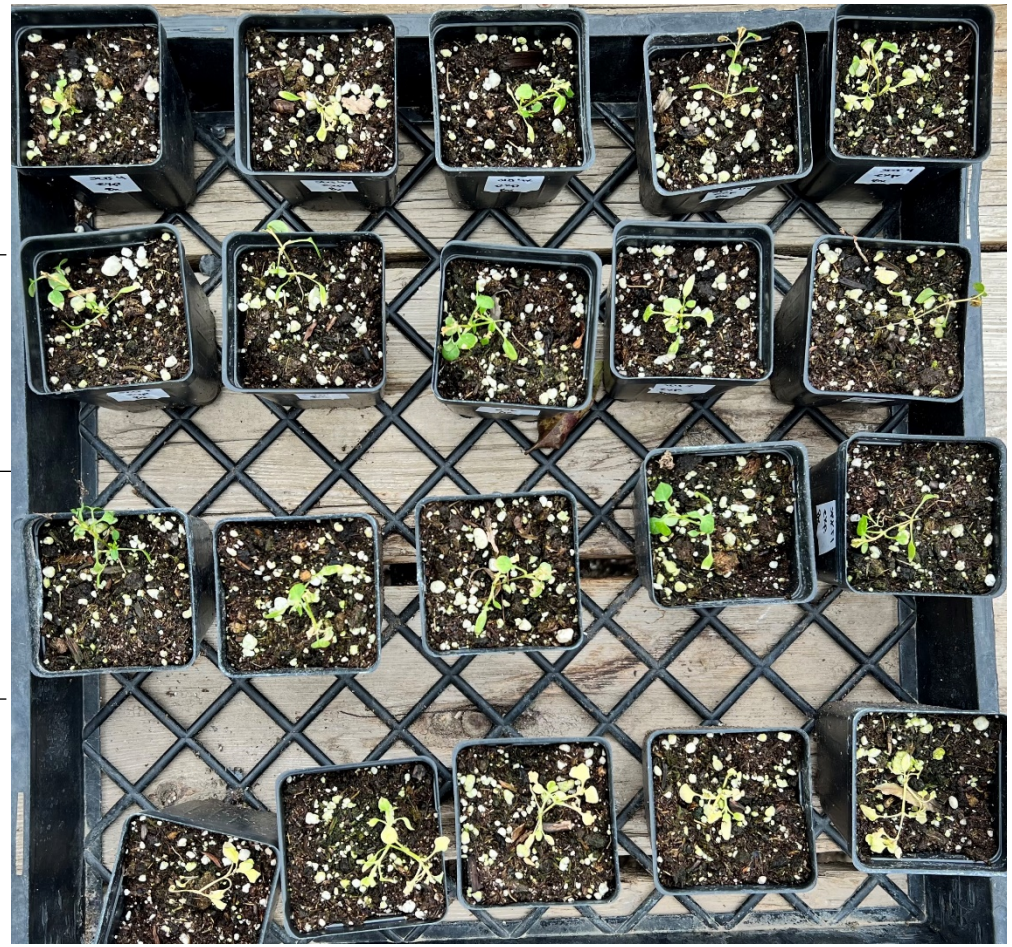

Osprey – UTC

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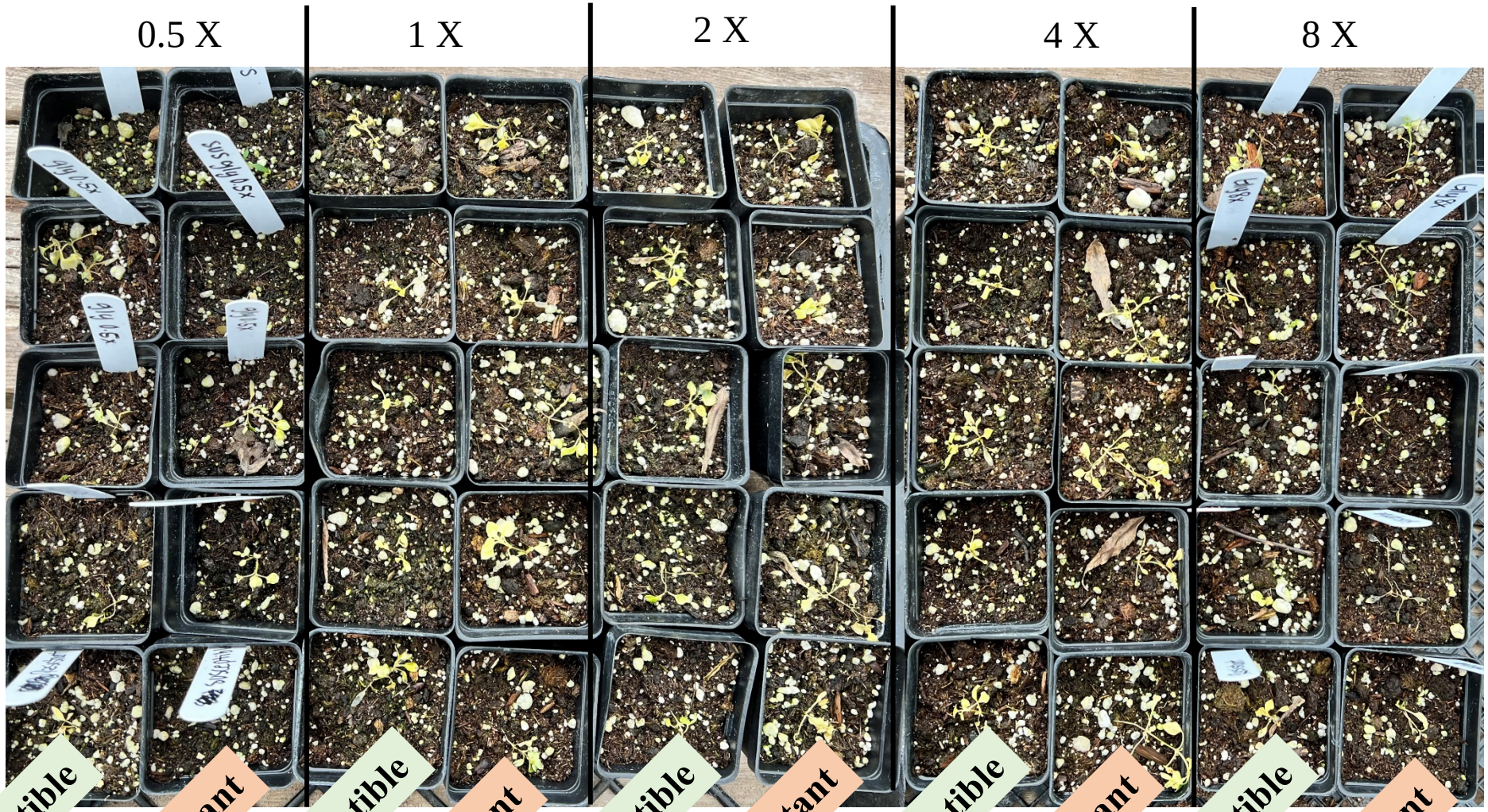
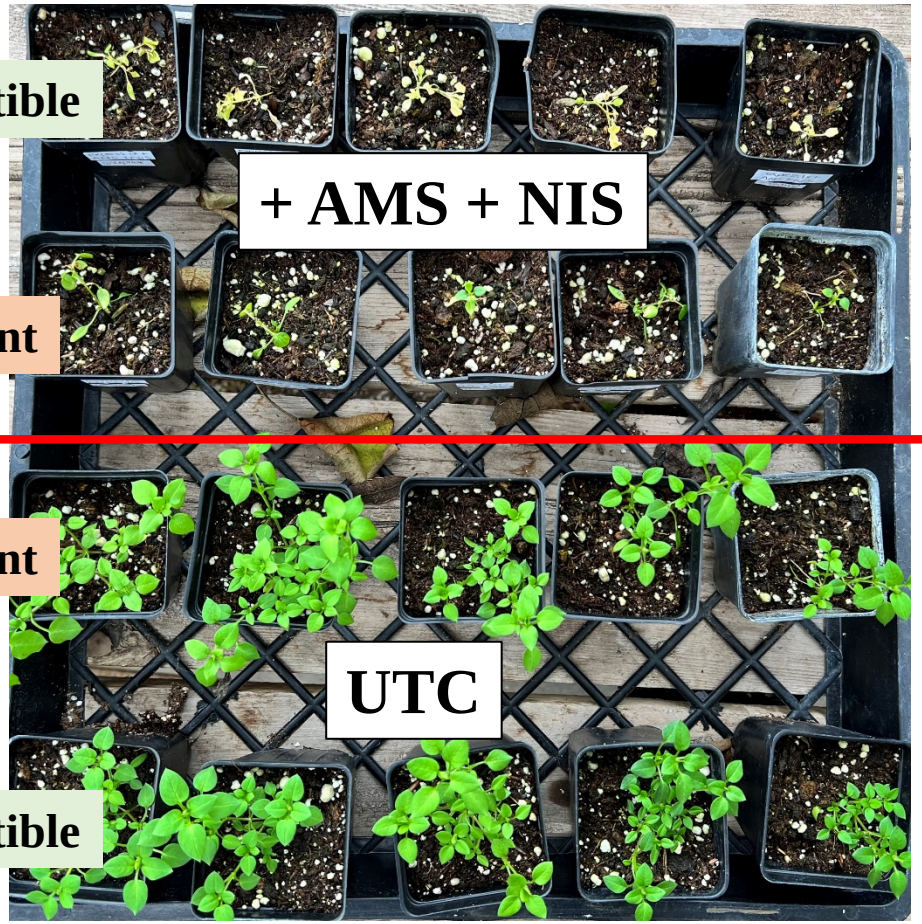
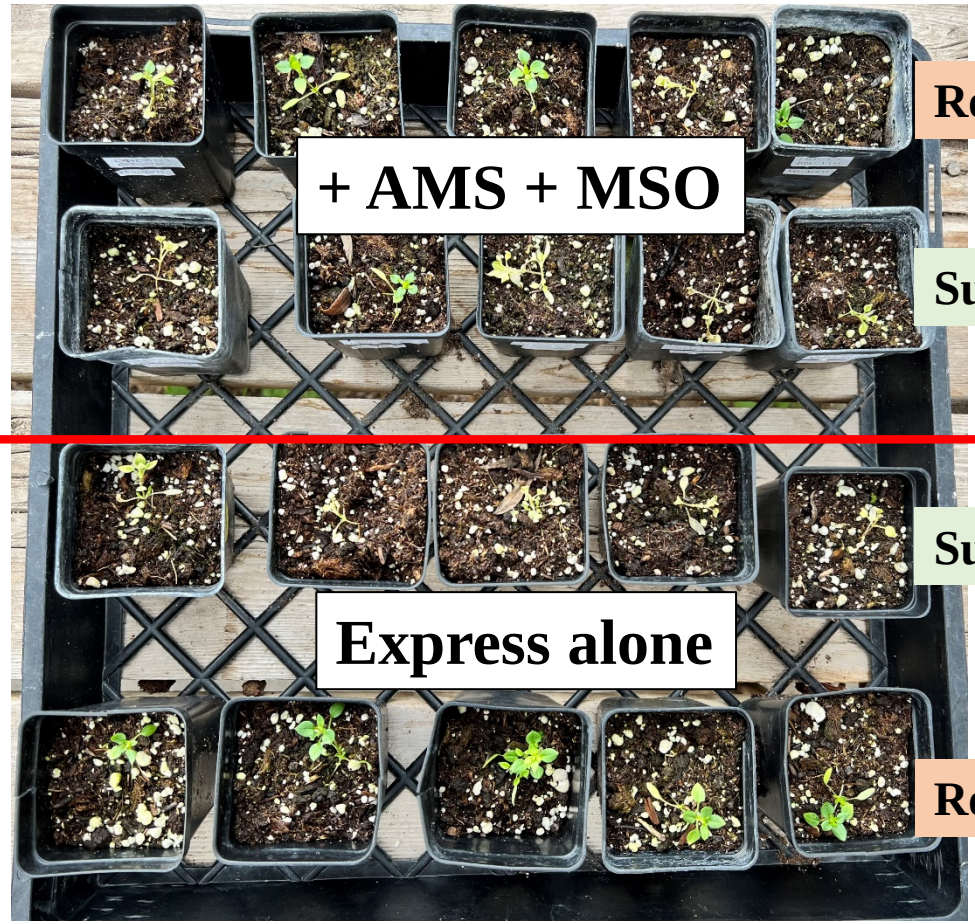
Susceptibility to glyphosate

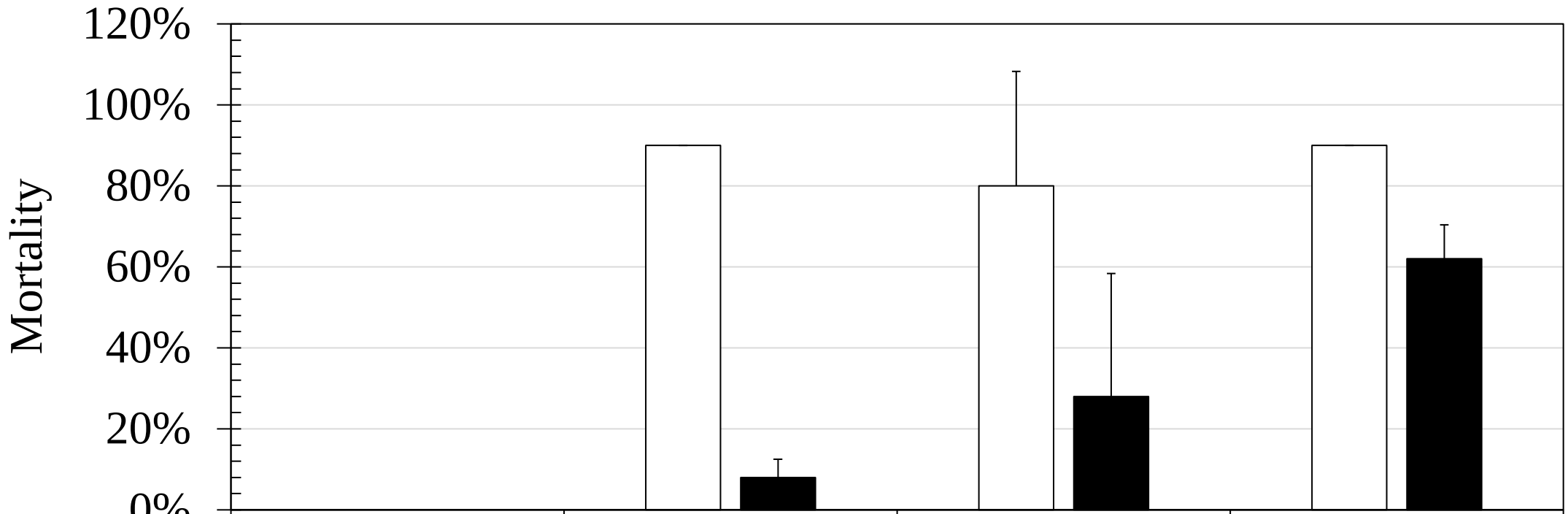


Switching adjuvants with Express





Mortality of chickweed populations between adjuvant treatments 28 days after treatment



	UTC	Express 1X	Express AMS + COC	Express AMS + NIS
□ Susceptible	0%	90%	80%	90%
■ Resistant	0%	8%	28%	62%

BMP's for weed control reminder

- Application timing for conditions
- Correct weed and crop stage
- Coverage
- Tank mix partners for broad spectrum of weeds & improving efficacy of tough weeds
- Top allowable label rates to zap tough weeds
- Rotate chemistry

AI's still CA registered for wheat with noted activity on chickweed – **Check the label**

Over the top post-emergence	Pre-crop or –weed emergence
2,4-D	Glyphosate
Dicamba	Flumioxazin
Pyraflufen	Pendimethalin
Diuron	Trifluralin
Bromoxynil	Saflufenacil
MCPA	

My question to you:
What should come next?

Critique, build onto our future objectives:

1. Survey extent of problem in CA
2. Expand ALS resistance testing in more chickweed populations
3. Genetic testing for resistance mutations
4. Determine chickweed competitiveness with small grains (yield, quality)
5. Pre-irrigation and pre-plant weed mgmt. strategies
6. Evaluate non-ALS herbicides at various chickweed growth stages
7. …
8. …
9. ?

THANK YOU

Nick Clark, CCA, Agronomy & Nutrient Mgmt. Farm Advisor – UC Cooperative Extension in Tulare, Kings & Fresno Counties. neclark@ucanr.edu; 559-852-2788

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