CULTIVATOR BREAKFAST

Round Table Meeting January 2024

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Moderator
Jenna Wicks

Program Manager
Farm Foundation

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2024 JANUARY CULTIVATORS

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The Ohio State University

Awatif El Abdellaouy
Texas A&M University

Alayna Gerhardt
Oklahoma State University

Kiara Ivy
Florida A&M University

Ashton Redd
University of Arizona

Ryanna Tietje
The Ohio State University

Thank you to BNSF and the Round Table Fellows for your support of the Cultivators Program!

BNSF RAILWAY

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Rachel Combs-Giroir

The Ohio State University

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CFAES

Impacts of waterlogging on pennycress, a new biofuel cover crop

Rachel Combs-Giroir

Farm Foundation Round Table Meeting: January 25th, 2024

THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Pennycress: A New Biofuel Cash Crop for the Midwest

- Winter annual cover crop with extreme cold hardiness
- High seed oil content and fatty acid oil composition suitable for aviation fuel
  - Remaining seed meal → high-protein animal feed
- Commercial pennycress seed yields are ~1,500 lb ac^{-1}
- If incorporated onto half of the US Midwest Corn Belt, pennycress could…
  - Fix 40 Mt of carbon annually
    - The emissions of ~31 million automobiles
  - Produce ~2.6 billion gallons of oil

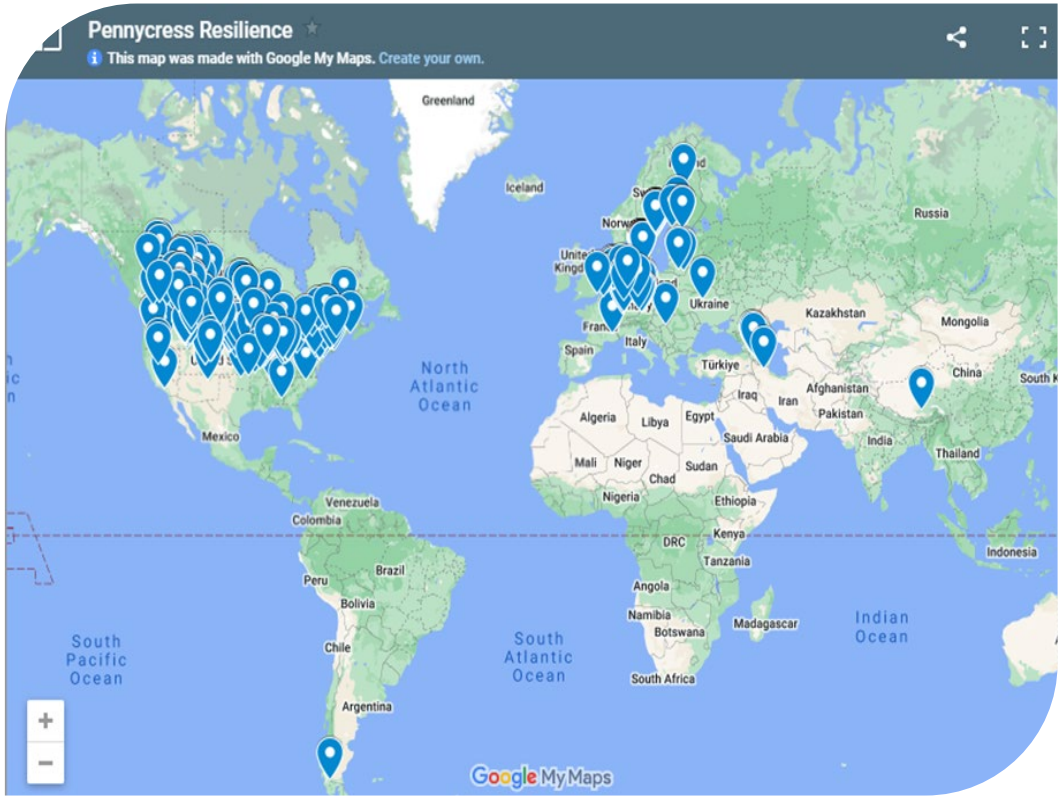
CoverCress™ : Commercialized Pennycress

- Rapid domestication through breeding and gene editing:
  - Reduced seed coat fiber for improved nutritional value
  - Low erucic acid for edible oil
  - Reduced seed glucosinolate content for palatable seed meal
  - Increased seed oil content (30-34%)
  - Reduced seed pod shatter
- Current breeding priorities:
  - Early maturity
  - High yield
  - Increased seed size
  - Reduced lodging
  - Reduced seed dormancy
  - Improved resilience to environmental stress

covercress.com

CoverCress Inc. (CCI)

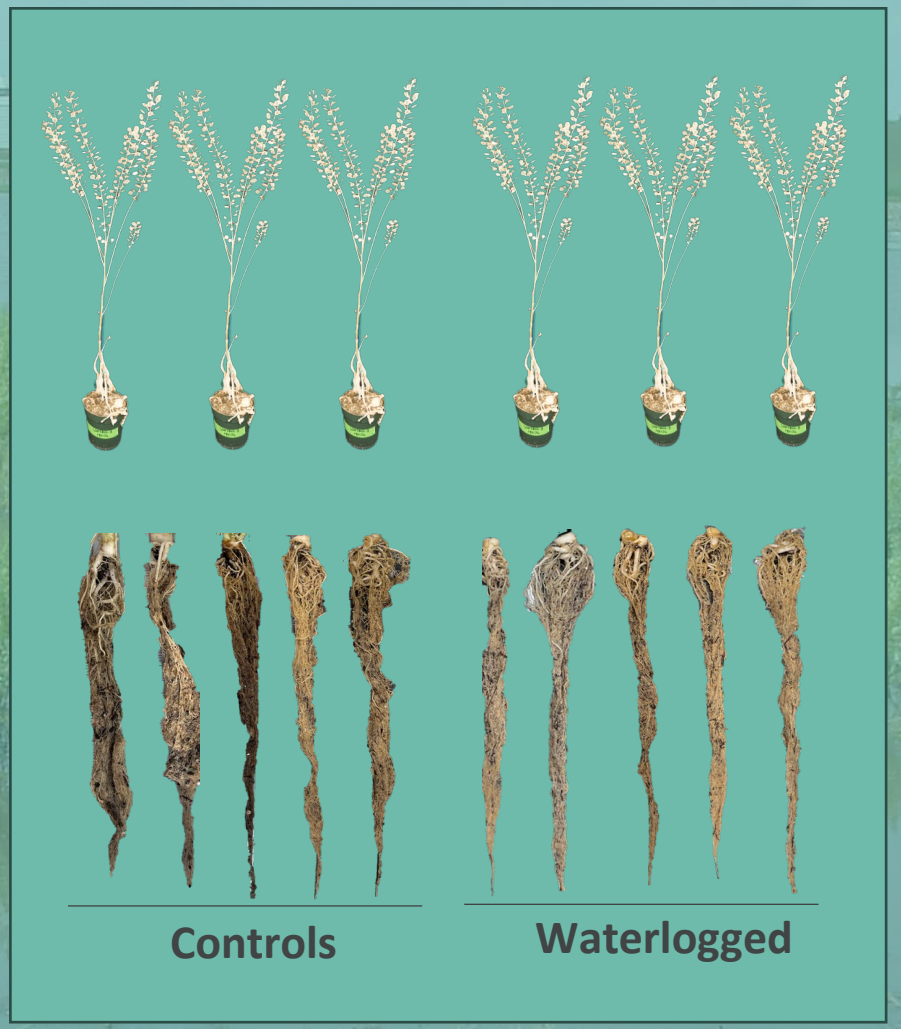
Pennycress Germplasm & Genetic Resources



Video credit: Dr. Win Phippen

IPReP Integrated Pennycress Resilience Project

Pennycress fields are susceptible to waterlogging

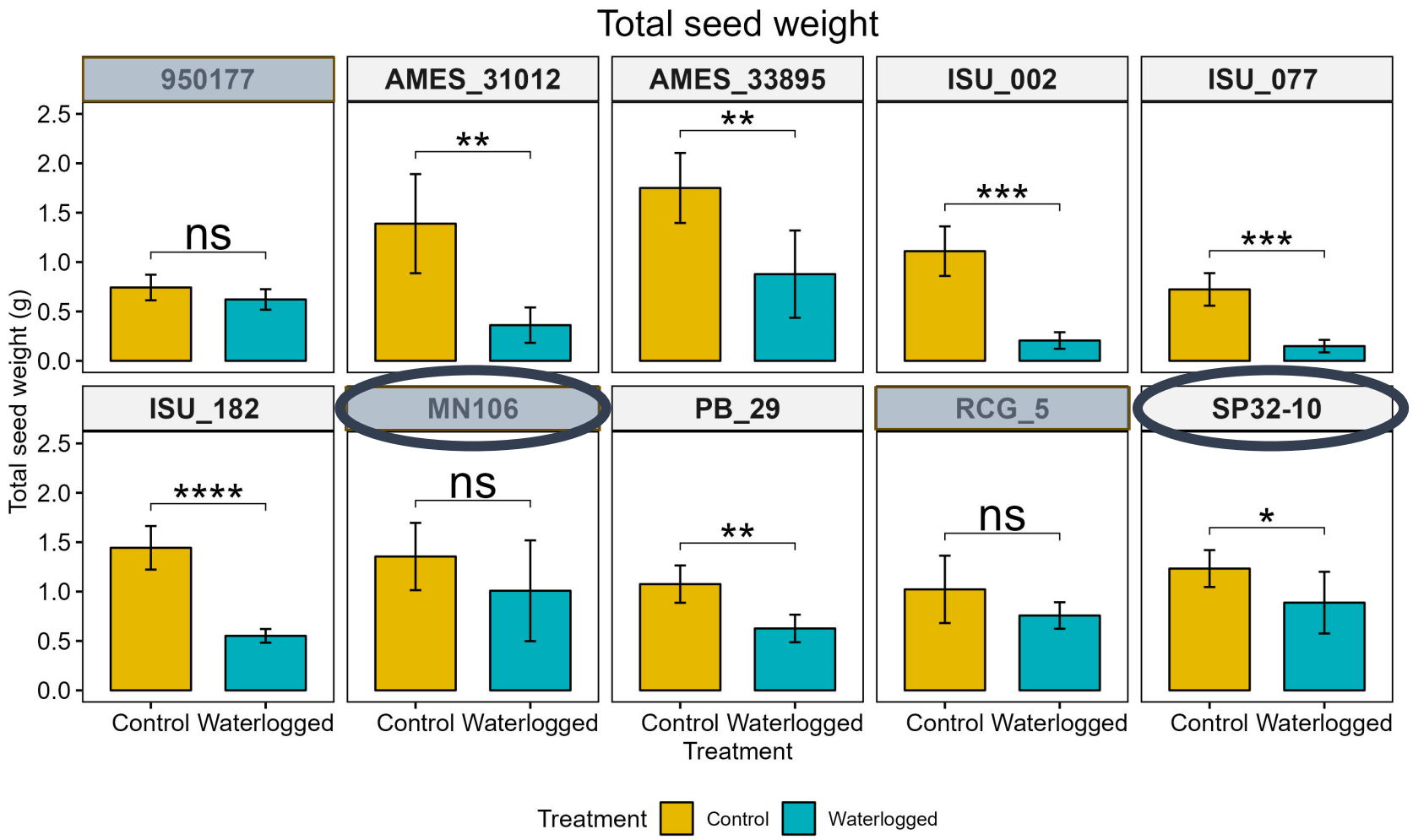


Morphology & Yield

RNA Sequencing – Gene Expression

April/May Flood in 2011- Dr. Win Phippen

Variation in seed yield among waterlogged pennycress accessions



Results

- *Identified 3 tolerant lines based on yield*
- *Identified candidate genes and pathways involved in waterlogging response/tolerance*

Acknowledgements

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Dr. Alex Lindsey

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Tara Creech
Molly Dougherty
Rosemary Ball
Ben Phillips
Annabel Shim
Alex Koopmans
Katie Fulcher

Greenhouse Staff
Gary Posey

IPReP Integrated Pennycress Resilience Project

U.S. DEPARTMENT OF ENERGY

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TRANSLATIONAL PLANT SCIENCES GRADUATE PROGRAM

CENTER FOR APPLIED PLANT SCIENCES

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NSF Graduate Research Fellowship
OSU University Fellowship

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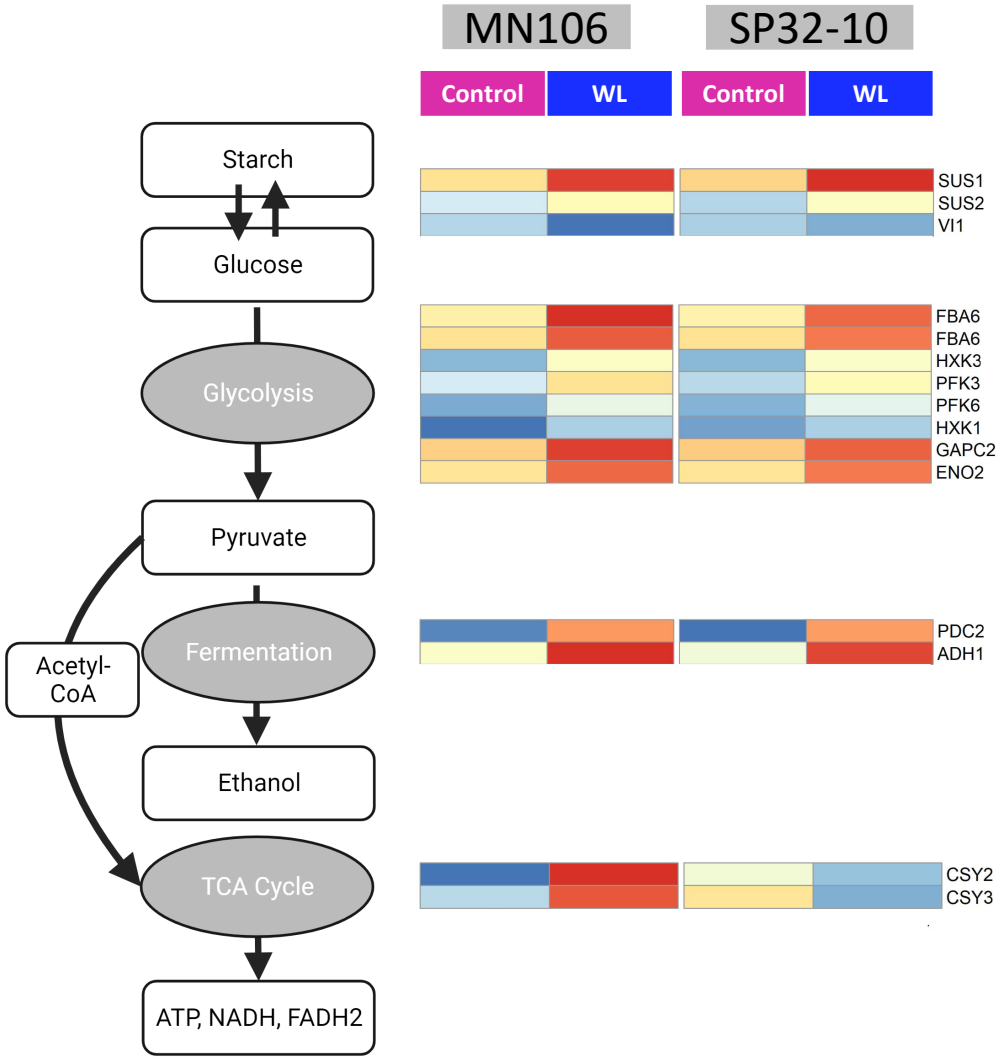
Changes in gene expression under waterlogging



Gene Ontology Term
response to hypoxia
cellular response to decreased oxygen levels
RNA splicing
response to heat
protein folding
mRNA splicing, via spliceosome
mRNA processing
translation
secondary cell wall biogenesis
xylan biosynthetic process
secondary metabolite biosynthetic process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Awatif El Abdellaouy

Texas A&M University

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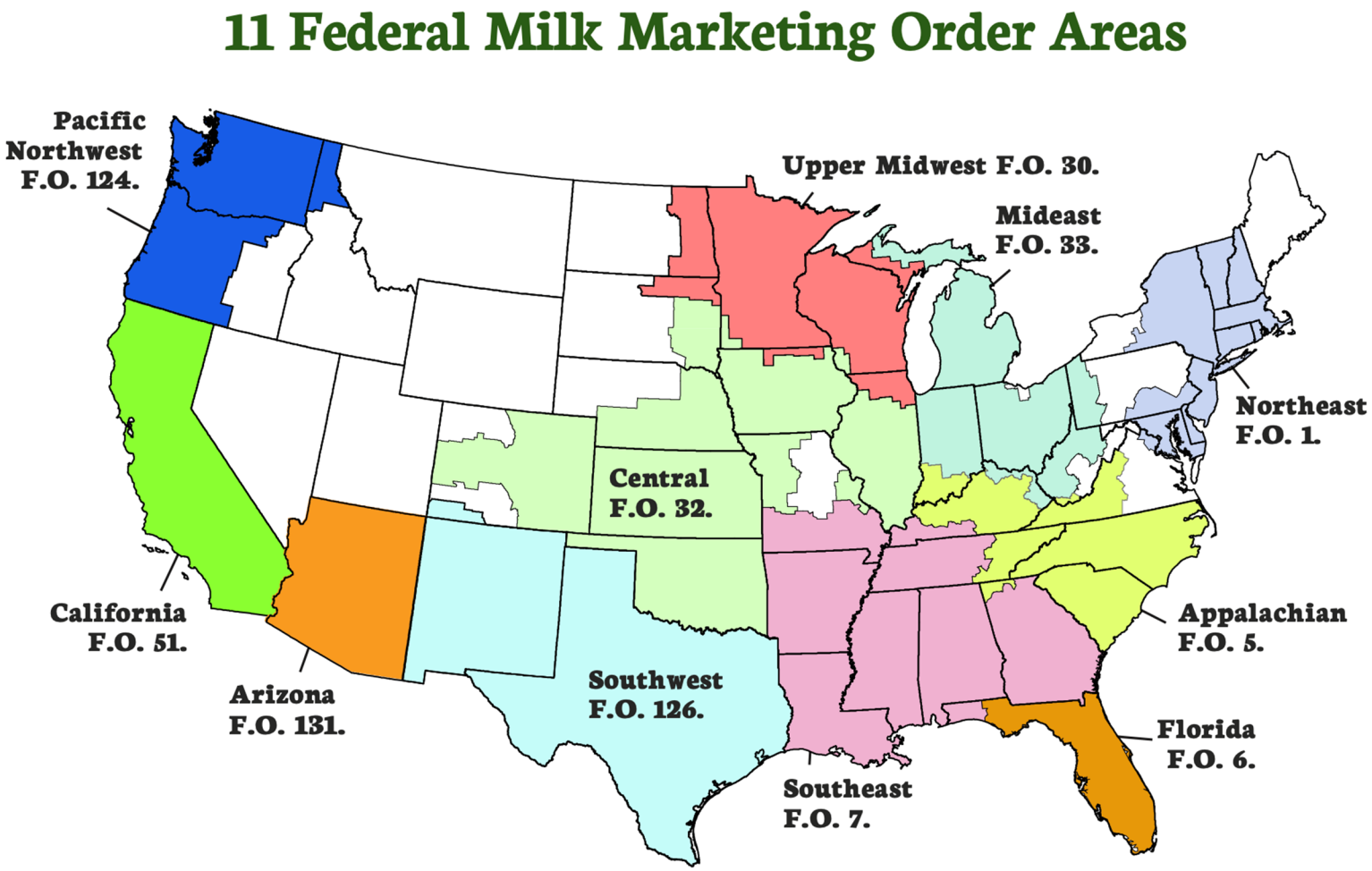
Impacts of Proposed Amendments to Federal Milk Marketing Orders

Awatif EL ABDELLAOUY
Texas A&M University

Overview of Current FMMO System



Each milk marketing order includes:

- Classified price plan
- System of minimum prices
- Terms of the order
- Provisions for administering the order

FMMOs and USDA authorized to amend the F.O through a hearing process overseen by The Secretary of Agriculture.

Ongoing hearing in Carmen Indiana , since August 23rd

NMPF's Proposal: Enhancing Make Allowances

Make allowances : an estimate of dairy processors' cost of converting milk into finished products

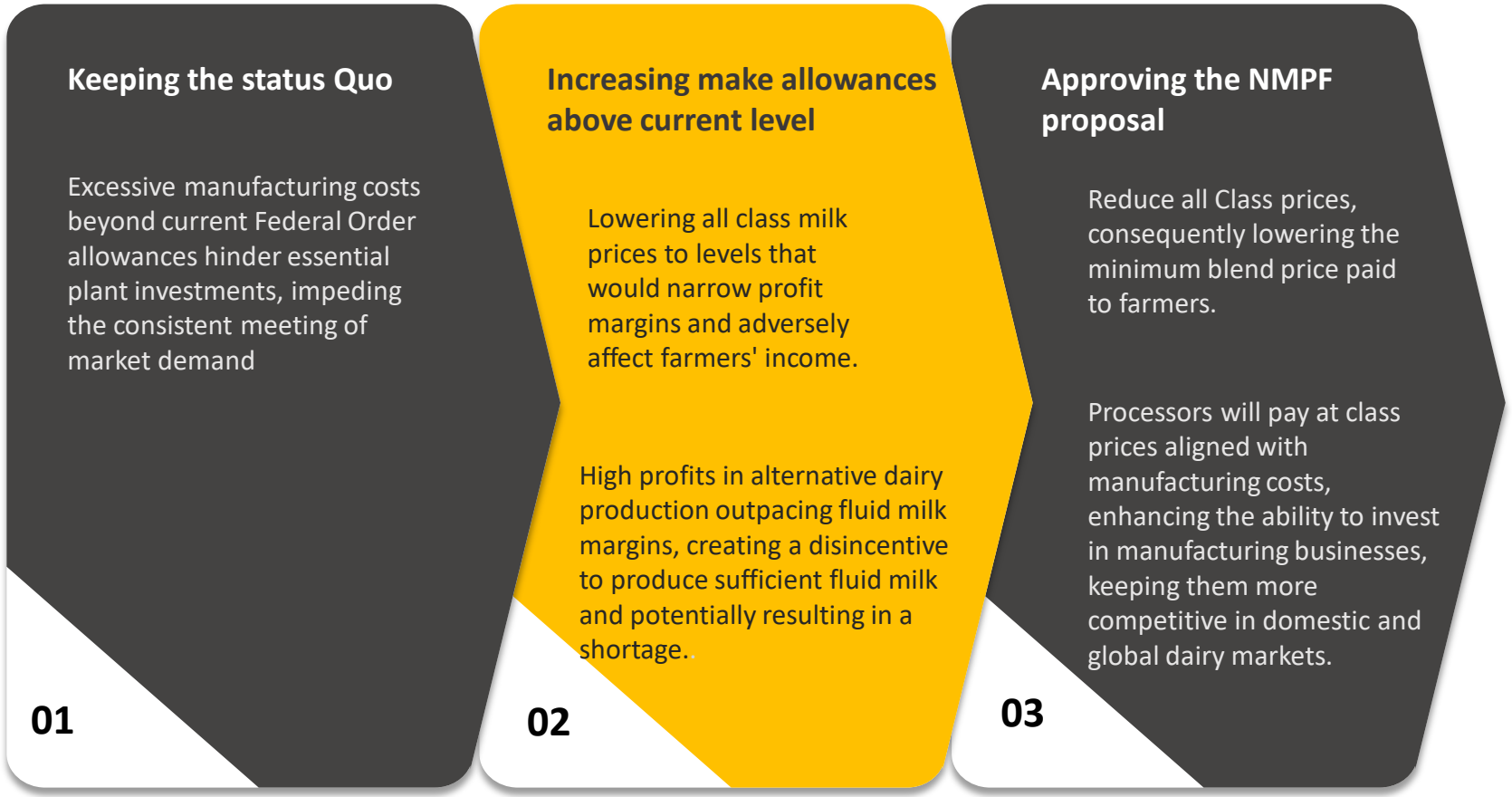
Component price per pound = (Product price per pound–**Manufacturing Margin**)×Yield Factor

The National Milk Producers Federation (NMPF) proposal to amend current make allowances.

Product	Current FMMO Allowance/pound	Proposed	Increase
Cheese	$0.2003	$0.2400	$0.0397
Whey	$0.1991	$0.2300	$0.0309
NFDM	$0.1678	$0.2100	$0.0422
Butter	$0.1715	$0.2100	$0.0385

Scenarios & Impacts

Component price per pound = (Product price per pound–Manufacturing Margin)×Yield Factor



Thank you
Q&A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Alayna Gerhardt

Oklahoma State University

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Virtual Fencing at Oklahoma State University

A. Gerhardt

Nofence


0000000
GALLAGHER
eShepherd

HALTER

Corral

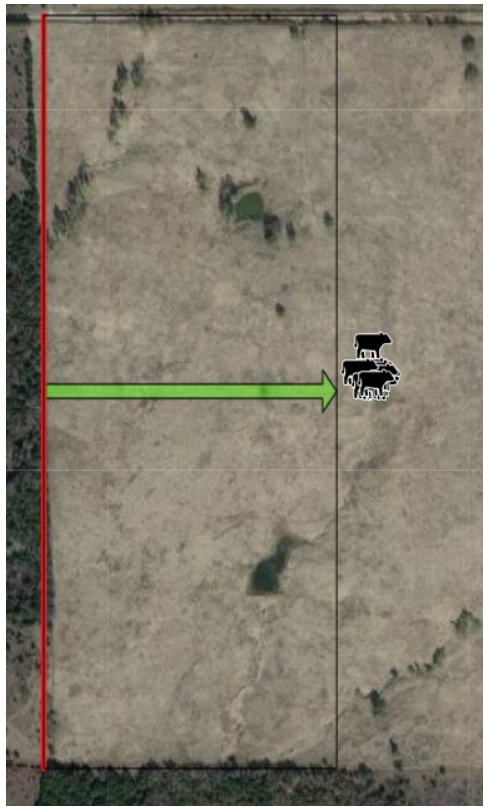
VENCE

Sustainable livestock
farming for the 21st Century

Types of Virtual Fence

Exclusion

Inclusion



Movement

Current Research

Oklahoma State University currently has two grants through the EPA and CIG. Both focus on:

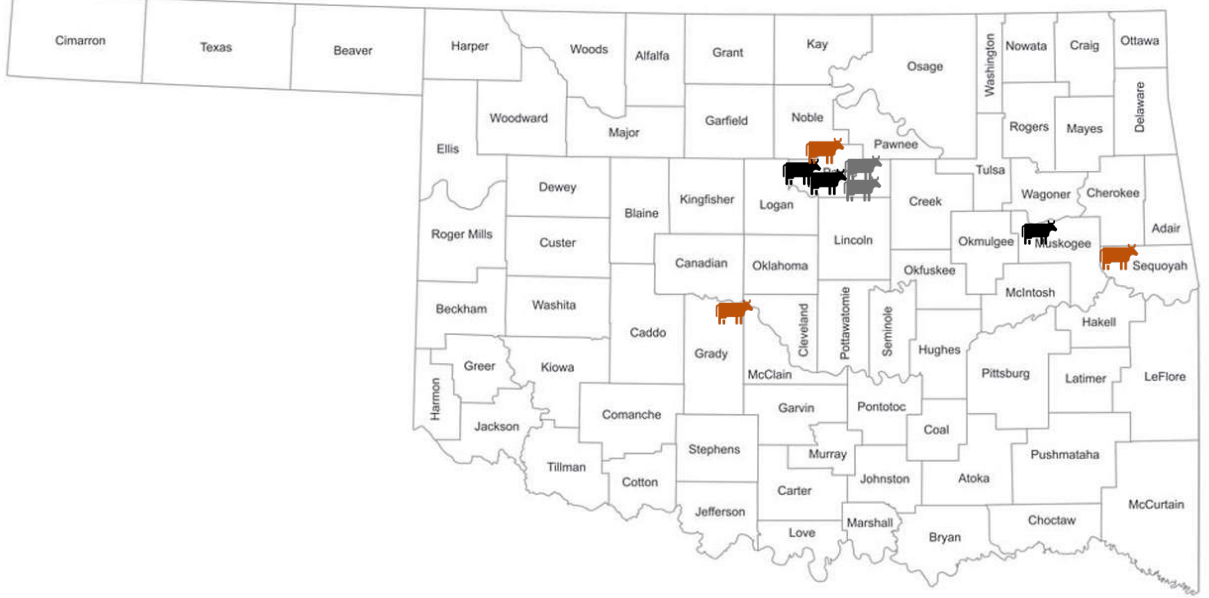
- Use of virtual fencing to
  - fence cattle out of sensitive riparian areas
  - improve soil and water quality
  - improve wildlife use and habitats

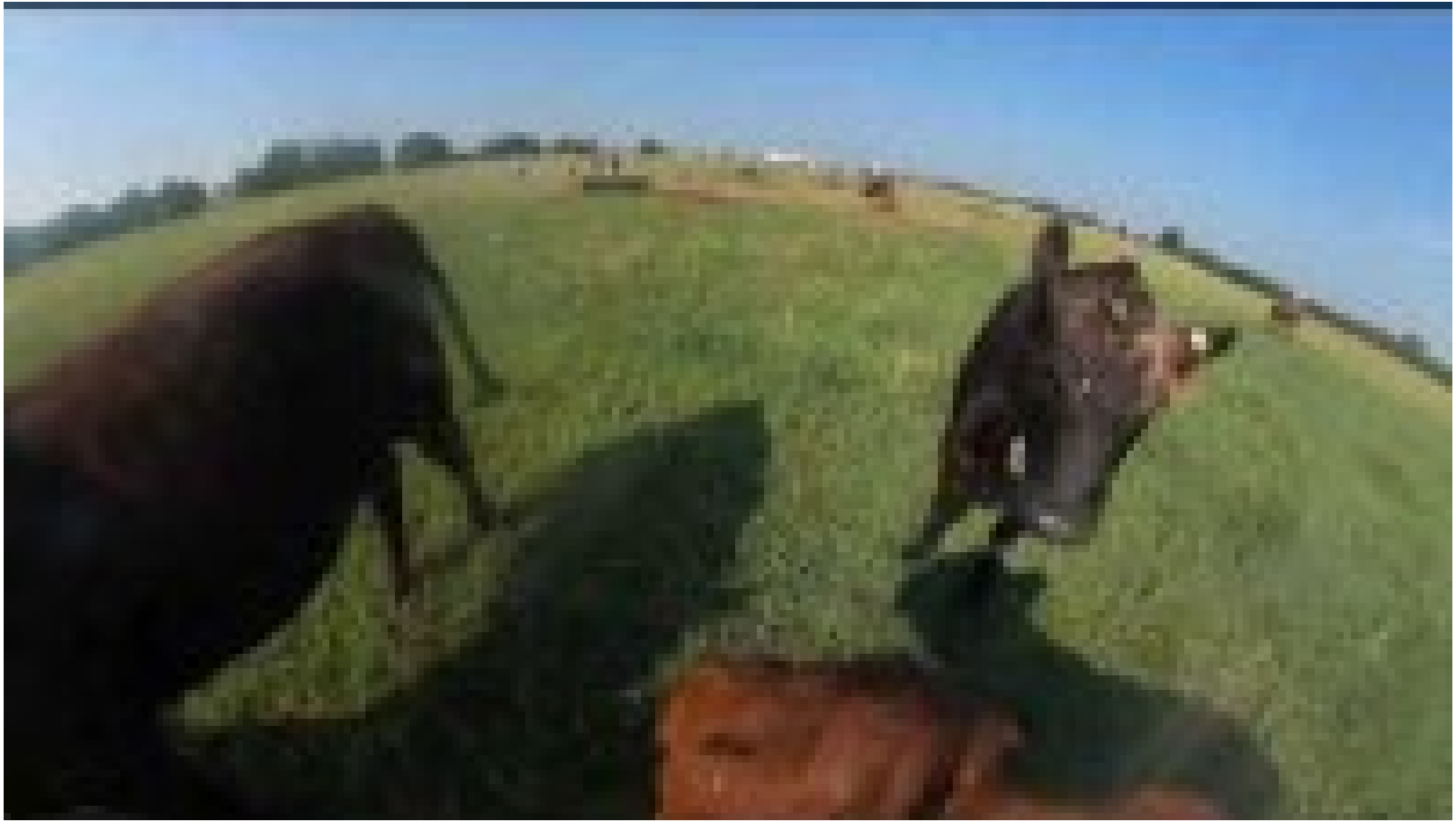
Oklahoma State Research Stations and Cooperating Ranches

Cooperating Ranch

OSU Research Station

Future Location





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Kiara Ivy

Florida A&M University

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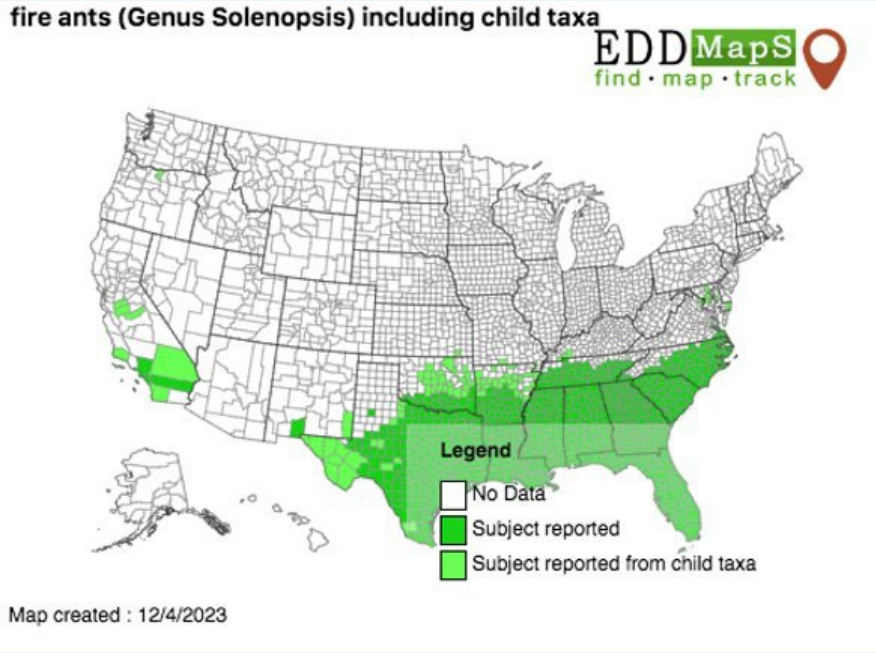
THE ESTABLISHMENT AND SPREAD OF NATURAL ENEMIES OF THE RED IMPORTED FIRE ANT (*SOLENOPSIS INVICTA*) IN NORTH FLORIDA

Kiara Ivy
Florida A&M University
College of Agriculture and Food Sciences
Center for Biological Control

PROBLEM OF RED IMPORTED FIRE ANTS (RIFA)



INVASIVE SPECIES ALERT

Introduced to the United States in the 1930s to Mobile, Alabama through ports.

ON THE RUN

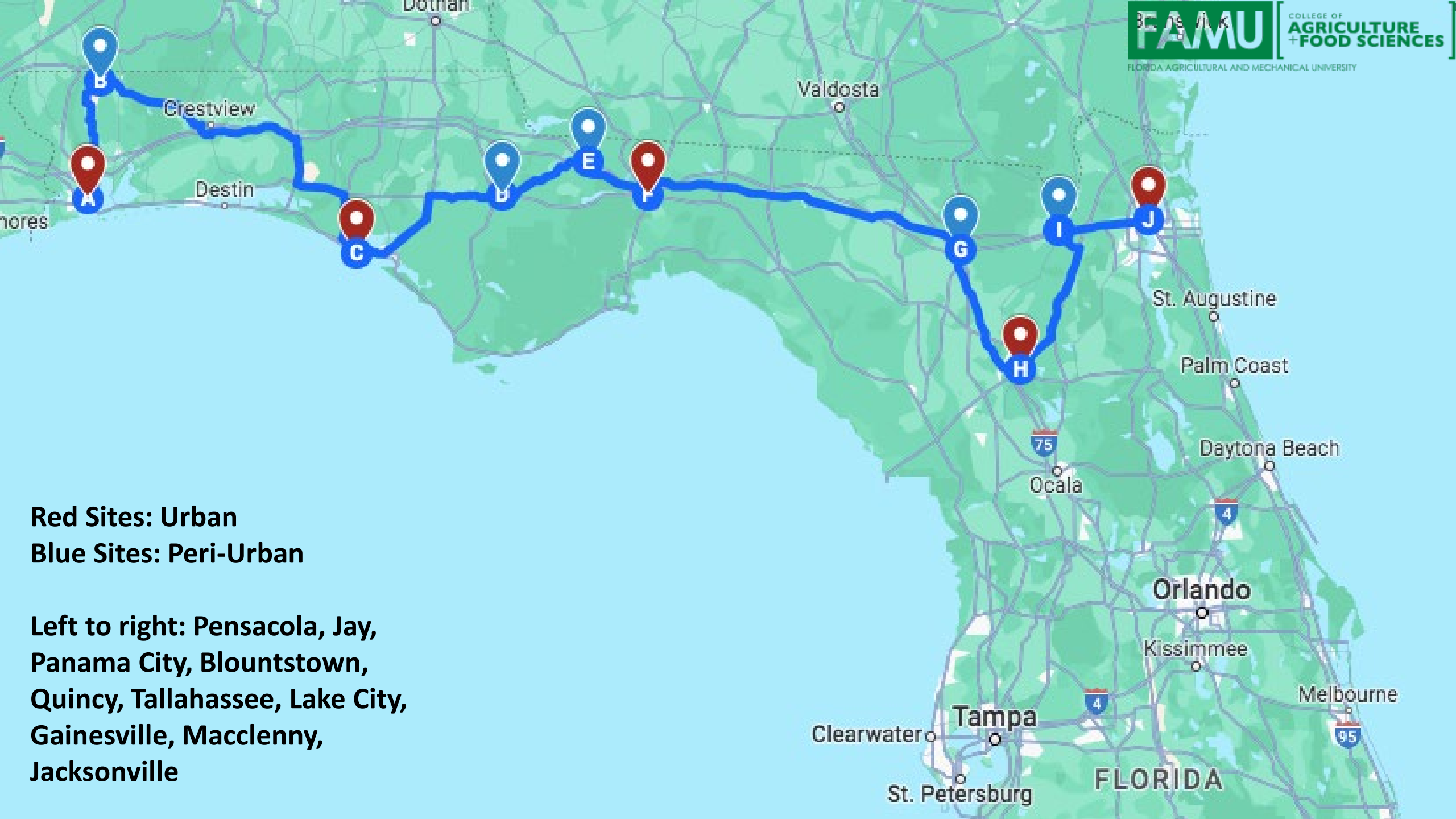
Native to Brazil and Argentina, but has been found in countries in the Caribbean, China, Taiwan, Australia, and newly Europe.

ECONOMIC COSTS

Cost an average of $6.7 billion USD of damage. In agriculture, urban pest management, and public health areas.

RESISTANCE

These ants have established themselves in polygyne (multiqueen) structures outside of its native range.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Dothan
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A
B
C
D
E
F
G
H
I
J
St. Augustine
Palm Coast
Daytona Beach
Ocala
75
4
Orlando
Kissimmee
Melbourne
95
Tampa
Clearwater
St. Petersburg
FLORIDA
Red Sites: Urban
Blue Sites: Peri-Urban
Left to right: Pensacola, Jay, Panama City, Blountstown, Quincy, Tallahassee, Lake City, Gainesville, Macclenny, Jacksonville

PARASITOID NATURAL ENEMY

PARASITIC LIFE CYCLE

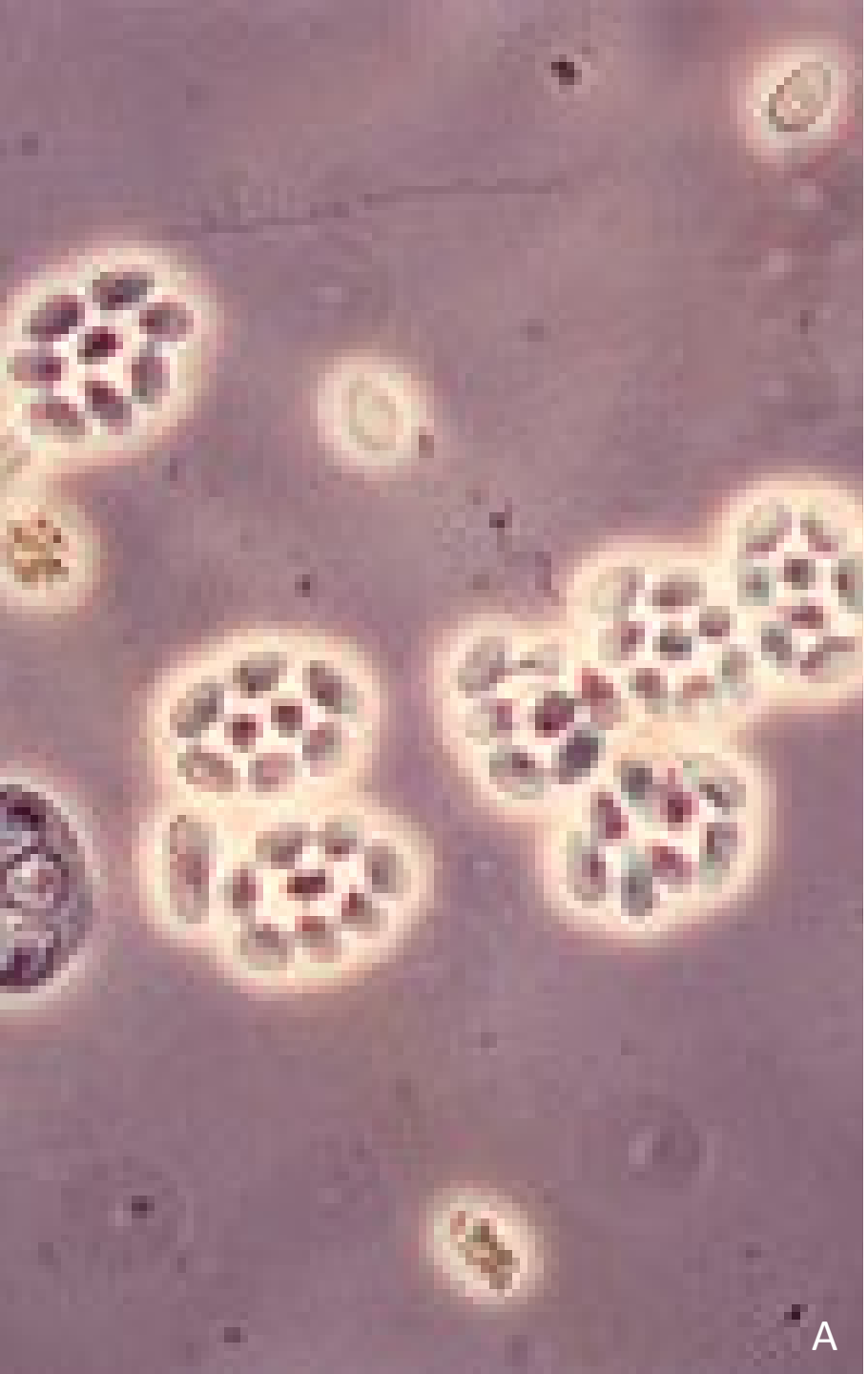
Lays eggs in the thorax of the ant, larvae of the fly feeds on body of the ant and grows, the ant will die and larva will eat head capsule of the ant and decapitate the ant after pupation is finished to continue the cycle.

PSEUDACTEON SP

Six species released in US since 1996. *Pseudacteon cultellatus, Pseudacteon curvatus, Pseudacteon litoralis, Pseudacteon nocens, Pseudacteon obtusus, and Pseudacteon tricuspis.*

Figure A: *Pseudacteon obtusus* female 0.72mm
Figure B: Set up of 'pizza' and 'lollipop' trap
Figure C: *Pseudacteon curvatus* and *Solenopsis invicta* worker size comparison

Location on I-10	Number of Sites	Month and Year of Survey	*Pseudacteon* sp. found
Jacksonville	0	Jun-23	N/A
Macclenny	3	May-23, Nov-23	*P. curvatus, P. obtusus*
Gainesville	5	Apr-23, Dec-23	*P. curvatus, P. obtusus, P. tricuspis*
Lake City	4	Mar-23	*P. obtusus*
Tallahassee	5	Mar-23, Dec-23	*P. curvatus, P. litoralis, P. obtusus, P. tricuspis*
Quincy	5	Mar-23, Nov-23	*P. curvatus, P. tricuspis*
Blountstown	2	Jun-23, Dec-23	*P. curvatus, P. obtusus*
Panama City	3	Jun-23	N/A
Jay	5	Apr-23, Oct-23	*P. curvatus, P. obtusus*
Pensacola	5	Apr-23	*P. curvatus, P. obtusus*



MICROSPORIDIA NATURAL ENEMY

WHAT DOES IT DO?

Creates cysts on the ovary of the ants and reduces the reproductive ability of queens.

IS IT SAFE?

It is genus specific to *Solenopsis sp.*

WHY IS IT IMPORTANT?

It is a natural enemy that can reduce the size and robustness of mounds if present.

HOW DO WE COLLECT IT?

In vials with rubber caps and 95-100% Ethanol.
We visualize the spores under Phase Contrast Microscopy.

Figure A: Spores of the microsporidian pathogen *Kneallhazia solenopsae,* a potential biocontrol of fire ants. (USDA-ARS 2009) (D1491-1)

A

FUNGAL NATURAL ENEMY

WHY IS IT IMPORTANT?

A natural biopesticide that is used for a wide range of agricultural pests.

HOW DO WE COLLECT IT?

Taking samples of dead ants with sporulation and incubating the fungus. We also take samples of the soil in and around the mound.

IS IT SAFE?

Beauveria bassiana Strain 447 is great for outdoor and indoor pest control of ants.

FUNGAL TESTING

We will incubate the dead ants that have sporulation and the soil samples to visualize fungal growth.

Figure A: *Beauveria bassiana* attacking an ant (IGEM 2018)

THANK YOU

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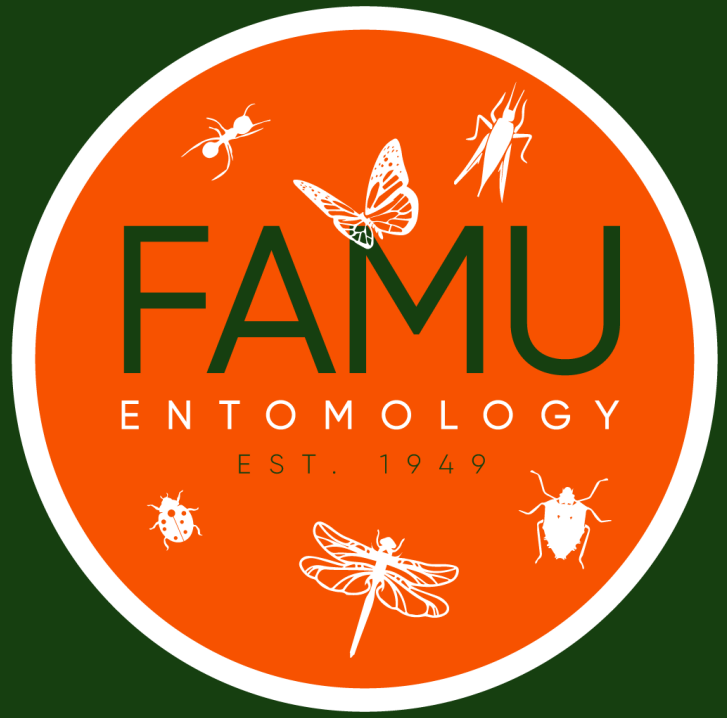


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Ashton Redd

University of Arizona

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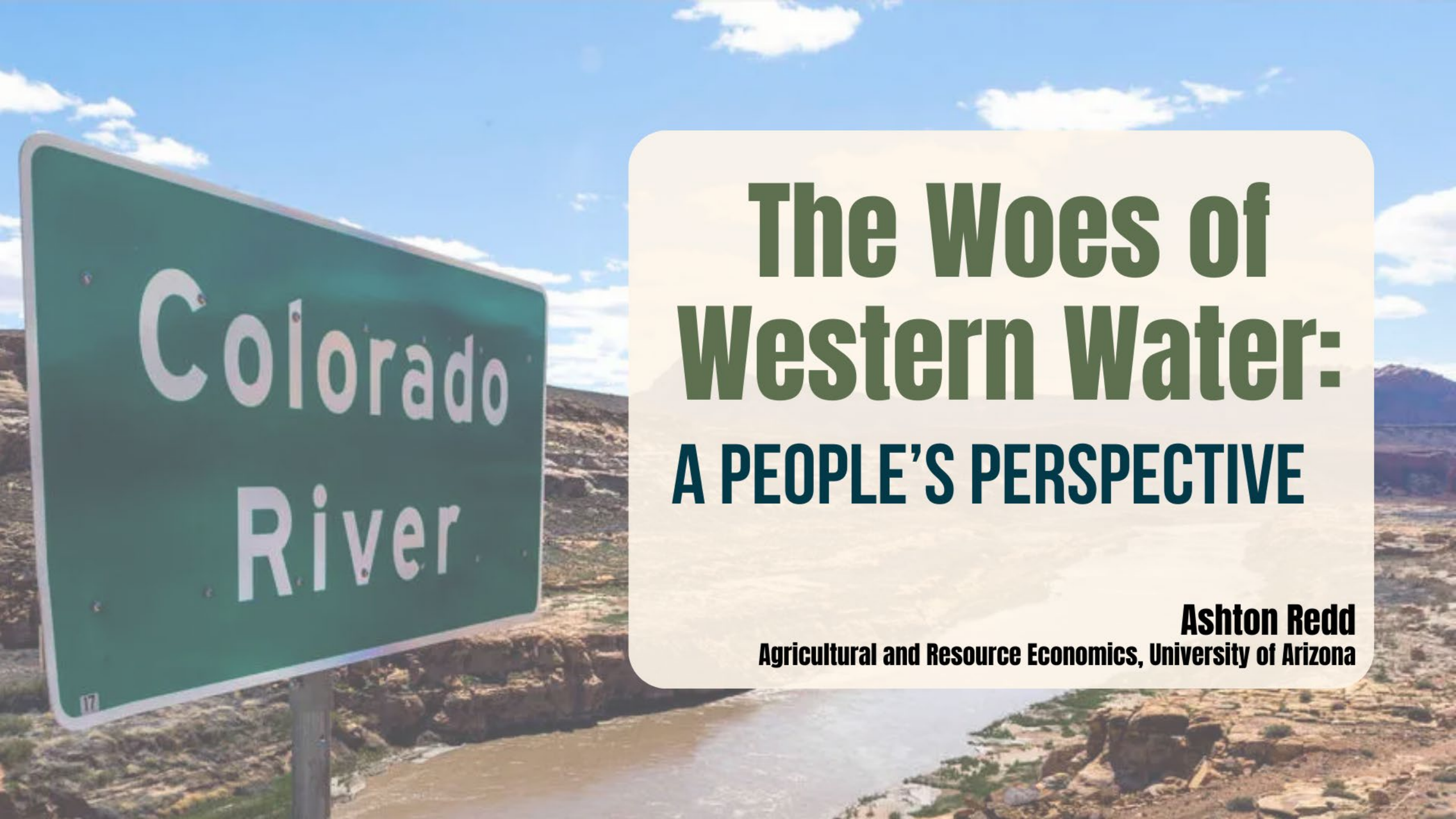


The Woes of Western Water:

A PEOPLE'S PERSPECTIVE

Ashton Redd
Agricultural and Resource Economics, University of Arizona

Brief History

- Understanding the “Law of the River”
  - 1922 Compact
  - Arizona v. California
    - Central Arizona Project
  - Drought Contingency Plan (2019)

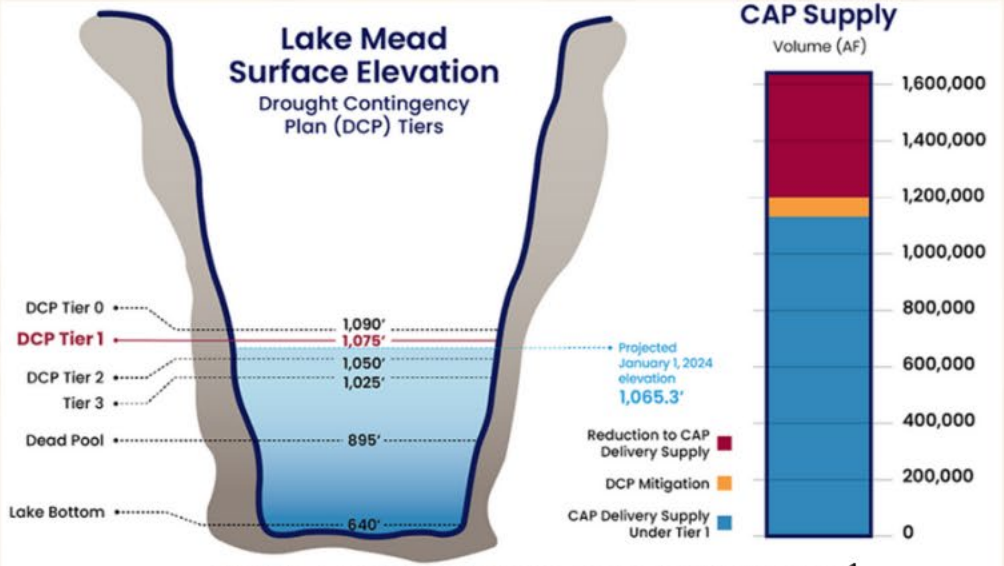
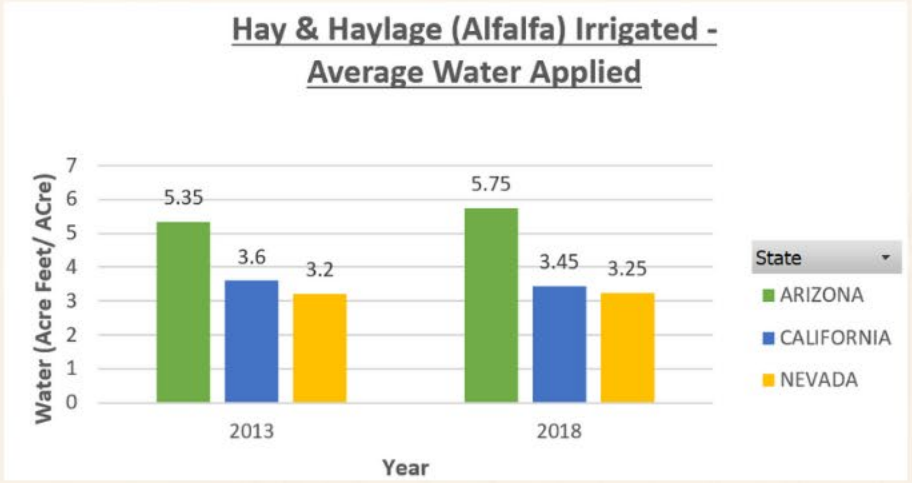


Figure 1 Central Arizona Project DCP Image[1]

OBJECTIVE

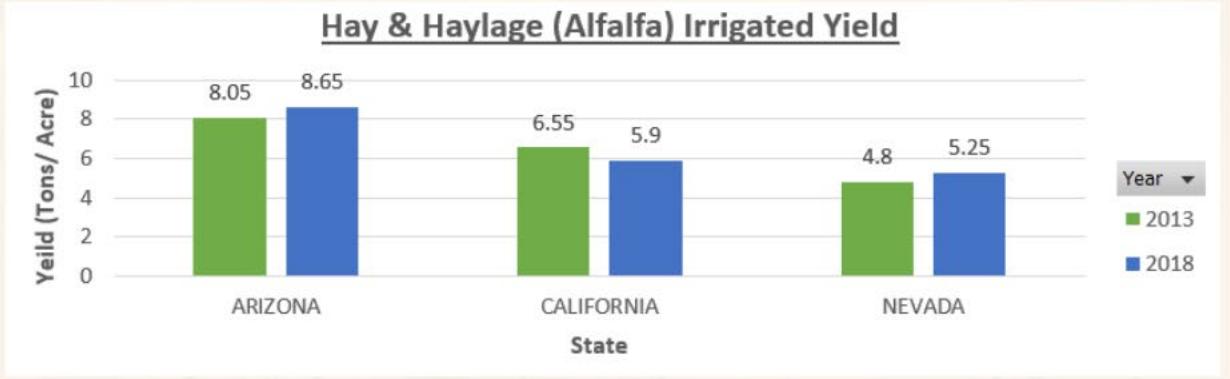
Understand the affect water management policies of the Colorado River Basin have on the agriculture industry in Arizona.

Results



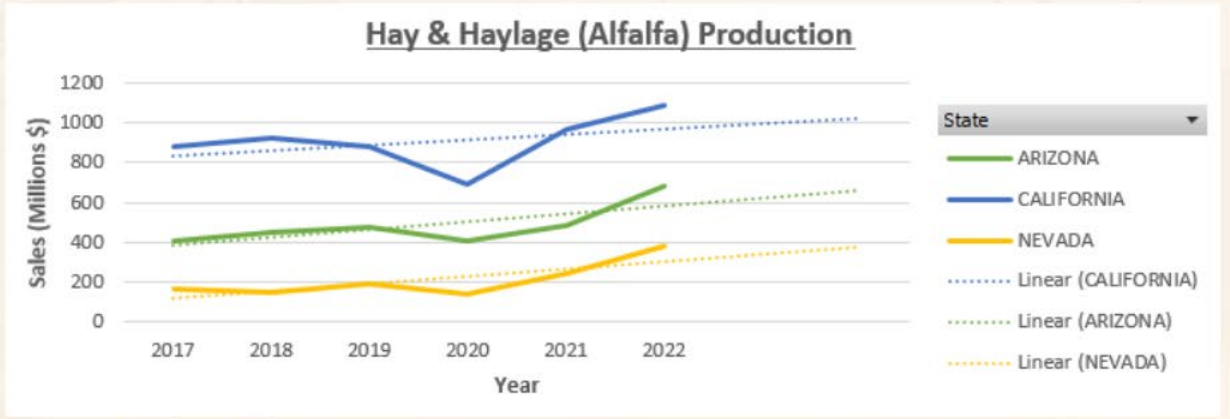
Water Input

- Arizona sees increased water applied



Yield Output

- Net change of 0.8 Tons/ Acre.



Price Element

- Upward trend in production; measured in sales (Millions $).

Conclusion

- **Price impact** has been significant as prices have roughly **doubled** since 2017.
- Water management policies have had **no significant** negative **impact** on hay and haylage production **quantity**.
- Patterns in **yield increase** follow that of **water applied**. Arizona and Nevada see slight uptakes while California decreases.

RELEVANT DISCUSSION

- 10,670,762 acre feet in the past five years entering the supply system (irrigation organizations).[2]
  - 1,390,290 acre feet in losses
- Farmers in southern Arizona followed Tier 2a cutbacks for 2023
- Expect to see great changes in research results in one year

Thank You!

For questions please come chat during breaks!

References

1. Shortage Impacts. Central Arizona Project. (2024, January). https://www.cap-az.com/water/cap-system/planning-and-processes/shortage-impacts/
2. USDA-National Agricultural Statistical Service (2013 -2022). Unpublished raw Data.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CFAES

Securing the future of the farm: Impacts of farm succession planning

Ryanna Tietje

Dr. Margaret Jodlowski & David Marrison

The Ohio State University

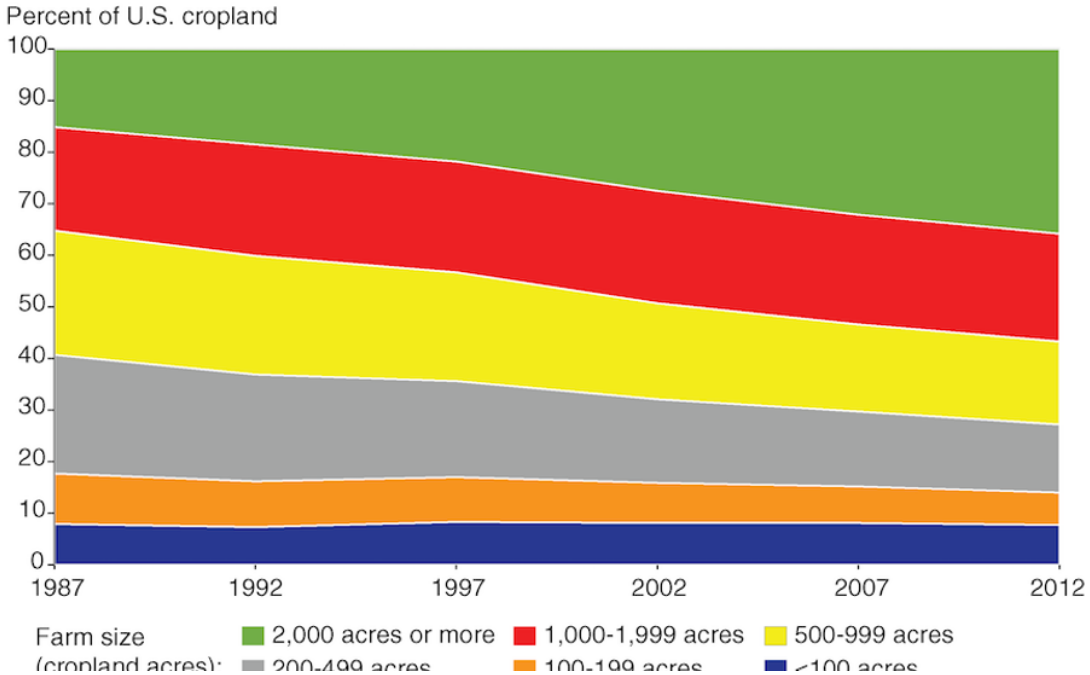
College of Food, Agricultural, and Environmental Sciences

My Background

- Raised on the family farm
- Studying Agribusiness and Applied Economics
- Internship experiences:
  - Ag lending
  - Grain risk management
  - Financial planning

Research Background

- Accelerating rates of farm consolidation



- Issues of connection to farming for young people

Research Objectives

- Which factors determine whether an operation has a succession plan?
- What is the relationship between succession planning and operational performance?
- Control for impact of variables impacting both presence of succession plan and farm's future financial stability

Methods

Self-designed Survey of Ohio's Farmers

- Distribute through the networks of OSU Extension, Ohio Corn & Wheat, Ohio Farm Bureau, and Ohio Soybean Council
- Collect data on demographic and farm characteristics of the primary operator, potential heirs, and agricultural operation
- Analyze relationships using descriptive statistics and regressions

Connect

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