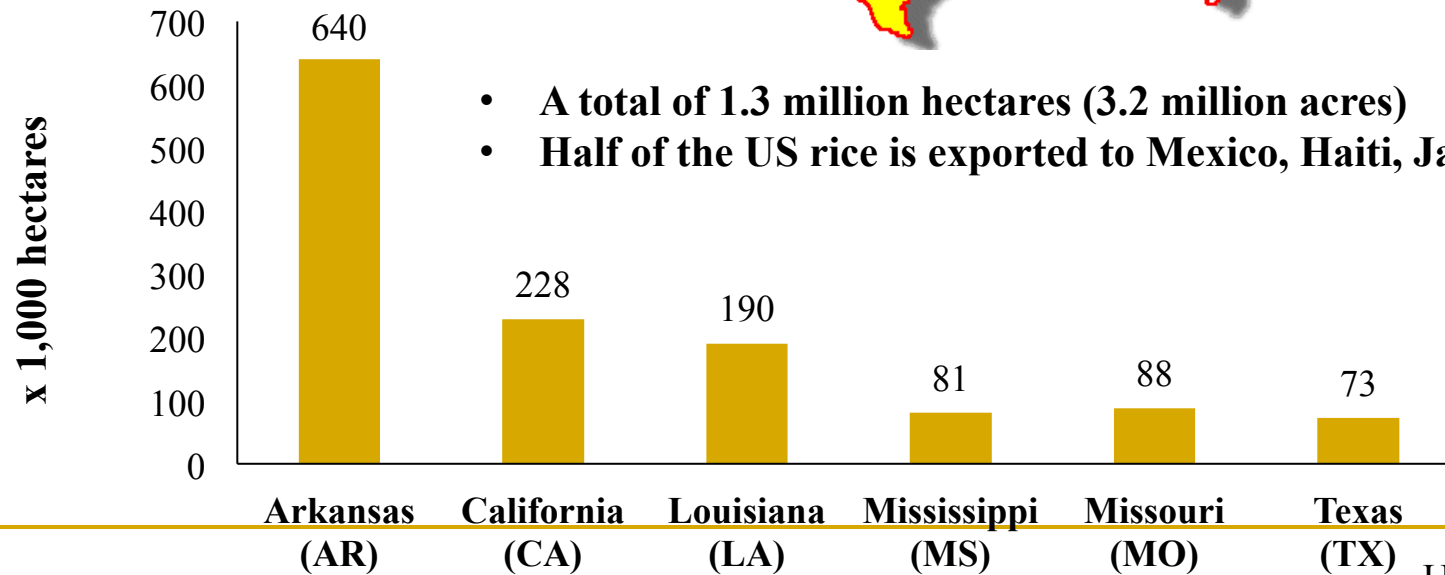
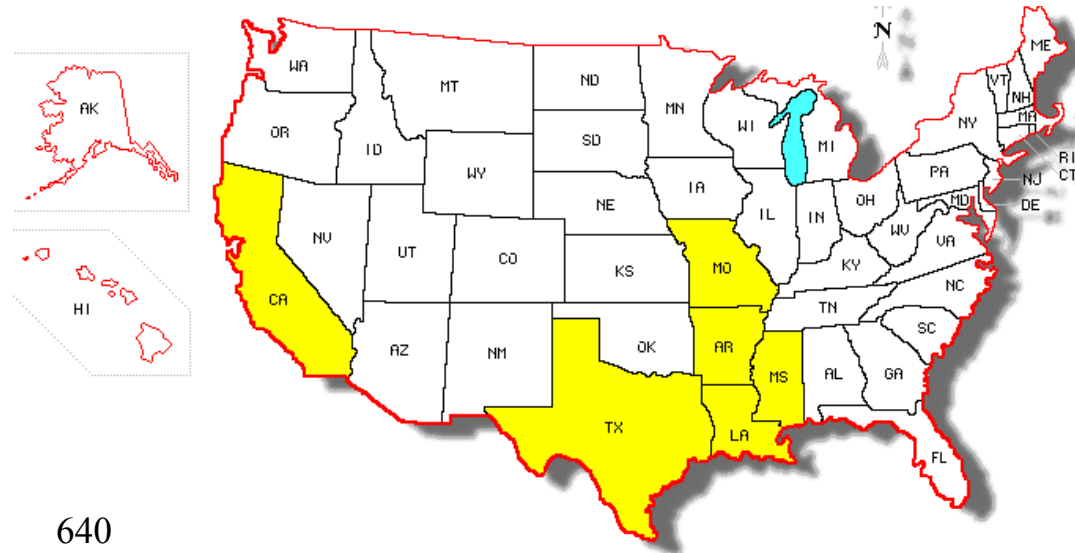


# Sustainable and Profitable Strategies for Integrated Pest Management in Southern Organic Rice

**Shane Zhou (PI)<sup>1</sup>, Anna McClung<sup>2</sup>, Fugen Dou<sup>1</sup>,  
Bradley Watkins<sup>3</sup>, Muthu Bagavathiannan<sup>1</sup>, Mo Way<sup>1</sup>,  
Bihu Huang<sup>4</sup>, Sixte Ntamatungiro<sup>4</sup> and Jessica Shade<sup>5</sup>**

<sup>1</sup>Texas A&M AgriLife Research, <sup>2</sup>USDA ARS Dale Bumpers National Rice Research Center, <sup>3</sup>University of Arkansas at Fayetteville, <sup>4</sup>University of Arkansas at Pine Bluff, and <sup>5</sup>The Organic Center

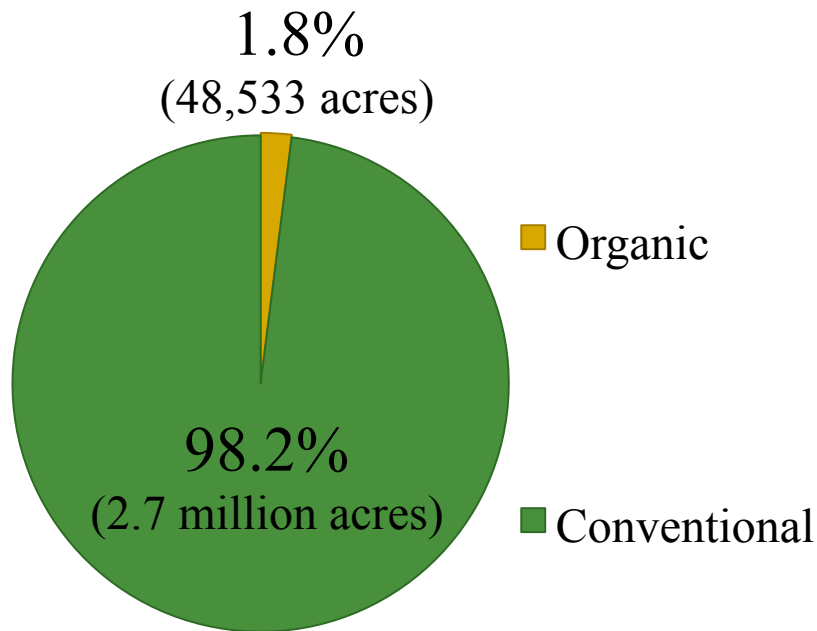
# Rice Hectarage in the U. S. in 2016



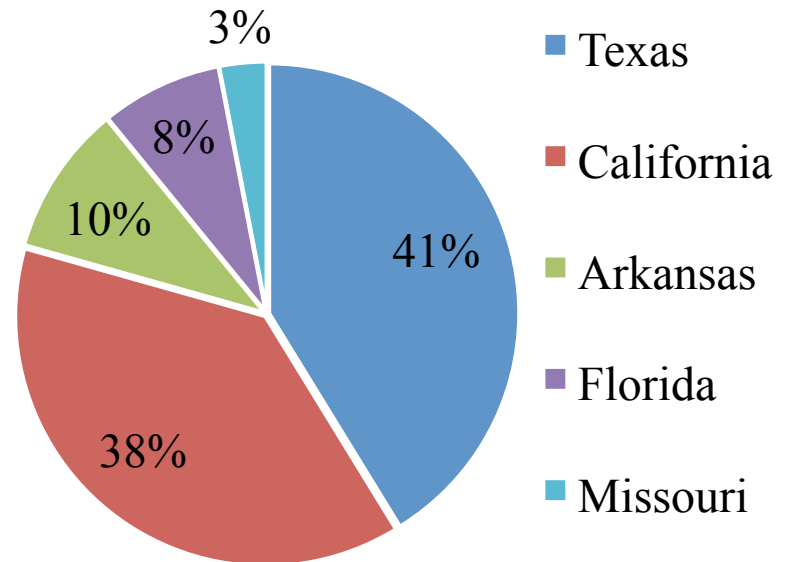
- A total of 1.3 million hectares (3.2 million acres)
- Half of the US rice is exported to Mexico, Haiti, Japan, etc.

# Organic Rice Production in the US

## Conventional vs. Organic Rice Acreage



## Distribution of Organic Rice in the US



# Challenges

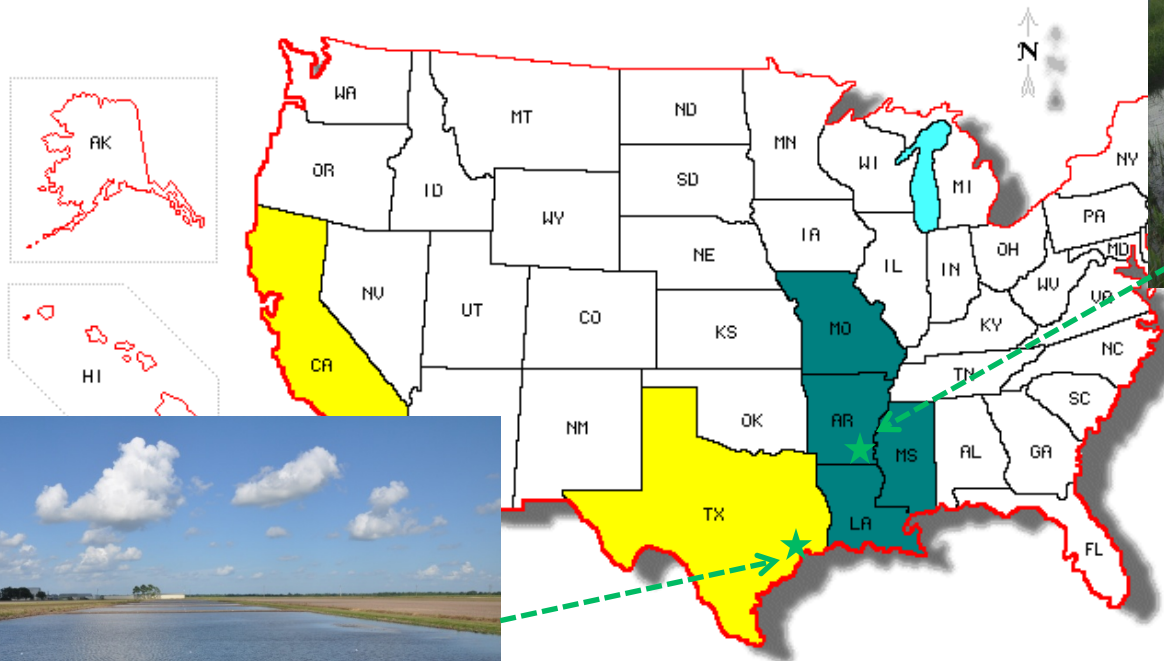
- ❑ Stand Loss
- ❑ Weed Control
- ❑ Disease Control
- ❑ Insect Pest Control
- ❑ Variety Selection



# Organic Rice Field Testing Sites



University of Arkansas,  
Pine Bluff, AR



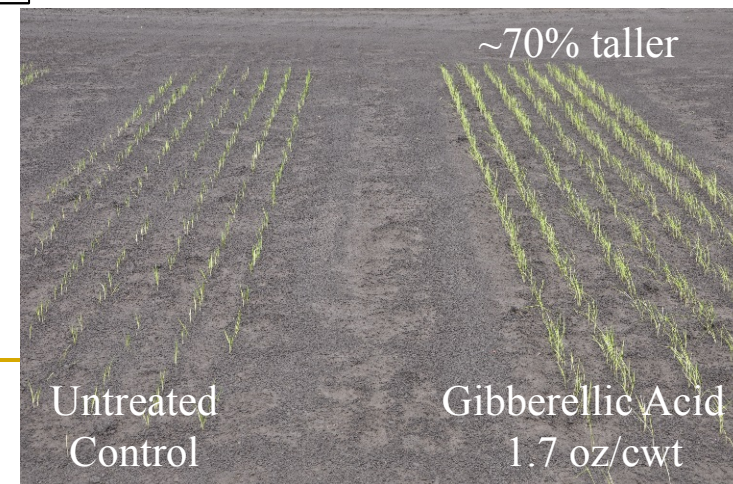
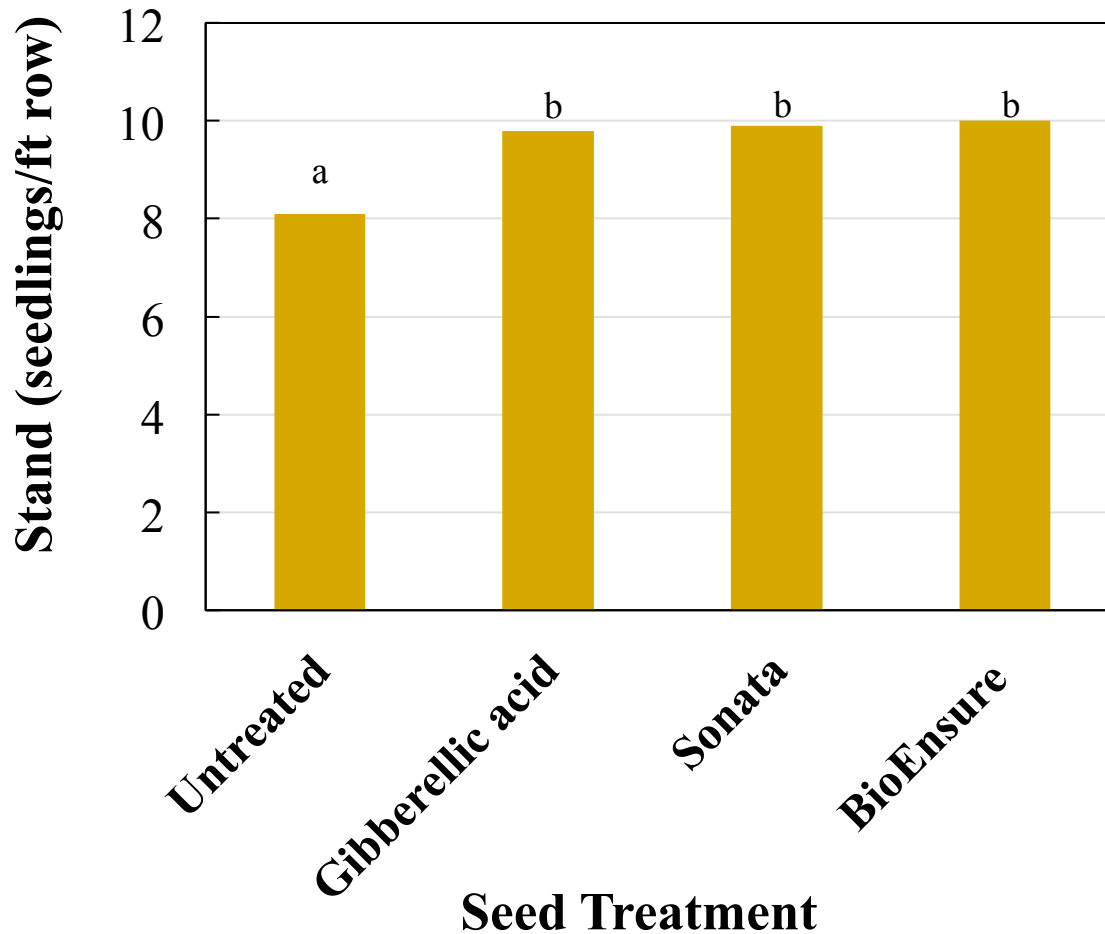
Texas A&M AgriLife Research  
Center, Beaumont, Texas

# Stand Loss

- Seed Rot and Seedling Diseases
  - ❑ *Rhizoctonia solani*
  - ❑ *Fusarium* spp.
  - ❑ *Pythium* spp.,
  - ❑ *Sclerotium rolfsii*
  - ❑ *C. miyabeanus*)



# Stand Improvement by Seed Treatment in 2016 and 2017



Sonata = *Bacillus pumilus*; BioEnsure = Fungal endophyte

# Stand Improvement by Seed Treatment with BioEnsure



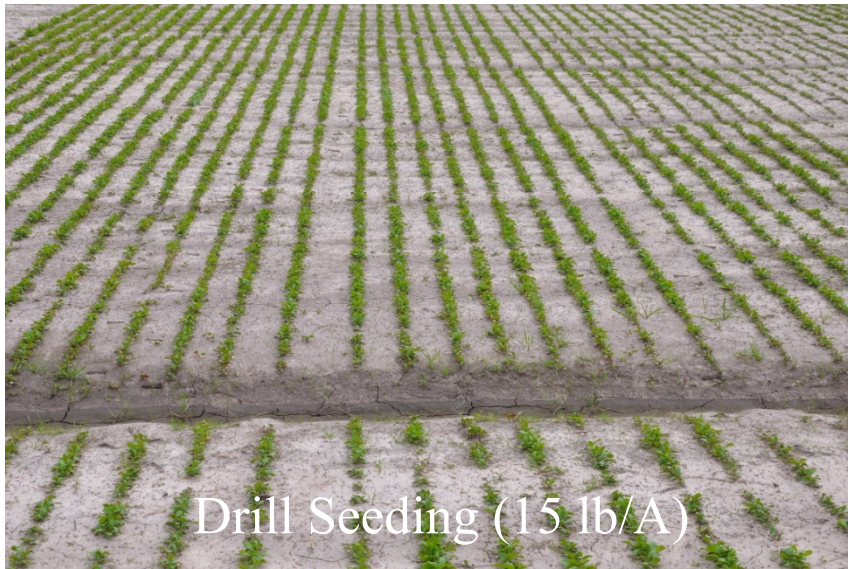
Untreated Control

BioEnsure Seed Treatment



# Stand Improvement by Cover Crops / Soil Amendments

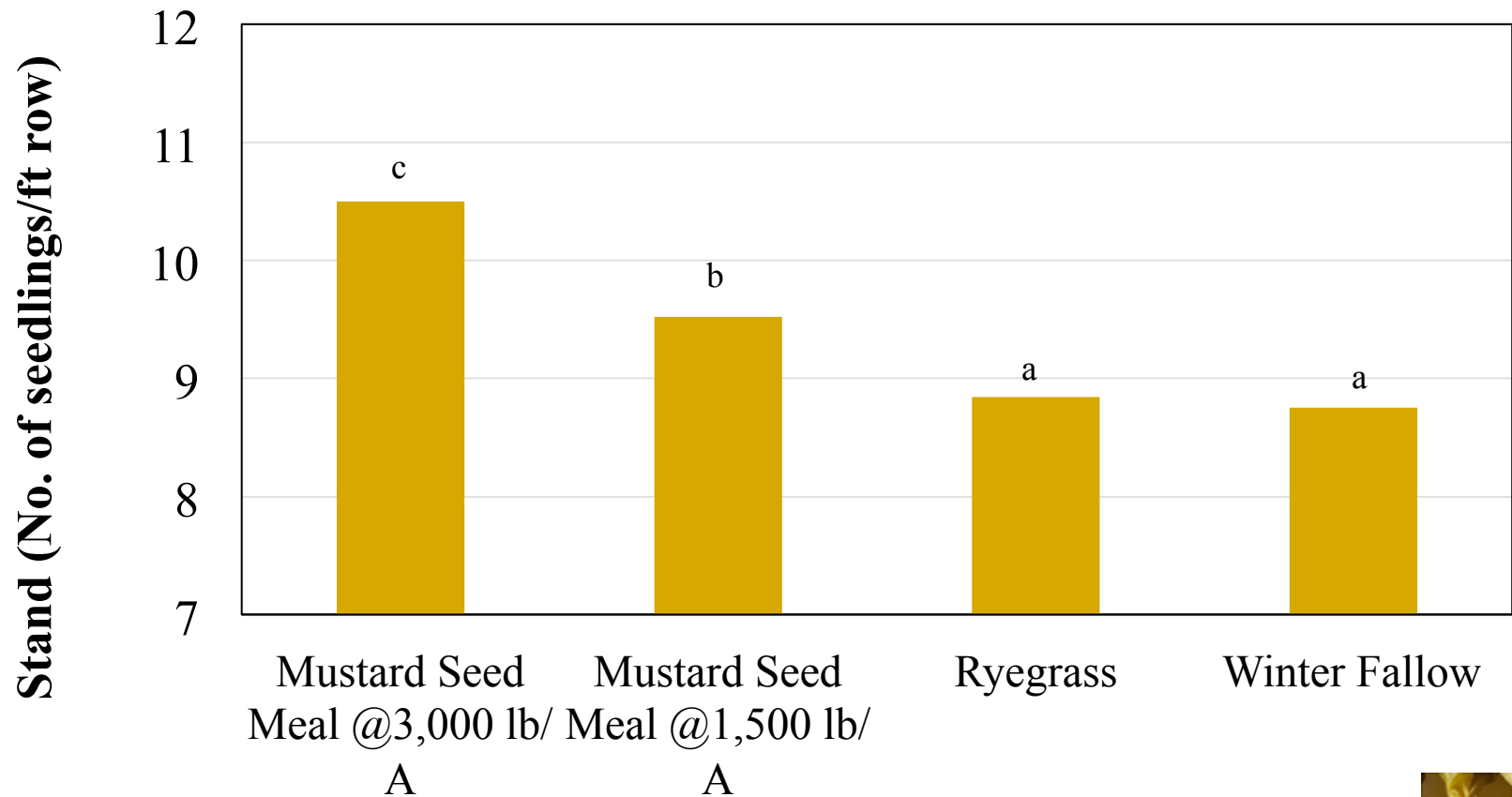
## Brassica (Mustard)



## Ryegrass Cover Crop



# Stand Improvement by Cover Crops / Soil Amendments - 2017



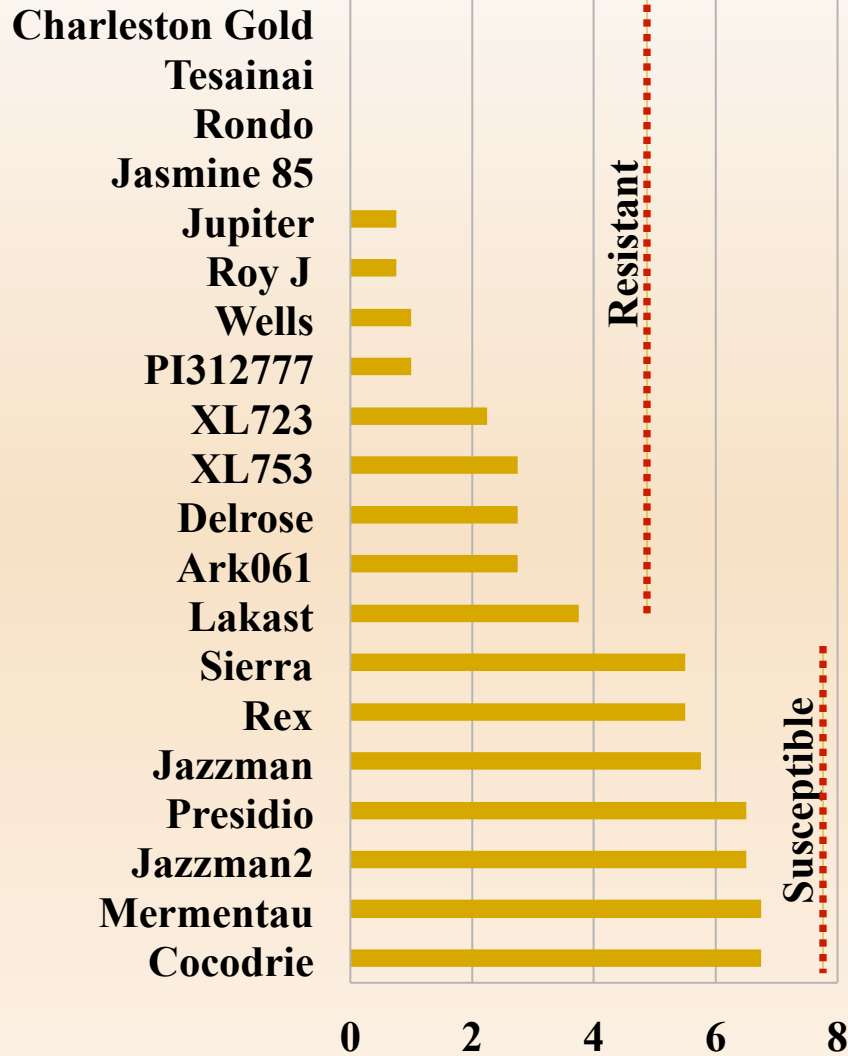
## Green Manure Cover Crop/Soil Amendment

Brassica (mustard) cover crop plus seed meals (4.5-1.5-1.2, N-P-K); Ryegrass fresh aboveground biomass (9,754 lb/A)



# Narrow Brown Leaf Spot Resistance - 2016

20 Cultivars



Narrow Brown Leaf Spot Severity

Resistant vs. Susceptible

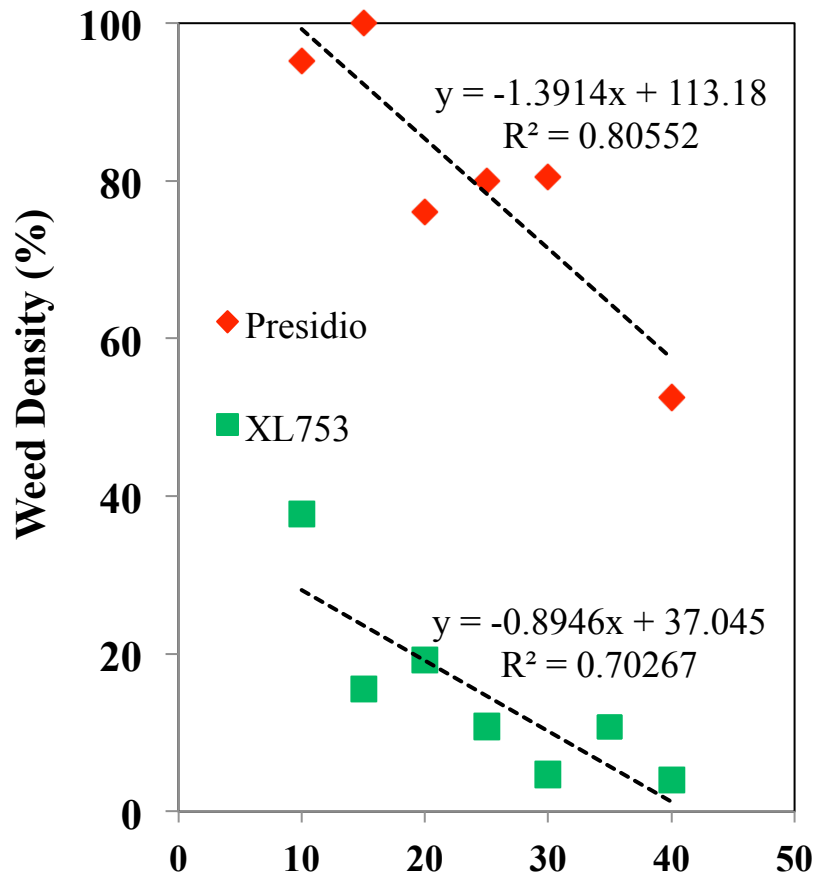


Hemp Sesbania

Hemp Sesbania, Baryardgrass, Signalgrass, Nusedge, etc.

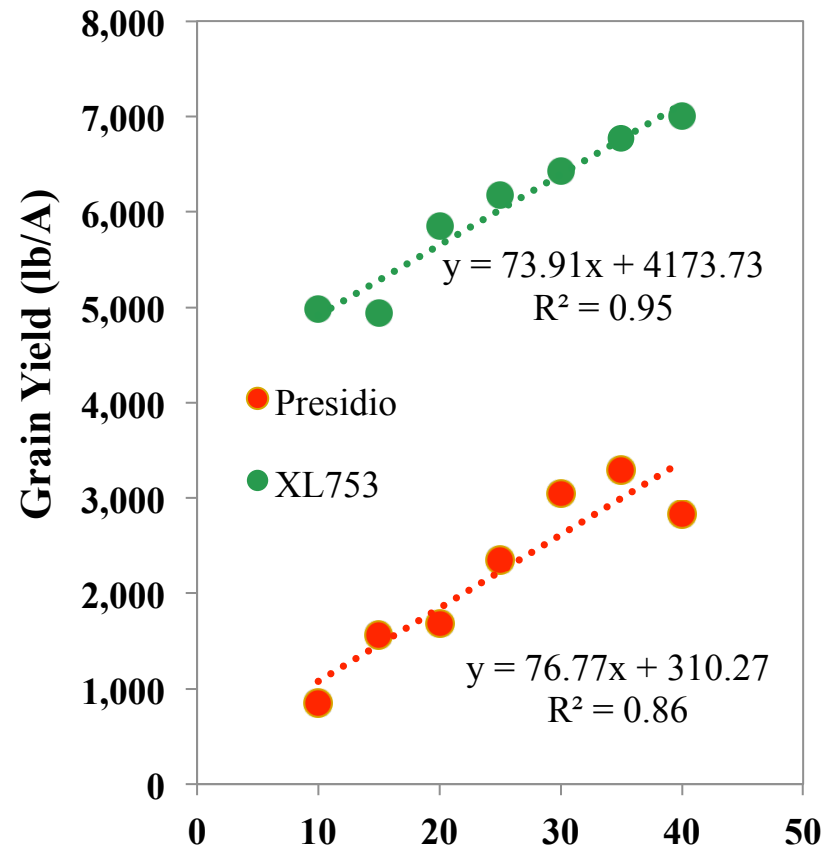
# Seeding Rate Effects on Weed & Yield

## Weed Density



Seeding Rate (seedling/ft<sup>2</sup>)

## Rice Grain Yield



Seeding Rate (seedling/ft<sup>2</sup>)

# Cultivar Selection for Weed Suppression



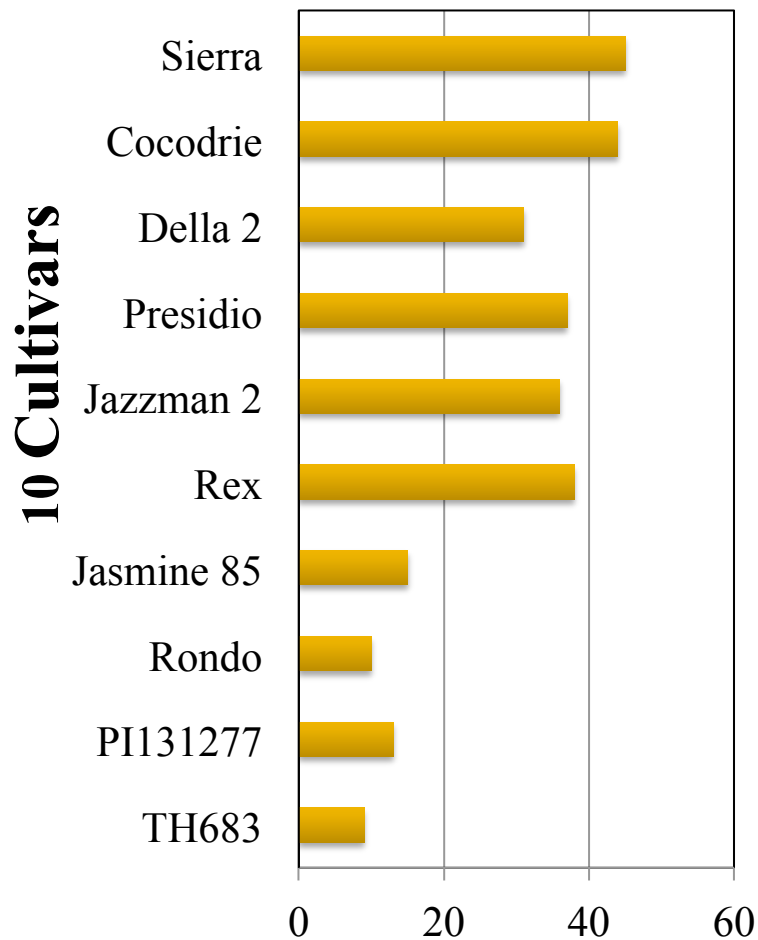
Cocodrie



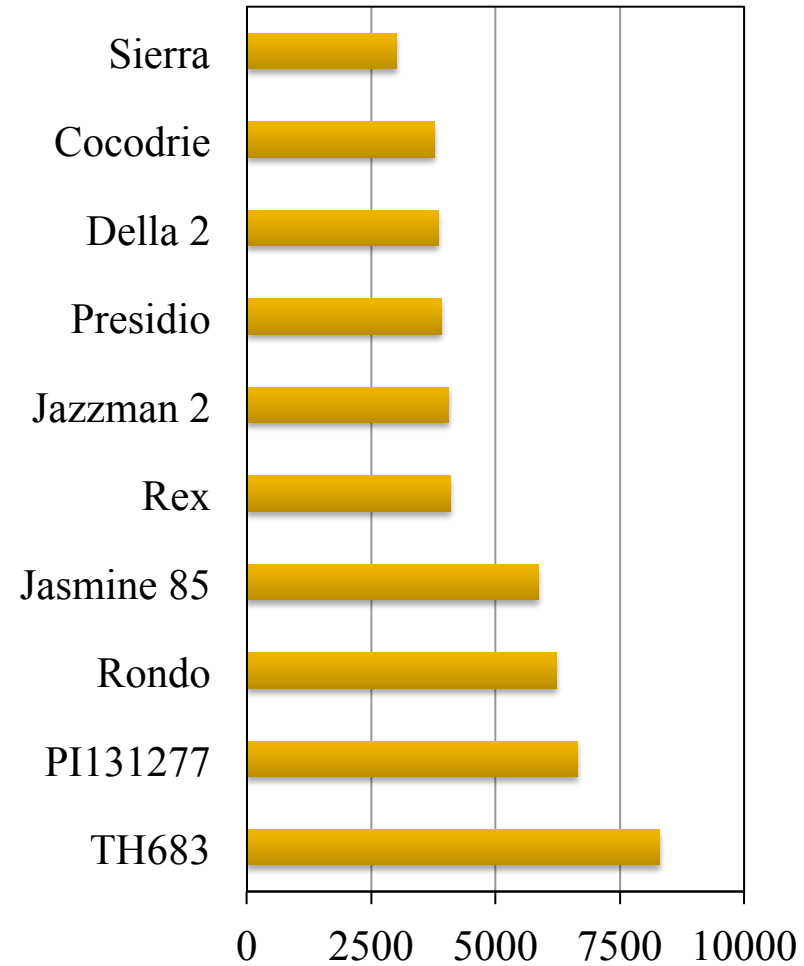
Rondo

# Cultivar Impact on Weed and Yield

## -2017



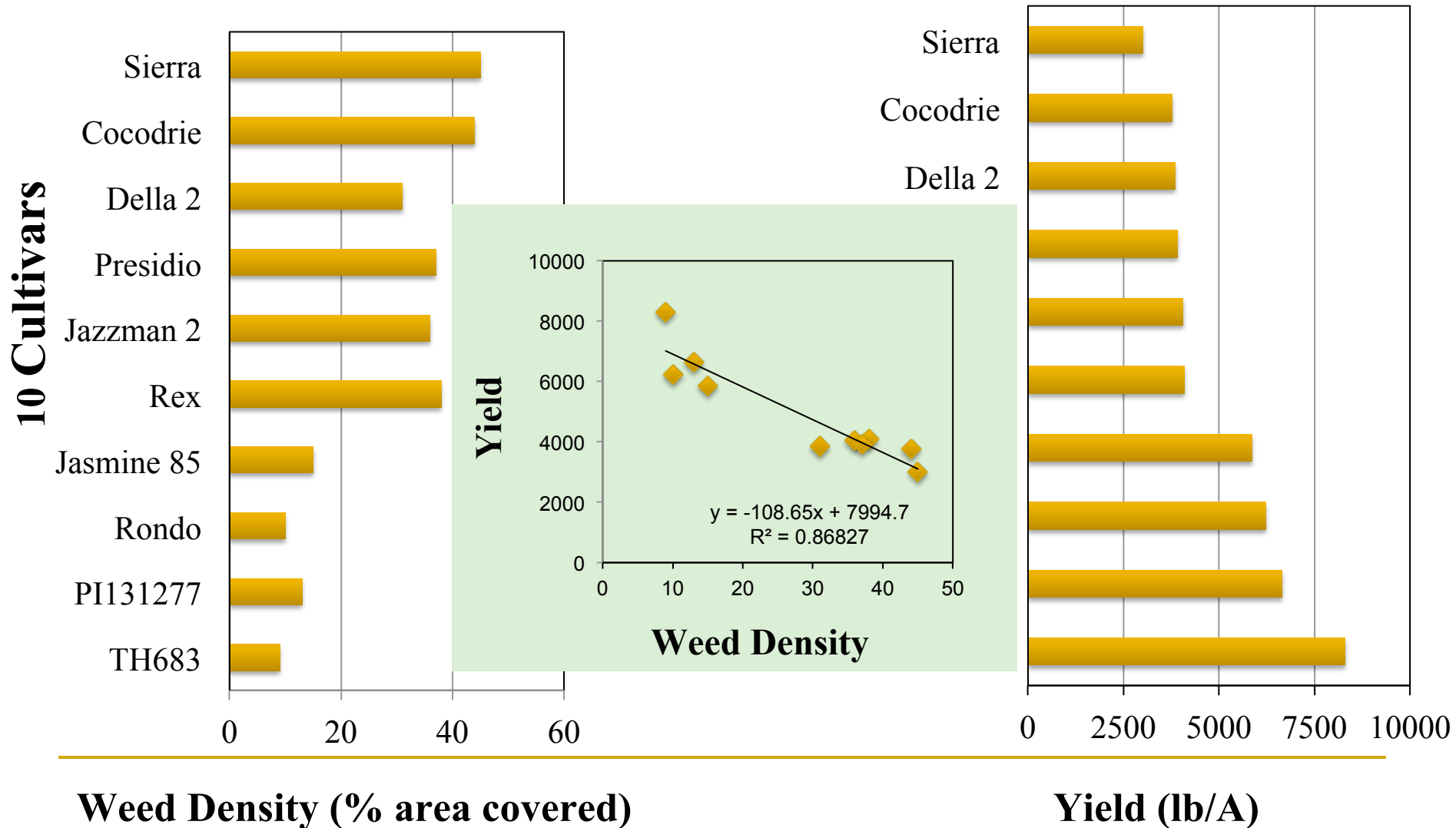
**Weed Density (% area covered)**



**Yield (lb/A)**

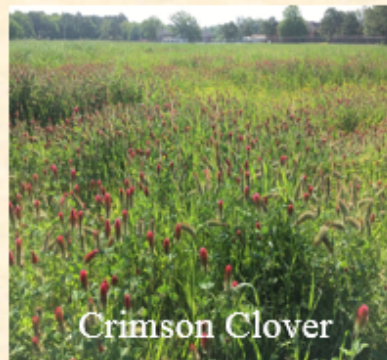
# Cultivar Impact on Weed and Yield

## -2017



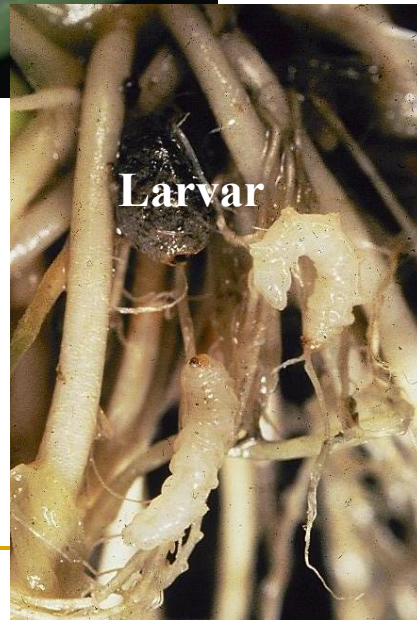


# Cover Crops for Weed Suppression



Winter and summer green manure crops in Texas and Arkansas.

# Evaluating for Rice Water Weevil Control



# Rice Water Weevil Sampling



# Relative Susceptibility of Cultivars to Rice Water Weevil

Cultivar	Very Susceptible	Susceptible	Moderately Susceptible
Cocodrie	x		
Cheniere	x		
CLXL745	x		
Cypress	x		
XL753		x	
XL723		x	
Jupiter		x	
Presidio		x	
Cypress		x	
CL151			x
CLXL729			x
Rondo			x

# Rice Cultivar Mean Net Return Rankings by Conventional and Organic Management

Cultivar	Conventional		Organic	
	Net Return \$/acre	Ranking (1 to 13)	Net Return \$/acre	Ranking (1 to 13)
PI 31277	84	8	1039	7
PI 338046	55	12	1029	8
Rondo	5	13	1110	5
Tesanai 2	202	2	1595	1
Bengal	65	10	987	9
Jupiter	868	1	1347	2
Cocodrie	165	4	918	11
Colorado	99	6	606	13
Cybonnet	88	7	979	10
Presidio	152	5	1076	6
Wells	70	9	1235	4
Jazzman	62	11	1284	3
Sierra	181	3	879	12

Spearman's Rank Correlation Coefficient

$$R_s = 0.005 \text{ (} p = 0.9858 \text{)}$$

---

# Top Six Rice Cultivars by Management Based on Mean Economic Net Returns Alone

## □ *Conventional*

1. Jupiter
2. Tesanai 2
3. Sierra
4. Cocodrie
5. Presidio
6. Colorado

## □ *Organic*

1. Tesanai 2
  2. Jupiter
  3. Jazzman
  4. Wells
  5. Rondo
  6. Presidio
-

# Outreach Activities in 2016 & 2017

No.	Meeting/Symposium/Workshop/Field Day	Date	Location
1	Weed Science Society & Southern Society	2/8-11/2016	San Juan, Puerto Rico
2	Organic Rice Symposium	3/1/2016	Galveston, TX
3	Advisory Board meeting	3/1/2016	Galveston, TX
4	36th Rice Technical Working Group Meeting	3/1-3/4/2016	Galveston, TX
5	Intern. Rice Market & Technology Convention	5/31-6/2/2016	Houston, TX
6	Eagle Lake Field Day	6/28/2016	Eagle lake, TX
7	Organic Rice Workshop	7/14/2016	Beaumont, TX
8	Advisory Board Meeting	7/14/2016	Beaumont, TX
9	Beaumont Field Day	7/14/2016	Beaumont, TX
10	American Phytopathological Society Meeting	7/30-8/3/2016	Tampa, FL
11	Texas Rice Festival	9/28-10/1/2016	Winnie, TX
12	Cuba Global Trade Show	11/1-4/2016	Havana, Cuba
13	West Texas Rice Conference	1/28/2017	El Campo, TX
14	Southern Weed Science Society Annual Meeting	2/27/2017	Birmingham, AL
15	Annual Rural Conference	4/1-5/2017	Atlanta, GE
16	Eagle Lake Field Day	6/28/2017	Eagle lake, TX
17	Beaumont Field Day	7/14/2017	Beaumont, TX
18	American Phytopathological Society Meeting	7/30-8/3/2016	Tampa, FL



Science to Practice

APS Annual Meeting

July 30–August 3 • Tampa, Florida

2016



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# Outreach Activities (More)

## ■ **Webpage**

- ❑ <http://bit.ly/299L2W5> for USDA NIFA OREI-Funded Organic Rice IPM Research Project with 81 update entries

## ■ **Google Adwords**

- ❑ Generated a total of 319,573 clicks and 9,153,058 ad views

## ■ **Social Media**

- ❑ Twitter page has 222 followers, 54 Tweets, and 40 photos
- ❑ Posts generated 116,127 impressions

## ■ **Press**

- ❑ Press Release can be found on 214 websites
  - ❑ Release has a potential total audience of 11,804,269 unique visitors per day
  - ❑ Total potential audience from tweets of the press release is 30,976 followers
-



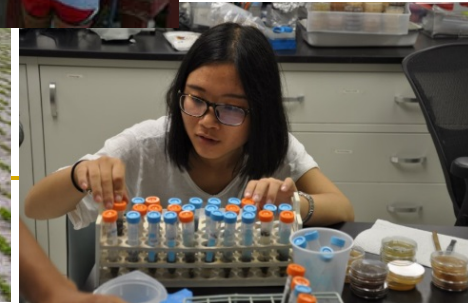
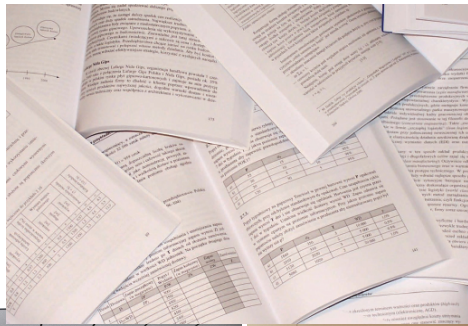
# Publications & Training Opportunities

## Publications

- Articles and Reports: 9
- Oral Presentation: 22
- Poster Presentation: 8
- Extension Publications: 4

## Training Opportunities

- Undergraduate Students: 13
- Graduate Students: 3
- Postdocs: 4
- Technicians: 4



# Thank You

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