

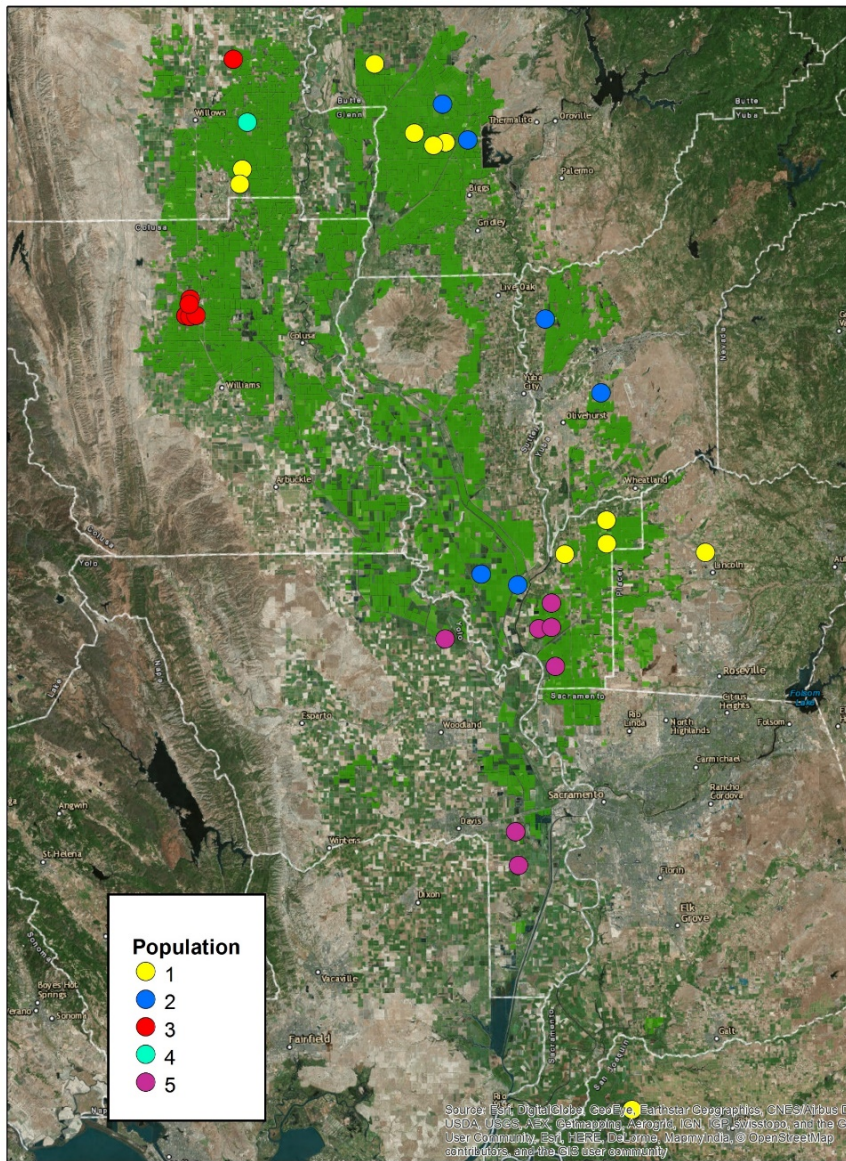
Weedy Rice and Emerging Weed Issues

UCCE Winter Grower Meetings 2019

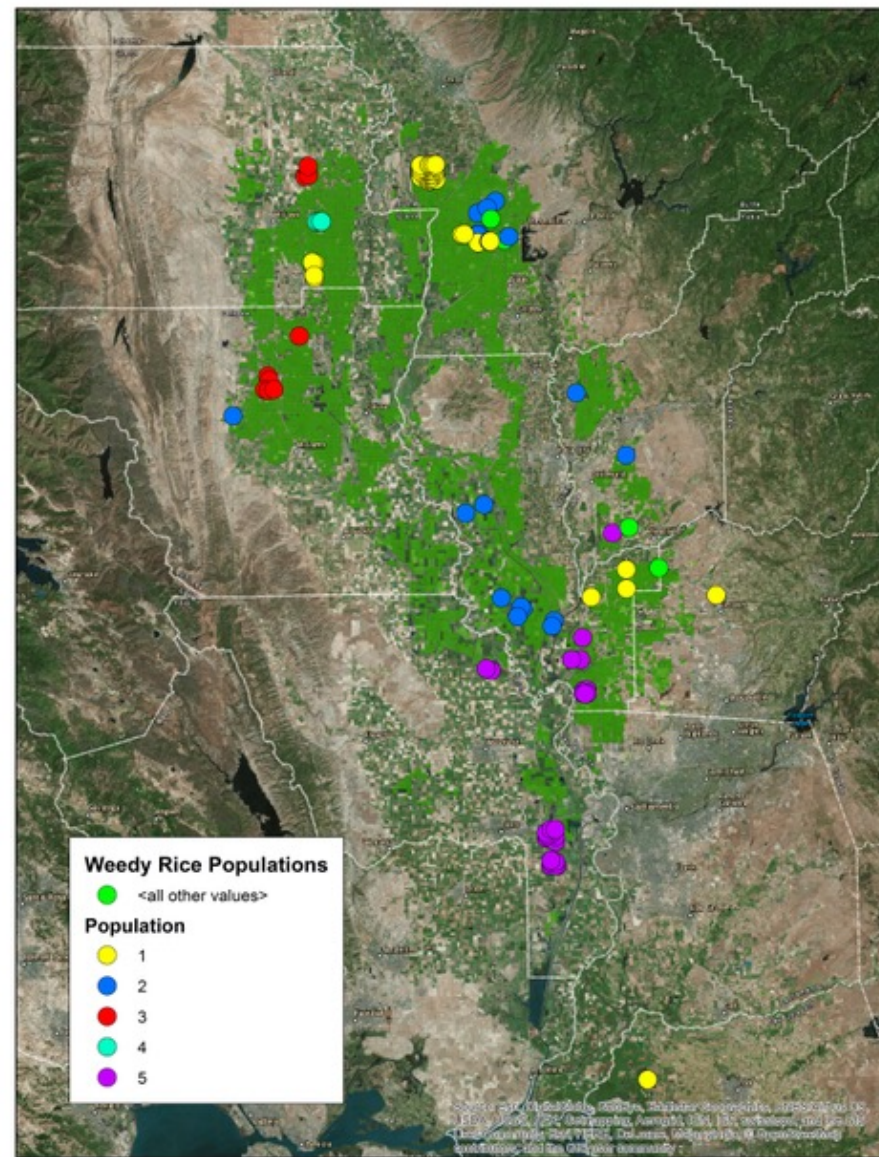
Whitney Brim-DeForest

CE Rice Advisor (Sutter, Yuba, Placer, Sacramento Counties)





2016



2017

****Only a few new fields found in 2017****

Field Survey: 2018

By the end of the season, we had a total of:

- 25 samples submitted
- 5 were confirmed to be weedy rice
- 4 total sites (1 site had 2 types)

- Total new acreage not yet determined


Many Arborio rices submitted:

- Industry still needs to carefully watch contamination issues, i.e. overflights, not cleaning out between varieties, etc.

1 new biotype identified



Photos: Timothy Blank, CCIA

- 
- A close-up photograph of rice panicles in a field. The panicles are filled with golden-brown rice grains, and the green leaves of the rice plants are visible in the background. The lighting is bright, suggesting a sunny day.
- All rice-growing counties (except for Colusa)

- **Type 1:**

- Awnless
- Straw hull color
- Tall stature
- No color on nodes

- 
- The image consists of two side-by-side photographs of rice panicles. Each panicle is composed of several branches, each bearing numerous small, elongated, golden-brown rice grains. The grains have a distinct bronze or coppery hue. The panicles are attached to long, slender, light green leaves that are slightly curved. The entire specimen is set against a solid black background, which makes the golden-brown grains and green leaves stand out. In the top right corner of the right-hand photograph, there is a white rectangular box containing text.
- Butte, Sutter and Yuba Counties

- **Type 2:**
 - Awnless
 - ***Bronze hull color***
 - Tall stature
 - No color on nodes

- **Type 3:**

- *Awned*
- Straw hull color
- Tall stature
- No color on nodes

- **Glenn and Colusa Counties**



- **Type 4:**
 - *Awned*
 - *Black hull color*
 - *Short stature*
 - No color on nodes



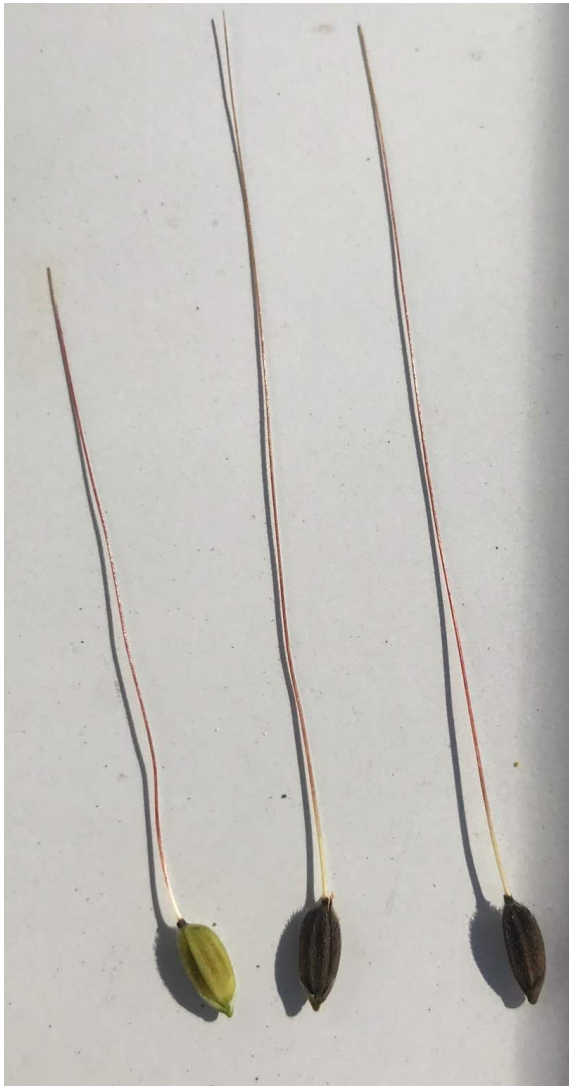
- **Currently in one location, Glenn County**

- **Type 5:**

- Awnless
- Straw hull color
- Tall stature
- ***Purple-colored nodes***



- **Sutter, Yuba, and Yolo Counties**



Type 6:

- Black-hulled
- Awned
- Awns are red in color before maturity
- Plant height is similar to other types
- 1 location (Butte County)



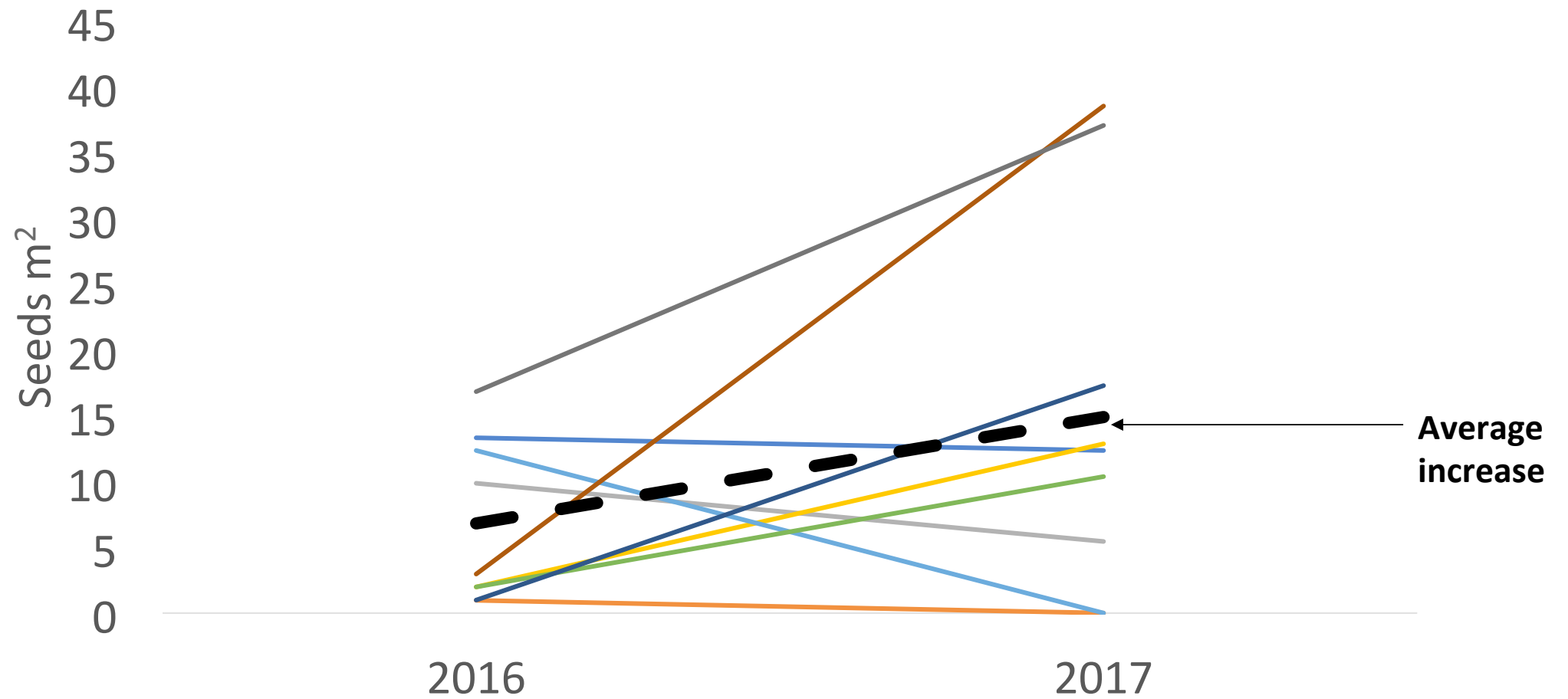
Soil Seedbank Surveys: Fall 2016-2018

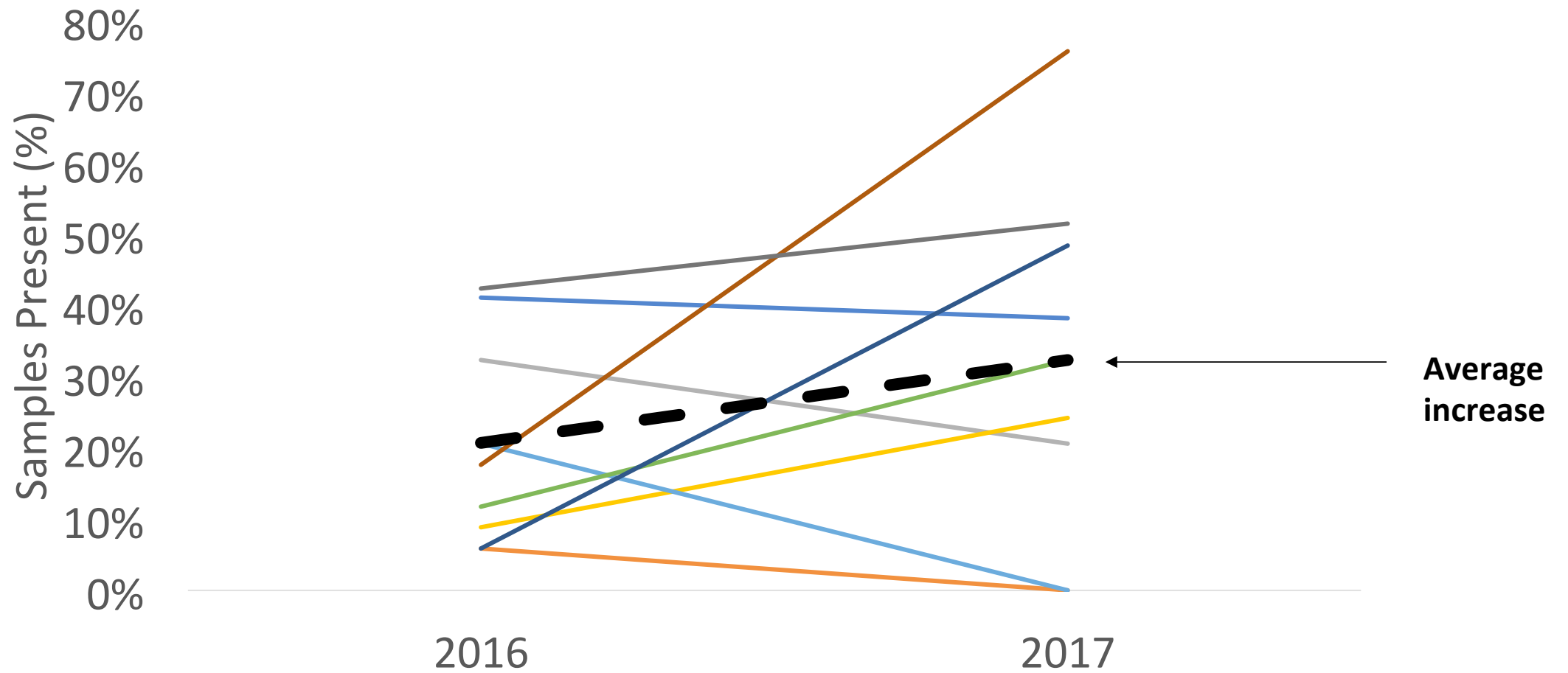
- Sample 10 fields with known infestations
 - Participating growers
- 34 soil cores taken every 20 feet along transect
- Soil samples were washed in a saline (salt) solution to extract organic matter
- Rice seeds found in each core were subjected to a KOH (potassium hydroxide) test



Weedy rice seed counts from soil samples collected in fall 2016 and fall 2017.

County	Ecotype	Seeds m⁻²		Samples Present (%)	
		2016	2017	2016	2017
Butte	1	13.4	12.4	41	38
Sutter	1	1.0	0.0	6	0
San Joaquin	1	9.9	5.4	32	21
Glenn	1	2.0	12.9	9	24
Yuba	2	12.4	0.0	21	0
Sutter	2	2.0	10.4	12	32
Colusa	3	1.0	17.3	6	48
Colusa	3	3.0	38.6	18	76
Sutter	5	16.8	37.1	42	52

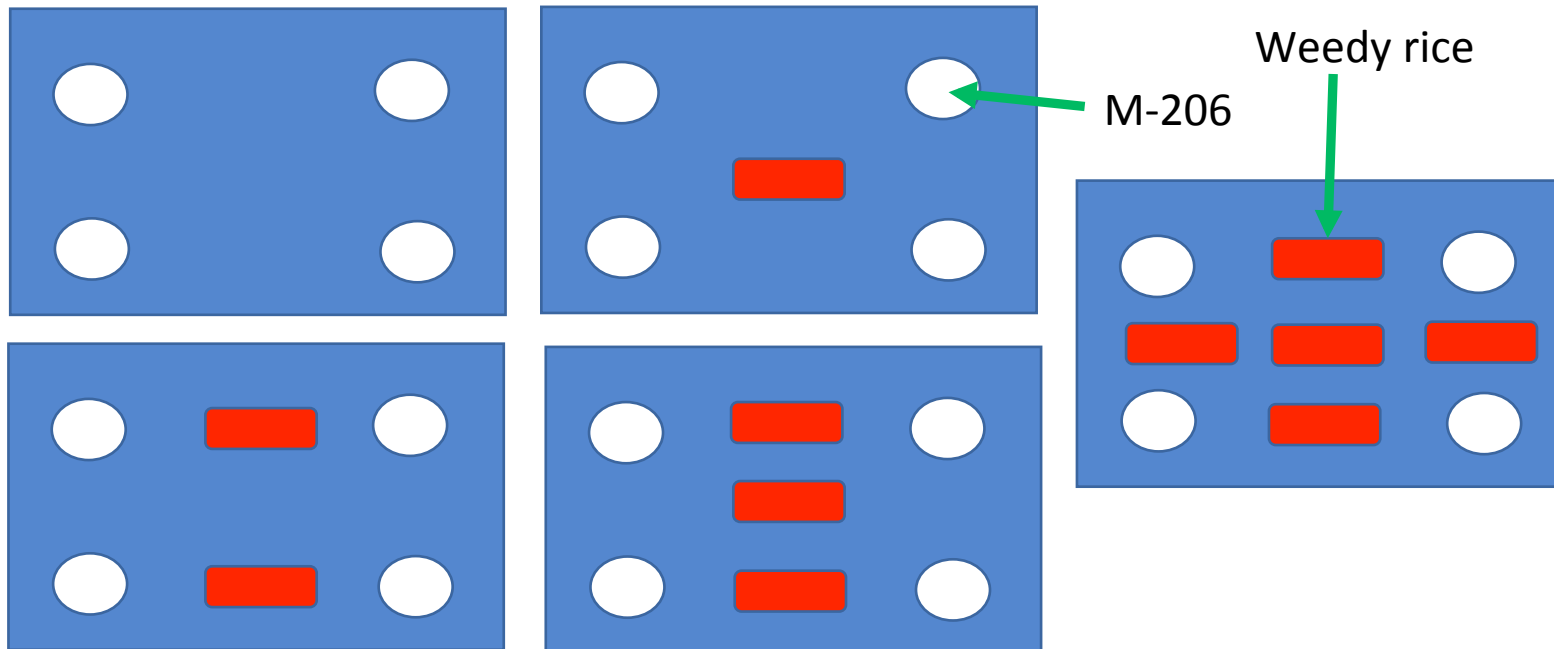




Competition Study

Additive Design:

8, 16, 24 and 40 plants per meter squared



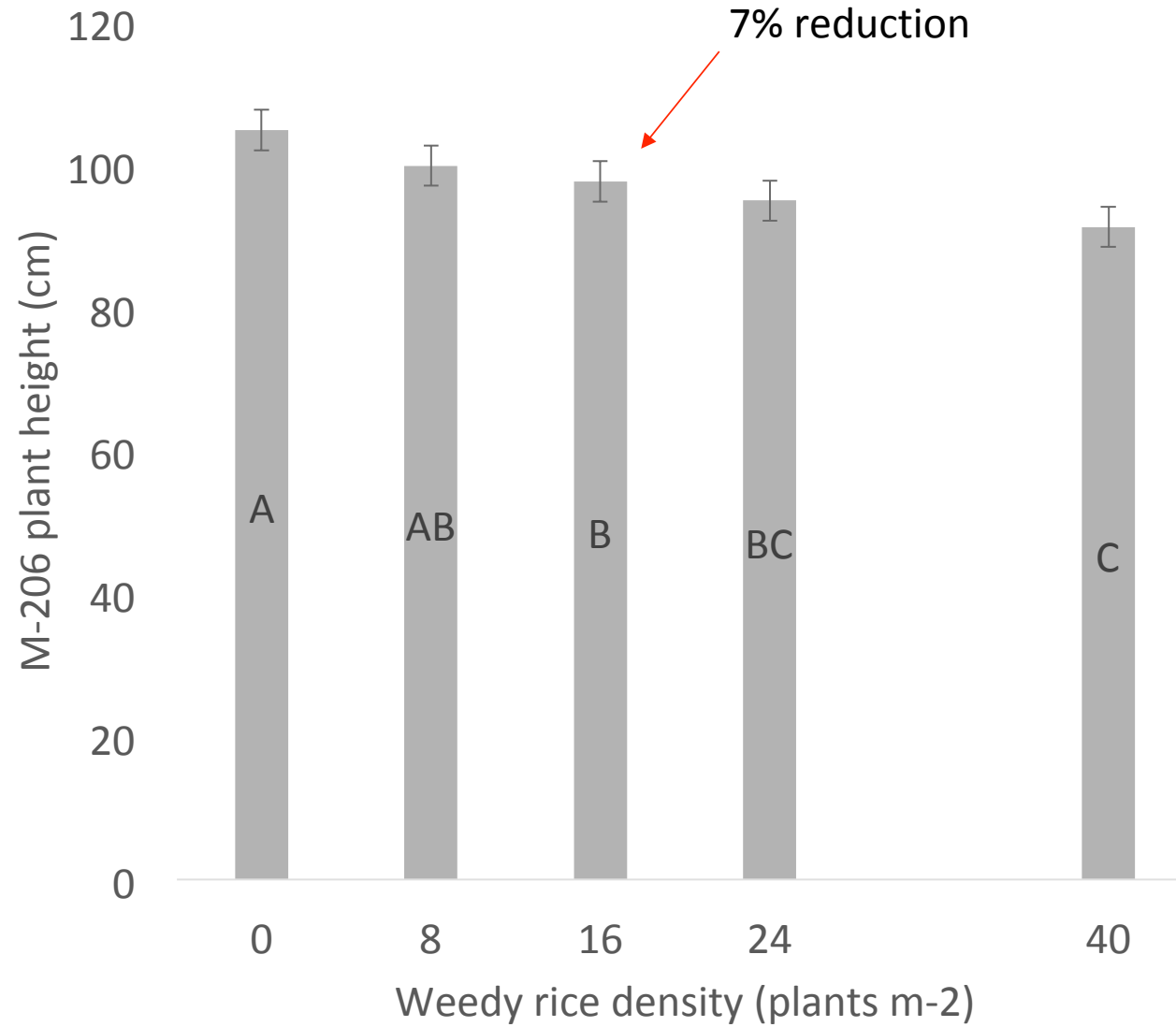
Impacts on M-206

- Results are still preliminary!!

Plant Height

Weedy rice density:

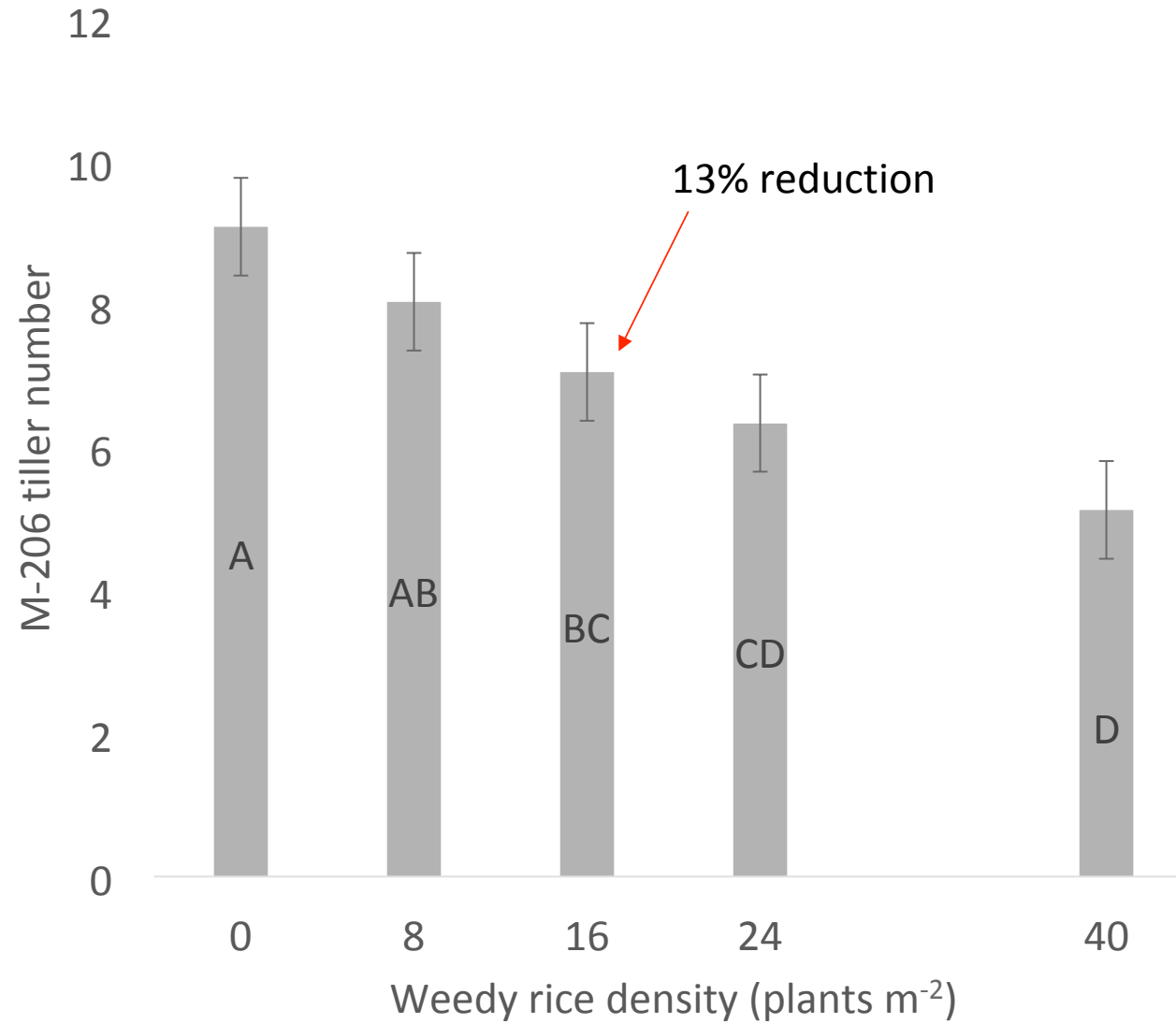
- Significant reduction in plant M-206 plant height with 16 plants m⁻² and above



Tiller Number

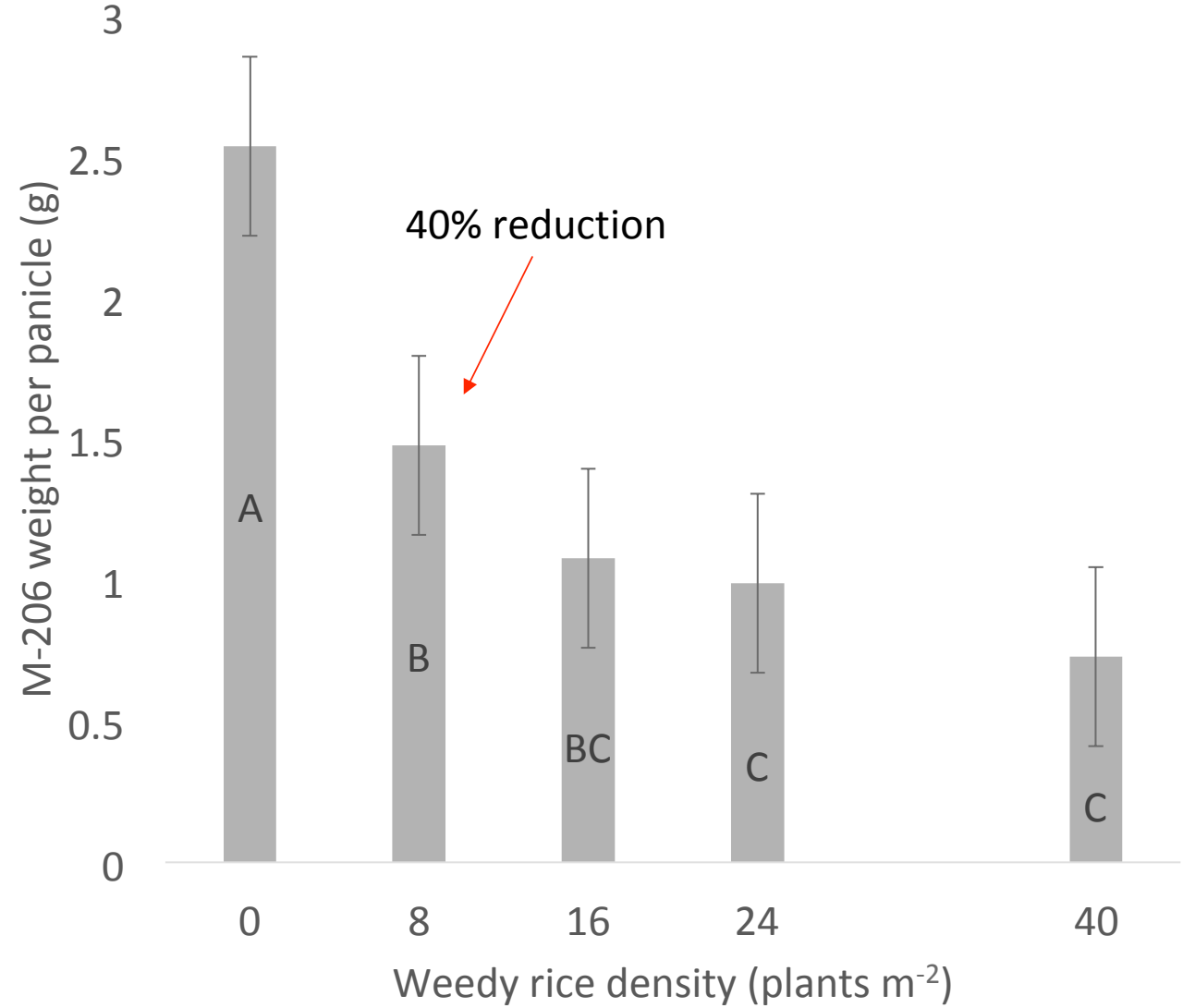
Weedy rice density:

- Significant reduction in M-206 tillering with 16 plants m⁻² and above



Weight per Panicle

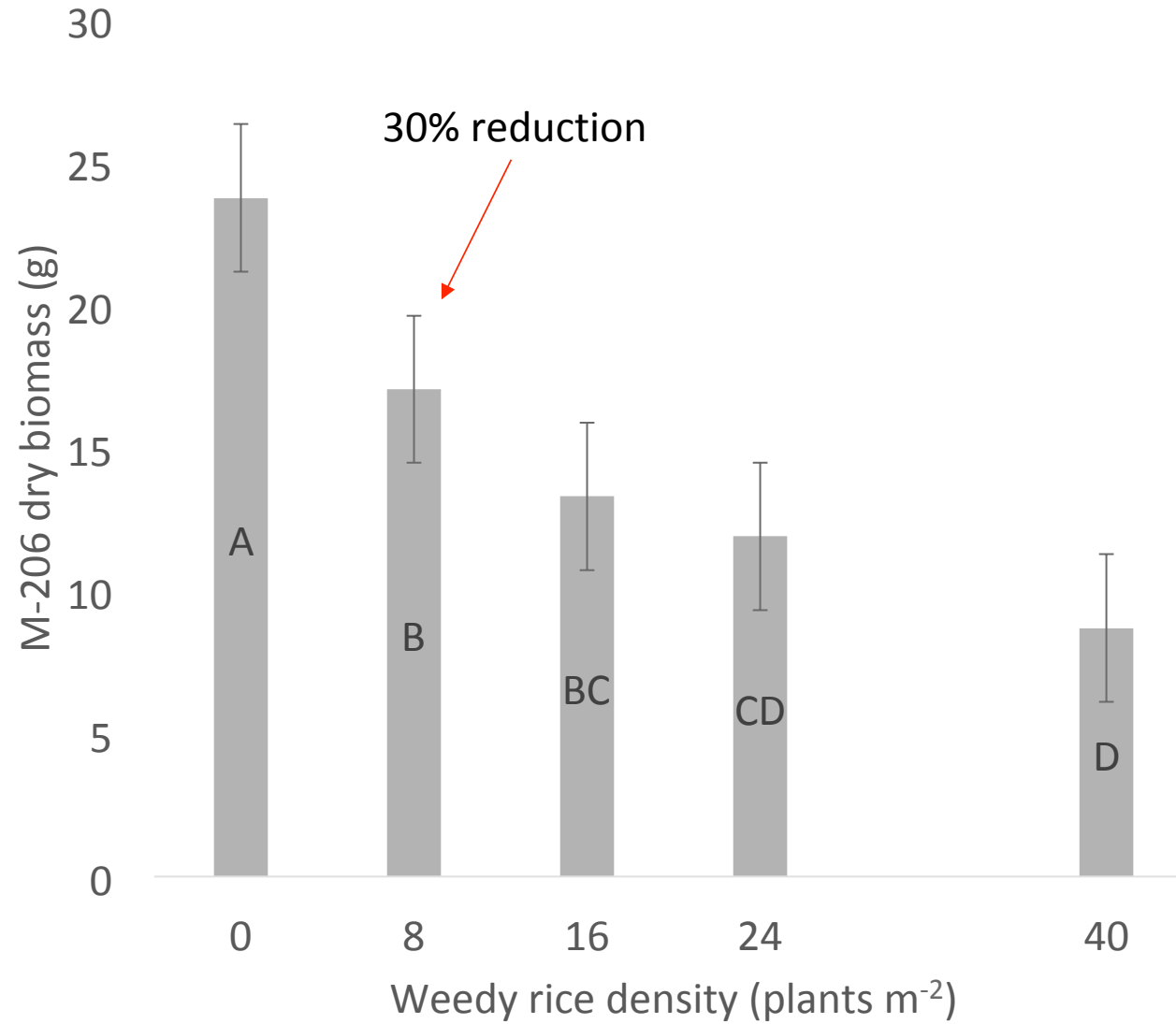
- Weedy rice density:**
- Significant reduction in M-206 panicle weight, with only 8 plants m⁻²



Biomass

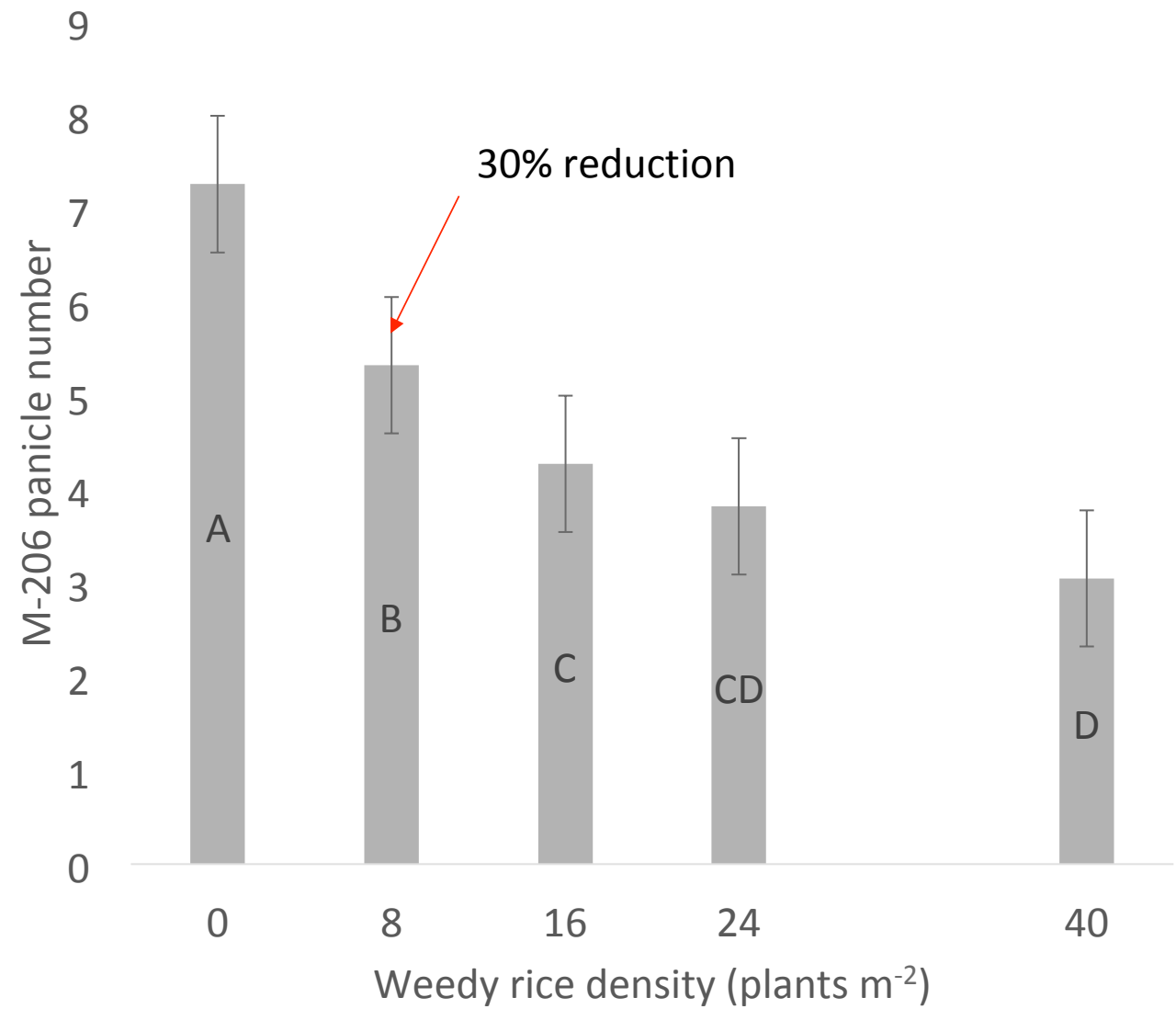
Weedy rice density:

- Significant reduction in M-206 dry biomass, with only 8 plants m^{-2}



Panicle Number

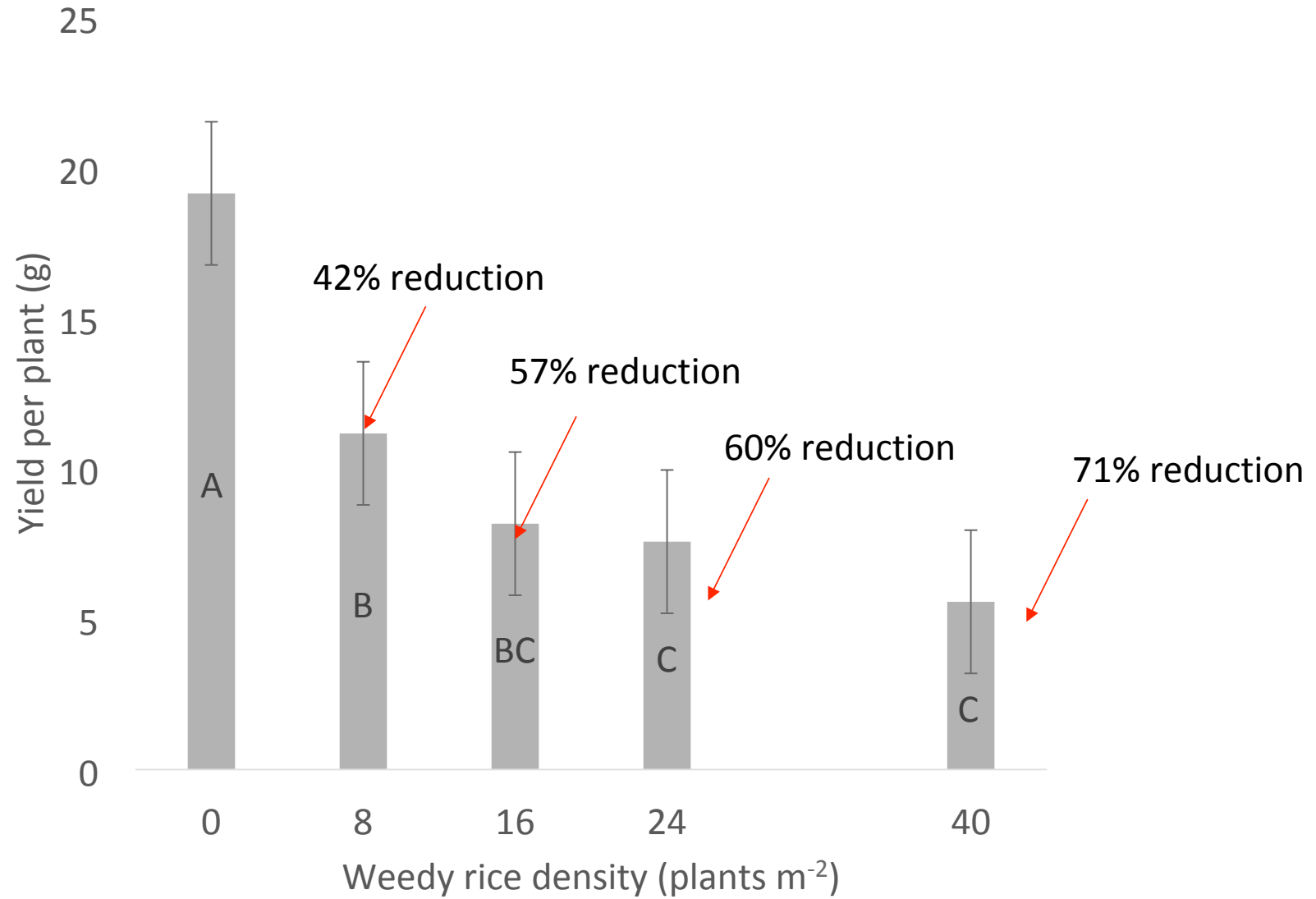
- Weedy rice density:**
- Significant reduction in M-206 panicle number, with only 8 plants m^{-2}



Yield per Plant

Weedy rice density:

- Significant reduction in M-206 yield per plant, with only 8 plants m^{-2}



M-206 Summary

- Regardless of biotype, weedy rice density of 8 plants m⁻² affected:
 - **Weight per Panicle:** from 2.5 g to 1.5 g (40% reduction)
 - **Dry Biomass:** from 24 g per plant to 17 g per plant (30% reduction)
 - **Panicle Number:** from 7 panicles per plant to 5 panicles per plant (30% reduction)
 - **Yield per Plant:** from 19 g per plant to 11 g per plant (40% reduction)
- Regardless of biotype, weedy rice density of 16 plants m⁻² affected:
 - **Height:** from about 105 cm to about 98 cm (7% reduction)
 - **Tillering:** from about 9 tillers per plant to about 7 tillers per plant (13% reduction)

Weedy Rice Drone Mapping

Sean Hogan, UCANR Informatics and GIS (IGIS) Statewide Program

Whitney Brim-DeForest, Luis Espino

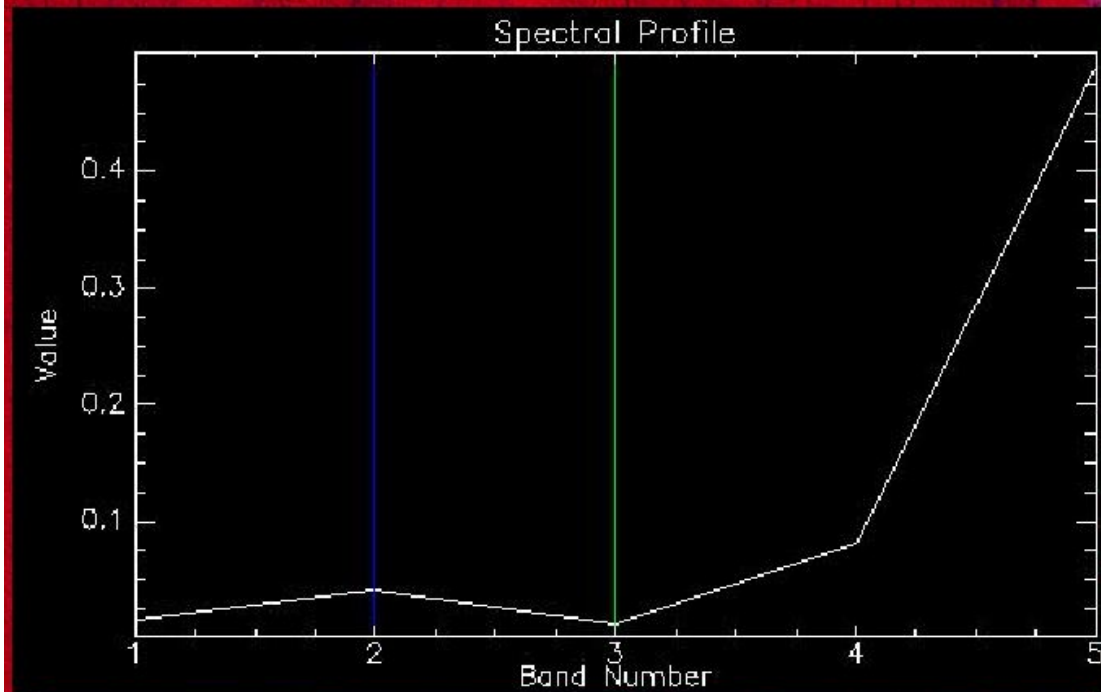
- Weedy rice Type 1 field
- Grower has been rogueing field since 2016
- Mostly single plants, although one large patch
- Wanted to work with UC, to ensure data was accessible to everyone
- Engaged Sean Hogan, who works with the UC statewide program
- Field was surveyed before weedy rice headed



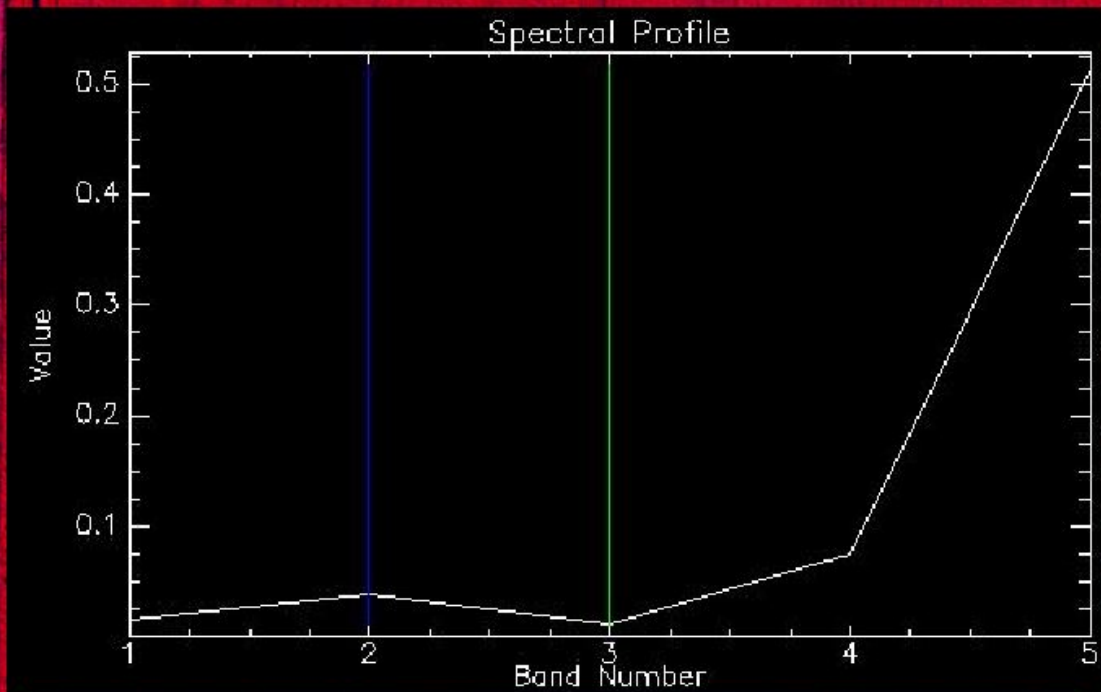
Methods

- Collected drone imagery at two different flight altitudes of 40 meters and 70 meters above ground level
- Simultaneously used both red-green-blue (RGB) and multispectral (blue-green-red-red edge, and near infrared) cameras.
- Luis Espino used the GPS unit to record the positions of 15 patches of weedy rice.





Weedy Rice



Regular Rice

Results

- Impossible to distinguish between the weedy rice and the cultivar
 - Might be possible if weedy rice was more clumped
 - Or if flight was done at a different timing
-
- However, for mapping for spraying, this timing was most appropriate

FUTURE: Planning to continue drone work next year

Weedy Rice Field Experiment

Location: UC Davis Plant Sciences Field

Establishment year

- Tried to establish a weedy rice population in the field
 - Biotypes 1, 2, 3, and 5
 - Not enough seed for Biotype 4
- Next year (2019) will start experiment:
 - Conventional Flood
 - Rotation (Rice-Sorghum-Rice)
 - Stale Seedbed
- Many bird problems...







New Watergrass Species

Late watergrass

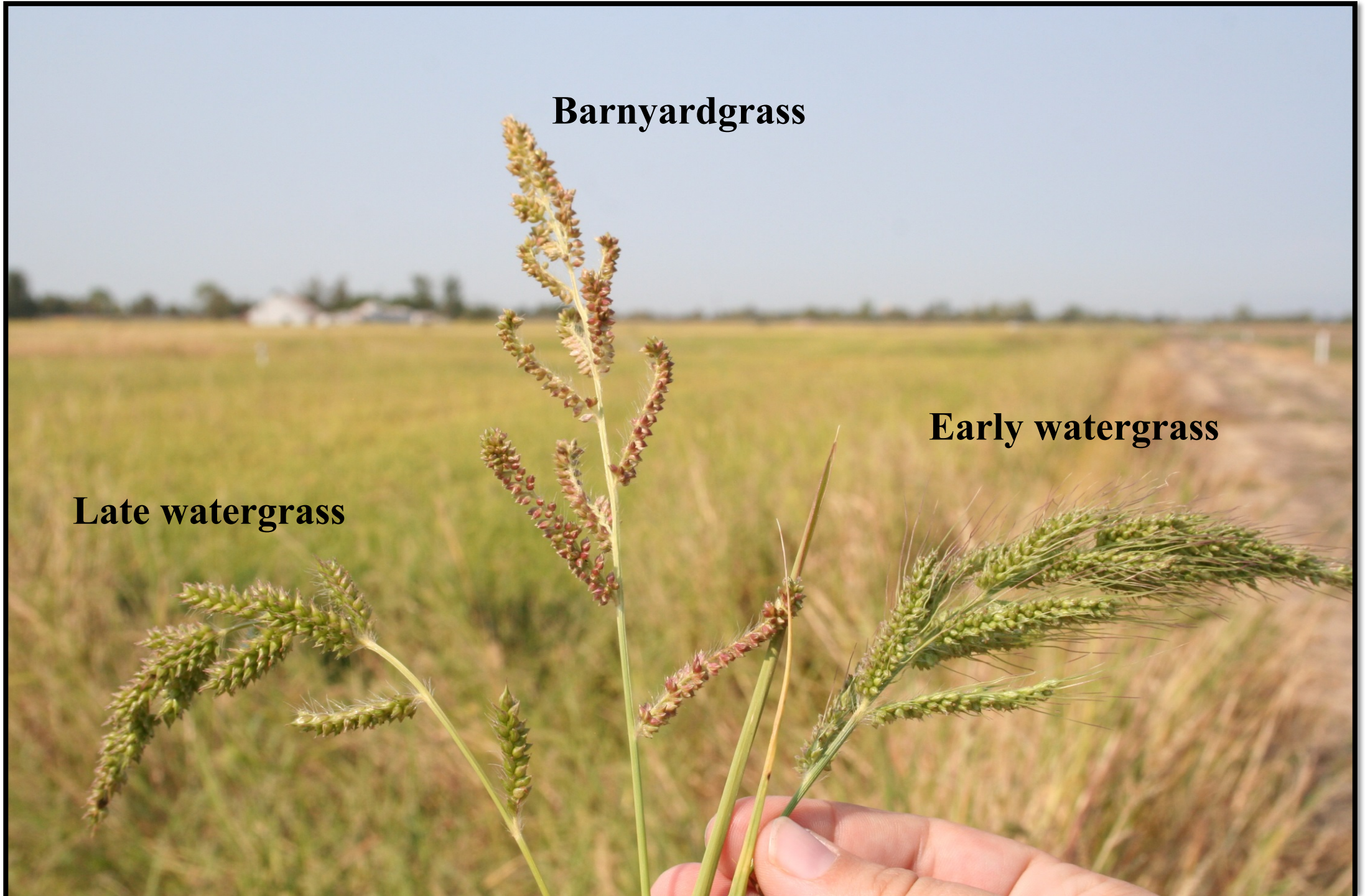
Barnyardgrass

Early watergrass

Barnyardgrass

Early watergrass

Late watergrass







Characteristics

- **Barnyardgrass:**

- Small seed size
- Heads are variably awned, awns are short

- **Late watergrass:**

- Large seed size
- Heads never awned

- **Early watergrass:**

- Large seed size (same as late watergrass)
- Heads are always awned

- **New Species:**

- Small seed size (barnyardgrass)
- Heads are always awned
- Purple-colored awns

Why the concern?

- Appears to be resistant or tolerant to all grass herbicides
- Collected about 10 samples that we will be screening this winter
- Please be on the lookout in 2019 season!

Questions?