

Weedy Rice Update

UCCE Winter Grower Meetings 2018

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Survey: Winter 2017

- 160 growers and PCA's were surveyed at 5 meetings in 4 counties (Butte, Glenn, Colusa, and Sutter):
 - 40% responded that they **had suspected a field was infested with weedy rice**
 - 49% stated that they had **seen it prior to 2016**
 - 57% **had not** reported the infestation to UCCE
- Approximately 25% of infestations likely not reported

Field Survey: 2017

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

- 53 samples submitted for testing
- Out of the 53, 22 confirmed to be weedy rice
- About 42% of the samples!**

Eight seed fields were found to be infested with weedy rice and were rejected as seed fields:

- 3 were new medium grain seed fields
- 1 was an established medium grain seed field
- 4 were specialty variety seed fields

No new biotypes identified



Photos: Timothy Blank, CCIA



Sprangletop:

- Like rice (and weedy rice), it has a ligule, so it can be confusing (esp. before heading)
- Has a white stripe down the middle of the leaf (mid-vein)

Elongated Upper Internode (EUI):

- A genetic abnormality of common medium grain rice varieties
- Causes the part of the stem attached to the rice panicle to elongate
- The plant will look just like the variety planted in the field



Research Updates

Soil Seedbank Surveys: Fall 2016

- Sample 10 fields with known infestations
- 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

Table 1. Weedy rice seed counts from soil samples collected in Fall 2016.

County	Ecotype	Seeds m ⁻²	Samples Present (%)
Butte	1	31.3	41
Sutter	1	2.3	6
San Joaquin	1	23.2	32
Glenn	1	4.6	9
Yuba	2	29.0	21
Sutter	2	4.6	12
Colusa	3	2.3	6
Colusa	3	7.0	18
Sutter	5	39.5	42
Yolo	Control	0.0	0

9500 seeds per acre

165,000 seeds per acre

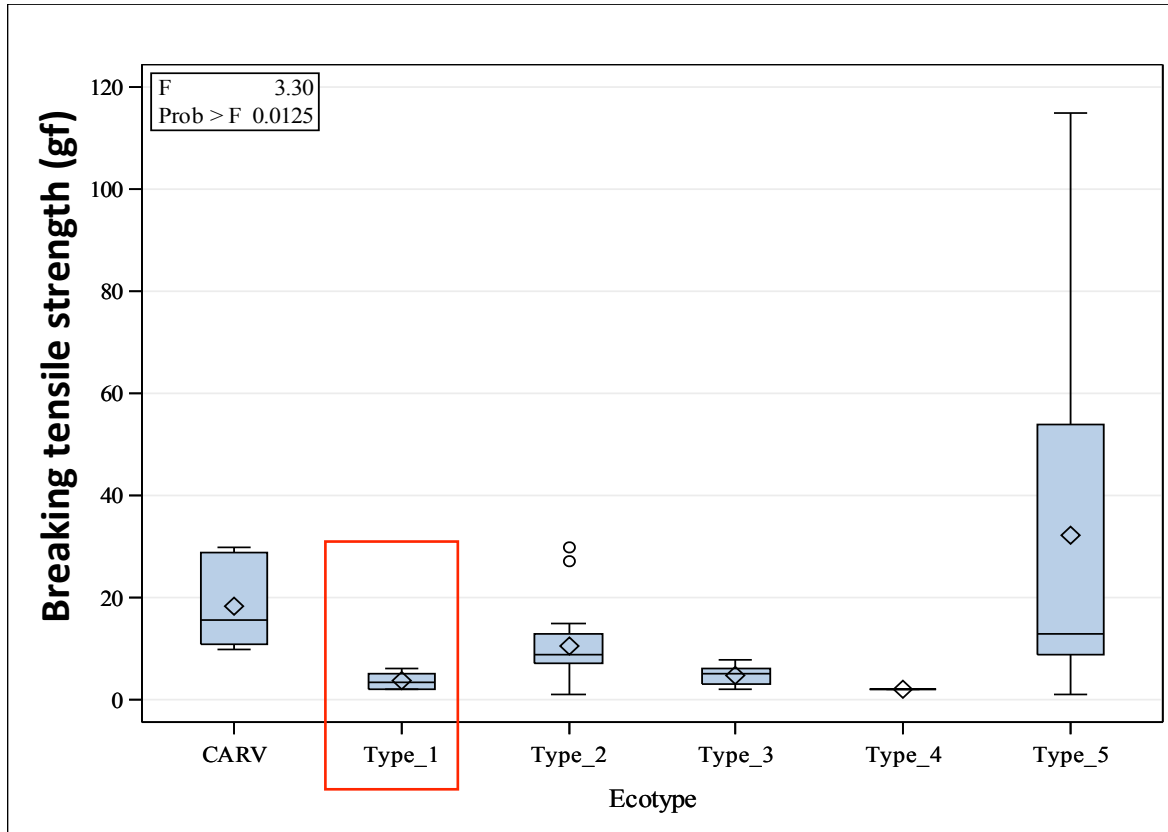
Research Updates

Weedy Rice Biotype Updates

- 
- 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)

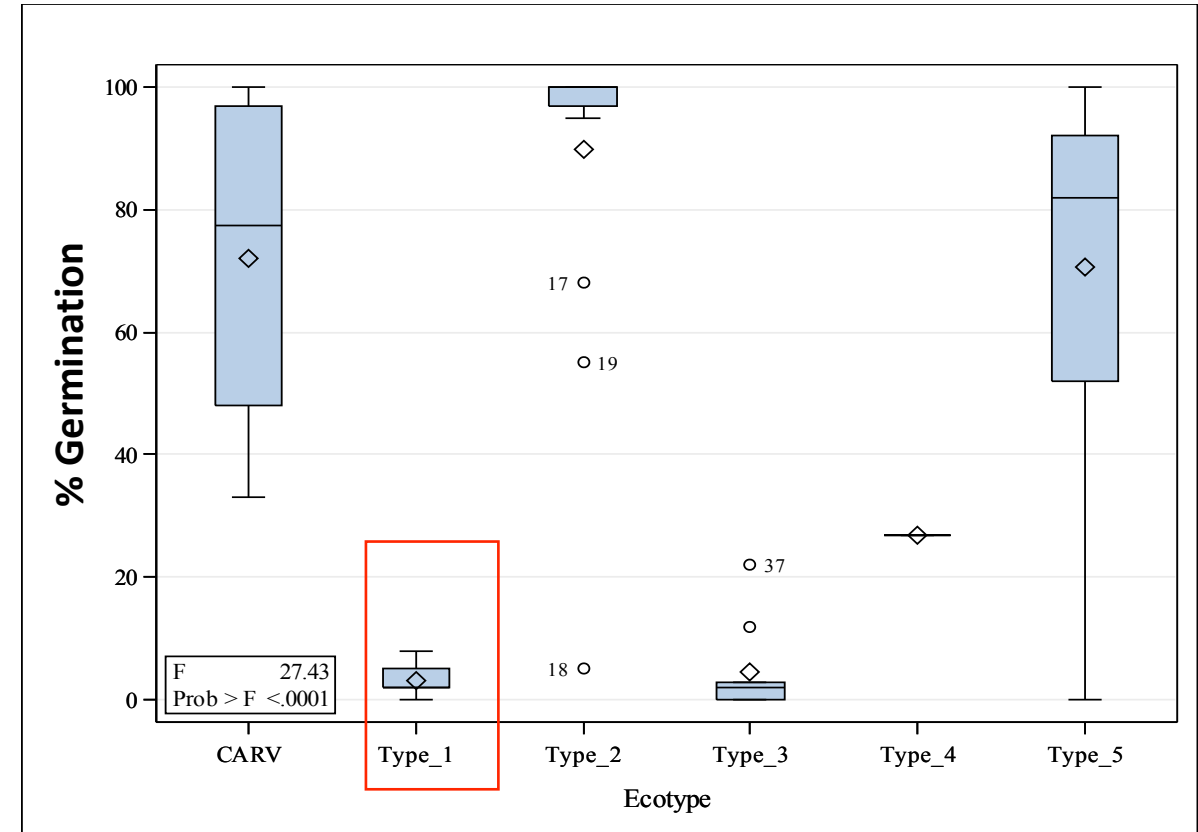
- **Type 1:**

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



Type 1:

- High shattering
- High dormancy



Implications for Management:

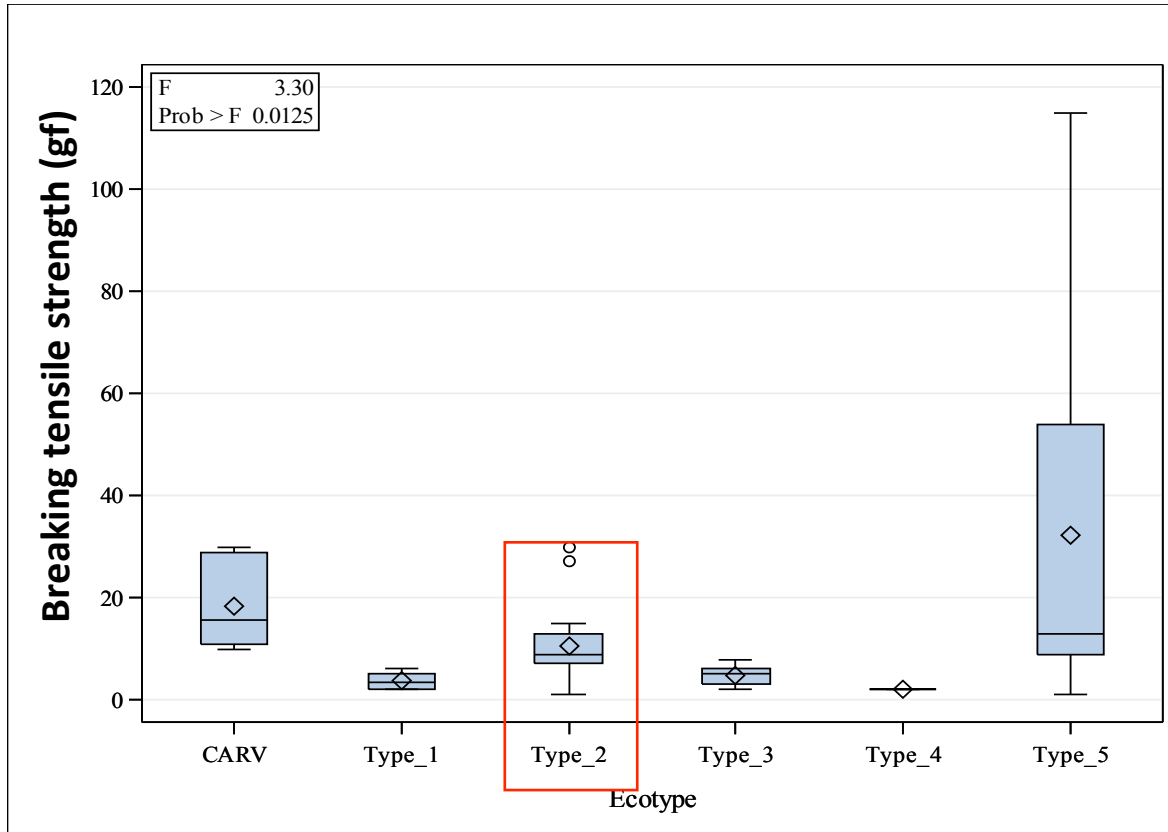
- High deposition into seedbank
- Length of time in soil: many years



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

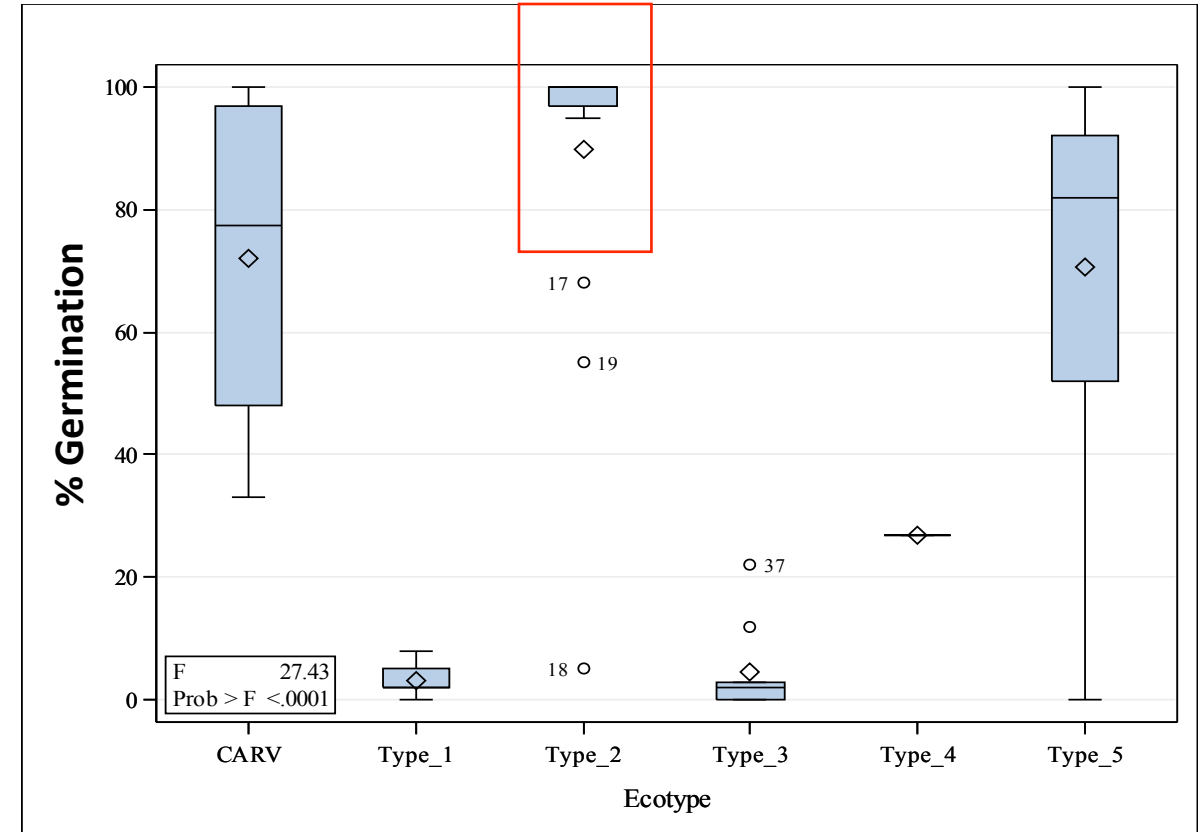


- **Butte, Sutter and Yuba Counties**



Type 2:

- High shattering
- Low dormancy



Implications for Management:

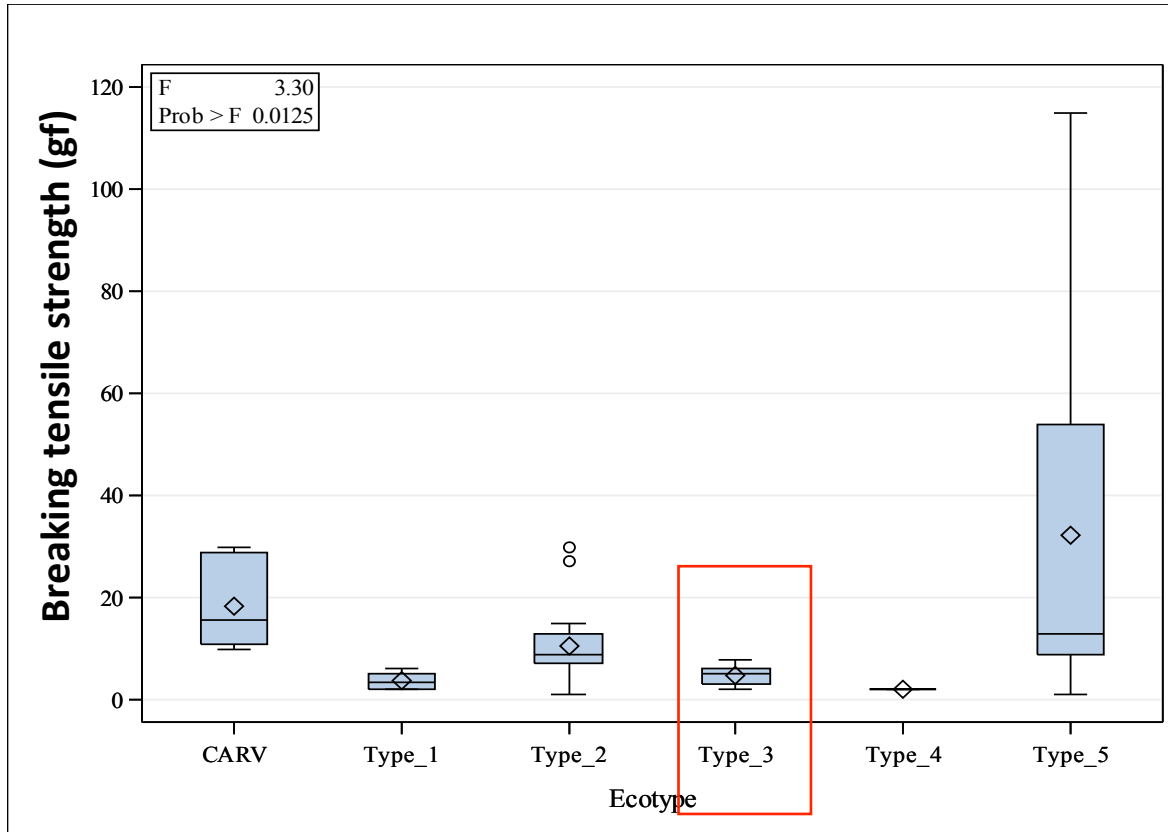
- High deposition into seedbank
- Length of time in soil: short!

- **Type 3:**

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

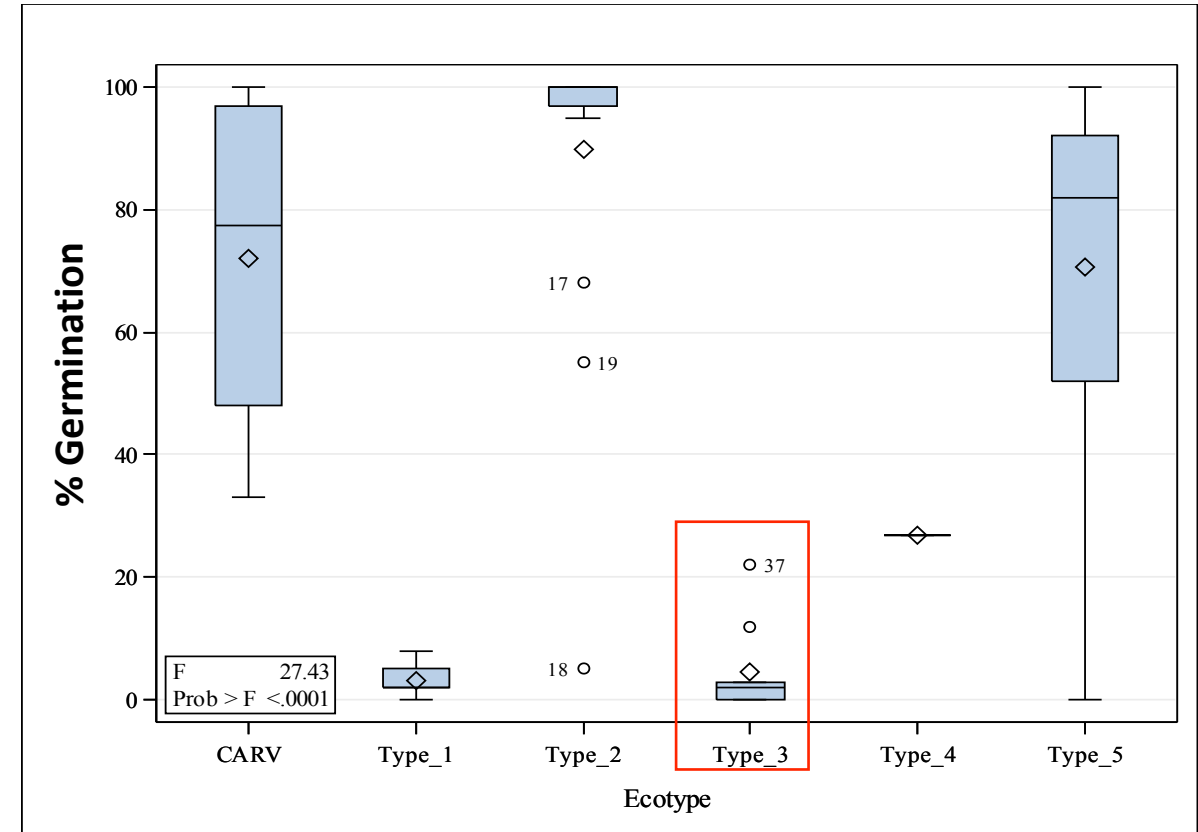
- **Glenn and Colusa Counties**





Type 3:

- High shattering
- High dormancy



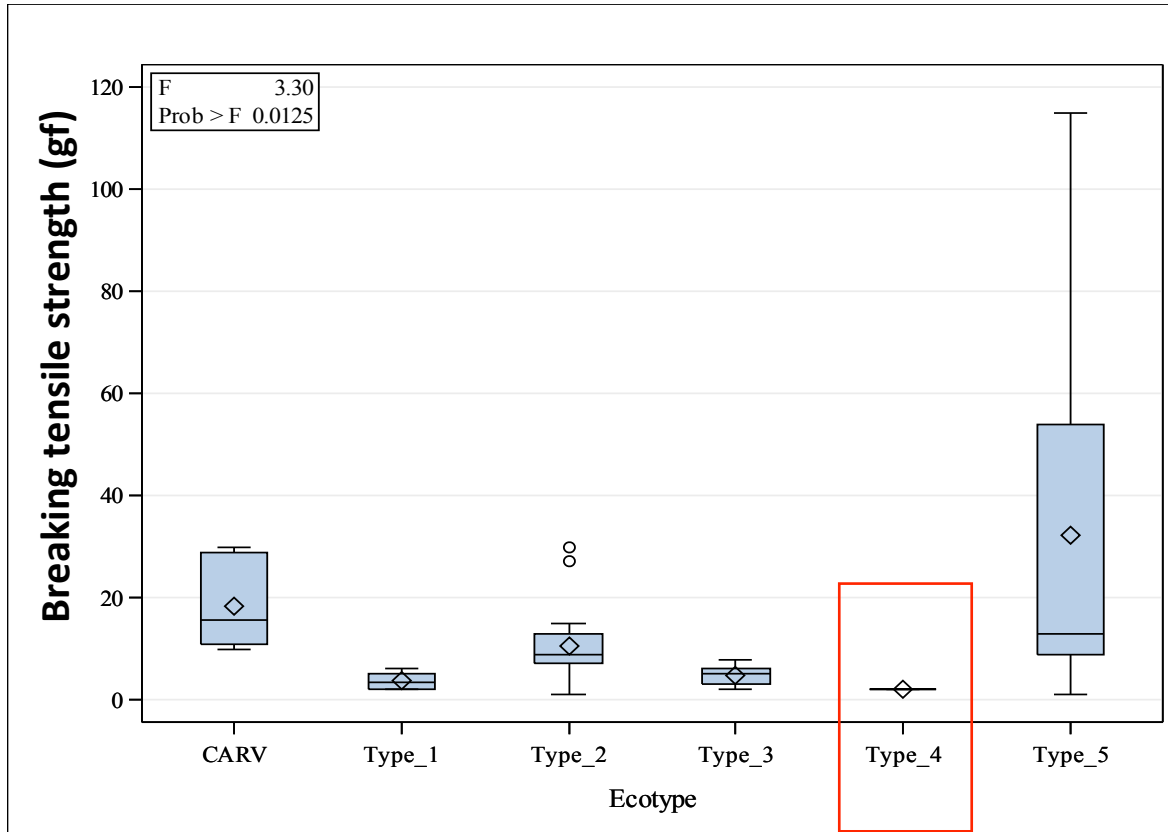
Implications for Management:

- High deposition into seedbank
- Length of time in soil: many years

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

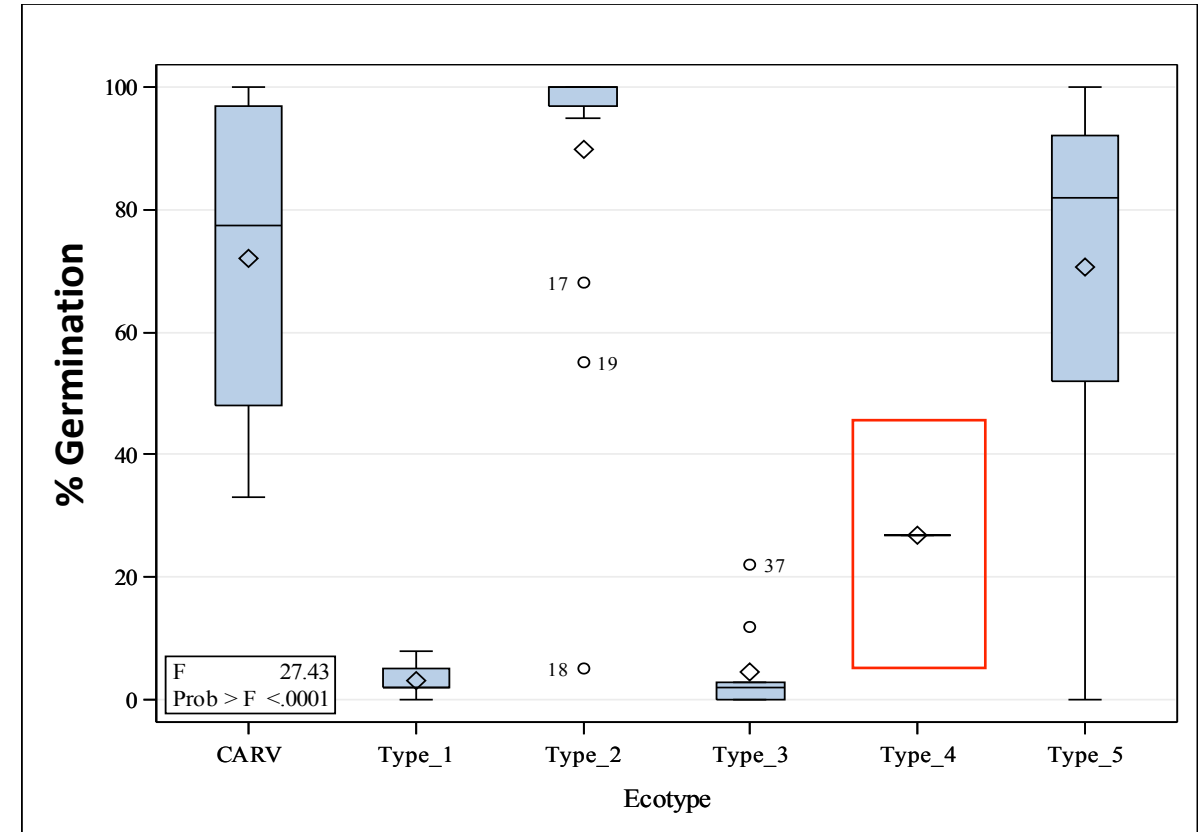


- **Currently in one location, Glenn County**



Type 4:

- High shattering
- High dormancy



Implications for Management:

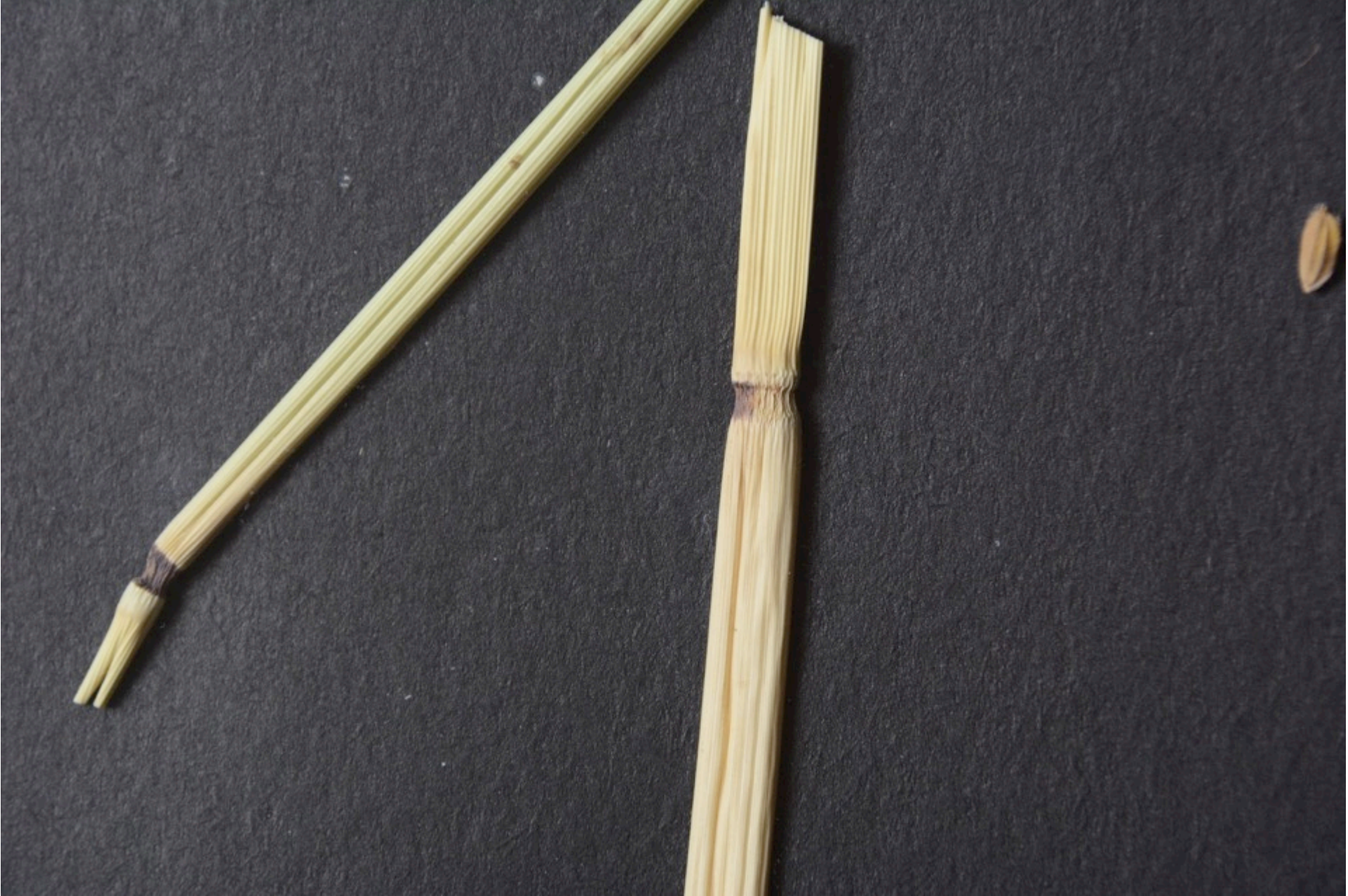
- High deposition into seedbank
- Length of time in soil: many years

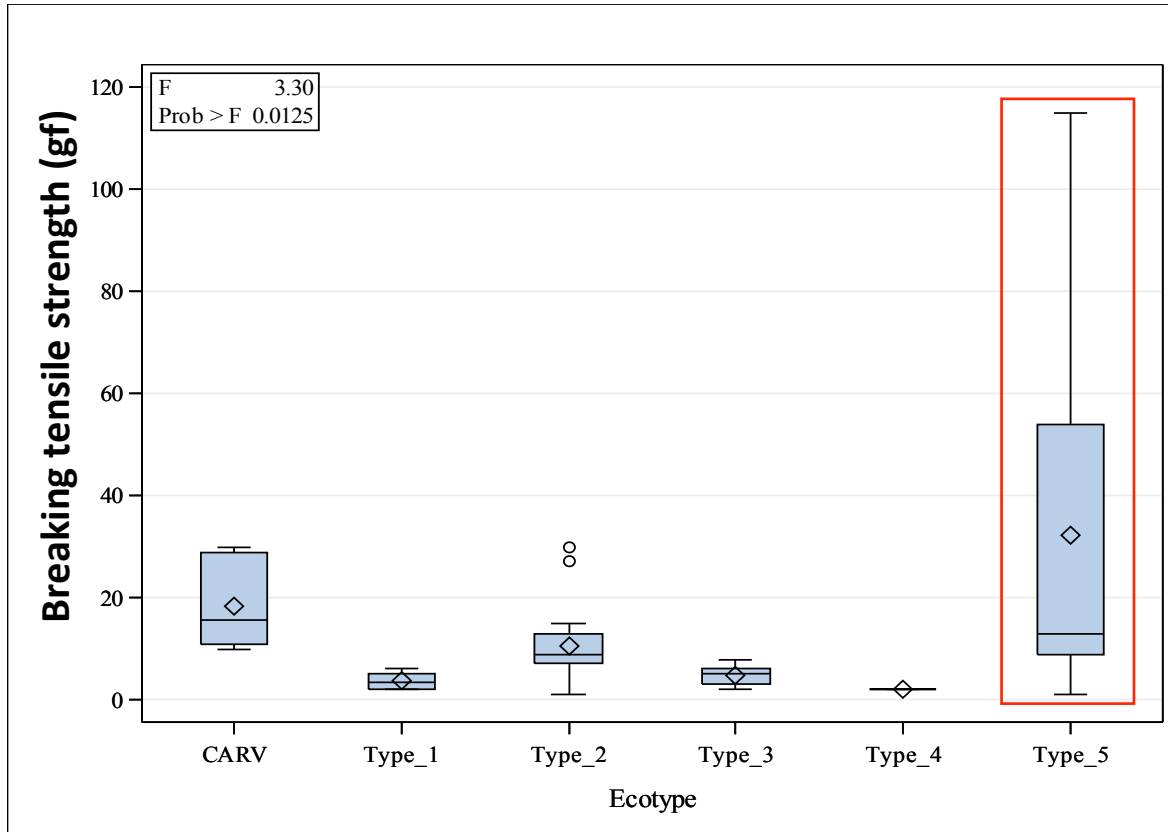
- **Type 5:**

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



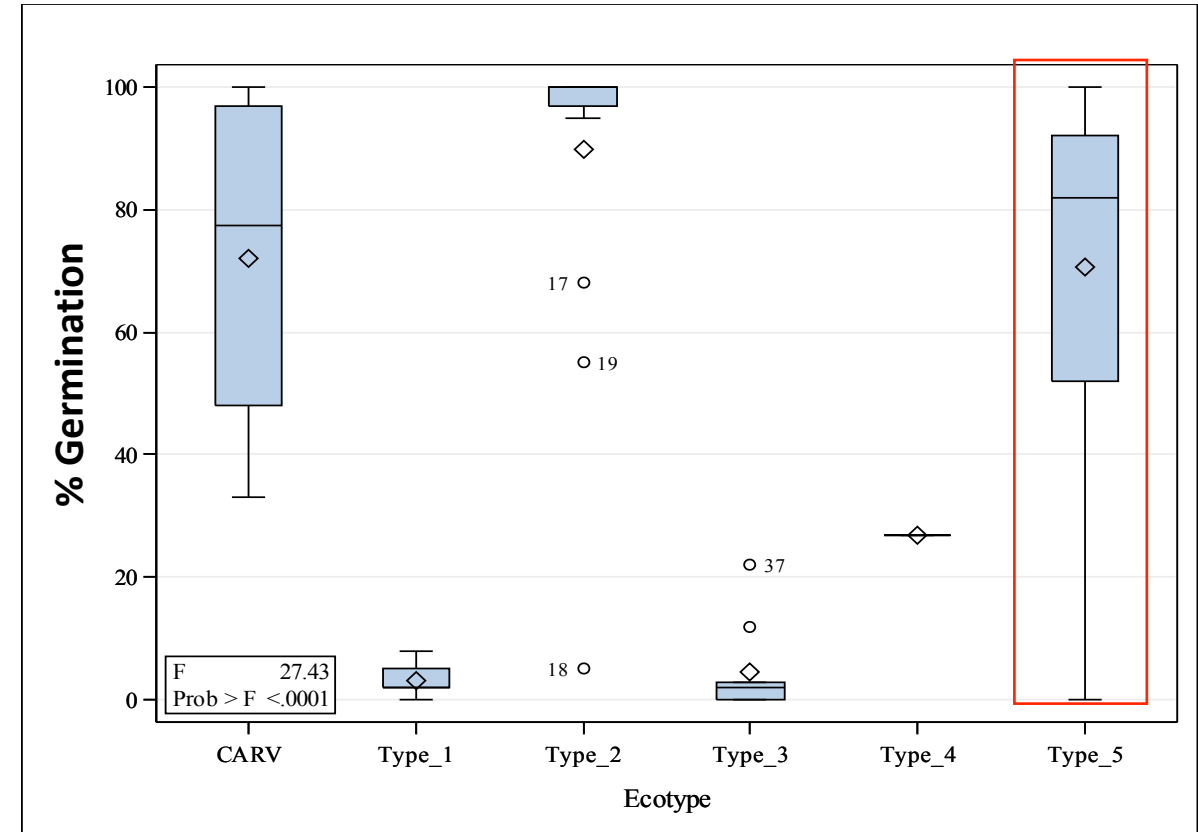
- **Sutter, Yuba, and Yolo Counties**





Type 5 (two groups):

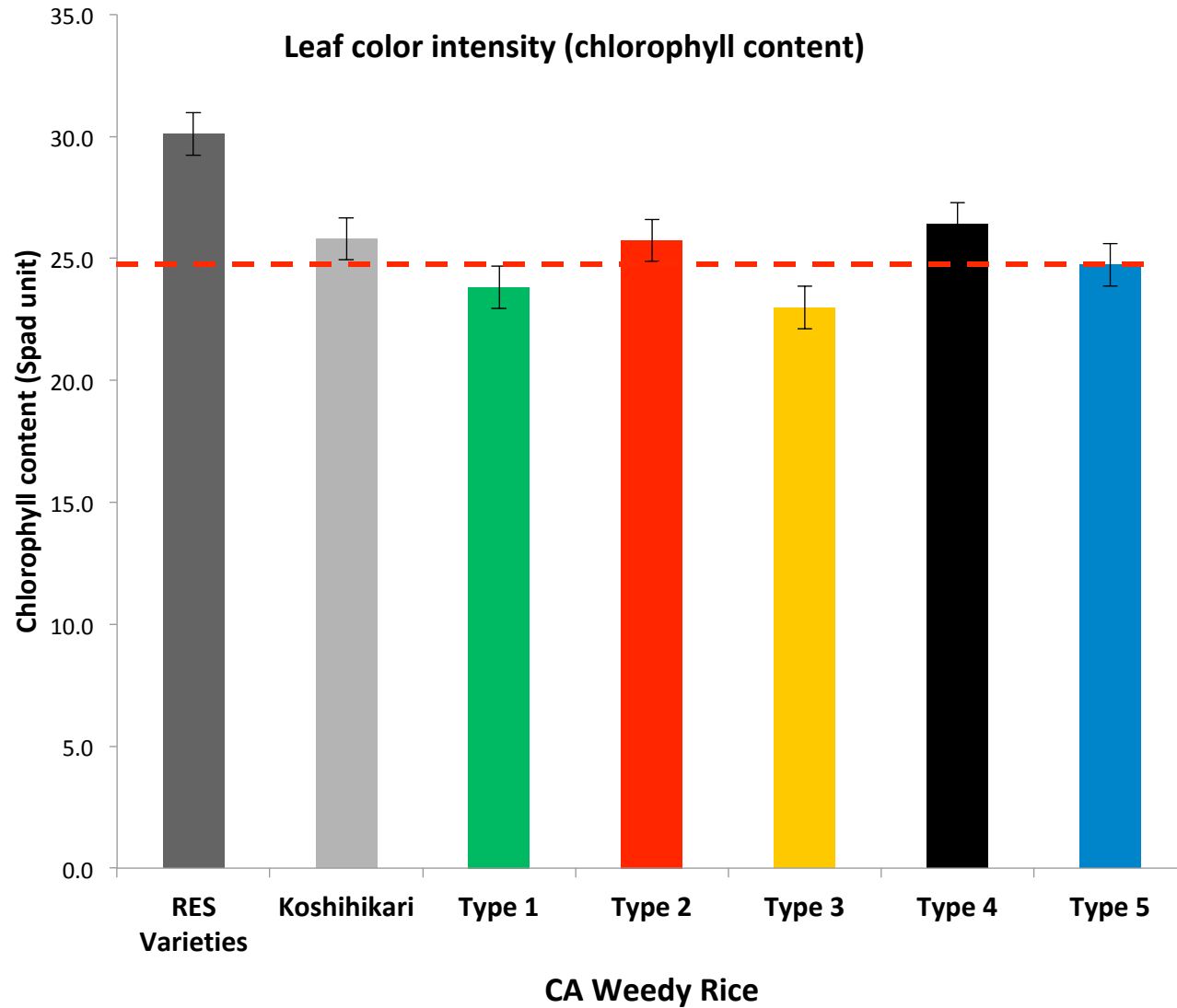
- High shattering
- Low dormancy



Implications for Management:

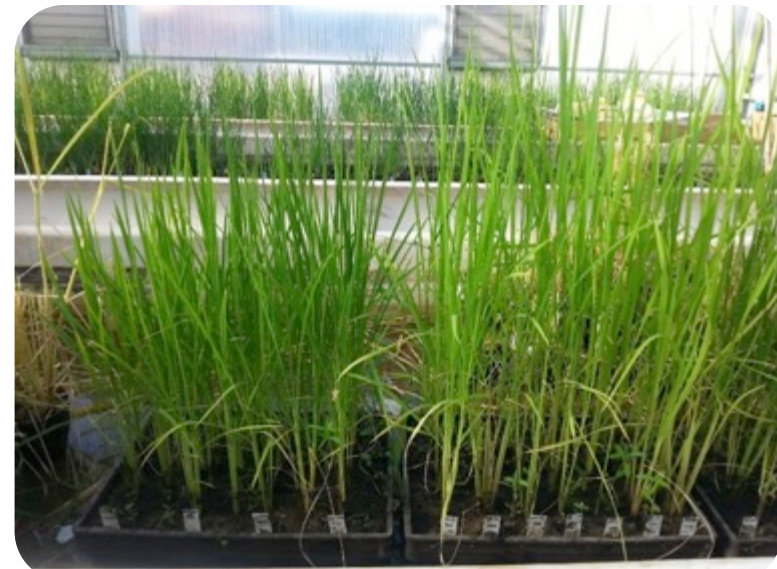
- High deposition into seedbank
- Length of time in soil: short!

Phenotypic characterizations of weedy rice

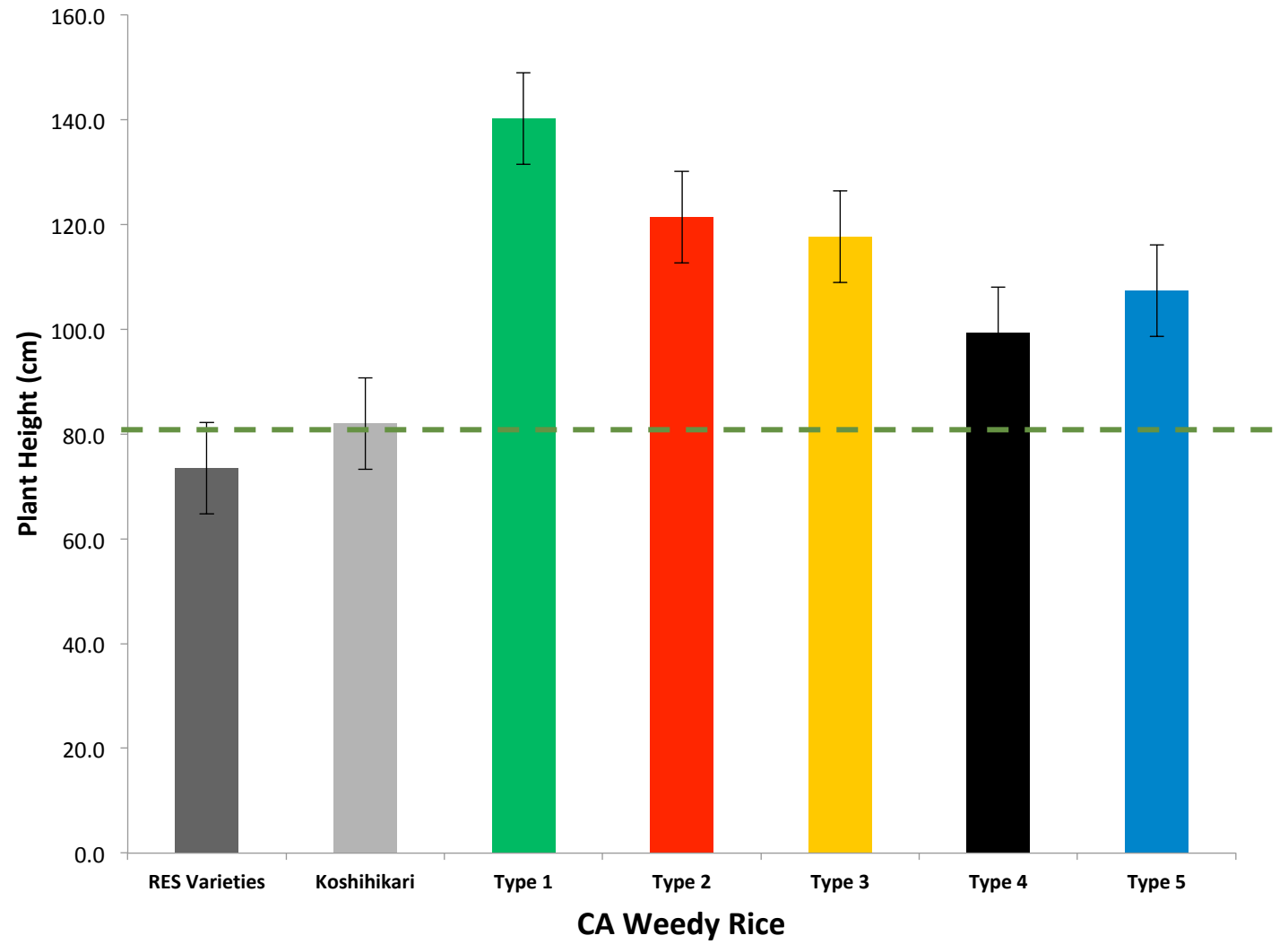


RES rice varieties

CA weedy rice



Plant height measurement



Characteristics	Populations	Duration of time in soil
High dormancy, high shattering	Type 1, Type 3, Type 4	Long-term (may be 10 or more years)
Low dormancy, high shattering	Type 2, Type 5	Shorter (likely to be a few years, but only if more seed is not being put into the soil seedbank)

- **All populations are:** red-branned (red pericarp)
- **All populations are:** lighter green than Japonica varieties
- **All populations are:** taller than Calrose varieties

Summary of Preliminary Genetics

- Five genetic groups, which align well with outward characteristics (phenotypes)
- **Type 1:** Most closely related to black-hulled weedy rice from the southern US and Aus varieties
- **Type 2:** Most closely related to straw-hulled weedy rice from the southern US and Indica varieties
- **Type 3:** Most closely related to straw-hulled weedy rice from the southern US and Indica varieties
- **Type 4:** Most closely related to straw-hulled weedy rice from the southern US and Indica varieties
- **Type 5:** Most closely related to Japonica (both temperate and tropical varieties)

Types 2, 3 and 4 closely related to each other!

Types 3 and 4 are most closely related to each other!

Diverse California weedy red rice
ecotypes → multiple possible origins!!!



Type 1



Type 2



Type 3



Type 4



Type 5



M-205

Herbicide Screening

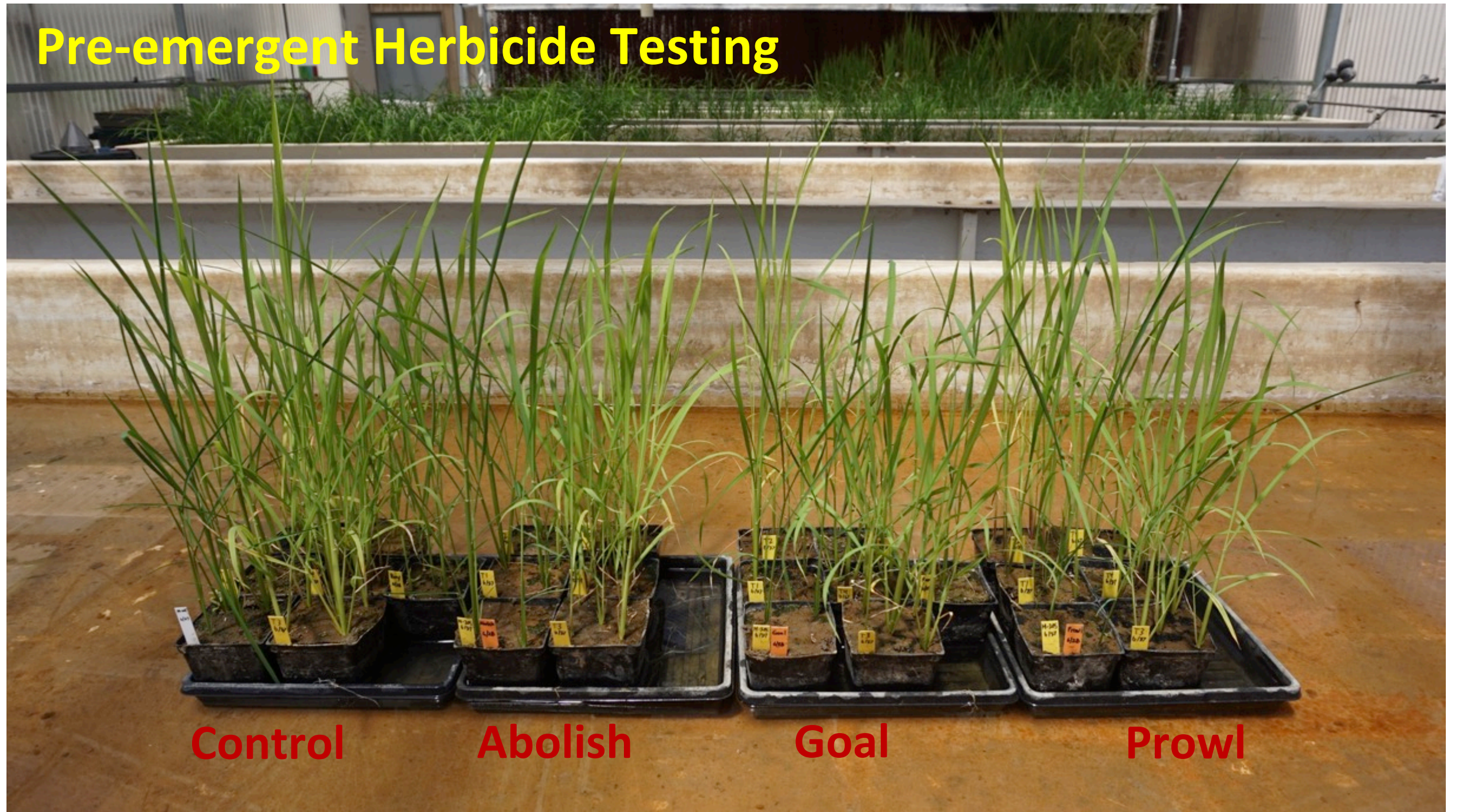
Pre-emergent Herbicide Testing

Control

Abolish

Goal

Prowl



Treatments and Rates

- Herbicides were applied 1 day after planting the seeds to about 1 cm depth (simulate drill-seeded system)
- Pictures were taken 23 days after spraying
- Herbicides:
 - Prowl- 2 pts/A
 - Abolish- 2 qts/A
 - Goal 2X- 2 pts/A

No effect on any of the weedy rice biotypes

Control

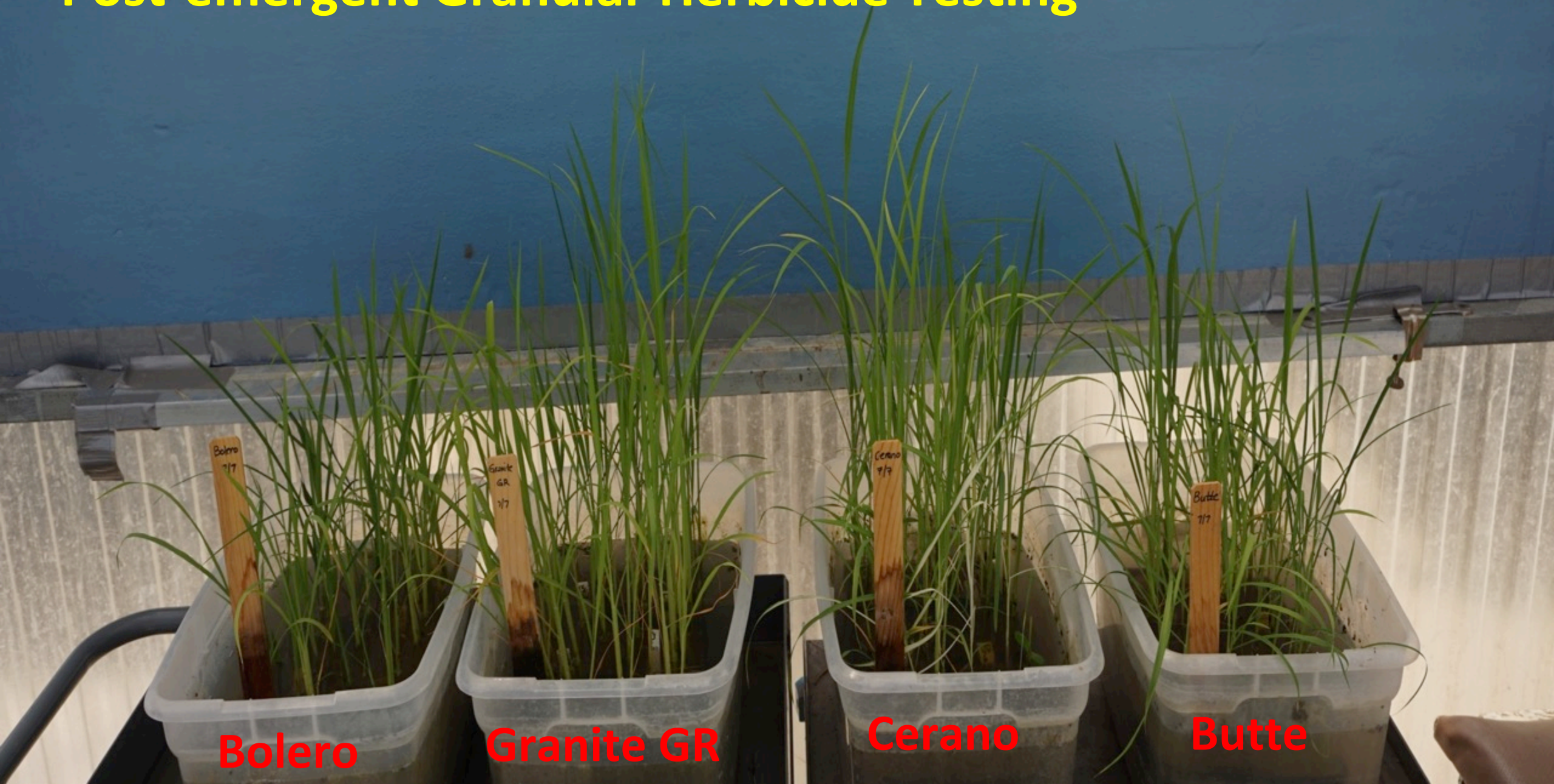
Abolish

Goal

Prowl



Post-emergent Granular Herbicide Testing



Bolero

Granite GR

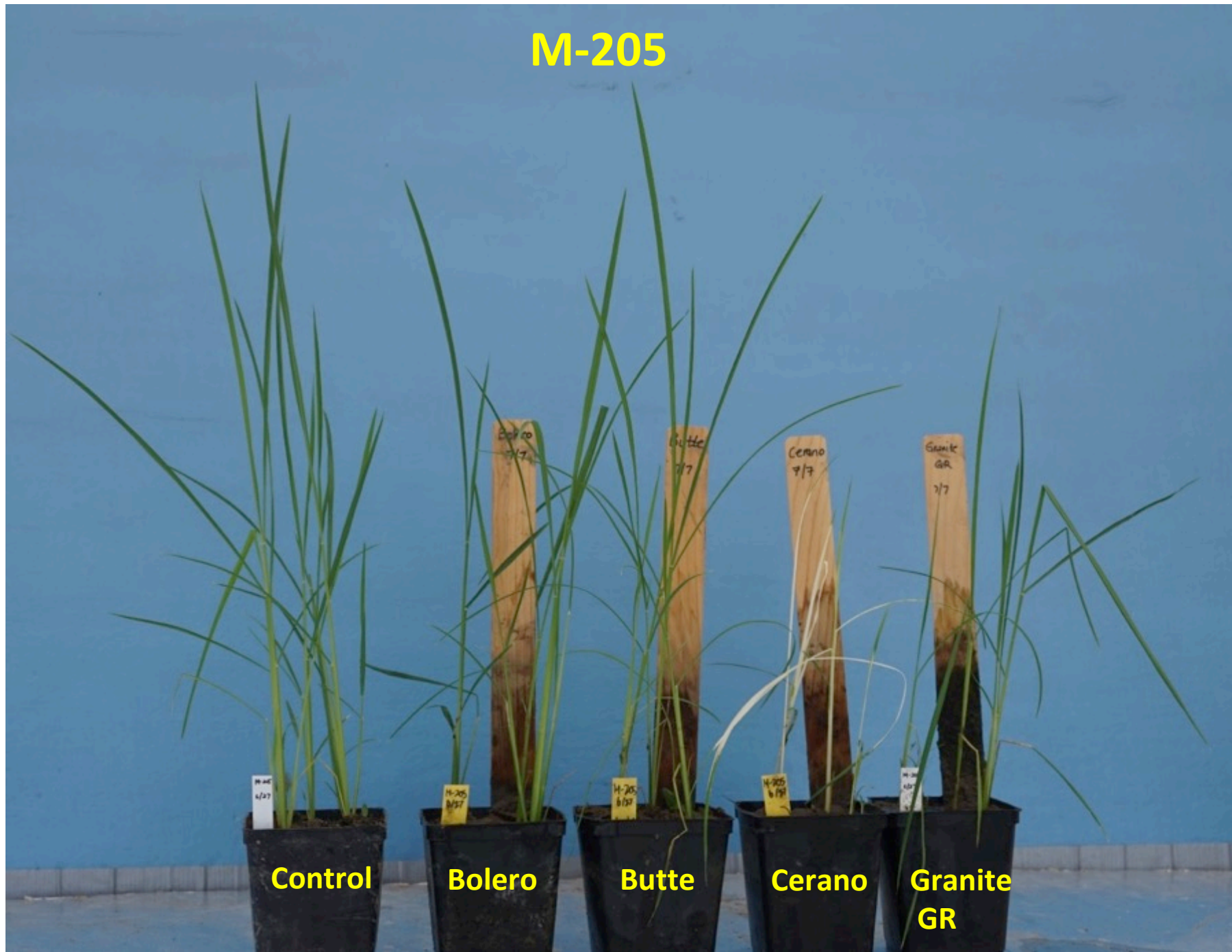
Cerano

Butte

Treatments and Rates

- Herbicides were applied 10 days after planting (1-2 leaf stage of rice)
- Two days after (48 hrs) plants were placed at 4-inch water depth
- Pictures were taken two weeks after herbicide application
- Herbicides:
 - Bolero- 23.3 lbs/A
 - Cerano- 12 lbs/A
 - Butte - 7.5 lbs/A
 - Granite GR – 15 lbs/A

M-205



Leaf bleaching
of M-205 by
Cerano.

Weedy rice type 1



Stunting of WR type 1
by about 50% by
Bolero.

Weedy rice type 2



Stunting of WR type 2
by about 50% by
Bolero.

Weedy rice type 3



Bolero makes WR type 3 stunted by about 35%.
Leaf bleaching by Cerano.

Weedy rice type 4



WR type 4 leaves are bleaching by Cerano.

Weedy rice type 5



No effect on T5.

Granular Herbicide Screening Summary

- Some injury noted on **Types 1-4** from Bolero, but plants recovered
- **Type 5:** no injury from any herbicides

Clethodim Spot-Spraying in the Field

Collaborator: Jim Cook

- Spot-sprayed tillering Type 3 weedy rice
- **Treatment 1:** 3 second duration spray of 2/3% V/V SelectMax + 0.25% V/V NIS
- **Treatment 2:** 5 second duration spray of 2/3% V/V SelectMax + 0.25% V/V NIS
- **Treatment 3:** 3 second duration spray of 2/3% V/V SelectMax + 1% V/V COC
- **Treatment 4:** 5 second duration spray of 2/3% V/V SelectMax + 1% V/V COC

- Damage to surrounding rice extended no more than 9.6 inches (for all treatments)
- Longer duration provided better control when using NIS (5 seconds)
- Treatments with COC as surfactant provided better control, regardless of duration (82% and 93%)

