Rice Briefs

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UC CE University of California Agriculture and Natural Resources | Cooperative Extension Colusa County

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Results of 2023 Rice Variety Trials

Luis Espino, Bruce Linquist, Whitney Brim-DeForest, Michelle Leinfelder-Miles, and Ray Stogsdill, UCCE

Every year, the University of California Cooperative Extension, in cooperation with the Rice Experiment Station (RES), conducts rice variety trials in several locations of the Sacramento Valley. The trials are conducted at the RES and eight farm locations across the Sacramento Valley, and one location in the San Joaquin Delta (not on the map) representing the main production areas of California. In 2023, the South Yolo trial was not conducted. Plots in the Sacramento Valley trials were 200 ft^2 and hand seeded while in the San Joaquin Delta trial plots were 150 ft^2 and drill seeded; the seeding rate for all trials was of 150 lbs/a. Grower cooperators treated the trial in the same manner as the rest of the field. Parameters evaluated in the trials included seedling vigor, days to 50% heading, plant height, lodging at harvest, grain moisture at harvest, and grain yield at 14% moisture. Varieties are replicated four times. In this summary, only yields are presented. All other parameters are included in the complete report, which will be available on our website at the end of February (http://rice.ucanr.edu).

Location of the UCCE and RES variety trials (RES=Rice Experiment Station)

Yield (lbs/a) from variety trials conducted at six locations across the Sacramento and San Joaquin Valleys and at the Rice Experiment Station (RES) in 2022.

Varieties	RES	Colusa	Glenn	Butte	South Butte	Sutter	Yolo	Yuba	San Joaquin
M-105	7,910	8,390	8,210	8,530	9,000	9,690	9,400	8,520	8,360
M-206	8,150	7,920	7,950	9,080	8,890	10,010	8,450	8,320	9,490
M-209	8,940	8,760	8,820	8,360	8,960	9,670	8,870	7,980	8,900
M-210	8,320	8,220	7,890	8,480	8,340	9,430	8,670	8,300	9,370
M-211	9,030	8,470	8,850	8,500	9,100	9,880	9,110	7,580	9,500
M-521	8,520	8,470	7,730	9,000	8,410	9,500	9,140	8,410	7,670
S-102	7,620	7,930	6,730	7,940	8,780	8,390	7,400	7,300	9,550
S-202	8,670	9,520	10,570	10,130	10,720	10,400	9,890	9,110	10,280
CH-203	7,520	8,490	8,810	9,310	8,900	9,190	9,320	7,990	9,270
CM-101	6,460	7,770	6,760	7,540	7,370	8,000	7,600	7,550	8,940
CM-203	8,200	8,610	8,840	9,450	9,730	10,190	9,340	7,970	9,710
L-207	8,890	9,250	8,400	9,380	10,220	10,250	9,170	8,600	10,710
L-208	8,950	9,040	9,680	10,000	10,640	10,830	10,460	8,500	11,570
CA-201	5,370	7,120	6,360	6,990	6,950	7,880	7,290	6,440	7,480
A-202	6,400	8,510	8,510	8,750	8,420	10,310	9,250	7,900	10,750
CT-202	5,640	6,100	4,880	5,650	5,860	6,570	5,360	5,540	7,160
CJ-201	8,620	9,150	7,560	8,610	8,560	9,700	8,690	8,270	8,050

A Solid Choice of Medium Grain Varieties to Adapt to Your Conditions

Bruce Linquist, UCCE Rice Specialist

In California, most acreage is devoted to high quality medium grain varieties. In 2023, over 94% of the acreage was grown to medium grains. There are currently six medium grain varieties to choose from: very early (M-105), early (M-206, M-209, M-210, and M-211), and late-maturing (M-401 – a premium medium grain). Here are some things to consider when making a choice. M-105 is the earliest variety; although it is only 1- 2 days earlier than M-206 in the northern part of the valley, it is 3-5 days earlier in the southern cooler parts of the valley. It also has excellent yield potential. Last year it had the highest yields in our yield contest with a yield of 132.5 cwt/ac. It also tends to yield the highest in our variety trials located in the southern portion of the valley (south of Hwy 20). It is an excellent choice to plant at the start of the season in order to get an early start on harvest. The knock on M-105 is that it can lodge; however, in our variety trials (and other trials at the Rice Experiment Station), there is no indication that its lodging potential is different than M-206.

M-206 and M-210 are nearly identical except that M-210 has blast resistance. They are both early varieties and stable across environments. In areas with blast, or if dry seeding, M-210 is an excellent choice. In 2023, blast was wider spread than normal. For growers who have only used M-206, try using M-210 on a field and see how it compares. You should have very similar results.

In terms of yield potential, M-209 and M-211 have the highest yield potential. M-211 regularly out yields other medium grains by 1-3 cwt/ac in our variety trials in the northern part of the valley (north of Hwy 20). Both M-209 and M-211 are longer in duration than M-206 and neither are well suited to cooler areas (M-209 being the least suited).

Duration is also important when thinking about water limitations as they require more water to irrigate. Achieving good milling quality is one issue with these varieties. Milling quality drops rapidly when harvest grain moisture drops below 20%. Given this, it may not be wise to plant these varieties on a large number of acres where a timely harvest may be difficult. On a positive note, these varieties are less prone to lodging. This is partly due to thicker tillers. Some growers indicate that managing the rice straw in M-211 is harder than for other varieties.

Finally, where kernel smut is an issue, M-209 is one of the more susceptible medium grains. Finally, California's first herbicide resistant variety M-521 has been approved for release. However, seed production for this variety will not proceed until the herbicide is approved.

New Herbicide Registered in California for 2024: Cliffhanger

Whitney Brim-DeForest, Rice Farming Systems Advisor, UCCE
Roberta Firoved, Pesticide Regulatory Consultant

California rice growers will have a new herbicide available this year: Cliffhanger™, manufactured by Gowan Co. The active ingredient is benzobicyclon, which is the same as one of the two active ingredients in the currently-registered herbicide, Butte®. Cliffhanger™ is a soluble liquid formulation (SC) which can be applied by ground-rig or airplane, including as a direct-stream application into the water. In contrast, Butte® is a granular pre-formulated mixture of benzobicyclon and halosulfuron. To use either product, applicators must attend a training and be certified. Dates for the training are posted on the California Rice Commission Calendar (https://calricenews.org/events/).

Controlled weeds are sprangletop, ricefield bulrush, and smallflower umbrellasedge. The application timing begins from day of seeding up to 82 days before harvest. Recommended timing for sedges is pre-emergent up to the 5-leaf stage, and for sprangletop, pre-emergent up to the 2.5 leaf stage as well as at tillering. Flood water should be a minimum of 4 inches when the product is applied. The active ingredient, benzobicyclon, is a pro-herbicide, meaning that it is not active until it comes into contact with water; therefore, for maximum efficacy, water should be held in the field for at least 5 days. Longer periods of flooding will result in better efficacy, whereas a drain soon after application will both reduce efficacy as well as encourage a new flush of weeds. The recommended waterhold is 10-14 days for maximum efficacy. Cliffhanger™ should only be applied once per season. It is not recommended that it be applied in the same season as any other HPPD-inhibitor product (Butte®). Applying both in the same season can select for herbicide resistance and may cause significant phytotoxicity to the rice. Repeated applications, both during the same season, or season after season, can select for resistance, particularly in sprangletop, ricefield bulrush, and smallflower umbrellasedge. Remember to always follow all label instructions when applying any pesticide, as the label is the law. Make sure to pay particular attention to the Use Precautions and Restrictions. Consult your local Agricultural Commissioner's Office regarding buffer zones and aerial restrictions, before making any applications.

New Weed in California Rice: White Water Fire

Whitney Brim-DeForest, Rice Farming Systems Advisor, UCCE

White water fire (*Bergia capensis*) was found in September of 2023, by the Butte County Agricultural Commissioner’s office in a rice field in Butte County. The weed was identified by the California Department of Food and Agriculture. It is the first find of this weed in California, and possibly in the United States. It is native to Africa, southern China, and tropical Asia, and it is known to be in rice fields in Europe, Central and South America, as well as the Caribbean. It was likely transported in seed to rice-growing areas and has been established in those locations for many years.

In Butte County, the weed was only found in one rice field, and the Agricultural Commissioner’s office surveyed surrounding rice fields but found no additional infestations. The method of introduction in California is unknown at this point. It currently has a “Q” rating by CDFA: “An organism or disorder suspected to be of economic or environmental detriment, but whose status is uncertain because of incomplete identification or inadequate information”. At this point, it is not considered a quarantinable pest so if it is found, so there is no penalty or restriction for finding it in a field.

White water fire looks similar to another common rice field weed, redstem (*Ammania* spp). However, the two species are not from the same plant family and are therefore not closely related. Due to the similarity, white water fire is quite difficult to identify in the field. One of the key distinctions is the thickness of the leaves, which are much broader in white water fire than in redstem. Another key distinction is flower color. The flower color of white water fire is white, whereas redstem can have either purple or red flowers.

Currently, no herbicide testing has been conducted in California, as we have recently collected the seed. UCCE will be scouting the previously infested field again in 2024, and we will collect more seeds at that time. In other countries, pretilachlor and metsulfuron have been used. However, neither of these products are registered in California rice, although some herbicides with the same mode of action are registered, and may be effective. However, extensive testing with currently registered herbicides, as well as herbicides in the registration pipeline, will need to occur before recommendations can be made. Currently, the best recommendation for control is to hand-rogue (pull) out the plants. Plants should be removed completely from the field, bagged, and disposed of in the trash. Other recommendations are to thoroughly clean equipment between fields when moving from an infested field to a non-infested field.

If you suspect you have this plant in your field, please give your nearest Rice Farm Advisor a call. The best way for us to deal with this weed, including possibly being able to use an herbicide is by knowing the extent of the issue. We can assist with identification, as well as control strategies.

White water fire (*Bergia capensis*) photos by L. Espino.

Management of Rice Seed Midge – Insecticide Trial Results

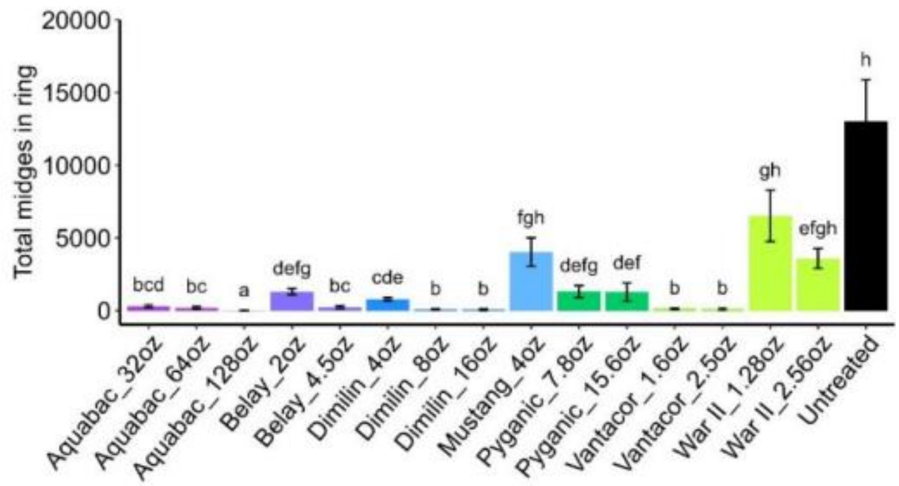
Ian Grettenberger, Kevin Goding, and Sophie Allen, UC Davis
Luis Espino, UCCE

Rice seed midge damage was first officially recorded in California rice production in 1953. This pest is actually a number of different species that are frequently lumped together in terms of defining them as a pest. Midges are some of the first colonizers of freshly flooded rice field and in high enough numbers, they can cause economic damage to rice during establishment. They often are most problematic in late-planted rice fields or during cool springs when rice struggles to germinate and become established. They have been a spotty yet challenging pest in recent years, so we have been working to examine management approaches. Current insecticide programs used for other early season pests like tadpole shrimp may not control rice seed midge.

This past year, we conducted a study examining control of midge larvae with insecticides. It was building off last year's work which indicated that a few materials may help manage seed midge, but many others, especially pyrethroids, seemed to not help or possibly even make matters worse (disrupted biocontrol?). We wanted to test several materials and a number of rates. We conducted it with very late-planted rice to exacerbate rice seed midge (it worked!) at the Rice Experiment Station. We used 10.7 ft 2 metal ring plots for our study. Treatments were applied immediately before planting. We sampled for midges using a "scoop mud→wash mud→count bugs" approach 11 days after treating. At the end of the trial, we estimated yield in each ring based on panicle counts. We couldn't just get grain yield because of irregular maturity and most rings simply not fully maturing given the late planting.

Overall, we saw some differences in midge counts among treatments, showing variability in efficacy. The untreated had the highest number of midges, followed by the pyrethroid treatments, including Warrior II at both rates and Mustang Maxx, which were all statistically equivalent to the untreated (see figure below). These pyrethroid treatments were generally equivalent to the Pyganic 5.0 treatments (both rates) and the low rate of Belay, although these had numerically lower counts. Most other treatments had very few midges, which included the Aquabac XT, high rate of Belay, Dimilin, and Vantacor treatments. The high rate of Aquabac XT had the fewest midges overall. Aquabac XT is a *Bacillus thuringensis* material (*israelnsis* strain), which relies upon toxins produced by bacteria for their efficacy.

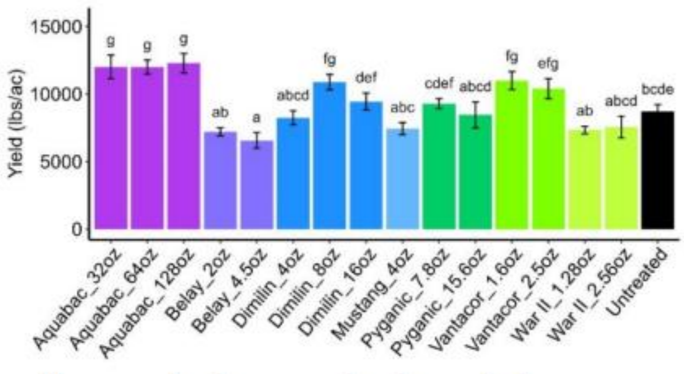
These results were a bit more "pronounced" than our 2022 trial in that the materials generally



Rice seed midge abundance in 10.7 sq ft metal ring plots for different treatments.

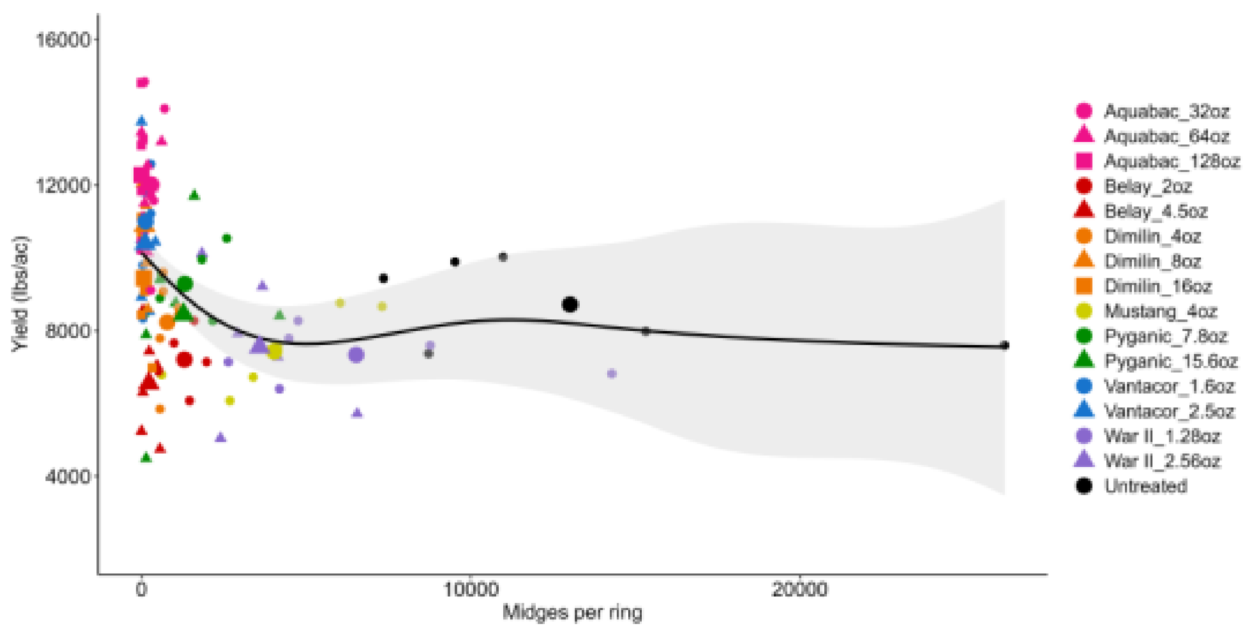
worked better across the board. The general lack of efficacy we saw with pyrethroids was consistent though. Vantacor and Aquabac XT were especially effective, even at the lower rates we tested, so this is something we think will be worthwhile following up on and learning more about their possible fit in rice IPM.

Other materials were also effective, but there was a mismatch between the yield assessment we made and midge counts. For yield, Aquabac XT clearly provided the best response, along with Vantacor.



Yield in rings for the rice seed midge trial. There was no effect of treatment.

What was less clear was what was happening with many of the other treatments. A large number were simply not different than the untreated, even though they did have extremely good midge control. The relationship between plant responses and midge abundance was fairly muddled overall, although it was not just that there was lots of noise. It is possible that there is some sort of difference based on when larvae are affected and die. However, we did treat very early, so this does not seem like it would be the driver. However, no other driver can be suggested otherwise. In the figure below, the relationship between midge counts and yield can be seen for the different treatments. It is clear that additional trial data could help elucidate these relationships and clarify if the lack of a yield response for some materials is consistent. Of note, we treated these plots early, but not so early that the materials were applied to dry soil as is sometimes done in rice with insecticides. It will also be important to know what happens when rescue treatments are made. It seems like rate of insecticide may come into play a bit more at this timing. It appears that the materials relied upon heavily for tadpole shrimp (pyrethroids) may not also be effective for rice seed midge. Rice seed midge is likely going to remain a pest that can crop up in rice, so we plan to continue to address issues around management.



Relationship between midge count and yield for individual plots and across replicates for each treatment. Each small point represents an individual plot, and treatments are denoted by points differing in color or shape. The larger points represent means across plots for that treatment for both variables. If there was a very clear midge-yield loss relationship, there would be a trend of decreasing yields with increasing midge counts.

Evaluating Losses Caused by Stem Rot

Luis Espino, Rice Farming Systems Advisor, UCCE

Stem rot is a common disease of rice that can cause blanking and lodging. When the disease is severe, the presence and effects of the disease on yield can be obvious. However, at lower levels, the symptoms and effects of the disease may “fly under the radar”.

Stem rot affects the tillers at the water level. Mid season, small black lesions appear on lower leaf sheaths. As the disease progresses, the pathogen penetrates the tiller and can reach the culm, causing rot. These symptoms are most obvious when fields are drained for harvest. Once plants start to senesce, it can be difficult to identify stem rot symptoms because plants dry out.

The severity of stem rot is determined at drain time using a ranking that goes from 0 (no disease) to 4 (tillers rotted through). Several years of trials have shown that for each increase in severity level, there is a 3.2% yield loss. The table below shows the yield losses that can be expected under each severity level for three different yield potentials.

Expected yield losses at different stem rot severity levels.

Stem Rot Severity level	Yield potential (cwt/a)		
	90	100	110
1	3	3	4
2	6	6	7
3	9	10	11
4	12	13	14

This information can be helpful for growers and PCAs to evaluate the importance of stem rot in their fields. One challenge is that evaluating tiller samples to determine the severity level is time consuming. An easier method of evaluation is to determine the incidence of the disease using the guideline below:

- 50% of tillers show stem rot symptoms = Severity level 1
- 100% of tillers show stem rot symptoms = Severity level 2 or higher

Yield losses at severity level 2 could be significant, so a manager should aim to be below this disease level. To determine incidence at drain time, cut a handful of tillers at the soil level and determine how many show symptoms of stem rot. Do this at several representative places in the field, avoiding nitrogen overlaps or skips, until you feel you have a good estimate.

The second challenge is that evaluating the severity of stem rot at drain time provides information that cannot be used to make any management actions the current year. However, the information can be used to plan management for the following year. Because stem rot inoculum survives in crop residue in the soil, disease severity levels tend to be uniform across years.

To manage stem rot, an integrated approach is needed. Managing straw after harvest is key. Burning or decomposing straw aids in reducing the amount of inoculum that survives from year to year. Excess nitrogen and potassium deficiency can significantly increase the severity of the disease. While there are no resistant varieties, very early varieties (CM-101, M-105) tend to develop more severe stem rot that varieties with longer cycles (M-209, M-211). Finally, fungicides can help manage the disease. Azoxystrobin applied at the early heading stage has been shown to reduce the severity of the disease by 30%.

New Rice Farming Systems Advisor for Colusa and Yolo Counties

My name is Sarah Marsh, and I am excited to join UC Cooperative Extension as the new Rice Farming Systems Advisor serving Colusa and Yolo counties. I will be based out of Colusa at the Colusa UCCE office. I grew up on a diversified row-crop and orchard farm in Arbuckle and am grateful for the opportunity to serve the community in which I was raised. After completing my undergraduate degree in Plant and Environmental Soil Science at Texas A&M University, I obtained a M.S. in Horticulture and Agronomy at UC Davis, where I worked with Dr. Kassim Al-Khatib in studying weeds and herbicide resistance in rice agroecosystems. I have since worked in rice breeding research and integrative pest management in several row crops in the Upper Gulf Coast region.

I hope to spend the first few months getting to know the growers and community of this region and learning what the unique needs of our area are. I am so thrilled to have the opportunity to learn from all of you, and I am excited to partner with the community to craft a research program that can deliver relevant results. I encourage you to reach out with ideas, requests, or questions relating to rice farming as I develop priorities to pursue in this position. Please feel free to drop by the Colusa UCCE office or give me a call. I can be reached via email at smarsh@ucanr.edu or telephone at (530) 203-8585.

Survey: Challenges and Opportunities for Organic Rice

Luis Espino, Rice Farming Systems Advisor, UCCE

In the next few weeks, you will receive an email with a link to a survey being conducted as part of a project looking at the attitudes of rice producers towards organic farming. This project is trying to understand what drives US rice producers to adopt organic farming and what factors limit adoption, and is a collaboration between University of Arkansas, Texas A&M University, and University of California Cooperative Extension. The information generated by the project can help the industry identify adoption barriers and try to address them through policy and extension, so that organic production can become a viable option for more producers. The survey should take 15-20 minutes to complete. You can learn more about this project at The Organic Center website (https://organiccenter.org/site/challenges-and-opportunitiesus-organic-rice).