UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources | Cooperative Extension

Rice Notes

Winter, 2026

In This Issue

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Save the Dates

Meetings	Location	Date
Discussion on the Cost of Rice Regulations Meeting	CIP Conference Room, Colusa	Feb. 4 9:00am - 1:00pm **RSVP Required**
Propanil Stewardship Meeting	CIP Conference Room, Colusa	Feb. 26 TBD
Rice Production Workshop	Lundberg Family Farms, Richvale	March 18 & 19 8:30am - 3:00pm **RSVP Required**
Rice Quality Workshop	Hillcrest Catering, Yuba City	July 30 9:00am - 12:00pm **Registration coming soon**

2025 Year-in Review

Bruce A Linquist, UCCE Rice Specialist, UC Davis

In California, 533,000 acres of rice were planted in 2025, which is the highest amount since 2016. Some of this increase in acreage was seen in San Joaquin County which planted 15,000 acres in 2025. There has been a steady increase in acreage in this county since 2017 when only 3000 acres were planted.

A dry spring led to an early start to planting. By May 1, about 25% of the acreage had been planted (one of the fastest starts to a season in the last 30 years). However, in early to mid-May, the planting progression slowed and the 50% plant date (May 16) was a couple days later than average date of May 13. There was also a lot of late planted rice with a good amount of acreage being planted in late May and early June.

The summer of 2025 was mild; however, the grain fill and drying period (late Sept through mid-November) received more rainfall than normal and in between the rainfall events, the temperatures were warmer than normal. I think these fluctuating warm/wet conditions led to poorer than normal grain quality; and in some cases, a very late harvest (harvesting into first week of December). Early harvested fields had generally high yields; however, as the harvest season progressed, yields tended to drop. Statewide average yields are not available yet, but I am guessing it will be around 86 cwt/ac - a little higher than 2025 (85.3 cwt/ac).

With the wet harvest conditions and a later harvest there was a lot more rutting than usual. Furthermore, field conditions and weather prevented a lot of post-harvest operations (i.e. chopping, tillage, etc). To manage the remaining straw and deal with ruts, stompers may be in high demand this winter.

In terms of pests, weeds, while always a major issue, were normal. Walter's barnyard grass is a continuing problem, and research has shown that this weed has resistance to many existing grass herbicides. Also, winged primrose willow (*Ludwigia decurrens*) which has only been found in Butte County to date, was detected in Placer County. For diseases, the incidence of bakanae has been on the rise, and 2025 was no exception. Other diseases were normal. Tadpole shrimp is showing some evidence of resistance to pyrethroids. Armyworms, while worse than normal, were not bad.

As for next year, acreage is largely dependent on water supply and the amount of spring rain (high amounts of rainfall in late April and May can result in a large amount of unplanted acres). As for the water supply, as I write this in early January, it is looking good (https://cdec.water.ca.gov/index.html). Across the state we are well above average for rainfall and the reservoirs have more water than normal for this time of year. However, the snowpack is lower than average in the northern part of the Sierras but close to average in the central and southern parts of the Sierras.

Update on Nutria Populations

Sarah Marsh Janish, UCCE Rice Farming Systems Advisor - Colusa/Yolo

Last year during the 2025 Winter Grower Meetings, we mentioned nutria as an emerging invasive pest capable of harming rice fields, especially in the Delta region. After these meetings, we received several anecdotal confirmations of sightings of nutria and nutria burrows around the Stockton area and further south. Although this pest has not been positively identified north of Solano County, California Department of Fish and Wildlife continues to document increased numbers and spread of this pest.

Nutria introduction to California

While nutria are nonnative to California, they have been in residence since the 1890s, where they were introduced in order to be farmed for their fur. With the collapse of the fur trade, many nutria were abandoned to the wild. Nutria were considered eradicated from the wilds of California by the 1970s and largely ignored until 2017, when a breeding pair was identified in Merced County. Since then, tracking efforts have revealed an extensive spread of this pest throughout the waterways within the Sacramento-San Joaquin River Delta and Central Valley.

Nutria have the capacity to damage irrigation infrastructure and crops. These rodents can burrow deeply into the banks of waterways, leading to collapse of levees and canals. They are also wasteful feeders; nutria can consume up to 25% of their body weight in above- and below-ground vegetation each day and can destroy up to 10 times that amount through their destructive feeding habits.

Ongoing eradication efforts

CDFW and collaborators believe that there is still a possibility to eradicate nutria, as California populations and geographic spread indicate that the level of nutria abundance is within the realm of eradication possibility. As time advances, both the population size and geographic range of infestation continue to grow, necessitating increased effort, resources, and funding for effective eradication. Consequently, the likelihood of successful eradication diminishes, potentially requiring California to focus on managing and mitigating the significant impacts of nutria on wetlands, agriculture, and water conveyance or flood control infrastructure

ID tips

Nutria are commonly mistaken for other semi-aquatic species, such as beavers, groundhogs, muskrats, minks, and river otters. CDFW has a great graphic (linked here) with tips for identifying nutria.

Distinguishing characteristics of nutria are:

1. Large orange front teeth
2. White whiskers
3. Dark round ears
4. Partially webbed hind feet (front feet are clawed for digging)
5. "Rat-like" tail

Photos courtesy of Mark Reuters (Adobe Stock) and M. Enos.

Signs of presence typically include cut, emergent vegetation (e.g. cattails and bulrushes), with only the basal portions eaten and the cut stems left floating, or grazed tops of new growth. Nutria create runs between feeding sites and burrows. Nutria often pile cuttings to create feeding/grooming platforms. Nutria construct burrows with entrances typically below the water line, though changing water levels may reveal openings. Nutria tracks have four visible front toes and, on their hind feet, webbing between four of five toes. Tracks are often accompanied by narrow tail drags.

If you see a nutria, report it!

Suspected observations or signs of nutria in California should be photographed and reported immediately. There are 3 ways to report:

1. Online at www.wildlife.ca.gov/Conservation/Invasives/report
2. Email Invasives@wildlife.ca.gov
3. Call (866) 440-9530

Sightings on state or federal lands should be reported to your local agency staff. There are 6 CDFW regions in California; the regions that encompass rice production are Regions 2, 3, and 4. Specifics on where your county falls into these CDFW regions can be found at https://wildlife.ca.gov/Regions.

Statewide Variety Trial Results

Bruce A Linquist, UCCE Rice Specialist, UC Davis

The California Rice Research Board supports our statewide variety trail evaluation each year. This project runs nine variety trails around the state and evaluates commercially available lines as well as promising lines that are coming out of the Rice Experiment Station. These are large trails with each one having over 140 plots. These trails are conducted in farmer's fields under their management practices. It can be a bit of a challenge for them, and we thank them for allowing us to work in their fields.

I am presenting a summary of results here. Details can be seen on our website at https://agronomy-rice.ucdavis.edu/. For ease of interpretation, I divide up the nine locations into two broad environments: those with warm nights and those with cooler nights. Cool nighttime temperatures in mid to late July when the rice is booting can cause sterility and result in blanking of grains. Cool nights are more common south of HWY 20.

In the warmer region north of HWY 20, M-211 is historically the best yielding variety. The 5-year average for M-211 is 92 cwt/ac. This is closely followed by M-209 (90 cwt/ac). Interestingly, M-105 and M-206 are the lowest yielding (84-85 cwt/ac), while the blast resistant M-210 has averaged 88 cwt/ac. In 2025, high yielding varieties at given locations included M-211(RES), M-209 (Colusa) and M-105 (Butte, Glenn).

In the cooler regions south of HWY 20, historically M-206 has done very well, and the 5-year average is 95 cwt/ac. M-105, M-210 and M-211 have also performed well in this region, 5-year averages at 92-93 cwt/ac. M-209 tends to do poorest and has averaged less than 90 cwt. In 2025, we saw generally similar results. We had a new location this year near Winters. This is maybe the coolest location. At this site, M-206 and M-210 did very well and averaged over 102 cwt/ac.

Thinking about variety selection for 2026, M-211 is a popular variety due to its high yields; however, milling can be poor when harvested at lower grain moisture. Due to poor milling stability, a number of rice driers limited the amount of M-211 accepted in 2025. This may also be the case for 2026. M-211 is being phased out and 2026 will be the last year for foundation seed sales. The RES is hopeful that they will have another higher yielding variety with better milling quality stability to replace it. M-210 and M-206 are almost identical genetically and agronomically (similar yields, lodging scores, heading dates, plant height, etc), except that M-210 carries blast resistance. Both M-210 and M-206 do well across the state, but particularly in the southern region. M-105 is the shortest duration variety and has very good yields; however, it is prone to lodging.

Stem Rot Monitoring Guidelines for the Mid Boot Stage

Luis Espino, PhD, UCCE Rice Farming Systems Advisor

Stem rot is a common rice pathogen present in all fields. The pathogen produces resting structures called sclerotia that survive in the soil after harvest. The sclerotia germinate in the spring and the pathogen infects tillers at the water level approximately when plants reach panicle initiation (45 to 50 days after seeding). The pathogen develops in the tiller, causing lesions that penetrate the tiller, reducing the movement of nutrients to the grains and increasing lodging. As sclerotia accumulate over time, the disease becomes more severe.

Several years of trials have shown that when the disease is severe, yield losses can be as high as 12-14%. Managing stem rot requires an integrated approach: burning, managing straw residue to maximize decomposition, using an appropriate N rate, addressing K deficiency, and, if necessary, incorporating a fungicide in your program.

The challenge with stem rot is that it is a difficult disease to evaluate. Yield losses can be masked by other problems such as weeds, weather, etc. Because tiller lesions are at the water level, symptoms are not evident until the disease level is very severe. To aid in the monitoring of stem rot, guidelines for the mid boot stage were developed. By knowing the level of stem rot at mid boot, a manager can make the determination to make a fungicide application to help reduce the severity of stem rot. However, remember that an integrated approach is needed to reduce the severity of stem rot over time.

Another factor that needs to be discussed here is variety. Trials have shown that varieties that have thicker tillers, such as M-209 and M-211, tend to develop less stem rot than varieties with thinner tillers like M-105. This should be taken in consideration when monitoring for stem rot.

Based on the information generated by the trials mentioned above, a fungicide application would be beneficial when the incidence of tillers with stem rot at the mid boot stage is:

Very early varieties (M-105)	Early varieties (M-206, M-210)	Late varieties (M-209, M-211)
30%	60%	80%

To determine incidence, cut a handful of tillers at the soil level in several areas of a check when plants are at the mid boot stage. The more handfuls the better, but no less than three. Avoid N overlaps or skips. Combine the tillers and randomly select 30 to 50. Inspect these tillers and determine the percentage that have stem rot lesions. Use the guideline above to determine if a fungicide application would be of benefit. Remember that a fungicide typically reduces the severity of stem rot by 30%. Do not expect stem rot to disappear from the field after a fungicide is used. To further reduce the severity, implement other management actions such as straw burning, incorporation, reducing N rate, and addressing K deficiency.

From Highly Effective to Highly Resistant: Pyrethroids and Tadpole Shrimp in Rice

Ian Grettenberger, Assistant Specialist in CE
Sophie Allen, UCD Jr. Specialist
Luis Espino, PhD, UCCE Rice Farming Systems Advisor

Pyrethroids are heavily relied upon for management of tadpole shrimp in California rice. Their efficacy has historically been excellent (and mostly still is!); they have proven both effective and very economical given their low material costs, in particular for lambda-cyhalothrin. In many cases, they have been used year after year. As one might say, “if it ain’t broke, don’t fix it”. Right, right?

Pyrethroids have a risk of off-target movement and aquatic invertebrate toxicity, so there has been a risk of regulatory action or additional reporting requirements should pyrethroids move out of fields and into surface waters. In fact, there is now a new Surface Water Quality Management Plan for Pyrethroids (Pyrethroid SQMP) developed by the California Rice Commission to address pyrethroid exceedances at specific monitoring locations. This requires growers within two sub-watersheds to report pyrethroid use and management practices. Heavy reliance on pyrethroids has increased the likelihood of these types of requirements and underscores the need for alternative active ingredients or management strategies.

As with many arthropod pests, repeated exposure to the same active ingredient places strong selection pressure on populations, accelerating the evolution of insecticide resistance. In the past several years, various populations of tadpole shrimp have been reported as resistant to lambda-cyhalothrin, leading to forced changes in management. Field control failures have meant growers have frequently needed to switch to Dimilin, an insect growth regulator.

Created using Google Gemini

For tadpole shrimp, the development of insecticide resistance is likely very localized because tadpole shrimp do not move long distances or disperse readily between fields as shrimp or eggs. Eggs hatch when fields are flooded in the spring. The eggs they deposit in the soil remain in the soil within the field, hatching to start the process again the next year. This means that how often pyrethroids are applied in a *given* field is what really drives the risk and development of resistance rather than region-wide insecticide use patterns.

We have conducted lab bioassays to assess resistance of various tadpole shrimp populations to lambda-cyhalothrin. Some of these were known to be resistant, while others had no history of resistance. In brief, we collected soil from the target fields, flooded the soil, and then cycled the shrimp for several generations to generate enough individuals to use in the bioassay. Shrimp from each population that had sufficient shrimp for testing were treated with 4-5 concentrations of lambda-cyhalothrin and assessed for mortality after 24 hours.

For known resistant populations, we used higher concentrations. At minimum, we tested a concentration (3018 ppm) concentration that approximated a high end of the label application of lambda-cyhalothrin (in this case, Warrior II at 2.56 oz) but sometimes used even higher rates.

We calculated LC_{50}s (Lethal Concentration 50%, concentration that kills 50% of individuals in assay). The LC_{50} value allows us to compare how resistant a population is in relation to the most susceptible population.
The results shown below highlight that the populations had variable levels of susceptibility, ranging from very susceptible to highly resistant (see Figure and Table). This seems to match what we see region-wide:

- When pyrethroids work, they work very well. Extremely low concentrations kill tadpole shrimp. This aligns with the overall toxicity profile of pyrethroids. They are highly toxic to aquatic invertebrates, which includes tadpole shrimp. This is good if we want to manage pests like tadpole shrimp but causes challenges in terms of minimizing potential non-target effects via off-target movement.
- When pyrethroids do not work because of resistance, this can be dramatic. Even very high concentrations (above label rates) do not kill shrimp at times.

On the higher end of susceptibility, Colusa 2, Colusa 3, Glenn 1, and Glenn 2 were all determined to be very susceptible. Even very low concentrations ($1/64^{th}$ of the high end of the label rate of lambda-cyhalothrin) did not result in reduced mortality compared to the higher concentration treatments. Two populations, Butte 1 and Butte 2 (Butte 2 being the Rice Experiment Station) had reduced mortality at lower concentrations. They might still be considered susceptible in terms of control in the field. Butte 1 was 14 times more resistant than Butte 2. Repeated applications of pyrethroids would likely push these populations to greater resistance levels.

Finally, the Sutter and Colusa 1 populations had such high levels of resistance that mortality never exceeded 50% even *with* very high concentrations. For Colusa 1, the highest concentration tested was a rate 4 times higher than the high end of the label rate, while for Sutter, it was a 16× rate. If we consider that Butte 2 is a susceptible population, the TPS from Colusa 1 and Sutter were 600 and 2400 times more resistant!

Weed Management Considerations for Drill-Seeded No-Till Rice

Whitney Brim-DeForest, UCCE Rice Advisor

Interest in drill-seeded no-till rice has increased in recent years; however, the most comprehensive herbicide research in drill-seeded rice systems was conducted before 2015, more than 10 years ago. Transitioning from water-seeded to drill-seeded rice, whether tilled or no-till, substantially alters weed emergence patterns, resulting in systems dominated by grass species, particularly sprangletop and watergrass. In contrast, aquatic weeds, including broadleaves and sedges, are generally reduced, making drill-seeding a viable option for fields with historically high broadleaf or sedge pressure.

This system (no-till drill-seeded) should not be repeatedly used over multiple years. When rice systems transition from continuous flooding with tillage to a flooded no-till system, there is potential for selection of perennial weed species, including ricefield bulrush and cattails (tules). This selection pressure increases and can result in the establishment of these species (if used repeatedly).

Other weed issues include winter weeds not normally found in rice systems. The absence of fall tillage increases pressure from weeds such as *Panicum* species and ryegrass (*Lolium* spp.), which must be effectively managed. Winter weeds are most prevalent in unflooded fields, but can also emerge following winter drainage. Herbicide options for winter weed control are currently limited. Registered products include 2,4-D for broadleaves and sedges, glufosinate for small grasses and broadleaves, and glyphosate as a non-selective option. However, widespread glyphosate resistance in ryegrass and the reduced efficacy of glufosinate beyond the 2–3 leaf stage limit control reliability. Oxyfluorfen is not registered for use in rice and, due to a 10-month plant-back restriction, is not a viable winter weed management option.

Early-season herbicide options in drill-seeded rice systems are limited because several commonly used products, including Butte and Cliffhanger (benzobicyclon), Cerano (clomazone), and Zembu (pyraclonil), are not permitted due to their granular formulations. For preemergence weed control, pendimethalin may be applied preflood in drill- or dry-seeded rice following seeding and light incorporation. Applications must include a safener adjuvant, and fields should be flushed with water within seven days of treatment to ensure efficacy and crop safety. Trials are underway to evaluate the efficacy of Abolish (thiobencarb) as a preemergent treatment, and combinations such as Abolish with pendimethalin in a tank mix are being tested. Abolish as a preemergent application is currently not registered for use in California rice.

During the 2-4 leaf stage of rice, prior to permanent flooding, herbicide options include pendimethalin (only for use on germinating seeds, not for control of emerged weeds), Abolish (thiobencarb), Loyant (florpyrauxifen-benzyl), Granite SC (penoxsulam), propanil, Clincher (cyhalofop), Regiment (bispyribac-sodium), Grandstand (triclopyr), Shark H2O (carfentrazone), and bensulfuron/halosulfuron. After flood establishment (tillering), several of these options can still be used, depending on rice leaf stage: Loyant, Granite SC, propanil, Clincher, Regiment, Grandstand, and Shark H2O. However, they should not be used multiple times in one season, so carefully planning an herbicide program from the beginning is key.

It is essential to plan for sprangletop control in these herbicide programs, as few effective options are available for this species. The only effective herbicides are pendimethalin as a preemergent, and Abolish (thiobencarb) and Clincher (cyhalofop) as foliar options.

Winter Weed Control (Fallow / Pre-Plant)

Herbicide	Target Weeds	Key Notes & Limitations
2,4-D	Broadleaves, sedges	Limited grass activity; timing critical before planting
Glyphosate	Non-selective	Widespread ryegrass resistance; unreliable alone
Glufosinate	Small grasses, broadleaves	Ineffective beyond 2–3 leaf ryegrass
Oxyfluorfen	Broadleaves	**Not registered in rice**; 10-month plant-back restriction

Preemergence

Herbicide	Target Weeds	Key Notes & Limitations
Pendimethalin	Grasses	Apply after seeding with light incorporation; safener required; flush within 7 days
Abolish (thiobencarb)	Grasses	Trials evaluating preemergence use (**Not registered in California rice with this usage)**
Abolish (thiobencarb) + Pendimethalin	Grasses	Tank-mix combinations under evaluation for preemergence use

Postemergence (2–4 Leaf to Tillering)

Herbicide	Target Weeds	Key Notes & Limitations
Pendimethalin	Grasses	Prior to permanent flood, only has activity on germinating seeds (no foliar activity)
Abolish (thiobencarb)	Grasses, sedges	Prior to flood
Loyant (florpyrauxifen-benzyl)	Broadleaves, sedges, some grasses	Pre- and post-flood (growth stage dependent)
Granite SC (penoxsulam)	Grasses, sedges, broadleaves	Pre- or post-flood
Propanil	Grasses, broadleaves, sedges	Pre- or post-flood
Clincher (cyhalofop)	Grasses	Key tool for grass control, pre-flood timing
Regiment (bispyribac-sodium)	Grasses, broadleaves, sedges	Growth stage critical
Grandstand (triclopyr)	Bulrush and Redstem	Effective post-flood
Shark H2O (carfentrazone)	Broadleaves, sedges	Contact activity, only as a foliar in this system
Bensulfuron / Halosulfuron	Sedges, broadleaves	Pre- or post-flood