UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources
Cooperative Extension

Rice Notes

Summer, 2025

In This Issue

Whitney Brim-DeForest
UCCE Farm Advisor
Sutter, Yuba, Sacramento and Placer Counties

Save the Dates!

Meetings	Location	Date
Weedy Rice Workshop	Delta	Tuesday, August 5, 2025
Rice Field Day	California Rice Experiment Station, Biggs, CA	Wednesday, August 27, 2025

2025 was a spread-out planting season for California rice

Bruce A Linquist, UCCE Rice Specialist, UC Davis

The 2025 planting progress for rice in California was a bit unusual compared to other years. I am looking at the USDA figures and while they are not perfect, I think they give a pretty good general indication of planting. Some things to note for the graph shown in Figure 1.

- Due to a warm dry spring, 2025 started off fast with 20% of the acreage planted by April 27 and 35 % by May 4. These values are much higher than for an average year.
- There was a lull in planting in early to mid-May which is unusual. This was likely due to a lot of wind and the forecast of rain (although in most cases rainfall amounts were small).
- From mid to end of May, planting continued at a steady pace with 95% of rice planted by June 1. USDA does not report planting progress after June 1; however, driving around in early June, I still saw a number of fields still being planted.
- In 2025, the time to 50% planting was slightly delayed relative to average (May 15 instead of May 13).
- In 2025, the majority of rice acreage (20 to 80%) was planted over a span of 4 weeks.

In most years that period requires only 3 weeks. The was largely due to the slower rate of planting in early/mid-May.

What does this mean? First, it should have made it easier to plan and get water, fertilizer and pesticides on in a timelier manner as the demand for those resources at any given time was less. Second, all else being equal (i.e. variety selection), it is going to spread out the harvest season. More rice will be coming in early and towards the end. Third, with a lot of late planted rice, a wet fall could cause harvest problems.

2025 Rice Production Workshop – Cancelled!

The Rice Production Workshop (July 23-24) has been cancelled due to unforeseen circumstances. We are rescheduling the workshop to be held in March of 2026, exact dates and location to be determined.

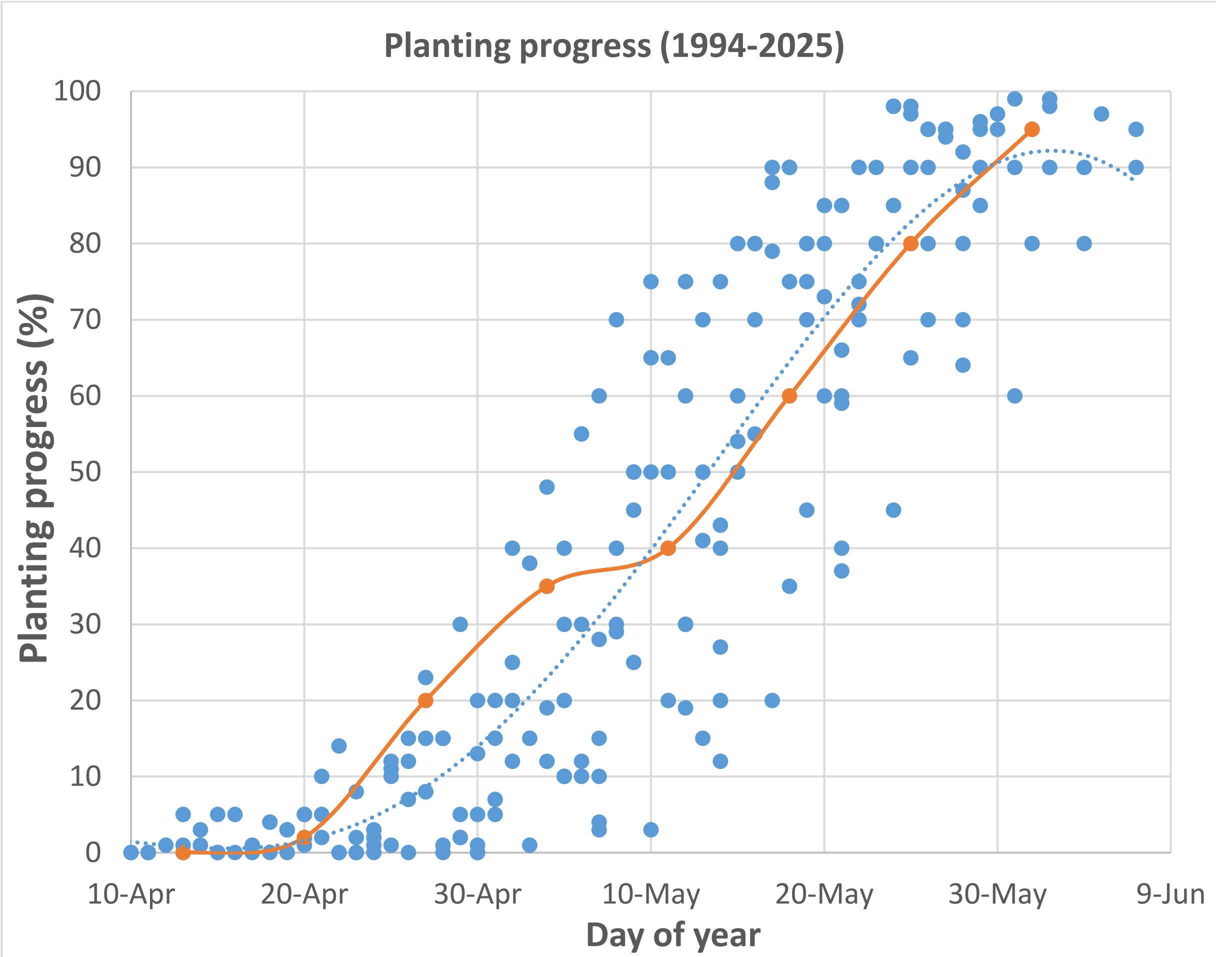


Figure 1. Planting progress for California from 1994 to 2025 (USDA). 2025 is shown in orange. The blue doted line represents an average of all the blue dots which are weekly planting progress data from 1994 to 2024 (31 years).

Summary of the California Rice Commission Report: *A Conservation Footprint for California Rice*

Sarah Marsh Janish, Rice Farming Systems Advisor, UCCE Colusa & Yolo

The University of California, Davis and Point Blue Conservation Science partnered with the California Rice Commission to create a "Rice Footprint" – a comprehensive outline of how the California rice industry impacts ecosystems, wildlife, and communities, and how many acres of rice are needed for them to thrive. The editors of this interdisciplinary report were John M. Eadie and Daniel S. Karp, both of UC Davis, with contributions made from over a dozen scientists from disciplines spanning economics, ecology, and wildlife biology.

A Conservation Footprint for California Rice was made public in early 2025 and highlighted the critical role of rice agriculture in California for wildlife conservation and the economy. Rice fields, especially winter-flooded ones, act as surrogate wetlands supporting diverse species, including Giant Gartersnakes, waterfowl, shorebirds, Sandhill Cranes, and native fishes. However, challenges such as climate change, water availability, crop market shifts, and urban expansion threaten these habitats.

There were 4 main questions this report sought to answer:

1. How much rice should be planted to meet minimum requirements for species of conservation concern in California's Central Valley?
2. How much planted rice needs to be managed in ways that provide ecological benefits (i.e., winter-flooding)?
3. Are there specific locations where rice has the highest potential to maintain high levels of wildlife abundance and diversity?
4. Which management practices are the most economically feasible and create the highest net positive benefits to the greatest number of species?

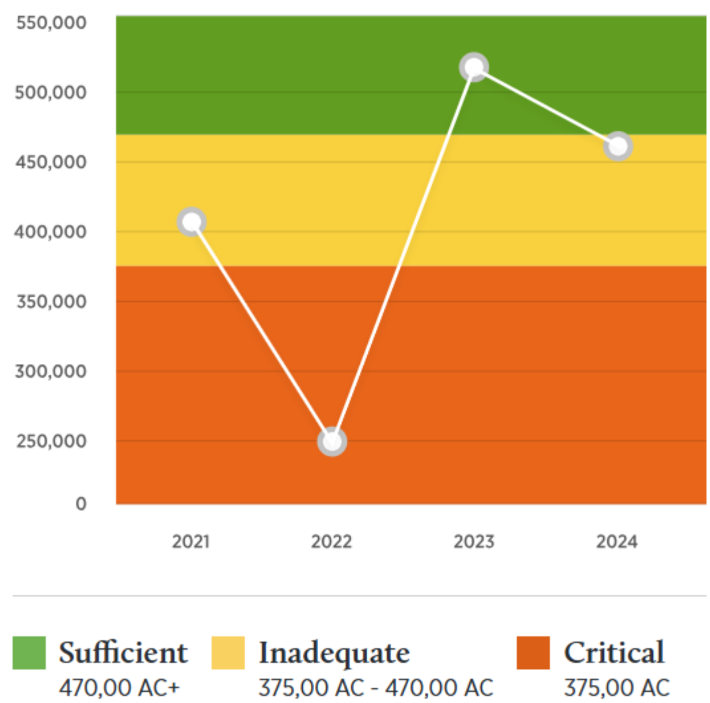
A minimum footprint of **~470,000 – 500,000 acres** would define the conservation footprint.

Among all rice management practices considered, **winter-flooding is by far the most valuable** for almost every species group.

Rice acreage in Colusa and Sutter basins, **especially near wetlands and wildlife refuges**, were often ranked as highest priority.

There is much potential support and **a willingness to pay for wildlife conservation** in California rice.

1. **Wildlife Conservation Needs**:



Priority areas include Colusa, Sutter, Yolo basins, and bypasses near wetlands and wildlife refuges.

For the Giant Gartersnake: 83, 634 acres of planted rice is needed to satisfy the recovery plan target habitat goals. Requires 80,000 acres of flooded rice near wetlands for recovery plan for the species.

For Waterfowl: Needs 500,000 acres of planted rice, with 257,727 acres winter-flooded, under high-competition loads.

For Shorebirds & Black Terns: Require 472,794 acres of planted rice for breeding and 373,540 acres of winter-flooded rice for non-breeding.

For Sandhill Cranes: Need 43,139 acres of flooded rice for roosting.

Native Fishes: Require 30,000 planted rice acres in Yolo and Sutter bypasses.

2. **Rice Management Practices**

For almost every species considered, winter-flooding is a vital part of the annual life cycle. for most species, though water depth and timing present conflicts. The optimal water depths for each species vary, ranging from 0–4 inches for shorebirds to >10 inches for native fishes. While early fall flooding benefits shorebirds, delayed spring draining can support ducks in the spring.

3. **Economic Contributions**

The California rice industry is central to the rural economy of not only the Sacramento Valley, but across the entire state. Rice agriculture generates over $1 billion annually and supports over 7,500 jobs when at peak production. It also provides myriad recreational opportunities for birdwatchers, hunters, and outdoor enthusiasts and creates a food base for waterfowl. **Replacing the food base for waterfowl provided by winter-flooded rice would require an additional 255,000 acres of managed wetlands at a cost of nearly $2.8 billion in 2010 dollars (Petrie and Petrik 2010).**

There were several economic factors to consider when determining the desired number of rice acres to support wildlife conservation in the Central Valley. It is a challenging task to evaluate the social and economic capital necessary to support these ricelands and wildlife-friendly management practices. However, public willingness to pay for conservation is significant, with estimates ranging from $106–$572 per household for species protection.

4. **Threats**

The report found that potential threats to achieving the necessary rice acreage to maintain peak wildlife conservation activity would be drought and water costs. These pose the greatest risks to rice acreage, with planted acres dropping to 250,000 during severe droughts. Conversion to other crops, such as orchards, is not considered a threat to acreage due to soil constraints.

5. **Next Steps**

The next steps of this interdisciplinary project are to 1) conduct multi-objective decision analyses to optimize conservation efforts; 2) improve mapping of water depths and management practices; and 3) expand research on underrepresented species and their compatibility with rice management.

To Sum it up:

California's rice fields are indispensable for wildlife conservation and the statewide economy. A conservation footprint of 470,000–500,000 acres is recommended to sustain multiple species, with strategic management practices and stakeholder collaboration being essential for long-term success.

For further reading, the full report can be accessed at https://www.calrice.org/rice-footprint.

2025 Pest Issues Update

Luis Espino, UCCE Rice Farm Advisor

I have seen several issues with arthropods and diseases so far this year. Here's a quick rundown:

Bakanae: Like in previous years, there have been several fields with heavy Bakanae infections. While the number of plants infected is high, I don't think any of those fields are going to experience a yield reduction due to Bakanae. What is concerning is that seed of most of these fields was treated with bleach. I suspect the issue is that the concentration of the soak water may not have been enough to clean up the Bakanae spores. I do not think this is related to one variety being more susceptible than others (see this blog post where I go over the possible reasons why we are seeing more Bakanae). In any case, it is concerning to continue to see Bakanae in the increase.

Rice water weevil: This issue was observed in our no-till, drill-seeded rice site at the Rice Experiment Station. Typically, rice water weevil is not a problem at the Station. I have not seen high populations there in more than a decade. Plants looked stunted and inspection of roots showed rice water weevil larvae. Because these are small basins, the infestation was observed through the basin, but was worse near levees. Also, areas with low N and that had herbicide injury seemed to be more affected. I have not seen or heard of rice water weevil problems in commercial fields.

Armyworms: Worm pressure this year was higher than the past 2 or 3 years, but we did not reach outbreak levels. However, in some fields number of worms went over 10 per square foot with defoliation approaching the threshold of 25%. I am conducting an insecticide trial in a field with good worm pressure. So far, we have confirmed what we have seen in the past: pyrethroids don't work; Intrepid and Dimilin are good options, though Dimilin acts slower than Intrepid; *Bt* products have limited efficacy. Chlorantraniliprole, an activie ingredient that may be available in upcoming years, was as good as Intrepid.

Rice seed midge: I have seen a couple of fields where it seems that stand was affected by rice seed midge. One was not treated with a pyrethroid, the other was. Even though rice seed midge is not a huge problem, every year a few fields get affected, especially fields that are planted late. An effective insecticide is needed to manage this pest.

What is coming next: blast, stem rot, armyworms at heading, kernel smut.

- Keep an eye out for blast. If leaf blast is detected, apply azoxystrobin at late boot/early heading.
- You can check the level of stem rot in your field at boot. If more than 50% of a sample of tillers show stem rot lesions, you may want to consider a fungicide application at late boot/early heading.
- The fact that we had heavy armyworms during vegetative growth does not necessarily mean we will have them at heading. In past trials we have seen that fields that are treated with Intrepid have less injury to panicles during heading.
- Kernel smut is a gamble. Will we see it? No one knows. At this point, if the field has a history of kernel smut, and a very susceptible variety is being grown (M-209, L-206, L-207, CJ-201), you may want to consider using propiconazole at mid boot. But remember, all our varieties are susceptible.

Drill seeding: How deep is too deep?

Alex Ceseski, ARC Agricultural Research & Consulting
Visiting Scholar, UCCE Sutter-Yuba

How deep is too deep to drill rice in California? I'll get the obvious answer out of the way first: it depends!

If you're thinking of trying out drill seeding in the future, there's going to be a learning curve. Much like with water-seeded rice, your variety selection matters as much as the weather, planting date, water and nutrition management, and weed and pest pressure do. I conducted a series of field and greenhouse trials at the Rice Experiment Station and at UC Davis to obtain data on variety selection and drilling depth a few years ago. Given the renewed interest in using drilling as an alternative cropping method for California rice, I think it's a good idea to highlight some of my findings.

Greenhouse trials

Variety depth trials were conducted in 2016-2017 with M105, M205, M206, and M209. These represented the most commonly used varieties at that time. Seed was planted at depths ranging from 0" to 3", into draining tubs filled with RES field soil, which was a heavier adobe clay. Irrigation consisted of about ½" of water every 8 days, just enough to keep the root zone moist. I had two major objectives for these trials: the first was to evaluate germination and seedling elongation below the soil, and the second was to evaluate emergence and early growth above the soil.

Germination and elongation

All of the varieties had over 94% germination; however, elongation and emergence were dramatically different for each variety. M209 and M205 tended to have the most rapid elongation in the heavy clay soil (Fig. 1), which is a good indicator of relatively higher vigor in those varieties. The proportion of germinated seed which eventually emerged was even more telling (Fig. 2), as it leaves out sterile, ungerminated seed. Here, we can see that M209 and M205 have a greater emergence potential at all depths, with M209 having almost 100% emergence potential when planted at 2". With that said, notice the sharp drop off in emergence between 2" and 3".

Emergence and growth

Total emergence and emergence over time also give important indicators of the limits to the differences between varietal planting depths. Although all varieties saw declines in total emergence at depths greater than 1”, M209 outperforms the other varieties in terms of total emergence from 2” and deeper (Fig 3). Interestingly, the total “emergence” (which is just germination in this case) seen at 0” depth was lower and more variable for all varieties than at ½” or 1”. Emergence over time tells a similar story, with time to 50% emergence being 1-2 days faster for both M209 and M205 at depths greater than 1”. Emergence *rapidity* - or evenness- is also important, as the faster a good stand appears, the faster you can make your next management decision. Again, M209 and M205 outperformed the other varieties below 1” depth, with M209 and M206 going from 50-90% emergence in 1-1.5 days, while M105 and M206 needed 3.5 and 2 days, respectively. M105 seedlings tended to be shorter and have fewer tillers than the other varieties by 4 weeks after planting. Taken together, the results of both studies suggest that M205 and M209 are more vigorous than M105 and M206, and that planting depth shouldn’t be greater than about 2 inches.

What does this mean in the field?

I need to stress that the above findings were obtained in a greenhouse under controlled conditions. After eight days with no irrigation, the soil in the tubs did not dry-down and crack in the same manner one might expect in a field. This means that the seedlings were pushing through the damp soil, without any cracks in the soil to hasten emergence. Indeed, this cracking and rapid emergence is precisely what we saw in field trials run from 2016-2021. These studies focused on M206 and M209 planted to $1^{3/8}$” and $2^{3/8}$”. Under favorable weather and irrigation conditions, the soil surface would crack along the drill furrows, and essentially all of the rice would emerge in a 1-1.5 day period, usually 5-6 days after the first irrigation. This was surprising at first, as there was no real difference in emergence rate or density between variety or depth. On the one hand, this is good news if you’re nervous about stand emergence, but on the other it gives a relatively short window for any weed management strategy that could injure the rice.

Under *unfavorable conditions,* however, the response of the different varieties to planting depth was pronounced. Generally, we found that M206 had a marked decrease in emergence under cooler or wetter weather, whereas M209 emerged a bit more slowly but still had very good stand density. In any case, if stands are reduced, increased tillering should make up much of the difference and protect grain yield. If planted later, around June 1, M209 reached 50% heading several days later than M206 and had decreased head yields when harvested in mid-October.

Another important consideration is lodging. Water-seeded rice is prone to lodging, but drilled rice has shown itself to be quite lodging-resistant. This can be a benefit both in terms of harvest speed and quality, as field drydown should be quicker than in a lodged field, and your combine or gleaner should be able to get through a field faster and with fewer grain left on the ground.

We did not test M210 or M211 in our trials, however M210 should perform much the same as M206, and I would guess that M211 should have seedling vigor similar to M205 or M209. I would encourage anyone interested in drill seeding rice to consult their local UCCE Advisor, as local soil and climate conditions will doubtless play a big role in deciding whether drilling is a good idea *at all*, to say nothing of variety or planting depth. More information about the trials I conducted can be found at https://doi.org/10.1002/csc2.20504 and https://doi.org/10.1016/j.fcr.2021.108369.

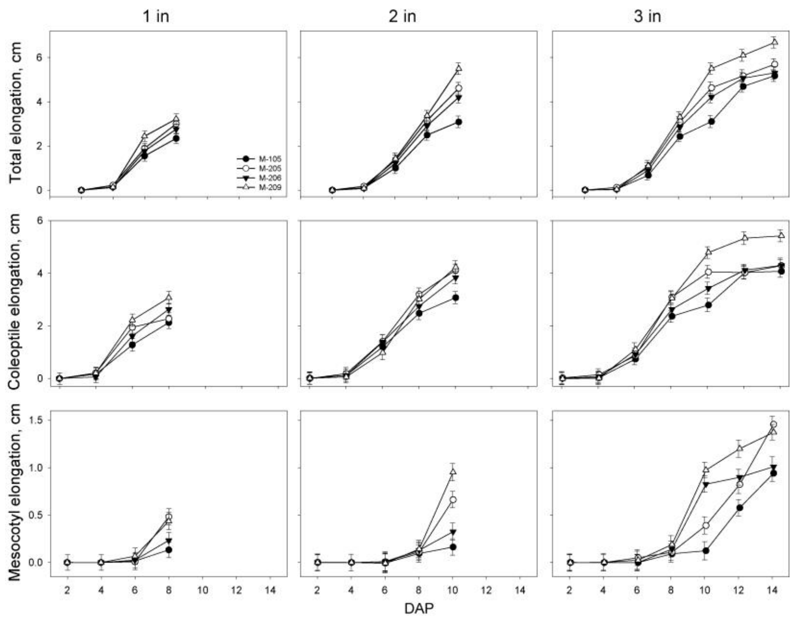


Figure 1. Rice seedling elongation at different planting depths.

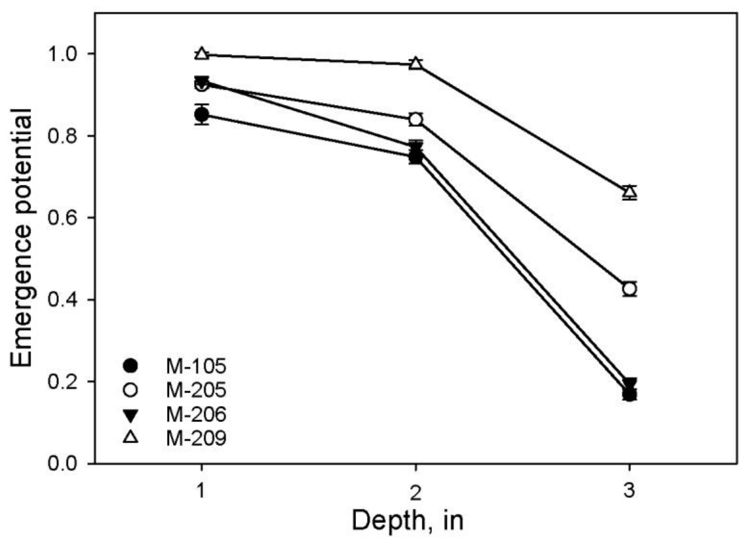


Figure 2. Rice seedling emergence potential, defined as the proportion of germinated seeds which emerge.

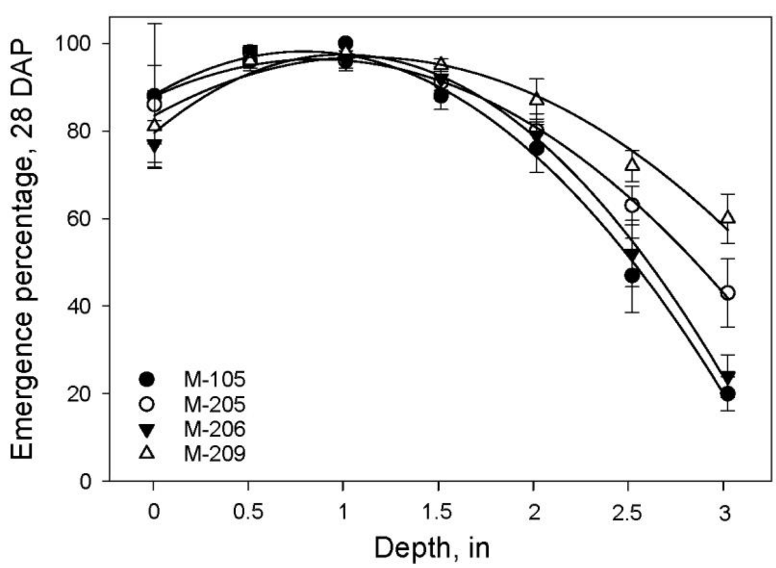


Figure 3. Rice seedling total emergence, 28 days after planting.

Can we do better? An attempt to improve scouting for tadpole shrimp using a novel sampler.

Ian Grettenberger, Asst Specialist, UC Davis
Dima Jones, Student 3, UC Davis
Cara Razma, Student 3, UC Davis
Luis Espino, UCCE Rice Farming Systems Advisor

In muddy rice fields where the water lies still, Tadpole shrimp lurk with a sneaky-slick skill. They're brown like the bottom, they blend in just right, And then—bam!—they appear, a big buggy fright! They grow super fast, from a speck to a brute, And ruin young rice with a mud-churning scoot!

Scouting for insect pests is the cornerstone of any good IPM game plan; you're spotting them before they cause too much trouble, but not pulling the trigger on an application too early. By regularly checking the fields and keeping tabs on who's hatching, crawling, or munching, growers can catch problems early and decide if action is really needed. It's not just about spotting trouble; it's about timing, thresholds, and making informed choices. Rather than spraying "just in case," scouting lets you know if, when, and where you need to take action. It saves money and reduces unnecessary insecticide use and helps prevent insecticide resistance.

For tadpole shrimp, scouting is not the easiest. They are pretty easy to see once they are large and zooming around, stirring up mud. But at this point, the shrimp are likely already causing damage, could be more difficult to kill with some insecticides, and may make applications rushed and time-crunched. The ability to scout has become important in cases where resistance to lambda-cyhalothrin has developed; alternative materials are more expensive and may not work as well as pyrethroids against large shrimp. A common tactic is to simply look into the flooded fields. However, seeing them when they are smaller is difficult even with clear and relatively calm water. They are fairly well camouflaged. A clear-bottomed bucket could you help you peer into the water. It is not easy to use from the edge though, and many seem to balk at sticking their head down into the bucket, especially once the summer temps start rising. You're only searching a relatively small area at a given time point.

What about if the water is stirred up? Good luck seeing through the silty water and seeing any small or medium shrimp just by staring into the water. The shrimp may be lurking in the muddy water, growing, and then munching on rice.

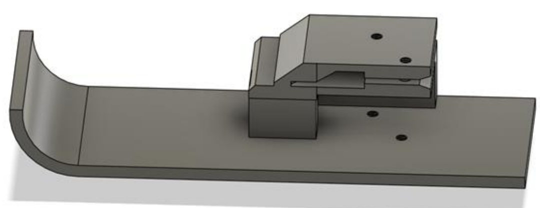
Difference between clear and murky water in finding tadpole shrimp. Note differences (with a best-case-scenario white background) in detectability of tadpole shrimp depending on how muddy the water is. Shrimp are small here, see permanent marker for size.

A more effective/efficient and easier to use scouting method is sorely needed. We aimed to improve the ability of growers and pest control advisors to scout for shrimp. This sampler project was part of a larger project funded by the Department of Pesticide Regulation. We wanted something that was:

- Effective (catches lots of tadpole shrimp)
- Efficient, able to detect shrimp quickly.
- Easy overall to use
- Able to collect small tadpole shrimp
- Able to sample tadpole shrimp even if the water was completely muddy

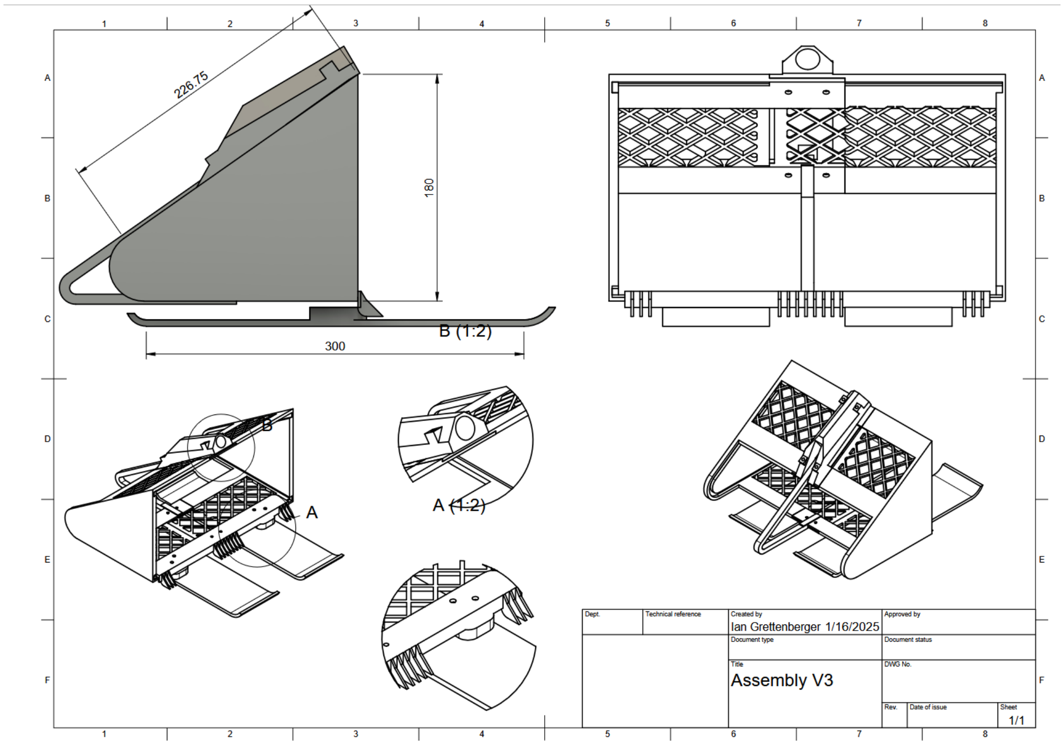
We started with the goal of creating sort of scoop with a handle that could be used to scoop up shrimp efficiently while also minimizing the debris and mud in particular that ended up in the scoop. We had previously used a pool net with a flat leading edge and dragged it along the bottom. While this worked to collect many shrimp, they also ended up completely covered in mud. This made counting them difficult and also limited their movement, which made seeing them at all a challenge.

For simplicity, we started by modifying a sand flea rake. This was a simple way to start because it streamlined the process and let us test the general idea as a concept. A sand flea rake had an overall scoop frame and handle, although we needed to make two modifications to create something more akin to our target design. The first was to simply add wire mesh to decrease the space between holes; a sand flea rake is designed to collect much larger arthropods. The second was to add runners or rollers/wheels to the lower edge of the rake head, which would be critical to avoid scooping up lots of mud, algae, and rice. We decided to start with a runner-type of design, which was something we stuck with moving forward. These runners were clipped onto the rake. We designed the runners using CAD and then 3D printed them.



Note how small the captured shrimp were in the photo on the right.

In our first field tests in 2024, the design seemed to be a resounding success. We standardized a sample as two scoops, reaching out, pulling the sampler in, repeating, and then counting and rinsing the sampler. The rake was pretty easy to use. One sample took 30-40 seconds to take from start to finish. The sampler was efficient (shrimp per unit time), easy to use, was unaffected by water murkiness, and importantly, caught small shrimp.



Design drawings of Version 2. Stainless steel mesh was added to the 3D-printed parts.

Going into the 2025 season, we planned to design the sampler from the ground up; we used CAD again and then 3D-printed prototypes with the goal of producing a fully 3D-printed sampler, aside from the handle. For the handle, we planned to use an extendable paint roller extension pole. We learned lessons from the first prototype and our tests in the field and incorporated them into this design. We would attach components together with bolts and create a design that allowed for integration of the mesh with no taping and minimal to no gluing. Mesh and bolts would be the only additional materials needed for the sampler itself.

We took these Version 2 samplers to the field and were impressed with how well they worked. In a couple of separate tests, they were very easy to use and found small tadpole shrimp. We also compared to the bucket and a visual assessment. This year though, the water in one field was muddy and these sampling methods produced no shrimp. We could see a few shrimp swimming around when looking at the field more broadly, but that was it. The sampler, meanwhile, cut through the silty water and extracted shrimp. The paint roller extension handle stored short for transportation and then could be expanded when ready for use.

Close up of the catch area for Version 2 of the sampler. While tadpole shrimp can be somewhat difficult to see here in a photo, they will move when first removed from the water and can be more easily counted.

Next steps? We plan to produce more of these samplers for folks to use and try out in the 2026 season. We hope that they can help facilitate more finely tuned management plans. We also hope that it'll make it simply easier overall to scout, which should also help make it easier to get insecticide applications out in time. There are plenty of things to keep people busy during tadpole shrimp season, and this tool could take some of the guesswork and gruntwork out of pest management in the early season. Stay tuned, we'll keep sharing updates as we move this forward or refine the design and would love to hear feedback from anyone.

Funding for this project has been provided in full or in part through a Grant awarded by the Department of Pesticide Regulation

Weed Updates 2025

Whitney Brim-DeForest, UCCE Rice Advisor

The two most problematic species I have been seeing in grower fields this year are sprangletop and, of course, watergrass. The two require slightly different management strategies, which I will elaborate on below.

One of the most important things for planning for the next year, however, is knowing if your field has a resistant weed population. This can help to avoid the use of herbicides that do not control your populations, thus saving time and money in the long run.

Resistance testing

In the next couple of months, as rice starts to flower, many of the weed species will be flowering and going to seed as well. Seeds from populations that are suspected to have resistance should be submitted to the UC Weed Science resistance testing program run by Kassim Al-Khatib, at the Rice Experiment Station. Seeds can also be dropped off at your local UCCE office, with your local Rice Advisor.

To collect seed:

1. Wait until the seeds **fall off** the panicle or seed head
    a. You can see if they are ready by tapping the head, and noting if seeds fall off
    b. Do not strip the seed off, as seed that is stripped is not mature
    c. Collecting immature seeds will mean that testing cannot be completed, as immature seeds will not germinate.
2. Collect seed into a **paper bag**
    a. Plastic bags will cause seeds to mold and rot, decreasing or inhibiting germination
3. The easiest way to collect is to put the seed head directly into a paper bag and then shake the seed off into the bag.
4. Make sure not to collect on field edges or areas where there may have been a skip or misapplication
5. Collect from multiple plants, to make sure that you have a large and representative sample
    a. Insufficient amounts of seed will result in poor test results
6. If you would like help collecting, please call your local farm advisor
    a. Whitney: Sutter, Yuba, Placer, Sacramento – (530) 822-7515
    b. Luis: Butte, Glenn - (530) 635-6234
    c. Sarah: Colusa, Yolo - (530) 987-7501
    d. Michelle: San Joaquin - (209) 953-6120

Results from the testing program should be available in February-March of the following year, before you plant your rice. All rice weed species can be tested.

Sprangletop Management

Sprangletop can emerge both under a continuous flood and under flushed conditions (drill-seeded). Plants emerge at higher numbers under flushed conditions than under flooded conditions. Emergence is slower under flooded conditions, so you have to time your herbicide applications to make sure you are controlling it effectively. Making applications that are closer to the 2-3 leaf stage of rice will ensure better control.

Applications made at day of seeding or pre-emergent applications may miss a number of plants that will emerge later.

Active Ingredients that control sprangletop (note: some of these have identified resistance):

- Clomazone (resistance, not widespread)
- Cyhalofop (resistance widespread)
- Benzobicyclon
- Thiobencarb
- Pendimethalin

Figure 1. Sprangletop. (Photo by Sarah Marsh)

Watergrass Management

Watergrass species (late watergrass, barnyardgrass, early watergrass, and Walter's barnyardgrass) are becoming increasingly difficult to control. The key to good grass control is to try to control it early. Most of the yield loss from the grasses is in the first 30 days after planting, due to competition with the rice for nutrients and light. Late applications (clean up applications) are only effective in reducing new seed inputs into the seedbank, but do nothing to address yield loss.

Late watergrass, early watergrass, and Walter's barnyardgrass all emerge under flooded conditions. Walter's barnyardgrass is highly competitive, and anecdotally, appears to be causing extremely high yield loss when uncontrolled.

The best strategy to control grass is to mix up the modes of action and chemistries as much as possible, and to make sure to apply in quick succession. For example, applying two into-the-water herbicides at the beginning of the season, and/or using a pre-emergent herbicide will ensure that grass is controlled early, when it matters. Applying multiple chemistries also increases the chances of overcoming the widespread herbicide resistance found in the grasses.

Active Ingredients that control watergrass (note: some of these have identified resistance):

- Clomazone (resistance, not widespread)
- Cyhalofop (resistance, not widespread)
- Benzobicyclon (suppression only)
- Thiobencarb (resistance, widespread)
- Pendimethalin
- Penoxsulam (resistance, widespread)
- Fluorpyrauxifen-benzyl (suppression only)
- Propanil (resistance, widespread)
- Pyraclonil (suppression only)
- Bispyribac-sodium (resistance, widespread)
- Glyphosate (stale seedbed only)

If possible, during the winter, flooding is encouraged, as it increases predation on the watergrass seeds, as well as increasing decomposition of seeds. In really bad fields, low tillage, or no tillage in the fall helps to increase both decomposition and predation over the winter when fields are flooded.

Figure 2. Walter's barnyardgrass (Left), barnyardgrass (Center), and late watergrass (Right).