Rice Notes

April, 2022

University of California
Agriculture and Natural Resources | Cooperative Extension

In This Issue

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

Fertility considerations going into 2022

Bruce Linquist, UCCE Rice Specialist

We are experiencing a dry winter and spring. This may affect fertility management considerations in a number of ways. First, if your rice fields were not flooded over the winter and the straw was left in the field (especially if it was not incorporated), there is a strong possibility that the straw did not decompose as much as normal. This might complicate tillage operations; however, it will also affect nitrogen management. Straw that has not decomposed will bind up applied fertilizer nitrogen and make it unavailable to the rice early in the season. Therefore, additional nitrogen fertilizer may be necessary in these situations. I am not a big advocate of using a lot of "starter" nitrogen (I tend to push for using as much aqua-N as possible); however, in these situations, it might be advisable to add the extra N as part of the starter blend. Importantly, while the fertilizer nitrogen may be bound up early in the season, it will become available later in the season.

The second consideration is that in the past decade when we have had dry winters, statewide rice yields have tended to be high. High yields could be for several reasons including plenty of time for good land preparation and early planting. Given the potentially higher yield potential, higher N rates may be warranted. Thus, at PI, make sure to access the crop for nitrogen status and apply a top-dress if necessary.

I also want to draw your attention to several Fact Sheets we have developed on fertility management in rice systems. These can be viewed at http://rice.ucanr.edu/FactSheets/Rice/. We have Fact sheets related to nitrogen, phosphorus and potassium management.

Finally, the Rice Research Board is funding some research to quantify nutrient deficiencies in rice fields other than N, P and K. We will be focusing on sulfur, calcium, magnesium, as well as some micro-nutrients like zinc. We are looking for fields where we can take soil and plant samples this year. The soil samples will need to be taken before any fertilizer has been applied. We also plan on taking plant samples during the season. If you have a field that you would like to have us look at please contact me at my email address (balinquist@ucdavis.edu)

Managing tadpole shrimp

Luis Espino, CE Rice Advisor

Tadpole shrimp can be a difficult pest to manage. Most likely, the longer flood-up times we will be experiencing this year are going to make it more difficult. When flooding for seeding takes longer than normal, the shrimp have more time to grow to a size that can injure rice. Once the shrimp shell (not including the "tail") is about the size of a rice seed (7 mm, I'll call this the critical size), the shrimp can cause injury to germinating rice. Late planted fields are at more risk because of the warmer temperatures we typically see in late May; warmer weather makes the shrimp grow faster.

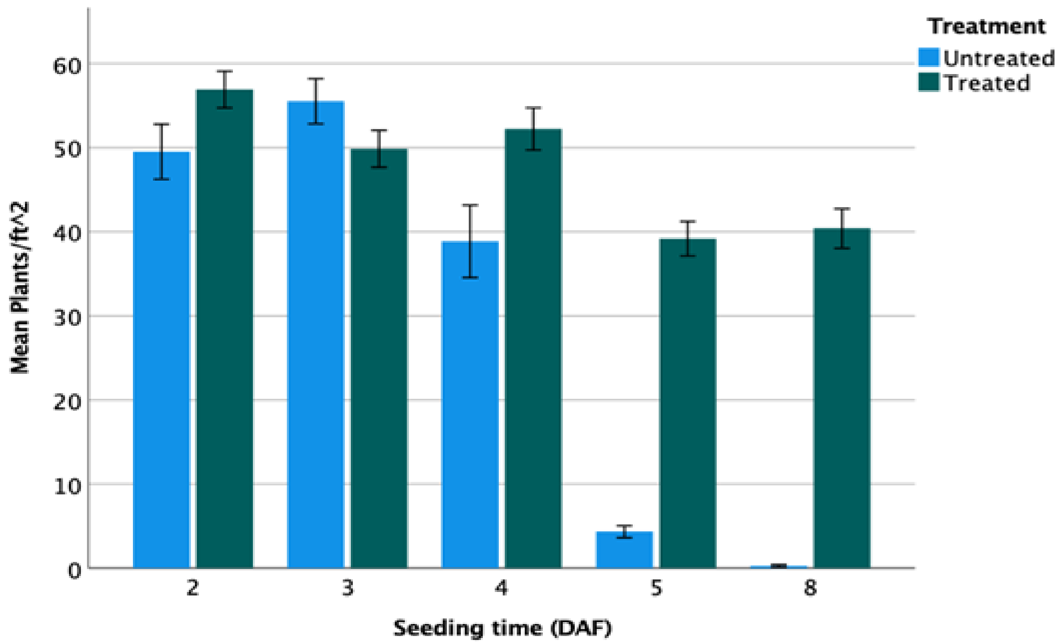
Shrimp with a shell of about the size of a rice seed can injure rice. I call this the critical shrimp size

One option in fields where shrimp is a recurrent problem, with initial flood -up, and planted in late May, is to treat pre-flood with a pyrethroid insecticide if the label allows. In this case, the whole field should be treated because pyrethroids tie to the soil and will not move as they do when applied after flood.

If treating after flood, monitor frequently and note the size of the shrimp and the stage of growth of rice. As rice grows it becomes less susceptible to shrimp injury, even to large shrimp. Fields that can be flooded and seeded quickly can escape shrimp injury because seedlings get established before the shrimp reach the critical size. In several trials conducted over the past few years, rice seedlings were safe from shrimp when they had a well-developed spike, and the radicle was well anchored in the soil. I'll call this the safe stage.

Seedlings with a well-developed spike and radicle are less susceptible to tadpole shrimp injury than younger seedlings. I call this the safe stage.

The figure below is from an experiment conducted last year that shows when rice seedlings are susceptible to shrimp. The experiment compared several seeding times after flood in basins with (untreated) or without (treated) shrimp. The shrimp reached the critical size about 9 days after flood.



Number of rice plants/ft² three weeks after seeding in tadpole shrimp treated and untreated plots seeded 2, 3, 4, 5, and 8 days after flood (DAF).

When the basins were seeded 2 or 3 days after flood, the stand was very similar between treated and untreated plots, showing that the shrimp did not cause damage. In these basins, most rice seedlings had reached the safe stage by the time the shrimp reached the critical size.

In the basins seeded 4 days after flood, the stand was slightly affected in untreated plots. In these basins there was still a good proportion (30%) of seedlings that had not reached the safe stage by the time the shrimp reached the critical size, which resulted in injury to these seedlings.

The stand in basins seeded 5 and 8 days after flood was decimated. In these basins the shrimp reached the critical size when seedlings had only a coleoptile or radicle or seeds were just starting to germinate.

Something important to note is that once the seedlings were well established, even very large shrimp did not cause a reduction in stand, as can be seen by the good stands obtained in the untreated plots seeded 2 or 3 days after flood. I have observed that when the shrimp are left alone once the rice is safe, they will feed on germinating weeds like sprangle top. However, if shrimp populations are high and seedlings are still underwater, shrimp can muddy the water and reduce light penetration, slowing down the growth of seedlings.

Remember to follow the label and comply with holding times after an application. Pyrethroid insecticides are being monitored in drains and the industry should avoid exceedances to preserve this pest management tool.

Watergrass Control Options Based on Herbicide Resistance Status

Whitney Brim-DeForest, UCCE Rice Advisor

FOLIAR-APPLIED HERBICIDES:

Propanil resistance (Super Wham or Stam):

If you have watergrass with suspected or confirmed resistance to Stam/Super Wham, rotational options (for late-season or follow-up applications), are Clincher (cyhalofop) or the highest label rate of Regiment (bispyribac-sodium) (0.8 oz/A). A tank-mix of Abolish + Regiment (thiobencarb + bispyribac-sodium) has also been shown to have a synergistic effect on late watergrass and may be a good option.

Applying a second application of propanil is not recommended if one application of propanil is not working well. Multiple applications of propanil in the same season are likely to select for propanil resistance in grass and sedge species.

Cyhalofop resistance (Clincher):

If you have watergrass with suspected or confirmed resistance to Clincher, possible rotational options (for late-season or follow-up applications), are SuperWham/Stam (propanil) or the highest label rate of Regiment (bispyribac-sodium) (0.8 oz/A). A tank-mix of Abolish + Regiment (thiobencarb + bispyribac-sodium) has also been shown to have a synergistic effect on late watergrass and may be a good option.

Bispyribac-sodium resistance (Regiment):

If you have watergrass with suspected or confirmed resistance to Regiment, possible rotational options (for late-season or follow-up applications), are Clincher (cyhalofop), or SuperWham/Stam (propanil). A tank-mix of Abolish + Regiment (thiobencarb + bispyribac- sodium) has also been shown to have a synergistic effect on late watergrass and may be a good option.

Note: If rotating with propanil, applying a second application is not recommended. Multiple applications of propanil in the same season are likely to select for propanil resistance in grass and sedge species.

GRANULAR HERBICIDES:

Clomazone resistance (Cerano):

If you have watergrass with suspected or confirmed resistance to Cerano, possible rotational options (for early season applications), are Granite GR (penoxsulam) or Bolero (thiobencarb). A pre-emergent application of Abolish (thiobencarb) may also be an option.

Benzobicyclon+halosulfuron resistance (Butte):
Butte is not a strong grass herbicide, and is only labeled for "suppression". Use in complement with other early-applied herbicides such as Cerano or Granite GR. Possible rotational options (for early season applications), are Granite GR (penoxsulam) or Bolero (thiobencarb). A pre-emergent application of Abolish (thiobencarb) may also be an option.

Penoxsulam resistance (Granite GR):
If you have watergrass with suspected or confirmed resistance to Granite GR, possible rotational options (for early season applications), are Cerano (clomazone) or Bolero (thiobencarb). A pre-emergent application of Abolish (thiobencarb) may also be an option.

Thiobencarb resistance (Bolero):
If you have watergrass with suspected or confirmed resistance to Bolero, possible rotational options (for early season applications), are Cerano (clomazone) or Granite GR (penoxsulam). League MVP (thiobencarb + imazosulfuron) and pre-emergent Abolish (thiobencarb) are not recommended as rotational options.

ADDITIONAL OPTIONS FOR GRASS CONTROL:
Deep Water:
Maintaining a deep flood (of at least 4-6 inches) can suppress some grass emergence. Deeper water will provide more suppression. Deep water also improves herbicide efficacy for granular herbicide applications, and deep water may also improve the efficacy of pre-emergent herbicides. Keeping the water on the field as long as possible will improve control. Watergrass typically emerges in the first 30 days after water is put on the field, so a longer flood duration is better.

Stale Seedbed:
A stale seedbed has been shown to provide good control of watergrass in heavily infested fields. To implement a stale seedbed, prepare the field as normal (in spring). Field can be tilled or untilled. If untilled, please keep in mind that watergrass seeds typically only emerge from the top 6 cm (3- 4 inches) of soil.

Once the seedbed is prepared, flood the field until water is 3-4 inches deep, then turn off the water and let it sub into the soil. This will increase watergrass germination. Roughly 1-2 weeks later, spray a non-selective herbicide (make sure the field is fully drained to ensure coverage). Tillage can also be utilized in place of an herbicide, but avoid deep tillage, as it will bring up additional grass seeds. The timing of herbicide application or tillage will depend on temperature. Warmer temperatures cause faster emergence of grass. Two weeks should be more than enough time to bring up most of the grass population that will be germinable (able-to-germinate), regardless of temperature.

If not planting rice, this process (flushing/flooding, followed by tillage or herbicide application) can be repeated multiple times throughout the season. If planting rice, flood up the field after the application of the non-selective herbicide (follow the label for instructions on flood timing).

Rotation to Drill- or Dry-Seeded System:
Drill-seeding or dry-seeding rice allows for the use of Harbinger or Prowl (pendimethalin), which is a different mode of action from all other currently-registered rice herbicides. If using Prowl, it is best used in a drill-seeded system, due to the possible injury to emerging rice plants. Harbinger can be used in a dry-seeded system, where the seed is flown on instead of drilled. For more information on application methodology, refer to the herbicide label.

Determining the Herbicide-Resistance in Grower Fields is a Key for Successful Weed Control in Rice

Kassim Al-Khatib, UC Davis Specialist and Professor

Herbicide resistance is a serious problem in California rice. However, not every control failure can be attributed to herbicide resistance. Other factors can be the cause of control failures. Among the most common reason for failure include weather, incorrect rate, poor coverage or application timing, skips, and spray equipment malfunction.

When weed control fails, it is important to determine the cause and when the cause is herbicide resistance, herbicide programs need to be adjusted. Resistance occurs after the same herbicides have been used repeatedly at the same site for several years. You will notice a gradual decline in the efficacy of the herbicide to control weeds that were once susceptible. When herbicide resistance is the problem, you will find healthy plants alongside dead ones of the same species after treatment; surviving weeds form discrete patches that consistently survive the herbicide treatment.

The UCCE Rice Weed Management Program conducts herbicide resistance testing for the major rice herbicides used in California at the Rice Experiment Station (RES) in Biggs. The testing is free of charge and funded by the Rice Research Board. The testing results help growers improve their weed control programs and also help the rice industry keep track of resistance issues. If you suspect herbicide resistance, collect seeds of the target weed, fill out the Resistant Weed Seed Testing form (included in this newsletter), and bring them to your local Farm Advisor, or send or drop off at the RES to be tested. These samples will be tested in the greenhouse at RES. To collect seeds for testing, follow these guidelines:

- Don't wait until harvest to collect the seed. By then, most weeds have shattered their seeds. If you collect after harvest, you may collect seeds from weeds that have emerged late and thus have not been exposed to the herbicide. The objective is to collect seed from plants that have survived the herbicide action.
- Collect seeds when they are mature and dislodge easily from the seedhead. In general, sprangle top matures the earliest, between rice panicle initiation and heading. Early watergrass, barnyard grass, small flower umbrellas edge, and rice field bulrush usually follow, maturing sometime before rice heading until maturity. Late watergrass matures last, at about the same time early rice varieties (M-205, M-206) mature.
- Collect seeds, not seedheads. Gently shake the seedhead inside a paper bag. Seeds that shatter are mature and will readily germinate. If seedheads are collected, seeds might not be mature or might have shattered already. It is good practice to keep the paper bag open for couple days to allow further seed drying.

- Collect seeds from areas of the field where you are certain the herbicide application in question was appropriate. Avoid field borders, tractor tire tracks, skips or areas where you suspect the herbicide was not sprayed correctly or not sprayed at all.
- Make sure to collect enough seed. In order to have conclusive results, several replications of herbicide resistance testing are needed. When not enough seed is provided, replications may not be possible. For small sized seed weed species such as sprangle top, small flower umbrellas edge or rice field bulrush, collect seeds from at least 20 mature seedheads at each location. For barnyard grass, early and late watergrass, collect from at least 30 mature seedheads.
- We will test every weed against all herbicides labeled to control that weed and you will be receiving a detailed report before the rice season start.

California Cooperative Rice Research Foundation Retools Rice Experiment Station for 2022

Dustin Harrell, Director, Rice Experiment Station

Like many growing seasons, the 2021 growing season was quite challenging for many California rice farmers. However, for the 11 rice farmers who serve on the Board of Directors for the California Cooperative Rice Research Foundation (CCRRF), it was one of the most difficult seasons in recent memory. The 11-member Board of Directors, who serve for the benefit of the California rice industry and do so without compensation, were tasked to re-tool the staff of the Rice Experiment Station (RES). The RES saw a loss of 54% of the professional staff in just a few months into the growing season due to retirements, career changes and attrition. More specifically, the RES lost their director, 2 experienced rice breeders, the genetics laboratory director, 2 breeding associates, 2 farm crew members and their executive assistant. Not only did the board members spend countless hours advertising, recruiting, and interviewing candidates to refill those positions, but many even pitched in time and labor to help make sure the research and foundation seed fields were harvested in a timely manner. Due to their time and efforts, the RES is back at full staff and ready to take on a new growing season and continue to fulfill the mission of the RES which is to develop new and improved rice varieties for the California rice industry.

Dr. Nirmal Sharma was hired as the long grain breeder on August 1, 2021. He is a graduate of the University of Illinois where he worked on cold tolerance of rice in collaboration with the International Rice Research Institute (IRRI). After graduation in 2019, he worked as a post-doctorial fellow with the Noble Research Institute in the Bermudagrass breeding program.

Ms. Emily Schaaf was hired as the RES executive assistant on September 1, 2021. She is a graduate from California State University Sacramento. Most recently she was employed by Far West Rice in Nelson, California, where her duties included payroll, accounts payable, insurance and other administrative tasks. Emily Schaff (maiden name Rudd) is a native of Gridley, California, where her family farms rice in the area.

Dr. Dustin Harrell was named as the director of the RES on November 1, 2021. He comes to the station with over 16-years of rice research experience with the LSU Rice Research Station in Crowley, Louisiana. During that time, he served in multiple capacities including the project leader for the rice fertility and agronomy program, extension rice specialist for Louisiana, and most recently as the resident coordinator of the LSU Rice Research Station.

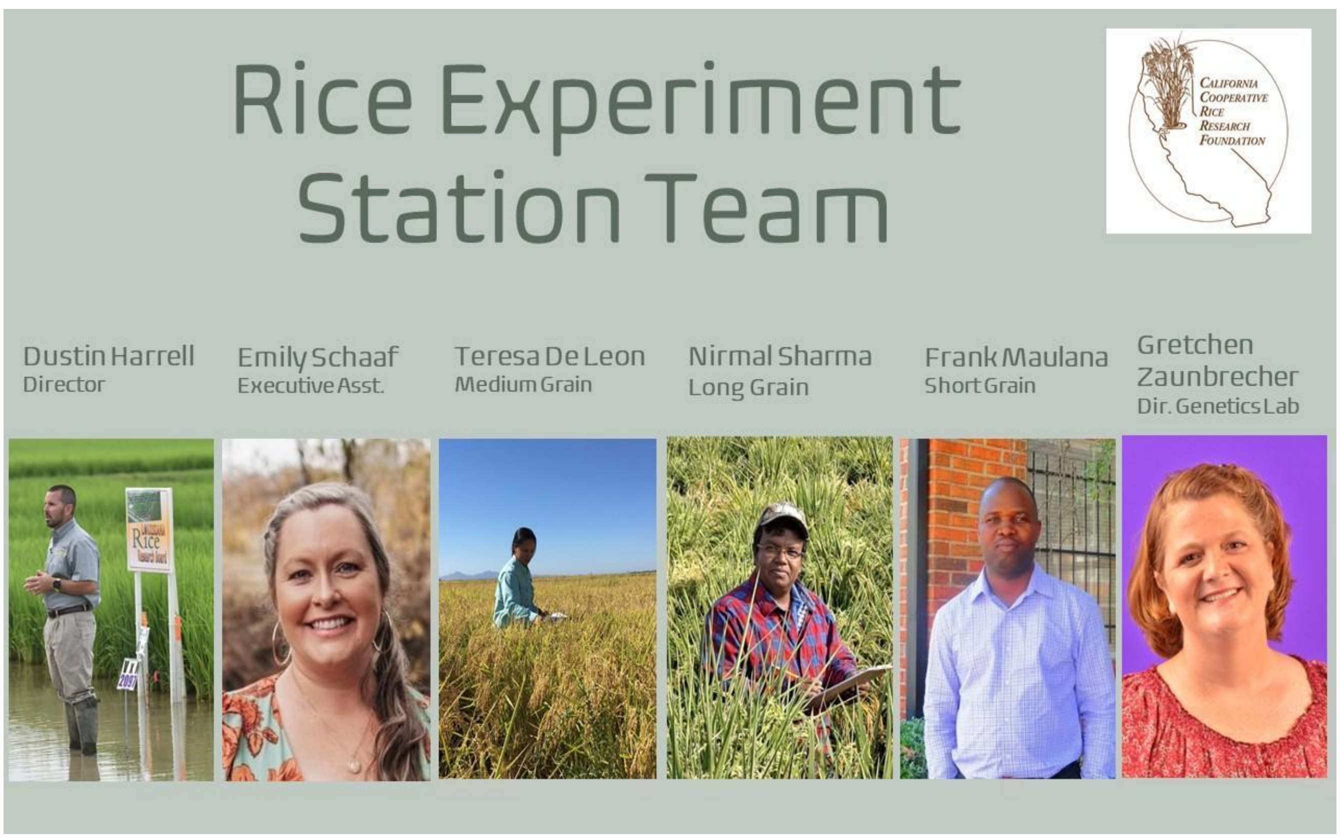
Dr. Gretchen Zaunbrecher was selected as the Director of the genetics laboratory on February 1, 2022. She received her M.S. and Ph.D. degrees from Texas Tech University and Texas A&M University, respectively.

Her previous experience includes 2-years of teaching at the University of Louisiana Lafayette and over 12-years of experience working in the biotechnology laboratory at the LSU AgCenter Rice Research Station in Crowley, Louisiana.

Dr. Teresa De Leon, the RES's longest tenured rice breeder, was recently promoted to lead the medium grain breeding project. She previously worked at IRRI as an assistant scientist with the plant breeding and genetics program from 2004 to 2008. She received her Ph.D. from LSU in 2016. After graduation she worked as a post-doctoral scientist with UC Davis in the red rice program. She was hired on January 1, 2018, to lead the RES short grain breeding program.

Dr. Frank Maulana is the newest hire for the Rice Experiment Station. He will lead the short grain breeding program. Frank is a graduate from Kansas State University where he received his M.S. and Ph.D. degrees in plant breeding and genetics. After graduation he was employed as post-doctoral researcher with the Noble Research institute in Ardmore, Oklahoma, where he worked in the small grains breeding laboratory. Over the past year he has worked at the LSU H. Rouse Caffey Rice Research Station as a post-doctoral scientist with the rice breeding program.

Other newcomers to the RES in 2021 include plant breeding assistants Gabriel Janish who is a 2021 graduate from Texas A&M University in College Station, Texas, and Joseph Martin who is a 2021 graduate of University of California Davis. New farm crew members include Ashley Averitt and Jose Martinez. Both Ashley and Jose live in Oroville, California.



While the CCRRF worked tirelessly this past year to fill important positions at the RES, they also recently approved several new capital improvements that will help the station and breeding program this coming year. One such improvement includes a newly poured 115 by 42 feet concrete slab on the northwest side of the grain bins. The new concrete will improve working conditions around the bins and improve pick-up and turnround for foundation seed orders. A second includes a new professional envelope printer which will speed the labeling process and accuracy of labeling research seed envelopes for the breeding program. A third includes a newly purchased used forklift to move rice seed and facilitate seed delivery. There are also several more RES improvements on the way, including a new website (www.crrf.org) which will be launched in the very new future.