HEALTHY FOOD SYSTEMS | HEALTHY ENVIRONMENTS | HEALTHY COMMUNITIES | HEALTHY CALIFORNIANS

# Rice Briefs

April 2024

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

## Contents



## Upcoming Events

Save the dates! More details to come.

### Drill-Seeded Rice Field Day

**June 18, 2024**

**Rice Experiment Station**
**955 Butte City Hwy, Biggs, CA 95917**

### Rice Quality Workshop

**July 18, 2024**

**Granzella's Banquet Hall**
**457 7th St, Williams, CA 95987**

### Rice Field Day

**August 28, 2024**

**Rice Experiment Station**
**955 Butte City Hwy, Biggs, CA 95917**

### Rice Pest Management Workshop

**September 4, 2024**

**Rice Experiment Station**
**955 Butte City Hwy, Biggs, CA 95917**

UCCE Colusa County. 100 Sunrise Blvd., Suite E . P.O. Box 180, Colusa, CA 95932
Office: 530.458.0570 Fax: 530.458.4625 Email: colusa@ucanr.edu Website: http://cecolusa.ucanr.edu

# New Herbicides Bring Additional Tools to California Rice Weed Management in 2024

Whitney Brim-DeForest, Rice Farm Advisor, UCCE
*Originally published in Rice Farming, March 2024*

This year brings several new chemical tools to California rice. With many herbicide-resistant species as well as emerging problematic weed species, the new chemistries are a welcome tool for managing resistance and preventing the selection of resistant biotypes.

Last year, we had use of Loyant® CA Rinskor™ active (florpyrauxifen-benzyl) for the full season (registered late in 2022). Loyant®, which is an auxin mimic, is applied as a foliar product. It gives additional options for early-season control of sedges and broadleaf weeds, and although not strong on watergrasses when applied alone, provides added control when tank-mixed with other herbicides for grass control. Based on data collected in 2022-2023, two good tank-mix options for watergrass control are SuperWham®/Stam® (propanil) and Regiment (bispyribac-sodium). It does not control sprangletop.

Cliffhanger™ (benzobicyclon) was just registered in 2024 and is a new formulation of a previously registered granular product already widely in use in California rice. Since it can be applied as a foliar product, it expands the timing that benzobicyclon can be applied in the flooded system. It can also be applied as a direct-stream application into the water. It is an HPPD-inhibitor, providing a good option for rotation. It controls sprangletop, ricefield bulrush and smallflower umbrella sedge. Additional tank-mix testing will be occurring this season to determine if it might be a good partner in combination with other herbicides for added late-season watergrass control.

The last product recently registered is Zembu™ (pyraclonil). Zembu™ is a granular formulation of pyraclonil, applied pre-emergence or at day-of-seeding into a flooded field. It provides control of smallflower umbrella sedge and broadleaf weeds and provides suppression of watergrass. As a PPO-inhibitor, it is a new mode of action for watergrass, as the only other PPO-inhibitor registered in California rice only has activity on sedges. It will provide a great rotational option for growers at the beginning of the season, as well as a great partner product (for added control) with other granular into-the-water products.

As always, the label is the law, so make sure to read and follow the current labels for each of these herbicides (found on the manufacturers website or at the Department of Pesticide Regulation's website). Also check in locally with your Agricultural Commissioner's office for training information and any other county-specific requirements.

With these three new options, as well as the currently registered products, rice growers in California should have a great suite of tools available this year, both for resistance management as well as to prevent the selection of future resistance. For help planning a weed management program, please reach out to your local Rice Farm Advisor.

# An Evaluation of Pyraclonil in California Rice

Sarah Marsh, Rice Farm Advisor, UCCE

A system of permanently flooded rice and a lack of diverse weed management techniques have selected for flood-tolerant weed populations in California water-seeded rice fields. Rising herbicide resistance results in increased costs of weed management, as well as increases the difficulty of growing rice in California. One technique to delay further expansion of herbicide resistance is to develop new herbicides to assist in managing current herbicide-resistant weed biotypes.

From 2019-2022, greenhouse and field experiments were conducted to characterize Zembu (active ingredient pyraclonil) activity on common California rice weeds alone and in combination with currently available herbicides.

Zembu, a novel protoporphyrinogen oxidase (protox) inhibiting active ingredient developed for California rice, was applied alone and in combination with other herbicides to determine grass, sedge, and broadleaf control and crop safety.

These experiments indicated that Zembu applied alone is insufficient for broad-spectrum weed control (Table 1), but, when applied in combination with currently available herbicides (SuperWHAM!, Cerano, Butte, Bolero, Granite, Regiment, Loyant) can provide consistently greater control of watergrass species, bearded sprangletop, ricefield bulrush, smallflower umbrella sedge, ducksalad, and redstem (Table 2).

Table 1. Sedge and broadleaf control from Zembu at different application timings in water-seeded rice and at three assessment dates as a repeated measure pooled across 2019, 2020 and 2023[ab]

| | | | | % Control | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | | Rate (lbs ac$^{-1}$) | Timing | Ricefield bulrush | | Smallflower umbrella sedge | | Ducksalad | | Water hyssop | | Redstem |
| 14 DAT | Zembu | 14.9 | 4-inch flood | 67 | ab | 63 | cd | 96 | ab | 97 | ab | 100 |
| 14 DAT | Zembu | 14.9 | Pre-seed bare ground | 66 | ab | 62 | d | 94 | b | 97 | ab | 100 |
| 14 DAT | Zembu | 14.9 | 1-inch flood | 72 | a | 64 | bcd | 95 | ab | 97 | ab | 100 |
| 14 DAT | Zembu | 14.9 | 3 DAF | 65 | ab | 71 | abcd | 95 | ab | 97 | b | 100 |
| 28 DAT | Zembu | 14.9 | 4-inch flood | 67 | ab | 95 | a | 98 | ab | 98 | a | 100 |
| 28 DAT | Zembu | 14.9 | Pre-seed bare ground | 62 | ab | 92 | abc | 98 | ab | 98 | a | 100 |
| 28 DAT | Zembu | 14.9 | 1-inch flood | 70 | ab | 95 | a | 98 | ab | 98 | a | 100 |
| 28 DAT | Zembu | 14.9 | 3 DAF | 60 | ab | 91 | abcd | 98 | ab | 98 | a | 100 |
| 42 DAT | Zembu | 14.9 | 4-inch flood | 60 | ab | 95 | a | 100 | a | 98 | ab | 100 |
| 42 DAT | Zembu | 14.9 | Pre-seed bare ground | 51 | b | 92 | ab | 100 | a | 98 | ab | 100 |
| 42 DAT | Zembu | 14.9 | 1-inch flood | 55 | ab | 96 | a | 100 | a | 98 | ab | 100 |
| 42 DAT | Zembu | 14.9 | 3 DAF | 59 | ab | 92 | abcd | 100 | a | 98 | ab | 100 |
| | | | | | | | | | | | | NS |

[a] Means with the same letter within each column do not differ by Tukey's HSD α=0.05

[b] DAT, days after treatment; DAF, days after flood; NS, not significant.

Table 2 Average percent weed control at 42 days after treatment with Zembu alone and in combination with other herbicides in 2019 and 2021

| | Treatment | Rate ($ac^{-1}$) | Timing | % Control | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Watergrass spp. | Bearded sprangletop | Ricefield bulrush | Smallflower umbrella sedge | Ducksalad | Redstem |
| T2 | Zembu | 14.9 lbs | DOS | 54 b | 80 ab | 24 b | 48 b | 86 a | 94 a |
| T3 | Zembu | 14.9 lbs | DOS | 88 a | 68 ab | 48 ab | 68 ab | 100 a | 88 a |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| T4 | Zembu | 14.9 lbs | DOS | 99 a | 100 a | 97 a | 99 a | 100 a | 100 a |
| | BUTTE | 7.5 lbs | 1.5 rice-leaf stage | | | | | | |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| T5 | Zembu | 14.9 lbs | DOS | 99a | 99 a | 69 ab | 78 ab | 100 a | 95 a |
| | Cerano 5 MEG | 6 lbs | DOS | | | | | | |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| T6 | Zembu | 14.9 lbs | DOS | 99a | 100 a | 88 a | 96 a | 100 a | 100 a |
| | Bolero UltraMax | 23.3 lbs | 1.5 rice-leaf stage | | | | | | |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| T7 | Zembu | 14.9 lbs | DOS | 100 a | 94 ab | 73 a | 81 ab | 89 a | 100 a |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| | Regiment CA | 0.8 oz | Early rice tillering | | | | | | |
| T8 | Zembu | 14.9 lbs | DOS | 92 a | 61 b | 87 a | 88 a | 100 a | 100 a |
| | Granite GR | 15 lbs | 3 rice-leaf stage | | | | | | |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| T9 | Zembu | 14.9 lbs | DOS | 98 a | 93 ab | 97 a | 97 a | 100 a | 100 a |
| | SuperWHAM! CA | 6 qt | 5 rice-leaf stage | | | | | | |
| | Loyant | 1.33 pt | Early rice tillering | | | | | | |

*Note:* Within columns, means accompanied by the same letter do not significantly differ with Tukey's honestly significant difference (HSD) at $\alpha = 0.05$. DOS, day of seeding.

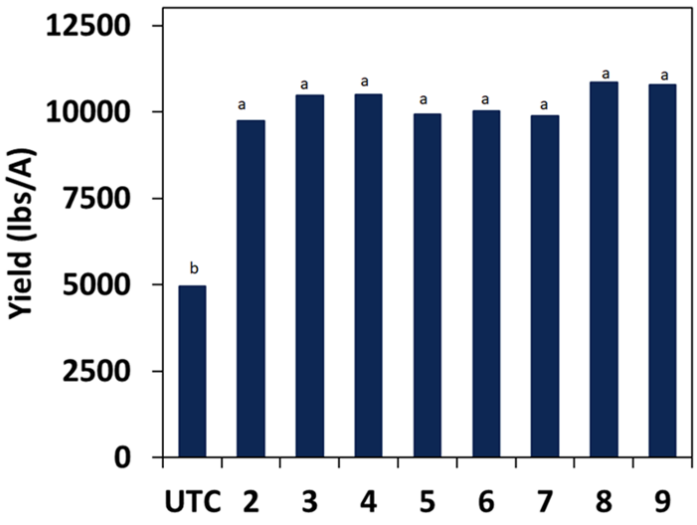


Figure 1. Yield differences between plots treated with Zembu and Zembu + other herbicides. Refer to Table 2 for herbicide combination names.

Yields from plots treated with Zembu, alone and in combination with other herbicides, were significantly higher than untreated control plots. There was no significant difference in yield among any plots treated with Zembu (Figure 1). There was evidence of temporary plant phytotoxicity in some plots treated with Zembu, Bolero, and SuperWham (Figure 2), but no plots demonstrated lasting injury that affected rice yields. Zembu was effective as a base treatment herbicide for incorporation into water-seeded rice weed management programs.

Figure 2. Rice phytotoxicity damage at 50 days after planting in plots treated with Zembu, Bolero, and propanil. Rice recovered by 90 days after planting.

## Don't Forget about the Bugs!

Luis Espino, Rice Farming Systems Advisor, Butte and Glenn Counties, UCCE

Arthropods have not been very problematic in California in the past few years. However, do not let your guard down and let the bugs catch you unprepared. The tadpole shrimp is our key pest. Shrimp tend to be a problem in the same fields year after year because their eggs remain in the soil from one season to the next. Make sure to scout fields soon after seeding, maybe even before seeding, especially fields that take more than a few days to flood. Tadpole shrimp eggs hatch very soon after the field is flooded and the young shrimp grow quickly. Seeding into a field with shrimp present, even small shrimp, is asking for trouble. Small shrimp (about ½ an inch or less) can injure rice, just not as much as larger shrimp. Also, do not just rely on the muddiness of the water. When they are small, shrimp do not disturb the soil much, and therefore you might not see muddy water even though shrimp are present.

Another arthropod that can be problematic in California is the armyworm. Many fields had significant yield losses during the outbreak of 2015. We have not seen a similar outbreak since, but in some years worm numbers have been high. I have been monitoring armyworm moth populations with pheromone traps across the

rice area since 2018. Last year we had the highest moth numbers we have ever seen but that did not translate into high worm numbers in the field. In fact, the worm pressure was very low. While the traps do not predict worm numbers, they can help us improve the timing of scouting. We know that we will see the highest worm numbers two weeks after the moth numbers peak. With Intrepid now fully registered for use in rice, we have a good tool that we can use to control armyworm populations if they get out of hand. You can sign up for my armyworm updates on the UC rice website.

The last pest that can be of concern is rice seed midge. The past three years we have seen some fields suffer stand reduction due to midge. This is a difficult pest to manage given its sporadic nature. Ian Grettenberger, UC Davis Extension Entomologist, has been doing insecticide trials for midge control. His work shows that pyrethroids are not very effective against midge, but at this point they are the only tool we have. Like tadpole shrimp, rice seed midge can be worse in fields that take a long time to flood. Also, late planted fields are at more at risk. Scout your field right at seeding and for the next few days, looking for the silken tubes rice seed midge form on the soil surface and inspect seed looking for injury. If there is enough injury to reduce the stand significantly, use an insecticide. A brief drain will also work; however, take into consideration any effects the drain may have on weed control and fertility.

## Imagine…

Bruce Linquist, Rice Farming Systems Advisor, Butte and Glenn Counties, UCCE

As I write this in early April, the weather is shifting back and forth between being warm and cold and there is the occasional rainfall. Many of you have started or are thinking about starting ground work in preparation for planting. With all this going on, I ask you to imagine what it would be like for your farming operations if you could plant a rice field in mid-April. Later this week, we are planning to plant our first research plots on a summer stale-seedbed (fallowed last year and worked in the summer into a seedbed) using a no-till planter. The ground is firm enough to support equipment, we have taken care of our winter weeds and the seed will be planted into moister. On top of that, we have rain in the forecast for the weekend. Once planted, these rainfall events are helpful.

If the soil is dry, how early one can plant really depends on temperature. Daily average temperature (average of daily minimum and maximum) should be 60°F. Historically, this average falls between April 10 and 15 in the Sacramento Valley. The other consideration if you are planting early is the availability of water. The seeds need to have water to germinate. You cannot always rely on rainfall. Sometimes it may be hard to plant to moisture. In these cases, you need irrigation water. If you have an irrigation pump, you are free to decide when to plant and irrigate your field. If you have to rely on district water, you will be more restricted in your planning.

Last year, we conducted a pilot study of these systems and the results were very encouraging. Yields were similar to water seeded conventional systems. This year we are testing these no-till systems at the Rice Experiment Station in a more rigorous experiment. We are examining the importance of using a seed treatment (gibberellic acid - GA) for more rapid seedling emergence, weed management programs (Whitney) and how best to manage nitrogen fertilizers. Luis will also examine the impact on pests and diseases. We are comparing three systems to a water seeded conventional practice. The three treatments are: (1) no-till drill seeding into a summer stale seedbed (fallowed last year and worked in the summer); (2) no-till drill seeding into a field that had rice last year but the rice straw was removed (3) no-till drill seeding into a field that has rice last year but the straw was chopped and left on the surface. We will be planting each of these treatments when it is possible to run a no-till drill across them. We expect to plant them in the order the treatments are listed. The treatment with the chopped straw mat holds in a lot of soil moisture which delays planting. However last year, we observed that the mat also helps a lot with weed control.

If you are interested in seeing this experiment, we will be having a field day on June 18 at the Rice Experiment Station (details will follow). You will also be able to see this experiment at the Annual Rice Field Day on August 28.