Rice Notes
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In This Issue

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Lookout for New Weed Species!

Whitney Brim-DeForest, UCCE Rice Advisor (originally published in Rice Farming)

Weed control in California rice has become more complicated over the past few years, both due to increasing number of herbicide-resistant weeds, as well as new weeds, including weedy rice and for some, winged-primrose willow. Just as we were beginning to think we were going to have a pause in new weed problems, it looks like we have another couple of new weed species to look out for this year.

The two species are both in the watergrass/barnyardgrass complex (*Echinochloa* spp). They are both found in rice fields in the southern US rice-growing region. One is called rough barnyardgrass (*Echinochloa muricata*) and the other is called coast cockspur grass (*Echinochloa walteri*). *E. muricata* is native all over the US (including California), and has been found around rice fields in California in the past. *E. walteri* is not native to California but is native to the eastern region of the US. *E. muricata* has been confirmed in California rice fields, and *E. walteri* is suspected to be present in California rice fields. They both look similar to barnyardgrass (*Echinochloa crus-galli*), which is commonly found in California rice fields.

The discovery that we had new weed species came through a long string of seemingly unrelated events. It began in early 2017, when I summarized the data from the herbicide resistance testing program with the University of California Weed Science group. I found that over the past several years, we had a large increase in the number of barnyardgrass (*E. crus-galli*) samples submitted for testing. We went from 0 in 2014, to 9 in 2015, to 35 in 2016. I speculated with my colleagues as to what was causing the increase, but we had no clear ideas. Then, at a national weed science conference, I noticed a poster on *Echinochloa* spp. in rice fields in the Southern US. There were two species on the poster, *E. walteri* and *E. muricata*, both of which were difficult to distinguish visually from barnyardgrass (*E. crus-galli*). I looked at the pictures and began to wonder if we might have these species in California rice fields.

Save the Dates!

UCCE Rice Production Workshop

Tuesday, August 7
Lundberg Family Farms Conference Room
Richvale, CA

*** Continuing Education Credits Pending ***

Then in the summer of 2017, I received two farm calls from growers in two different counties, concerning barnyardgrass that was impossible to control. Both growers had applied many different herbicides, with different modes of action, that when combined, should have provided some control. However, when I went to visit the fields, it appeared that the weeds were not even touched by the herbicides. At heading, the growers and Pest Control Advisers (PCAs) for the corresponding fields collected plant specimens, which we sent to the UC Davis Herbarium. They confirmed that we did indeed have *E. muricata* in both of the fields. The infestation was widespread throughout both fields, not patchy, indicating that it had likely been there for a number of years.

To get an initial idea of how widespread these two weed species are, we have grown out all of the submitted samples from the past several years, to have them identified. We also plan to do some genetic testing to determine if there is a non-visual way to distinguish between the three species (*E. crus-galli*, *E. muricata*, and *E. walteri*). We suspect, but have not yet confirmed, that these species may be tolerant to many of our rice herbicides. We are currently conducting further testing.

For now, we are asking all growers and PCAs to be on the lookout for these two species in 2018. In particular, if there is a large amount of *Echinochloa* spp. remaining in the field after all herbicides have been applied, it will be important to get the plants identified. Please give your local University of California Rice Advisor a call.

Figure 1. Panicle of *Echinochloa muricata (*rough barnyardgrass), a confirmed new weed of rice in California.

Figure 2. Panicle of *Echinochloa walteri* (coast cockspur grass), a suspected new weed of rice in California.

Update on Early Season Arthropod Management

Luis Espino, UCCE Rice Advisor

There are two main arthropod problems that can affect rice soon after planting, the rice water weevil (RWW) and the tadpole shrimp (TPS). Adult RWWs emerge from overwintering sites at the end of April and early May, feed on grassy weeds on levees or ditches, and then fly to flooded fields to lay their eggs in rice seedlings. From these eggs, small worms will hatch and burry themselves in the mud in search for rice roots to feed on. The injury that their feeding causes won't be noticed until a month and half after seeding, and it will look as stunted plants that are N deficient.

TPS eggs are in the soil, and hatch as soon as the field is flooded. Small TPS feed on algae and decomposing organic matter, but once they get large enough (shell size about half the size of a rice seed) they can feed on the germinating rice seeds. Once the coleoptile or radicle is cut, the seed will die. TPS grow very fast, especially when temperatures are high, and molt throughout their life.

In the past few years, RWW has not been a big problem. Even though one can find RWW adults in almost any field, their populations are low and do not cause problems. TPS, on the other hand, are widespread and can cause stand losses if left uncheck. The go-to products to control these pests are the pyrethroids (Warrior, Mustang and others). Research for the past several years has shown that pre- and post-flood applications work well. Nevertheless, I am concerned with resistance development. The pyrethroids have been used for early arthropod control in rice for almost 20 years. While there is no evidence that resistance is developing on the RWW, there have been several recent reports in which TPS was not controlled after a pyretroid application. In two fields, I confirmed that TPS had increased tolerance to pyrethroids. In the 1980s and 1990s, TPS developed resistance to parathion, so it would not be surprising to find pyrethroid-resistant TPS.

Thankfully, there are a few other insecticides that can be used. Research has shown that Belay and Coragen work well against both RWW and TPS. Belay is recommended only post-flood; pre-flood applications do not work. Coragen can only be applied pre-flood. Sevin (carbaryl) has also shown good control of both pests when applied post-flood; pre-flood applications of Sevin resulted in mediocre control of RWW (not sure with TPS, but given the short residual of carbaryl, it might not work either).

Dimilin can also be used against RWW and TPS. Dimilin does a good job of controlling RWW when applied at the 3 leaf stage of rice. Remember that Dimilin does not kill RWW adults, but causes the females to lay sterile eggs; therefore the adult females have to feed on treated rice. My trials have shown that Dimilin works well against small TPS (shell size about half the size of a rice seed or smaller), killing them in 24 h. However, larger TPS seem to be able to survive for longer periods, and it may take up to 72 h to see full control. This longer period needed to get good control may result in more stand loss than expected.

A few years back I visited a field that was showing symptoms of RWW injury. At the time, there was nothing that could be done at that point; available insecticides could not reach the larvae feeding on the roots. With Belay, this has changed. Belay can be used as a rescue treatment in cases where RWW was not controlled earlier. Applications at the 5 or 6 leaf stage of rice can reduce larval populations. Control may not be as high as when applied earlier, but it can be as high as 90%.

Fertility Management

Bruce Linquist, UCCE Rice Specialist

As we begin land preparation, I just wanted to highlight a few things to do and also to avoid related to fertility management. Further information can be found on our website (http://rice.ucanr.edu/).

- Apply the amount of N you think is needed for the crop as preplant and starter N. Access at panicle initiation (PI) if any more N is necessary.
- Apply as much N as aqua-ammonia as possible. This form of N is taken up most efficiently.
- The period of time between the preplant N application and flooding the field for planting should be kept as short as possible. Rain or equipment breaks downs during occur this time can extend this period and may lead to greater potential for N loss. Rain is a particular problem if the soil around where the fertilizer is applied gets wet. Time and rain allows for nitrification to occur (when ammonium fertilizer converts to nitrate). This nitrate will denitrify (be lost to atmosphere as N2 gas) when field is flooded. It is almost impossible to determine how much N is lost and thus rectifying the problem is difficult.
- If scum is a problem in your field and you are applying some phosphorus, apply the starter blend 3 to 4 weeks after planting. If applying preflood, the starter should be raked into soil surface.
- How much P fertilizer do you need? Our P calculator at http://rice.ucanr.edu/P_Budget_calculator/ will help you determine the right amount of P fertilizer to apply.
- Do you need to apply potassium? You should apply at least maintenance levels if your soil K test value is below 120 ppm. Maintenance values depends on if you are removing rice straw from the field or not. If only removing grain from the field (not removing rice straw) the amount of K required to maintain soil levels depends on yield but is roughly 30 lb K_2O/ac. If you are removing straw the amount of K to maintain soil K is much higher (greater than 100 lb K_2O/ac) and depends on how much straw has actually been removed.

2018 Yield Contest

Bruce Linquist, UCCE Rice Specialist

This year we plan to continue running the UCCE Yield Contest. Last year, an overall low yield year, we had three winners with yields ranging from 101 to 116 cwt/ac. Last year's winners received a cap from UCCE and, compliments of AgOne Solutions, a color map of 200 contiguous acres at a resolution of 2 inches per pixel (each valued at $600). We encourage participation from all over the valley. For more information as well as access to forms please visit our web site (http://rice.ucanr.edu/Rice_Yield_Contest/). The last day to submit the Entry forms is at the Annual Rice Field Day on August 29.

Armyworms 2018: Get ready

Luis Espino, UCCE Rice Advisor

This year, with the help of Dow AgroSciences, I will increase the number of armyworm traps that I have been monitoring. The idea is to give growers and PCAs more localized information so that they can have a better idea of what's going on near them, and when to increase their monitoring efforts. Weekly trapping numbers will be posted on our website, UC Rice Online, http://rice.ucanr.edu/armyworm_traps/

I will be sending a weekly "armyworm alert" email once the trap numbers are updated on the website. The e-mail will go out to those who are subscribed to one of our electronic newsletters (Rice Briefs, Rice Leaf, or Field Notes). If you receive the armyworm email but are not interested, just click on the unsubscribe link at the bottom of the email. For those who do not receive our newsletters electronically, you can subscribe to the alert email in the armyworm website: http://rice.ucanr.edu/armyworm_traps/

Useful Websites

Weedy Rice Website: www.caweedyrice.com

The California Weedy Rice website (a collaboration between UCCE and the California Rice Commission) contains information on identification, best management practices, sample collection, and additional resources on weedy rice. There is also a link to subscribe to our "Weedy Rice" e-communication, which will keep the rice industry updated on the latest information on weedy rice, as we progress through the rice season.