

California Rice Research Board

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soil depths and inconvenient times in the irrigation cycle.

- How competitive is Weedy Rice compared to California's major varieties.

- How susceptible is Weedy Rice to any of the registered California herbicides

Finally, UCCE will be offering individual management plans. Beginning in fall of 2017, those who submit Weedy Rice samples to UCCE will have the genetics of each weedy rice infested field

Weedy Rice Update

Work continues on determining the distribution, looking at the ecology for weak points, and distributing the best information and management practices about Weedy Rice. Whitney Brim-DeForest and Hassim Al-Khatib are leading this effort. I hope you will take advantage of the tools they are offering.

Growers are being interviewed via a survey to broaden our information on the pest. It is important for growers to participate in these surveys and be forthright in their answers. The industry has a lot to lose if growers choose to hide a Weedy Rice problem rather than address it. Information on field history and management will be collected to see if certain practices enhance or suppress the progress of Weedy Rice. Populations will be tracked in these fields and the seedbank analyzed. Changes in the population will be correlated to the practices growers utilize in their fields.

Genetic analysis has been going on since the Winter of 2016. Samples will be compared to known Weedy Rice biotypes from other parts of the world. It looks like we are developing our own strain rather than inheriting a strain from the Southern US.

Beginning in 2017 you can submit

samples to the UCCE Farm Advisors to determine if you have Weedy Rice. Detailed instructions are given at the www.caweedyrice.com web site. The three main points are these:

- Do not transport seed, plants or soil from a suspected field.

New Assessment Rate

The RRB Board of Directors reduced the assessment rate from eight cents to five cents per hundredweight for the 2017 crop. Because of the Colombia TRQ funds, the RRB has adequate reserves to cover the difference for this year. Research will continue at the same pace as last year using your assessment funds and the reserves provided by the Colombia funds. It is hoped that in a small way this reduction will help your bottom line.

- Contact UCCE Farm Advisors listed on the web page. The Advisor will visit the field, and if necessary, take a leaf or seed sample.

- You will receive the status of the sample as soon as it is processed.

Secondly, a series of greenhouse and small-scale field studies are being conducted. There are three primary questions these studies seek to answer.

- Germination depth and irrigation. Anecdotal information suggests that Weedy Rice may sprout from surprising

determined (which of the five types of Weedy Rice do you have). Growers will begin to receive information about specific recommendations for their field, based on the weedy rice population present, as well as the level of infestation and management history of the field.

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So I encourage you to visit the web site www.caweedyrice.com and educate yourself on the identification tools, prevention recommendations, sample collection protocol and available publications. The Weedy Rice Reporter app for your phone is also available there.

Drone Work

One of the great difficulties with Weedy Rice is that it is rice. Conventional herbicides that do not harm rice don't seem to harm Weedy Rice. So a possible solution would be to use a non-selective herbicide, applied very precisely.



To address this strategy the RRB has two research projects. The first is a multispectral imaging technology to see if regular rice and Weedy rice can be differentiated. The results have been promising thus far and it appears that this is possible. Early results have shown that Weedy Rice can be detected as early as the first 30-50 days after planting. So imagine a drone, with a specialized camera, flying your field and creating a map of the Weedy Rice.

Secondly, Dr. Ken Giles, UCD is working with a drone that could apply the non-selective herbicide to these mapped locations. If Dr. Giles sounds

familiar, you may have seen his work in Napa vineyards with a large helicopter type drone. This drone would use very precise GPS mapping technology to position itself and spray the Weedy Rice. Experiments are presently going on to determine the type of spray system needed to create minimal damage to surrounding rice. Imagine loading the previously created map into this drone and having it go from point to point spraying the Weedy Rice.

Do we know if this will all come together? Not yet. But compared to hand rouging the field, this would be a great improvement in speed and accuracy. It also holds the possibility of being able to do it much earlier in the season, thus preventing an increase in the seed bank.

ROXY Rice

An exciting development in rice breeding, known as ROXY rice is progressing well. Here is how Kent McKenzie at the Rice Experiment Station describes it.

In 2014, a special 3 year CRRB project, "Herbicide Tolerant Rice for California- Screening for Herbicide Tolerance through Induced Mutation", was initiated.



Objectives were:

- Establish protocols and generate mutant populations for screening
- Establish protocols and screen large mutant populations



- Evaluate promising mutants for their merits for commercial level rice weed control and if merited move them quickly into the breeding program.

The project was successfully concluded in 2016, meeting the objectives above. Research focused on medium grain mutant populations produced by the DNA Marker Lab and irradiation. Populations were screened in greenhouse (year round) and field tests (~20 acres) from 2014-2016. Putative mutants were recovered and tested to confirm tolerance.

Lines were recovered from an M-206 population that gave a high level of resistance to the herbicide oxyfluorfen (Goal 2XL and GoalTender). Genetic studies by RES showed that this trait is inherited as a single recessive gene, and has been designated as ROXY. Greenhouse and field testing with pre-plant applications of oxyfluorfen have demonstrated the herbicide tolerance of the mutant lines and 1st generation breeding materials. Promising levels of



weed control were also demonstrated in 2015 to 2017 field tests. Initial crosses, progenies and segregating populations involving herbicide-tolerant mutants were done by the medium grains project, and this trait has been passed on to the other projects as well. A patent has been filed and efforts are being pursued to obtain registration for this herbicide for use on rice in California.

Evaluation of ROXY: Crop Tolerance and Weed Control

Our weed control team, led by Kasim Al-Khatib, has been evaluating ROXY rice. Here is what they have found regarding its performance.



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ROXY is an oxyfluorfen-resistant rice which is currently under development by the RES. In this study, ROXY was evaluated for crop tolerance and weed control with oxyfluorfen applied alone or in combination with several other rice herbicides. Oxyfluorfen is a PPO-inhibitor (same mode of action as Shark H2O); and it has good activity on a broad-spectrum of rice weeds.

ROXY was tested under a continuously-flooded system with 2 pt/A rate of Goal 2XL (oxyfluorfen 2 lb ai/gal) applied pre-flood. The ROXY seed material (17Y3000) used in this study showed only a minimal injury early in the season to the applied rate of Goal 2XL. The stand-alone application of Goal 2XL provided an excellent control of broadleaf weeds (ducksalad, monochoria, redstem and waterhyssop) and the control was at least 90% for late watergrass and barnyardgrass. Control of smallflower umbrellasedge with Goal 2XL alone was excellent; however, the control was only fair for ricefield bulrush. Overall, Goal 2XL alone provided a broad spectrum of weed control and offered an exceptional level of crop safety.

Inclusion of into-the-water herbicides such as Bolero (23.3 lb/A at 2.5 lsr), Butte (7.5 lb/A at 1 lsr), Cerano (10 lb/A at DOS), or Granite GR (15 lb/A at 2.5 lsr) into the program increased control of grasses and ricefield bulrush (> 98% control).

Similarly, an early follow-up application of Clincher (13 oz/A + 2.5% COC at 1 tiller) improved grass control (> 99%) and Regiment (0.67 oz/A + 2.0% v/v UAN + 0.2% v/v NIS) or Granite SC (2.5 oz/A 2.5% v/v COC) applied at 1 tiller improved control of both grasses and ricefield bulrush (> 99% control). A late tank-mix application of Stam 80 EDF and Grandstand (5 lb/A + 8 oz/A + 1.25% v/v COC) or RiceEdge (10 lb/A) following the pre-flood application of GOAL 2XL provided a perfect control of all major weeds.

This year's data suggest that a high majority of initial flush weeds could be controlled with Goal 2XL alone without

causing a significant injury to ROXY. In conclusion, preliminary results are encouraging in that the ROXY offers an excellent crop safety to oxyfluorfen, and fits well into the various weed control programs. The choice of an appropriate follow-up application or an inclusion of a granular herbicide may largely depend on the weed population pressure and/or resistance status of the weeds in the field.

Jason Bowen Chairman

The RRB has had a new Chairman for the last year, Jason Bowen. To give a little background, Jason is a third-generation farmer who works 300 acres of rice and has been farming for 14 years. He also works for Colusa County Farm Supply and acts as a crop consultant for rice, almond and walnut growers. This has been a real benefit as he has led the



effort to combat Weedy Rice. Jason serves on the Maxwell little league, has been on the Maxwell fire department for 15 years, and helps with Field of Dreams veteran duck hunt. Enjoys hunting, snowmobiling, and coaching youth sports. Most of all he likes spending time with his wife Jennifer and two sons Lucas and Rhett in the outdoors.

Here is a part of the speech he gave at Field Day this year.

There are two really big issues that

come to mind as we gather here for Field Day, 2017 – Weedy rice and economic survival.

Weedy rice is not going to go away by itself. You can blame your neighbors or hide the problem you have in your field, you can even ignore it, but that will not make it go away. As an industry we must make a choice to do battle with this invasive weed. Wars are never fun, but some wars are necessary. Inaction will doom us to become like the Southern US and result in just living with the problem from here on out.

What can you do? Though the information we have today is not perfect, we are striving to give you the best information we have through **CAWeedyRice.com**. Take advantage of the UCCE Weed Course coming up in September so you are able to accurately identify weedy rice and not confuse it with other weeds. Insist that your PCA is trained to identify weedy rice if they are your eyes in the field. And very importantly, when you find it, report it. UCCE has developed an app for your

phone (Weedy Rice Reporter) that will allow you to take a picture of the weed and report its location, again on **CAWeedyRice.com**. Farm advisors will then come out and verify the problem for you. Beginning this Fall, they will even take a plant sample and return to you a grower management plan with information on the genetics of each weedy rice infested field. Growers will begin to receive information about specific recommendations for their field, based on which of the five weedy rice populations are present, as well as the level of infestation.

What is the Rice Research Board doing? We are funding the work of Whitney Brim-DeForest and Dr. Al-Khatib to understand the pest and find the weak points in its biology. The weed classes and the app have grown out of this effort. In addition, we are working with two researchers on ways to utilize drones to act as a means of detecting the weed in the field, and potentially, as a means of precisely spraying the weeds. The CRC is also pursuing the registra-

tion of chemicals for this purpose.

Secondly, you as growers need to be able to survive financially. The Rice Research Board chose to lower their assessment rate from eight cents to five cents this year. I realize that this is not a great deal of money, but we hope it helps provide some small relief. The Research Board has adequate reserves to cover the difference in the assessment rates.

Finally, the Rice Research Board continues to be committed to research for the industry. We will be continuing with a full array of projects for the 2018 season to meet the research needs of industry. The Colombia TRQ funds have been a great benefit to us at this time. New developments are on the horizon and you will get to see one today. Kent McKenzie will be talking about ROXY rice and its potential for weed control.



Yuba City, CA 95992

PO Box 507

RICE RESEARCH BOARD