UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION
Agriculture & Natural Resources

Rice Briefs

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION COLUSA COUNTY
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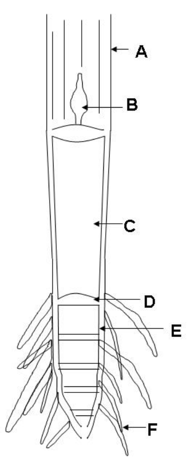
Panicle Initiation and Differentiation

Around this time of year we start seeing rice changing from the vegetative phase into the reproductive one. We talk about topdressing and rice being now at the panicle initiation (PI) stage. But what exactly is PI and why is it so important?

The reproductive phase of rice goes from PI to anthesis, and during this phase, changes in vegetative growth and formation of the panicle occur. The internodes elongate and plant height increases, while tillering and root growth are reduced. PI marks the moment in which the shoot apex starts to differenciate into the panicle. At this moment, the panicle is not visible to the naked eye; however, a green band can be seen at the lowest internode. This stage is commonly referred to as “green ring”. The panicle becomes visible 3 to 5 days later, and this is known as the panicle differentiation stage. At this stage the panicle is 1 to 2 mm long and the internode below it has elongated half an inch (see figure on the left).



A. Main culm
B. Differentiated panicle
C. First elongated internode
D. Node
E. Unelongated internode (root node)
F. Root

Adapted from Moldenhauer, K. A. K., and J. H. Gibson. 2003. Rice morphology and development, pp. 103-127. *In* C. W. Smith and R. H. Dilday [eds.], Rice. Origin, history, technology, and production. John Wiley & Sons, New Jersey.

The number of spikelets (flowers) per panicle is determined during the differentiation stage. During the final stages of differentiation pollen is formed within each spikelet. This is the most sensitive period to cold temperatures. Temperatures of 55°F or less can inhibit pollen formation and cause sterility that will result in blanking. Raising the water level at PI above the developing panicle can help avoid cold temperature induced blanking.

Correcting nitrogen deficiencies should be done up to PI. As mentioned before, the number of spikelets is established at the differentiation stage; therefore, the effectiveness of topdressing diminishes with time beyond this point.

Contents

Correction

In the May issue of Rice Briefs, the article “Herbicide Programs for Resistant Late Watergrass” incorrectly stated that Granite GR was applied at day of seeding. Actually, Granite GR was applied at the 2-3 leaf stage of rice. Earlier applications of this product can cause crop injury and stand reduction. We are reprinting the corrected article in this issue. We apologize for the confusion.

Receive Rice Briefs and rice meeting announcements on your e-mail

To receive this newsletter and rice meeting announcements electronically, go to *http://cecolusa.ucdavis.edu/rice/* , click on “Rice Briefs Newsletter” on the left side menu, enter your e-mail on the next page and click “Submit”. Your e-mail will only be used to deliver the newsletter. If you have any questions, comments, or suggestions regarding topics, contact me at laespino@ucdavis.edu or at 530-458-0578 or 530-635-6234.

Herbicide Programs For Resistant Late Watergrass

Luis Espino, UCCE, and Albert Fischer, UC Davis

Late watergrass, *Echinochloa phyllopogon* is one of the most difficult weeds to control in California rice fields. In many areas this weed has evolved resistance to most available rice herbicides; this resistant form of late watergrass is also called "mimic". Studies have confirmed resistance to Granite (penoxsulam), Regiment (bispyribac-sodium), Whip (fenoxaprop-p-ethyl), Clincher (cyhalofop-butyl), Bolero/Abolish (thiobencarb), and Cerano (clomazone).

Several combinations of herbicides were evaluated during 2008 by the UC Davis Weed Science Program to try to control resistant late watergrass. Small plots were established in a field with a severe resistant late watergrass infestation in Glenn County. Treatments consisted of day of seeding, into the water application of Cerano or **application of Granite GR at the 2-3 leaf stage of rice (lsr)**, followed by a foliar spray of a different herbicide at the 4-5 lsr with the water lowered for foliar exposure.

Results show that various herbicide combinations can achieve acceptable resistant late watergrass control and

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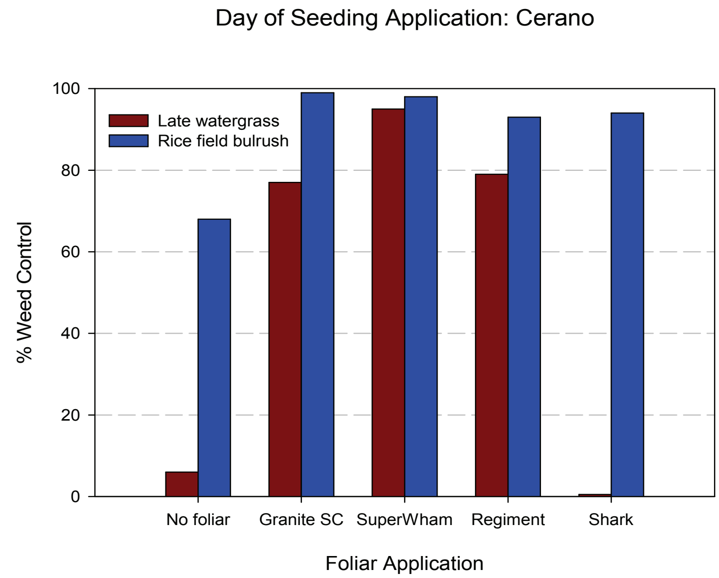

Fig. 1. Percent weed control 97 days after seeding. Cerano applied at day of seeding followed by foliar applications made at the 4-5 leaf stage of rice. Glenn Co., 2008.

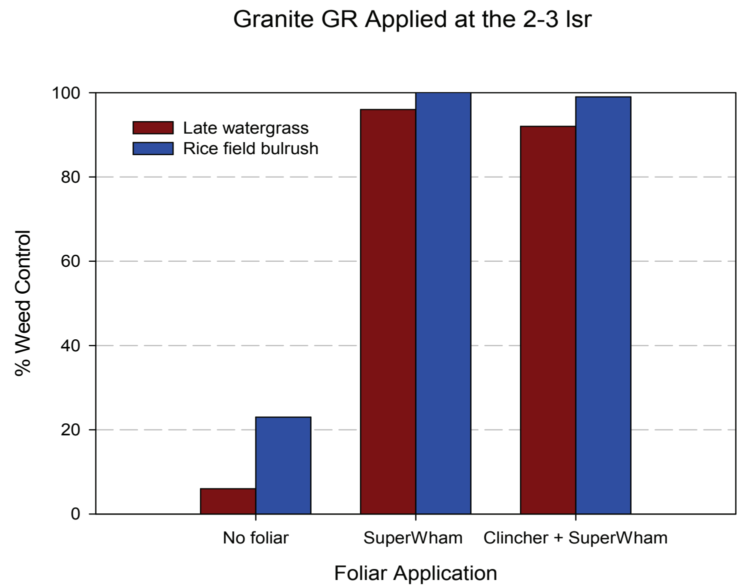

Fig. 2. Percent weed control 97 days after seeding. Granite GR applied at the 2-3 leaf stage of rice (lsr), followed by foliar applications made at the 4-5 lsr. Glenn Co., 2008.

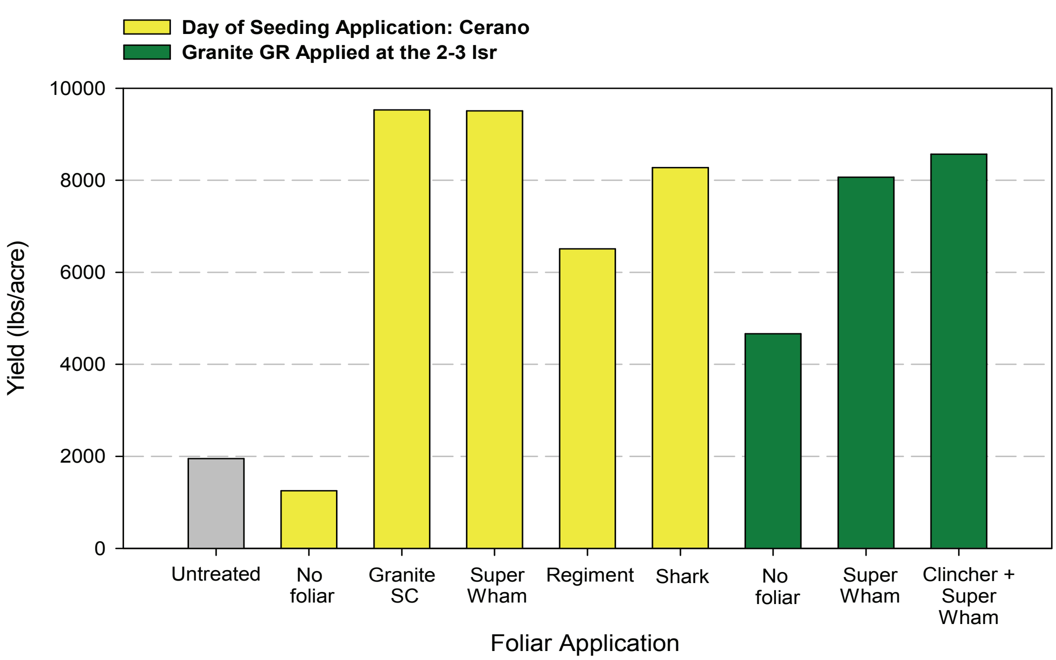

Fig. 3. Yield from plots infested with resistant watergrass and treated with selected herbicides. Cerano applied at day of seeding, Granite GR applied at the 2-3 leaf stage of rice (lsr), followed by foliar applications made at the 4-5 lsr. Glenn Co., 2008.

Managing Nitrogen Fertilization for Early Season Drains

Luis Espino, UCCE, and Bruce Linquist, UC Davis

Research conducted by the UC Davis Agroecosystems Lab has shown that early season drains for weed control affect the way nitrogen (N) behaves in the soil. Experiments conducted in previous years demonstrated that during the drain period, N, in the form of nitrate (NO_3^-), accumulates at an average rate of 2 lbs/acre/day. After reflooding, this N is susceptible to losses due to denitrification.

For example, if a field is drained for 10 days, N losses could be as high as 20 lbs/acre. This may vary with field and even within a single field, because nitrification [the process by which soil microbes use ammonium (NH_4^+), and turn it into NO_3^-] can be affected by soil moisture, soil properties and temperature. A field can be considered drained when water has stopped moving out of the field and soil is showing but there are still puddles.

If an early season drain for weed control purposes is planned, the question then is: how does the N management need to be changed to compensate for any N losses during the drain-reflood process?

To answer this question, the UC Davis Agroecosystems Lab conducted an experiment during 2008 on a rice field between Biggs and Richvale. Four rates of aqua ammonia were injected before planting (0, 80, 120 and 160 lb N/acre) and supplemented with 40 lbs N/acre applied at the surface before planting or 40 days after sowing. The field was drained 5 days after seeding for a period of 11 days for a Clincher application.

Results showed that there was a significant response to the application of N to the soil surface. The application of surface N at planting increased yields by 600 lbs/acre; the application of surface N 40 days after seeding increased yields by 1000 lbs/acre.

Most importantly, results showed that, for equivalent N rates, yields and N uptake were higher when all N was applied as aqua ammonia. The injection of aqua ammonia 3-4 inches deep in the soil protects the N from denitrification losses. This means that if you are planning a 10-15 day early season drain, you should increase the rate of aqua ammonia by 20-30 lbs N/acre to compensate for denitrification losses and inject it all before seeding.

Surge in Global Rice Prices Analyzed by USDA

This past May, The USDA released the publication “Factors Behind the Rise in Global Rice Prices in 2008” by N. Childs and J. Kiawu. The authors reviewed long and short-term factors that caused the increase in rice prices. They concluded that the most important factors behind the recent increase in price were export restrictions by major suppliers, panic buying by several major importers, a weak dollar and high oil prices. It is interesting to note that the increase in prices occurred during a year of record global rice production, larger supplies and buildup in stocks.

The authors state that in the future, sudden drastic increases in the price of rice will be less likely to occur as export restrictions are lifted and global rice yields increase. They also mention that the adoption of genetically enhanced (GE) rice could contribute to reduce the likelihood of rice price spikes. However, because major rice importers are not willing to accept GE rice, the adoption of GE rice will likely not happen in the near future.

The complete report can be downloaded from the following website: **http://www.ers.usda.gov/Publications/RCS/May09/RCS09D01/**

Herbicides Programs *(Continued from previous page)*

rice yields (Figs. 1-3). For example, Cerano followed by SuperWham (propanil) gave very good watergrass control and rice grain yield. Similarly, Granite GR followed by Clincher and/or SuperWham worked very well. Using Cerano or Granite GR alone did not control resistant late watergrass satisfactorily.

When choosing an herbicide mix for resistant late watergrass control, consider other weeds that may be present. In the study mentioned above, rice field bulrush was satisfactorily controlled with all herbicide mixes.

Rates used in the experiments:
Cerano: 12 lb/a
Granite SC: 2.4 oz/a
SuperWham: 6 qt/a
Regiment: 0.79 oz/a
Shark: 4 oz/a
Granite GR: 15 lb/a
Clincher: 15 oz/a

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