UNIVERSITY of CALIFORNIA

Agriculture & Natural Resources

COOPERATIVE EXTENSION COLUSA COUNTY

P. O. Box 180, 100 Sunrise Blvd., Suite E, Colusa, CA 95932 Tel. (530) 458-0570 Fax (530) 458-4625

RICE  BRIEFS

July 2008

In this issue…

- **Top-dressing**
- **Rice leafminer**
- **Armyworms**

A large proportion of rice is at or approaching panicle initiation. In this issue of Rice Briefs I'm reproducing information from the 2006 California Rice Production Workshop Manual that deals with top-dressing. If you have the manual, the information included in this newsletter is in the Fertility and Crop Nutrition chapter. There you will find more information regarding the methods to determine leaf nitrogen levels. If you don't have the manual and would like to get an electronic copy, contact me by phone or e-mail.

I recently visited a late planted field that had a moderate rice leafminer infestation. Injury by this insect can be difficult to detect or confused with herbicide injury or rice water weevil scars. The rice leafminer is usually not a problem in California rice; however, it's important to correctly identify its injury so as not to base management decisions on a wrong diagnosis. Some pictures are included.

Since we're talking about insects, I am starting to see armyworms in some rice fields. I haven't seen anything severe, but keep an eye on your fields. Armyworms before heading are not usually important, but with the changing weather we never know what is going to happen. Some pictures are included.

To see the pictures included in this newsletter in color you can go to:
http://cecolusa.ucdavis.edu/newsletterfiles/newsletter439.htm
and download the corresponding issue.

Finally, mark your calendars. The Rice Experiment Station will be having its 2008 Rice Field Day on Wednesday August 27.

Top-dressing*

Randall Mutters, Farm Advisor, UCCE
William Horwath, Professor; Land, Air and Water Resources; UC Davis
Chris van Kessel, Professor, Plant Sciences, UC Davis
Jack Williams, Farm Advisor (retired), UCCE

Correction of mid season deficiencies or managing tissue levels for quality requires knowing the growth stage, target tissue concentrations at each growth stage, tissue sampling techniques, and an understanding of the fertility 'strength' of the individual field.

Critical tissue concentrations of nitrogen (N) range from 4.6% at mid-tillering to 2.6% at flag leaf emergence (Table 1). Concentrations are based on the Y-leaf, the most recently fully expanded, for the first three growth stages. Standardized criteria for tissue levels depends on sampling the appropriate leaf. Sampling too old or too young of a leaf may yield an inaccurate evaluation since leaf N levels can change with leaf age.

Table 1. Critical tissue concentrations in Calrose rice varieties for nitrogen, phosphorus and potassium at four stages of growth.

Plant growth stage	Nitrogen (% total N)	Phosphorus (ppm extractable PO_4-P)	Potassium (% extractable K)
Mid-tillering	4.6	1000	1.4
Maximum tillering	4.0	1000	1.2
Panicle initiation	3.3	800	1.0
Flag leaf	2.6	800	1.0

There are three methods to determine leaf N levels: 1. chemical analysis, 2. leaf color chart and 3. chlorophyll meter or SPAD meter. Regardless of the technique, it is essential that a field is thoroughly sampled. Take samples from numerous locations to provide a clear indication of the overall nutrient status of the field and any spatial variability (i.e. weak or strong spots). Again, in all cases sample the Y-leaf. Correcting nutrient levels at heading has generally proven to be marginally useful. However, late season sampling would provide useful information on nutrient management strategies for subsequent years.

Keep in mind that when making mid-season N management decisions based on leaf tissue concentrations, apply only what is needed to achieve adequate nutritional levels. More than that is not necessary to ensure high yields, it is an additional cost, and too much can result in a yield reduction. For example in M-202, crop productivity did not increase when leaf N content at panicle initiation (PI) increased above about 3.2% (Figure 1). There was no significant difference in yield across a range of leaf N from 3.2 to 3.8%. Excessive N leads to luxurious vegetative growth which is conducive to diseases and lodging.

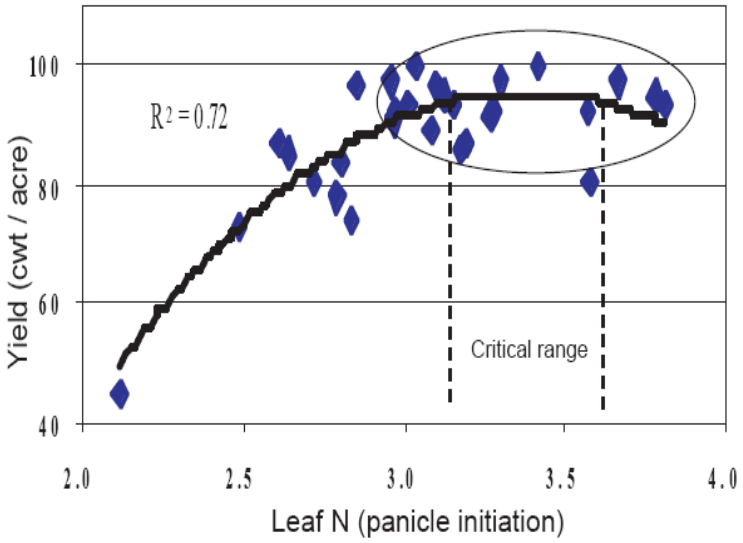

Fig. 1. Yield as a function of leaf N at panicle initiation in M-202.

Additionally, some varieties are more sensitive to over fertilization than others. For example, increasing le.0af N beyond the adequate level at PI in M-401 led to a substantial yield decline. In fact the yield plateau fell within a rather narrow range of 3.1 to 3.6% N.

Correcting N deficiencies is most practical up to PI as indicated by the expansion of the internodes. A rapidly expanding internode space that is easily identifiable is sometimes referred to 'agronomic' PI. At this point, the number of spikelets per panicle is already established. It is generally thought that the effectiveness of top dressing diminishes with time beyond this point. However, latter applications may be useful for Japanese varieties for purposes of grain quality and lodging control. Under experimental conditions, Y-leaf nitrogen at PI was a good predictor of final yield in Akitakomachi.

*Adapted from the 2006 California Rice Production Workshop Manual.

Rice leafminer

Leafminer injury (mines) has the appearance of necrotic lesions of irregular shape. These mines can be small or large. Sometimes, under heavy infestations, more than one mine can be found in the same leaf, coalescing and forming a bigger mined area. Mines dry with time, and leaves acquire a “burned” appearance. To confirm injury is due to leafminers, run the leaf between your fingers and see if you can feel the larva as a small swelling in the leaf. The leafminer larva or pupa can be found by carefully opening the mines.

Rice leafminer mine with pupa inside

Mines can coalesce and dry a whole leaf

Rice leafminer larva

Armyworms

Armyworms can be found in the upper canopy early in the morning. However, as the day warms up, they move to the bottom of the plants. They might be hard to spot, camouflaging themselves among the dry leaves. If you can't see them, look for fresh frass (insect excrement). This is a good sign of their presence. Remember that significant yield reductions can occur if defoliation is greater than 25% at 2 to 3 weeks before heading.

Armyworm injury

Armyworm frass and larva

Armyworm larva

For more information regarding identification, monitoring and management options, visit the Rice UC IPM website (http://www.ipm.ucdavis.edu/PMG/selectnewpest.rice.html).

To receive this newsletter electronically or for suggestions/questions send an email to: laespino@ucdavis.edu, or go to http://cecolusa.ucdavis.edu/rice/

This newsletter is produced by:

Luis Espino, Ph.D.

Farm Advisor

P.O. Box 180
100 Sunrise Blvd., Suite E
Colusa, CA 95932
(530) 458-0570
(530) 635-6234
Email: laespino@ucdavis.edu
http://cecolusa.ucdavis.edu/rice/

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Colusa, CA 95932

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