Fertility update

February 11, 2021

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California Rice Research Board

UC DAVIS DEPARTMENT OF PLANT SCIENCES

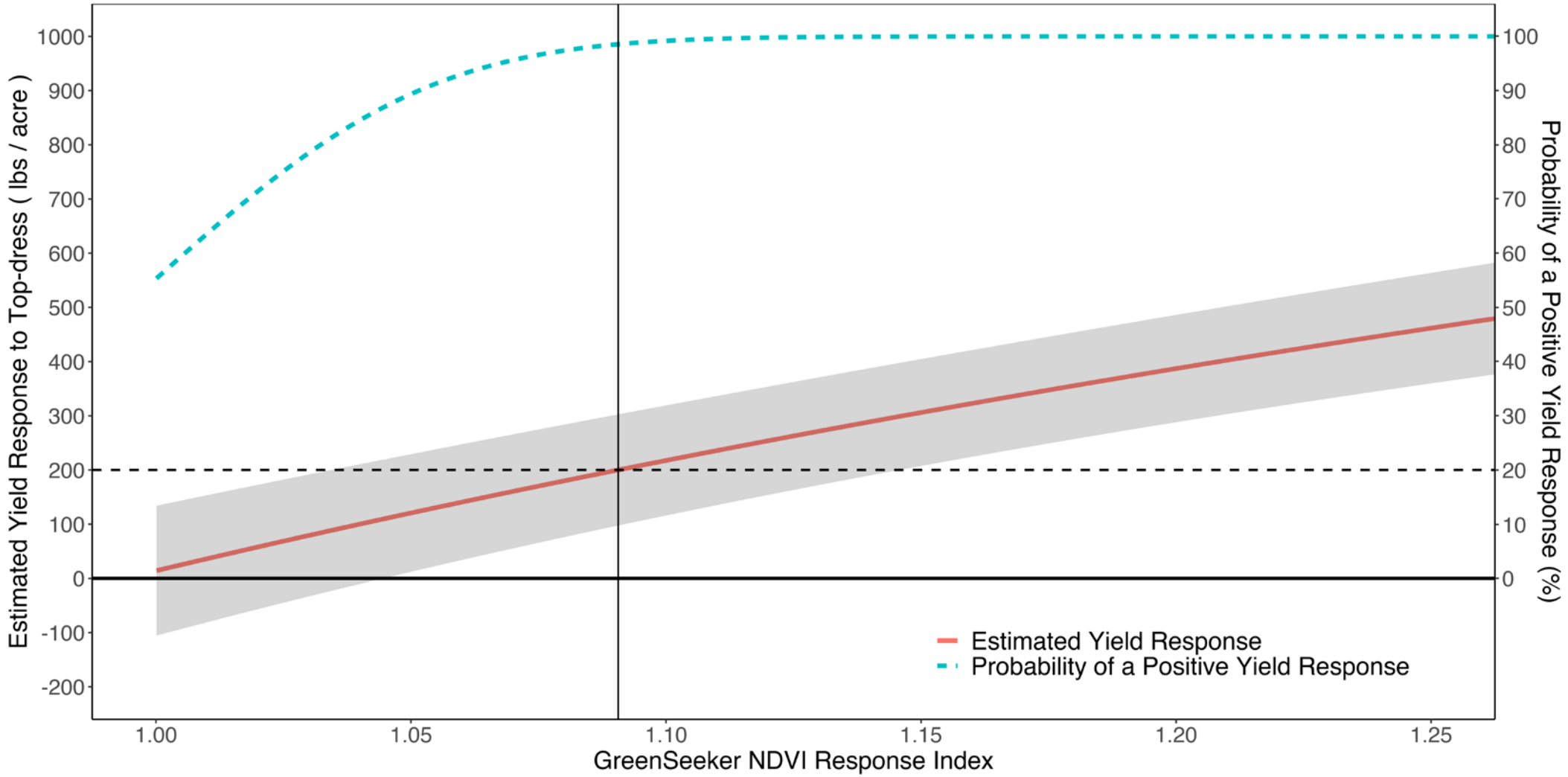
Determining need for top-dress N application: Response Index

- Ratio of High N strip to test area
  - = NDVI High N / NDVI test
  - For example:

72 / 65 = 1.1

- Response index to apply: depends…..

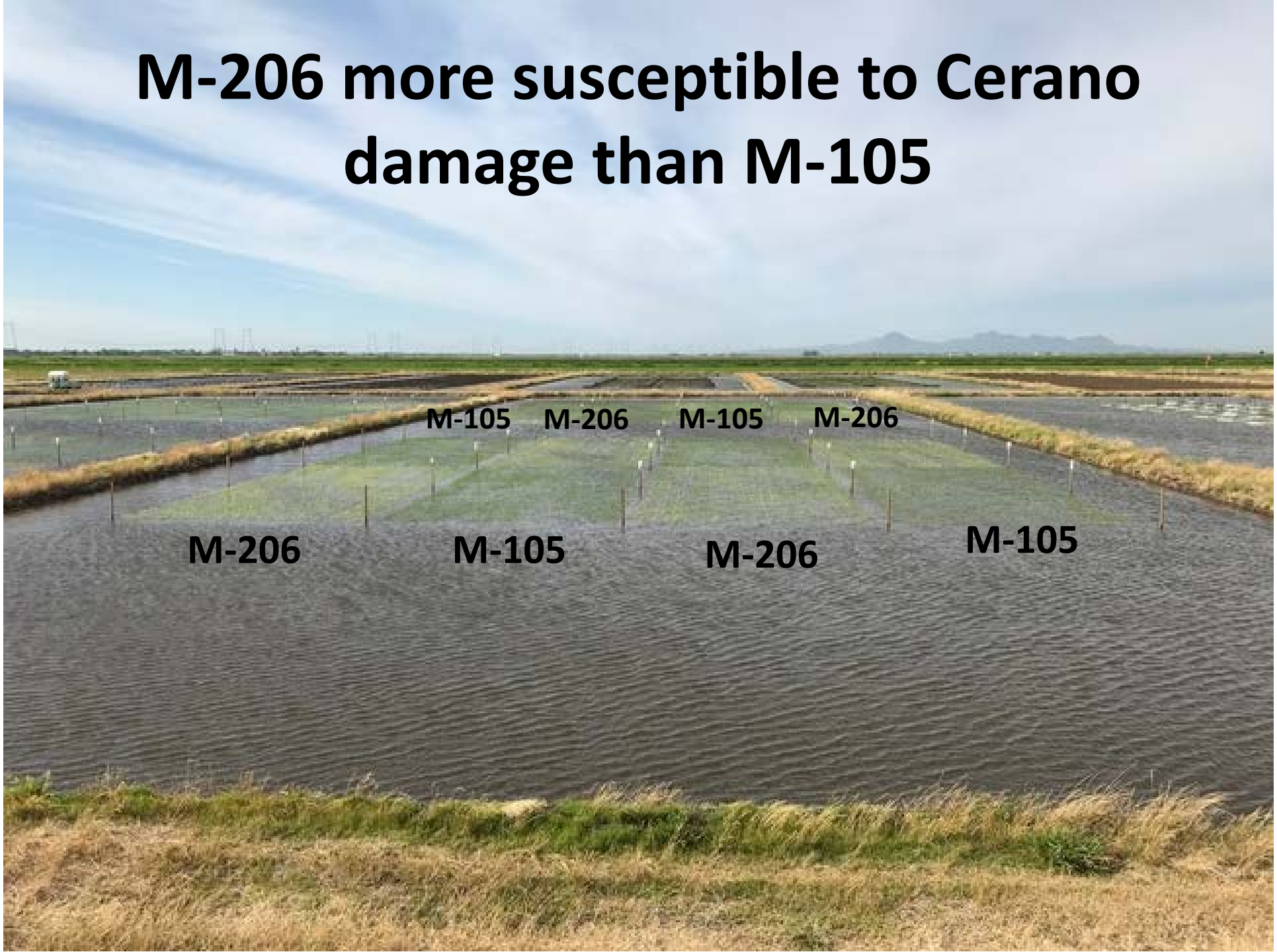
Should I apply a top-dress?



Lodging: M-105 vs M-206

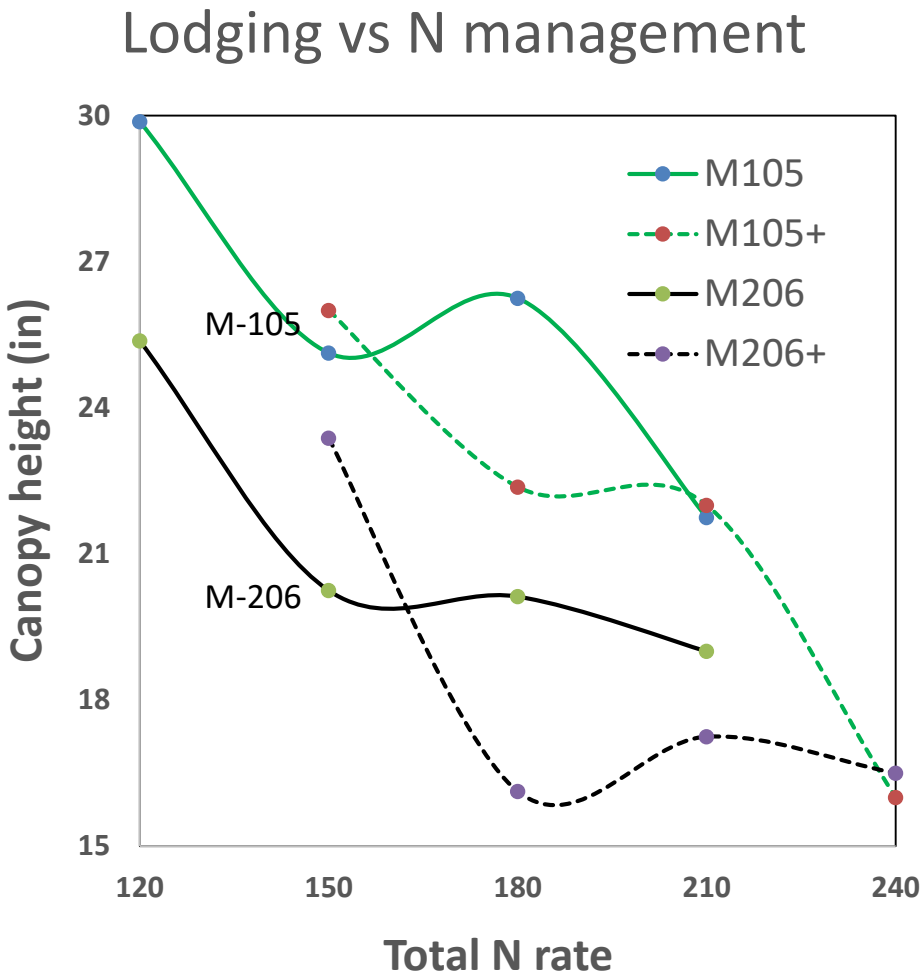
- M-105
  - is earlier than M-206
  - Slightly higher yield potential
  - BUT is susceptible to lodging
    - Slowing harvest operations and possibly impacting quality
- In 2020 we have a trail to quantify lodging and to see if N management may play a role.
  - Testing if splitting N may help reduce lodging while providing similar yields.
- Treatments are 4 preplant N rates (120, 150, 180 and 210 lb N/ac) with and without a top-dress N (30 lb N/ac)

M-206 more susceptible to Cerano damage than M-105



Plant response to N management

- Yield: no difference
  - Tended to decrease with increasing N rate
- Lodging
  - **M-206 lodged more across N rates than M-105**
  - **Applying all of the N at planting did not increase yields relative to split applications.**
    - Top-dressing sometimes resulted in more lodging at comparable total N rates.
- Plant height
  - M-206 taller than M-105 (0.5” to 1.5”)
  - Preplant fertilizer increased plant height (2”)
  - Top-dressing increased plant height (0.5”)

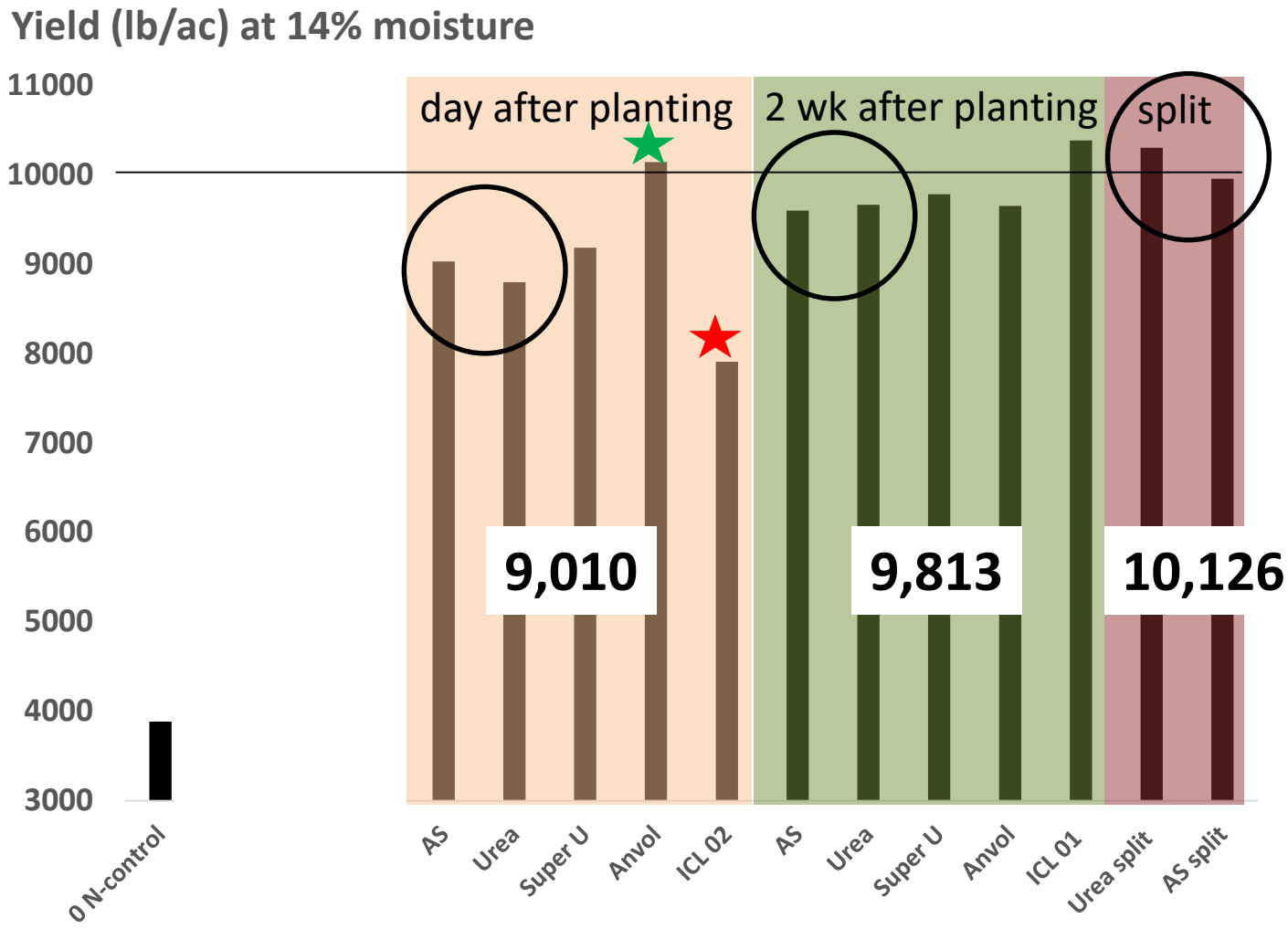


Comparison of granular N sources: when can not be applied before flooding

- Treatments:
  - AS, urea, and enhanced efficiency fertilizers **applied same day as planting**
  - AS, urea, and enhanced efficiency fertilizers **2 weeks after planting**
  - AS and urea **split application** 2, 4, 6, 8 weeks after planting (20:30:30:20 split)
  - Control-no N fertilizer
- Enhanced efficiency fertilizers
    - Super U (urease and nitrification inhibitor) (Koch Agronomics)
    - Anvol (urease inhibitor) (Koch Agronomics)
    - Coated urea (delay availability) (Agrocote-ICL)
- All applied at a rate of 135 lb N/ac

2020 yield results

- At planting<2wk< Split
- AS = Urea
- A couple of enhanced efficiency fertilizers showed promise:
  - Anvol
  - ICL
- Repeating study in 2021



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PRIMARY CONTACTS

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Welcome

University of California Rice On-line is an interdisciplinary team consisting of UC Cooperative Extension specialists, faculty and farm advisors dedicated to providing rice growers with up-to-date guidelines and information on rice production in California.

Rice growing area (lightest green) **within California counties where rice is produced** (darkest green). **Rice variety yield trial locations are indicated** (red pins).

Information about UC Rice Variety Trials

Click or tap red pins to view variety trial data for each location

FACT SHEETS

Weedy Rice Information

Gary Enos | Eric Sligar | Greg Driver

2020 Rice Yield Contest Winners

Armyworm Monitoring Information

Looking for Wild Rice?

8:41 AM
2/2/2021

Fact Sheets

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Agronomy Fact Sheet — Fact Sheet #1

Nutrients in Rice Grain and Straw at Harvest

Background

Knowing the amount of nut
harvest time is important for

1. It provides an idea of
needs. Some of these
routinely in fertilizer appl
are readily available from
water.

2. It helps us understand h
soil nutrient balances. Grai
it) are removed from the
straw may or may not be r

3. The nutrient compos
implications for how it can

Nutrient Concentration

Table 1 provides the nutri
grain and straw at harvest, th

*Table 1. Nutrient concentratio
amount of nutrient in a ton o
Fairhurst, 2000).*

Nutrient	Concentra
	%
Nitrogen	1.1
Phosphorus*	0.2
Potassium*	0.29
Calcium	0.05
Magnesium	0.15
Sulfur	0.1
Silicon	2
Zinc	0.002
Iron	0.02
Manganese	0.00
Copper	0.00
Boron	0.00

* To convert P to P_2O_5 multiply

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Agronomy Fact Sheet — Fact Sheet #9

Optimal and Critical Nutrient Concentrations in Rice Tissue

Background

Nutrient deficiencies or toxicities can b
determine visually. Knowing the
concentration in the plant can greatly

*Table 1. Optimal, critical and excessive or
initiation - PI). Data source (Dobermann and*

Element	Growth stage	Plant par
Nitrogen*	Tillering-PI	Y-leaf
	Flowering	Flag-leaf
	Maturity	Straw
Phosphorus	Tillering-PI	Y-leaf
	Flowering	Flag-leaf
	Maturity	Straw
Potassium	Tillering-PI	Y-leaf
	Flowering	Flag-leaf
	Maturity	Straw
Zinc	Tillering-PI	Y-leaf
	Tillering	Shoot
Sulfur	Tillering	Y-leaf
	Tillering	Shoot
	Flowering	Flag-leaf
	Flowering	Shoot
	Maturity	Straw
Silica	Tillering	Y-leaf
	Maturity	Straw
Magnesium	Tillering-PI	Y-leaf
	Tillering-PI	Shoot
	Maturity	Straw
Calcium	Tillering	Y-leaf
	Tillering-PI	Shoot
	Maturity	Straw
Iron	Tillering	Y-leaf
	Tillering	Shoot
Manganese	Tillering	Y-leaf
	Tillering	Shoot
Copper	Tillering	Y-leaf
	Maturity	Straw
Boron	Tillering	Y-leaf
	Maturity	Straw
Aluminum	Tillering	Shoot

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Agronomy Fact Sheet — Fact Sheet #2

Managing Potassium in Rice Fields

Why Is It Important?

Potassium (K) is an essential nutrient for rice. It is important to have good K fertility not only for optimizing yields, but also K helps reduce the severity of some common plant diseases that we see (e.g. aggregate sheath spot and stem rot).

Deficiency Symptoms

K deficiency symptoms include (1) yellow/brown leaf margins, (2) dark brown spots on leaf surface, and (3) leaf bronzing (Figure 1).

Figure 1. Potassium deficiency symptoms. Yellow leaf margins and bronzing (top); brown spots (bottom). Source: top - IRRI (Rice Knowledge Bank), bottom - AgFax.

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Agronomy Fact Sheet — Fact Sheet #7

Managing Phosphorus in California Rice Fields

Why is it Important?

Phosphorus (P) is the second most commonly applied fertilizer to rice (nitrogen is the first). Plants use P for membrane integrity, energy storage and phloem transport. Phosphorus deficiencies are not common in California as many farmers apply P fertilizer (on average, 40-45 lb P_2O_5/ac). However, in a recent study, we found 10% of fields tested to be deficient. With farmers achieving higher yields, deficiencies may become more common unless P fertilizer rates are increased.

Deficiency Symptoms & Critical Levels

Deficiency symptoms often diminish with time but include: Stunted dark green plants, narrow leaves, reduced tillering, and delayed flowering.

Figure 1. Phosphorus deficiency symptoms showing narrow dark green leaves.

The Olsen-P soil test (sodium-bicarbonate) is the best test for identifying P-deficient rice soils in California. The Bray test does not work as well. An Olsen P value above 6-9 ppm is indicative of a soil that is not P deficient.

For plant tissue, if the Y-leaf P concentration at 35

Soil Phosphorus Budgets

A P budget accounting for all of the P fertilizer added and removed in grain or straw over the past five years also provides a good indicator of soil P status. If more P has been removed from the soil than has been applied, it is likely the soil P status is low (Table 1). Importantly, at harvest, about 70% of the P in the plant is in the grain; therefore, P removal in grain is the major pathway that P is removed from the system. Very little P is lost via leaching or in the tailwater drain. Given that these losses are low, it is possible to build up P in the soil.

The Four Rs of P Fertilizer Management

Right rate: First ask, should you apply? If your soil test levels are high (>15 ppm Olsen P), you probably do not need to apply any P fertilizer. If soil P levels are between 6 and 15 ppm Olsen P, apply the maintenance application rate. If Olsen P levels are below 6 ppm consider build-up application rates (rates higher than maintenance). To calculate the maintenance application rate you can go to "rice.ucanr.edu/P_Budget_calculator/". However, Table 1 provides general guidelines that will give you a rough estimate based on your expected yields and straw management.

Right time: Phosphorus fertilizer can be applied anytime from before flooding to about 30 DAS for optimal yield response. Applying P before planting can lead to algae (scum) build up in the water and lead to poor stand establishment (Fig

Thank you

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