MU Cropping Systems
Rice Research Review

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Cropping Systems 2015

• Rice
  – DD50 V x N validation
  – Clearfield VT and CL 172 seeding rate validation
  – BASF Limus validation
  – Micronutrient packages for rice
  – Amendments to reduce rice chalkiness
  – Silicon and lime as soil amendments
  – Irrigation management smartphone app
MO DD-50 Program

- Accumulation of heat units from emergence
- Crop model uses DD50 to predict crop growth and make recommendations
- Uses real-time weather stations
- Updated with many new varieties
DD-50 Rice Model for Southeast Missouri
University of Missouri-Columbia

*Required information:

Field: 

Variety: Alan

Weather Station: Cardwell - Dunklin-S Co.

Emergence Date: (necessary for program calculations)

Month: 

Day: 

SUBMIT Query

*Name and address are optional. Enter these only if you want them to appear at the top of each report.

Name: 

Address: 
Missouri Weather Stations

- Located throughout the state
- Provide real time and historical weather data
- Integrate weather data into these crop modeling programs

http://agebb.missouri.edu/weather/stations/index.htm
Missouri Rice Growth and Development Predictions
10/7/03

Gene Stevens
University of Missouri-Delta Center

field: Pan 5 -- variety: Cocodrie

weather station: Glennonville

5/19
EMERGENCE - (average 10 one-leaf rice plants per square foot)

5/19 - 6/7
May need to flush field

5/19 - 6/11
Control weeds (10 gal water/acre): A. PROPANIL (post, 2 app); B. PROPANIL+BOLERO (post); C. BOLERO split (2 lb BOLERO Pre Then 3 lb PROPANIL+2 lb BOLERO (post); D. PROPANIL+PROWL (pre or post); E. FACET (pre or post); F. ARROSOLLO (post); G. WHIP (post)

5/19 - 6/11
Control insects: A. Armyworms; or B. Chinch bugs (may be controlled by flooding or by applying insecticide)

6/11
FIRST TILLER - Tilling begins

6/11
Apply nitrogen on dry soil. Three-way split program: apply 90 lb N/acre (200 lb urea). Single N application program: apply 120 lb N/acre (266 lb urea). Increase N in following situations: on clay soils (+30 lb N), following rice or cotton (+20 lb N), less than 10 plants/square foot (+20 lb N). If single N application program is used, be sure and check with area board at 1/2 IE.

6/11
Control insects: Foliar applications of Dimilin 2L (12-16 oz/A) or Karate 2.08CS (1.6-2.56 oz/A) should be applied within 7 to 10 days after flooding the fields to maximize control of rice water weevil infestations.

6/14
Begin to apply ORDGRAM if needed (flood must be established and stable)

6/18
Begin checking for any fertility deficiencies that may occur after flooding.

6/30 - 7/21
Apply BLAZER at 1/2 to 1 pint per acre

7/2
Begin to apply PHENOXY herbicide if needed (immediately prior to green ring until 1/2 inch internode length)

7/4
Begin checking for internode elongation.
DD50 V x N Validation

- Evaluating current and future rice cultivars and hybrids
  - Growth stage timings for DD50 validation
  - Nitrogen Validation
  - 75%, 100%, and 150% of recommended N (120, 150, 180 lb N)
DD50 V x N Validation

Highest yielding lines for MO: RiceTec Hybrids, CL151, Roy J, Lakast, and Mermentau
DD50 V x N Validation

Nitrogen response can be highly dependent on soil residual N.

N-STaR recommended 75 lb N PF in 2015.

\[ \alpha = 0.8241 \]

\[ \alpha = <0.0001 \]
Clearfield Variety Trial

- Funded by Horizon Ag
- Evaluation of current Clearfield lines
  - CL 111
  - CL 151
  - CL 152
  - CL 163
  - CL 172
  - CL 271
Clearfield Variety Trial

Highest yielding Clearfield lines for MO: CL151, CL271, and CL111
CL 172 Seeding Rate Study

- Evaluation of seeding rate on yield of CL 172
- 20, 40, 60, 80, 100, 120 lb seed per acre

Yield of CL172 was not statistically dependent on seeding rate
Limus Additive Validation

• **BASF Limus**
  – NBPT Urease Inhibitor
  – NPPT Urease Inhibitor
    • Proprietary to BASF

• **Two Trials**
  – Urea Volatilization
  – Yield Trial

• **Two Locations**
  – MO Rice Research Farm
  – MU Lee Farm

• **Roy J fertilized 8-10 dbf**
Urease inhibitors generally increased rice yield, high N rates increased yield similar to DD50
Ammonia losses were reduced by urease inhibitors when urea wasn’t watered in.
Micronutrient Packages for Rice

• Evaluation of 14 micronutrient solutions
  – Both broad and narrow spectrum
  – V4 Application
Micronutrient Packages for Rice

• **Highest yielding treatments (6-13 bu increase):**
  - 4% N, 1.1% S, 0.25% B, 2% Mn, 2% Zn
  - 9% EDTA Zn
  - 5.82% S, 10% Mn
  - 3% S, 0.1% B, 3% Mn, 4% Zn
  - 19% K₂O, 13% S

• **Lowest yielding treatment**
  - 4.5% HEDTA Fe (58 bu avg decrease)

Rice yields increased with additions of S, Mn, or Zn and decreased with HEDTA Fe
Amendments to Reduce Chalk

• Two varieties per location
  – CL 151
  – CL 111 / RT XL753

• Four amendments
  – Soil K
  – Soil Calcium Silicate
  – Foliar Gibberellic Acid
  – Foliar Kinetin

• Determining locations on panicle where chalkiness is most prevalent
Amendments to Reduce Chalk

Yields were reduced with applications of Gibberellic Acid or K at Internode Elongation.

\[ \alpha = 0.0598 \]
\[ \alpha = 0.0107 \]
Grain transparency was significantly reduced on both lines with applications of GA or KPP.
Panicle Location

Rice grain transparency factor

- Bottom
- Middle
- Top

Panicle tops had significantly higher transparency, also mature earlier
Silicon and Lime Amendments

- Preplant soil applications
  - Calcitic Lime
    - 750, 1500, and 2250 lb/acre
  - Dolomitic Lime
    - 750, 1500, and 2250 lb/acre
  - Calcium Silicate Slag from Steel Refinery
    - 450, 900, 1350, 1800, and 2250 lb/acre

- Affect on rice yield

- Competition for other elements in the root zone (Specifically As)
Applications of 450 lb CaSi have shown increased yields for three years.
Irrigation Management

- Smartphone App for Mobile Management of Irrigation
- Pivot and Furrow Irrigated Rice
  - Fine tuning water use curves
- Inputs
  - Field GPS Location
  - Soil Type
  - Crop and Rooting Depth
  - Irrigations
- Outputs
  - Recorded rainfall
  - Irrigation scheduling
  - Accumulated heat units

http://agebb.missouri.edu/horizonpoint/cropwater.php
Crop Water Use App

Field Status

**Marsh Field 4 Pivot W 1/2**
- **Crop:** Soybean
- **Planting date:** June 3, 2015
- **Soil texture:** sandy loam
- **Rooting depth:** 30.5 in
- **Allowable depletion:** 50%
- **Default irrig rate:** 1.00 in

**Current Status Estimate (Tue July 14, 2015)**
- Last water event: 0.09 on Thu 7/09
- Proj ET crop: 0.15 in
- Soil Water Balance: -0.84 in (est)

**Irrig trigger (MAD):** -1.49 in.

Field Summary

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Summary

• RT XP760 led VT yields
• Highest yielding conventionals
  – Roy J, Lakast, Mermentau
• Nitrogen benefits depend on residual N
  – N-STaR can help to identify diminishing returns
• CL 151 still leads Clearfield varieties
  – CL 111 & CL 271 are competitive
Summary

• CL 172 yield was unaffected by seeding rate
  – Moderately resistant to blast, lodging
• Gibb. Acid and K-IE significantly reduced yield
• Delayed maturity tended to decrease rice transparency
  – Due to amendments or panicle location
  – Could be attributed to temperature/soil moisture
• Applications of 450 lb CaSi slag improved yield
  – Across 3 years data
Summary

• Urease inhibitors generally increased yields
  – Essential for application to wet soil
• Micronutrient packages with S, Mn, or Zn improved yields
• Rice yields were reduced with foliar Fe
• MU’s Crop Water Use app can be utilized in your furrow or pivot irrigated rice
  – Provides daily irrigation scheduling
Questions?