Variable Rate Nitrogen for Cotton Using Directed Rx

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Why Variable Rate?

Uniform Rate Applied

N Rate to Maximize Profit

Use of NDVI for N Prescription in Cotton

A NEW CONCEPT IN

VARIABLE RATE PRESCRIPTION DEVELOPMENT: D-Rx

THE CLEMSON “DIRECTED PRESCRIPTION” SYSTEM

The Clemson “Directed Prescription” System (D-Rx)

EC Data
Test Strips
Site-Specific Yield Response
The Clemson "Directed Prescription" System (D-Rx)

EC Data Test Strips Site-Specific Yield Response

Directed Prescription

How It Works: D-Rx Idealized Concept

Soil Characteristic

Yield Profit

Rate 1
Rate 2
Rate 3

Rate 3
Rate 2
Rate 1

EXAMPLE 1: E7 FIELD
8 IRR. AC; DP 1538

2016 E7: D-Rx Test

True Deep EC

Yield lb-lint/ac

N Rates

2016 E7: Returns vs True Deep EC by N Rate

Returns Above N Costs $/ac

True Deep EC

- 60 lb N
- 80 lb N
- 100 lb N
- 120 lb N
- 140 lb N
**2016 E7: D-Rx N Rate to Maximize Profitability**

- Graph showing profitability through varying N rates.

**2016 E7: Evaluation of Variable Rate Profitability**

- Bar chart illustrating $/Ac Benefit at different N rates.

**2017 E7: N Treatments**

- Image depicting different N treatments with color-coded bands.

**2017 E7: $ Returns vs True Deep EC by N Rate**

- Graph comparing $/Ac returns versus True Deep EC.

**2016 vs. 2017 E7: D-Rx N Rate to Maximize Profitability**

- Comparison graph showing 2016 vs. 2017 D-Rx N rates.

**2017 E7: Evaluation of Variable Rate Profitability**

- Bar chart showing $/Ac Benefit across different N rates.

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**2017 E7: Evaluation of Variable Rate Profitability**

- Bar chart showing $/Ac Benefit across different N rates.
**EXAMPLE 2: BATES FIELD**

21 IRR. AC; DP 1538

**2017 E7: Comparison Across All Treatments**

Returns Above Nitrogen Costs, $/ac

<table>
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<tr>
<th>Total Nitrogen Applied, lb/ac</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
<th>140</th>
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<td></td>
<td>98.2 (B)</td>
<td>90.0</td>
<td>82.0</td>
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<td>105.4 (A)</td>
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<td>81.0</td>
<td>73.0</td>
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<tr>
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<td>120.0</td>
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</tbody>
</table>

**2016 Bates: N Test**

Deep EC

N Rates

Yield lb-lint/ac

**2016 Bates: Returns vs Deep EC by N Rate**

Returns Above Nitrogen Costs, $/ac

- 75 lb N
- 95 lb N
- 115 lb N
- 135 lb N

**2016 Bates: D-Rx N Rate to Maximize Profitability**

Deep EC

D-Rx

115

**2016 Bates: Evaluation of Variable Rate Profitability**

Returns Above Nitrogen Costs, $/ac

- Negligible Benefit
- A
- B
- C
- D

- D-Rx
- 115 lb N/ac Blanket
- 95 lb N/ac Script
- 135 lb N/ac Blanket
- 75 lb N/ac Blanket
2017 Bates: N Treatments

75 lb/ac
95 lb/ac
115 lb/ac
135 lb/ac
D-RX
NDVI-RX

2017 Bates: $ Returns vs Deep EC by N Rate

2016
2017

2016 vs. 2017 Bates: D-Rx N Rate to Maximize Profitability

2017 Bates: Evaluation of Variable Rate Profitability

2017 Bates: Comparison Across All Treatments

LESSONS LEARNED FROM POOLED DATASET: 5 SITE YEARS
Profitability as a Function of Uniform N Rate

Profitability vs. N Management Strategy

Overall N Use vs. N Management Strategy

Overall N Use vs. N Management Strategy

Generalized Optimum N Rate vs. Deep EC
CONCLUSIONS

Would all fields benefit from V.R. Nitrogen?

Conclusions
- Not all fields are good candidates for variable rate nitrogen, but D-R system can still benefit grower
- D-R system can increase profitability at similar overall N rates
  - E7 2017: +$15/ac; +3 lb-N/ac
- 2017 D-R system out-performed NDVI-R system in both fields, but not significantly different
- Trends in optimum N rates to maximize profitability are similar across years
- Deep soil characteristics were generally better classification bases than shallow characteristics

Questions?

Thank you to:
- Walker Nix Farms (Barnwell Co., S.C.)
- JCO Farms (Allendale Co., S.C.)

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