INTRODUCTION: HOW WE DEVELOP VARIABLE RATE PRESCRIPTIONS TODAY

Typical Steps in Developing Variable Rate Prescriptions

1. Zone Development
2. Productivity Assessment by Zone
3. Rate Assignment
4. Rate Assessment

Zone Definition by Soil Data

Zone Definition by “Composite” Yield

Productivity Assessment by Zone
**THE PROBLEM WITH TODAY’S PRESCRIPTION PLAN STRATEGIES**

Yield Silo Laid on Top of Zone Silo

Suggests Productivity Potential by Zone

Zone Basis is a Silo

Prescription Then Based on Generic Data
Checks Only Useful for Evaluating Rates Within Zones
Not Useful for Evaluating Zone Definitions Themselves

A NEW CONCEPT IN VARIABLE RATE PRESCRIPTION DEVELOPMENT:
THE CLEMSON "DIRECTED PRESCRIPTION" SYSTEM

The Clemson "Directed Prescription" System

EC Data Test Strips Site-Specific Yield Response

How It Works: Idealized Concept

EXAMPLE APPLICATION:
DUAL VARIETY PLANTING IN COTTON
Step 1: Contour EC Data (or other zone basis)

Step 2: Establish Test Strips

Step 3: Collect Yield Data for Strips

Step 4: Merge Yield Data With Zone Data

Step 5: Determine Yield as a Function of Zone Basis
Step 6: Determine $ Returns as a Function of Zone Basis

Step 7: Assign Prescription to Maximize Profit

Build Prescription Map

CONCEPTUAL PROFIT ANALYSIS

Conceptual Profit by Zone, $/ac

<table>
<thead>
<tr>
<th>Zone</th>
<th>NemRes</th>
<th>NemSusc</th>
<th>Dual Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$80.33</td>
<td>$(33.57)</td>
<td>$80.33</td>
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<tr>
<td>2</td>
<td>$113.04</td>
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<td>3</td>
<td>$126.06</td>
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<td>4</td>
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$15.17/ac Return
THE TRUTH

BUT IT DOES WORK...

CONCLUSIONS


### Directed Prescriptions vs. Conventional Prescriptions

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<th>Conventional Prescriptions</th>
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<td>Zone boundaries are fluid</td>
<td>Zone boundaries are static</td>
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<tr>
<td>Finite management zones</td>
<td>Coarse management zones</td>
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<tr>
<td>Continuing learning capability</td>
<td>Limited learning capability</td>
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<tr>
<td>Prescriptions developed from in-field data</td>
<td>Prescriptions developed from off-site data or nebulous</td>
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<td>Integrates yields with zones with prescriptions</td>
<td>Stacks yields and prescriptions on top of zones</td>
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### Potential Pitfalls

- **Repeatability**
  - Yield limiting factors next year will not be same as this year
  - Best suited for irrigated land
  - Pooled data from multiple years possible
- **Yield monitor accuracy**
  - Calibration required
  - Post-process calibration desirable
  - Software can automatically clean yield data
- **Ease of implementation**
  - Software design
  - Compatibility with V.R. controllers

### The Vision for the "Directed Prescription" System

- System applicable to all crops in rotation
- Only portion of field used for prescription
  - 5-10% in strip tests for next year’s prescription
  - 90-95% in prescription from last year’s data
- Site-specific applications in cotton
  - Dual variety planting
  - V.R. nematicide
- Software
  - Simple interface
  - Free

### The Clemson "Directed Prescription" Software

- User Uploads
  - Strip treatment plan (shapefile)
  - Contoured EC data (shapefile)
  - Yield data (csv or shapefile)
- User Inputs
  - Relative cost per treatment $/ac
  - Commodity market price $/yield unit
- Software outputs
  - Profit analysis by treatment
  - Recommended prescription plan (tabular, user-overrided capability)
  - Prescription map (shapefile)

### Research Work to be Done

- Validate method
  - Irrigated on-farm trials
  - At least 2-year tests
  - Comparison to conventional methods
  - Long term: Non-irrigated trials
- Evaluate economic benefit
- Complete software development
- Evaluate best zone basis

### Questions?

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