

Emerging Hay Baler Technologies

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Simpson Station Field Day
Simpson REC, Pendleton, SC
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COMMERCIALLY AVAILABLE TECHNOLOGIES FOR HAY

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Available technologies for hay

- Bale Weighing
- Moisture Measurement
- Yield Mapping
- Automated Preservative Applicators
- Continuous Round Balers



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Trimble S1100A - Bale Weighing



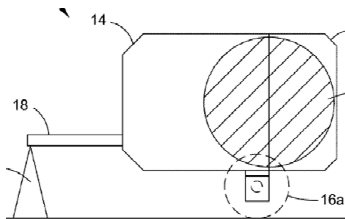
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Onboard Scales - Bale Weighing

- OEM Providers
 - CNH??
 - Krone
 - Vermeer
- Aftermarket kits
 - Tara Systems (Small Square Bales)
 - Scale-Tec



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AgraTronix BHT-2 - Moisture Measurement

- Small square and round
- Retail: \$380
- Moisture Range: 8% to 40%

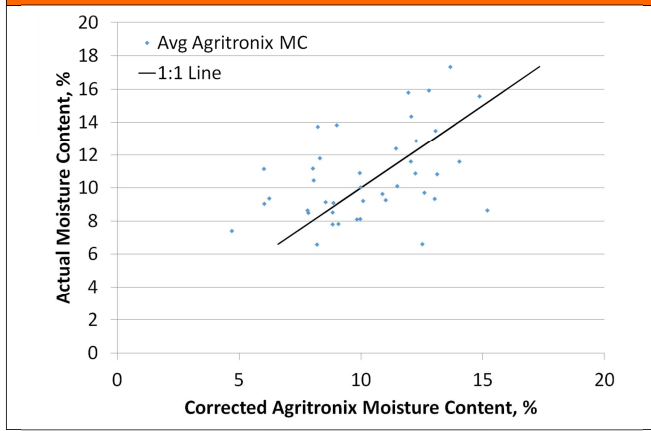


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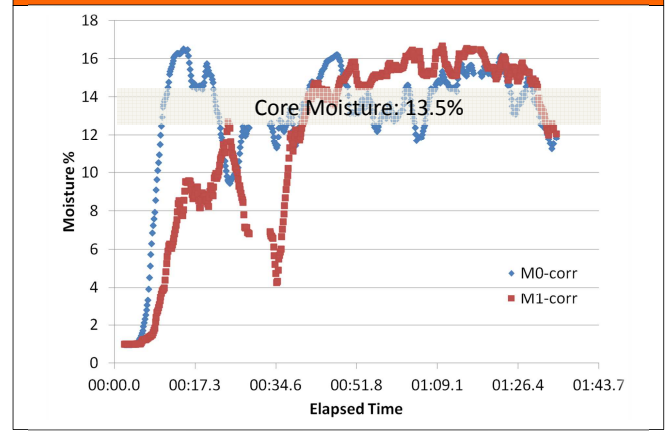


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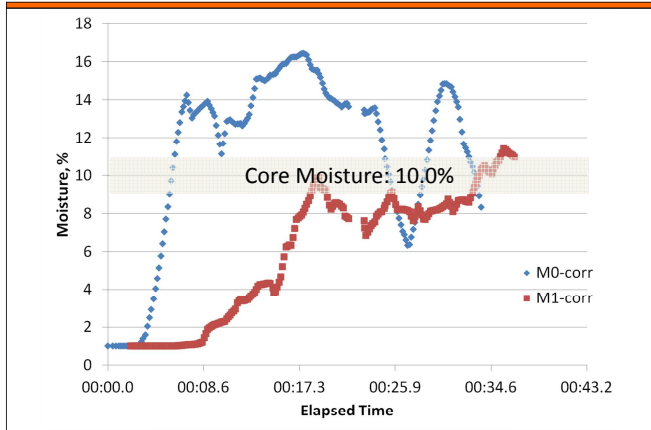
AgraTronix BHT-2 - Moisture Measurement



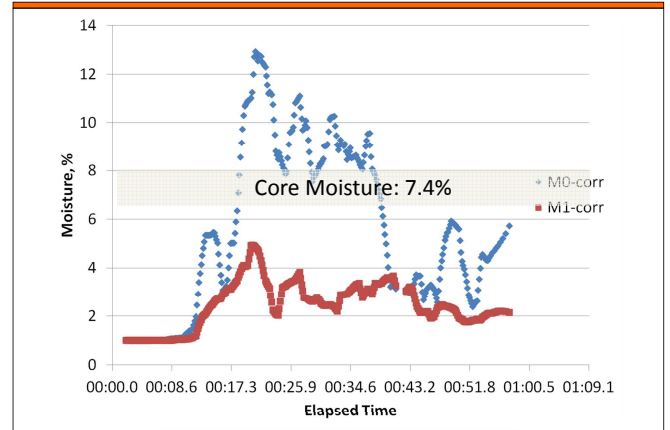
AgraTronix BHT-2 - Moisture Measurement



AgraTronix BHT-2 - Moisture Measurement

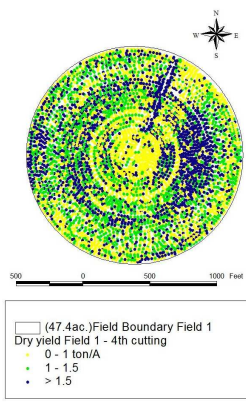
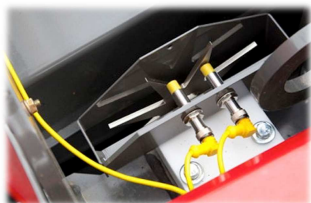


AgraTronix BHT-2 - Moisture Measurement



Harvest Tec Products (via AgCo)

- Rotating star wheels
 - Measure moisture content
 - Automatic preservative applicator control
 - Estimate tonnage weight (large square balers only)
- Retail: \$4000 + \$3,000



CLEMSON ROUND BALE WEIGHING SYSTEM RESEARCH & DEVELOPMENT

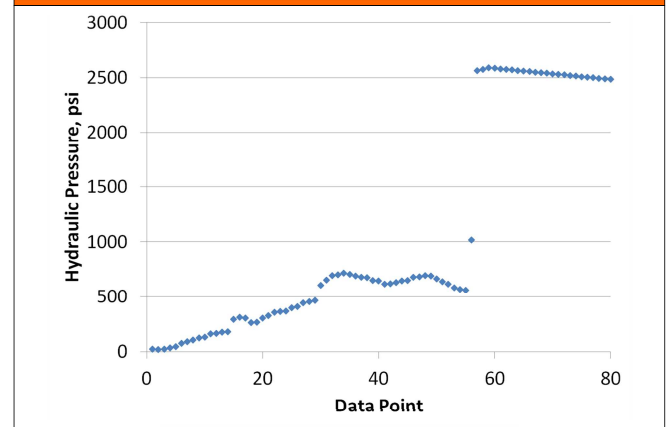


How the Clemson bale weighing system works

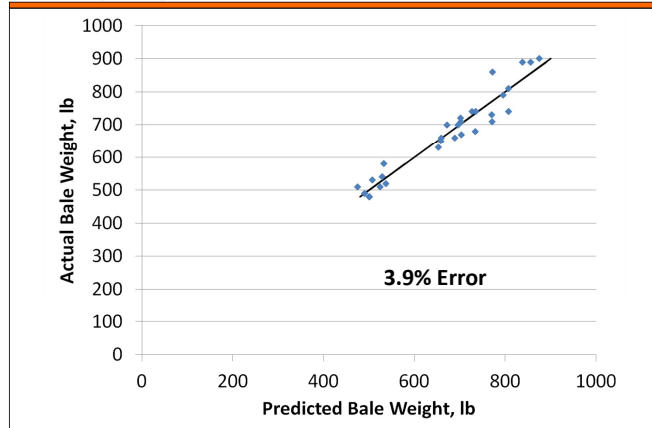
- Pressure transducer on bale kicker
- Records hydraulic pressure as bale is discharged
- Correlates peak(s) in hydraulic pressure to bale weight



Raw Kicker Data



Net Wrap Only: Kicker Predictions



HAY YIELD MONITORING

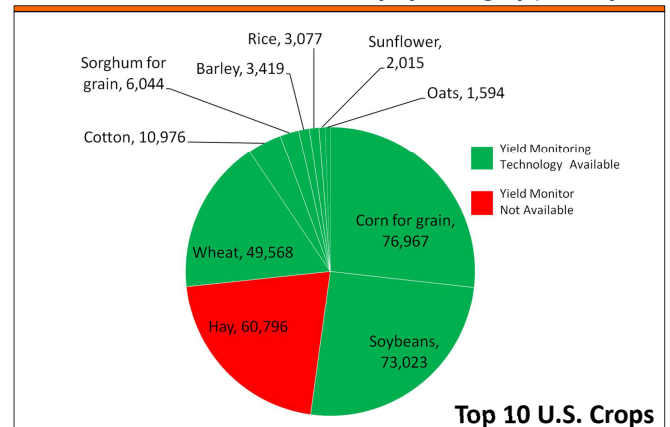


Crop Yield Maps

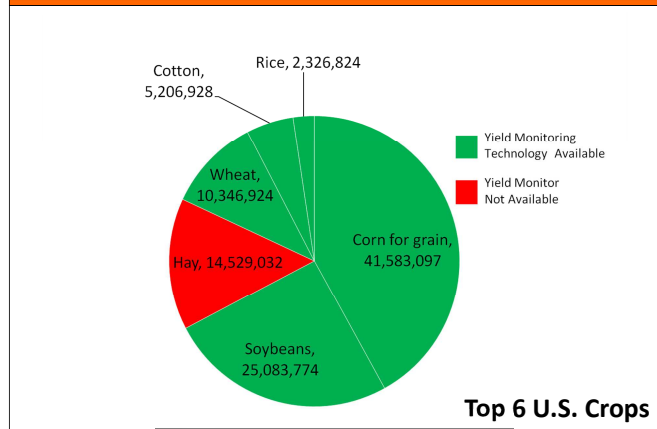
- Yield monitoring
 - Available for cotton, corn, and grain
 - 2nd among PA technologies (Winstead et al.)
 - Can be used to define management zones
 - Evaluate achievement of yield goals
 - Adjust management strategy
- Cost-Benefit or ROI
 - Difficult to determine
 - Case-by-case basis
 - 2% profit increase reasonable



Yield Monitor Commercial Availability by Acreage (1,000 ac)



Yield Monitor Commercial Availability by Crop Value (\$1,000)



CLEMSON HAY YIELD MONITOR DEVELOPMENT



How the Clemson hay yield monitor works

- Tongue/throat mounted sensors measure windrow height on-the-go
- Window height multiplied by distance traveled to calculate windrow volume
- Windrow volume correlated to bale weight and/or bale count

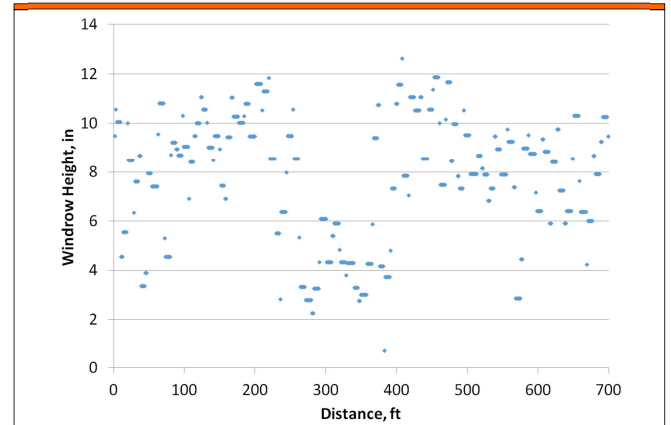


Unique features of the Clemson hay yield monitor

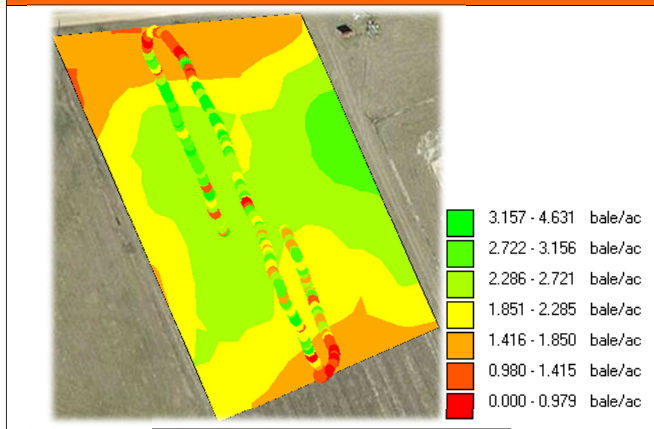
- Adaptable to any baler
 - Round balers
 - Small square balers
 - Large square balers
- Multiple calibration capabilities
- Aftermarket retrofit or OEM option



Raw Sensor Data Across Bale



...Converted to a Yield Map

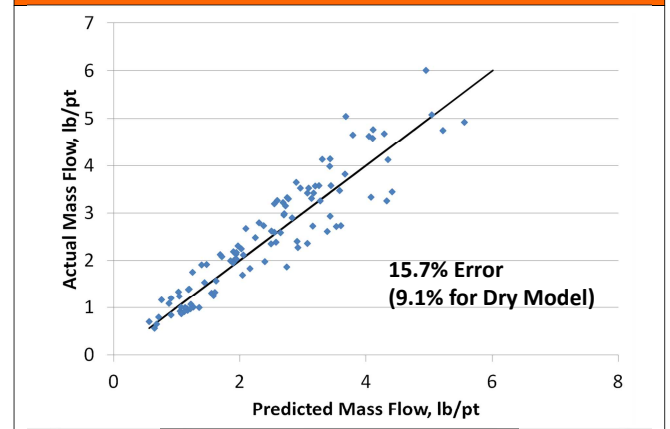


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All 2014 Bales: Actual vs. Predicted Mass Flow

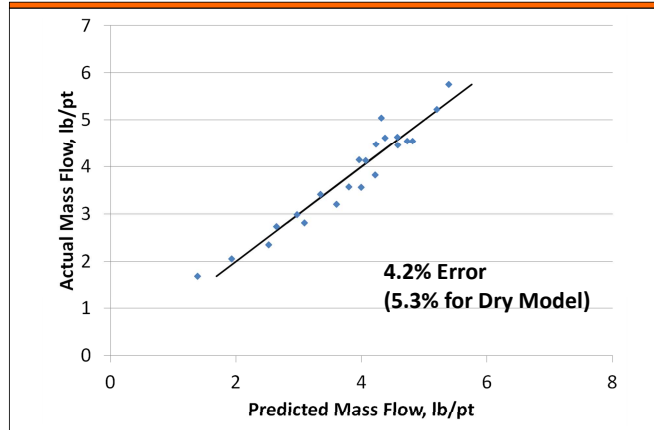


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Bermudagrass: Actual vs. Predicted Mass Flow



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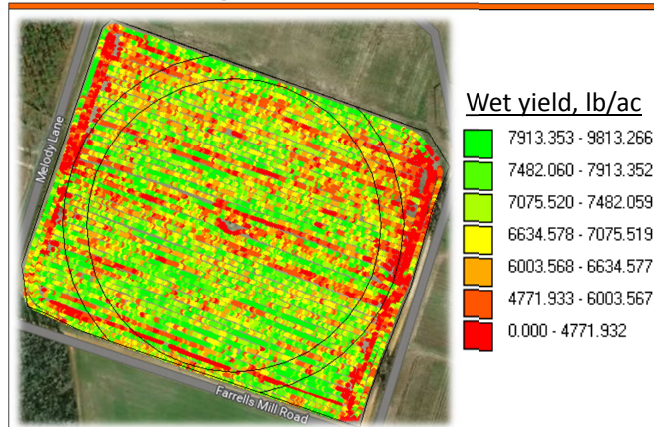
YIELD DATA AS FUNCTION OF IN-FIELD VARIABILITY

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Yield benefit of irrigation

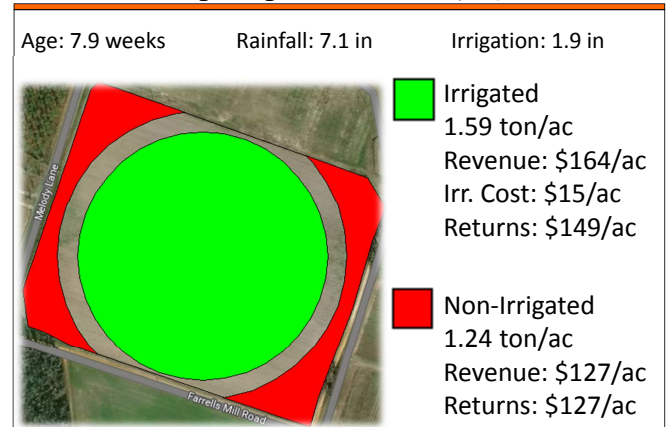


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Tift-85 1st Cutting: Irrigation Benefit = \$22/ac



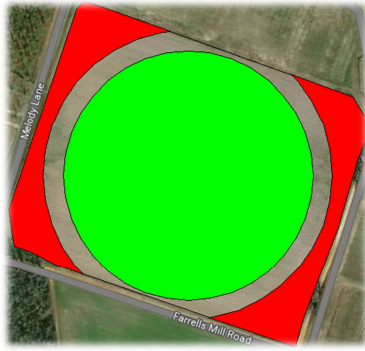
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Tift-85 2nd Cutting: Irrigation Benefit = \$8/ac

Age: 4.9 weeks Rainfall: 8.3 in Irrigation: 2.35 in



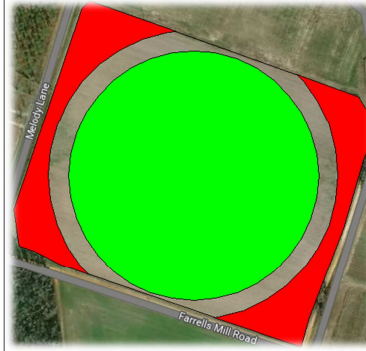
Irrigated
3.39 ton/ac
Revenue: \$327/ac
Irr. Cost: \$19/ac
Returns: \$318/ac

Non-Irrigated
3.25 ton/ac
Revenue: \$310/ac
Returns: \$310/ac



Tift-85 3rd Cutting: Irrigation Benefit = \$4/ac

Age: 6.86 weeks Rainfall: 4.28 in Irrigation: 5 in

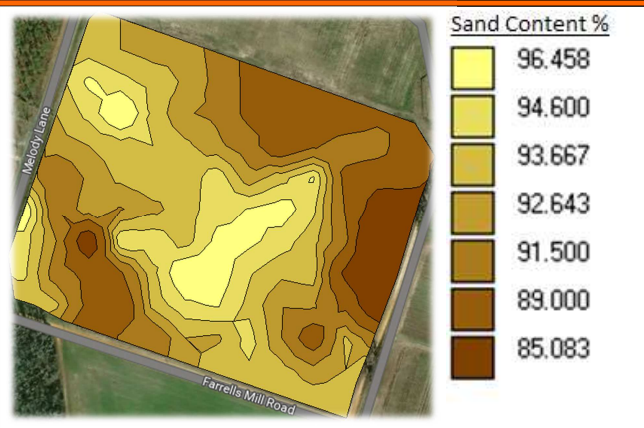


Irrigated
3.16 ton/ac
Revenue: \$421/ac
Irr. Cost: \$40/ac
Returns: \$381/ac

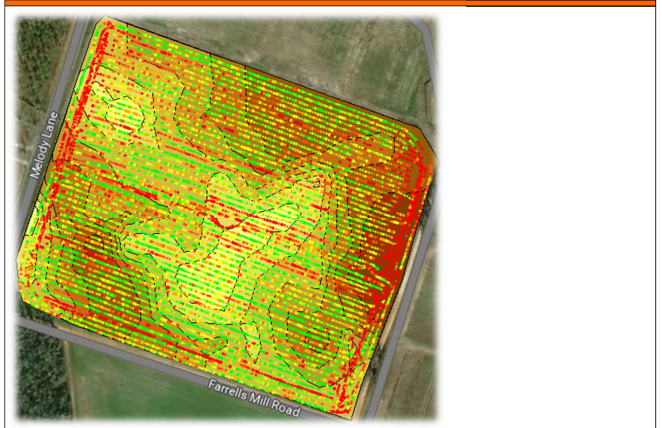
Non-Irrigated
2.83 ton/ac
Revenue: \$377/ac
Returns: \$377/ac



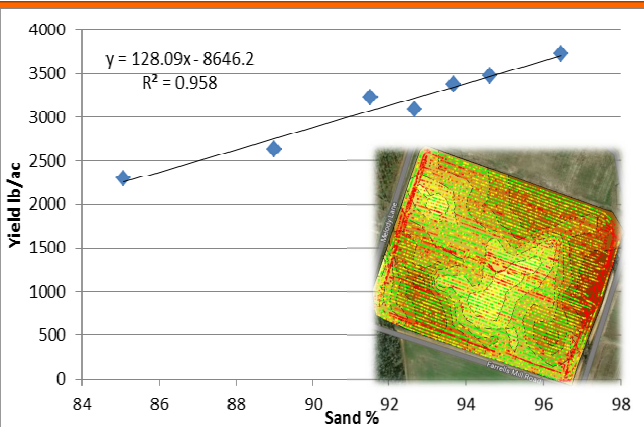
Tift-85 Yield Relationship with Sand Content



Tift-85 Yield Relationship with Sand Content



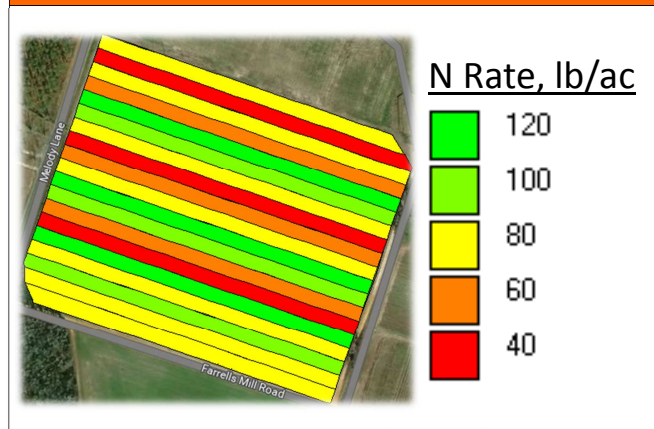
Tift 85 1st Cutting Yield by sand content under irrigation



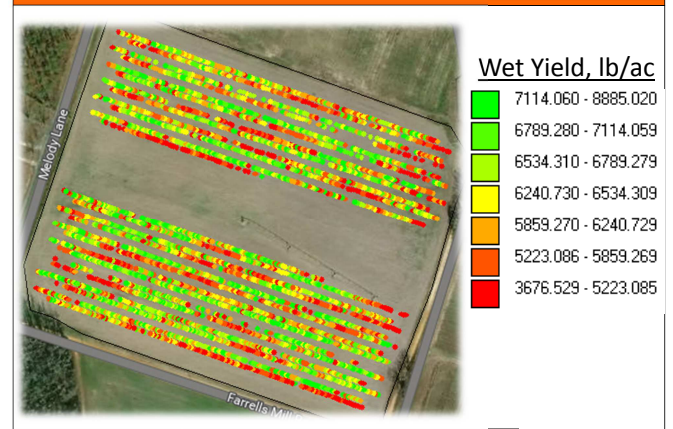
**LESSONS LEARNED:
NITROGEN TESTS**



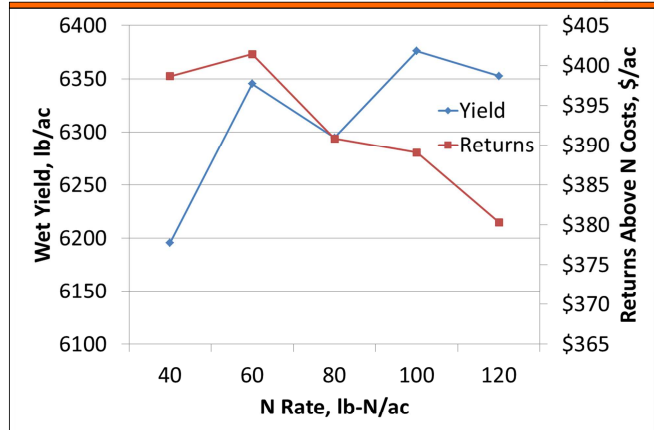
Nitrogen Strip Test Design



Yield Data from Nitrogen Test



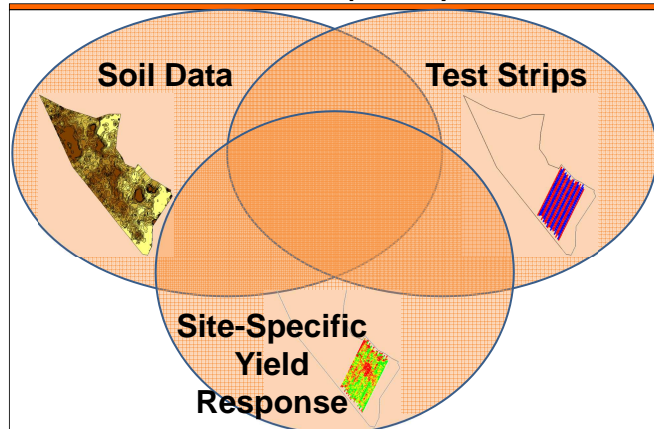
Yield & Returns as Function of N Rate – Irrigated Only



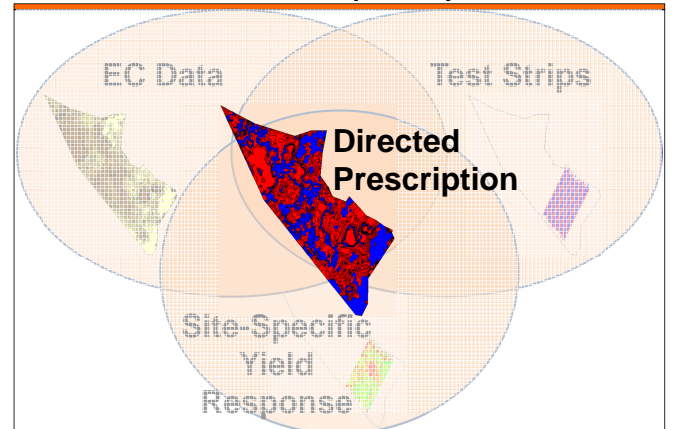
PUTTING THE YIELD DATA TO WORK: DIRECTED PRESCRIPTION



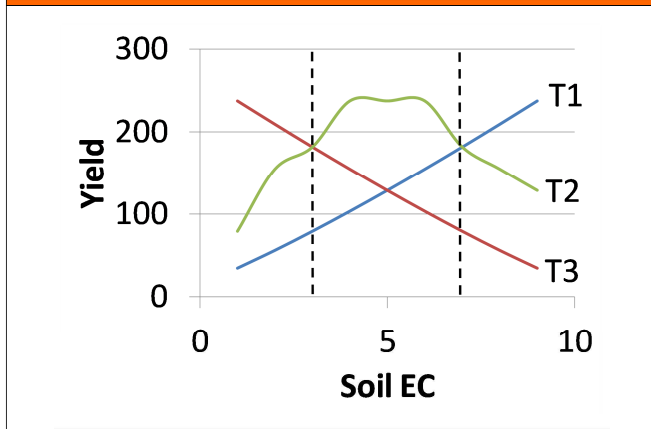
The Clemson "Directed Prescription" System



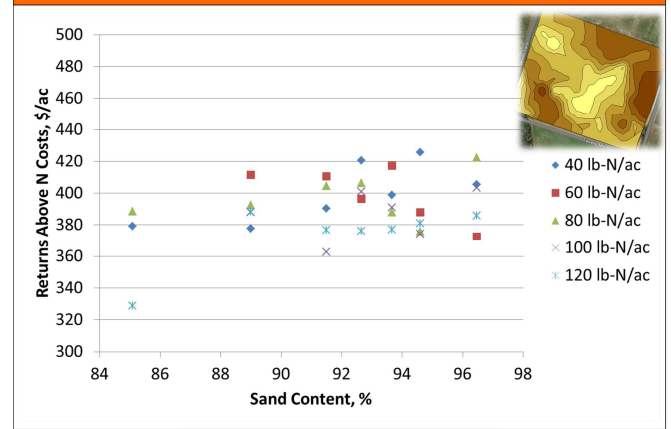
The Clemson "Directed Prescription" System



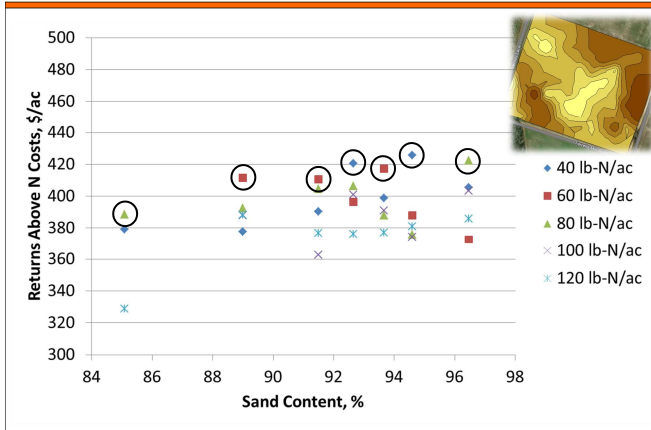
How "Directed Prescription" Works: Idealized Concept



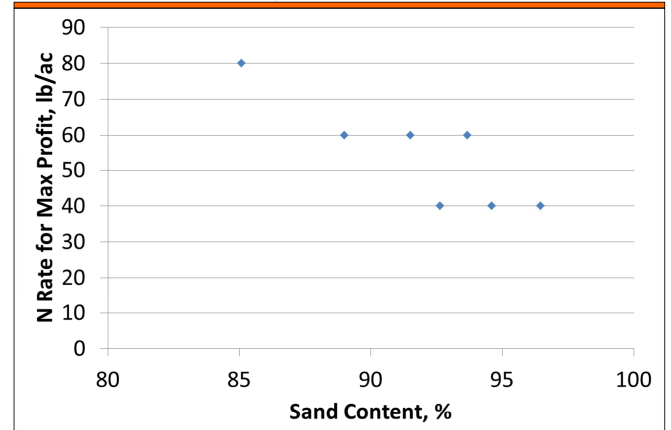
Returns as Function of Sand Content by N-Rate



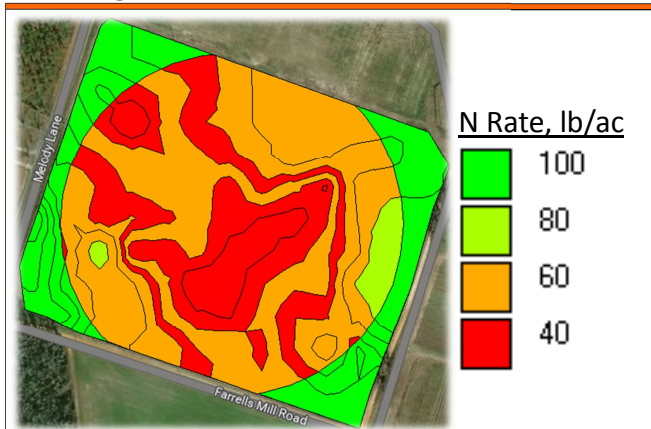
Max Return by Sand Content Zone



N-Rate for Max Profit by Sand Content



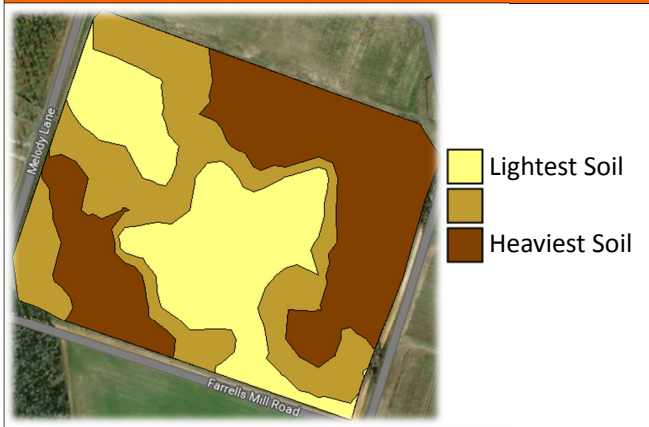
VRA Nitrogen Directed Rx



**YIELD MANAGEMENT ZONES:
VARIABLE RATE NITROGEN Rx**



Yield Management Zone Development

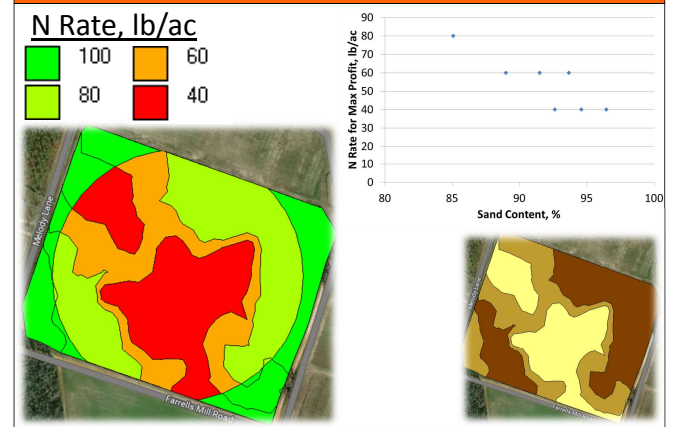


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Yield Management Zone Development



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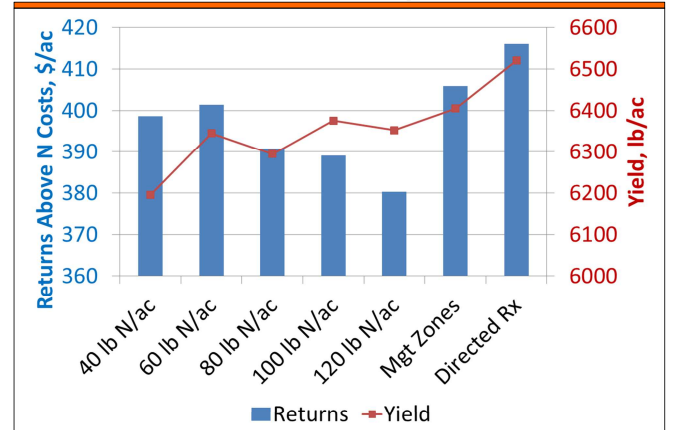
POTENTIAL FOR BENEFIT FROM VRA IN HAY

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Benefit Potential from VRA-N in Hay

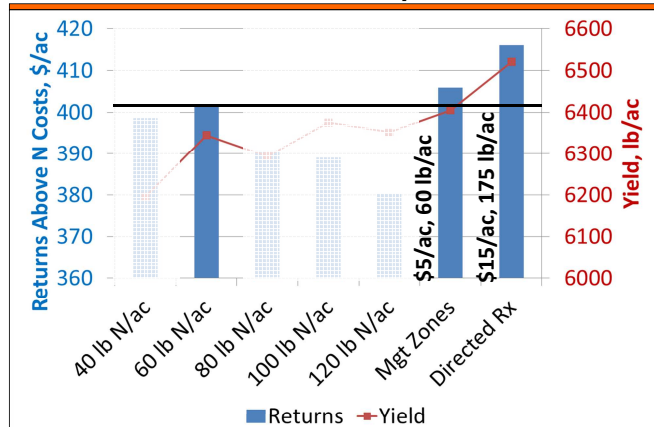


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Benefit Potential from VRA-N in Hay



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Questions?

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