Utilizing Multiple Precision AG Practices to Reduce Costs and/or Maximize Profits

Cotton Inc.
Crop Management Seminar
Nov. 12, 2008
Topics

• Which technologies are right for me?
• How do I make it happen?
• Does all of this technology really work?
• Is there any way to make this easier?
• What is the ultimate goal?
Soil Fertility Management

• Grid sampling
  – 10, 5, 2.5, 1 acre grid?
  – Interpolates/estimates values between sample points

• Zone sampling
  – Field is divided into zones (EC or bare soil imagery)
  – Each zone is treated as an individual field
Management Zones

- Provide Guides for soil sampling
- Identify “Fields within Fields”
- Track productivity or profitability of any subset of the field
In-season fertility management

- Directed tissue and/or soil sampling
- Aerial imagery
  - Directs where to collect tissue or soil samples
  - Relies heavily on ground truthing
  - Limited by clouds
- On-the-go sensors
  - Measure reflectance data and simultaneously vary the rates
  - Relies heavily on algorithms
  - Not limited by clouds
Making it happen

• Hardware needs
  – Consultant/Service provider
    • GPS, handheld computer, computer
  – Fertilizer applicator
    • GPS, VR controller

• Software needs
  – GIS software
    • Mapping and soil sampling capability
    • Ability to import data to make management zones
    • Ability to write and export prescriptions to any VR controller
Making it happen

• Committing the time and resources
• Realizing that there will be setbacks!!
Does this really work?

- Yes and NO
- Lower fertilizer costs inhibit ability to work
- Higher fertilizer cost enhance opportunities
Field A

• 2004 Straight Rate
  • Grower Standard 20 Gal/Acre of 11-37-0
  • Fertilizer Cost - $1.34/Gal for Total of $26.72/Acre
  • Yield – 1,327# Lint/Acre

• 2006 Variable Rate
  • 11-27-0-7 + 1 Gal/Acre Hydra Hume
  • Average Rate per Acre = 14.7 Gal/Ac
  • Fertilizer Cost - $1.35/Gal + Hydra-Hume @ $5.00/Gal for a Total of $24.85/Acre
  • Total Fertilizer Cost in 2004 Dollars was $22.79
  • Yield – 1,387# Lint/Acre
Comparision

- $950/ton DAP; $575/Ton 0-0-60
- Rice-
  - 100 lbs DAP
  - 150 lbs 0-0-60
- Cost per acre 80 acre field
  - $47.50 for DAP
  - $43.00 for 0-0-60
- $90.50/ A

- Hyground-zone sampling
- Rice-
  - 45 lbs DAP
  - 180 lbs 0-0-60
- Cost per acre
  - $22.00 for DAP
  - $51.75 for 0-0-60
  - $73.75/A
**Shallow EC Polygons**

- Field Boundary
- Shallow EC Polygons mS/meter
  - 2.9 - 20.7 (7.6 ac) (15%)
  - 20.8 - 38.9 (18.7 ac) (37%)
  - 39 - 58 (9.5 ac) (19%)
  - 58.5 - 76 (8.8 ac) (17%)
  - 76.2 - 105.5 (6.1 ac) (12%)

**Deep EC Polygons**

- Field Boundary
- Deep EC Polygons mS/meter
  - 1.5 - 22.8 (20.3 ac) (40%)
  - 22.9 - 40.2 (15 ac) (30%)
  - 40.2 - 55.6 (8.4 ac) (16%)
  - 55.7 - 68.4 (4.5 ac) (9%)
  - 69.1 - 83.6 (2.5 ac) (5%)

Season: 2009
Min: 2.86 mS/meter
Avg: 42.50 mS/meter
Max: 105.50 mS/meter

Season: 2009
Min: 1.46 mS/meter
Avg: 31.47 mS/meter
Max: 83.64 mS/meter
pH - Soil Test

Season: 2009
Min: 5.60 PH SCALE
Avg: 6.00 PH SCALE
Max: 6.50 PH SCALE
Min Rate: 1,750.25 lb/ac
Avg Rate: 2,182.31 lb/ac
Max Rate: 3,920.00 lb/ac
Total Nutrient: 111,162.41 lb
Applied Area: 41.67 ac
pH Target: 6.5
Lime Rec Option: SMP Buffer
pH

Field Boundary
pH - Soil Test PH SCALE
- 5.6 - 5.7 (7.8 ac) (15%)
- 5.7 - 5.9 (13.4 ac) (26%)
- 5.9 - 6.1 (12.1 ac) (24%)
- 6.1 - 6.4 (9.7 ac) (19%)
- 6.4 - 6.5 (7.9 ac) (16%)

Lime Recommendation

Field Boundary
Lime Recommendation lb/ac
- 0 - 0 (9.1 ac) (18%)
- 1750.3 - 2361.7 (14.5 ac) (28%)
- 2378.8 - 3024 (18.8 ac) (37%)
- 3034.5 - 3610.6 (2.5 ac) (5%)
- 3618.1 - 3920 (5.9 ac) (12%)

HELENA
HyGround
Scout Map from Aug. 2004

The 2006 samples showed that the N levels ranged from 55.4 to 73.6 lbs of Available N.
Results

Leaf Tissue N:
Peak Bloom
Class 3: 4.05% N
Class 4: 4.34% N
Class 5: 5.43% N

Leaf N Critical Values:
Mid-bloom: 4.1%
Cut-out: 3.8%
(Bell et al., 2003 Crop Science)

DP 432 RR
2004 Yield: 1333 lbs/A
2005 Yield: 1253 lbs/A
Is there any way to make this easier??

• Obstacles
  – Substantial investment for hardware and software
  – Taking the time to learn software
  – Getting results in a format that is usable

• Possibilities
  – Relationships with larger service providers
    • Allows for consultant to do field work
    • Service provider does computer processing
    • Consultant makes agronomic decisions from the results
Where are we headed

- Would tying yield maps and record keeping data to fertility management be useful??