Precision Ag – A Midwestern Look at Cotton Production

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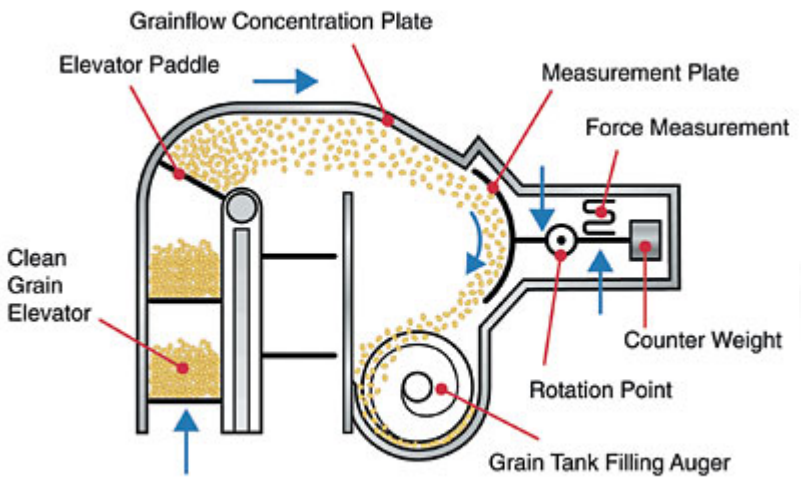
Precision Ag Technologies

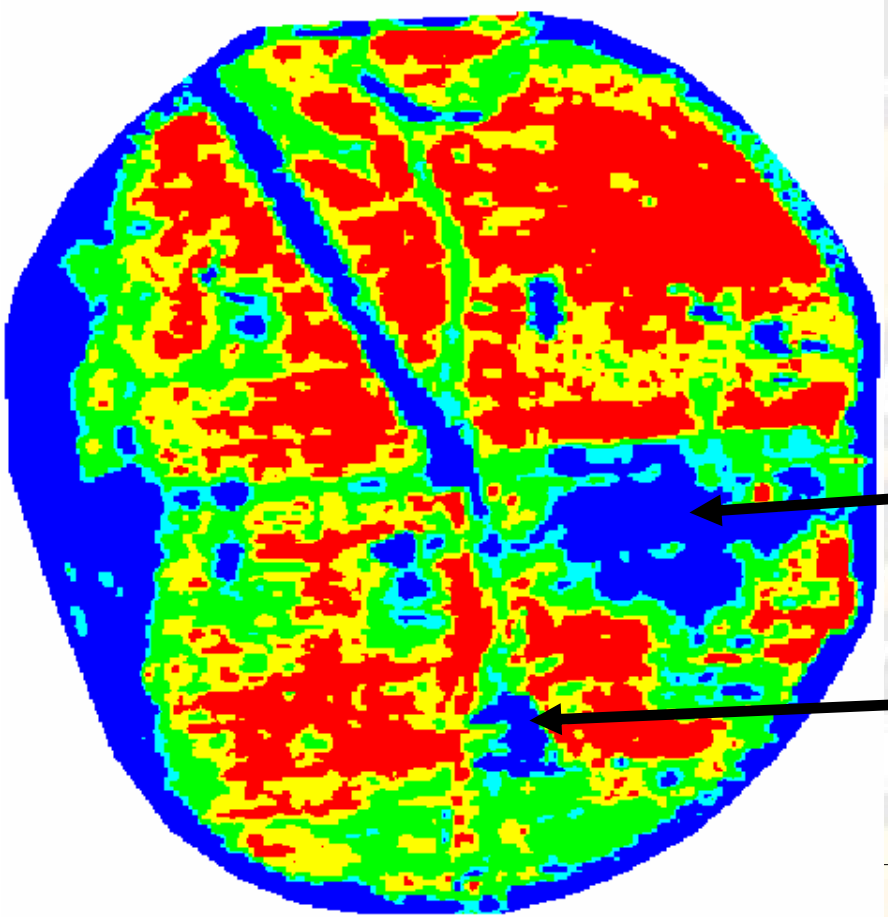
- Yield Monitors
- Georeferenced Sampling
- Guidance Systems
- Control Systems
- Sensor Technology
- Remote Sensing
- GIS Advancements

Yield Monitors

- Grain yield monitors have been commercially available since the early 90's and are a accepted commodity
- They will become standard equipment on new combines by default
- Key uses are:
  - Diagnosing Crop Production Problems
  - On-Farm Research
  - Determining Spatial Yield Potential



Diagnosing Crop Production



0 to	126
126 to	142
142 to	173
173 to	189
189 to	250

Wire worm infestation

Crop drowned

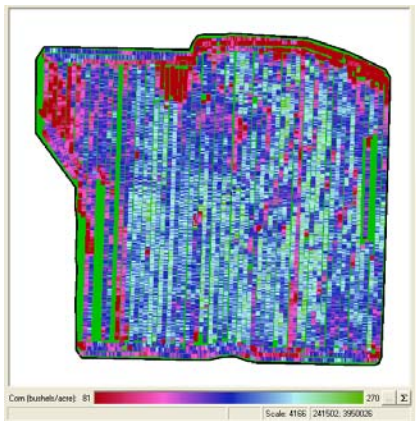
On-Farm Research

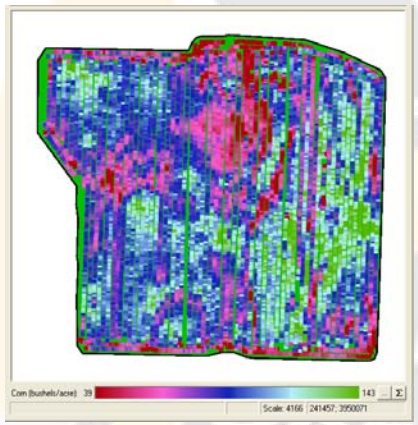
- Has the potential to expand knowledge about individual farms
- Comparison of varieties, tillage practices, fertility rates, etc.
- Not as easy as it may seem
  - What do you want to know?
  - Why do you want to know it?

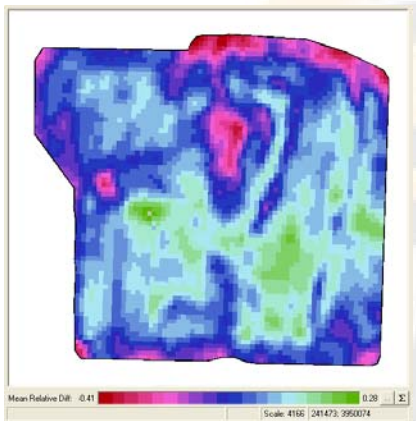
Spatial Yield Potential

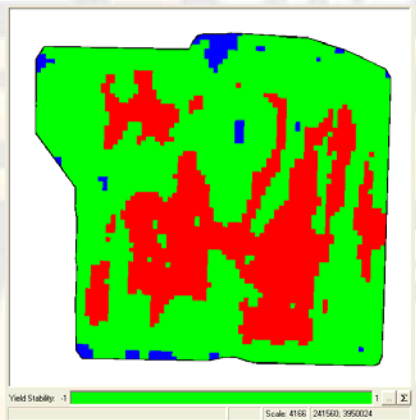
- Many nutrient recommendation models require the use of a crop yield goal
- Development of a nutrient recommendation map may require the use of a yield goal map
- How can you generate variable yield goals?

Processing Yield Monitor Data









Start with multiple yield maps on the same field.

Do they need to be the same crop?

Normalize each year and average the maps.

Does yield stability matter?

Sensor Technology

- Sensing needs and adjusting application rates on-the-go
- No need for a map of last years yield, fertility, etc.
- Does the crop need nutrients?
- Are there weeds present that need to be sprayed?

Sensor Technology

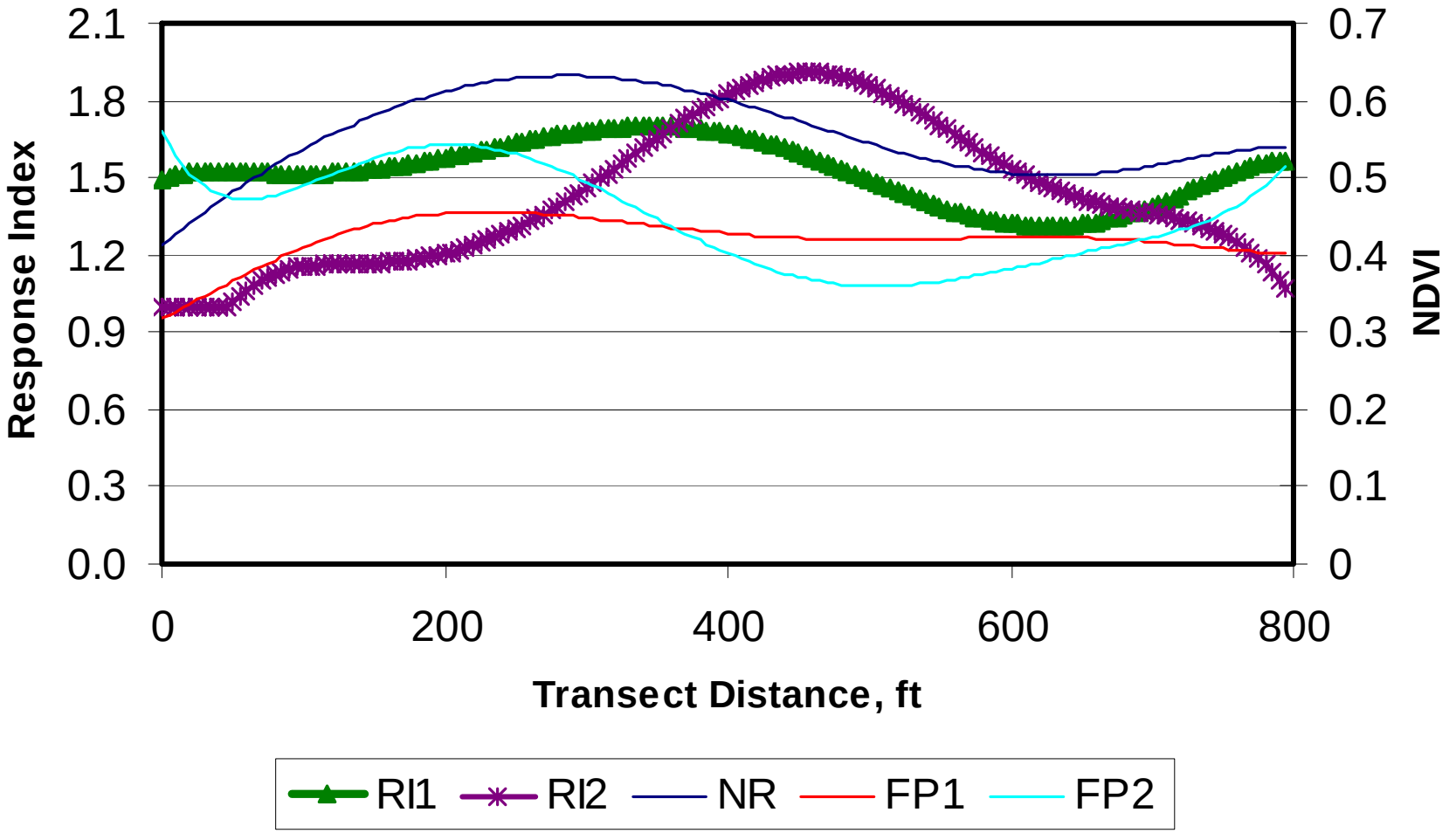
- Greenseeker
  - N-management
- Veris Technologies
  - Soil EC Sensor
  - Mobile Sensor Platform
    - w/ pH Manager

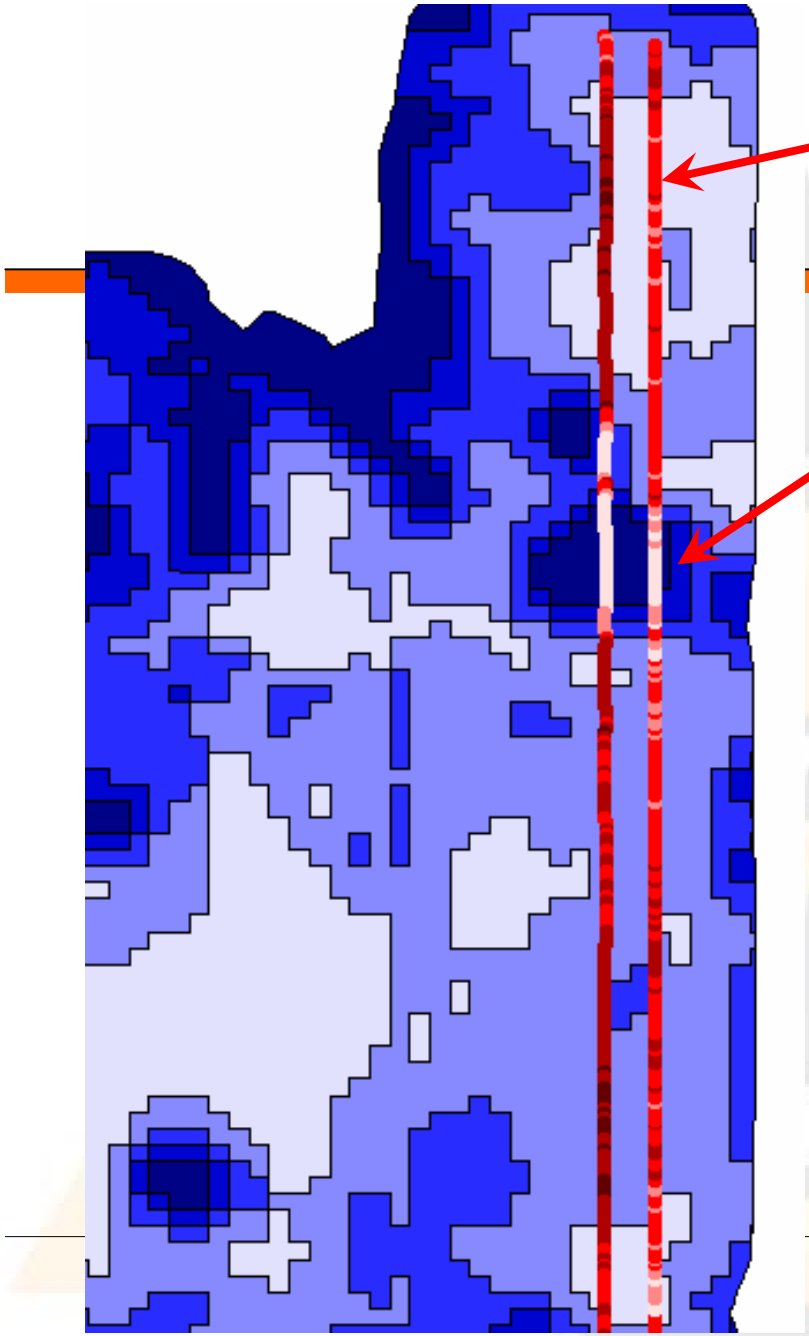
Sensor Based Nitrogen Management

Integrating Crop Sensors and Yield Monitor Data

- We know that the response to N varies spatially across the field.
- We also know that response to N varies each year.
- Can we incorporate other information (yield monitor data) that we have to aid nitrogen decisions?
- Use yield monitor data to determine yield potential zones and crop sensors to determine seasonal N needs.

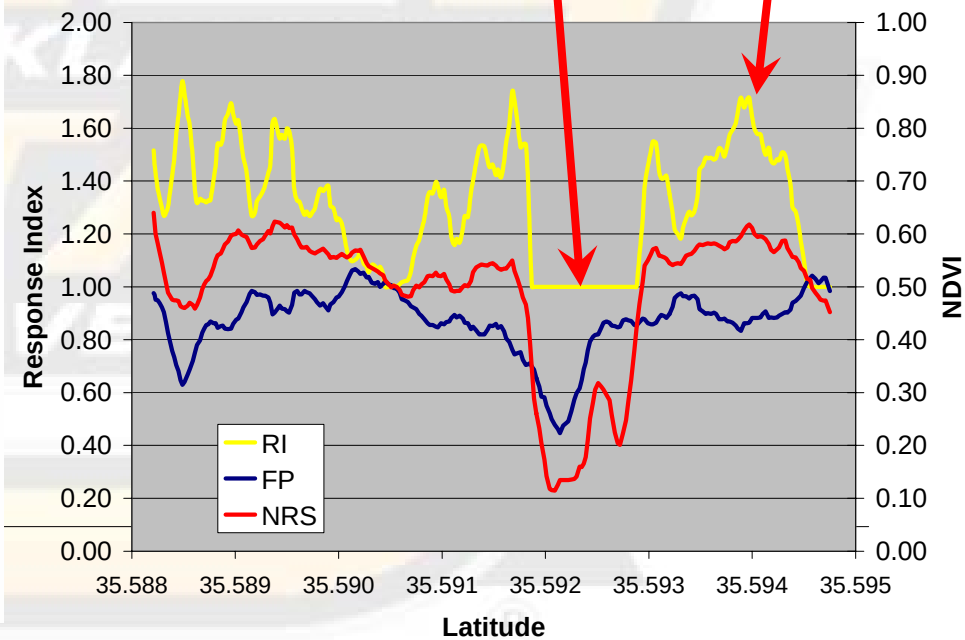
Wheat Transect





High yielding zone where the NDVI is greater in the N-Rich strip and nitrogen was recommended.

Low yielding area where NDVI between the N-Rich strip and farmer practice are similar. No extra nitrogen was recommended.



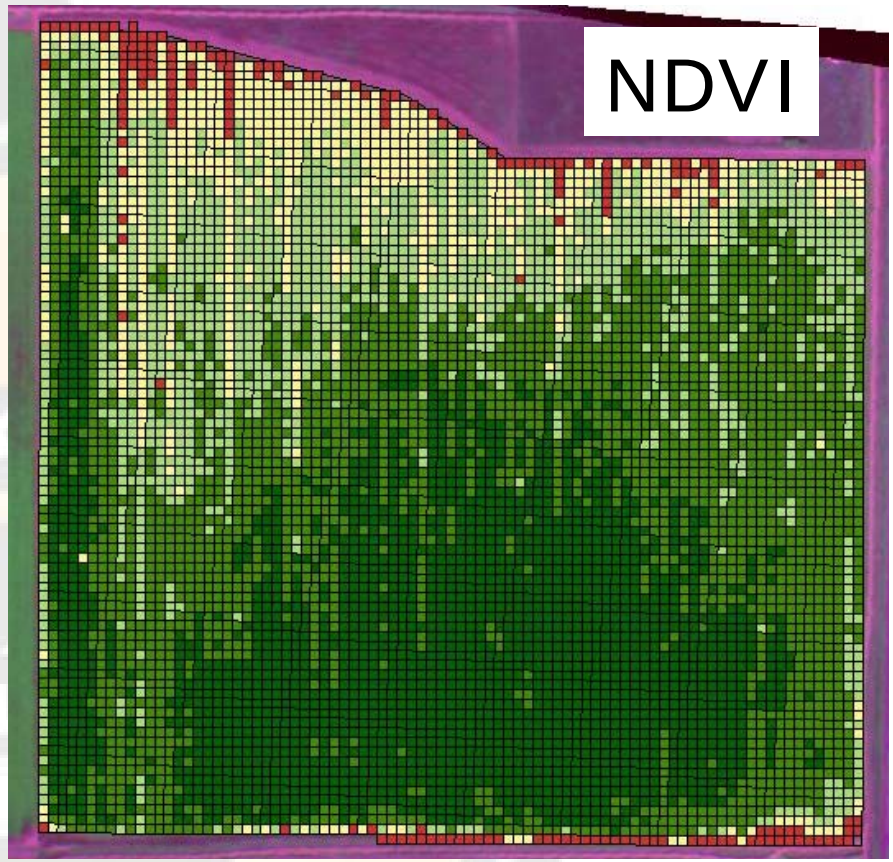
Remote Sensing

- It will be the savior of precision ag technologies
- There have been some niche applications, but widespread adoption has not occurred
- However, cotton is the crop that has shown the most promise for remote sensing applications

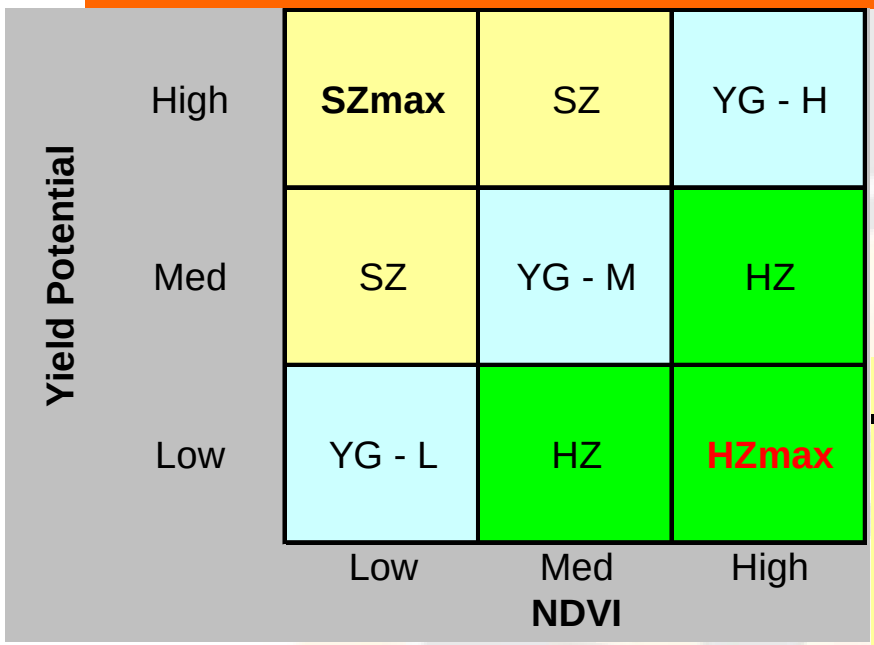
What's Different About Cotton?

- Growing corn is like racing cars
- Cotton is indeterminate
- Variable Rate Opportunities
  - Nitrogen
  - Growth Regulators
  - Defoliants

Yield and Remote Sensing

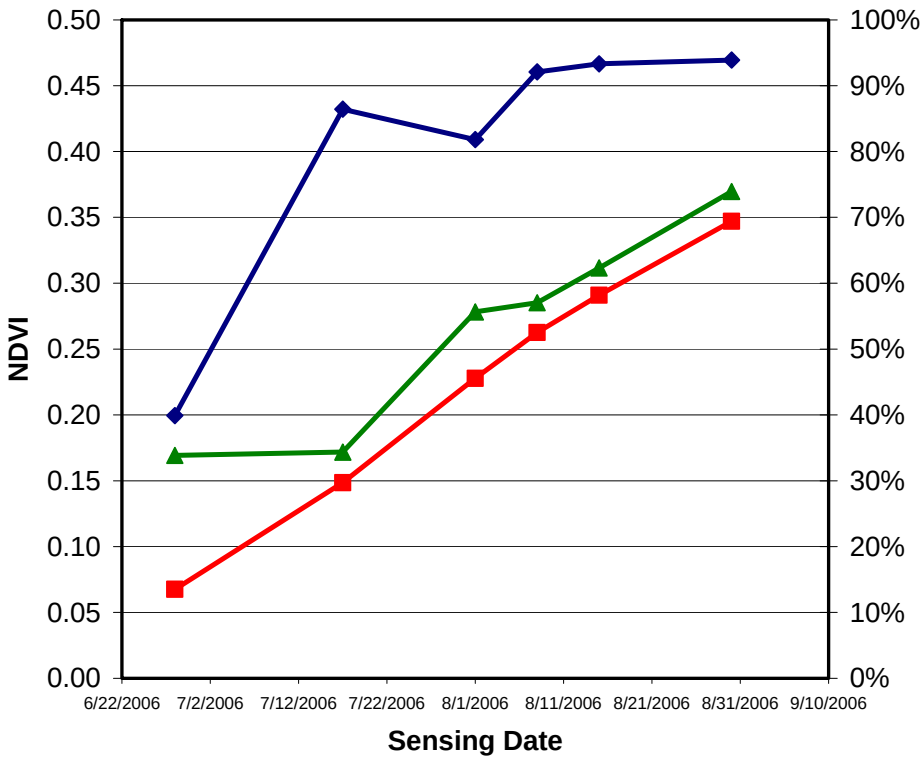


Cotton Management Concept

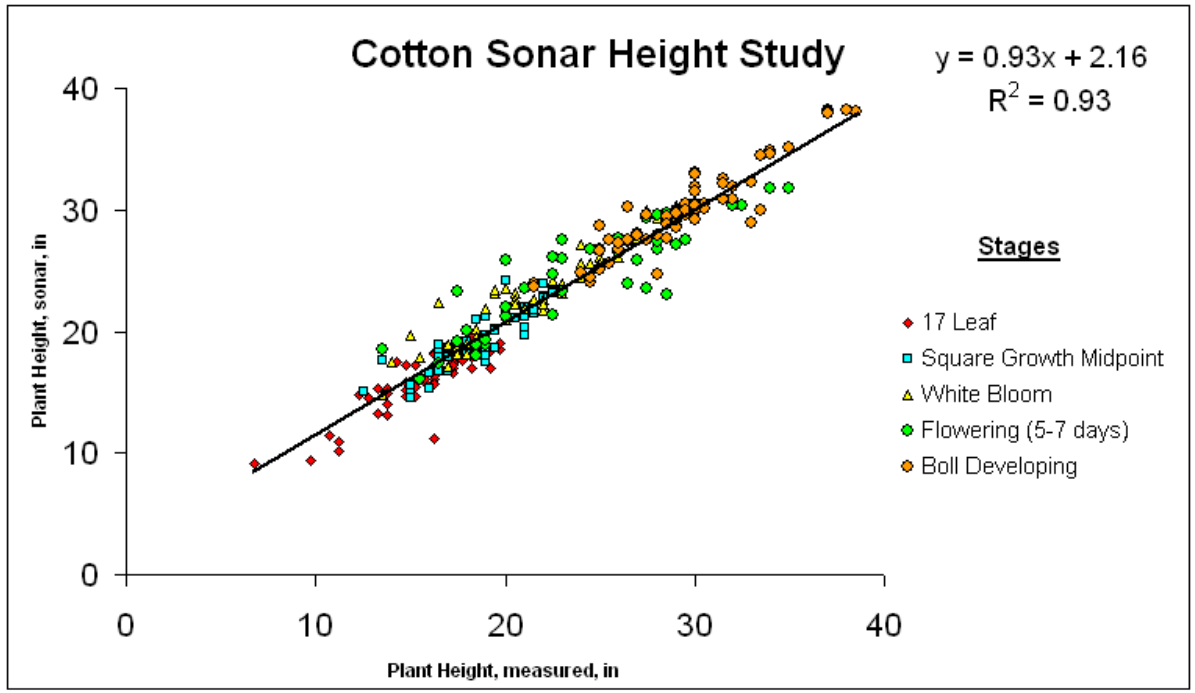


NDVI	Yield	Zone	N-Rate
High	High	YG-H	High
Med	Med	YG-M	Med
Low	Low	YG-L	Low
High	Low	**HZmax**	0
High	Med	HZ	Low
Med	Low	HZ	0
Low	High	**SZmax**	High
Med	High	SZ	High
Low	Med	SZ	Med

Estimating Canopy Closure



Sensing Cotton Height



REDBALL™
APPLYING INNOVATION

GreenSeeker® RT200

Variable Rate Application and Mapping System

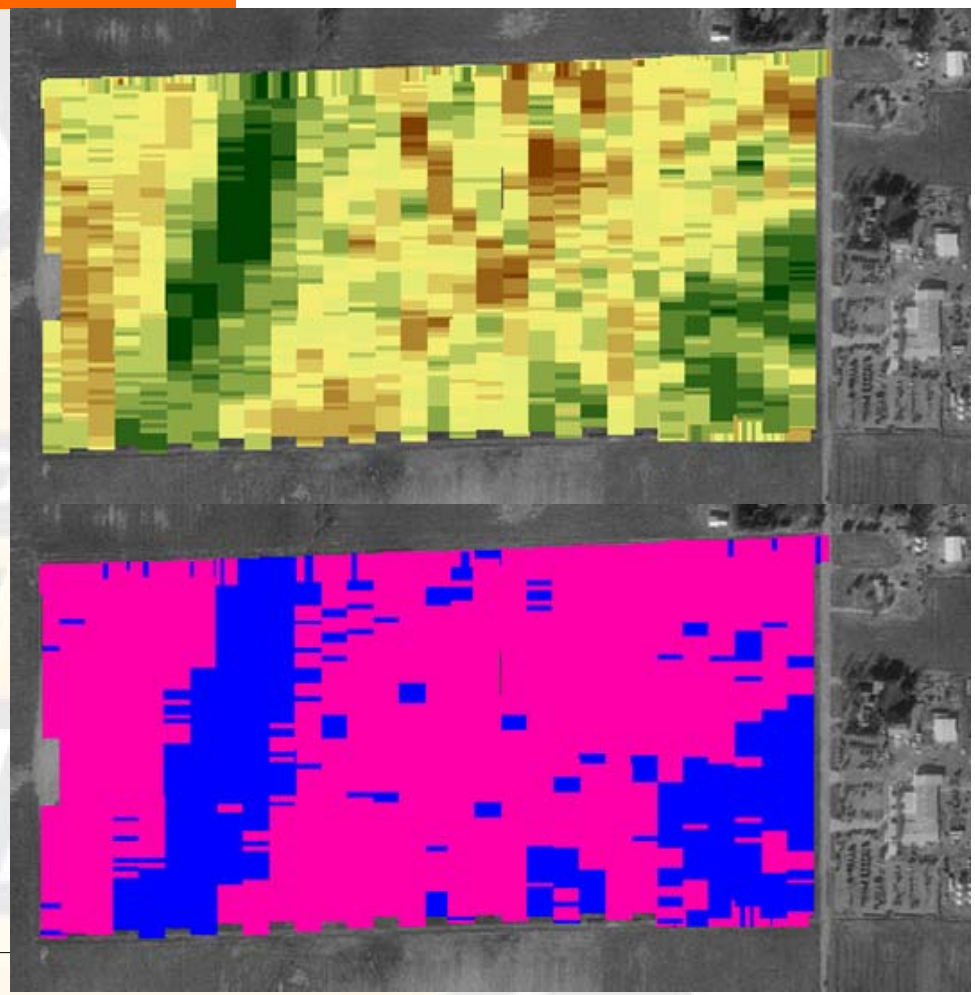
NTech® Industries, Inc.

Sensor Based Defoliant Application

NDVI values show large differences in vigor across the field. NDVI values below 0.4 (light yellow) have much less leaf area than higher values.

Map of on-the-go prescription rates sent to the sprayer's rate controller by GreenSeeker.

Customer set only 2 rates - 12.5 and 15 gallons per acre



Precision Agriculture

- Mechanization of agriculture was considered one of the top ten engineering achievements of the previous century
- The incorporation of electronics and control systems will be one the next great achievement in ag equipment

Remember, its

Evolution
not
Revolution

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