Nitrogen deficiency: the yellow plague of 2008

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If there's a plague...

• The Cause
• The Symptoms
• The Damage
• Prevention
• Diagnosis
• The Cure
The Cause

Total Precipitation in Inches
April 1, 2008 to June 30, 2008

>16” precip April to June = trouble
The Symptoms

1. Yellow corn!!
   Much more this year than any of the past 11 years

2. STREAKS
Central Iowa
late August
Central Iowa
early August
North-central Iowa
Northeast Iowa
Northeast Iowa
Northwest Missouri
Western Illinois
My Windshield Diagnosis:

average bushels/acre lost
My aerial photo diagnosis: average bushels/acre lost

Yield loss estimate on every 100th photo
Dollars lost in 2008 due to N deficiency: 
My estimates by state

Total 9 states: $2.3B

• Some yields are very good anyway
• Many could have been better
Prevention??

• Spring anhydrous?
• N-Serve?
• DCD (SuperU)?
Prevention:

Later application

180 N at planting

110 N sidedress V7.
Diagnosis

• Aerial photos
  – Quantify potential yield loss
  – Prioritize fields (how severe?)
  – Diagnose a lot of fields quickly
  – Not until corn is waist high

• Computer models (Adapt-N in New York)
  – More regional, less accurate
  – Can diagnose the problem earlier
Diagnosis: an example

June 24 aerial photo

Yield loss map predicted from June 24 aerial photo

Yield loss map based on yield monitor data (September 30)
The Cure
Can rescue N really work?

Miami County, Kansas
Same field

with extra N
without extra N

Photo: Andy Holzwarth
Yield response:
- 35 bu where stress is visible
- 2 bu where no stress is visible
The Cure—how late?

![Graph showing yield relative to preplant N vs. growth stage of single or main N applic. for different states.]
N loss scenario

• I’ve had wet weather
• The corn doesn’t look so good, I think I’ve lost N
• But the corn is chest high, so it’s too late—isn’t it?

• NO, it’s not too late
Delivering the Cure

- High-clearance applicators
- Aerial application
- Fertigation
Delivering the Cure
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Delivering the Cure
Delivering the Cure
Delivering the Cure—Do we have enough equipment?

• My estimate: 14.6 million acres in 2008 needed N

• Comparison: about 12 million acres in 2007 got fungicide
Delivering the Cure— Do we have enough fertilizer?
Delivering the Cure—Do we have enough fertilizer?

A: Probably

Biggest holdup: rail cars
Summary of this plague

• The Cause: high April to June rainfall over a large area

• The Symptoms: yellow corn, streaky fields

• The Damage: $2.3 billion
Summary of this plague

• Prevention: sidedress application, spring NH3, N-Serve
• Diagnosis: aerial photos, computer models
• The Cure: Nitrogen fertilizer by 1 week after tassel