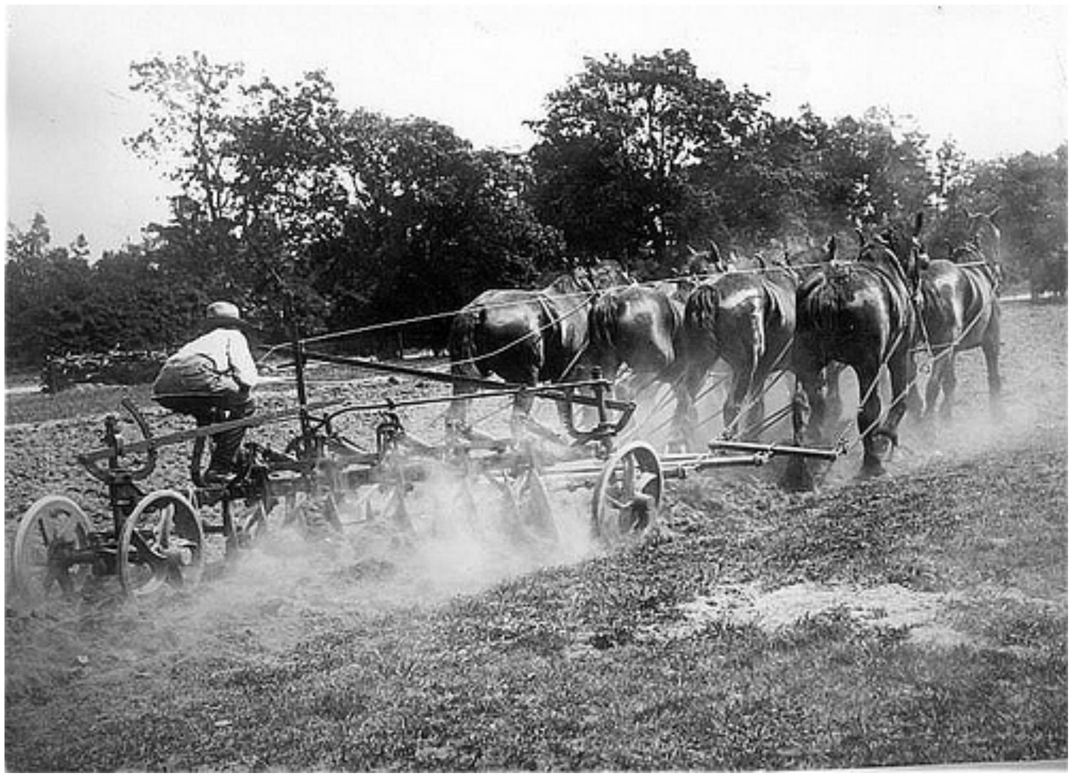
Nutrient and Soil Management For Farmers Looking to Save $ (and Stingy Norwegians)

David Legvold, Northfield, MN

January 13, 2011





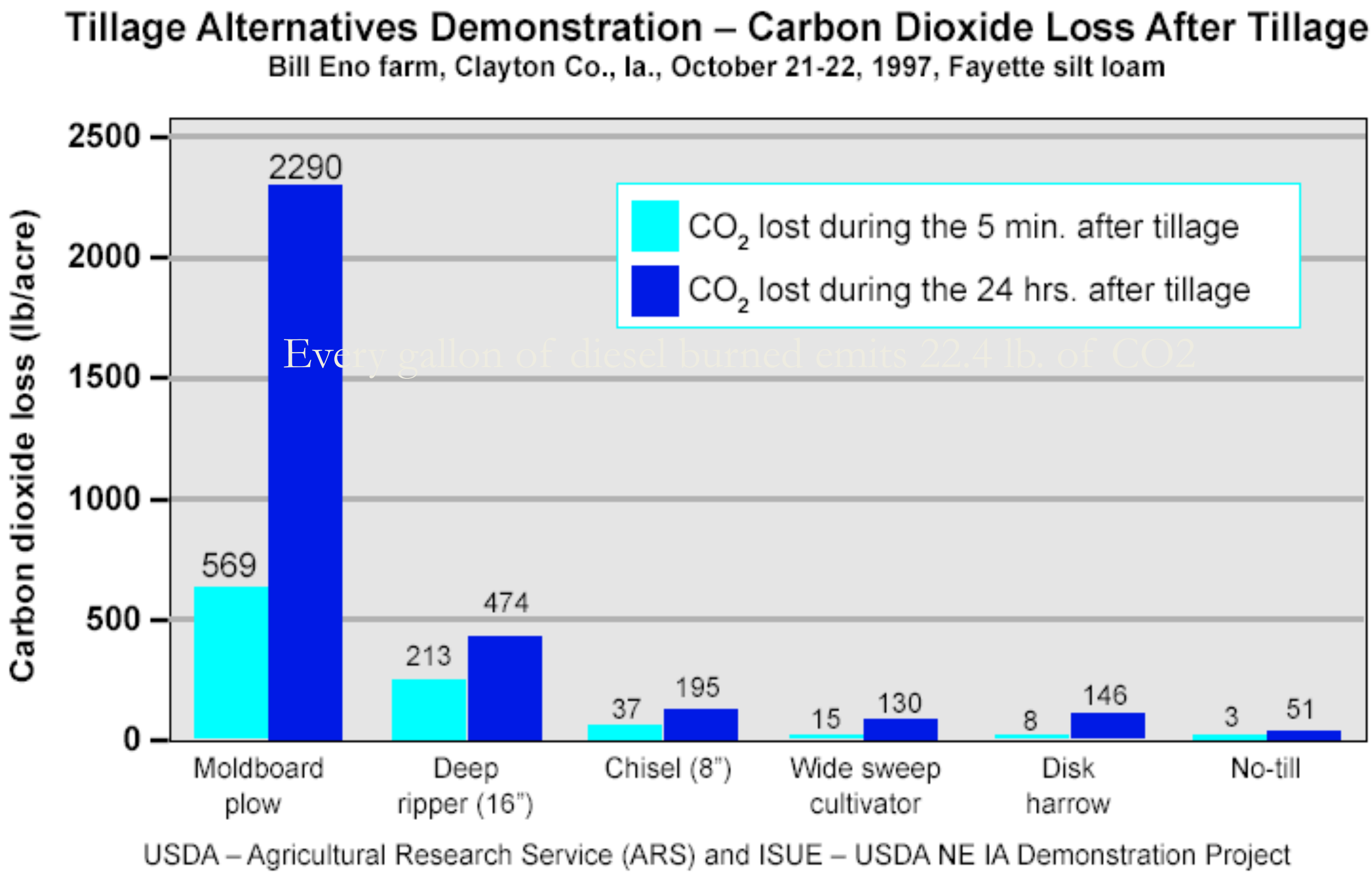


Carbon and other gasses.

- US agriculture emits about 1% of CO_2
- Burning one gallon of diesel = 22.38 lb of CO_2
- 33% of all methane emissions
- 70% of all nitrous oxide emissions
- One unit of NOX is equivalent to 296 units of CO_2
- Agricultural soils have potential to sequester 10to15% of US greenhouse gas emissions.

"…you can't put your head in the sand and hope the problem will go away, farmers must act and take a leading role."
Tom Vilsak, USDA Secretary

US EPA /Progressive Farmer, June 2009



Every gallon of diesel burned emits 22.4 lb. of CO2


SOIL WARRIOR


Soil Warrior with dry fertilizer system
Trimble Auto Steer with cellular correction


ENVIRONMENTAL TILLAGE
ENVIRONMENTAL TILLAGE
SYSTEMS INC.

Soil Warrior with dry fertilizer system $84,354

Trimble Auto Steer with cellular correction $20,322

JOHN DEERE 7000

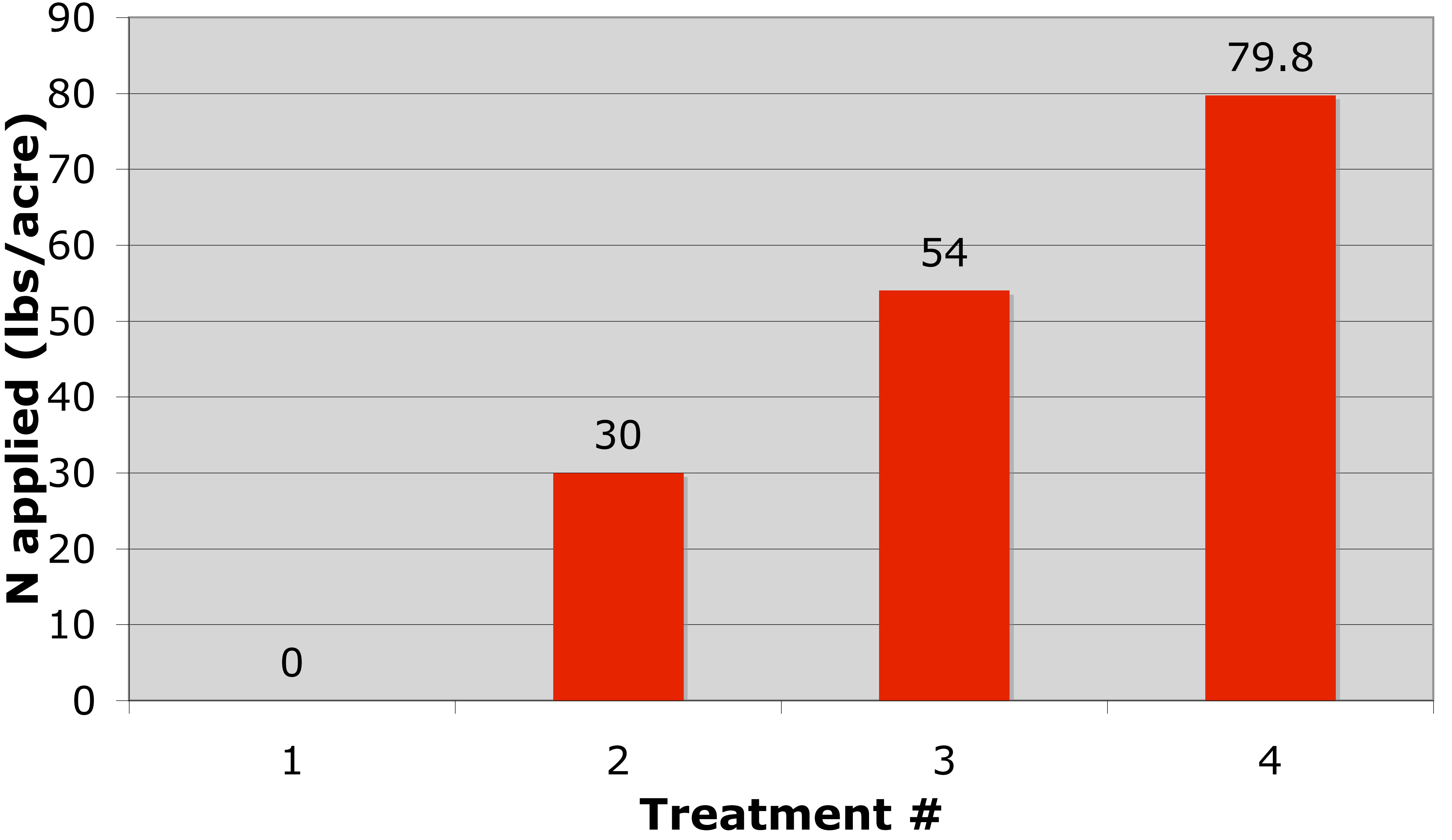

DAWN

A recipe for corn on a small N budget

- With Soil Warrior, fall apply 150 lb. 9-23-30 dry fertilizer
- Spring apply 60lb. N with strip tillage
- At 1' tall, apply 30lb. N as liquid side dress
- Total N for corn crop: 105 lb.

Use stalk N test and yield results- PERFORMANCE!

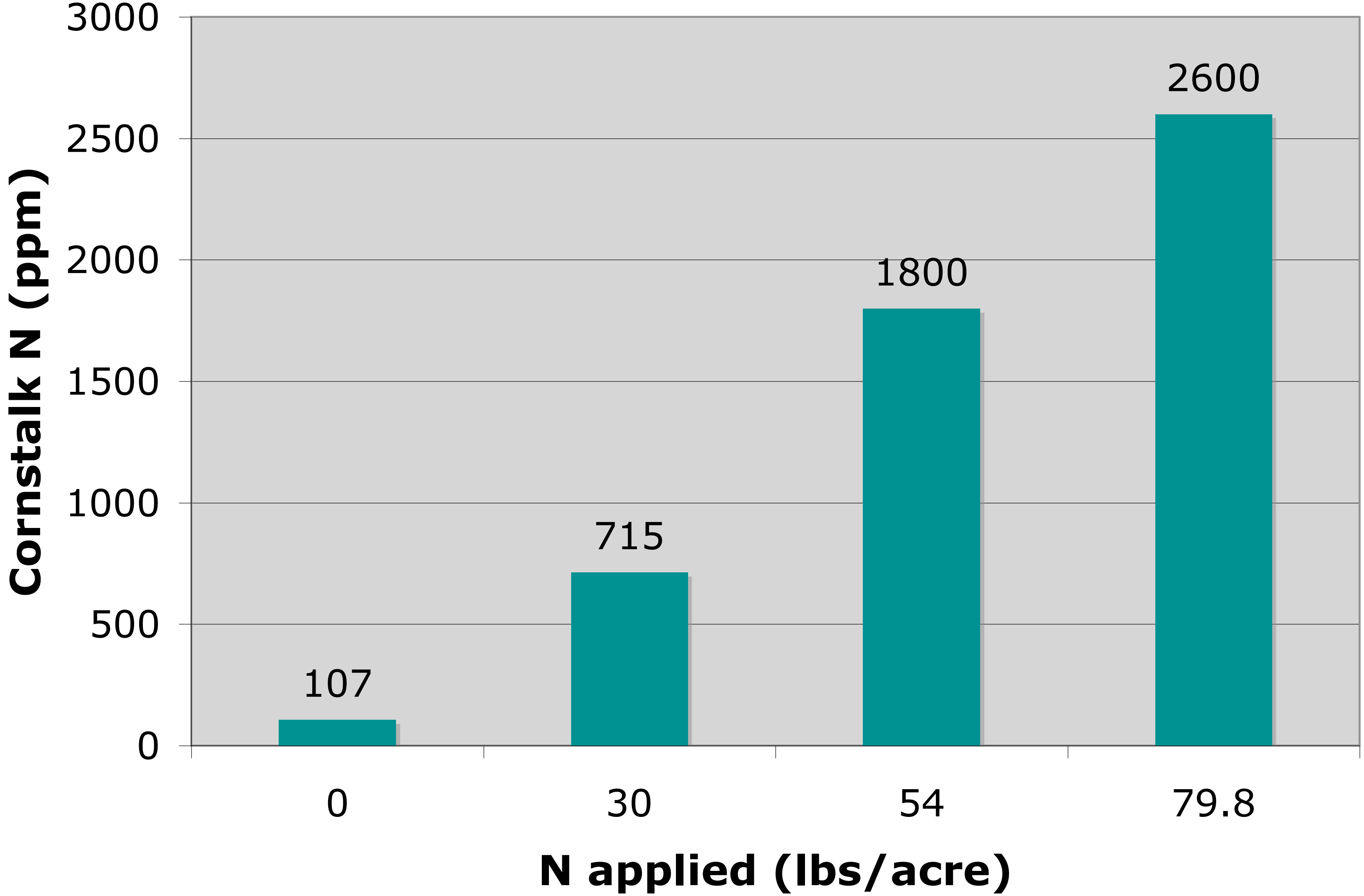
Experimental levels of N fertilizer application



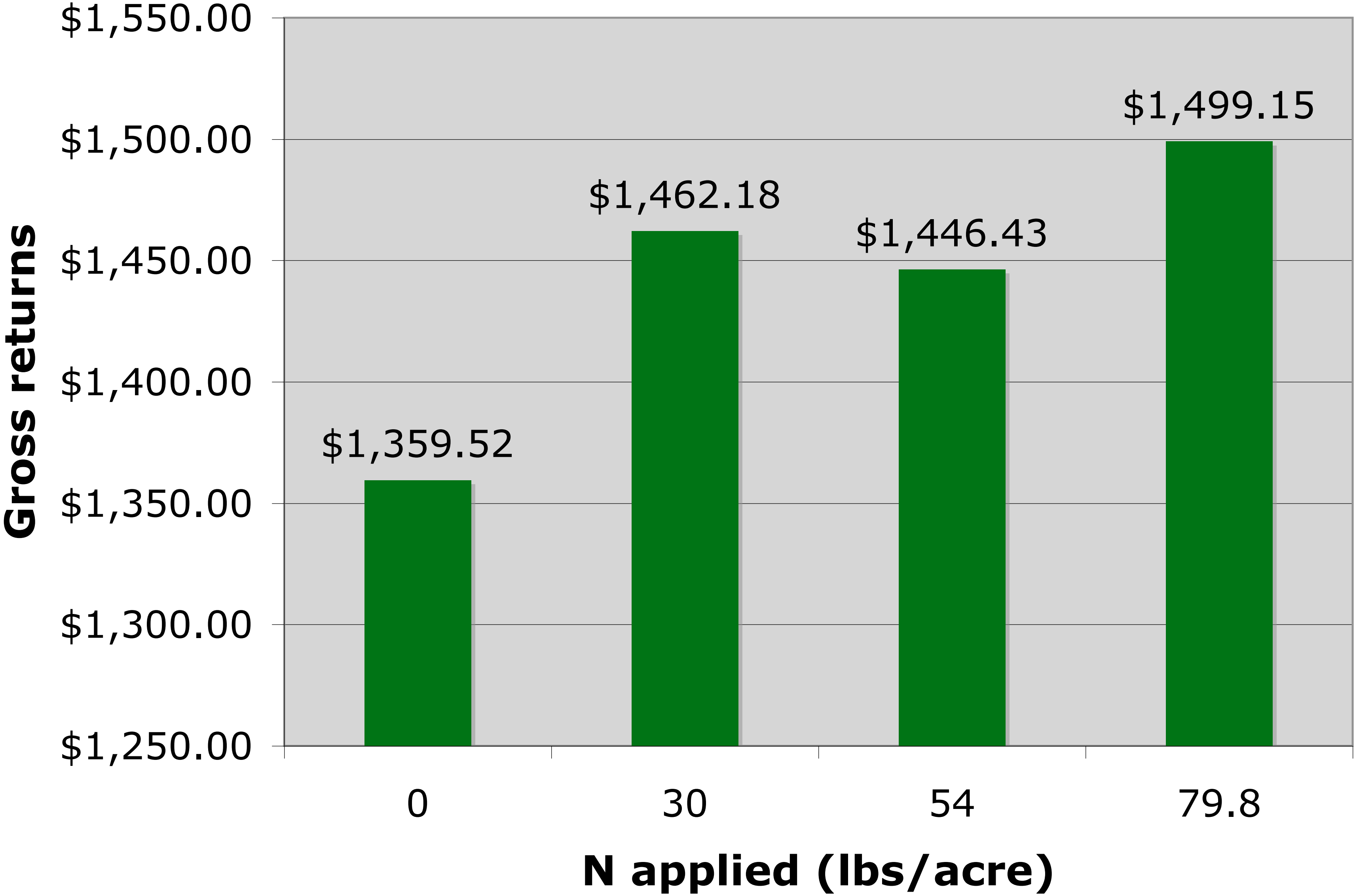
Sampling regime

- 80% or more black layer (when corn reaches physiological maturity)
- 8” cornstalk sample cut 1’ from ground
- Sent to MVTL, New Ulm, MN
- 0-700 is deficient; probably lost yield
- 700-2000 is optimal
- 2000 or greater is excessive; wasted fertilizer $ $

Cornstalk nitrate concentration with varying levels of N



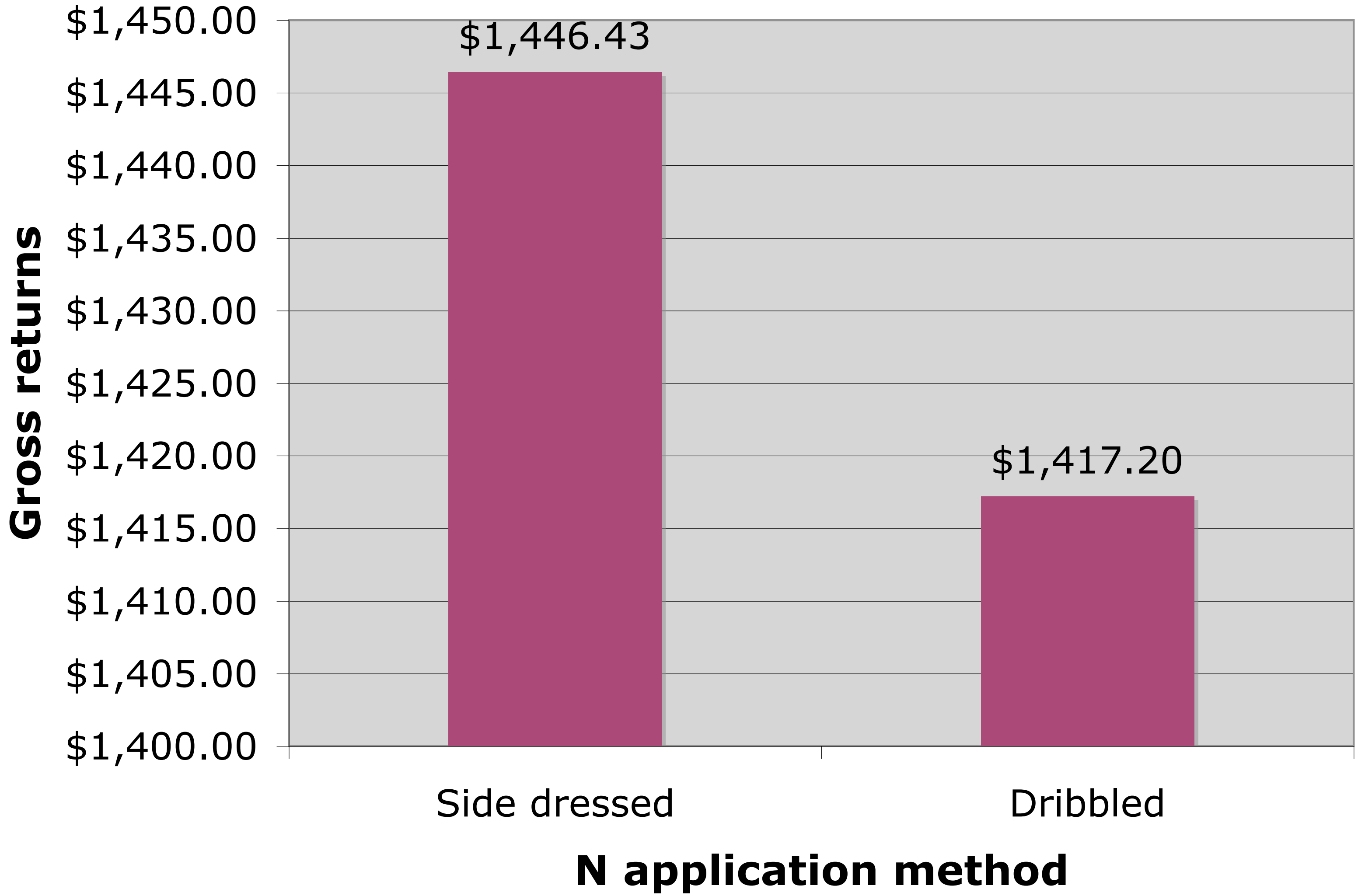
Gross returns for varying N application levels



Dribble or inject?

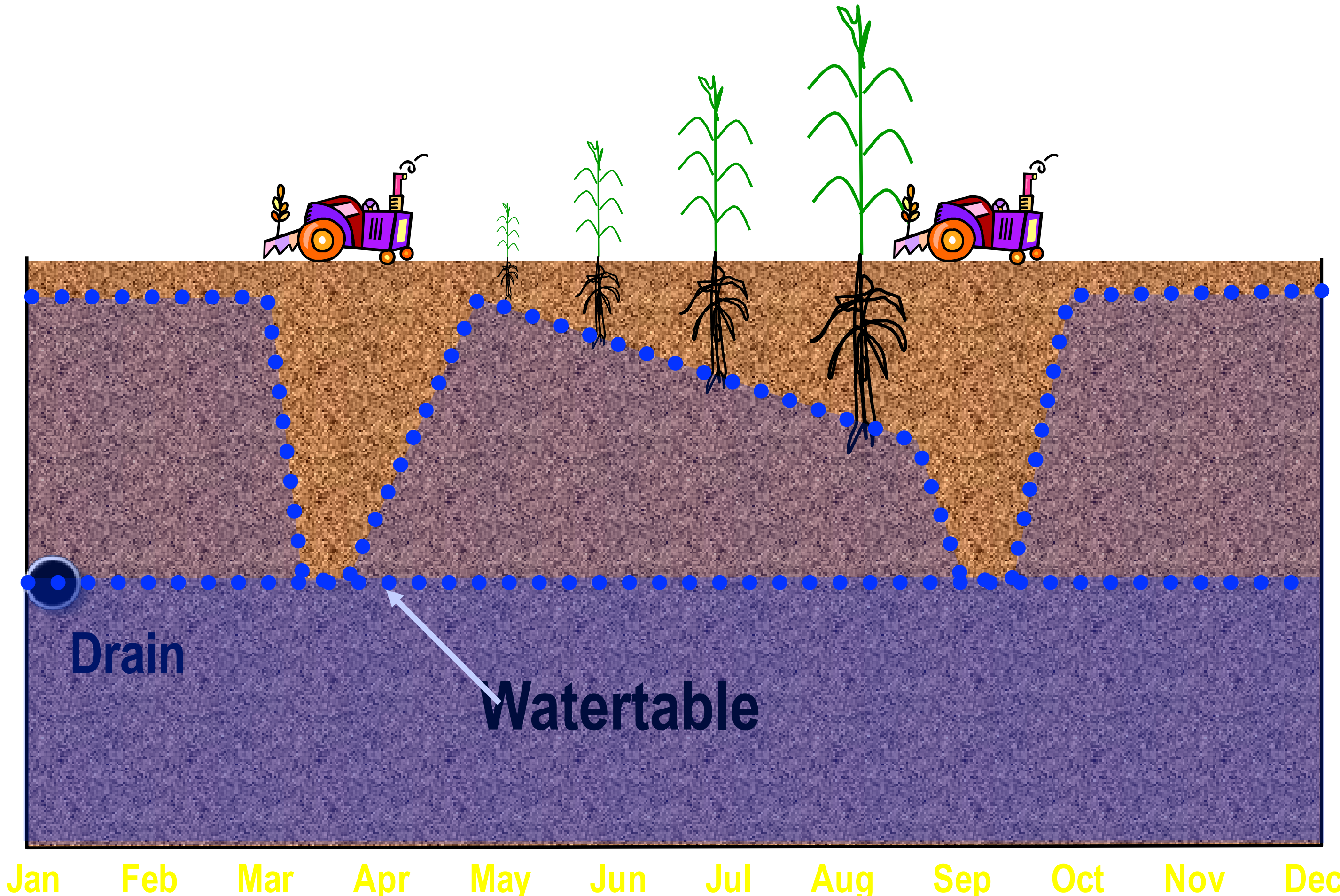
- My goal is maximum N efficiency
- Study by Ostermeier, Van De Wostyne, and Blackmer of Iowa State
- Found injecting N provided a 5bu. Advantage
- Rate was 100lb/acre
- May address loss of N to atmosphere if placement is 2-4" deep
- My 2009 stalk N was low. Need to do yield and stalk N testing to get best rate. Takes years!

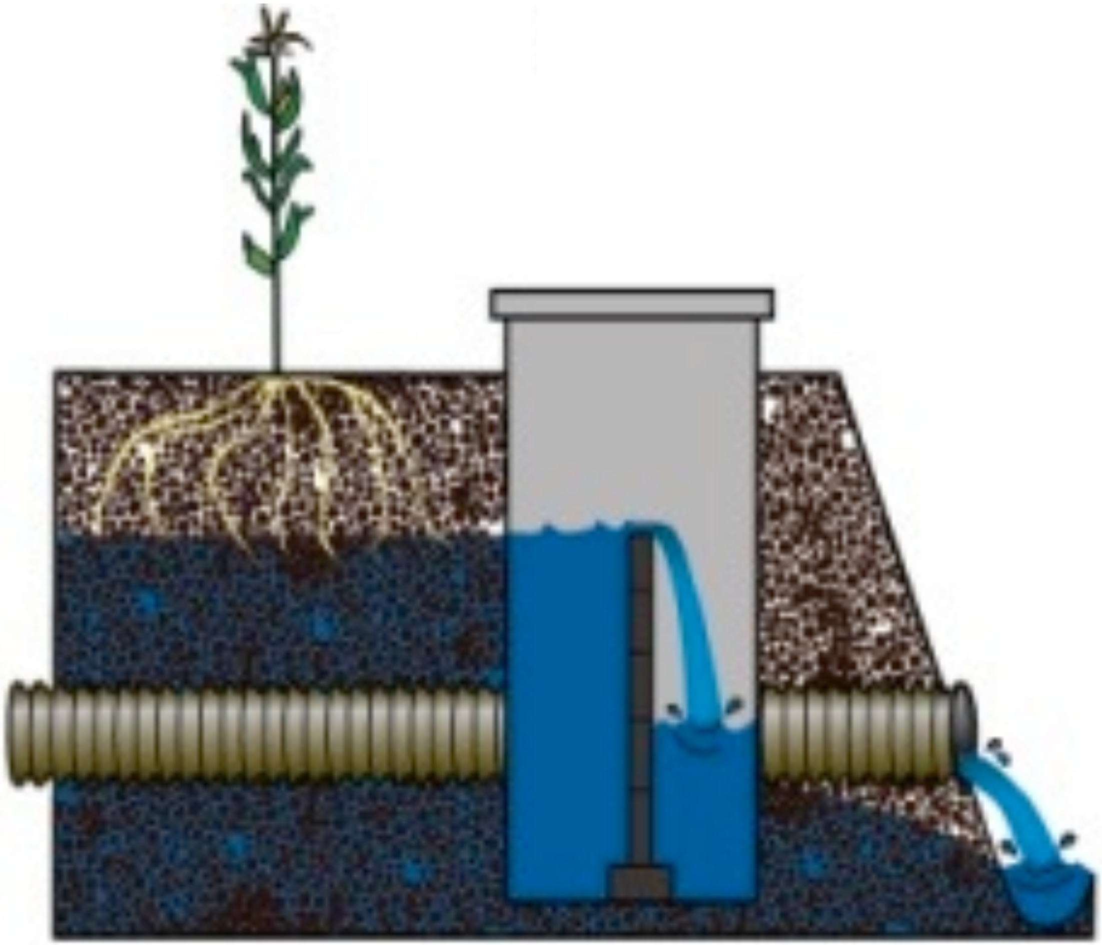
Gross returns per acre for side dressed vs. dribbled application




ST. OLAF

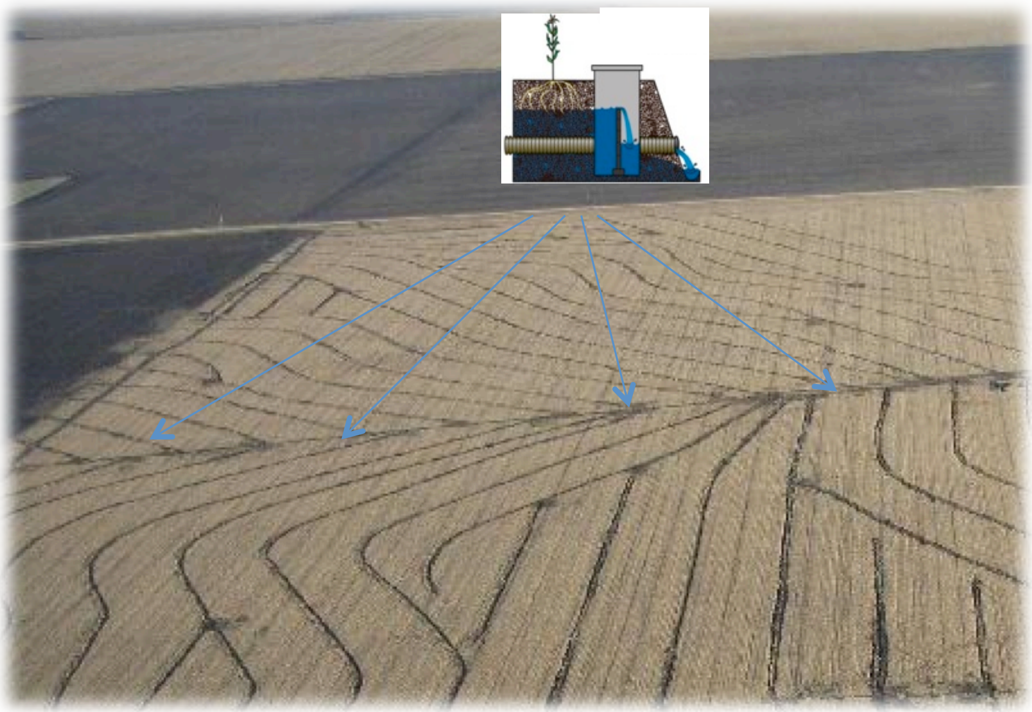
Drainage Water Management





Subsurface Drainage Practices

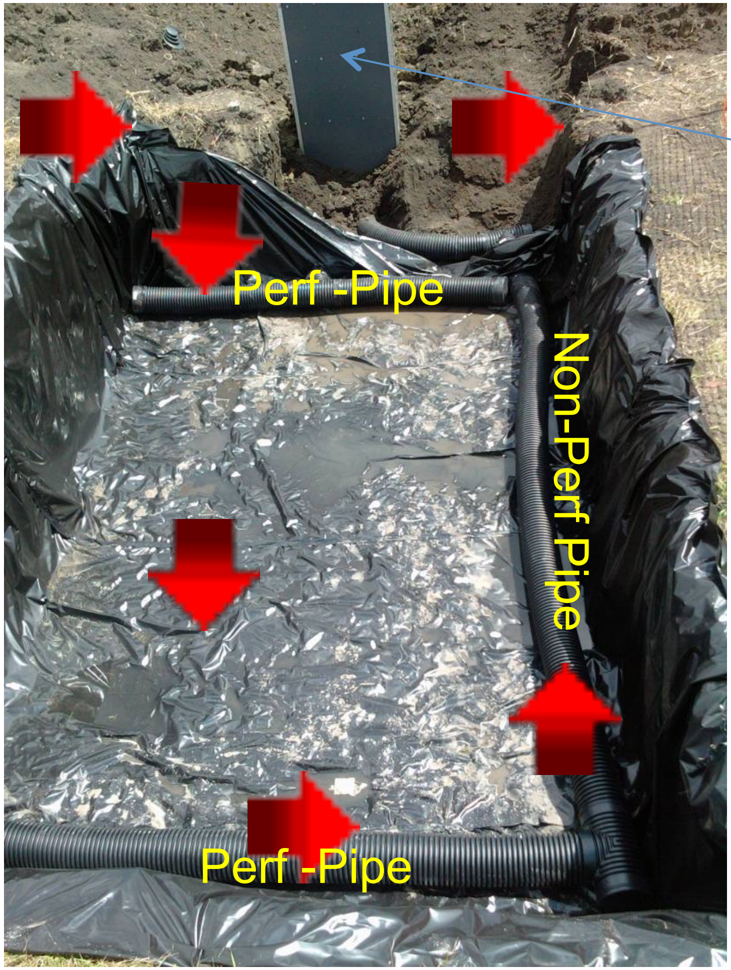
- Drainage water management
- Better drainage design




Mower County Surge Basin Near Grand Meadow.


Mower County Site Retention Basin Near Ostrander

Tile flow from subsurface drainage divereted into a trench of woodchiops. Routed in and out with one structure.



Site, one month after construction.

Bioreactor receiving 66 acres, 10 by 75 ft excavated area.

What about manure ?

Can it be effectively used in no-till/strip-till systems?

It is a stinky problem but we can do it!

Manure Utilization Strategies

Grant from Minnesota Pollution Control Agency Environmental Assistance Grants 2006-2008

Develop new technology for manure application to reduce fecal coliform impact on surface and groundwater

- Method to apply manure within no-till farming
- Base trial application rate on **phosphorous** uptake of corn crop (75 lb./year)
- Additional N applied with zone tillage to meet agronomic requirements
- Bottom line returns as good or better for reduced manure

Manure Utilization Strategies

- Liquid hog manure on corn fields
- 7,000 gal/acre trial (~ 4 acre strip)
  - Traditional manure tanker/applicator
  - Conventional tillage to incorporate manure
- 1,500 gal/acre trial (~ 4 acre strip)
  - "Honey Warrior™" tank /applicator
  - Direct manure placement into strip tilled soil

MPCA Grant: Tile Monitoring

- Determine the effect of manure applications of varying rates upon the bacteria content of tile discharge water
- Three drain tile lines, one for each test plot
  - Tile 1 = 7,000 gal/acre manure application, conventional tillage
  - Tile 2 = 1,500 gal/acre manure application, strip-till
  - Tile 3 = No manure application, strip-till
- No open intakes or vertical intakes.


County Highway 23
N
Feet
0
125
250
500

Row-incorporated low rate manure application at 1500 gallons/acre.

Stalk Nitrate Tests with hog manure

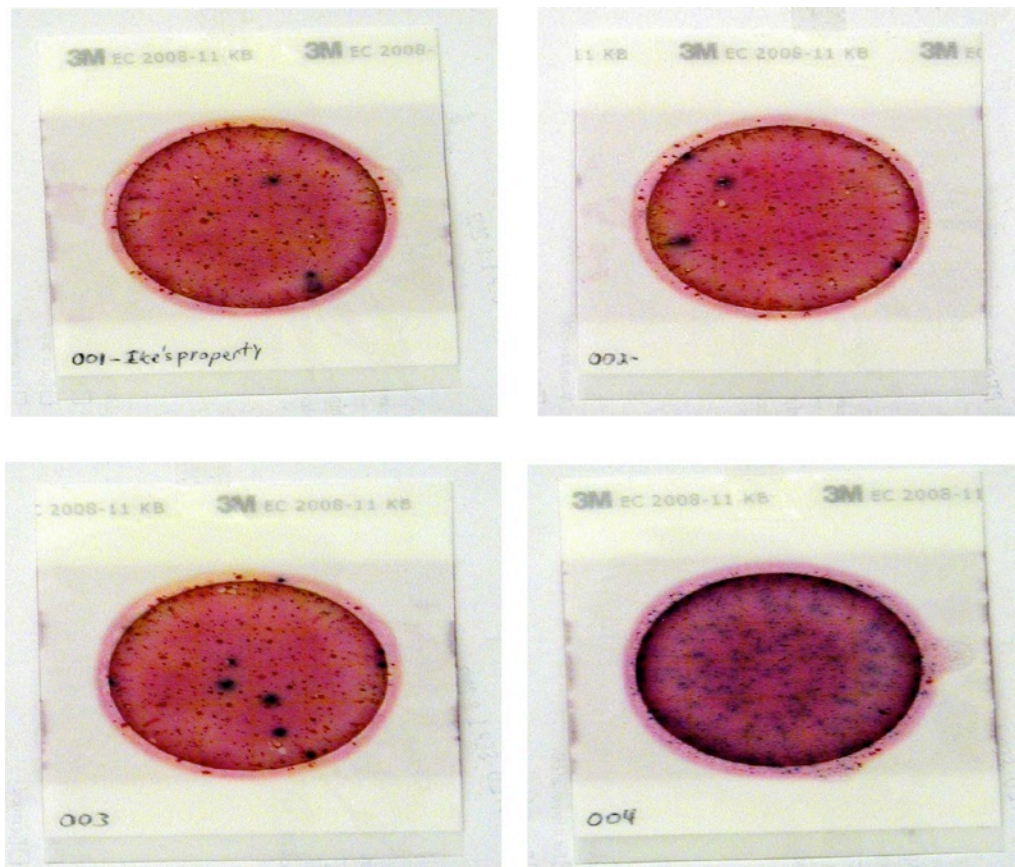
- 7000 gal/acre (~350 lbs N): stalk nitrate 5822 ppm (229bu/a)
- 1500 gal/acre (~75 lbs N + 60 lbs commercial N): stalk nitrate 522 ppm (219bu/a)
- No manure (130 lbs commercial N): stalk nitrate 162 ppm (198bu/a)


HIGH
VOLTAGE

Lab Analyses

- *E. coli* tests – 3M Petrifilm Coliform Count Plates

(Photo: Aaron Wills)



Year	Max.	Minimum	Ave.	Tile Line
2007	10.8	< 1	3.6	1
	14.3	< 1	3.3	2
	9.2	< 1	3.2	3
2008	44.3	< 1	9.7	1
	9.8	< 1	3.4	2
	4.1	< 1	1.5	3

End of season soil e-coli readings, November 2009: ZERO for all plots.

Corn Yield Results

Year	7,000 gal/acre field	1,500 gal/ acre field
2006	168	172
2007	160	180
2008	185	191

2009 Manure Utilization Strategies

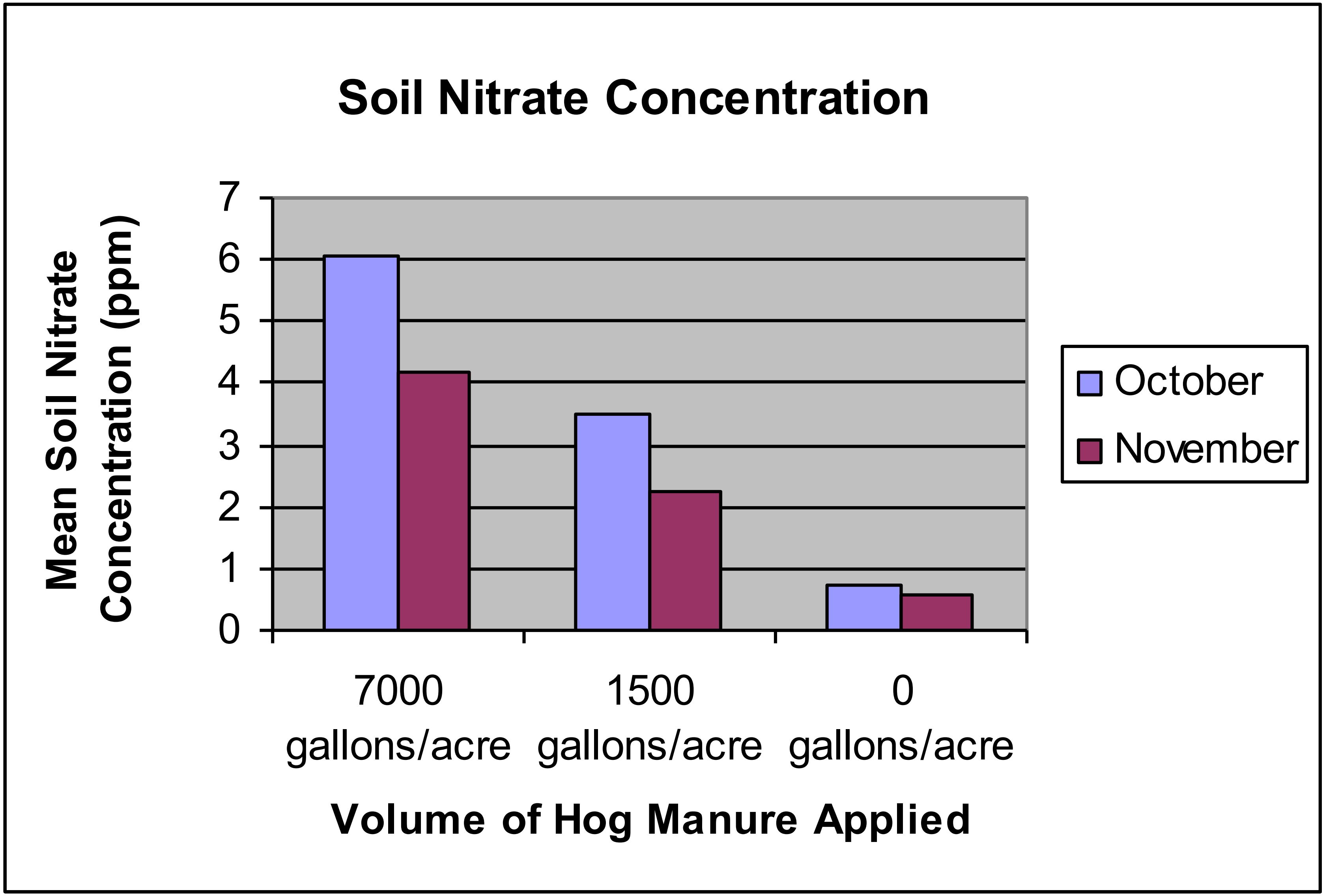
- Results
  - 7000 gal- 229 bu/a

    1500 gal- 219 bu/a

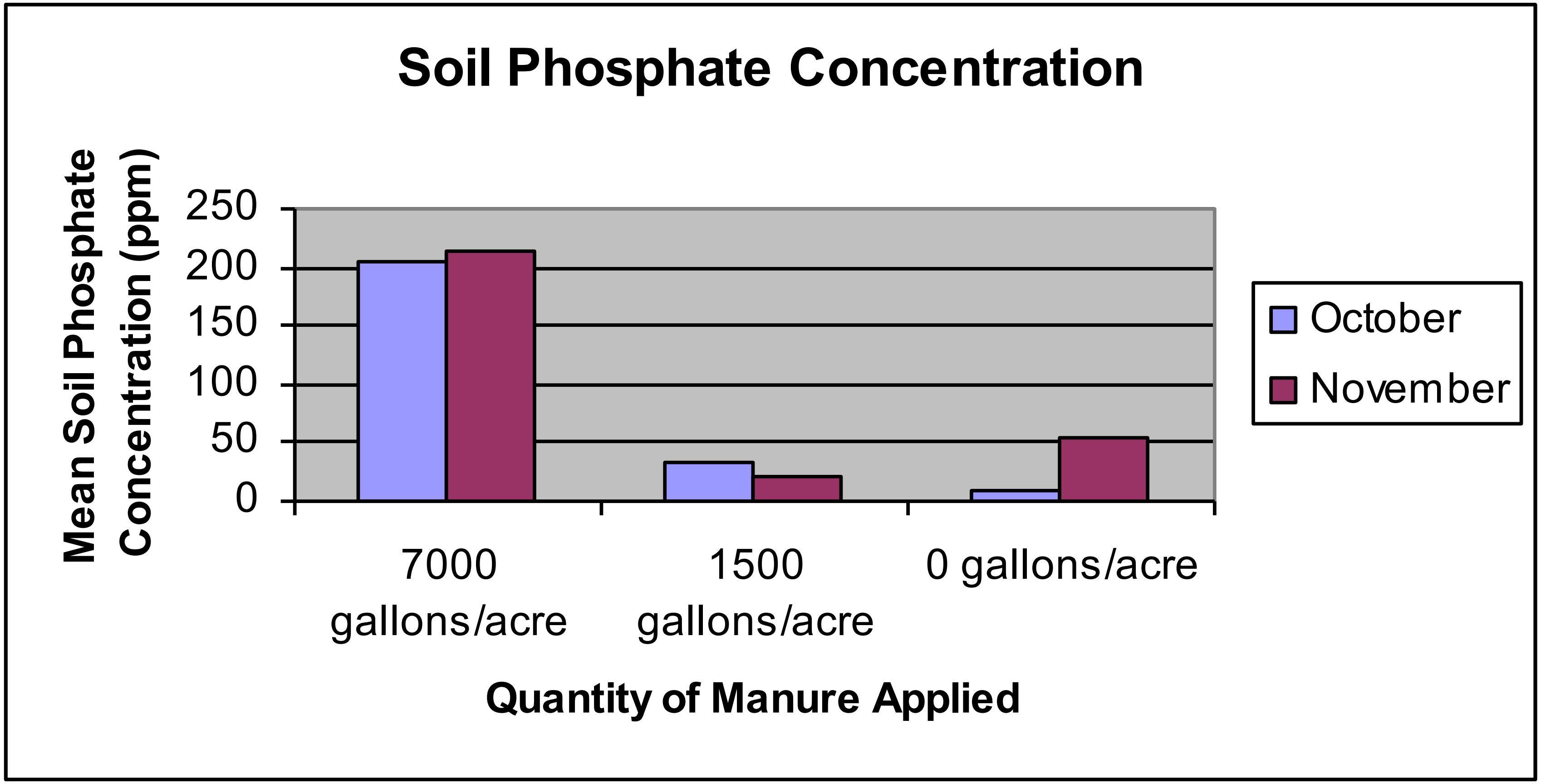
    No manure- 198 bu/a
  - Return above manure costs

    7,000 gal/acre = $418.61

    1,500 gal/acre = $630.94



Soil Nitrate Concentration
Mean Soil Nitrate Concentration (ppm)
7
6
5
4
3
2
1
0
7000 gallons/acre
1500 gallons/acre
0 gallons/acre
Volume of Hog Manure Applied
October
November


Soil Phosphate Concentration
Mean Soil Phosphate Concentration (ppm)
250
200
150
100
50
0
October
November
7000 gallons/acre
1500 gallons/acre
0 gallons/acre
Quantity of Manure Applied

Optimizing nitrogen fertilizer use in no-till cornfields considering environmental impacts and economic returns

Good Land. Good Farming. Better Waters.

Rachel Wieme
St. Olaf College

Objectives

- Evaluate effects of varying levels of Nitrogen fertilizer in no-till corn field
  - Environmental (soil properties, surface run-off) and economic (yield & financial returns)

- Establish exchange of data from St. Olaf scientific community to farmers of St. Olaf land
  - "Locally-grown" research
  - Personalized, detailed performance data

St. Olaf Nitrogen Rate Trials 2011

Ryan Lemickson
And
Rachel Weime ’12 St. Olaf College

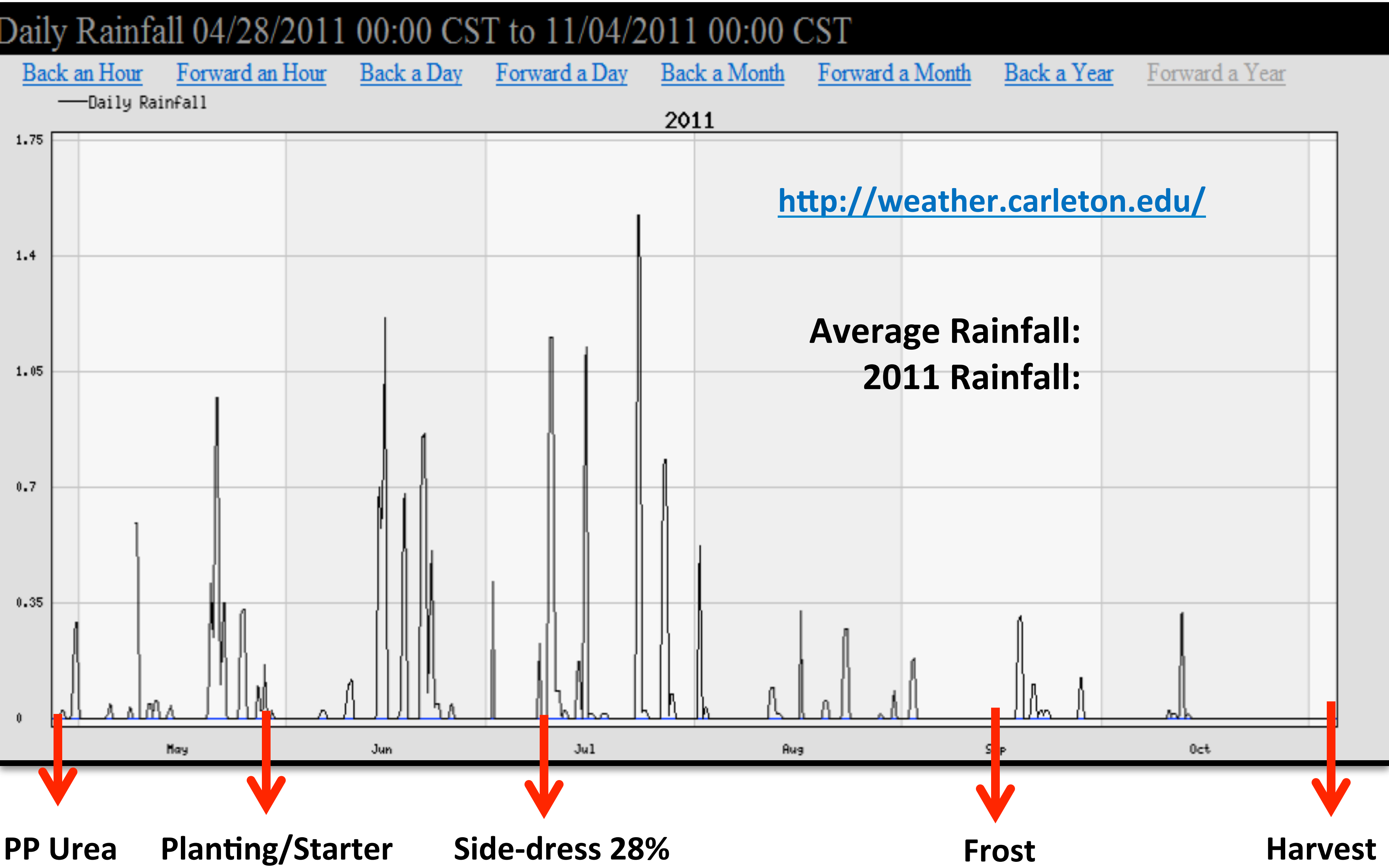
MINNESOTA DEPARTMENT OF AGRICULTURE

Premilinary

Surface Water Run-off

2011 Weather

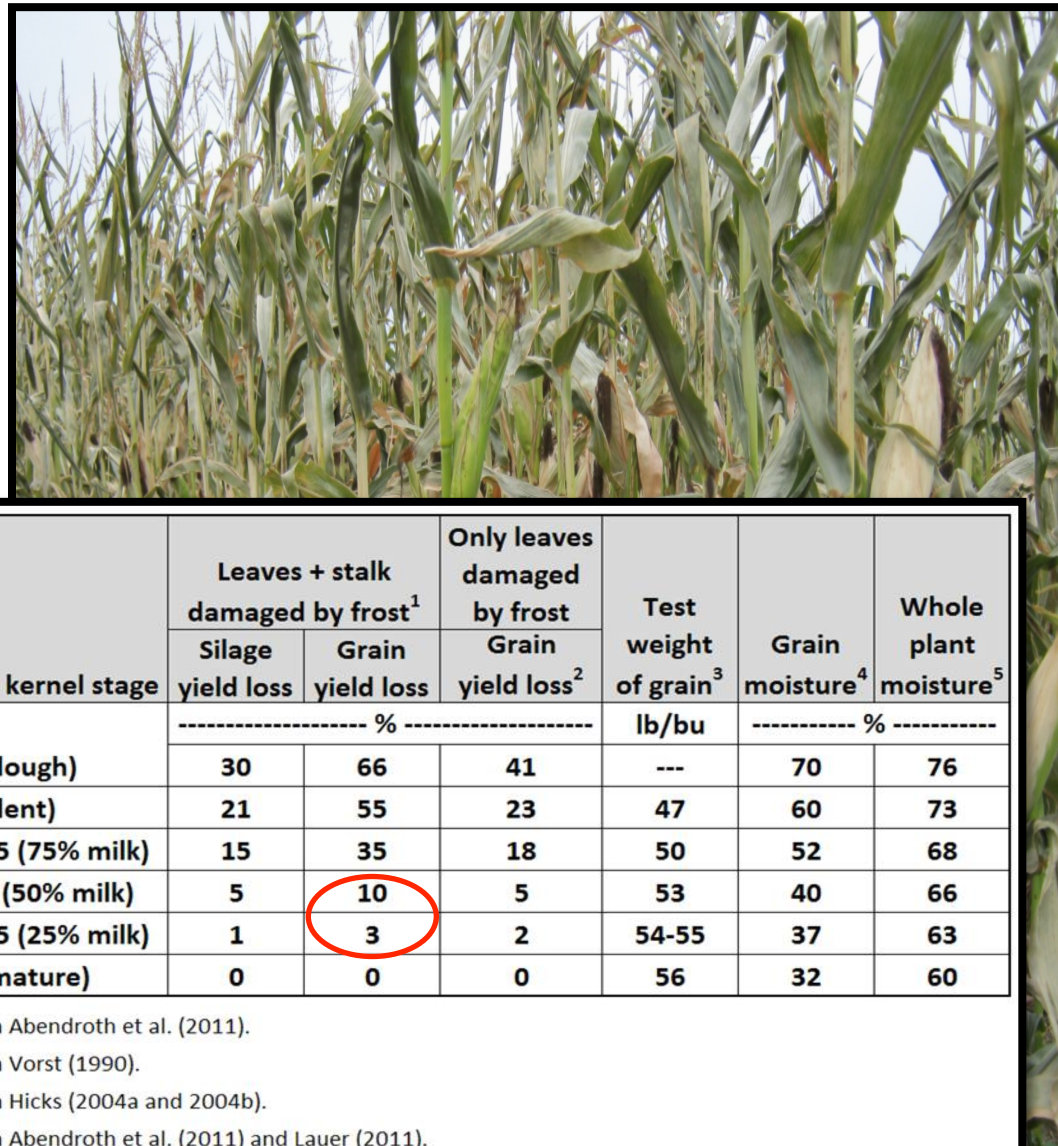
Rainfall & Timeline

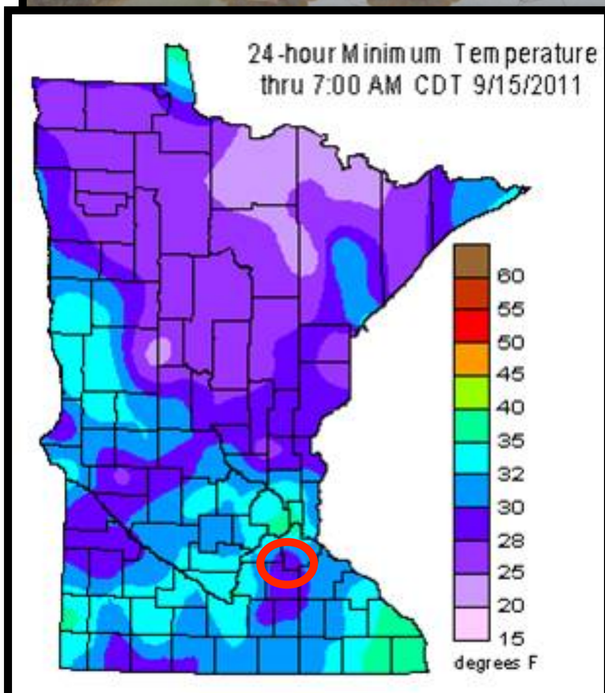


2011 Weather

September 15 Frost

- Prior to plant maturity (black layer)





Corn kernel stage	Leaves + stalk damaged by frost[1] Silage yield loss	Leaves + stalk damaged by frost[1] Grain yield loss	Only leaves damaged by frost Grain yield loss[2]	Test weight of grain[3]	Grain moisture[4]	Whole plant moisture[5]
	%	%	%	lb/bu	%	%
R4 (dough)	30	66	41	---	70	76
R5 (dent)	21	55	23	47	60	73
R5.25 (75% milk)	15	35	18	50	52	68
R5.5 (50% milk)	5	10	5	53	40	66
R5.75 (25% milk)	1	3	2	54-55	37	63
R6 (mature)	0	0	0	56	32	60

[1] From Abendroth et al. (2011).

[2] From Vorst (1990).

[3] From Hicks (2004a and 2004b).

[4] From Abendroth et al. (2011) and Lauer (2011).

[5] From Lauer (1996 and 2011).

Map and Table from U of M Extension: http://blog.lib.umn.edu/efans/cropnews/2011/09/yield-and-harvest-consideratio.html

Corn/Corn Site

Corn Price: $6.01/bushel   N Price (UAN): $448/ton *($0.80/lb)*

(.13 ratio)

Iowa N Rate Calculator MRTN: **145 lbs N** (137 – 151 lbs N/acre)

Corn Nitrogen Rate Calculator

Finding the Maximum Return To N and Most Profitable N Rate

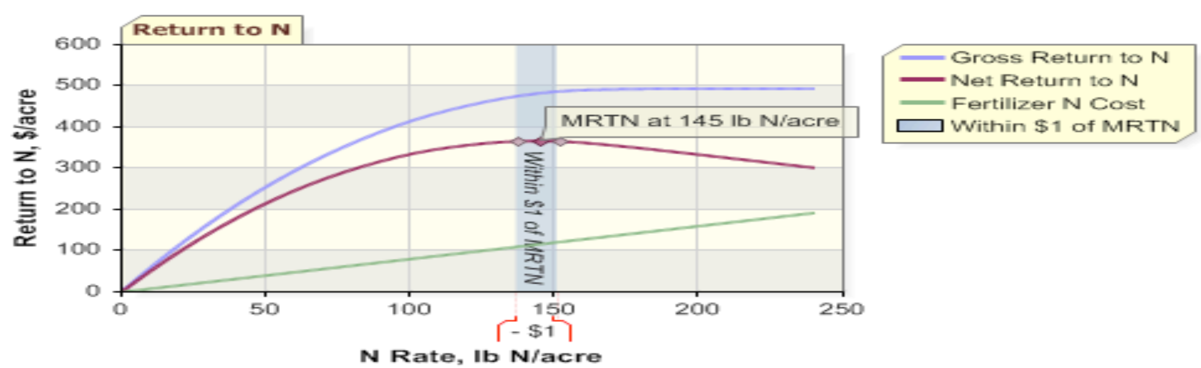
A Regional (Corn Belt) Approach to Nitrogen Rate Guidelines

State: Minnesota
Number of sites: 47
Rotation: Corn Following Corn
Non-Responsive Sites Not Included

Nitrogen Price ($/lb): 0.80
Corn Price ($/bu): 6.01
Price Ratio: 0.13

MRTN Rate (lb N/acre):	**145**
Profitable N Rate Range (lb N/acre):	137 - 151
Net Return to N at MRTN Rate ($/acre):	$366.76
Percent of Maximum Yield at MRTN Rate:	99%
UAN (28% N) at MRTN Rate (lb product/acre):	518
UAN (28% N) Cost at MRTN Rate ($/acre):	$116.00

Most profitable N rate is at the maximum return to N (MRTN).
Profitable N rate range provides economic return within $1/acre of the MRTN.



http://extension.agron.iastate.edu/soilfertility/

Corn/Corn

Fertilizer Applied

(Variable: 28% UAN Sidedress at V7)

July 5, 2011

Normal Practice:

Preplant Product Mix

(210 lbs)

- *Urea (46-0-0)*
- *MAP (11-52-0)*
- *Potash (0-0-60)*

Starter at Planting

(110 lbs)

- *(9-23-30)*

Sidedress UAN (28%)

- *45 lbs*
- *Injected*

	N	P	K
Preplant	41	31	46
Starter	10	25	33
	51	**56**	**80**

Total: 96 – 56 – 80 ???

**Sulfur: 14 lbs/ac*
Zinc: 7 lbs/ac

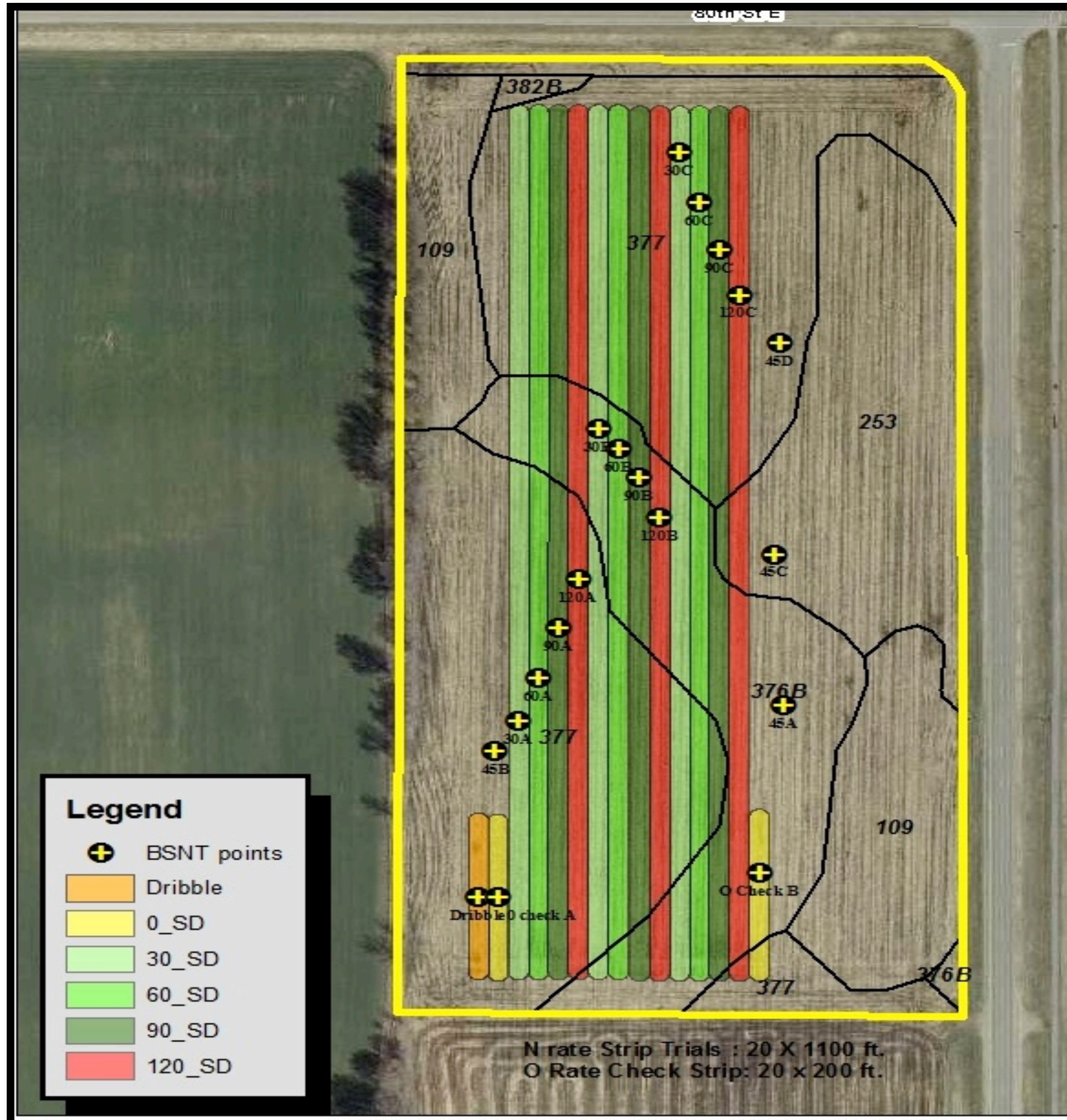
Corn/Corn

N Rate Strip Trials (Sidedressed)

- **4 SD Rates/3 replications**
  - Water issues (east)
    - Wider strips in the future… (40ft)
- **BMP Rates**
  - 90-120 lbs SD (141-171 lbs N Total)
    - 45 lbs SD (96lbs) Rest of field
- **O Rate Check Strips (2)**:
  - 51lbs N
    - *(No sidedress 28%)*

Basal Stalk Nitrate Testing

- **After Black Layer (Maturity)**
- **2 Dominant Soil Types**
  - Merton Silt Loam 377 (1-3 % Slope)
  - Moland Silt Loam 376B (1-4% Slope)
- **Each Individual Strip Sampled**
  - Rest of field sampled



Basal Stalk Nitrate Testing

- **Sample points built in ArcGIS**
  - Trimble GPS Unit to navigate to points in the field

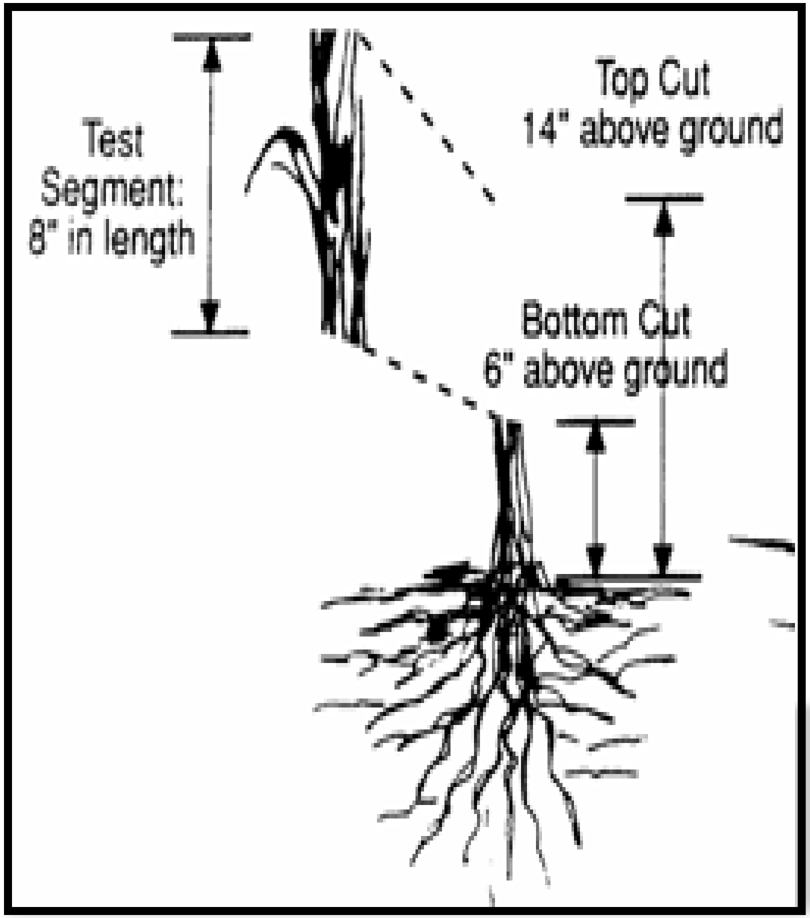
  - **10 Stalks Per Strip = 1 Sample**
  - 8 inch Section
  - 6" off the ground

  - **Ear Samples as Visuals**

Basal Stalk Interpretation

Lab Analysis Results

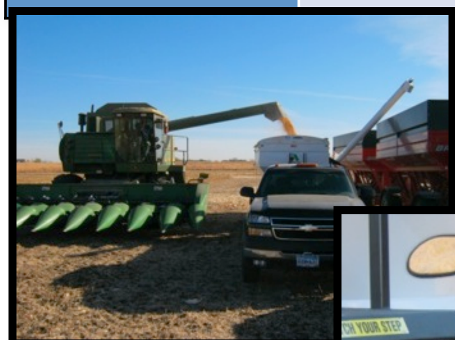
- **< 250 ppm** = Low, N deficient
- **250 -700 ppm** = Marginal, possible N deficiency
- **700-2000 ppm** = Optimum, Yield Not limited by Nitrogen
- **> 2000 ppm** = Excessive Nitrogen or some other factor influenced results
  - Heat Stress, Drought, Frost??
    - Test results are typically higher in dry conditions



Corn/Corn

Results (Averages)

Strip ID (sidedress)	Total N (lbs)	Moisture (%)	Test Weight	Yield (Bu/ac)	BSNT (ppm)
0	51	14.2	51.8	112	56
30	81	13.8	53.6	138	65
60	111	14.3	54.1	142	412
90	141	14.2	53.7	156	3451
120	171	14.1	54.2	159	3733



Harvest Weigh Wagon

Rest of Field

BSNT: 462 ppm

Yield: ??

Mike Ludwig - Monsanto
Rachel Wieme - St. Olaf

Corn/Corn

Results

Total N (lbs)	Sidedress Rate (lbs) *(From 51 lbs)*	Yield Increases (bushels)	Yield Benefit	N cost	Return to N *(Yield Increase * Corn $) - (SD Rate* N cost/ lbs)*
81	30	26	$156	$24	$132
111	60	30	$180	$48	$132
141 (BMP Rate)	**90**	**44**	**$264**	**$72**	**$192**
171	120	47	$282	$96	$186

Based on difference from Check Strips -(No sidedressed N)

Corn/Soybean Site

Corn Price: $6.01/bushel **N Price (UAN): $448/ton *($0.80/lb)***

(.13 ratio)

Iowa N Rate Calculator MRTN: **103 lbs N** (96 – 110 lbs N/acre)

Corn Nitrogen Rate Calculator

Finding the Maximum Return To N and Most Profitable N Rate

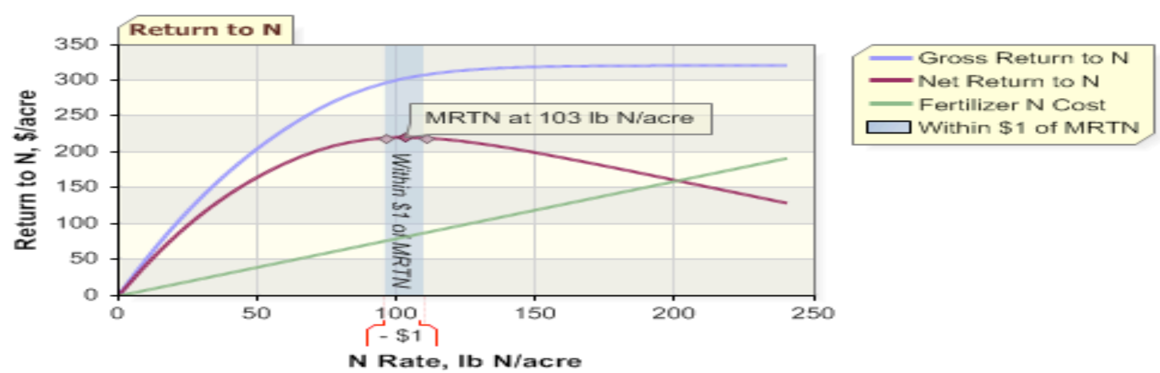
A Regional (Corn Belt) Approach to Nitrogen Rate Guidelines

State: Minnesota
Number of sites: 60
Rotation: Corn Following Soybean
Non-Responsive Sites Not Included

Nitrogen Price ($/lb): 0.80
Corn Price ($/bu): 6.01
Price Ratio: 0.13

MRTN Rate (lb N/acre):	**103**
Profitable N Rate Range (lb N/acre):	96 - 110
Net Return to N at MRTN Rate ($/acre):	$221.51
Percent of Maximum Yield at MRTN Rate:	98%
UAN (28% N) at MRTN Rate (lb product/acre):	368
UAN (28% N) Cost at MRTN Rate ($/acre):	$82.40

Most profitable N rate is at the maximum return to N (MRTN).
Profitable N rate range provides economic return within $1/acre of the MRTN.



http://extension.agron.iastate.edu/soilfertility/nrate.aspx

Fertilizer Applied

(Variable: 28% UAN Sidedress at V7)

June 30, 2011

Normal Practice:

Preplant Product Mix

(180 lbs)

- *Urea (46-0-0)*
- *MAP (11-52-0)*
- *Potash (0-0-60)*

Starter at Planting

(110 lbs)

- *(9-23-30)*

	N	P	K
Preplant	35	26	40
Starter	10	25	33
	45	**51**	**73**

Sidedress UAN (28%)

- *45 lbs*
- *Injected*

→ **Total: 90 – 51 -- 73**

**Sulfur: 14 lbs/ac*
Zinc: 7 lbs/ac

Corn/Soybean

Results (Averages)

Strip ID (sidedress)	Total N (lbs)	Moisture (%)	Test Weight	Yield (Bu/ac)	BSNT (ppm)
30	75	14.2	57.0	159	79
60	105	14.3	57.1	175	167
90	135	14.3	57.1	179	900
120	165	14.2	57.3	185	404

Rest of Field

BSNT: 97 ppm

Yield: ??

Results

Corn/Soybean

7.5 bushel Yield increase needed between the 30 lbs rates to be significant

•Significant responses to additional Nitrogen up to 105 lbs

•105 vs 135: No difference

•135 vs 165: No difference

Total N (lbs)	Sidedress (lbs) *(Increase from 75 lbs)*	Strip Yield (Avg)	*Yield Increase (bushels)	Yield Benefit	N cost	Return to N *(Yield Increase x Corn $) - (SD increase x N cost/lbs)*
75	NA	159	NA	NA	NA	NA
105 (BMP Rate)	**30**	**175**	**17**	**$102**	**$24**	**$78**
135	60	179	20	$120	$48	$72
165	90	185	26	$156	$72	$84

Based on difference from 75 lbs Strips (No 0 Checks)

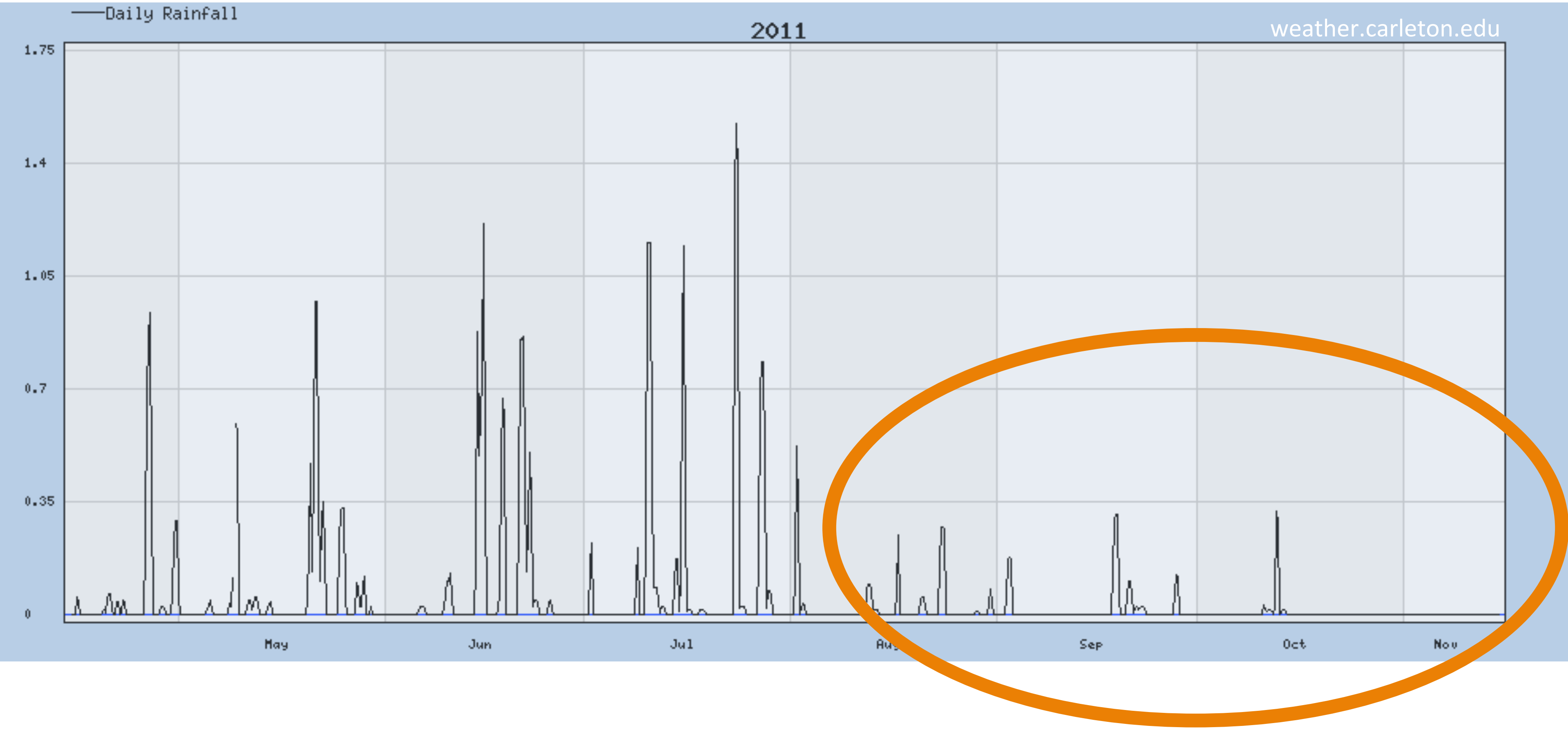
So what are we learning?

- No fall N – decrease losses to air and groundwater
- Target nutrient placement: strip till, planter application, side dress
- Follow N-Calculator recommendations as your starting point
- Gather your own locally-grown data
- Seek EQIP funding for your research

Fertilizer Application

- Treatments: 30, 60, 90, 120 lbs/acre; Apply when 1’ tall
- Side-dress method (injected)

Surface Water Run-off

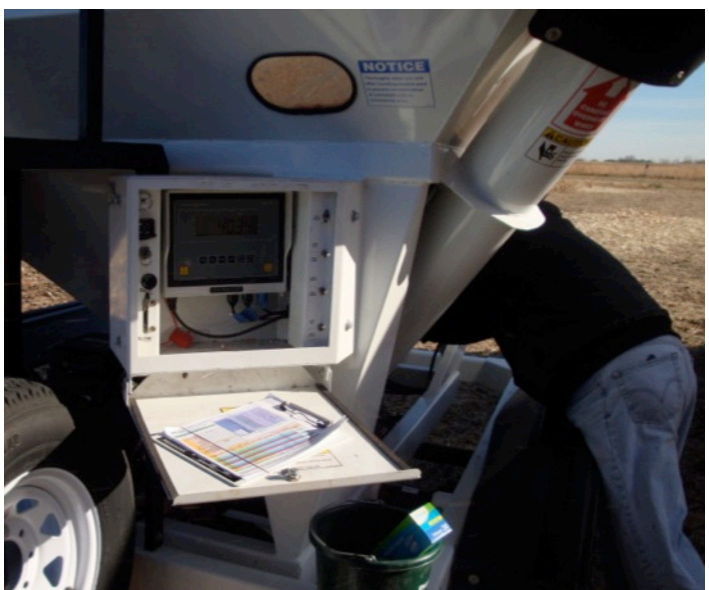


Methods: Sampling

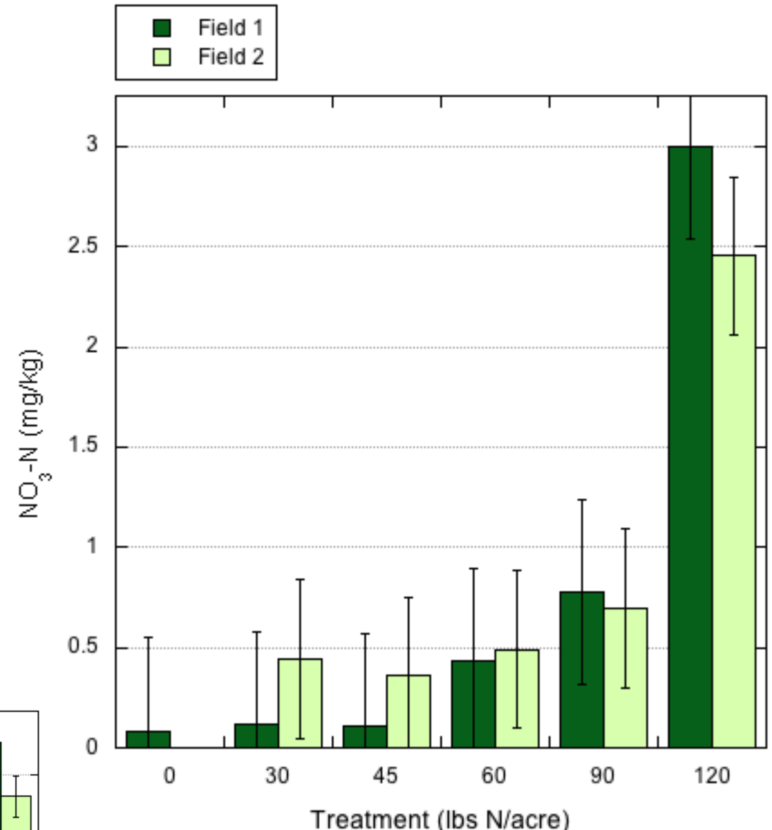
- Soil Samples – 2 samples per replicate
  - Test for % Soil Moisture, SOM, NO_3-N,NH_4, PO_4-P
- Stalk Nitrate
  - Mature Corn -> Black layer
  - 6-14" above ground
- Soil Respiration & Corn Moisture
- C:N and Stable Isotope
- Yield Data

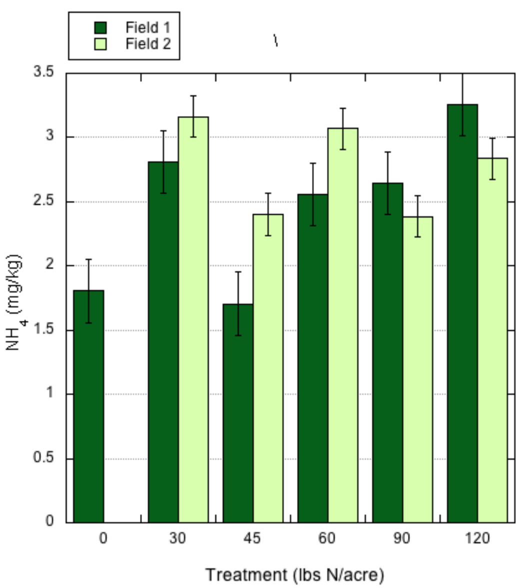
Harvest, Yield Data

* Weigh each replicate, sample from each for test weight

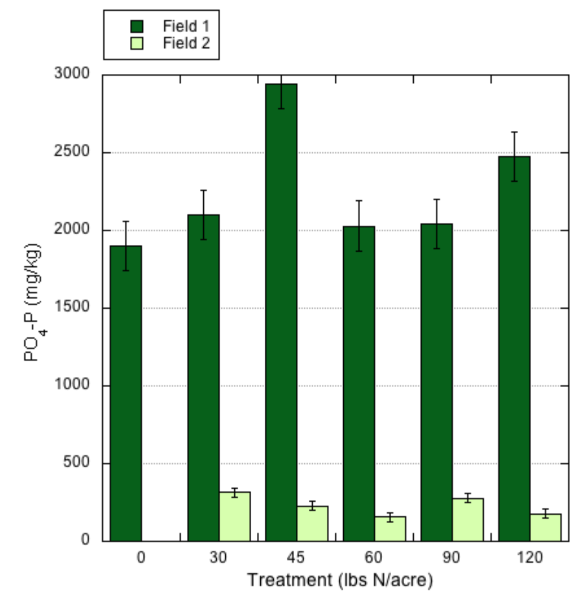


Results: Soil Nutrients





- Nitrates (NO3-N) increased with higher N fertilizer levels.
- No trends with NH4 of PO4 among N treatments



Results: Cornstalk Nitrate

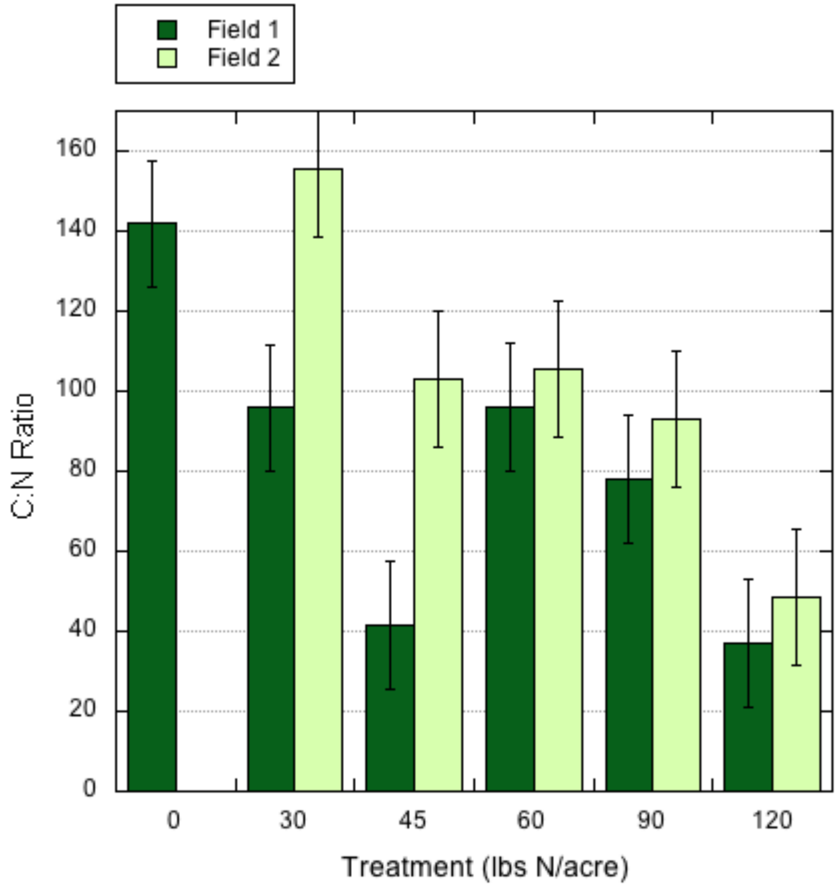
Optimal Range = 700-2000ppm

Treatment lbs N/acre	Field 1		Field 2	
	Stalk Nitrate (ppm)	Interpretation	Stalk Nitrate (ppm)	Interpretation
0	<50	Low	--	--
30	<50	Low	<50	Low
45	1995	Optimum	860	Optimum
60	53	Low	83	Low
90	1093	Optimum	142	Low
120	4891	Excessive	2300	Excessive

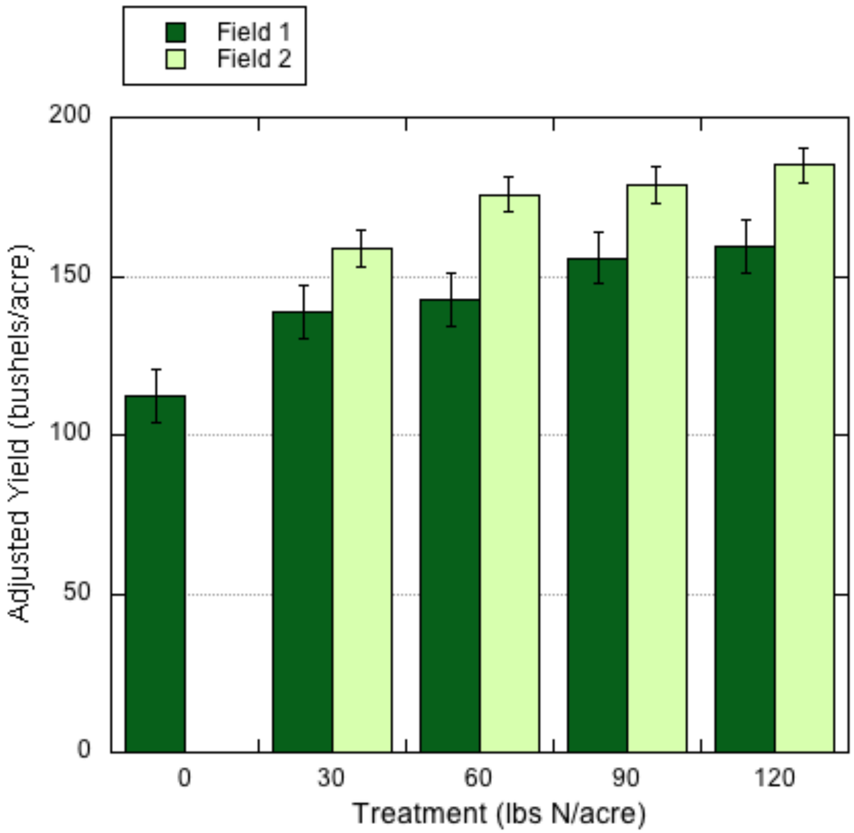
2010 Results

N Fertilizer (lbs/acre)	Application Method	Cornstalk Nitrate (ppm)	Interpretation
0	Side-dressed	107	Deficient
30	Side-dressed	715	Optimum
54	Side-dressed	1800	Optimum
54	Dribbled	242	Deficient
79.8	Side-dressed	2600	Excessive

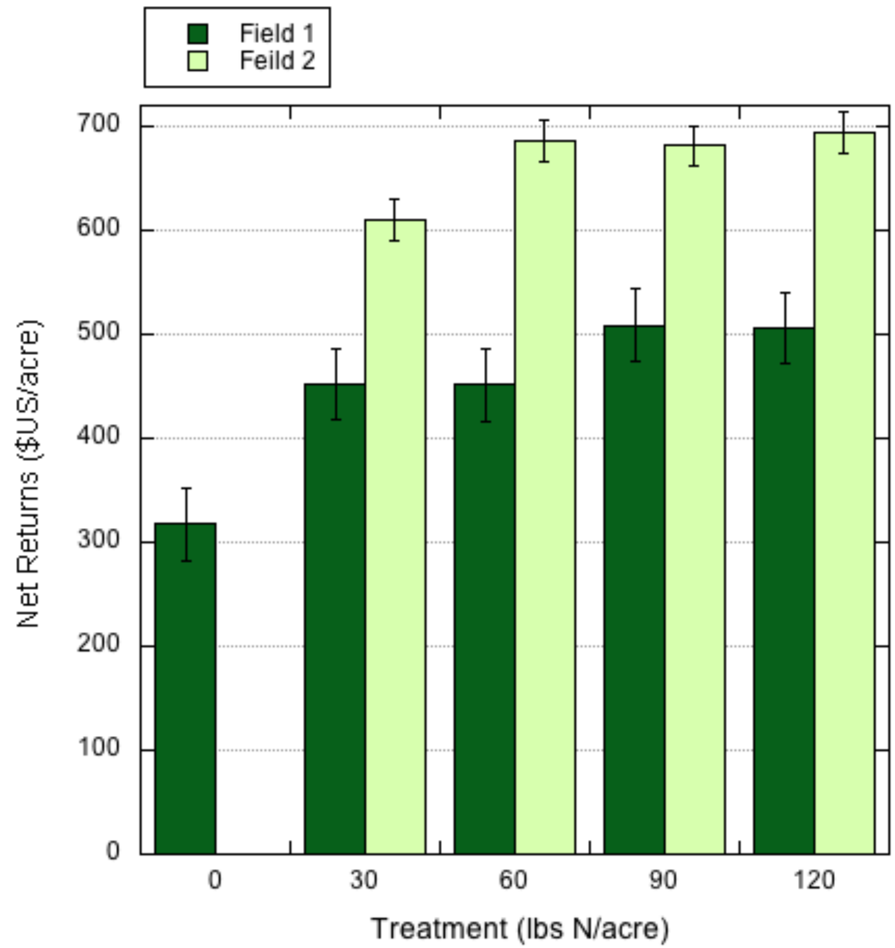
Results: C:N Ratio



Results: Yield & Returns



- Yield increases with increased levels of N fertilizer. However…



* ….Net Returns do not increase after a certain point

Conclusions

- Excessive levels of N fertilizer applied in the summer resulted in high levels of residual soil NO_3^--N that are susceptible to leaching and contaminate waterways; high amounts of N fertilizer also lead to higher levels of N in plant tissue.
- There was no significant difference in yield or net financial returns within each field between 60, 90 and 120 lbs N/acre fertilizer treatments, meaning farmers could reduce N pollution while achieving the same economic gains.

* Demonstrate that farmers can make environmentally beneficial decisions and profits simultaneously: efficiency
* Confirm the benefits of on-farm, "locally grown" research, specific to each grower' s operation.

QUESTIONS?

Carbon and other gasses.

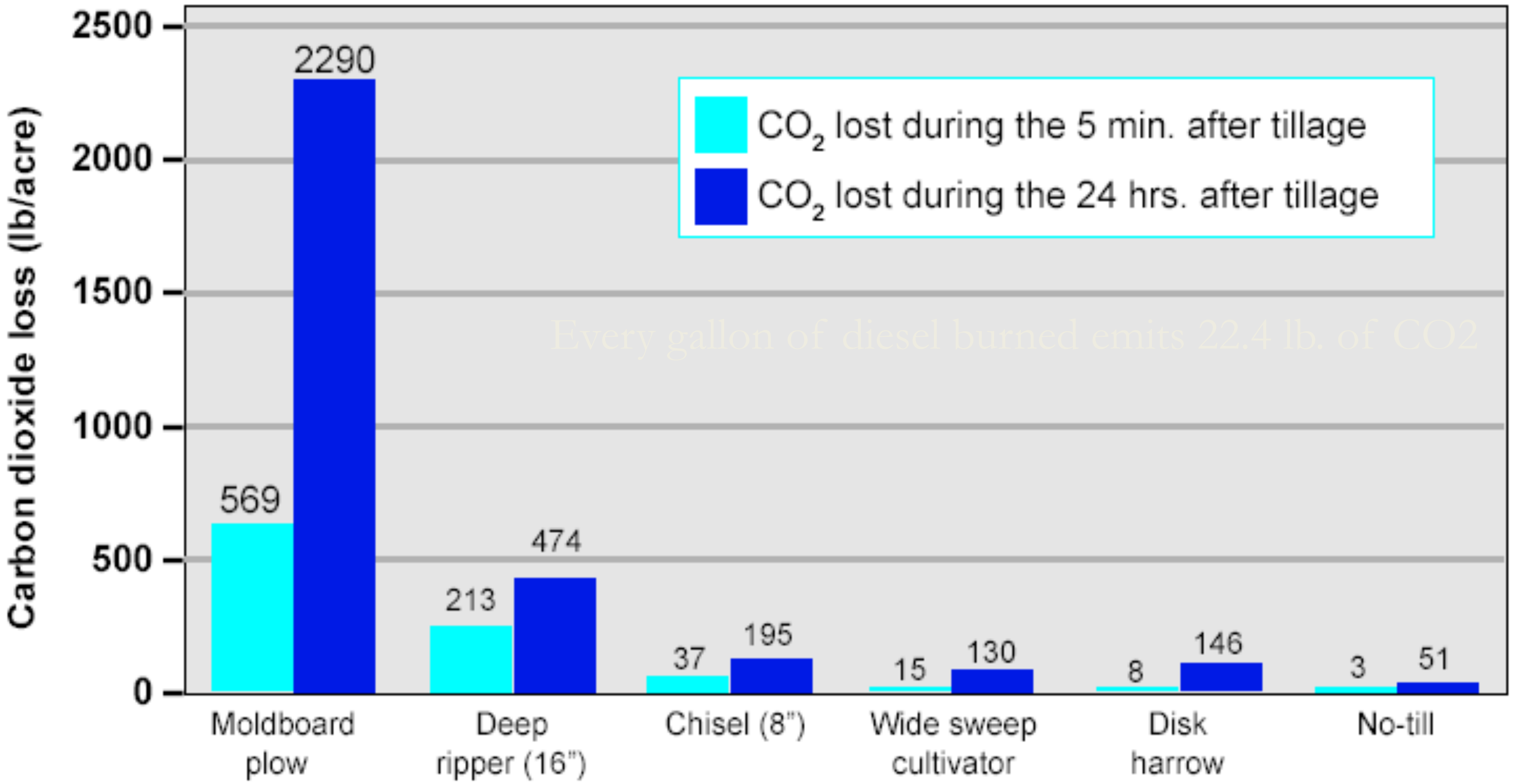
- US agriculture emits about 1% of CO_2
- Burning one gallon of diesel = 22.38 lb of CO_2
- 33% of all methane emissions
- 70% of all nitrous oxide emissions
- One unit of NOX is equivalent to 296 units of CO_2
- Agricultural soils have potential to sequester 10to15% of US greenhouse gas emissions.

"…you can' t put your head in the sand and hope the problem will go away, farmers must act and take a leading role."
Tom Vilsak, USDA Secretary

US EPA /Progressive Farmer, June 2009

Tillage Alternatives Demonstration – Carbon Dioxide Loss After Tillage

Bill Eno farm, Clayton Co., Ia., October 21-22, 1997, Fayette silt loam



USDA – Agricultural Research Service (ARS) and ISUE – USDA NE IA Demonstration Project

STOCARB

Seeking forgiveness for our Carbon sins

A St. Olaf student-led initiative for local agricultural carbon offsets

Making Music… and a footprint

St. Olaf Band – California Tour January ’09

- 100 members
- 9 days on the road
- Trucking entire set-up

No cost to students, but what cost to the environment?

Carbon Emissions for California Tour 2009

Truck:

- 8 mpg • 5,179 total miles

Bus:

- 6.5 mpg • 2,280 total miles (for 2 coach buses)

Diesel Fuel[a]:

- 22.38 lbs CO_2 / gallon
- CO_2 lbs to MT = 1 lb X 4.5359 x 10-4

Truck emissions

$$5179 \text{ mi} \times \frac{\text{gallons}}{8 \text{ mi}} = 647.375 \text{ gallons} \times \frac{22.38 \text{ lbs}}{\text{gallon}} \times 4.5359 \times 10\text{-}4 = \mathbf{6.57\ MT\ CO_2}$$

Bus emissions

$$2280 \text{ mi} \times \frac{\text{gallons}}{6.5 \text{ mi}} = 350.769 \text{ gallons} \times \frac{22.38 \text{ lbs}}{\text{gallon}} \times 4.5359 \times 10\text{-}4 = \mathbf{3.56\ MT\ CO_2}$$

Flight emissions[b] (for 100 passengers)

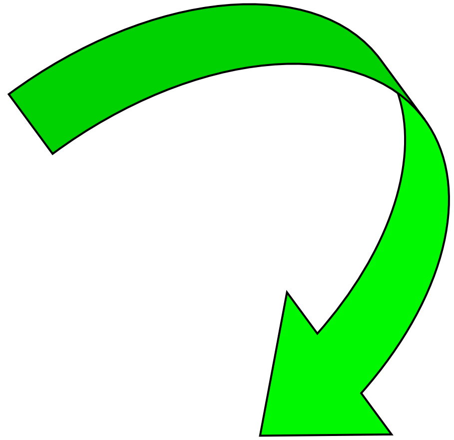
MSP -> SFO = 1,595 miles 28.5 tons

LAX -> MSP = 1,542 miles 28 tons → Totals: 3,137 miles **56.5 tons**

***Grand Total Emissions* = 66.6 tons CO_2**

[a] figures for diesel fuel and conversion factors from *Redefining Process* webpage at <http://www.rprogress.org/energyfootprint/energy_footprint/?id=1b> and the U.S. EPA webpage at <http://www.epa.gov/appdstar/pdf/brochure.pdf>

[b] calculations for air travel carbon emissions from www.carbonfund.org Carbon Calculator



Carbon dioxide emitted by the Band on tour is sequestered through no-till farming practices

- Modeled after Chicago Climate Exchange
- In Northfield: ~ 0.6 MT CO_2/acre per year
- 2:1 offset → 133.2 MT CO_2
- Free will donations by Band members
- $331.50 raised
- 286 acres → 171.6 MT CO_2

The student verification crew.


STOP
DAKOTA
96
COUNTY


The 50 foot standard; county and state.
50 feet: most effective for least space.
And… it is the law.

2008-2010 Shoreland Mapping Project

Project leaders: Whitewater Watershed/Cannon River Watershed Partnership

(Ross Hoffmann,CRWP)

*Ten SE MN counties

*High resolution data files

*Objective: To determine the degree of shoreland compliance in each county. (Are there buffers where there should be?)

Rice and Steele Counties

- Rice: 4415 acres of shoreland(50 ft. on each side of DNR public waterways)

  402 acres of shoreland are in violation of shoreland standard protection rules (cropland9.11%)
- Steele: 1447 acres of shoreland

  44.5 acres in violation (cropland 3.08%)

Who is Responsible?
County Planning and Zoning

Shoreland water filters – an opportunity for cooperation and support.

Information

Education

Collaborate

Technical assistance

Cost share programs

Enforcement

Who is enforcing?

- Dodge County: Sent over 208 letters to landowners indicating they were in violation of MN Shoreland Protection Rules.

  Over 70% immediate response and compliance, no negative eruptions! ($10K cost to county)

- Olmsted County: Sent 485 letters to landowners informing them of shoreland rules.

  Very positive response, 306 working on compliance.

*** A notice of violation eliminates eligibility for government programs***

A Lost Opportunity

U of M, MN Department of Agriculture

- Private Pesticide Applicator Certification
- 50 questions on required information
- Only one question on ***WATER***
  - Number 33. "Protecting groundwater is important because groundwater provides ____% of the drinking water for rural Americans.

Other Critical Issues

Vertical tile inlet setbacks

Setbacks from surface water

What pesticides are restricted near surface waters?

Manure application setbacks

- Commodity organizations that "work for farmers" do good work in varietal research and marketing.

  But…their work to assist Minnesota farmers to move ahead in working on TMDL water quality goals is questionable.

  "Scientific work done to date has been termed as without merit, based on crude models." (MN Soy 2010)

An initiative with Monsanto, The Nature Conservancy, Delta Wildlife, Audubon Society, Iowa Soybean Assn. to reduce nutrient and sediment in the Mississippi was nearly lost when MN Soybean objected , fearing that farmers would be blamed.

<u>Water Quality Issues and Production Agriculture: The Impact of Accepting Blame, (</u> MN Soybean 2009)

Do farmers need protection from blame?

Minnesota agriculture needs proactive programs that work with farmers to reach production and economic goals.

On-farm monitoring, data gathering, economic analysis, and performance assessment are the tools farmers need.

A "wait and see while we argue about the science" attitude does not give farmers real tools to work with.

For most farmers if there is a hint of blame, they will become effective problem solvers.

Take pride in doing things right.

Performance based environmental management incentives.

(Hewett Creek model, Fayette County)

- Phosphorous index: $10/a. if p-loss risk is less than 3
- Soil conditioning index $10/a for each 0.1 above 0
  (conversion to no-till/strip till plus $500 per farm/yr)
- Stalk nitrate testing $400 if stalk N is less than 1700 ppm
- $200 for manure calibration
- $300 for grid sampling
- $500 for septic system upgrade
- $.50 per ft for waterways, grass headlands, buffers

*Managed <u>by</u> farmers <u>for</u> farmers.

Boone River Watershed
2007 Water Monitoring

A serious issue in the Des Moines watershed that is tied to agriculture is NITRATE.

Des Moines city water supply comes from surface water-nitrate must be removed.

Iowa Soybean and Iowa Corn, Nature Conservancy, Mc Knight, Monsanto, Land Stewardship, Ag cooperatives, farmers collaborate.

Large monitoring program.Farmers are receiving proof that their BMPs are working.

The Iowa Soybean Environmental Model

ISA Environmental Program partners with:

- 4000 farmers
- SWCDs and NRCS
- environmental groups
- commodity groups
- Iowa Farm Bureau
- EPA
- Ag cooperatives
- 9 Watershed organizations

ISA On-Farm Network

- Focused on one-on-one work with producers
- Assists farmer with technology, best management practices, and alternative methods.
- Provides individual farm trials as well as gathering state wide data to inform decisions.

Investments in Proactive Programming for Agriculture.

Iowa Soybean Environmental Services (2008)

$946,898

$567,098 checkoff dollars

$379,800 non checkoff dollars

ISA On-Farm Network(2008)

$2,335,505

$924,978 checkoff dollars

$1,310,527 non checkoff dollars

Minnesota Soybean:

$871,280 for Research, varietal-marketing

"We didn't wait to start reducing erosion and improve our management practices. It takes time for policies and better farming to take effect but the improved profitability is noticed almost right away. Better soils, better water and high production all go together to preserve our way of life."

"We work with farmers to improve their bottom line. But most importantly, we want to help farmers through education and adaptation to make positive environmental choices so they retain their right to make their own decisions. The way we farm is changing and we must work with the changes."

NO-TILL FARMER