BEST PRACTICES FOR MANAGING NITROGEN IN NO-TILL

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ABSOLUTELY BEST PRACTICE FOR MOST CROPS AND PLACES

1. Split N with a portion early in life cycle and the remainder close to rapid N uptake

2. Inject the N below the residue layer





N Losses in High Residue

1. Immobilization
   into organic matter
   surface applied N

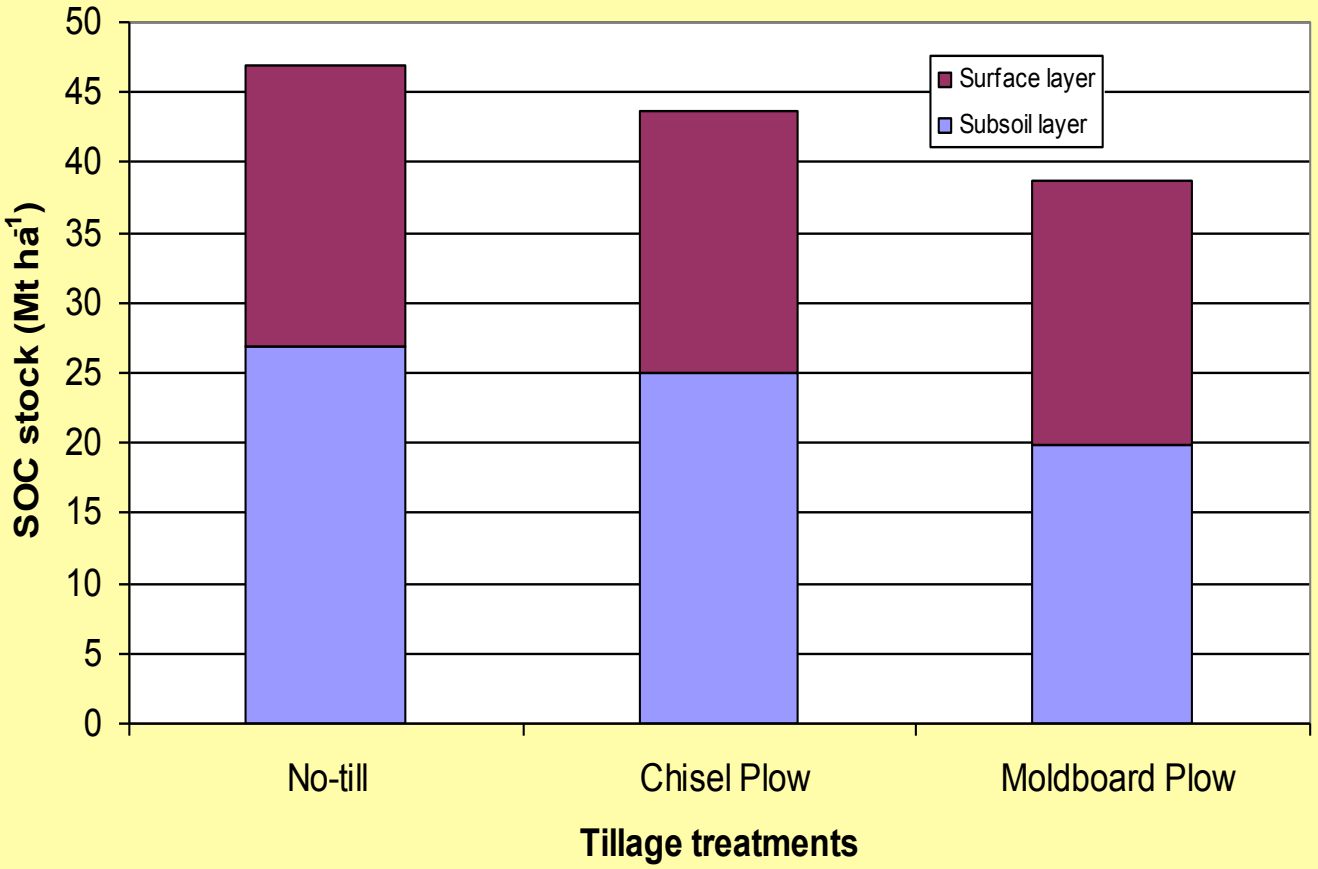
2. Volatilization
   urea into air
   surface applied Urea

3. Denitrification and Leaching
   into air or into ground water
   excessive wetness
   all situations





20% less SOC after 12 years with MP



K. R. Olson, UI





35 Years Of Continuous NT

Depth	NT 35 Yr	CT 25 yr fb NT 10 yr
0-1”	3.1	2.4
1-2”	3.1	2.4
2-3”	3.1	2.4
3-4”	3.1	2.4
4-5”	3.1	2.4
5-6”	3.2	2.5
6-7”	3.2	2.4
7-8”	2.9	2.0
8-10”	2.9	2.0
10-12”	2.4	1.8
12-14”	1.7	1.8

M. Plumer, U of I

Ebelhar, 2007





Nitrogen in Organic Matter

1. C:N ratio in soil OM = 20:1
2. 1% OM X 2 million lbs = 20,000 lbs/ac
3. 20,000 X 5% N = 1,000 lb N/ac
4. Increase OM 0.5% = 500 lb N/ac
5. Yearly differences vary with crop
6. N demand changes over time





Fate Of Fertilizer N In No-Tilled And Conventional Tilled Maury Soil

			Fertilizer N	
N Rate (lb/acre)	Tillage	In Grain (%)	Immobilized	Lost (%)
75	No-Till	23	42	29
75	Conventional	40	27	26
150	No-Till	29	39	25
150	Conventional	28	37	27





Effect Of Nitrogen Source And Placement On No-Till Corn Yield

	AGRY	SEPAC	AGRY	SEPAC	SWPAC
	1979		1980		
150 Lbs N	---------- Bu/Acre ----------				
28% Inj.	165	135	137	152	168
28% Surf.	156	124	121	134	138





IMMOBILIZATION SOLUTIONS

1. Inject

2. Add More N ~ 15-30 lbs/ac





Average Percent Loss of N by Volatilization		
	Urea Incorporated into Soil	Ammonium Nitrate
	0	0
	Surface Applied	
¼" Rain within 3 Days	0	0
Bare Ground	0-10	0
No-Till	0-50	0
Pasture	0-50	0

a. Early application reduces losses
b. Band nitrogen reduces losses





VOLATILIZATION

1. Urea is Fertilizer of Choice
2. Urea is Soluble
3. It must Hydrolyze (break down) to get NH_4+
4. Intermediate Compounds are Unstable
   (Ammonium Carbonate)
5. Complete Reaction in 4 to 7 days
6. Reaction Can Be Delayed by Urease Inhibitor





Ammonia Volatilization is Controlled By:

Temperature

- Cool Temperatures Reduce Reaction Rate and Losses (60°at 4”)

Moisture

- Warm Moist Soil, with Residue Increase Loss
- Rain or Irrigation within 2 das Greatly Reduces Loss
- Extremely Dry Conditions Greatly Reduces Loss

Contact with Soil

- Ammonium held by Soil
- Surface, and Below Surface
- Risk is Small on Bare Soil with pH < 6.5





Ammonia Volatilization is Controlled By:

Soil pH

- Loss Increases Greatly Above 6.5 pH

Summary

- Loss is Greatest in MidSouth

  Sods After May 1 (Average)

  No-Till Residue After May 1 (Average)





Relative Differences in No-Till Corn Production by N Sources and An Inhibitor (4 Years)

	Yield Increases for Added N
N Treatments	%
None	0
Ammonium Nitrate	100
Urea	80
Urea + NBPT	97
UAN	83
UAN + NBPT	100





Yield of Corn Treated with Different Soil Nitrogen Fertilizers and Additives

	Treatment		Yield (bu/ ac)
Source	Rate	Additive	Avg.
-	0	-	104 C
ESN	75	Polymer	174 A
Am. Nitrate	75	-	172 A
Urea	75	-	152 B
Urea	75	Agrotain	169 A
Urea	75	NSN	155 B
0.1 level of significance 0.2 CV = 5.7			





New Tool : Polymer Coated Urea





Slow Release Fertilizer

Hydration

Plastic Polymer

UREA

Water diffusion

Release

Plastic Polymer

Liquid Urea

diffusion





Solutions to Volatilization Loss:

Put Urea into Soil

- Rain, Irrigation, Tillage, Injection

Apply More Nitrogen

- Can Not Afford This Any More

Use a Urea Inhibitor or Polymer





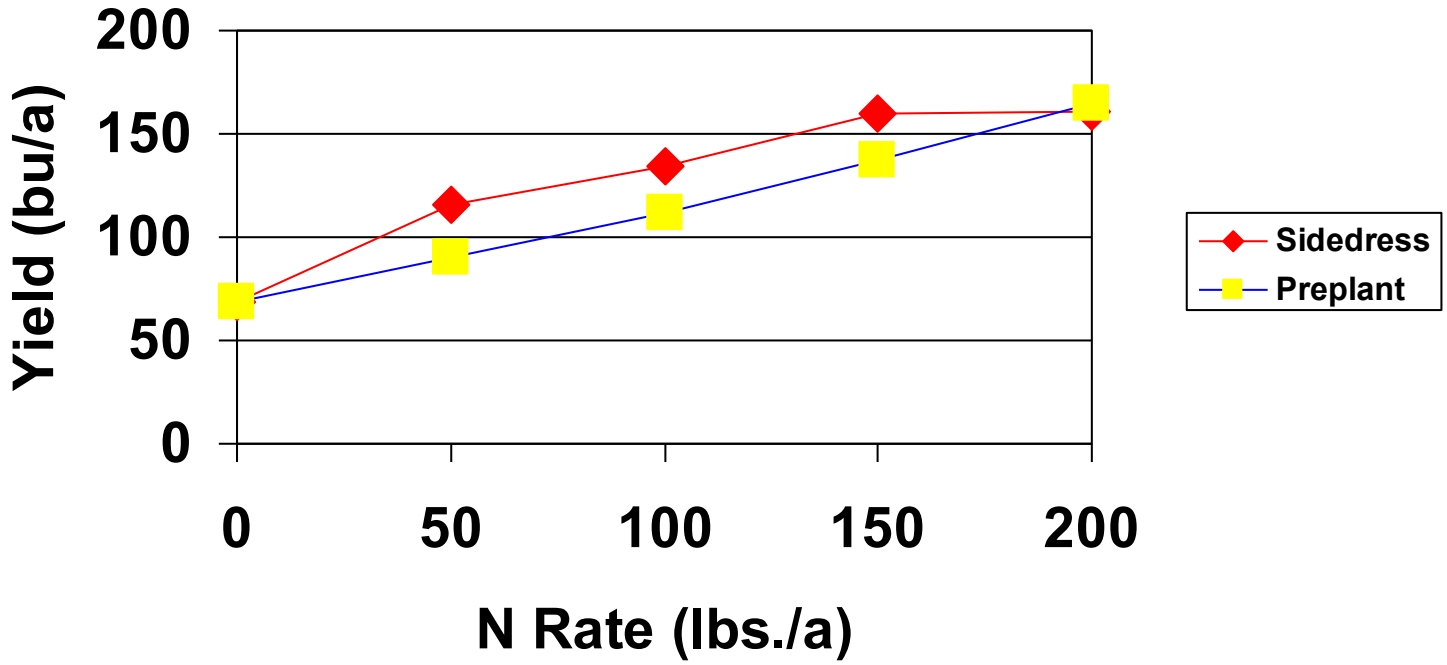
DENITRIFICATION - LEACHING

1. Excessive Wetness
2. Sandy Soils – Leaching
3. Poorly Drained Soils – Denitrification
4. Early in Season
5. After N Applied
6. No-Till Adds to Loss





Effect of Nitrogen Rates on NoTill Corn Yield on Somewhat Poorly Drained Soils



Benefits of Sidedressing:

1. 25% N Loss During Wet Springs
2. 200 lb/ac X 0.25 = 50 lb Loss
3. 50 lb/ac X 0.25 = 12.5 lb Loss





Effect of Tillage, Row Fertilizer and Row Cleaning of Residue on Corn Yield

	Treatment		
Tillage	Row Fertilizer	Row Cleaner	Yield (bu/ac)
Chisel + Disc	No	No	132.1 A
No-Till	No	No	114.0 B
No-Till	Yes	No	123.0 AB
No-Till	No	Yes	131.2 A
No-Till	Yes	Yes	136.9 A
Chisel Only	No	Yes	128.1 AB

Row Fertilizer: 10 gal/ac of 12-36-0 Planting Date: 4-25-89
Tilsit silt loam (moderately well-drained)
Row cleaner removed 90% of residue over the row (10% band)





DENITRIFICATION – LEACHING SOLUTIONS

1. Sidedress Half or More of the N
2. Add a Nitrification Inhibitor When Large Amounts of N are Applied Early
3. Anhydrous Ammonia is Very Good in this Situation
4. Use a Polymer Coated Product





SUMMARY

1. Injecting and Split N Applications Protect You Against Everything

2. Two Biggest Problems – Volatilization and Denitrification
   Leaching

3. Volatilization
   - non urea sources
   - injection
   - proven urease inhibitors
   - polymer coated urea

4. Denitrification – Leaching
   - split application
   - anhydrous Ammonia and/or Nitrification Inhibitor
   - polymer coated urea





GREENSEEKER WHEAT UPDATE 2011

Lloyd Murdock
Dottie Call
John James





20th Annual National No-Tillage Conference

St. Louis, Missouri * Jan. 11-14, 2012

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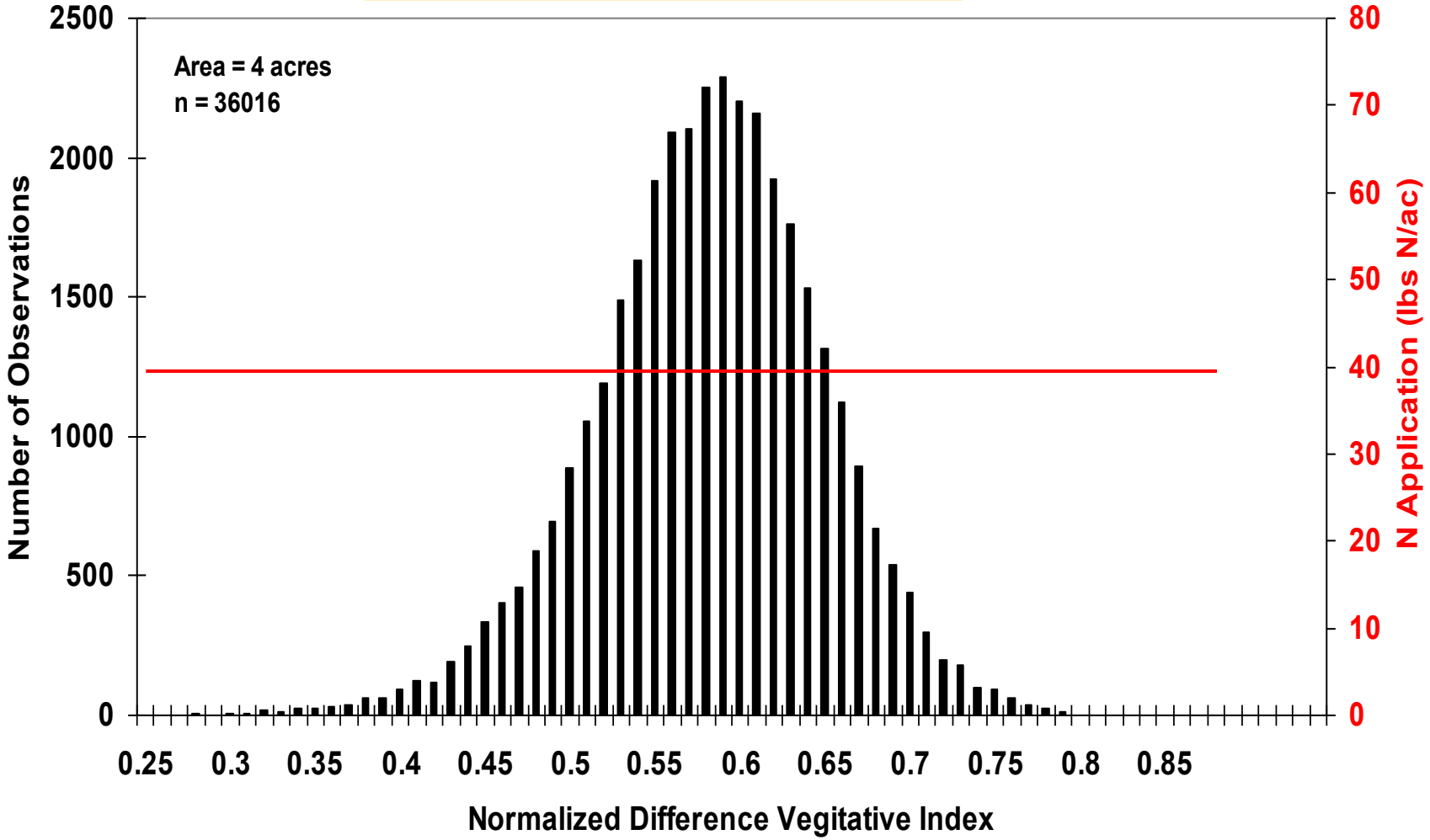
Farmer Practice (F6)



Algorithm Used for Field Trials in 2010 and 2011 on a Moderate to Well Drained Soil (Pembroke)

N Needed at Feekes 6	Differential NDVI Algorithm
140	>0.24
110	0.11 – 0.24
85	0.04 – 0.11
55	0.02 – 0.04
25	0.01 – 0.02
0	<0.01





Effect of Greenseeker (VRN) On Wheat

1. Three Replicated Field Studies All with Significant Responses Average Response

   Yield = 4 bu/ac Increase
   N = 7 lb/ac Increase
   Returns = $20/ac Increase





Algorithm for Moderately to Well Drained Soil (Pembroke) Feeks 6