



Wheat N Topdress Fertilizer Study

January 25, 2007

Kansas Agricultural Research Association

2007 Precision Ag Conference

Salina, Kansas



Wheat N Topdress Fertilizer Study

Lee A. Scheufler

Scheufler Farms, Inc.

1810 22nd Road

Sterling, KS 67579

620-257-2508



Lee@ScheuflerFarms.com

Wheat N Topdress Fertilizer Study



Background:

Are we using the correct amount of Nitrogen when topdressing our dryland wheat?

We have been using a simple equation to determine the amount to apply based on yield goal, previous crop, carry-over nitrogen, starter fertilizer, and other topdress applications.



Wheat N Topdress Fertilizer Study



Background:

This is a continuation of a study from 2004 and 2005.



Wheat N Topdress Fertilizer Study



Background:

$$\begin{array}{rcl} \text{Yield} & & \text{(credit for soybeans)} \\ \text{goal} * & \text{minus} & \text{(carryover)} \\ 1.8 & & \text{(starter fertilizer)} \\ & & \text{(other applications)} \\ & = & \text{Topdress amount} \end{array}$$

Wheat N Topdress Fertilizer Study



Methodology

At topdress time (early spring '04 & '05) we applied an additional 20 units of nitrogen to one pass of the fertilizer sprayer (90 feet) on several fields. The location of these were recorded in JD Office using the Field Doc program in a JD4710 sprayer.

Wheat N Topdress Fertilizer Study

Methodology

Results from that study led us to believe that we may have been applying too much N.

Wheat N Topdress Fertilizer Study

Methodology

So, at topdress time (early spring '06) we reduced the nitrogen by 20 units on one pass of the fertilizer sprayer (90 feet) on several fields. The location of these were recorded in JD Office using the Field Doc program in a JD4710 sprayer.

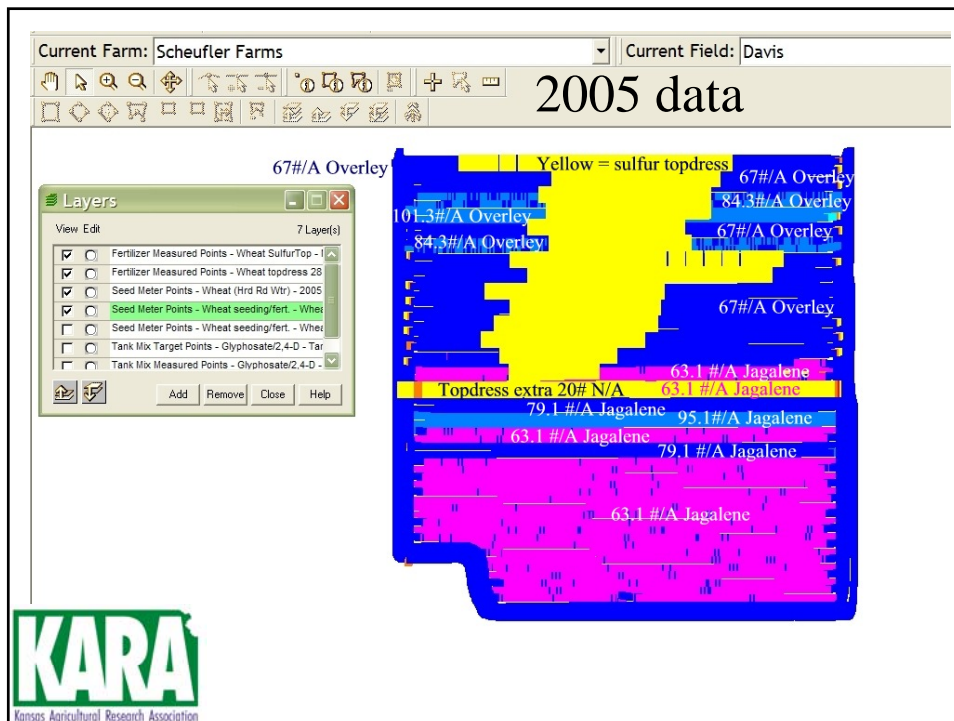
Wheat N Topdress Fertilizer Study



Methodology

All operations were performed with guidance by JD AutoTrac with RTK differential signal with the same “A-B” line.

All other cultural practices are to remain the same.



Wheat N Topdress Fertilizer Study



Solutions:

Review how this is handled in my presentation on Seeding Rate Study.



Thode 05 Wheat Excel data

Lat	Lon	53.72275 Yield	9.130769 Moisture	Swath	Time	24.13923 Distance	Flow	Interval	Time_2	UTM	RMcode	1304.347 Y*D	54.03434 true yield
38.212	-98.1053	42.879	9.5	384	120	19.51	1	1.12E+09	14	0	RMcode	836.5693	
38.212	-98.1053	51.257	9.5	384	117	16.87	1	1.12E+09	14	0	RMcode	864.7056	
38.2121	-98.1053	44.443	9.5	384	121	18.85	1	1.12E+09	14	0	RMcode	837.7506	
38.2121	-98.1053	49.746	9.5	384	120	21.94	1	1.12E+09	14	0	RMcode	1091.427	
38.2121	-98.1053	52.24	9.5	384	120	19.73	1	1.12E+09	14	0	RMcode	1030.695	
38.2121	-98.1053	43.947	9.5	384	121	21.94	1	1.12E+09	14	0	RMcode	964.1972	
38.2122	-98.1053	51.751	9.5	384	119	23.04	1	1.12E+09	14	0	RMcode	1192.343	
38.2122	-98.1053	51.079	9.5	384	119	19.51	1	1.12E+09	14	0	RMcode	996.5513	
38.2122	-98.1053	50.409	9.5	384	119	22.6	1	1.12E+09	14	0	RMcode	1139.243	
38.2123	-98.1053	54.672	9.5	384	117	21.94	1	1.12E+09	14	0	RMcode	1199.504	
38.2123	-98.1053	58.69	9.5	384	118	24.36	1	1.12E+09	14	0	RMcode	1429.688	
38.2123	-98.1053	57.168	8.7	384	118	23.48	1	1.12E+09	14	0	RMcode	1342.305	
38.2124	-98.1053	50.576	8.7	384	118	25.46	1	1.12E+09	14	0	RMcode	1287.665	
38.2124	-98.1053	58.064	8.7	384	117	24.8	1	1.12E+09	14	0	RMcode	1439.987	
38.2124	-98.1053	57.105	8.7	384	119	21.94	1	1.12E+09	14	0	RMcode	1252.884	



Thode 05 Data to Use

Summary of Data						
Strip #	Strip ID	Fert Rate	yield	Moisture	Distance	truer yield
1	1_W	91#N;19#P;15#S	53.7	9.1	24.1	54.0
2	1_M	111#N;19#P;15#S	55.0	8.8	24.8	55.5
3	1_E	91#N;19#P;15#S	48.7	8.6	20.8	49.8
4	2_N	84#N;19#P	40.1	8.2	19.9	40.7
5	2_M	104#N;19#P	36.8	8.5	19.0	38.9
6	2_S	84#N;19#P	32.1	8.6	15.9	33.1
7	3_N	91#N;19#P;15#S	50.0	8.0	23.2	50.3
8	3_M	111#N;19#P;15#S	48.5	8.6	23.5	48.7
9	3_S	91#N;19#P;15#S	46.7	8.3	20.5	47.1

Trial ID	Yield Hi N	Yield Lo N
Thode1	55.48275	51.9344
Thode2	38.93292	36.91995
Thode3	48.72335	48.71146



Wheat N Topdress Fertilizer Study

By carefully going through the data, we were able to capture data from 8 observations from 2004, 12 observations from 2005 and 11 observations from 2006.



All trials

2004

Trial ID	+20 #N	Base Rate
Gayles80	59.91	59.12
Davis	53.80	52.84
Jobe	69.84	69.61
Julies80	60.57	61.25
Julies 56#	42.77	37.66
Julies 115#	50.91	44.73
Varney	71.63	66.87
Wyatt	54.50	52.45

2005

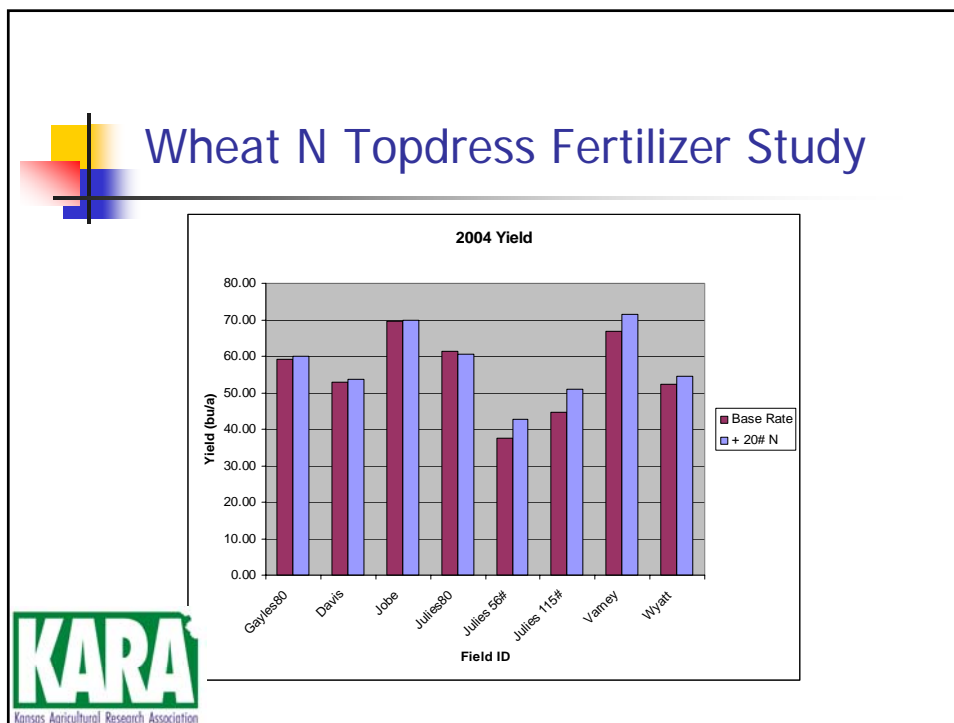
Trial ID	+20 #N	Base Rate
Wyatt 2	28.40	29.94
Wyatt 3	34.31	36.38
Davis	35.85	36.18
Julie80	26.41	26.09
N10 1	46.48	43.63
N10 2	54.66	50.77
SE3	58.25	56.94
Thode1	55.48	51.93
Thode2	38.93	36.92
Thode3	48.72	48.71
SE12	50.14	48.58
SE32	49.09	47.06



Field	N treat	yield	gallons	weight	%N	%S	pounds N	N ²	pounds S
SE 21	18.2 S blend	44.7073	18.2	11.5	0.253	0.069	52.9529	2804.01	14.4417
SE 21	14.8 S blend	45.65897	14.8	11.5	0.253	0.069	43.0606	1854.215	11.7438
3-80's	18.9 Thio	47.75	18.90	11.50	0.253	0.069	54.99	3023.85	15.00
3-80's	15.5 Thio	43.67	15.50	11.50	0.253	0.069	45.10	2033.76	12.30
3-80's	18.9 Thio	42.30775	18.9	11.5	0.253	0.069	54.98955	3023.851	14.99715
3-80's	15.5 Thio	36.35344	15.5	11.5	0.253	0.069	45.09725	2033.762	12.29925
3-80's	18.9 Thio	47.57929	18.9	11.5	0.253	0.069	54.98955	3023.851	14.99715
3-80's	15.5 Thio	50.01656	15.5	11.5	0.253	0.069	45.09725	2033.762	12.29925
3-80's	18.9 Thio	46.09516	18.9	11.5	0.253	0.069	54.98955	3023.851	14.99715
3-80's	15.5 Thio	42.69846	15.5	11.5	0.253	0.069	45.09725	2033.762	12.29925
NE 27	7.0 32%	44.78	7.00	11.05	0.320	0.000	24.75	612.66	0.00
NE 27	none	36.57	0.00	11.05	0.320	0.000	0.00	0.00	0.00
NE 22	17 gal 32%	60.87	17.00	11.05	0.320	0.000	60.11	3613.45	0.00
NE 22	14.1 gal 32%	62.50	14.10	11.05	0.320	0.000	49.86	2485.78	0.00
SE 3	18.4 gal 32%	43.71	18.40	11.05	0.320	0.000	65.06	4233.12	0.00
SE 3	15.5 gal 32%	42.14	15.50	11.05	0.320	0.000	54.81	3003.92	0.00
SE32	19.8 gal 32%	46.48	19.80	11.05	0.320	0.000	70.01	4901.79	0.00
SE32	17 gal 32%	43.68	17.00	11.05	0.320	0.000	60.11	3613.45	0.00
SE32	17 gal 32%	15.91	17.00	11.05	0.320	0.000	60.11	3613.45	0.00
SE32	14.1 gal 32%	19.31	14.10	11.05	0.320	0.000	49.86	2485.78	0.00
Base	45#N as 32%	60.57	12.73	11.05	0.320	0.000	45.01	2026.20	0.00
Base	45#N as 28%	60.88	15.10	10.65	0.280	0.000	45.03	2027.54	0.00
Base	12.6 gal 32%	51.64	12.60	11.05	0.320	0.000	44.55	1985.02	0.00
Base	15.6 gal S blend	54.18	15.60	11.50	0.253	0.069	45.39	2060.09	12.38
Ethels 80	12.6 gal 32%	28.89	12.60	11.05	0.320	0.000	44.55	1985.02	0.00
Ethels 80	7 gal 32%	26.08	7.00	11.05	0.320	0.000	24.75	612.66	0.00

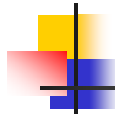
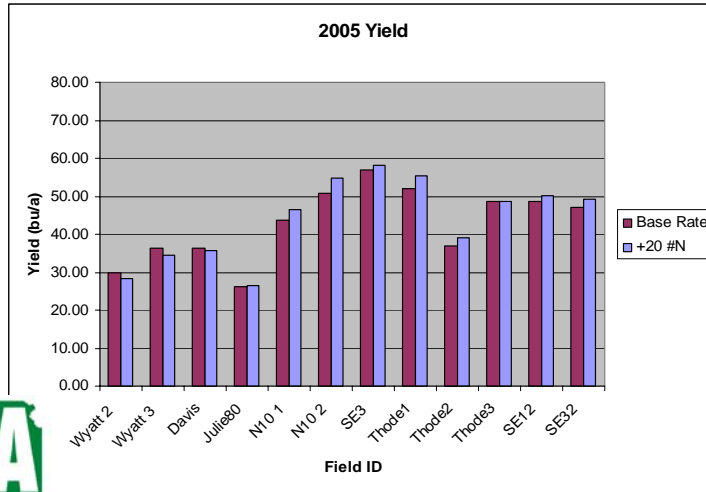
2006 data

Field	Base N	-20 #N	Base - low€
SE 21	44.7	45.7	-1.0
3-80s 1	47.7	43.7	4.1
3-80s 2	42.3	36.4	6.0
3-80s 3	47.6	50.0	-2.4
3-80s 4	46.1	42.7	3.4
NE 27	44.8	36.6	8.2
NE 22	60.9	62.5	-1.6
SE 3	43.7	42.1	1.6
SE 32 1	46.5	43.7	2.8
SE 32 2	15.9	19.3	-3.4
Ethels 80	28.9	26.1	2.8
Mean	42.6	40.8	1.9

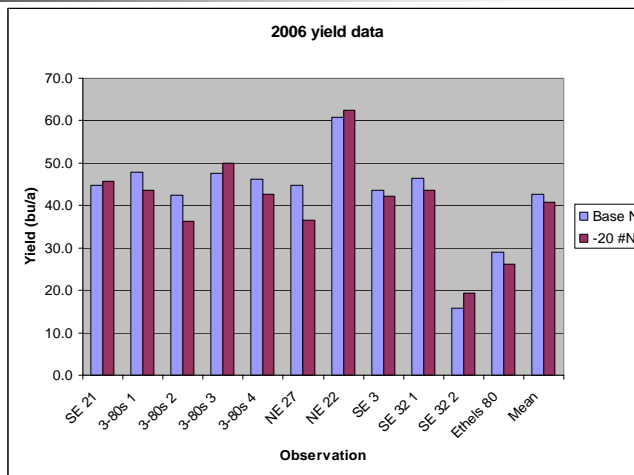




Wheat N Topdress Fertilizer Study



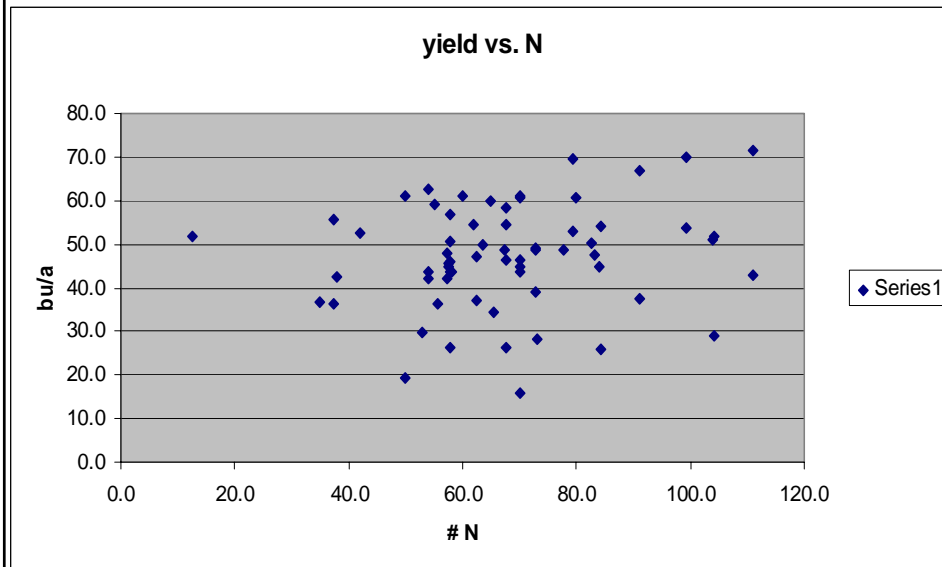
Wheat N Topdress Fertilizer Study





Analysis summary all data 2005 & 2004

t-Test: Two-Sample Assuming Equal Variances			
	+ 20 #N	Base rate	Difference
Mean	49.53	47.88	1.65
Variance	151.654	137.3998	
Observations	20	20	
Pooled Variance	144.5269		
Hypothesized Mean Difference	0		
df	38		
t Stat	0.433759		
P(T<=t) one-tail	0.333458		
t Critical one-tail	1.685953		
P(T<=t) two-tail	0.666916		
t Critical two-tail	2.024394		

All points from 2004, 2005 & 2006




<i>Regression Statistics</i>								
Multiple R	0.124067							
R Square	0.015393							
Adjusted R	-0.01689							
Standard E	12.13034							
Observatio	64							
ANOVA								
	df	SS	MS	F	ignificance F			
Regressor	2	140.3225	70.16125	0.476816	0.623051			
Residual	61	8975.86	147.1452					
Total	63	9116.183						
	Coefficient	standard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	pper 95.0%
Intercept	39.68427	13.20699	3.004792	0.003853	13.27525	66.09328	13.27525	66.09328
Nrate	0.27735	0.380816	0.728305	0.469213	-0.484138	1.038838	-0.484138	1.038838
N^2	-0.002274	0.002681	-0.848323	0.399575	-0.007636	0.003087	-0.007636	0.003087

Wheat N Topdress Fertilizer Study

wheat price (bu)	\$	5.00
N price (lb)	\$	0.35
	N rate	model Y
optimal N	61.0	48.1
	45.6	47.6



Wheat N Topdress Fertilizer Study



Conclusions:

Even though the data looked pretty rough, we were able to salvage quite a bit for analysis.



Wheat N Topdress Fertilizer Study



Conclusions:

There was variability of the response:

2005: negative 2.07 to positive 3.89 bu/a

2004: negative 0.68 to positive 6.18 bu/a

2006: Lower N gave lower yield in only 7 of 11 observations. (1.9 bu/a.)



Wheat N Topdress Fertilizer Study



Questions and Discussion

What should we do now?

We have already applied topdress for some of the 2007 crop at our Base rate.

We have reduced the N rate by 20#/A on a test strip in several fields and will apply for funding from KARA to continue the study.

Wheat N Topdress Fertilizer Study



Questions and Discussion

Lee A. Scheufler

Scheufler Farms, Inc.

1810 22nd Road

Sterling, KS 67579

620-257-2508



Lee@ScheuflerFarms.com

Wheat N Topdress Fertilizer Study



Thank You!!

Thanks to KARA for funding for this project.
Thanks to Dr. Terry Kastens for assistance on
the statistical analysis.

Thanks to Margaret Scheufler and Dan Taylor
for really doing the hard parts of this project.

