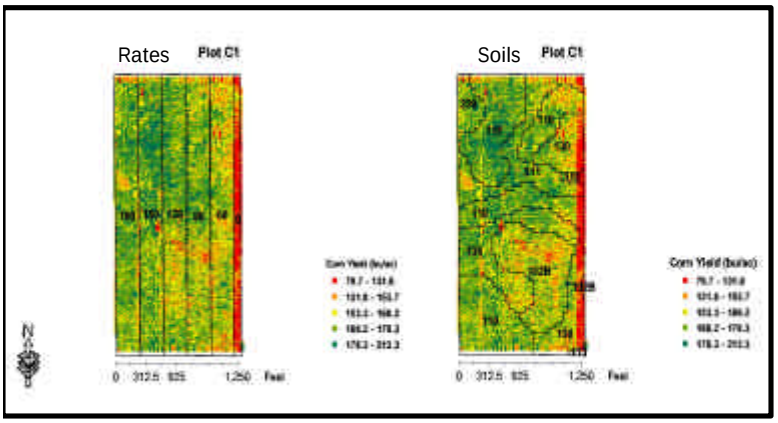
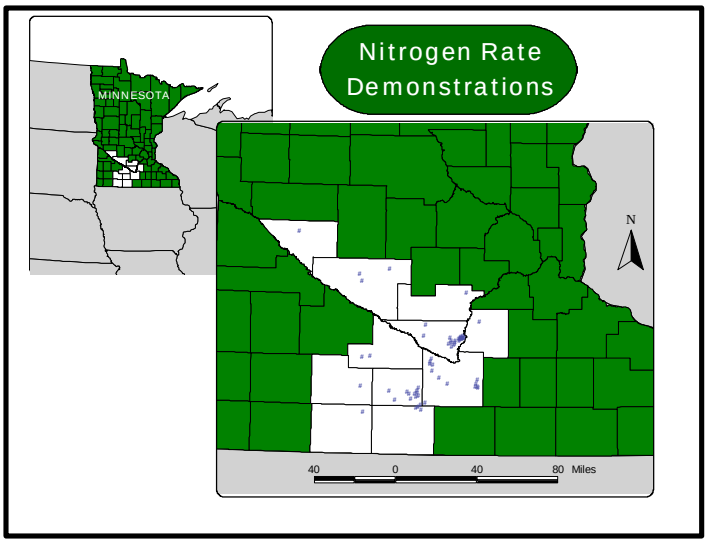
Southern Minnesota 2000-2003 On–Farm Nitrogen Rate Trials





Nitrogen Rate Trial Methods

- 50-acre fields with previous crop as soybeans and no manure in past 5 years were selected.
- Five different nitrogen rates were applied in 10-acre strips. Widths are set to match the farmer's applicator and harvest machinery. Strips are at least 200 feet wide by 1,500 feet long.
- Total nitrogen rates of 60, 90, 120, 150, and 180 lbs./acre were applied.
- Nitrogen source was mainly fall applied anhydrous or spring applied UREA.
- On the majority of sites, a smaller 2.5-acre strip of 0 pounds of applied N was used as a control.
- The plot was field harvested using a GPS enabled yield monitor.
- The harvest was documented, calibrated, and verified by a certified crop consultant.
- Yield and soils data was then analyzed at the University of Minnesota Precision Ag Center to determine Economically Optimum Nitrogen Rates (EONR) and Yields.
- EONR analysis used regression models and assumed $2.25/bu. corn and $0.17/lb. of N.
- Farmer is paid $750 to participate (depending on watershed) and data is kept confidential.
- * St. Peter Wellhead Trials were conducted on 30-acre fields with rates of 0, 60, 90, 100, and 150 lbs. of applied N per acre and were replicated three times in 2.5-acre strips.

Conclusions

- 2000-2003 were average to high yielding corn years and provided a good test for N rate trials.
- Corn yields of 175 bu./acre were typical in fertilized strips. Corn yields of 137 bu./acre were typical in un-fertilized strips.
- On average, the maximum profit occurred with a nitrogen application rate of 109 lbs./acre.
- EONR was highly variable and ranged from 20-180 lbs./acre, but less than 7% of the farms had an EONR of greater than 145 lbs./acre.
- Yields at EONR ranged from 122-230 bu./acre and averaged 169 bu./acre for the participating farmers.
- In general, adding more than 120 lbs./acre of N did not increase yields or profits.
- The optimum N rate to apply is very sensitive to the price of N fertilizer. For every $0.10 increase in N price, the optimum rate of N to apply decreases by about 10 lb./acre.
- Most producers who participated in this study could have reduced conventional N rates by 30 lb. N/acre or more with no loss of profit. This could result in a savings of $7-$14/acre.
- More studies over more years need to be completed to verify and enhance these findings.

For more information about On-Farm Nitrogen Rate Demonstrations contact Gary Wyatt, Extension Service at 507-389-6748 or Kevin Kuehner, watershed coordinator at (507) 381-9440 or Bruce Nowlin, Blue Earth Consulting at (507) 947-3362 or Dave Mullla, Precision Ag Center at 612-625-6721 or access the following web site at http://mrbdc.mnsu.edu/org/bnc/.

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2000-2003 On Farm Nitrogen Rate Trials (60 Trials)

St. Peter Wellhead Protection Area (12)

2000	bu./ac	lb./ac
	YEONR	EONR
A	170	105
B	152	86
C	160	108
D	161	100
E	143	90
Average	157	98

2001	YEONR	EONR
A	136	68
B	161	138
C	147	60
D	152	117
Average	149	96

2002	YEONR	EONR
A	170	125
B	166	100
C	162	89
Average	166	105

SPWHPA	YEONR	EONR
Average	157	99

Watonwan and Lower Maple River Watersheds (6)

2003	YEONR	EONR
A	196	126
B	174	141
C	187	130
D	209	101
G	200	149
H	203	119
Average	195	128

Yield Goal (bu./ac.)	*N to apply (lbs./ac.)*
150-174 =	120
175-199 =	140
200+ =	160

** UM Nitrogen Recommendations for corn following soybeans with M and H organic matter soils.

Seven Mile Creek Watershed (9)

2001	YEONR	EONR
A	162	121

2002	YEONR	EONR
B	184	141
J	187	180
Y	180	154
M	167	82
C	183	131
Average	180	138

2003	YEONR	EONR
A	182	116
B	207	127
C	230	179
Average	206	141

SMCW	YEONR	EONR
Average	192	137

Plot stats

All Trials	YEONR	EONR
Average	169	109
Min	122	20
Max	230	180

Of the 60 Trials:

--- 93% of the trials required less than 145 lbs./acre of nitrogen fertilzer.

--- Average optimum N rate was 109 lbs./acre.

--- Average optimum yield was 169 bu./ac.

* EONR = Economically Optimum Nitrogen Rate
* YEONR = Yield at EONR

South Central MN Counties (33)

2001	bu./ac	lb./ac
	YEONR	EONR
A	122	133
B	130	142
C	146	120
D	149	141
E	124	98
F	145	93
G	144	104
Average	137	119

2002	YEONR	EONR
B	166	101
A1	214	150
B	174	60
C	171	20
C1	173	123
D1	170	129
DHF	164	101
DHS	166	125
E	216	60
E1	157	61
F	183	82
G	187	60
K	182	131
L	157	86
N	140	100
OP	150	136
Q	190	84
R	159	124
S	143	137
T	163	80
U	177	111
V	178	59
W	145	140
X	185	116
Z	176	42
C3	162	89
Average	171	96

SCMN	YEONR	EONR
Average	164	101