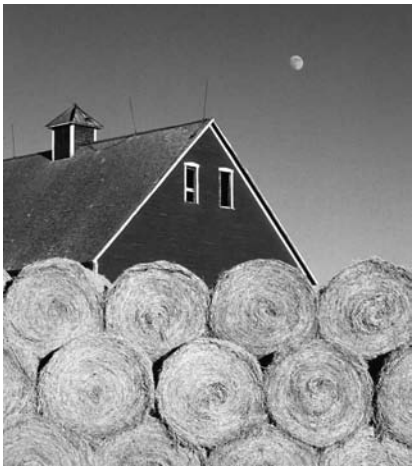
On-Farm Cropping Trials

Northwest and West Central Minnesota

January 2004



UNIVERSITY OF MINNESOTA
Extension
SERVICE

2003 On-Farm Cropping Trials
For Northwest and West Central Minnesota

The University of Minnesota is pleased to provide you with the results of the 2003 on-farm field cropping trials conducted in northwest and west central Minnesota.

This is the fifth year for the trials booklet. It was developed to increase the awareness and impact of the many on-farm cropping projects conducted in Minnesota. The booklet contains summary information for projects on a wide range of management issues for corn, soybeans, small grains, and other regional crops.

This project was made possible thanks to the hard work of many people. This includes farmers, Regional Extension Educators, and specialists who conducted these trials, and their names are listed with results. Also, thank you to our task force and our graphic designer, Mary Gieseke.

The studies in this booklet are divided into either Research or Demonstration chapters. Included is a description of the difference between the two. Whenever possible, research plot data were analyzed using statistics.

For more information about any of the studies included in this report, please contact the Regional Extension Educator or specialist listed. We invite your input on priorities you believe are important for Minnesota crop producers and have included an evaluation on Page 3 for you to complete and mail to the address printed on the back of the evaluation form.

Sincerely,

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2003 On-Farm Cropping Trials Booklet
Evaluation Form

We want to know what you think about this booklet. Please take a few minutes to fill out this evaluation form, and mail it to the address on the back of this sheet. Your comments will help shape the future on-farm cropping research and the booklet.

1) Where did you receive a copy of this booklet? (Check all that apply.)
- ☐ In the mail
- ☐ An Extension Educator
- ☐ The local Coop
- ☐ At crop production meetings or field days
- ☐ Other_____

2) In general, how will you use the On-Farm booklet? (Check all that apply.)
- ☐ Read at least some
- ☐ Skim
- ☐ Save for future reference
- ☐ Pass on to a friend
- ☐ Recycle or discard without using
- ☐ Other_____

3) How would you rate the On-Farm booklet in terms of:

	Excellent				**Poor**
Design	1	2	3	4	5
Communication information on our projects	1	2	3	4	5
Clarity and readability	1	2	3	4	5
Interest to you	1	2	3	4	5

4) How would you describe your profession? (Check all that apply.)
- ☐ Farmer/rancher
- ☐ University of Minnesota Faculty
- ☐ Seed/equipment dealer
- ☐ Nonprofit organization
- ☐ State/Federal employee
- ☐ Crop consultant
- ☐ Other_____

5) I typically get my information about production practices from: (Check all that apply.)
- ☐ Other farmers/ranchers
- ☐ Other farmers/ranchers
- ☐ Books
- ☐ Farm journals and newsletters
- ☐ Extension or other agency personnel
- ☐ The Internet
- ☐ Other_____

6) Which information in the booklet was most useful to you in your work?

7) What research topics would you like to see covered in future booklets?

8) Do you plan to make any changes in your agricultural practices as a result of information provided in this booklet?

9) What do you feel would be the economic impact of changing these practices?

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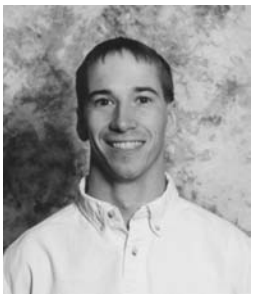

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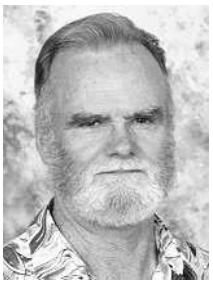

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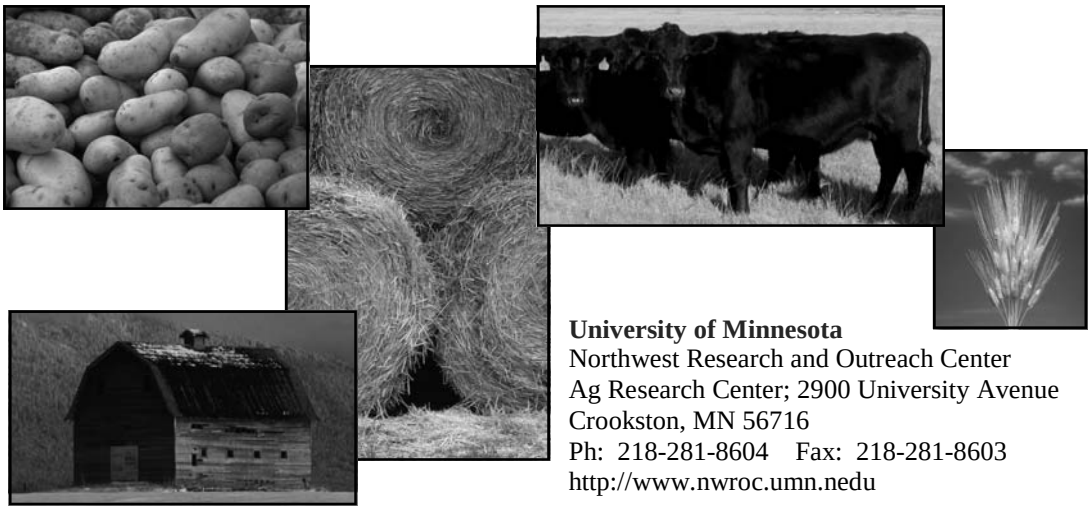
Northwest Research and Outreach Center (NWROC)
Crookston, Minnesota

The mission of the NWROC is to contribute, within the framework of the Minnesota Agricultural Experiment Station (MAES) and the College of Agricultural, Food and Environmental Sciences, to the acquisition, interpretation and dissemination of research results to the people of Minnesota, with application to the knowledge base of the United States and World. Within this framework, major emphasis is placed on research and education that is relevant to the needs of northwest Minnesota, and which includes projects initiated by Center scientists, other MAES scientists and state or federal agencies.

Research Areas
- Agronomy
- Dairy & Beef Science
- Entomology
- Natural Resources
- Plant Pathology
- Soil Science
- Soil & Water Quality
- Small Grains Extension
- Sugarbeets
- Potatoes



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What are Research Trials?

Research plots are replicated in the field or across geographic locations. Randomization reduces the chances of one treatment being favored in any way. Replication is used to increase precision in identifying treatment differences. Randomization and replication allows a statistical analysis of experimental treatment means and field variation. This analysis will help determine whether detected differences are real due to experimental treatments or due to random chance and field variation. Research trials can be replicated in space (different fields or locations), time (across years), or both.

Some comparisons of treatments may result in no statistically significant differences. When this occurs, it is not appropriate to conclude which treatment is superior. A difference of one or two (or even 10 to 15) bushels per acre between treatment means may or may not represent a true yield advantage. If a non-significant yield advantage from one trial at one location is consistent across other locations or years, statistical analysis across the locations or years may show true differences in treatment do exist. A minimum difference between treatment means, called the least significant difference (LSD), is required for the observed difference to be attributed to the treatments.

T1	C	T2	C
C	T1	C	T2
T1	T2	T2	T1

C = Check Plot Treatment T1 = Treatment 1 T2 = Treatment 2

Example of a research plot design — In this example there are four replications of three treatments. The location of each treatment was assigned totally at random (Completely Randomized Design).

T1	C	T2	C
C	T1	T1	T2
T2	T2	C	T1

C = Check Plot Treatment T1 = Treatment 1 T2 = Treatment 2

Example of a research plot design — In this example there are four replications of three treatments. The location of each treatment was “blocked” within each replication (Randomized Complete Block Design).

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Yellow Nutsedge Control in Soybean – Fosston, MN – 2003

C. Holen, B. Holder, R. Severson, J. Cameron

An experiment was conducted on soybean to evaluate soil applied and postemergence herbicides on yellow nutsedge at the Olson brothers farm near Fosston, MN. 'Gold Country 3202 Roundup Ready' soybean was planted at 160,000 seeds per acre in 22 inch rows on May 13. Preplant incorporated (PPI) herbicides were incorporated with a tractor mounted roto-tiller to a 3 inch depth. Treatments were arranged in a randomized complete block design with four replications. Herbicide treatments were made to the center 6.6 ft of 10 x 25 ft plots with a CO_2 backpack sprayer delivering 10 gpa at 30 psi and equipped with XR80015 flat fan nozzles. Poast and crop oil (1.5 pt + 1.5 pt) were applied to provide foxtail control. Environmental conditions at the time of application and herbicide efficacy results are in Tables 1 and 2 respectively.

Table 1. Environmental conditions at time of herbicide application

Date	May 13	June 22	June 30	July 8
Application	ppi	POST	POST	POST
Sky	P Cloudy	Cloudy	P Cloudy	Clear
Wind mph	4-6 NW	0-2 SE	4 SW	Calm
Temp	63°F	68°F	82°F	70°F
Soil	moist	wet	Moist	Moist
Crop stage	-	3 trifoliates	Early flowering	Early flowering
Nutsedge stage	-	4 inches	6-8 inches	10-14 inches

Table 2. Yellow nutsedge control

Treatment	Rate (product/a)	Timing	July 14 Injury	July 14 Control	August 14 Injury	August 14 Control
			%			
Lasso	8 pt	ppi	0	74	0	55
Lasso/Glyphomax Plus+AMS[1]	4pt/2pt	ppi/6-8 in	0	87	0	94
Lasso/Basagran+COC[2]	8pt/2pt+2pt	ppi	0	89	0	76
Dual II Magnum	2 pt	ppi	0	80	0	57
Dual II/ Glyphomax Plus + AMS	1.3 pt/2pt	ppi/6-8 in	0	97	0	89
Dual II/ Basagran+COC	2 pt/2 pt	ppi/6-8 in	2	97	6	95
Outlook	21 oz	ppi	21	90	23	72
Outlook/ Glyphomax Plus	16 oz/2pt	ppi/6-8 in	14	97	17	82
Outlook/ Basagran+COC	21 oz/2 pt	ppi/6-8 in	30	96	27	92
Basagran+COC/Basagran+ COC	2 pt /2 pt	4 in/14 day	0	95	0	94
Glyphomax Plus+FirstRate+ AMS/ Glyphomax Plus + AMS	2pt + 0.3 oz / 2pt	4 in/14 day	0	91	0	97
Glyphomax Plus+AMS	2pt	4 in	0	57	0	57
Glyphomax Plus+AMS/ Glyphomax Plus+AMS	2pt /2pt +	4 in/14 day	0	80	0	96
Glyphomax Plus+AMS	2pt	6-8 in	0	65	0	89
Authority/Glyphomax Plus + AMS	4 oz/ 2pt	ppi/6-8 in	0	79	0	96
LSD(0.05)			6	21	5	26

[1]AMS= AmStik by West Central Chemical applied at 8.5 lbs/100 gal
[2]COC= Cornbelt Premium Crop Oil Concentrate applied at 2 pts/a

The yellow nutsedge infestation was uneven at this site with both light and heavy patches scattered across the research area. The best treatments were combinations of either soil plus postemergence herbicides or sequential applications of Glyphomax Plus or Basagran. Single applications of either soil applied or postemergence herbicides did not provide adequate control, except for Glyphomax Plus applied at the 6 to 8 inch timing. Control with single applications of postemergence herbicides was improved in this study and in previous trials when the application timing was delayed. Postemergence applications should target yellow nutsedge that are at least 6 to 8 inches tall. Sequential applications that begin earlier (4 in height) are a better weed control strategy for most soybean producers, as the first application reduces early season competition from other weed species, and the second application is more effective on nutsedge.

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Evaluation of Phosphorus and Potassium Rates on Soybean as a Tool to increase Yield and Protein

Cooperator: Ron Peterson
Variety: Legend 009
Planting date: May 12, 2003
Harvest date: September 26, 2003
Soil Test Results: 0-6" depth
Olsen P - 8ppm
Potassium - 115ppm
Organic matter - 35%
pH - 8.2
Carbonates - 6.3%
Soluble salts - 0.47mmhos/cm

Purpose of study

New soybean cultivars with higher yield potentials have been developed for the region over the past ten years and this prompted the idea to conduct a phosphorus and potassium rate study to determine if the phosphorus and potassium nutritional needs of the crop were still being met from lower testing soils. Last years research showed significant increases in yield and protein with the addition of P_2O_5 on lower testing soils.

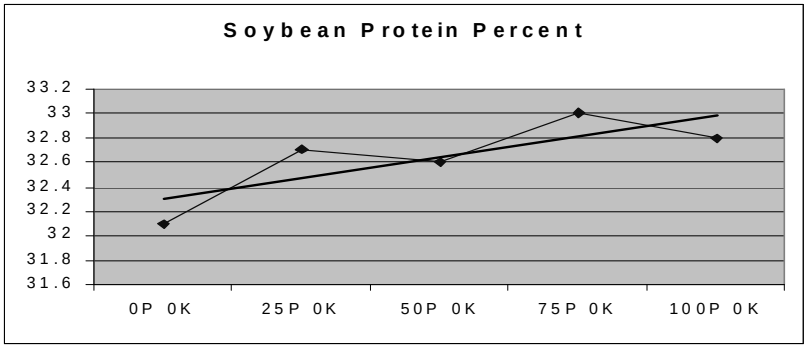
Results

The treatment with 50 P_2O_5 100 K_2O_5 was the only treatment significantly different from the 0 P_2O_5 0 K_2O treatment with respect to yield. There was no significant difference in protein percent or oil percent when compared to the 0 P_2O_5 0 K_2O treatments. Protein percent increased in a linear relationship with phosphorus rate from 32.1% with no added phosphorus to 32.8% with 100 pounds of P_20_5 added. This trend in protein increase was not statistically significant. There was about a 2 bushel increase in soybean yield over phosphorus rates when 100 pounds of K_2O was added to the soil however this increase was not statistically significant.

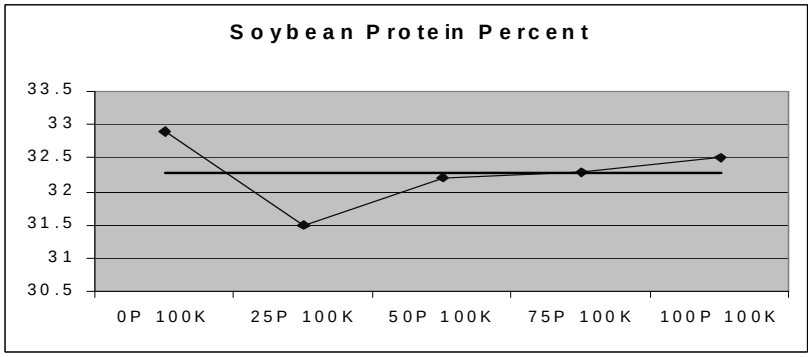
Table 2. Treatment means for Yield, Protein% and Oil%

Treatment	Yield	Protein	Oil
P_2O_5 & K_2O Rates	bu/a	%	%
0 - 0	49.1	32.1	18.9
25 - 0	48.9	32.7	18.8
50 - 0	50.7	32.6	18.6
75 - 0	50.6	33.0	18.2
100 - 0	48.3	32.8	18.0
0 - 100	51.0	32.9	18.2
25 - 100	52.2	31.5	18.7
50 - 100	53.6	32.2	18.5
75 - 100	51.7	32.3	19.0
100 - 100	52.8	32.5	18.4
Significance		N.S.	
LSD (.05)	4.1	1.6	0.6

Soybean protein percent with 0 K_2O and 0 to 100 P_2O_5 rates



Soybean protein percent with 0 K_2O and 0 to 100 P_2O_5 rates.



Funding:
Minnesota Soybean Research and Promotion Council

For additional information:
Russ Severson

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Evaluation of Phosphorus Application Rates and Methods to Increase Yield and Protein of Soybean

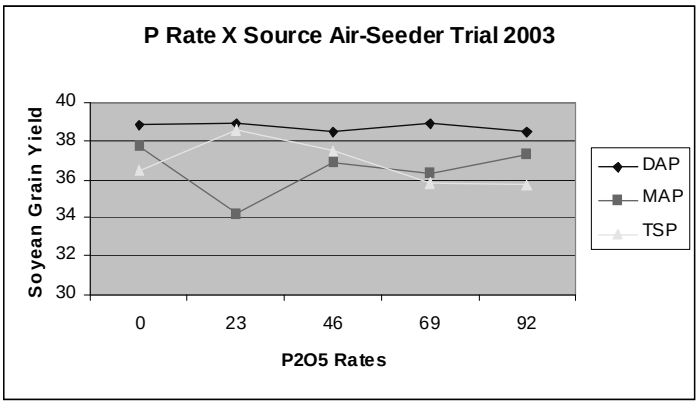
Cooperator: Gerald Nordick Farm - Rothsay
Variety: 90B53RR
Planting date: May 23, 2003
Harvest date: October 8, 2003
Soil Test Results: 0-6" depth
Olsen P - 7ppm
Potassium - 130ppm
Organic matter - 3.1%
pH - 7.9
Carbonates - 0.7%
Soluble salts - 0.32mmho/cm

Purpose of study:
Many soybean growers have switched to using an air-seeder to plant their soybean crop. A question on how much fertilizer can safely be applied with an air-seeder at planting time is unclear. A phosphorus application method experiment was conducted to determine if phosphorus can safely be applied with an air-seeder at planting time to reduce input costs associated with broadcast application and incorporation prior to planting. This trial was designed to investigate three different fertilizer materials ((DAP) diammonium phosphate, (MAP) monoammonium phosphate and (TSP) triple super phosphate) applied at five rates at planting time. Nitrogen was broadcast to appropriate plots to equalize the total amount on nitrogen added to each plot from each source.

Results:
There were no significant differences with respect to grain yield. Protein concentration was significant at the p=.10 level when averaged across sources. There were no significant differences in protein concentration between sources. There was a linear trend to increase protein concentration with increased P_2O_5 application rate equaling a 1% increase. There were no significant differences with respect to population. There was a linear trend to decrease oil concentration with increased P_2O_5 application rate equaling a 1/2% oil concentration decrease. Oil concentration decrease was significant at the p=.10 level when averaged across sources. There were no significant differences in oil concentration between sources. Environmental conditions were not normal at this site with 15 inches of rain recorded early in the growing season.

Soybean grain yield of phosphorus sources and rates.

Source	P_2O_5 Rate					Mean
	0	23	46	69	92	
DAP	38.8	38.9	38.5	38.9	38.5	38.7
MAP	37.7	34.2	36.9	36.3	37.3	36.6
TSP	36.5	38.6	37.5	35.8	35.7	36.8



Soybean populations at phosphorus sources and rates.

Source	P_2O_5 Rate					Mean
	0	23	46	69	92	
DAP	94380	107448	103818	104544	92202	100478
MAP	88572	94380	100188	98010	104544	97138
TSP	100914	102366	84216	105996	87120	96122

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Evaluation of Phosphorus Rates on Soybean as a Tool to Increase Yield and Protein

Cooperators: Doug Nelson, Roger & David Black, Gerald Nordick
Collaborators: George Rehm
Nearest town: Ada, Rindal, Rothsay
Variety: Traill, Mycogen 5007, Pioneer 90B53RR
Planted: May 27, June 10, May 23
Harvested: Oct. 13, Oct. 8, Oct. 8

Purpose of study:
New soybean cultivars with higher yield potentials have been developed for the region over the past ten years and this prompted the idea to conduct a phosphorus rate study to determine if the phosphorus nutritional needs of the crop were still being met from residual phosphorus in the soil. Last years research showed significant increases in yield and protein with the addition of P2O5 on lower testing soils.

Ada Site: Soil Test

Olsen P	10ppm
Potassium	156ppm
Organic matter	4.7%
pH	8.3
Carbonates	10.1%
Soluble salts	0.54mmho/cm

Results: There was no significant difference in yield, protein percent or oil percent at this location in 2003.

Treatment means for Yield, Protein% and Oil%.

P2O5 Rate Lb/A	Yield Bu/A	Protein %	Oil %
0	24.3	35.5	18.8
20	22.8	35.5	18.8
40	24.2	35.7	18.8
60	24.5	35.9	18.9
80	21.6	35.5	18.8
100	24.1	35.5	18.9
Significance	N.S.	N.S.	N.S.

Rindal Site: Soil Test

Olsen P	8ppm
Potassium	92ppm
Organic matter	4.2%
pH	8.0
Carbonates	5.1%
Soluble salts	0.35mmho/cm

Results: There was no significant difference measured on soybean yield. There was a 1.3% increase in protein percent however it was not statistically significant.

Treatment means for Yield, Protein% and Oil%.

P rate Lb P2O5/A	Yield Bu/A	Protein %	Oil %
0	40.4	31.3	19.4
20	39.3	31.6	19.1
40	39.8	32.0	19.0
60	42.6	31.7	19.2
80	40.8	32.6	19.0
100	40.8	31.1	19.5
Significance	N.S.	N.S.	N.S.

Rothsay Site: Soil Test

Olsen P	7ppm
Potassium	130ppm
Organic matter	3.1%
pH	7.9
Carbonates	0.7%

Results: There were no significant differences for soybean yield, protein concentration or oil concentration at this site in 2003. Fifteen inches of rain was received at this site early in the growing season which reduced yields significantly.

Treatment Means for Yield, Protein% and Oil%.

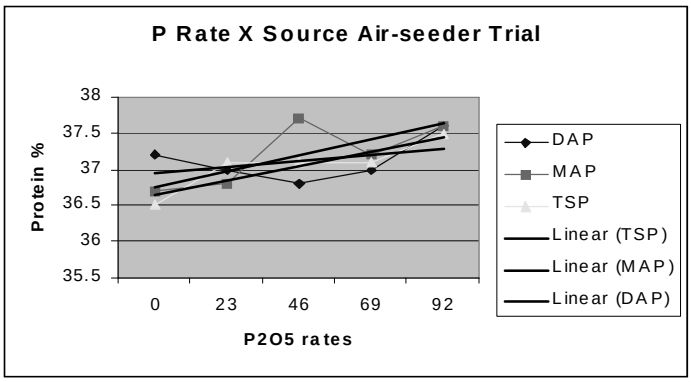
P rate Lb P2O5/A	Yield Bu/A	Protein %	Oil %
0	25.3	37.1	18.2
20	27.7	36.4	18.6
40	25.6	36.9	18.4
60	25.5	37.0	18.4
80	29.3	36.7	18.7
100	25.3	37.3	18.2
Significance	N.S.	N.S.	N.S.
LSD(.05%)	7.0	1.4	1.1

For additional information: Russ Severson

Evaluation of Phosphorus Application — (*continued)*

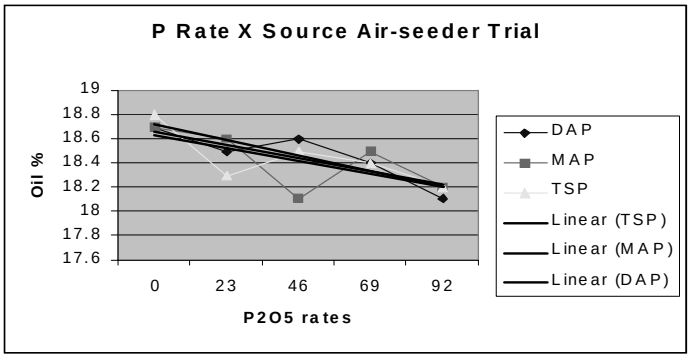
Soybean protein concentration at phosphorus sources and rates.

Source	P_2O_5 Rate					Mean
	0	23	46	69	92	
DAP	37.2	37.0	36.8	37.0	37.6	37.1
MAP	36.7	36.8	37.7	37.2	37.6	37.2
TSP	36.5	37.1	37.1	37.1	37.5	37.1



Soybean oil concentration at phosphorus sources and rates.

Source	P_2O_5 Rate					Mean
	0	23	46	69	92	
DAP	18.7	18.5	18.6	18.4	18.1	18.4
MAP	18.7	18.6	18.1	18.5	18.2	18.4
TSP	18.8	18.3	18.5	18.4	18.2	18.5



Funding:
Minnesota Soybean Research and Promotion Council

For additional information:
Russ Severson

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Soybean Varietal Trials —Polk County

Cooperator: Rick Roed
Nearest Town: Fosston
Previous Crop: Wheat
Planting Date: May 13, 2003
Seeding Rate: 180,000 live seeds/acre
Harvest Date: September 23, 2003
Soil Type: Knute Fine Sandy Loam
Conv. Herbicide: 3 oz. Raptor + COC + 28% (6/17/03)
RR Herbicide: 1 qt. Roundup Ultra (6/23/03)
Soil Test Data:

NO-3-N	0-6" = 52 lb/acre
	6-24" = 118 lb/acre
Olsen P	55 ppm
Potassium	267 ppm
Organic Matter	4.90%
Carbonate (CCE)	0.60%
Soluble Salts	0-6" = .38 mmho/cm
	6-24" = .38mmho/cm
pH	6.9

Conventional Soybean Variety Trial

Variety	Yield	Protein %	Oil %
Pioneer 90B43	59.5	34.2	19.9
Ledgend 0557	56.2	34.2	20.2
Stine 0300-0	51.8	34.5	19.5
MN 0302	50.6	34.4	19.7
ND Walsh	50.2	34.3	20.4
Mycogen 5007	50.0	34.2	19.8
ND Traill	50.0	35.9	19.4
LSD (0.05)	2.9	0.7	0.4

Roundup Ready Soybean Variety Trial

Variety	Yield	Protein %	Oil %
Pioneer 90B74	62.4	34.6	19.4
Monsanto Asgrow AG0301	61.5	33.0	20.0
Pioneer 90B51	61.1	34.5	19.9
Monsanto Dekalb DKB009-51	59.1	34.2	19.8
Legend 0091	57.7	35.8	20.0
Hyland RR Rugged	57.0	33.6	20.9
Mycogen Atlas 5B051	57.0	36.5	18.9
Wensman 2020	56.4	33.6	20.6
Hyland RR Regal	55.8	34.5	19.6
Stine SO330-4	55.6	36.3	19.5
Wensman W20091	55.3	35.3	19.5
Stine SO236-4	54.4	34.8	20.2
Mycogen Atlas 5B008	52.3	35.2	19.5
Legend 0082	49.7	34.2	20.6
LSD (0.05)	6.2	0.6	0.6

Partnership/Funding: Funded by entrants

For additional information:
Russ Severson
Jim Stordahl

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Roundup Ready Soybean Variety Trial, Fisher and St. Hilaire Polk and Red Lake / Pennington Counties

Cooperator: Fisher: Jim and Jon Ross
St. Hilaire: Gary Novak

Nearest Town: Fisher
St. Hilaire

Soil Type: Fisher: Clay Loam
St. Hilaire: Sandy Loam

Tillage: Fisher: Fall Chisel plow, Spring Field cultivator
St. Hilaire: Fall and Spring Field cultivator

Previous Crop: Fisher: Sugar Beets
St. Hilaire: Fallow

Planting Date: Fisher: May 28, 2003
St. Hilaire: May 20, 2003

Row Width: 7 inches

Fertilizer: Fisher: (N-P-K) 0-30-0
St. Hilaire: (N-P-K) 0-30-20 (Broadcast in Spring)

Herbicide: Fisher: PPI Prowl, Pre-emerge Roundup 1 qt , POST Roundup 1 qt
St. Hilaire: POST Roundup 1 qt

Populations: Fisher: 157.000 plants/a established
St. Hilaire 147.000 plants/a established

Harvest date: Fisher: October 8, 2003
St. Hilaire: October 7, 2003

Experimental Design: Randomized complete block with 2 replications and 2 locations

Purpose of Study:

Producers have a large selection of Roundup Ready Soybeans. For the first time in NW MN a large number (60 varieties) of Roundup ready soybeans have been evaluated together in these experiments with the aim to evaluate iron chlorosis response, vigor, crop height, and yield.

Results:

Table 1 is organized by the company maturity rating from earliest material 002 to 009. Table 2 has varieties with maturity ratings 01 to 04. Within each maturity class varieties are organized according to the mean yield over the two environments. There were significant differences among all parameters evaluated. The Fishers site, although not selected for it, was a severe iron chlorosis environment. The varieties with higher iron chlorosis scores tended to have lower yields at the Fisher site. The St. Hilaire site was uniform but not a high yielding environment. Both locations received excessive rain during the first part of the growing season.

Funding:
U of M Extension Service and Croplan Genetics

For additional information:
Hans Kandel

Roundup Ready Soybean Variety Trial, Fisher and St. Hilaire *(continued)*

Table 1. Roundup Ready Soybean Variety Trial Fisher and St. Hilaire

			Fisher				St. Hilaire			
PRODUCT	MAT	SOURCE	Iron[1] Chlorosis Mean	Vigor[2]	Height (inches)	Yield[3] (bu/a)	Vigor	Height (inches)	Yield (bu/a)	Mean Yield (bu/a)
0027RR	002	NORTHSTAR	4.3	4.0	21.0	24.0	3.0	18.8	32.0	28.0
2200RR	002	THUNDER	4.0	3.5	19.3	26.9	3.0	18.5	27.7	27.3
RT0032	003	CROPLAN	2.3	2.0	22.5	43.7	3.0	16.0	18.0	30.9
RT0041	004	CROPLAN	2.5	2.0	30.3	42.0	3.0	20.5	29.3	35.7
RR Ramsey	005	HYLAND	2.3	2.5	30.0	42.5	3.0	20.0	27.8	35.2
BG0050RR	005	BIOGENE	2.0	2.0	29.0	45.0	2.5	19.5	24.3	34.7
K-0051	005	KAYSTAR	2.8	2.5	25.5	39.6	3.0	18.0	26.5	33.1
23005RR	005	THUNDER	2.3	2.5	26.8	35.7	3.5	19.0	28.9	32.3
DKB005-51	005	DEKALB	1.9	1.5	23.5	44.6	2.5	16.8	19.9	32.3
PB-0052	005	PRAIRE BRAND	2.8	3.0	25.5	37.8	3.0	17.5	23.6	30.7
RR Regency	005	HYLAND	4.0	4.5	22.0	18.9	3.5	21.5	32.2	25.6
RT0065	006	CROPLAN	2.3	3.5	26.0	42.0	3.5	19.0	28.8	35.4
PB-0072	007	PRAIRE BRAND	2.5	3.0	24.3	40.5	3.0	19.8	35.4	38.0
W 20073	007	WENSMAN	2.9	3.0	26.5	41.0	3.5	17.3	26.3	33.7
DSR-007	007	DAIRYLAND	2.5	3.0	27.0	38.8	4.0	19.5	25.9	32.4
RT0073	007	CROPLAN	2.8	3.5	25.5	36.2	4.0	20.0	26.1	31.2
S00-J4	007	SYNGENTA	3.8	3.5	18.5	27.1	3.0	19.8	27.5	27.3
5B008	008	MYCOGEN	3.0	3.5	23.5	33.3	3.0	19.8	30.5	31.9
LS 0082	008	LEGEND	3.3	3.5	24.0	31.2	3.0	17.5	28.7	30.0
030 008RR	008	PETERSON	3.5	3.5	20.0	24.7	3.0	17.5	32.3	28.5
23008RR	008	THUNDER	3.8	3.5	24.8	21.1	3.0	22.0	30.8	26.0
X3008R	008	SYNGENTA	5.0	4.5	15.0	5.9	2.5	19.8	34.9	20.4
PB-0094	009	PRAIRE BRAND	2.6	3.5	25.0	43.0	2.5	21.5	35.7	39.4
I 0095	009	INTERST/GARST	2.0	3.5	25.5	42.5	4.0	19.8	32.6	37.6
W 20091	009	WENSMAN	2.0	2.5	26.5	41.3	3.5	21.0	29.4	35.4
DG30D09	009	DYNAGRO	2.3	3.5	26.5	40.1	3.5	21.8	26.7	33.4
BG0090RR	009	BIOGENE	3.3	3.5	21.0	31.1	2.5	19.8	32.8	32.0
DSR-009	009	DAIRYLAND	2.5	2.5	27.0	38.4	3.5	27.8	23.9	31.2
LS 0091	009	LEGEND	3.5	3.5	23.0	31.3	3.5	18.5	29.0	30.2
		Experimental Mean	3.1	3.3	24.1	32.6	3.1	20.4	29.0	30.8
		LSD (0.05)	1.1	1.2	4.2	12.8	1.0	3.4	6.3	

[1] Iron Chlorosis score from 1-5, 1= no yellowing and 5 = severely chlorotic or dead. Mean over scores taken July 15 and August 5, 2003.
[2] Vigor rating 1-5, 1 = good and 5 is poor.
[3] Yield bu/acre corrected to 13% moisture and 60 lb/bu testweight

Roundup Ready Soybean Variety Trial, Fisher and St. Hilaire *(continued)*

Table 2. Roundup Ready Soybean Variety Trial Fisher and St. Hilaire

			Fisher				St. Hilaire			
PRODUCT	MAT	SOURCE	Iron[1] Chlorosis Mean	Vigor[2]	Height (inches)	Yield[3] (bu/a)	Vigor	Height (inches)	Yield (bu/a)	Mean Yield (bu/a)
RG200RR	01	NDSU	2.8	3.5	28.0	35.7	3.0	21.0	34.1	34.9
933RR	01	GOLD	2.3	4.0	26.5	35.0	3.5	21.0	29.9	32.5
0107RR	01	COUNTRY NORTHSTAR	2.1	2.5	25.5	38.8	3.0	25.8	25.9	32.4
90B11	01	PIONEER	3.5	4.0	23.0	28.5	3.0	21.0	34.4	31.5
PB-0232	02	PRAIRE BRAND	2.5	3.0	23.3	46.2	2.5	18.5	31.4	38.8
DG34G02	02	DYNAGRO	2.0	3.0	26.5	41.9	2.5	17.8	31.1	36.5
M 023	02	MUSTANG	1.8	2.0	22.0	40.0	3.0	18.3	29.5	34.8
0206RR	02	NORTHSTAR	3.5	2.5	24.5	33.4	2.0	22.0	34.9	34.2
RT0255	02	CROPLAN	3.3	4.0	24.5	36.9	2.5	19.8	31.1	34.0
1300RR	02	GOLD COUNTRY	2.8	3.5	26.0	34.9	3.0	19.8	32.3	33.6
I 0211	02	INTERST/GARST	3.3	3.0	23.5	33.1	2.0	20.5	31.4	32.3
W 2020	02	WENSMAN	3.5	4.0	24.0	31.1	3.0	18.0	30.6	30.9
K-0255	02	KAYSTAR	3.5	3.0	23.5	27.8	3.0	18.8	28.7	28.3
RT0269	02	CROPLAN	2.8	3.0	28.5	32.0	3.0	28.3	17.7	24.9
LS 0201	02	LEGEND SEEDS	4.3	4.5	18.0	12.9	3.5	23.3	34.7	23.8
S02-G2	02	SYNGENTA	4.5	4.0	17.0	5.7	3.5	20.3	38.1	21.9
AG0301	03	ASGROW	2.4	3.0	30.0	50.7	3.0	23.0	33.3	42.0
0332121	03	PETERSON	2.5	3.0	24.0	42.2	3.0	17.8	26.9	34.6
M-033	03	MUSTANG	2.5	3.0	28.3	36.4	3.5	17.8	27.6	32.0
RT0396	03	CROPLAN	3.0	3.5	24.5	36.0	3.5	18.0	25.2	30.6
RR Rugged	03	HYLAND	3.9	3.5	24.5	21.8	3.0	24.8	34.9	28.4
RT0312	03	CROPLAN	4.3	4.5	27.0	26.5	3.5	29.0	30.3	28.4
DG39P03	03	DYNAGRO	3.0	3.5	24.5	29.2	3.5	17.8	24.3	26.8
0332125	03	PETERSON	3.8	4.5	21.5	24.4	3.5	21.3	29.1	26.8
W 2034	03	WENSMAN	2.8	3.5	26.0	29.3	4.0	18.5	22.4	25.9
K-0350	03	KAYSTAR	4.5	4.5	18.0	15.6	3.5	19.3	34.8	25.2
I 0300	03	INTERST/GARST	4.3	3.5	19.5	17.2	3.0	23.8	32.3	24.8
O314RR	03	NORTHSTAR	4.5	4.5	18.5	12.9	3.0	22.3	29.0	21.0
0417RR	04	NORTHSTAR	3.0	3.0	23.5	34.0	3.5	18.8	24.5	29.3
RT0476	04	CROPLAN	3.5	3.5	23.0	29.9	3.0	23.8	24.2	27.1
DSR-040	04	DAIRYLAND	3.0	4.5	26.8	26.5	4.0	23.3	16.7	21.6
		Experimental Mean	3.1	3.3	24.1	32.6	3.1	20.4	29.0	30.8
		L.S.D. 0.05	1.1	1.2	4.2	12.8	1.0	3.4	6.3	

[1] Iron Chlorosis score from 1-5, 1= no yellowing and 5 = severely chlorotic or dead. Mean over scores taken July 15 and August 5, 2003.
[2] Vigor rating 1-5, 1 = good and 5 is poor.
[3] Yield bu/acre corrected to 13% moisture and 60 lb/bu testweight

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Roundup Ready Soybean Plots — Norman County

Cooperator: Doug Nelson
Nearest Town: Ada
Previous Crop: Wheat
Planting Date: May 28, 2003
Harvest Date: October 13, 2003
Herbicide: Raptor + Select
Soil Test: Olsen P 10 ppm; Potassium - 156ppm; Organic matter - 4.70%; pH - 8.3; Carbonate - 10.10%; Salts - 0.54mmho/cm

Varieties replicated 4 times
*** Protein & oil data from one replicate only**

Company	Variety	Maturity	Yield/Acre	Protein %	Oil %
Kaystar/Vanseeds	K-0505	0.5	29.5	35.0	18.4
Pioneer	90M90	0.9	29.4	31.7	18.9
Asgro	AG0301	0.3	29.3	32.7	19.8
Stine	S0536-4	0.5	29.1	33.0	18.9
Garst	0901	0.9	29.0	30.7	19.7
Garst	XR05Y05	0.5	27.9	32.3	19.1
Prairie Brand	PB - 0799	0.7	27.1	33.2	19.1
Pioneer	90B51	0.5	27.0	33.8	19.1
Hyland Seeds	Regal	0.5	26.9	34.9	18.6
Mycogen/Atlas	5B051	0.5	26.6	35.5	18.2
Dyna-Gro	34G02	0.2	25.6	33.3	20.1
Prairie Brand	PB - 0232	0.2	25.4	32.3	20.1
Dyna-Gro	30d09	0.1	25.1	32.9	19.8
Asgro	AG0601	0.6	25.0	33.4	19.0
Mycogen/Atlas	5B031	0.3	24.5	33.0	19.1
Legend	LS0082	0.1	24.5	34.2	19.5
Seeds 2000	0071	0.1	24.4	36.3	17.7
Legend	LS0601	0.6	24.3	32.7	19.2
NK Brand	S06-L6	0.5	24.3	34.5	17.5
Dyna-Gro	38d05	0.5	24.0	34.0	17.7
Prairie Brand	PB - 0532	0.5	23.8	33.3	19.0
Garst	XR03Y43	0.3	23.5	31.9	20.6
Stine	S0236-4	0.2	23.2	33.7	19.8
Pioneer	90B74	0.7	23.1	31.9	19.4
Seeds 2000	2070	0.7	22.4	36.4	17.7
Mycogen/Atlas	5B021	0.1	22.4	33.4	20.2
NK Brand	S02-G2	0.2	22.3	32.3	19.0
Legend	LS0991	0.2	21.9	35.6	18.6
Dekalb	DKB0651	0.6	21.8	32.7	19.7
Seeds 2000	2021	0.2	17.0	32.1	20.1
LSD .05			**6.1**	*	*

For additional information:
Ken Pazdernik - Pazdernik Agronomy Services

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Supplying Phosphorus for Sugarbeet Production with 10-34-0 Banded with the Seed—Marshall County

Cooperator: Earl Reopelle
Nearest Town: Argyle or Alvarado, Minn.
Soil Type: Colvin-Fargo clay
Tillage: Fall chiseled and spring field cultivated
Previous Crop: Spring Wheat
Variety: Beta 6600
Planted: May 8, 2003
Row Width: 22”
Fertilizer: Nitrogen fertilizer was applied in the fall of 2002 to meet University of Minnesota N recommendations based on the soil test nitrate-N level in a 4 ft deep soil sample. Phosphorus fertilizer as applied at various rates and sources in randomly selected plots as part the treatment structure of the experiment.
Herbicides: Microrates applied three times from June 2 – June 19 and consisted of a mixture of Betamix, UpBeet, Stinger, Select, and MSO.
Harvest Date: October 6, 2003
Experimental Design: Randomized complete block with four replications

Purpose of Study:
The objective was to determine the effect on sugarbeet root yield and quality of 3 gals 10-34-0 A^{-1} applied in the seed furrow at planting and compared that effect to that of various broadcast phosphorus fertilizer rates and increased rates of 10-34-0.

Results:

Earlier experiments on loam soils have shown that the application of 3 gals 10-34-0 A^{-1} in furrow with the seed resulted in sugarbeet root yields equal to or exceeding those of broadcast P fertilizer applied at University of Minnesota recommended rates. Applying P fertilizer in addition to the 3 gal A^{-1} 10-34-0 as either broadcast P fertilizer or additional amounts of 10-34-0 has never increased sugarbeet root yields above those achieved with 3 gals A^{-1} 10-34-0 alone.

The soil at the Reopelle farm was a fine textured clay soil with a fall soil P test level of 4 ppm. Banded rates of 10-34-0 increased sugarbeet root yield compared to the check with no P fertilizer applied (Fig 1). There was no difference in sugarbeet yields among treatments with 10-34-0 applied at various rates.

Three gals 10-34-0 A^{-1} banded in the seed furrow at planting resulted in root yields similar to that achieved with high rates of broadcast P fertilizers (Fig 2). Additional rates of broadcast P with 3 gals 10-34-0 A^{-1} did not improve root yields compared to 3 gals 10-34-0 A^{-1} alone. Maximum sugarbeet root yields were obtained with either 3 gals 10-34-0 A^{-1} or with 45 to 60 lbs P_2O_5 A^{-1} broadcast. Though 3 gals 10-34-0 A^{-1} only applies about 12 lbs P_2O_5 A^{-1}, root yields were not improved with additional amounts of P fertilizer either as increased rates of 10-34-0 in the furrow (Fig 1) or with broadcast P fertilizer (Fig 2).

There was no difference in net sugar concentration among any of the treatments. Net sugar averaged about 16.2% across all treatments.

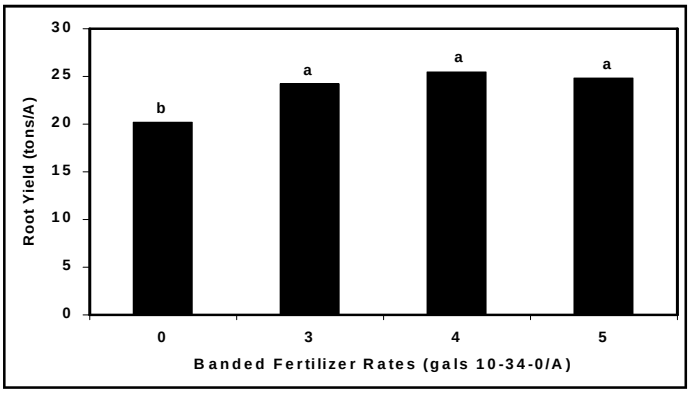


Fig 1. Sugarbeet root yield response to varying rates of 10-34-0 fertilizer banded in the furrow with the seed at planting time. Columns with the same letter at the top were not significantly different (LSD=0.05)

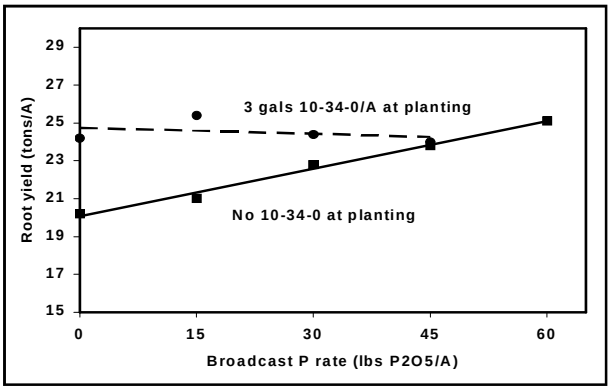


Fig 2. Sugarbeet root yield response to various rates of broadcast P fertilizer with and without 3 gals 10-34-0 A^{-1} applied in the seed furrow at planting.

Funding:
Minnesota and North Dakota Sugarbeet Research and Extension Board

For additional information:
Dr. Albert Sims

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Inputs for Wheat Production: What's Economic, What's Not?

Russ Severson – Polk County Ext. Educator
George Rehm – Ext. Soils Scientist
Albert Sims – NWROC Soil Scientist
Doug Holen – Ottertail County Ext. Educator
Char Hollingsworth – Ext. Plant Pathologist

Each year hard red spring wheat producers are faced with difficult decisions regarding choices for crop production inputs. Some practices such as fertilizer and herbicide use have clearly been shown to be economical. The economic value of practices such as seed treatment, insecticide and fungicide applications are not well understood with changing environmental influences for this region. An individual practice may be economically beneficial in one year but not in others. Therefore, a study was initiated in 2003 to evaluate the agronomic and economic impact of various discretionary inputs available to producers.

Experiments were conducted at three locations in Northwestern Minnesota; the Don Bradow Farm near Fergus Falls, U of M Northwest Research and Outreach Center near Crookston and Chris and Ken Hove Farm near Fosston. The research areas were fertilized based on a 60-bushel yield goal and recommended herbicides were used for weed control. Seven treatments were randomly assigned to plots and replicated four times at each location. Table 1 describes the seven input management systems or treatments tested. The various inputs of each management system are designated by a "YES" or "NO" in the table. With respect to seeding rate, a "YES" indicates a seeding rate based on seed count and a "NO" indicates that seeding rate was based on bushels per acre. The herbicide + fungicide treatment "YES," indicates a fungicide added with the herbicide and "NO" indicates no fungicide added.

Table1. Input management strategies

Treatment	Seeding rate	Herb + Fung	Fung + Insect	Fung + Fert	Seed trt
	choice	3 lf stage	flag lf	heading	
1	Yes	Yes	Yes	Yes	Yes
2	No	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	No
4	Yes	No	Yes	Yes	Yes
5	Yes	Yes	No	Yes	Yes
6	Yes	Yes	Yes	No	Yes
7	No	No	No	No	No

The best-suited wheat variety was chosen for each environment based on previous University variety testing data. The variety Oxen was seeded at the Fergus Falls location, Alsen at the Fosston location and Ingot at the Crookston site. Seeding rates were either 1.25 million live seeds per acre (YES) or 1-1/3 bushel per acre (NO). Vitavax Extra was applied as a seed treatment at 5 oz. Per 100 pounds of seed on treatments 1,2,4,5 and 6. The three-leaf stage fungicide treatment was an application of Tilt applied at 2 oz./acre. The fungicide + insecticide treatments (1,2,3,4, and 5) were Tilt at 2 oz./a + Penncap-M applied at 1 qt/acre. The heading treatment was Folicur at 4 oz/acre + 20-0-0-3 liquid fertilizer at 10 gallons per acre. Individual input costs are listed in Table 2 and total input costs per treatment are shown in Table 3. Table 3 includes a $ 4.00/ac application charge for each treatment except the 3 leaf state treatment, which was in combination with the standard herbicide application. Table 4 lists the net economic gain or loss based on yield and treatment input costs for each treatment compared to treatment 7, which had none of the tested inputs applied. Hard red spring wheat price of $ 3.40 per bushel was used in the calculations for net gain or loss.

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Inputs for Wheat Production - *(continued)*

Table 2. Itemized cost for each experimental input based on spring retail prices.

Input	Rate	Cost/ac.
Seeding rate	1.25 MLS/ac.	$1.00
Vitavax Extra	5 oz./100 lbs. seed	$2.03
Tilt (1/2 label rate)	2 oz./ac.	$11.55
Folicur (full label rate)	4 oz./ac.	$9.60
20-0-0-3	20 lb. N/ac.	$6.45
Application charge	$/ac.	$4.00

Table 3. Total cost per treatment.

Treatment	1	2	3	4	5	6	7
Input cost	$43.43	$42.17	$41.10	$38.63	$27.88	$23.38	$0.00

Table 4. Net gain or loss based on yield and management strategy input costs.

Treatment	Crookston	Fosston	Fergus Falls
1	-$35.27	-$54.99	-$31.19
2	-$35.71	-$45.23	-$40.13
3	-$31.88	-$26.78	-$31.54
4	-$31.83	-$34.55	-$34.55
5	-$38.08	-$26.86	-$23.80
6	-$26.78	-$19.30	-$7.74
7	$0.00	$0.00	$0.00

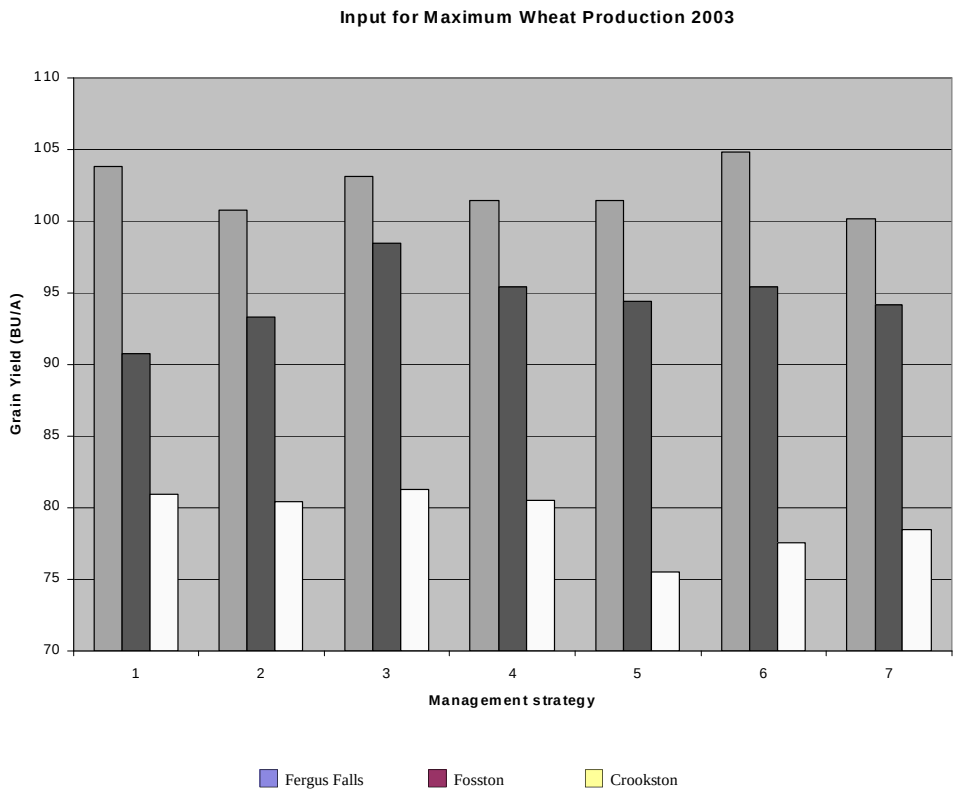
Figure 1 shows the yield response from each location relative to the seven management strategies. There were no significant statistical differences in yield when comparing management strategy 1(all tested inputs applied) or 7 to management strategy 2 through 6. Management strategy 7 consistently appeared to have more leaf disease damage at all three locations but disease injury did not translate into reduced yield or thousand kernel weights at any of the sites.

In 2003, at all three locations, additional inputs for hard red spring wheat production were not economical taking into account the cost of the input and relative yield increase or decrease compared to management strategy 7 which had no additional inputs applied. The 2003 environmental conditions were not conducive to insect and disease damage however under favorable environmental conditions these results may be quite different.

This is the first year of a two-year trial investigating inputs for wheat production, which inputs are economic and which inputs are not. The trial will again be conducted in 2004 at all three locations.

Appreciation is expressed to the Minnesota Wheat Grower's for providing financial support for this research. A special "thank you" is also expressed to the cooperating wheat producers who provided their land and the NW Research and Outreach Center who provided their land and plot equipment to conduct this research.

Figure 1 Wheat yield response at Crookston, Fosston and Fergus Falls, 2003



Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Red River On-Farm Variety Trials - Spring Wheat
W. Otter Tail, Norman, Red Lake, Pennington, & Kittson Counties

Cooperators: Don Bradow, Brian Hest, Ray Swenson, Jim Kukowski, Gerald Olsonowski
Nearest Town: Fergus Falls, Perley, Brooks, Strathcona, Hallock
Soil Type: Sandy Loam, Clay Loam, Sandy Loam, Clay Loam, Clay Loam
Previous Crop: n/a
Planting Date: April 15, April 15, April 16, April 24, April 21
Row Width: 6 inches
Fertilizer: 60 bu yield goal
Herbicide: Puma / Bronate
Planted Populations: 1,250,000 plants/Acre
Harvest Date: August 6, Not Harvested, August 18, August 16, August 16
Experimental Design: Randomized Complete Block

Table 1: Locations of the 2003 Red River Valley On-Farm Yield Trials.

	Location	Cooperator	Planting Date	Harvest Date
1	Fergus Falls	Don Bradow	April 15	August 6
3	Perley	Brian Hest	April 15	Not harvested
4	Oklee	Ray Swenson	April 16	August 18
7	Strathcona	Jim Kukowski	April 24	August 16
8	Humboldt	Gerald Olsonowski	April 21	August 16

Purpose of Study:

To evaluate wheat varieties in 5 environments in 2003.

Table 2: Hard Red Spring Wheat entries in the Red River On-Farm Yield Trials (2001-2003)

Breeder	Cultivar	Year Released	2001	2001	2003
AgriPro	NorPro	2000	x	x	x
	Hanna	2001		x	x
	Knudson	2001		x	x
Northstar Genetics	Mercury	1998	x	x	x
NDSU	Parshall	1999	x	x	x
	Reeder	1999	x	x	x
	Alsen	2000	x	x	x
	Dapps	2003			x
SDSU	Oxen	1996	x	x	x
	Ingot	1998	x	x	x
	Walworth	2000	x	x	x
	Briggs	2002		x	x
Univ. of Minnesota	Verde	1995	x	x	x
	Oklee	2003	x	x	x
Western Plant Breeders	Granite	2001		x	x

Red River On-Farm Variety Trials - Spring Wheat - *(continued)*

Table 3. Relative yield expressed as a percentage of the trial mean across all locations 2003 and multi-year (2001-2003) comparisons and agronomic characteristics of cultivars entered in the Red River Valley On-Farm Yield Trials.

Across All Locations

Cultivar	1-Year	2-Year	3-Year	1-Year Data			
	% of mean			Plant Height (inches	Lodging (1-9)	Test Weight (Lbs/Bu)	Protein %
Ingot	94.7	90.1	92.6	37.7	3.2	**63.0**	15.1
Walworth	100.8	100.7	102.7	34.5	**5.3**	60.1	14.6
Oklee	104.3	102.8	102.4	32.6	3.5	62.5	14.7
Briggs	101.0	103.7	-	33.3	3.7	61.6	14.6
Oxen	**110.3**	107.5	**106.7**	31.3	3.0	59.9	13.9
Alsen	95.0	96.1	95.3	32.8	3.0	61.5	14.8
Hanna	97.1	90.4	-	39.6	2.8	61.6	14.4
Dapps	87.5	-	-	37.0	3.3	60.6	**15.8**
Parshall	94.6	90.4	91.3	36.4	3.5	61.5	14.8
Reeder	100.3	99.3	100.5	32.8	2.7	60.8	14.9
Knudson	102.2	**109.9**	-	31.1	3.0	61.4	13.8
Mercury	101.2	105.0	104.7	**28.6**	3.3	60.6	13.6
Norpro	102.7	94.4	97.4	31.0	3.5	59.9	13.9
Verde	105.3	106.7	102.2	31.8	2.8	61.2	13.7
Granite	96.2	96.9	-	30.8	1.2	62.4	15.5
C.V.	7.8	10.4	9.9	5.5	25.0	1.7	3.1
LSD (5%)	9.6	8.2	5.8	2.1	1.5	1.2	0.6
Mean (Bu/A)	85.2	59.7	60.3	33.5	3.2	61.2	14.5

Partnership and funding information: NWROC

Doug Holen, Ken Pazdernik, Russ Severson, Curtis Nyegaard, Vince Crary, Clair Althoff, Jim Stordahl, Howard Person, Nathan Johnson, Hans Kandel

For additional information:

Jochum Wiersma

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Red River On-Farm Variety Trials - Spring Barley
W. Otter Tail, Norman, Red Lake, Pennington, & Kittson Counties

Cooperator: Don Bradow, Brian Hest, Ray Swenson, Jim Kukowski, Gerald Olsonowski
Nearest Town: Fergus Falls, Perley, Oklee, Strathcona, Humboldt
Soil Type: Sandy Loam, Clay Loam, Sandy Loam, Clay Loam, Clay Loam
Previous Crop: n/a
Planting Date: April 15, April 15, April 16, April 24, April 21
Row Width: 6 inches
Fertilizer: 60 bu yield goal
Herbicide: Puma / Bronate
Planted Populations: 1,250,000 plants/Acre
Harvest Date: August 6, Not Harvested, August 18, August 16, August 16
Experimental Design: Randomized Complete Block

Table 1. Locations of the 2002 Red River Valley On-Farm Yield Trials.

	Location	Cooperator	Planting Date	Harvest Date
1	Fergus Falls	Don Bradow	April 15	July 28
3	Perley	Brian Hest	April 15	July 28
4	Oklee	Ray Swenson	April 16	August 4
7	Strathcona	Jim Kukowski	April 24	July 30
8	Humboldt	Gerald Olsonowski	April 21	July 30

Purpose of Study:

To evaluate barley varieties in 5 environments in 2003.

Table 2: Spring barley entries on the Red River Valley On-Farm Yield Trials (2001-2003).

Breeder	Cultivar	Type	Year Released	2001	2002	2003
Anheuser Busch	Legacy*	6-row	2000	x	x	x
NDSU	Conlon*	2-row	1995	x	x	x
	Foster*	6-row	1995	x	x	x
	Drummond*	6-row	2000	x	x	x
U of MN	Robust*	6-row	1983	x	x	x
	Lacey*	6-row	2000	x	x	x

* AMBA approved malting barley cultivars.

Red River On-Farm Variety Trials - Spring Barley - *(continued)*

Table 3: Relative yield expressed as a percentage of the trial mean across locations for 2003 and multi-year (2001-2003) comparisons and agronomic characteristics of cultivars entered in the Red River Valley On-Farm Yield Trials.

Cultivar Variety	Across All Locations							
				3-Year Data				
	1-Year	2-Years	3-Years	Plant Height (inches)	Lodging	Plump %	Test Weight lbs./bu.	Protein %
	—— % of mean ——							
Conlon*	91.2	93.6	94.3	26.6	6.6	**92.9**	**46.9**	13.3
Foster*	101.4	102.5	104.1	28.0	4.0	89.9	42.7	**12.9**
Drummond*	97.1	95.1	97.5	26.8	4.0	86.3	43.6	13.4
Robust*	93.2	94.4	96.3	29.3	4.5	85.2	44.1	13.7
Lacey*	103.3	**104.3**	**104.5**	27.0	4.3	86.3	44.9	13.5
Legacy*	**105.4**	101.4	103.2	28.3	3.7	85.2	43.1	13.3
CV	5.5	8.5	10.1	9.2	22.9	4.7	3.4	4.0
LSD (5%)	6.5	6.5	6.2	1.4	0.7	3.3	0.7	0.3
Mean (bu/A)	134.2	93.1	87.0	27.6	4.5	87.7	44.3	13.3

Partnership and funding information: NWROC

Doug Holen
Vince Crary
Ken Pazdernik
Russ Severson
Curtis Nyegaard
Clair Althoff
Hans Kandel
Jim Stordahl
Howard Person
Nathan Johnson

For additional information:
Jochum Wiersma

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Zone Tilled Corn—Stearns County

Cooperator: John and Marie Illies
Soil Type: Clay Loam
Previous Crop: Soybeans
Hybrid: Pioneer 38A25
Planting Date: May 3, 2003
Row Width: 30”
Fertilizer: 4.5 T/A Chicken Manure
Herbicide: Basis 0.33 oz/a
Clarity 4 oz/a
Atrazine 1/2# 90 df
COC 1 qt/a
AMS 2 1/2 #/a
Plant Populations: 33,600
Harvest Date: October 17, 2003

Nearest Town: Elrosa
Tillage: Ridge Till

Purpose of Study

To compare zone tilled yield, grain moisture, and planting temps to a non deep tillage system. Subsoiler was used Fall 2002 at a 20” depth and pulled through wet and dry field conditions.

Results: Grain yield, moisture and soil temps were not affected by deep ripping. Poor drainage had a larger affect on yield and plant growth than tillage. The soil moisture treatments were areas that were either “dry” or “wet” within the same production field

Corn Yield (bu/a)

	Wet	Dry
No Zone	154.4	183.3
Zone Tilled	155.5	184.9
LSD (0.10)	NS	NS

Corn Moisture %

	Wet	Dry
No Zone	21.6	22.6
Zone Tilled	22.3	21.5
LSD (0.10	NS	NS

Soil Temp at 2” 1 Week Prior to Planting

	Wet	Dry
No Zone	46.8	49.0
Zone Tilled	47.1	50.6
LSD (0.10)	NS	NS

For additional information:
Jodi DeJong-Hughes

Partnership:
University of Minnesota—George Rehm and Deb Allan
USDA-ARS Soils Lab—Jane Johnson, Ward Voorhees
WCROC, Centrol Consulting, Pioneer Hybrid Company

Funding:
Crop Production Research Funds

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Corn Silage Hybrid Evaluation—Otter Tail County

Cooperator: Dan Dreyer
Nearest Town: Otter Tail
Previous Crop: Soybean
Planting Date: April 26-27
Row Width: 36”
Fertilizer: 50 lb. N credit from manure, 40 lb. N credit from soybean; 95 lb. N, 11 lb. P, 67 lb. K, 5 lbs. S, and 1/8 lb. S per acre synthetic fertilizer
Pesticides: Kernelguard Supreme applied in planter box, Clinch broadcast pre-emergence, Distinct broadcast post-emergence
Harvest populations: 26,000 seeds/acre
Harvest Date: September 11-12
Experimental Design: Randomized complete block, 2 replications

Purpose of Study:
Provide yield and quality comparison of corn silage hybrids for west central Minnesota.

Results:
Silage yields ranged from 16.6 to 19.6 ton/acre. Milk per ton and milk per acre, as calculated using Milk2000 developed by the University of Wisconsin, averaged 3,300 and 22,500, respectively, and did not differ among entries. Entries did not differ in NDF content, but NDF digestibility varied among entries (at 0.20 level), ranging from 50 - 54% of NDF.

Table 1. ***Relative maturity (RM), whole-plant moisture (moist.), silage yield, and quality traits for corn hybrids planted at Ottertail, MN (Otter Tail County) in 2003.[1]***

				Yield [2]		Concentration [3]					Milk [4]	
Brand	Hybrid	RM rating	Moist. %	DM - ton/acre -	Silage - ton/acre -	CP %	NDF %	IVD %	NDFD %	Starch %	Ton lb/ton	Acre lb/acre
Hyland	HL S058	102	66.2	6.6	19.6	8.2	44	80	54	30	3,369	22,335
Dyna Gro	DG55227	100	61.4	6.7	17.5	7.5	44	79	52	32	3,255	21,926
Hyland	HL S041	98	61.8	7.0	18.3	8.1	40	81	53	35	3,484	24,432
Mycogen	TMF 2M405	97	62.6	7.4	19.8	8.2	44	78	50	33	3,181	23,519
Producer Hybrid	5611	96	62.8	7.0	18.8	7.8	41	80	53	35	3,426	23,944
Mycogen	2D421	95	57.4	7.1	16.6	7.7	42	79	50	34	3,171	22,481
Wensman	W4164	93	60.7	6.6	16.7	7.8	43	79	51	33	3,229	21,203
Dyna Gro	DG5195	92	63.3	6.1	16.7	8.4	43	80	54	33	3,420	20,987
Hyland	HL S034	90	58.9	6.8	16.6	7.9	42	79	51	36	3,242	22,172
	Means		61.7	6.8	17.9	8.0	43	79	52	33	3,309	22,555
	LSD (0.10)		ns	ns	ns	0.3	ns	ns	ns	ns	ns	ns
	CV		4.0	7.1	7.6	2.6	5.1	2.1	3.6	5.8	5.4	6.7

[1] Planted April 26-27 at 26,000 seeds/ac on 36” rows; central pivot irrigation; harvested September 11-12.

[2] **DM** yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

[3] CP is crude protein, NDF is neutral detergent fiber, IVD is in vitro digestibility, and NDFD is NDF digestibility; Concentrations are expressed as a % of DM, except NDFD which is expressed as a % of NDF.

[4] Milk estimate values calculated using spreadsheet MILK2000 developed by the University of Wisconsin.

For additional information:
Vince Crary
Doug Holen
Paul Peterson

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Annual Crops for Emergency Forage—Otter Tail County

Cooperator: David Sjostrom (farmer)
Nearest Town: Pelican Rapids
Tillage: Conventional
Previous Crop: Alfalfa
Planting Dates: May 16, June 16 and July 2
Row Width: Corn and forage sorghum 30", all other list crops 7"
Fertilizer: 6000 gallons/acre dairy manure; no synthetic fertilizer; soil test P and K high
Herbicides: Accent (corn), 2,4-D (forage sorghum, sorghum-sudan, sudangrass, Japanese millet, and pearl millet), Basagran (barley, small grain-pea, soybean, and foxtail millet), and Raptor (alfalfa and chickling vetch)
Experimental Design: Randomized complete block, 3 replications nested within planting dates

Purpose of Study:

Determine the influence of planting date on yield potential of annual crops planted for emergency forage in west central Minnesota.

For additional information:

Paul Peterson, Extension Agronomist
Doug Holen
Vince Crary

Other Collaborators:

Jacob Drevlow
Marcia Endres
Craig Scheaffer
Jim Halgerson
Doug Swanson
Joshua Larson

Partnership/Funding:

MDA Energy and Sustainable Agriculture Program, NCR, SARE Producer Grant Program

Results:

Precipitation was 2.6" above normal in May – June, but 5.0" below normal in July-September, resulting in significant drought stress and thus reduced forage yields. Forage yields of entries varied substantially, both within and among planting dates. Averaged across all entries, planting delayed until June 16 or July 2 reduced total season forage yield by about 30 and 50%, respectively, compared to planting May 16. The mid- and early-maturity corn silage hybrids were the highest yielding entries for the May 16 and June 16 planting dates. In contrast, for the July 2 planting date, forage yields were greatest for forage sorghum, sudangrass, sorghum-sudan, late maturity corn, and pearl millet. Corn populations were generally thinner than desired, so silage production potential was probably underestimated. In addition, deer damage to soybean and potato leafhopper damage to alfalfa resulted in reduced yields for those forages. Forage quality data has not been determined.

Annual Crops for Emergency Forage—Otter Tail County (continued)

Influence of Planting Date on Forage DM Yield of Single- and Multiple-Cut Annual Crops at Pelican Rapids, MN, in 2003

***Bold** values indicate which entries were statistically highest yielding for each planting date.*

			Planting Date						
			May 16		June 16		July 2		Entry
Species	Variety	Source	DM Yield	Harvest(s)	DM Yield	Harvest(s)	DM Yield	Harvest(s)	Average
			T DM/ac	*DAP [1]*	*T DM/ac*	*DAP[1]*	*T DM/ac*	*DAP[1]*	*T DM/ac*
Corn	80 day	Mycogen 1877	**5.90**	*98 (23K) [2]*	**5.23**	*99 (27K)[2]*	2.51	*96 (19K)[2]*	**4.55**
Corn	90 day	Mycogen 2395	**6.75**	*104 (21K)[2]*	**5.43**	*112 (28K)[2]*	2.50	*96 (15K)[2]*	**4.97**
Corn	100 day	Mycogen 2587	4.85	*104 (18K)[2]*	4.32	*112 (27K)[2]*	**2.76**	*96 (20K)[2]*	4.13
Forage Sorghum	Dairy Master	Olds Seed Solutions	4.38	*104*	4.41	*112*	**3.41**	*96*	4.07
Japanese Millet		Olds Seed Solutions	2.34	*55, 82, 124*	0.58	*38, 64, 93*	1.06	*44, 77*	1.33
Pearl Millet	Hybrid	Olds Seed Solutions	3.48	*55, 82, 124*	2.80	*38, 64, 93*	**2.64**	*44, 77*	2.97
Sudangrass	Greenleaf	Croplan Genetics	4.76	*55, 82, 124*	3.71	*38, 64, 93*	**2.97**	*44, 77*	3.81
Sorghum-Sudan	Greantreat IV	Croplan Genetics	4.34	*55, 82, 124*	3.15	*38, 64, 93*	**2.89**	*44, 77*	3.46
Sorghum-Sudan	Drip-O-Honey BMR	Croplan Genetics	4.62	*55, 82, 124*	2.81	*38, 64, 93*	2.22	*44, 77*	3.21
Foxtail Millet	Manta Siberian	Agassiz	2.93	*66*	1.73	*51*	1.52	*51*	2.06
Foxtail Millet	German	Agassiz	5.21	*77*	3.43	*64*	**2.61**	*69*	3.75
Soybean[3]	B076RR (RM 0.7)	Mycogen	2.87	*95*	2.05	*85*	na	*na*	2.54
Soybean[3]	X5325RR (RM 2.5)	Mycogen	2.90	*104*	2.29	*99*	1.23	*83*	2.25
Barley/Pea	Robust/Trapper	Agassiz	3.40	*55*	1.74	*60*	1.26	*57*	2.13
Oat/Pea	Jerry/Trapper	Agassiz	3.09	*55*	1.14	*60*	1.25	*51*	1.82
Barley	Westford	Agassiz	3.06	*55*	1.30	*60*	0.86	*69*	1.74
Alfalfa[4]	WL 319HQ		1.04	*62, 91*	0.35	*60*	0.00	*na*	0.46
Chickling Vetch	AC Greenfix	Dakota Frontier	1.38	*62*	0.87	*60*	0.42	*77*	0.89
Planting Date Average			3.68		2.64		1.87		2.76
LSD (0.05)			0.89		0.89		0.89		0.51

[1] Days after planting
[2] Harvested plant population per acre

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Plumeless Thistle Control and Pasture Management—Wadena County

Cooperator: Bill Case
Nearest Town: Sebeka
Previous Crop: Permanent Pasture
Research Design: Randomized Complete Block (3 reps)

Purpose of Study:

1. Demonstrate effective chemical and cultural strategies for managing plumeless thistle.
2. Improve the profitability and sustainability of grazing systems.

Application and Environmental Information:

Date:	May 14, 2002	October 16, 2002
Application:	POST	POST
Sky:	Clear	Overcast
Wind (mph):	1-2 SW	2-3
Temperature:	56 F	38 F
Legumes:	Thin stand	Sparse stand
Grasses:	Primary component	Primary component
Thistle Stage:	2-8" wide rosette	3-8" wide rosette
Timing:	**Rosette**	**Fall**

* 10-16-02 – Application was made after killing frost.

Table 1: Plumeless Thistle Control with Herbicides - Sebeka, MN 2002-2003

					Plumeless Thistle % Control			
	Treatment	**Cost /A**	**Rate Product/A**	**Timing**	**5-29-02**	**8-05-02**	**9-20-02***	**9-25-03****
1	2,4-D / 2,4-D	$3.15/ 3.15	2 pt 2 pt	Rosette + Fall	68	96	35	70
2	Clarity + NIS/ Clarity + NIS	11.80/ 11.80	1 pt + 0.5% 1 pt + 0.5%	Rosette + Fall	74	100	88	98
3	Redeem/ Redeem	12.20/ 12.20	1.5 pt 1.5 pt	Rosette + Fall	83	99	98	98
4	Redeem	12.20	1.5 pt	Rosette	82	100	95	93
5	Redeem/ Redeem	6.10/ 6.10	0.75 pt 0.75 pt	Rosette + Fall	75	98	87	96
6	Redeem	6.10	0.75 pt	Rosette	77	99	95	99
7	Curtail/ Curtail	8.75/ 8.75	2 pt 2 pt	Rosette + Fall	70	83	68	83
8	Curtail/ Curtail	4.35/ 4.35	1 pt 1 pt	Rosette + Fall	67	99	85	100
9	Cimarron + NIS/ Cimarron + NIS	6.50/ 6.50	0.25 oz + 0.5% 0.25 oz + 0.5%	Rosette + Fall	78	90	27	67
10	Cimarron + NIS + 2,4-D	9.65	0.25 oz + 0.5% + 2 pt	Rosette	75	93	50	42
11	Cimarron + NIS + 2,4-D	6.35	0.1 pt + 0.5% + 1 pt	Rosette	70	90	45	38
12	Cimarron + Rangestar/ Cimarron + Rangestar	9.18/ 9.18	0.25 oz + 1 pt 0.25 oz + 1 pt	Rosette + Fall	77	88	28	88
13	Cimarron + Rangestar/ Cimarron + Rangestar	14.68/ 14.68	0.5 oz + 1 pt 0.5 oz + 1 pt	Rosette + Fall	81	99	62	93
14	Nontreated				5.0	0.0	3	33
	LSD (0.05)				12	15	45	45

* Residual control of newly established rosettes
** In-season and residual control of plumeless thistle

- 5-21-03, 40 units of Nitrogen (46-0-0) broadcast applied to site ($0.17/Unit or $6.80/A).
- Herbicides were applied to the center 6.6 feet of 10ft wide x 25 ft long plots with a CO_2 backpack sprayer delivering 10 gpa at 30 psi and equipped with XR80015 flat fan nozzles.
- Site is longtime established pasture grazed annually with horses.

Plumeless Thistle Control and Pasture Management— (continued)

Results

Plumeless thistle is a noxious and highly invasive weed across MN. It is a biennial plant reproducing only by seed and is commonly found in pastures, CRP, and wastelands. Long term management of plumeless thistle must focus on preventing seed production over several consecutive years to deplete the seed bank present in the soil.

A critical component of plumeless thistle control is correct timing of the application. Previous research has shown that herbicide applications in the rosette stage (mid May) and late fall are the most effective.

This research was conducted on an actively grazed horse pasture with heavy and uniform plumeless thistle populations. Treatments included five broadleaf herbicides (labeled for thistle control and grazing systems), and two application timings (rosette and rosette + fall). All herbicides, applied in the spring in 2002, provided excellent in-season control of plumeless thistle at the 8-05-02 (Table 1) evaluation. Plumeless thistle control on 9-20-02 is an estimate of the percent reduction of newly germinating plumeless thistle seedlings from herbicides applied in the spring. Visual control ratings of plumeless thistle on 9-25-03, at the conclusion of the two year study, ranged from 38 (Cimarron + 2,4-D) to 100 % (Curtail). This rating is an estimate of both the in-season control, of a fall application of herbicide, and the residual effect of herbicides on newly geminating plumeless thistle seedlings. Herbicides without residual efficacy on plumeless thistle require annual applications.

Redeem, Clarity and Curtail provided excellent immediate and residual control of plumeless thistle. 2, 4-D and Cimarron treatments provided excellent in-season control of plumeless thistle (8-05-02 rating), but did not provide residual control of new rosettes in the fall of 2002 (9-20-02 rating, 9-25-03 rating) or 2003. Costs of the treatments ranged from $3.15 (2,4-D single application) to $14.68 (Cimarron + Rangestar single pass).

Upon request, data exists from other sites involving additional application timings, herbicides and rates, and pasture systems.

Funding: U of MN Central Region Partnership

Partnerships: U of MN Central Region Partnership, Wadena County Land Resource Dept., DuPont Crop Protection

For additional information:
Doug Holen
Carlyle Holen
Bobby Holder
Vince Crary

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Effects of Donkey Grazing on Plumeless Thistle—Otter Tail County

Cooperator: Chad Moyer
Nearest Town: Wadena
Soil Type: Sandy Loam
Previous Crop: Pasture
Hybrid: Grass Pasture
Experimental Design: Randomized complete block with three replicates

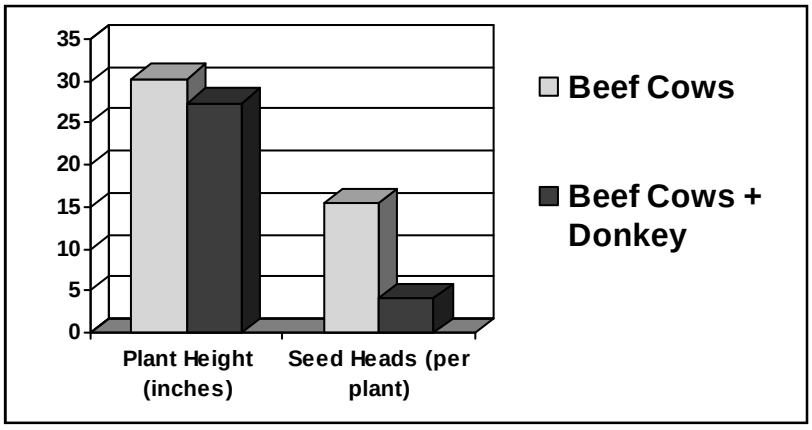
Purpose of Study:
Determine long-term effects of grazing donkeys on plumeless thistle infestations in pastures.

Introduction

Plumeless thistle is a highly invasive biennial plant that is abundant in overgrazed pastures across NW Minnesota. Control of plumeless thistle is possible with repeated herbicide applications over a period of years to deplete the seed bank present in the soil. However, some pastures are difficult to spray with herbicides due to trees, water, rocks, steep slopes, etc. and in these situations using animals such as donkeys to provide control may be more effective.

The research site selected was a small pasture that was heavily infested with plumeless thistle located at the Chad Moyer farm in Wadena, MN. The pasture was subdivided into 6 paddocks, with three 3 acre pastures that were grazed with two cow/calf pairs and three 2.5 acre pastures that were grazed by 1 donkey and 1 cow/calf pair. A permanent series of transect lines were established in each pasture to determine the influence of each animal grazing treatment on plumeless thistle infestations over time.

Figure 1. Effects of grazing animals on plumeless thistle



Results

Actively grazed plants were stimulated to produce additional branching and late season blossoms. Plumeless thistle in pastures with donkeys and a cow/calf pair were shorter in height and had substantially fewer seed heads than thistle in the pastures with only cow/calf pairs (see Figure 1). Results in this paper are data from the first year of a three year study.

All three donkeys in this trial actively consumed plumeless thistle flowers and flower buds, and to a lesser extent fed on leaves or stems. However, one of the donkeys ('Jake') had a greater affinity for consuming plumeless thistle than the other two; this is likely do to with parenting influences.

Partnership and Funding Information:
The Central Region Partnership in Staples, MN headed by Executive Director, Sharon Rezac Andersen

Acknowledgements:
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Dr. John Wiersma NWROC
Dr. Kevin Sedivec, NDSU
Luke Samual, student NDSU

For additional information:
Vince Crary
Carlyle Holen
Bobby Holder
Doug Holen

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Northern Minnesota Pasture Forage Evaluation — Roseau County

Cooperator: **Hard Rock Dairy**
Nearest town: Warroad
Soil type: Loamy clay
Previous crop: Summer fallow, wheat prior to fallow
Planting date: May 31, 2002
Fertilizer: Grass monocultures received 50 lb N/ac after each harvest; grass-legume mixtures received no fertilization.
Harvest dates: June 24, Aug. 9, and Oct. 2, 2003

Purpose of study:
To compare forage legumes and grasses for northern Minnesota, thus identifying opportunities for pasture and/or hay species/varieties and mixtures.

Experimental Design:
Randomized complete block, 4 replications, 26 treatments (8 grass-legume mixtures, 18 grass monocultures), 5' X 20' plots

Results:
One year after seeding, meadow bromegrass, smooth bromegrass/alfalfa, pubescent and intermediate wheatgrass, orchardgrass, Courtenay tall fescue, and meadow fescue were the highest yielding of 26 monocultures and mixtures tested, averaging 3.7 ton DM/acre over three harvests. Smooth bromegrass/alfalfa, timothy/birdsfoot trefoil, tall fescue/red clover, and perennial ryegrass/ white clover had the highest forage quality based on RFQ index of the second and third harvests. Forage and turf perennial ryegrasses and Spring Green festulolium suffered significant winter injury during the first winter (2002-03), thus did not have harvestable yields until the third harvest in 2003. Kura clover established poorly, so grasses in mixture with kura clover were visibly N deficient, and grass/kura clover yields were low.

Yield and relative forage quality (RFQ) of forage monocultures and mixtures harvested three times in 2003 at Warroad, MN (seeded spring 2002) ***Entries listed in descending order of total season yield.***

		Total	June 24	August 2		October 2		Aug/Oct
Species or Mixture	**Varieties**	**DM Yld** *ton/acre*	**DM Yld** *ton/acre*	**DM Yld** *ton/acre*	**RFQ** *Index*	**DM Yld** *ton/acre*	**RFQ** *Index*	**RFQ** *Index*
Meadow Bromegrass	Paddock	**4.07**	**1.97**	**1.05**	104	1.05	149	125
Smooth Bromegrass/Alfalfa	Alpha/HybriForce 400	**3.83**	1.58	**1.19**	**141**	1.07	217	**177**
Pubescent Wheatgrass	Greenleaf	**3.81**	**2.12**	0.87	85	0.81	122	102
Orchardgrass	Justus (Early Mat.)	**3.71**	0.81	**1.27**	108	**1.63**	132	121
Tall Fescue	Courtenay	**3.66**	1.23	**1.11**	122	1.31	185	155
Meadow Fescue	WI Experimental	**3.57**	1.31	0.86	124	**1.39**	163	145
Orchardgrass	Orion (Late Mat.)	**3.53**	0.86	**1.21**	112	**1.45**	148	131
Intermediate Wheatgrass	1997 Seed	**3.51**	**1.76**	0.80	97	0.94	133	117
Smooth Bromegrass	Alpha	3.37	**1.72**	0.89	106	0.75	160	130
Timothy	Colt	3.23	1.25	0.97	124	1.02	197	162
Reed Canarygrass	Chieftan	3.20	1.23	**1.04**	93	0.93	155	123
Tall Fescue	Montebello	3.14	0.91	0.99	104	1.24	162	135
Tall Fescue	Select	3.02	1.08	0.87	116	1.06	167	143
Creeping Foxtail	Garrison	3.01	1.02	0.88	134	1.11	184	161
Festulolium	Hykor	2.95	0.89	0.95	125	1.11	163	146
Timothy/Birdsfoot Trefoil	Colt/Roseau	2.81	1.26	1.01	**150**	0.55	**249**	**183**
Tall Fescue/Red Clover	Montebello/Scarlet	2.63	0.75	**1.02**	**141**	0.86	218	**177**
Orchardgrass/Ladino Clover	Orion/Shasta	2.57	1.07	0.80	125	0.69	187	153
Reed Canarygrass/Kura Clover	Chieftan/NF-93	1.89	1.21	0.46	94	0.23	140	109
Perennial Ryegrass/Ladino Clover	BG-34/Shasta	1.78	0.13	0.69	**155**	0.95	200	**181**
Tall Fescue/Kura Clover	Montebello/NF-93	1.47	0.73	0.45	99	0.28	143	115
Orchardgrass/Kura Clover	Orion/NF-93	1.43	0.71	0.48	115	0.23	165	129
Perennial Ryegrass	BG-34	1.07	0	0	NA	1.07	164	**164**
Festulolium	Spring Green	0.93	0	0	NA	0.93	158	158
Perennial Ryegrass	WH x TQ	0.79	0	0	NA	0.79	138	138
Perennial Ryegrass	Grand Daddy	0.65	0	0	NA	0.65	181	**181**
Average		**2.68**	**0.99**	**0.76**	**117**	**0.93**	**168**	**144**
LSD (0.05)		**0.63**	**0.51**	**0.25**	**17**	**0.31**	**23**	**19**

RFQ = Relative Forage Quality: A new index similar to RFV, but includes NDF, digestibility in estimates of intake (DMI), and digestible energy (TDN).

Partnership or funding information: NRCS EQIP
Other collaborators: Donn Vellekson, Nancy Ehlke, and Jim Halgerson

For additional information:
Gene Krause and Paul Peterson

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Tile Drainage in Northwest Minnesota—Red Lake and Polk County

Cooperator: Keith and Ray Swenson, and the Northwest Research and Outreach Center
Nearest Town: Brooks and Crookston
Soil Type: Brooks: Vallers Loam, Crookston: Fargo Clay Loam
Fertilizer: Wheat 90 N, 41 P, 45 K, Soybeans 30 P, 50 K

Purpose of study:

Determine the effect of tile drainage on crop yields in northwest Minnesota.

Results:

Data was collected on soybeans and wheat at Brooks in 2001-03 and on soybeans, wheat, and sugarbeets at Crookston in 2002-03. At the Brooks site yield of wheat and soybean has not been affected by tile drainage with the exception of the 50 ft. spacing on wheat in 2003 (7 bu/A benefit). At the Crookston site wheat yields were greater on tiled plots in 2002, but not in 2003. Small increases in soybean yields were observed in Crookston in 2002, but not in 2003. Sugarbeet yields in tons/A and sugar/A were higher on tiled plots in both 2002 and 2003. Optimal tile spacing is difficult to determine from these results.

Rainfall received from April through September at Brooks was 15.78", 21.18", and 13.57" for 2001, 2002, and 2003 respectively. For the same period, Crookston received 24.79" in 2002 and 16.78" in 2003.

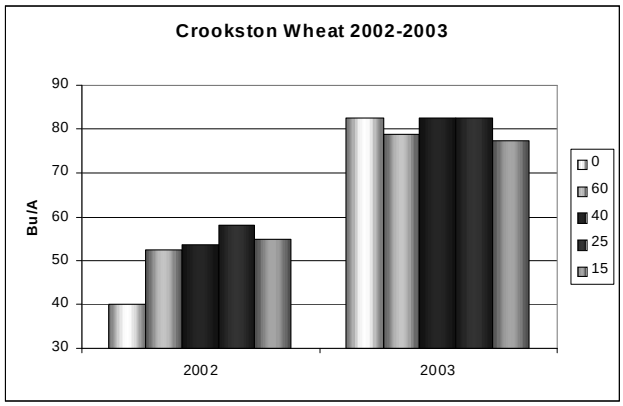
Wheat, Soybean, and Sugarbeet Yields: Brooks and Crookston 2001—2003

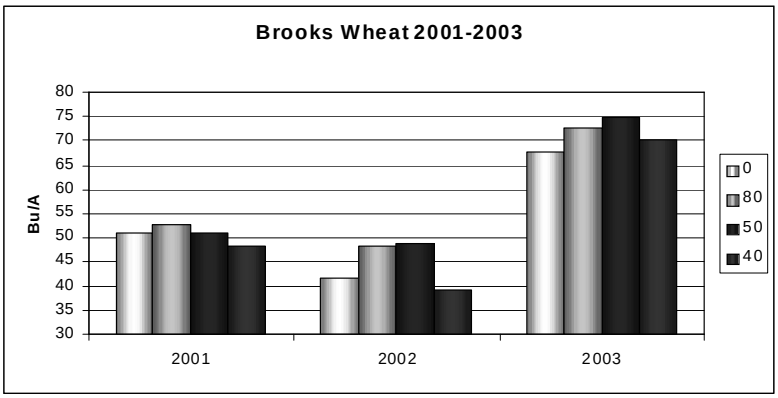
	Brooks Wheat (Bu/A)			Brooks Soybeans (Bu/A)		
Tile Spacing (Ft.)	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**
0	50.8	41.6	67.7	27	30.8	22.2
80	52.7	48.4	72.8	26.6	31	21
50	50.9	49	74.7	26.6	31.7	22.4
40	48.4	39.2	70.2	26.1	30	22.7
LSD (0.05)	-	-	5.8	-	-	NS

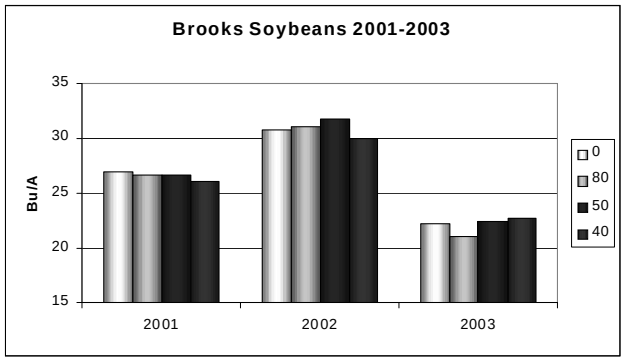
	Crookston Wheat (Bu/A)		Crookston Soybean (Bu/A)		Crookston Sugarbeet T/A		Crookston Sugarbeet Recoverable Sugar lbs./acre	
Tile Spacing (Ft.)	**2002**	**2003**	**2002**	**2003**	**2002**	**2003**	**2002**	**2003**
0	40	82.8	37	39.4	24.2	20.2	7050	7139
60	52.6	78.9	40.3	38.9	25.9	21	7444	7484
40	53.6	82.8	37.8	39.2	28	21.6	8055	7673
25	58	82.7	39.8	37	26.9	20.1	7623	7169
15	54.9	77.4	43	36.9	24.9	20.5	6836	7229
LSD (0.05)	-	4.8	-	NS	-	1.0 (0.10)	-	335 (0.10)

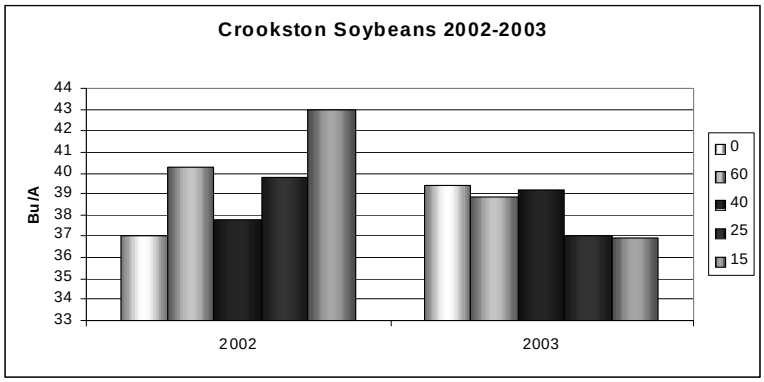
Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

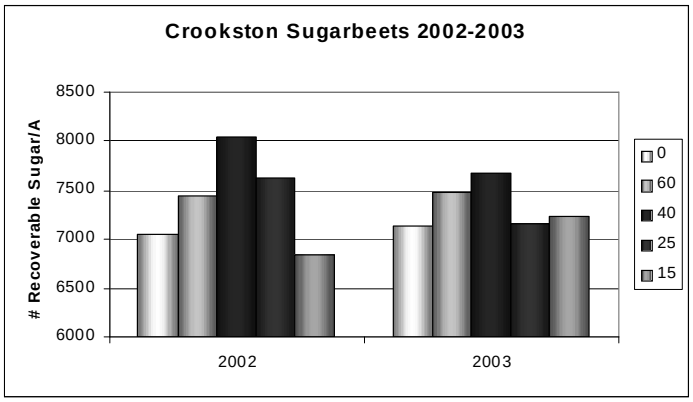
Tile Drainage in Northwest Minnesota—(continued)











Funding: University of Minnesota Rapid Response Fund
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Field Drainage, Inc.

For additional information:
Zachary Fore

Partnerships: Dr. Gary Sands, U of MN Biosystems and Ag Engineering
Dr. Jochum Wiersma, U of MN Northwest Research and Outreach Center
Dr. Terry Hurley, U of MN Dep't of Applied Economics
Dr. Hans Kandel, U of MN Extension Service

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Niger Variety Trial, Thief River Falls—Pennington County

Cooperator: Ken and Connie Mehrkens
Nearest Town: Thief River Falls
Soil Type: Clearwater Clay
Tillage: Fall chiseled, spring cultivated 3x
Previous Crop: Soybean
Variety: See table
Planting Date: May 8, 2003
Row Width: 6 inches
Soil test: 0-6" 16 lb N/a
6-24" 42 lb N/a
Fertilizer: 40 lb N/a
Herbicide: 1.5 pts/a Treflan
Populations: See table
Swathing Date: August 14 through September 2 (see table)
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:

To evaluate stand, bloom differences, crop height, yield, test weight, and maturity differences of niger varieties grown in NW MN and compare yield and test weight with a similar experiment conducted in 2003 in Langdon, ND.

Results:

The variety NS031 bloomed earlier, was shorter, and matured earlier but yielded significantly lower than EarlyBird. EarlyBird and FinchGold were not significantly different in yield.

	Thief River Falls						Langdon, ND	
Variety	Plants (ft^2)	Bloom[1] (%)	Height (inches)	Swathing[2] (days)	Yield (lb/a)	Test Weight (lb/bu)	Yield (lb/a)	Test Weight (lb/bu)
EarlyBird	9.1	55.0	47.3	114	356	45.1	555	43.5
FinchGold	9.1	42.5	48.2	117	283	46.1	479	43.5
N951	6.7	42.5	54.9	114	243	43.9	373	41.9
NS031	10.0	91.3	27.0	98	233	43.9	452	44.6
LSD (0.05)	2.0	6.6	2.1	3	89	0.7	NS	1.0

[1] Recorded on July 28, 2003
[2] Days after planting

Partnership: NDSU
Funding: NDSU and Northwest Regional Partnership

For additional information:
Hans Kandel
Paul Porter
Dave LeGare

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Niger Time of Swathing Evaluation—Pennington County

Cooperator: Ken and Connie Mehrkens
Nearest Town: Thief River Falls
Soil Type: Clearwater Clay
Tillage: Fall chiseled, spring cultivated 3x
Previous Crop: Soybean
Variety: EarlyBird
Planting Date: May 8, 2003
Row Width: 6 inches
Soil test: 0-6" 16 lb N/a
6-24" 42 lb N/a
Fertilizer: 40 lb N/a
Herbicide: 1.5 pts/a Treflan
Populations: See table
Experimental Design: Randomized complete block with 4 replications

Treatment		Yield	Test Weight	Population	Height
Swath	Combine	(lb/a)	(lb/bu)	(plants/ft^2)	(inches)
14-Aug	20-Aug	400	39.7	9.5	41.3
19-Aug	4-Sep	427	42.6	9.3	41.8
27-Aug	4-Sep	430	44.0	8.3	42.4
2-Sep	9-Sep	229	44.5	9.3	42.6
9-Sep	16-Sep	104	43.7	8.6	39.4
None	9-Sep	168	43.2	10.9	40.0
None	16-Sep	96	43.1	10.4	41.4
LSD (0.05)		70	1.7	NS	NS

Purpose of Study:

To evaluate swathing date on yield and test weight of EarlyBird niger compared to straight combining after complete crop dry down.

Results:

During this dry summer and fall the crop matured faster than in previous years. Harvesting before the majority of the seeds were physiologically mature reduced the test weight (swathing in this trial on 14-Aug). Swathing past the time most seeds are mature reduced yield (2-Sep). Straight combined yields were low due substantial shatter loss while the crop was drying in the field. On August 21, 23, 28 and Sept 2 there were winds of 20 to 30 mph in the plots.

Judging from visual observations of the plots at swathing and the yields obtained, a good guide to swath the niger is between 20% and 80% browning of the canopy. If high winds are forecasted, swathing should be done on the early side of the range. If the crop is less than 20% browning and a severe frost is forecasted, then swathing prior to the frost or the day after the frost is recommended.

Partnership: NDSU
Funding: NDSU and Northwest Regional Partnership

For additional information:
Hans Kandel
Paul Porter
Dave LeGare

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Niger Seeding Rate and Nitrogen Evaluation—Pennington County

Cooperator: Ken and Connie Mehrkens
Nearest Town: Thief River Falls
Soil Type: Clearwater Clay
Tillage: Fall chiseled, spring cultivated 3x
Previous Crop: Soybean
Variety: EarlyBird
Planting Date: May 8, 2003
Row Width: 6 inches
Soil test: 0-6" 16 lb N/a
6-24" 42 lb N/a
Fertilizer: 0, 20, 40, 60 lb N/a
Herbicide: 1.5 pts/a Treflan. Plots were hand weeded when necessary.
Populations: See table
Swathing Date: August 27 through September 2
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate niger stand, bloom differences, crop height, yield, and test weight when grown with four nitrogen levels and three seeding rates.

Results:
Adding 60 lb of N (total plant available 118 lb N) reduced yield compared with 0 lb application rate (58 lb N residual). Over four environments no yield differences were observed between the different N application rates, confirming that Niger is a low input N crop. Increasing the seeding rate caused the crop to bloom earlier, however there were no significant differences in yield. Based on 3 years of field observations and researching seeding rates, the 6 lb seeding rate results in a quicker stand establishment and the crop competes better with weeds than the 3 lb seeding rate. Niger at the 6 lb seeding rate also matures more evenly.

	Thief River Falls					4 Environments[1]
Treatment	Yield (lb/a)	Test Weight (lb/bu)	Population (plants/ft^2)	Crop Height (inches)	Bloom[2] (%)	Yield (lb/a)
Seeding Rate						
3 lb acre	415.0	44.7	5.0	47.5	50.9	453
6 lb acre	422.0	44.5	8.6	46.8	58.4	485
9 lb acre	448.0	44.8	12.3	48.1	65.6	514
LSD (0.05)	NS	NS	1.0	NS	2.1	NS
Nitrogen Application Rate						
0 lb acre	476.0	45.0	8.6	48.2	55.8	490
20 lb acre	438.0	45.0	8.6	47.1	59.2	487
40 lb acre	428.0	44.6	8.7	47.2	59.2	481
60 lb acre	370.0	43.9	8.5	47.5	59.2	477
LSD (0.05)	69.6	0.6	NS	NS	2.5	NS

[1] Combined data over Thief River Falls and Langdon ND 2003, and St. Hilaire and Oklee 2002.
[2] Recorded on July 28, 2003.

Funding: NDSU and Northwest Regional Partnership
Partnership: NDSU

For additional information:
Hans Kandel
Paul Porter
Dave LeGare

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Cover Crop Evaluation in NW Minnesota
Kittson (K) - Marshall (M) - Roseau (R) Counties

Cooperator:	(K) Rob and Tim Rynning	(M) Todd Stanley	(R) Braaten Farms
Nearest Town:	(K) Kennedy	(M) Grygla	(R) Roseau
Soil Type:	(K) Sandy Loam	(M) Clay loam	(R) Loam
Tillage:	(K) Cultivated 2x	(M) Cultivated 1x	(R) Cultivated 1x
Previous Crop:	(K) wheat	(M) wheat	(R) fallow
Planting Date:	(K) May 14, 2003	(M) May 2, 2003	(R) May 2, 2003

Row Width: 6 inches

Fertilizer: Plots were fertilized for canola production.

Experimental Design: Randomized complete block with 2 replications at three locations

Crop	Biomass[1] 23-Jun (lb/a)	Biomass 28-Jul (lb/a)	Biomass[2] 20-Aug-01 (lb/a)
Austrian Pea[3]	3064	8175	3819
Dry Field Pea	3857	6258	5736
Chickling Vetch	2508	5649	5382
Hairy Vetch	1630	4306	4564
LSD (0.05)	676	1642	863

[1] Biomass is above ground dry matter
[2] Details in On-Farm Cropping Trials booklet, Jan 2002, page 8.
[3] Austrian Pea: Annual, common austrian pea. Late maturing, long vines.
Dry Field Pea: 'Swing' semi leaf-less, short statured pea.
Chickling Vetch: AC Greenfix, annual.
Hairy Vetch: Biannual, common hairy vetch.

Purpose of Study:

Some producers are interested in a cover crop, which can add organic matter and nitrogen to the system, or there are times when producers may not get their main crop seeded and want to plant a cover crop instead of leaving the land fallow. This study compared a number of cover crops which chickling vetch, which is a relatively new annual cover crop in our region. This vetch was developed in Canada. Two sampling dates were used.

Results:

Dry field pea produced the largest amount of biomass at the June sampling date. The later maturing, long vined Austrian pea was able to continue its growth and provided the largest total biomass at the second sampling date. Part of the biomass was the maturing seed. Dry field pea was nearing maturity (produced seed). Chickling vetch produced more biomass in the first part of the season compared with hairy vetch. Hairy vetch was still actively growing at the second sampling date whereas chickling vetch started to mature and complete seed fill.

For additional information:
Hans Kandel
Dave LeGare

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Phosphorus Mobilization by Buckwheat

Cooperators:	Dan Olsgaard, Lee Thomas
Nearest Towns:	Comstock, Clay County; Felton, Clay County
Soil Type:	Fargo Clay, Bearden Loam
Tillage:	variable
Previous Crops:	2001– buckwheat as a green manure crop; 2002 - soybean; 2003 - wheat
Variety:	Toyopro
Planting Date:	22 May, 2002
Row Width:	soybean: 22" wheat: 6"
Fertilizer:	none on plot areas
Herbicide:	None, both fields are certified organic
Experimental Design:	Randomized Complete Block with three (2002) or six (2003) replications.

Purpose of study:

Buckwheat is often claimed to "sequester" soil P for availability to a subsequent crop. The objective was to determine buckwheat's ability to 1) sequester soil P and other nutrients, 2) suppress weeds, and 3) provide habitat to beneficial insects.

Buckwheat was established in 2001 as a green manure crop in two locations and incorporated after flowering, but before seed set. Soil samples were taken prior to buckwheat establishment in 2001 and from the same sites (within 1 meter) in 2002 in the following soybean crop, and in the 2003 wheat crop. Soybean (2002) and wheat (2003) plant samples were collected, at the same locations, and analyzed for P and several other common elements from the two treatment areas. In the fall of 2002, grain yield was also measured, but not in 2003. No other soil amendments were added during the trial.

Results:

Soil conditions were extremely wet in 2001 which delayed planting and reduced the buckwheat biomass at the Olsgaard location. The buckwheat stand was excellent at the Thomas location.

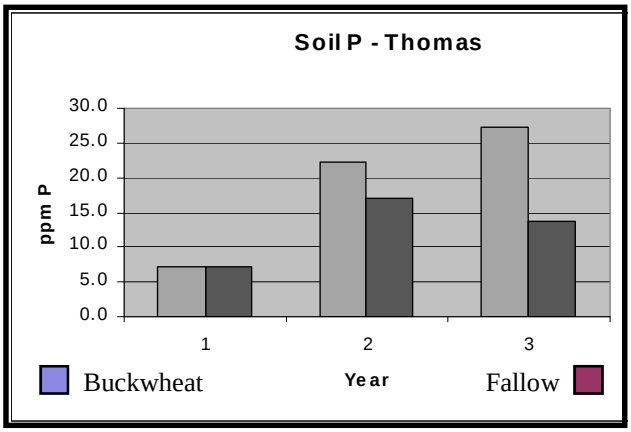
The soil P concentration increased significantly from 2001 to 2002 on both the buckwheat and fallow treatments. Buckwheat did not significantly increase the measurable soil P concentration at either location. One thousand pounds/acre of "Cluck" (4-4-2) was applied at both locations for the crop year 2000 and may explain the precipitous increase in P concentration between years.

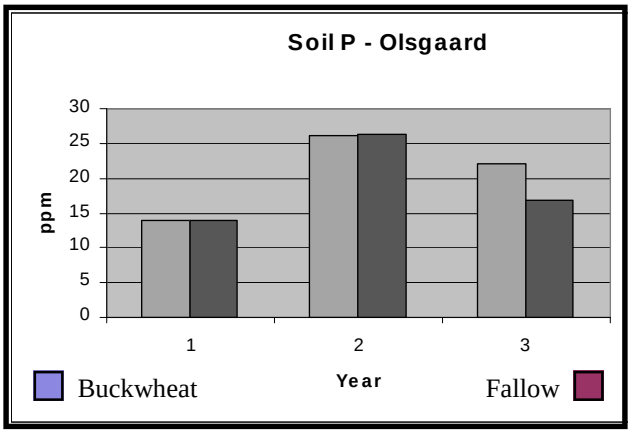
In 2002, the P concentration in soybean biomass increased following buckwheat despite no measurable differences in soil P concentration at the Olsgaard location. At the Thomas location, buckwheat reduced the plant K concentration but caused an increase in Na and Zn concentrations. These differences had no effect on grain yield at either location

In 2003, the soil P concentration at the Thomas location was significantly greater ($p<.01$) where buckwheat was planted two years previously. The trend was similar at the Olsgaard location, but the increase was not statistically significant (<.14). This difference may be explained by the difference in buckwheat biomass production, which was significantly greater at the Thomas location.

Buckwheat is very competitive and effectively eliminates weed competition if an adequate stand is established (data not shown). This was clearly the case at both locations.

Buckwheat attracts many types of beneficial insects. Although several groups of beneficial insects were present in the buckwheat in 2001, the average number of individuals trapped within a species was relatively low and did not vary across location. The Tachinid fly was the predominant beneficial insect across locations. The green lacewing and hover fly also occurred in greater numbers compared to most of the other beneficial insects (data not shown).





Funding: North Central Sustainable Agriculture Research and Education (SARE)

Partnerships: Dr. Denise Olson, Entomologist, North Dakota State University

For additional information:
Jim Stordahl
Hans Kandel

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Gypsum Application to Organic Soybeans—Clay County

Cooperator: Lynn Brakke
Nearest Town: Comstock
Soil Type: Fargo Clay
Tillage: Fall chiseled, spring cultivated
Previous Crop: Wheat
Variety: NK S 08-80
Planting Date: June 2, 2003
Seeding Rate: 237,600 seeds per acre
Row Width: 22 inches
Fertilizer: nothing applied
Weed Control: Plots were cultivated June 20, July 3, and July 17 and hand weeded July 24.
Populations: See table
Harvest Date: October 6, 2003
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate yield, test weight, crop height and population response of organic soybean to the application of different rates of gypsum per acre.

Results:
In this experiment no effects of application of gypsum were found on yield, test weight, height or population of NK S 08-80 organic soybeans.

Treatment (lb/a)	Yield (bu/a)	Oil %	Protein %	Test Weight (lb/bu)	Height (inches)	Population[1] (plants/a)
0	30.2	19.7	33.3	58.3	25.9	203,000
500	28.7	20.2	33.9	58.4	26.1	217,000
1000	29.6	19.7	33.7	58.3	25.4	214,000
1500	29.3	19.6	33.0	58.2	25.1	220,000
LSD (0.05)	NS	NS	NS	NS	NS	NS

[1] Stand counts were taken June 18, 2003.

Funding:
NDSU and Northwest Regional Partnership

For additional information:
Hans Kandel
Paul Porter

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Organic Soybean Variety Trial, Comstock—Clay County

Cooperator: Lynn Brakke
Nearest Town: Comstock
Soil Type: Fargo Clay
Tillage: Fall chiseled, spring cultivated
Previous Crop: Wheat
Planting Date: June 2, 2003
Seeding Rate: 237,600 seeds per acre
Row Width: 22 inches
Fertilizer: nothing applied
Weed Control: Soybean was row-crop cultivated June 20, July 3, and July 17 and hand weeded July 24.
Harvest Date: October 6, 2003
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate yield, protein and oil content, test weight, crop height, population, maturity, and lodging responses of different organic soybean varieties.

Results:
There were significant yield differences. The specialty natto beans yielded lower than regular soybeans. Nornatto and Nannonatto had significantly higher lodging scores compared with other varieties. Some of the shorter varieties early in the season were less competitive with weeds and required more hand weeding.

Variety	Yield (bu/a)	Test Weight (lb/bu)	Protein[1] (%)	Oil[1] (%)	Height[2] 17-Jul-03 (inches)	Height[3] 22-Sep-03 (inches)	Population[4] (plants/a)	Maturity[5] (1-5)	Lodging[6] (1-6)
Viper	32.5	58.8	34.9	18.8	10.3	25.4	214,000	1.3	1.0
Enterprise	32.5	58.1	33.3	19.1	9.8	24.8	199,000	2.8	1.0
OF41	32.0	57.3	32.3	19.9	10.0	24.0	213,000	1.0	1.0
Atwood	31.9	57.0	32.6	20.3	11.0	22.9	212,000	1.0	1.0
S 08-80	31.6	58.3	33.6	19.0	11.0	26.1	234,000	2.5	1.0
S12-C2	31.4	58.2	34.2	18.3	10.5	23.6	190,000	2.3	1.0
OF94	31.4	58.0	32.8	20.0	10.8	22.9	217,000	1.0	1.5
Surge	31.3	58.7	34.5	19.2	9.8	23.0	203,000	1.8	1.0
S14-P6	31.1	58.6	32.5	19.0	10.0	23.5	192,000	3.5	1.0
Emerson	30.9	57.7	32.3	20.8	12.3	24.4	237,000	1.0	1.0
Minori	30.4	58.2	34.7	18.2	10.8	24.1	218,000	4.0	1.5
Bygland	30.2	57.2	34.2	19.4	10.0	24.0	224,000	1.0	1.5
Panther	29.9	58.3	36.9	18.2	11.5	23.8	203,000	1.3	1.0
1A24	29.7	58.8	33.7	17.6	11.8	25.3	218,000	5.0	1.0
1F53	29.1	59.1	32.0	18.8	10.8	25.3	209,000	4.0	1.0
1F11	29.0	58.5	32.4	19.5	8.8	24.1	178,000	2.8	1.0
MN0301	27.8	57.4	31.6	20.4	9.8	23.5	159,000	1.5	1.0
Nornatto	27.6	58.0	32.6	17.2	11.8	25.8	175,000	1.0	4.0
MN0201	27.6	59.0	36.6	18.0	10.3	26.4	207,000	1.0	2.3
O332	26.0	57.9	34.3	19.1	8.3	24.3	226,000	1.3	1.5
Carlton	25.5	58.2	34.6	18.7	11.3	23.4	171,000	1.0	1.5
OF84	25.5	57.6	32.1	19.7	8.8	20.8	174,000	1.0	1.5
Bravado	23.8	58.0	32.8	19.2	9.3	23.4	184,000	1.0	2.0
Nannonatto	23.6	58.8	34.2	16.7	8.0	22.4	213,000	1.0	4.0
Colibri	22.7	58.7	32.6	17.7	7.0	22.4	223,000	1.0	2.0
LSD (0.05)	4.2	0.5	—	—	2.4	NS	30,000	0.5	1.5

[1] Protein and oil data from composite sample, no LSD available.
[2] Early season height provides a measure of competitiveness. [3] Height at end of the season.
[4] Stand counts were taken June 18, 2003.
[5] Maturity score taken September 22 provides and indication of relative maturity: 1= plants brown, 2 = still few leaves on the plant, stem and pods brown, 3 = yellow leaves on the plant, stem and pods start to brown, 4 = leaf color yellow, still attached to the plant, and 5 = leaf color green and yellow.
[6] Lodging score taken September 22, 1 = no lodging, 3 = some lodging, and 6 = substantial lodging.

Funding:
NDSU and Northwest Regional Partnership

For additional information:
Hans Kandel and Paul Porter

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Organic Oat Variety Trial, Fertile—Polk County

Cooperator: Jim and Pat Todahl
Nearest Town: Fertile
Soil Type: Flaming sandy loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Variety: See table
Planting Date: May 1, 2003
Row Width: 8 inches
Fertilizer: 3 ton/a turkey manure, fall 2002
Weed Control: Harrowing 3 times
Herbicide: None, field is certified organic
Harvest Populations: See table
Harvest Date: August 13, 2003
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:

To evaluate yield, test weight, crop height and 1,000-seed weight of oat varieties grown under a certified organic production system.

Results:

Differences in yield, test weight, crop height and 1,000-seed weight were found in this study. The top four yielding varieties were significantly greater yielding than the four lowest yielding varieties. Buff, a hulless variety, had the highest test weight and the lowest seed weight.

Variety	Yield[1] (bu/a	Test Weight (lb/bu)	1,000-seed Weight (gram)	Plant Height (inches)	Plant[2] Population (million/a)
Morton	112.4	36.5	17.4	44.4	0.63
HiFi	110.6	36.8	17.2	45.0	0.65
Youngs	107.6	35.9	22.0	45.0	0.66
Ebeltoft	107.2	35.3	18.2	38.9	0.68
Wabasha	97.4	35.1	15.6	42.1	0.64
Richard	93.4	35.0	17.4	42.7	0.56
Sesqui	92.3	36.7	15.6	40.3	0.61
Leonard	86.2	34.5	15.2	41.7	0.50
Hytest	72.9	39.2	18.2	44.5	0.63
Buff	65.5	42.6	13.4	38.5	0.58
LSD 0.05	10.2	1.5	1.4	2.1	0.10

[1] Corrected to 14% moisture.
[2] Stand counts were taken June 6, 2003.

Partnership: NDSU
Funding: SARE Grant

For additional information:
Hans Kandel
Paul Porter

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Organic Oat Variety Trial, Comstock—Clay County

Cooperator: Lynn Brakke
Nearest Town: Comstock
Soil Type: Fargo Clay
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Planting Date: The entire plot area was under seeded with alfalfa on April 28, 2003. Oat was seeded April 30, 2003
Row Width: 9 inches
Fertilizer: 900 lbs/a of "Cluck" 4-4-2 was applied fall 2002
Herbicide: None, field is certified organic
Populations: See table
Harvest Date: August 12, 2003
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate yield, test weight, 1,000-seed weight, crop height and in-season alfalfa height of different oat varieties grown under a certified organic production system.

Results:
Differences in yield, test weight, 1,000-seed weight, crop height and alfalfa height were found in this study. Morton was significantly greater yielding than the four lowest yielding varieties. Buff, a hulless variety, had the highest test weight but the lowest seed weight. Although there were differences in alfalfa height during the season there is no correlation between the height of the alfalfa and the oat yield.

Variety	Yield[1] (bu/a)	Test Weight (lb/bu)	1,000-seed Weight (gram)	Plant Height (inches)	Plant[2] Population (million/a)	Alfalfa[3] Height (inches)
Morton	139.3	39.7	19.6	50.9	1.44	10.5
Leonard	138.3	37.5	17.6	45.4	1.55	12.0
Sesqui	135.7	39.7	18.2	44	1.46	11.5
HiFi	128.9	38.6	18.4	47	1.31	10.5
Ebeltoft	127.4	36.1	19.4	42.6	1.35	12.0
Wabasha	124.3	38.3	18.6	43	1.50	11.5
Youngs	116.5	36.2	21.2	50	1.35	12.0
Richard	115.8	38.0	19.4	47	1.36	10.0
Buff	114.5	47.1	15.4	42.8	1.44	11.0
Hytest	96.9	42.4	21.2	47.1	1.50	9.5
LSD 0.05	16.4	0.8	0.8	2.6	N.S.	1.6

[1] Corrected to 14% moisture.

[2] Stand counts were taken May 22, 2003.

[3] Alfalfa height was measured, in season, on June 25, 2003.

Partnership: NDSU
Funding: SARE Grant

For additional information:
Hans Kandel
Paul Porter

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Organic Wheat Variety Evaluation, Fertile—Polk County

Cooperator: Jim and Pat Todahl
Nearest Town: Fertile
Soil Type: Fargo Clay
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Variety: See table
Planting Date: May 1, 2003
Row Width: 8 inches
Fertilizer: 3 ton/a turkey manure, fall 2002
Weed Control: Harrowing 3 times
Herbicide: None, field is certified organic
Harvest Populations: See table
Harvest Date: August 13, 2003
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate spring wheat varieties grown under a certified organic production system. Entries came originally (2001) from either an organic or conventional seed source. Seed for the 2003 season came from the 2002 organic wheat study

Results:
Walworth was the top yielding variety at Fertile in 2003 (and 2002) significantly outyielding many of the other tested varieties, but did not differ significantly in yield from Oklee, AC-Cadillac or Ingot. In organic production protein premiums can be a major part of the income. Glupro provided the highest protein percentage. Plant population was generally low due to intensive early-season harrowing.

Variety	Yield[1] (bu/a)	Protein (%)	Test Weight (lb/bu)	1,000-seed Weight gram	Plant Height (inches)	Plant[2] Population (million/a)
Walworth	44.0	13.3	61.7	29.3	34.3	0.97
Oklee	43.4	13.4	63.9	29.0	32.8	0.86
AC-Cadillac	42.9	13.6	63.7	32.0	40.2	0.81
Ingot	42.2	13.3	64.0	29.3	36.5	0.77
Reeder	37.4	13.5	61.9	27.7	30.8	0.89
Stoa	37.1	13.6	60.9	28.2	37.2	0.71
Acadia	36.3	12.5	61.7	31.7	41.7	0.79
RedFife	36.1	12.6	60.3	32.0	47.5	0.78
Alsen	35.4	13.7	62.5	28.0	30.0	0.79
Parshall	34.8	12.9	62.5	28.2	35.8	0.77
Dapps	34.7	14.1	61.1	28.7	37.2	0.84
Gunner	34.3	13.7	63.2	25.7	34.2	0.77
BacUp	32.8	15.0	63.4	25.7	36.3	0.96
Waldron	31.0	13.9	60.0	29.3	37.8	0.75
Glupro	30.0	16.0	59.5	31.7	43.8	0.74
Chris	28.7	13.9	61.1	25.0	37.5	0.72
Coteau	25.2	15.2	58.9	23.7	37.3	0.73
LSD (0.05)	4.9	0.7	0.8	2.3	3.2	0.15

[1] Corrected to 13.5% moisture
[2] Stand counts were taken after the third harrowing initial stand (before harrowing) was on average 1.5 million plants/acre.

Partnership: NDSU
Funding: SARE Grant

For additional information:
Hans Kandel
Paul Porter

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Organic Wheat Variety Evaluation, Comstock—Clay County

Cooperator: Lynn Brakke
Nearest Town: Comstock
Soil Type: Fargo Clay
Tillage: Fall chiseled, spring cultivated
Previous Crop: Soybean
Variety: See table
Planting Date: The entire plot area was under seeded with alfalfa on April 28, 2003
Wheat was seeded April 30, 2003
Row Width: 9 inches
Fertilizer: 900 lbs/a of "Cluck" 4-4-2 was applied fall 2002
Weed Control: None
Herbicide: None, field is certified organic
Populations: See table
Harvest Date: August 12, 2003
Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To evaluate spring wheat varieties grown under a certified organic production system. Entries came originally (2001) from either an organic (O) or conventional seed source. Seed for the 2003 season came from the 2002 organic wheat trial.

Variety	Yield[1] (bu/a)	Protein (%)	Test Weight (lb/bu)	1,000-seed Weight (gram)	Plant Height (inches)	Plant[2] Population (million/a)	Alfalfa[3] Height (inches)
Ingot	61.4	12.4	63.2	32.0	37.8	1.58	9.8
Stoa	59.4	12.7	60.4	31.4	41.4	1.38	12.0
Walworth	59.9	12.6	60.4	30.7	35.5	1.47	11.8
Dapps	57.5	13.1	61.1	33.7	38.5	1.35	10.8
AC-Cadillac	56.8	12.6	62.4	34.3	41.1	1.51	9.5
Parshall	55.4	12.3	63.2	32.9	38.7	1.51	11.3
Gunner	54.1	11.7	62.3	29.0	37.3	1.57	12.3
Alsen	53.3	13.4	62.9	32.3	33.8	1.58	12.8
Reeder	51.6	12.2	61.9	33.7	33.1	1.49	11.8
Oklee	49.8	12.5	62.3	32.0	31.2	1.42	11.3
Acadia	48.4	12.1	59.6	10.0	43.2	1.09	10.0
Chris	47.1	13.2	60.5	30.7	41.5	1.30	11.5
Waldron	46.9	13.4	59.6	32.0	40.2	1.35	10.3
RedFife	46.8	11.4	59.9	34.7	46.7	1.41	11.5
Coteau	42.4	14.2	59.7	30.0	39.3	1.42	11.8
BacUp	42.0	14.4	62.4	29.0	35.3	1.37	10.8
Glupro	37.8	14.9	58.8	33.3	43.8	1.36	10.5
LSD (0.05)	6.2	0.7	0.4	1.3	1.8	0.16	1.6

Results:
The top seven varieties did not significantly differ in yield. Walworth was the top yielding variety at Fertile in 2003 (and 2002) and was the third highest yielding variety at Comstock in 2002. In organic production protein premiums can be a major part of the income. Glupro provided the highest protein percent, but not significantly different from Coteau and BacUp. We noticed a significant difference in the under seeded alfalfa plant height during the season. Wheat height and population interacted to provide differences in competitiveness between varieties.

[1] Corrected to 13.5% moisture.

[2] Stand counts were taken May 22, 2003.

[3] Alfalfa height was measured on June 25, 2003.

Partnership: NDSU
Funding: SARE Grant

For additional information:
Hans Kandel
Paul Porter

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

What are Demonstration Plots?

The purpose of demonstration plots is to allow visual observation of differences between two or more treatments. However, demonstration plots, such as strip tests, may have a serious problem with field variability, which can make the results misleading. A statistical approach is a more meaningful way to compare treatments.

Replication is a key part of statistical methods because it addresses variability within a treatment due to other factors. However, farmers may not be willing to replicate treatments in a strip plot trial, with the same treatments applied to all farms. Thus, each farm is a replicate.

A second concern with the validity of demonstration plots is biasing results by placing a favorite treatment on a preferred block of land. This can be avoided by randomly allocating treatment positions in the field by some independent means (e.g. drawing numbers from a hat). Randomization of treatments within a field is an extremely important factor contributing to the final reliability of the results.

C	T1	T2

C = Check Plot Treatment T1 = Treatment T2 = Treatment 2

Example of a demonstration plot design — Here three treatments are compared. However, with no replication, there is no assessment of natural variability, and differences between treatments cannot be validated statistically.

C	T1	T2
C	T1	T2
C	T1	T2
C	T1	T2

C = Check Plot Treatment T1 = Treatment T2 = Treatment 2

Example of a demonstration plot design — Here three treatments are compared. However, with no randomization, there is no assessment of natural variability, and differences between treatments cannot be validated statistically.

Both replication and randomization are necessary for treatments to be analyzed statistically in order to determine whether or not differences between treatment means are real.

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Corn Variety Strip Trial—Norman County

Cooperators: Skaurud Grain Farms Inc. and Pazdernik Agronomy Services
Previous Crop: Dry Beans
Corn Plots: 12 row plots half mile long or 1.13 acres/plot
Population: 32,000
Harvest Date: October 9, 2003
Planting Date: May 8, 2003
Chemical: Doubleplay at 5.5 pints/A
Fertilizer: 7.5 gal of 10-34-0 with planter
Harvest Data: John Deere Combine Yield Monitor

Company	Variety	Maturity	Tech.	Combine % Moist.	Test Weight	Ave. Yield
CK-Garst-MR	**107**			**18.34**	**54**	**145**
Kaystar/Vanseeds	KX2795	79	Conv	22.62	54	152
Seeds 2000	2821	82	Conv	20.24	51	184
Quality Seed Gen	QSG 0283	83	Conv	22.29	53	184
Mycogen	2E212	86	Conv	22.58	52.5	173
Legend	LS 5287	87	Conv	23.47	52	159
Quality Seed Gen	QSG 0289	89	Conv	24.42	55.5	172
CK-Garst-MR	**107**			**18.34**	**55.2**	**145**
Golden Harvest	6131	82	Bt	23.95	55	161
Pioneer	39H85	82	Bt	19.75	53.5	164
Dyna-Gro	51F85	85	Bt	22.76	50	205
Garst	8959YG1	86	Bt	23.10	51	207
Golden Harvest	6389	86	Bt	20.92	52	174
Pioneer	39M79	85	Bt/LL	21.44	52.5	205
Hyland Seeds	HL B267	88	Bt	19.31	54.3	166
Mycogen	2H243	88	Bt	23.33	49	189
Garst	8894Bt	92	Bt	24.93	49	182
CK-Garst-MR	**107**			**18.34**	**54**	**146**
Legend	LR9378	78	RR	25.23	53.5	155
Mycogen	2P172	81	RR	24.68	51	190
Dekalb	DKC33-10	83	RR	20.19	57	161
Garst	8992	83	RR	19.33	53	158
Dyna-Gro	51K95	84	RR	21.86	53.5	219
Seeds 2000	2842	84	RR/Bt	22.94	51.5	208
Legend	LR9385	85	RR	23.26	52.0	186
Kaystar/Vanseeds	KX2821	85	RR/Bt	24.06	49.5	173
Dekalb	DKC35-02	85	RR/YG	20.89	51.5	180
Dekalb	DKC39-47	89	RR/YG	23.15	49.0	206
Kaystar/Vanseeds	KX4000	91	RR/Bt	23.92	49.0	208
CK-Garst-MR	**107**			**18.34**	**55.0**	**144**
				Check av.		145

Seeding Helpers: Tim Poehler, Vickie Skaurud, Eric Pazdernik, Mark Fogelson
Harvesting Helpers: Dave Vipond, Ron Truax

For additional information:
Ken Pazdernik—Pazdernik Agronomy Services

Source: 2003 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2004

Corn Variety Strip Trial—Norman County (Brandt)

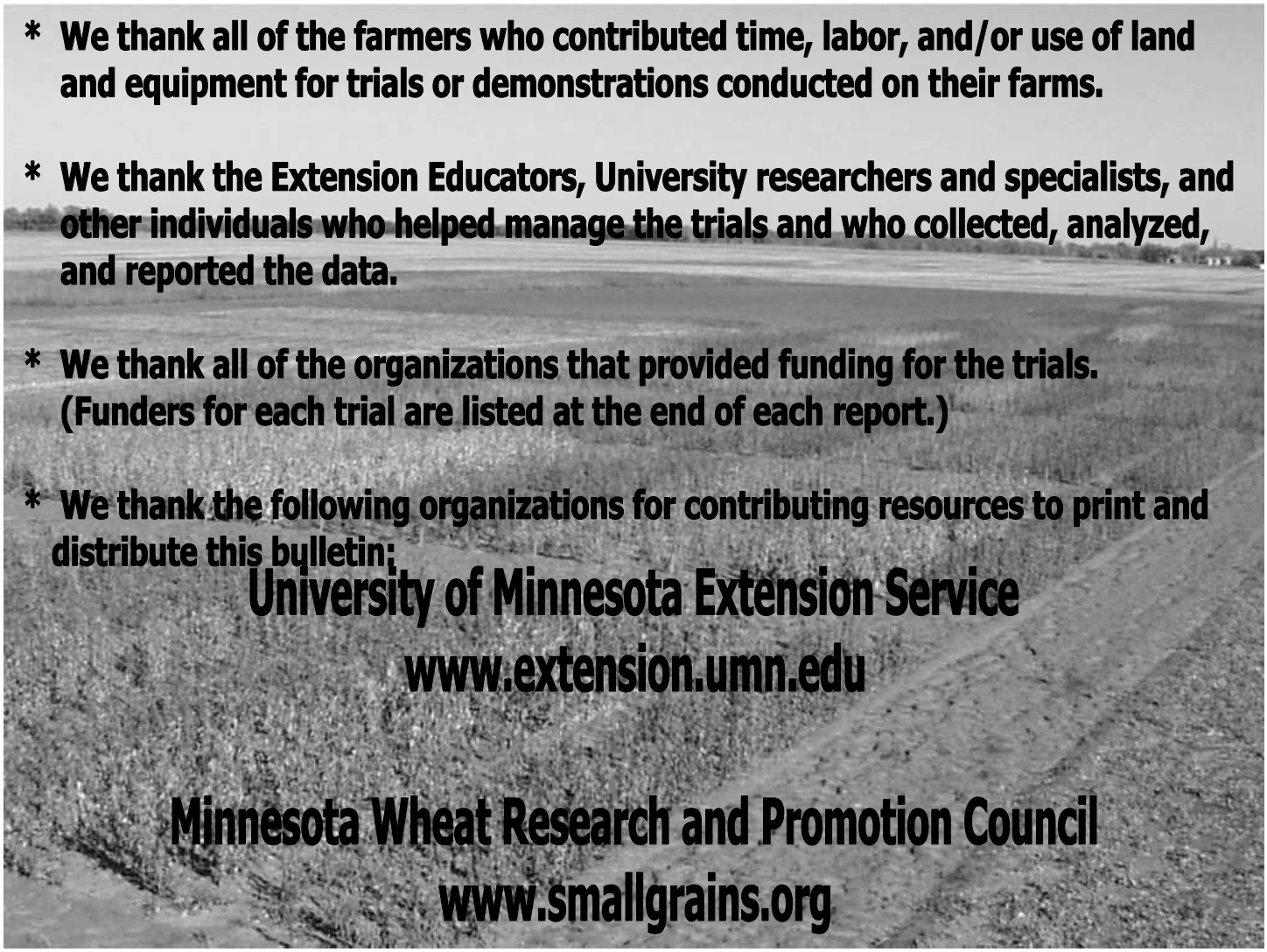
Cooperators: Glen and Danny Brandt
Soil Test: N-23, P-6, K-126, ph-8.3
Previous Crop: Wheat
Planting Date: May 2, 2003
Harvest Date: October 15, 2003
Fertilizer: N-103, P-73, K-64 with 30 lbs. of Anhydrous
Chemicals: Recommended rate of Celebrity Plus
Corn Plots: 6 rows 22' by 800 feet long

Company	Variety	Maturity Days	Tech.	Moist. %	Test Weight	Yield/ Acre	Comments
CK-Dekalb	**DKC 334**	**84**	**Bty**	**16.5**	**56**	**161.1**	**Heavy wind damage**
Kaystar/Vanseeds	KX2795	79	Conv	16.9	58	154.3	Light wind damage
Quality Seed Gen	QSG 0283	83	Conv	15.8	57	163.8	
Seeds 2000	2821	82	Conv	15.1	59	127.9	Heavy wind damage
Dekalb	DKC33-10	83	RR	15.1	57	149.6	
CK-Dekalb	**DKC 334**	**84**	**Bty**	**16.7**	**56**	**125.9**	**Heavy wind damage smut**
Mycogen	2E212	86	Conv	16.2	55	137.6	Mod. wind damage
Legend	LS5287	87	Conv	17.0	55	131.1	Heavy wind damage
Golden Harvest	6131	82	Bt	17.4	55	146.9	
Dyna-Gro	51F85	85	Bt	16.0	58	153.8	Light wind damage
CK-Dekalb	**DKC 334**	**84**	**Bty**	**16.9**	**56**	**113.4**	**Heavy wind damage**
Garst	8949YG1	86	Bt	16.6	57	146.6	Light wind damage
Golden Harvest	6389	86	Bt	17.6	56	143.5	Light wind damage
Hyland Seeds	HL B267	88	Bt	15.3	56	150.2	Light wind damage
Mycogen	2H243	88	Bt	18.6	52	149.4	Light wind damage
NK Brand	N16-N7	80	BT/LL	16.7	58	134.2	
Garst	8894Bt	92	Bt	18.6	52	149.4	Light wind damage
Stine	9307	89	RR/Bt	19.2	54	152.1	Heavy wind damage
Thunder	218	86	Conv.	19.0	55	116.9	
Fielders Choice	FC7123	81	Conv.	15.8	57	146.7	
Fielders Choice	FC 9481	85	Conv.	16.7	57	144.6	
CK-Dekalb	**Missing data**				**Var ave.**	**144.4**	
					Ck ave.	**133.5**	

*** Weigh Wagons by Legend Seeds and Croplan**

For additional information:
Ken Pazdernik - Pazdernik Agronomy Services

We appreciate the numerous contributions that made this bulletin possible.



* We thank all of the farmers who contributed time, labor, and/or use of land and equipment for trials or demonstrations conducted on their farms.

* We thank the Extension Educators, University researchers and specialists, and other individuals who helped manage the trials and who collected, analyzed, and reported the data.

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University of Minnesota Extension Service
www.extension.umn.edu

Minnesota Wheat Research and Promotion Council
www.smallgrains.org