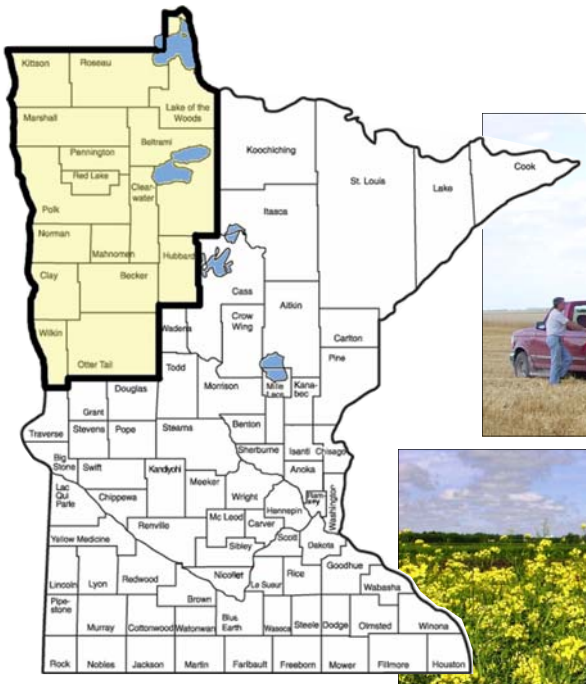
On-Farm Cropping Trials

Northwest and West Central Minnesota

January 2007



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2006 On-Farm Cropping Trials For Northwest and West Central Minnesota

The University of Minnesota is pleased to provide you with the results of the 2006 on-farm field cropping trials conducted in northwest and west central Minnesota.

This is the eighth 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. Previous On-Farm Cropping Trials booklets can be found at http://www.nwroc.umn.edu/Cropping_issues/NW_Crop_trials/On_Farm_Trials.htm.

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

Whenever possible, research plot data was analyzed using statistics. The LSD (Least Significant Difference) numbers beneath columns in tables are statistical measures of variability. If the differences between two treatments equals or exceeds the LSD value, the higher yielding treatment probably was superior in yield. If the difference is less than the LSD the treatment difference is probably due to environmental factors. An "NS" notation in a column indicates no significant difference for that characteristic.

For more information about any of the studies included in this report, please contact the Extension Educator or specialist listed. We invite your input on priorities you believe are important for Minnesota crop producers.

Sincerely,

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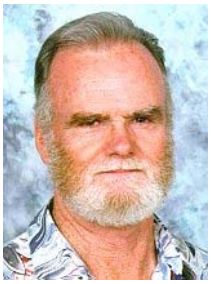

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Research Areas

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

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The mission of the NWROC is to contribute, within the framework of the Minnesota Agricultural Experiment Station (MAES) and the College of Food, Agricultural, and Natural Resource 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.

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Effect of the Fungicide Headline on Soybean Plant Health—Pennington

Cooperator: Ken and Connie Mehrkens
Nearest Town: Thief River Falls
Soil Type: Clearwater loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Wheat
Variety: Croplan Genetics RT0043
Planting Date: 5-20-06
Row Spacing: 7 inches
Plot Size: 7 rows x 25 feet
Fertilizer: 8 lb N, 40 lb P, 40 lb K
Weed Control: Preplant chemical Prowl 2.5 pts/a
Post application of Roundup: V3 application - 1 1/2 pts/a Cornerstone + 1 pt/a Class Act; R2 application - 1 1/2 pts/a Cornerstone + 1 pt/a Class Act

Purpose of Study:
Soybean leaf rust was detected in the US in 2004. Fungicides will help to control leaf rust. Some chemical companies feel that a foliar application of strobilurin fungicides in the absence of disease may still enhance plant health. At present, fungicide application results on soybean have been inconclusive and studies were lacking in northwest Minnesota. This field trial was designed to determine whether benefits from applying Headline (pyraclostrobin) fungicide at the R1 and R3 stage would promote "plant health", possibly resulting in increased yields for growers.

Fungicide: Application dates and environmental conditions:

Date	July 6	July 17
Soybean growth stage	R1	R3
Wind (mph)	2-3 S	1.4 N
Temperature	75F	73F
Conditions	Partly cloudy	Clear sky
Soil condition	dry	dry
Time of application	8:50 p.m.	8:25 p.m.

Harvest Date: 9-15-06
Experimental Design: Randomized complete block with 4 replications

Results:
During the dry summer season the soybean plots were visited on a regular basis. Under the dry conditions very limited leaf disease pressure was noted. No visual differences in the treatments were observed until the end of the season. At the end of August the control plots appeared to loose their leaves quicker, but the % of remaining leaves recorded on August 31st was not significantly different between treatments. A low level of soybean aphids was observed in the field as well as natural predators. The conclusion is that under very low disease pressure none of the treatments showed significant differences when compared with the control (no treatment applied).

Effects of Headline applied at two developmental stages on yield and quality of soybean.

Treatment	Fungicide Headline[1]	8-31-06 Leaves remaining on the plants (%)	Plant Height (inch)	Harvest Moisture (%)	Yield[2] (bu/a)	Test[2] Weight (lb/bu)	Oil (%)	Protein (%)
Control	no	14.3	20.5	8	44.9	60.6	19.94	33.05
R1	12 oz/a	23.8	20	7.6	45.3	60.8	19.93	33.01
R3	12 oz/a	24.3	20.5	7.8	44.3	60.7	19.91	33.10
LSD 0.05		NS	NS	NS	NS	NS	NS	NS

[1] Fungicide was applied with a CO_2 backpack sprayer delivering 10 gpa at 30 psi using 8015 flat fan nozzles.
[2] Corrected to 13 % moisture.

Funding: Minnesota Soybean Research and Promotion Council
Partnership: Paul Gregor, Agronomist Croplan Genetics
Acknowledgements: Carlyle Holen, Bobby Holder

For additional information:
Hans Kandel

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Soybean Aphid Overwintering Success in the Red River Valley

Cooperator: Ray Johnson
Nearest Town: Moorhead
Experimental Design: Completely Randomized

Purpose of Study:
The objective was to determine when soybean aphid (SBA) colonized buckthorn, the duration of their egg laying, the relative abundance of eggs, spring hatching success, and occurrence of emigration to soybean.

Figure 2. (a) Cluster of newly hatched soybean aphid beneath buckthorn bud breaking dormancy. (b) Soybean aphid on buckthorn leaf. (c) Soybean aphid on buckthorn with wingbuds.

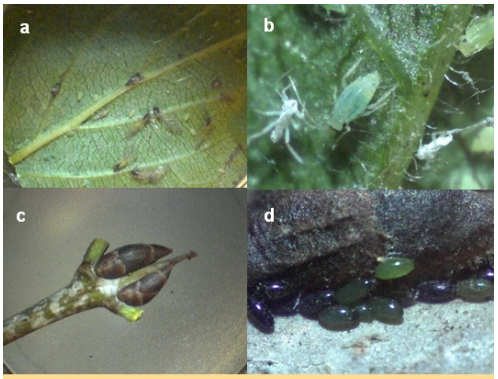


Figure 1. (a) Winged Soybean aphids colonizing buckthorn leaf in September '05. (b) Mature soybean aphid ready to lay eggs. (c) Dormant bud of buckthorn and the preferred egg laying site. (d) Cluster of soybean aphid eggs at the base of buckthorn bud.

Results:
The largest populations of soybean aphid ever colonizing buckthorn in NW Minnesota were observed August to October, 2005. Winged SBA (Figure 1) were first found the last week of August. The first nymphs for the sexual generation on buckthorn were observed Sept 6. The first mature oviparae (egg producing form of SBA) were found October 6. SBA were present until Nov 2 when all leaves finally dropped from branches. The first eggs were found the first week of October. The numbers of eggs found are summarized in Table 1.

In spring 2006, buckthorn broke bud around April 16. The first twig samples were taken April 20 and SBA nymphs were already present. No aphids were found on buckthorn after May 17. The earliest emerged soybean plants were already present in neighboring fields. The first SBA found infesting soybean occurred on June 6.

Table 2 summarizes data for observed SBA variables as a mean for the weekly sample of 10 randomly selected buckthorn twigs. Egg remnants became increasingly difficult to find, so the early estimates of percent hatch are more reliable than the later.

Table 1. Observations related to soybean aphid egg laying on common buckthorn, *Rhamnus cathartica*, in the fall of 2005 in Moorhead, MN.

Date	Eggs per 100 Buds	% Buds with SBA Eggs	Number of Buds observed by corresponding # SBA eggs/ bud pair					
			1	2	3	4	5	> 5*
10-6-05	3.3	6.5	6	0	0	0	0	0
10-13-05	0.5	0.9	2	0	0	0	0	0
10-20-05	11.5	8.7	6	2	3	2	0	2
10-28-05	71.5	19.8	20	10	5	1	0	18

** In the group of >5 eggs per bud pair, the greatest number of eggs was 45.*

Table 2. Observations in spring 2006 of hatch and population development of soybean aphid in Moorhead

Sample Date	Mean # Buds	Mean # of SBA by Age or Condition						Mean # of Eggs by Condition			Estimated Egg Hatch (%)
		Nymphs			Adult		Dead				
		1 to 2	3 to 4	Alatoid	Wingless	Winged	SBA	Swollen	Collapsed	Hatched	
4-20-06	15.3	8.2	0	0	0	0	0	5.4	0.3	7.2	64
4-27-06	14.7	0.9	0.4	0	0	0	0.4	0.5	0.8	1.4	63
5-3-06	12.8	2.3	0.4	0	0	0	0.4	0.1	4.3	2.2	47
5-10-06	9.2	1.1	0.3	0.3	0	0	0	0	0.4	1.2	106
5-17-06	7.9	0.9	0.7	0	0.2	0.1	0	0	0	0.2	NA

Partnership/Funding:
Minnesota Soybean Research and Promotion Council

For Additional Information:
Phillip Glogoza

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Soybean Aphid Insecticide Efficacy Study—Otter Tail

Cooperator: Phil Jennen
Nearest Town: Fergus Falls
Soil Type: Clay Loam
Tillage: Disk and Chisel Plow
Previous Crop: Corn
Variety: Pioneer 90M60
Planting Date: 5-17-06
Planting Rate: 190,000
Row Width: 15 Inch
Fertilizer: None
Herbicide: 6-8-06 Glyphosate @ 26 oz/a
6-27-06 Glyphosate @ 26 oz/a
Insecticide Treatments: Various
Treatment Date: 7-17-06
Harvest Date: 9-27-06
Experimental Design: Randomized Complete Block (3 replications)
Plot Size: 7.5 feet X 20 feet (center 4 rows for harvest)

Purpose of Study:
Evaluate insecticide efficacy on soybean aphid populations and the interaction with plant yield and quality components.

Results:
There was no significant difference in the amount of yield loss prevented by any of the Warrior, Asana or Lorsban treatments (including 4 oz of Lorsban mixed with Orthene 90S). The other Orthene treatments and the numbered Valent compound did prevent significant yield loss compared to the Crop Oil Concentrate treatment or untreated controls. Interestingly, while not preventing the same yield loss as any of the insecticide treatments, the Crop Oil Concentrate did demonstrate some aphid mortality and associated yield loss prevention. The patterns of Cumulative Aphid Days agree generally with that of yield loss prevention, which is to be expected given the mechanism through which yield loss occurs from aphid feeding. Interestingly, seed size was not directly correlated with yield. This may infer that yield loss was not principally the result of decreased seed size, which is typical of Soybean Aphid impact in West Central and Northwest MN. Rather, the earlier developing aphid populations of 2006 may have also impacted nodes and number of pods. Unfortunately, this data was not available for analysis.

Treatment	Rate (Product/a)	Yield (bu/a)	Cumulative Aphid Days	Seeds per lb
Lorsban	2 pt	62.3a	6,474a	2474ab
Lorsban	1 pt	62.1a	8,550ab	2623ab
Lorsban + COC	1 pt + 0.02 qt	62.0a	7,325ab	2400a
Warrior	3.2 oz	61.7a	8,669ab	2427a
Asana	5.8 oz	60.8a	8,910ab	2425a
Asana	9.6 oz	60.1a	9,515ab	2451ab
Lorsban	4 oz	59.2a	9,120ab	2630ab
Warrior	1.92 oz	58.7a	7,777ab	2580ab
Orthene 90S + Lorsban	.75 lb ai + 4 oz	57.6ab	9,975ab	2405a
V-10191	.75 lb ai	51.3b	18,083c	2691b
Orthene 90S	.75 lb ai	50.6b	15,986bc	2499ab
Orthene 97 Pellets	.75 lbai	48.1b	21,104c	2507ab
COC	0.02 qt	37.1c	37,429d	2901bc
Untreated		26.1d	54,908e	2939c

Means within columns followed by the same letter are not significantly different (P<0.05) according to Fisher's Protected LSD.

Funding: Minnesota Soybean Research and Promotion Council
Partnership: Northwest Research and Outreach Center (NWROC)

For additional information:
Ian MacRae, Doug Holen

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

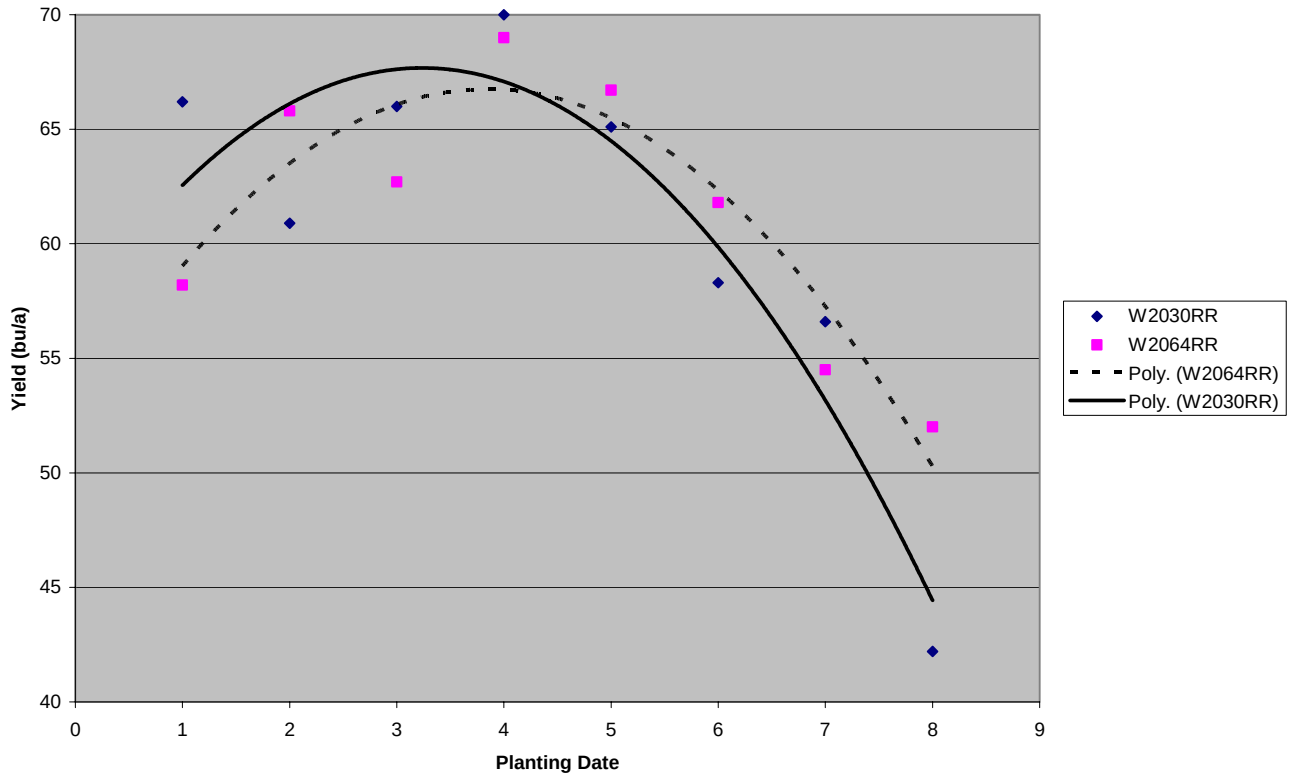
Soybean Relative Maturity and Planting Date Influence on Optimal Yield

Cooperator: Tyler and HD Ross
Nearest Town: Crookston
Soil Type: Bearden silty clay loam
Tillage: Field cultivator with rolling baskets
Previous Crop: Sugarbeet
Variety: Wensman W20051RR, W2030RR & W2064RR
Planting Date: 4-26-06 - 6-12-06
Row Width: 6 inch
Fertilizer: None
Herbicide: Roundup Original
Harvest Populations: 180,000
Harvest Date: 9-25-06
Experimental Design: Split plot with varieties as main plot and planting date as subplot

Purpose of Study:
To evaluate soybean relative maturity and planting date influence on optimal yield in northwestern Minnesota.

Results:
The plots were established utilizing three Wensman cultivars with 00.5, 0.2 and 0.6 relative maturities planted at eight different dates commencing Aril 26 and concluding on June 12. Herbicide drift from a neighboring field severely affected several plots of the early maturing variety W20051RR across a number of planting dates. Data collected from these plots were not included in data analysis, summary or interpretation. The mid (W2030RR) and late (W2064RR) maturing varieties were not affected and data from these varieties are in the results presented. Optimum yield was achieved with the mid and later maturing varieties at planting date 4 (May 16th) as is noted in Graph 1. Protein percentage were not affected by planting date and oil percent significantly decreased with delayed planting as is noted in Graph 2.

Graph 1. 2006 Planting Date Yields



Partnership/Funding: Minnesota Soybean Research and Promotion Council
NW Research and Outreach Center

For additional information:
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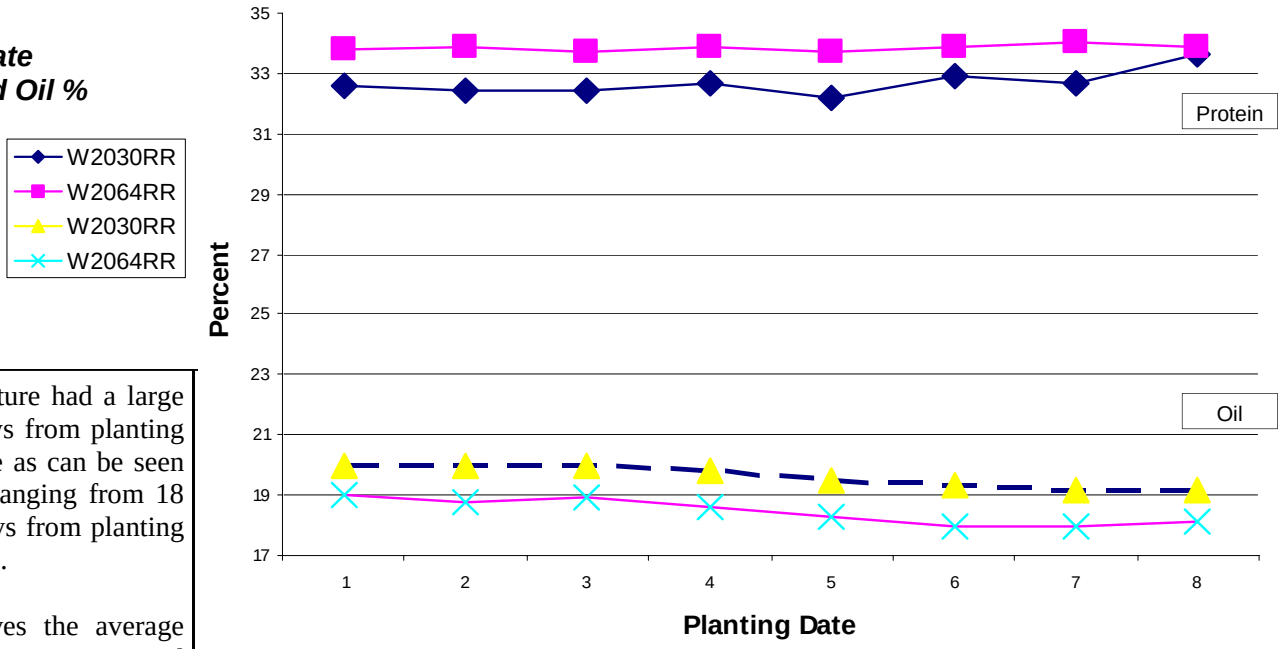
Soybean Relative Maturity and Planting Date Influence on Optimal Yield *(continued)*

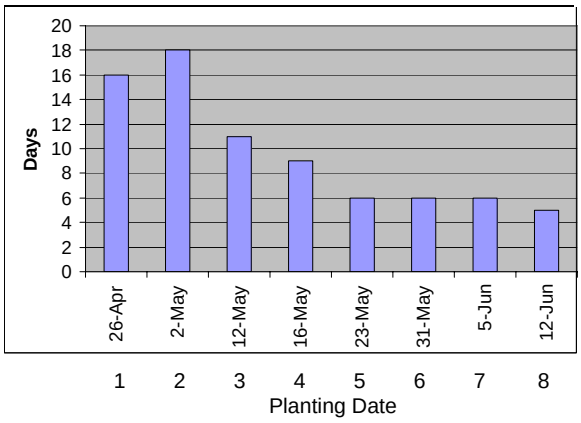
Graph 2.
Planting Date
Protein and Oil %

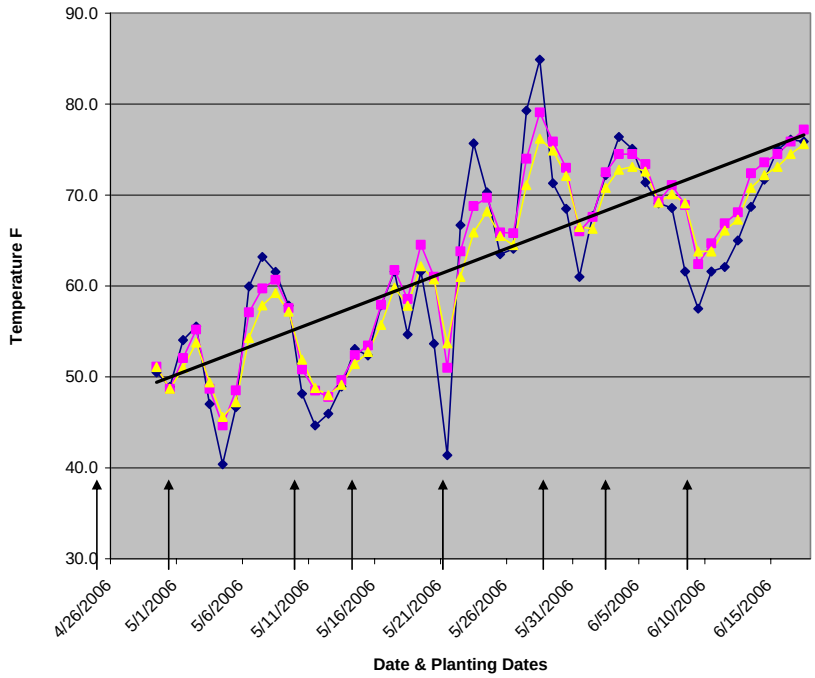


Soil temperature had a large effect on days from planting to emergence as can be seen in Graph 3 ranging from 18 days to 5 days from planting to emergence.

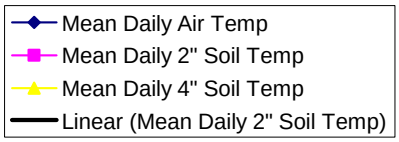
Graph 4 gives the average daily air temperature, and average 2 inch and 4 inch soil temperatures. Mean soil temperatures at the 2 and 4 inch depths had achieved 50 degrees as early as May 1 in 2006 which is above normal. Needless to say, the growing conditions during 2006 were not typical of a normal year in northwestern Minnesota with borderline drought conditions and warmer than normal soil temperatures. To utilize this information to make planting date decisions, several years of different environments need to be considered to determine a risk assessment of early planting of soybean.

Graph 3.
Number of days planting to emergence





Graph 4.
Mean Daily Air, 2" & 4" Temps 2006



Soybean Varietal Trials — Pennington and Roseau County

	Thief River Falls	Roseau
Cooperator:	Christensen Brothers	Richard Magnuson
Nearest Town:	Thief River Falls	Roseau
Soil Type:	Sandy loam	Loamy clay
Previous Crop:	Spring Wheat	Spring Wheat
Seed Bed Prep:	Cultivation 2 x	Cultivated 2 x
Soil Test:	Olsen P 7 ppm and K 85 ppm	None
Fertilizer:	None	None
Planting Date:	5-18-2006	5-18-2006
Row Width:	12 inch	12 inch
Seeding Depth:	3/4 inch	3/4 inch
Seeding rate/a:	160,000	160,000
Herbicides:	Valor (3 ounces/a) 5-24-06 Raptor (5 ounces/a) 6-14-06	3 pt Prowl—preemergence 2 pt Raptor—postemergence
Harvested:	10-14-06	10-7-06
First Frost Date:	9-21-06	9-18-06
Experimental Design: Randomized complete block with 3 replications.		

Purpose of Study:
To evaluate visual maturity, maturity, crop height, yield, protein and oil percent of soybean varieties grown in the far northern zone.

Results:
Significant differences in visual maturity score were observed. It is important to use the actual maturity date in variety selection. There are significant differences in crop height, yield, protein and oil percent.

Company	Variety	Visual[1] Maturity score (1-9)	Maturity[2] date	Company Maturity Rating	Crop[3] Height (Inches)	Yield[2] Percent of mean (%)	Protein[2] Percent of mean (%)	Oil[2] Percent of mean (%)
KSC/Challenger	K-003RR	2.8	9-4-06	00.3	27.9	91	93	109
North Star Genetics	NS0011RR	3.6	9-6-06	00.5	19.4	92	99	104
Dyna-Gro	30B04	4.1	9-9-06	00.4	22.6	97	101	102
North Star Genetics	NS0041RR	4.9	9-9-06	00.3	29.8	90	102	98
Minn. AES	MM0071	5.0	9-9-06	00.7	23.5	88	99	103
N.D. AES	Jim	4.2	9-9-06	00.8	21.8	82	100	96
NuTech	NT-0066RR	4.1	9-10-06	00.5	23.0	104	93	108
Earthwise	Kamichis	6.8	9-10-06	00.3	26.3	101	99	99
PFS	06004RR	3.8	9-10-06	00.9	22.3	101	95	107
Gold Country	426RR	3.8	9-10-06	00.8	23.8	98	95	105
Thunder	27003RR	4.2	9-10-06	00.3	26.5	91	97	105
Legend	LS0036RR	4.3	9-11-06	00.3	19.9	99	97	107
Wensman	W20051RR	4.3	9-11-06	00.5	22.0	98	98	104
Prairie Brand	PB-00425RR	3.8	9-11-06	00.4	20.5	97	96	105
Kruger	K-006RR	3.8	9-11-06	00.7	20.8	95	98	107
NK Brand	S00-K5	4.4	9-11-06	00.5	20.2	90	105	97
DairyLand	DSR-C900/RR	5.6	9-11-06	00.9	24.7	90	103	103

Table continues on following page. See footnotes on Page 13.

Partnership/Funding:
Minnesota Soybean Research and Promotion Council

For additional information:
Jim Orf, Hans Kandel, Howard Person, Derek Crompton

Soybean Varietal Trials — Pennington and Roseau County (*continued*)

Company	Variety	Visual[1] Maturity score (1-9)	Maturity[2] date	Company Maturity Rating	Crop[3] Height (Inches)	Yield[2] Percent of mean (%)	Protein[2] Percent of mean (%)	Oil[2] Percent of mean (%)
Asgrow	AG00603	5.8	9-11-06	00.6	22.9	89	97	98
Earthwise	Colibri	4.5	9-11-06	00.3	25.3	84	93	96
Wensman	W20074RR	5.1	9-12-06	00.7	24.7	108	98	104
KSC/Challenger	K-007RR	5.3	9-12-06	00.7	26.3	104	102	98
Proseed	RR50-04	4.9	9-12-06	00.4	26.2	101	102	98
KSC/Challenger	K-005RR	4.4	9-12-06	00.6	22.5	101	98	102
PFS	07006RR	4.7	9-12-06	00.6	26.2	94	103	96
PFS	07008RR	5.2	9-13-06	00.8	26.2	110	96	108
Monsanto	XP5007ARR	4.3	9-13-06	00.7	23.7	108	96	103
Wensman	W20091RR	4.7	9-13-06	00.9	27.5	105	101	101
Prairie Brand	PB-00736RR	4.8	9-13-06	00.7	27.0	104	103	96
NuTech	NT-0055RR	4.7	9-13-06	00.4	24.3	103	97	99
Proseed	RR60-06	5.8	9-13-06	00.6	25.3	103	104	97
Prairie Brand	PB-00576RR	4.9	9-13-06	00.5	23.9	102	97	101
North Star Genetics	NS0031RR	5.5	9-13-06	00.5	22.8	101	97	104
Hyland Seeds	RR Ramsey	4.8	9-13-06	00.5	25.8	95	103	98
Dyna-Gro	30A06	5.4	9-13-06	00.6	24.9	95	105	94
Thunder	26004RR	5.8	9-13-06	00.4	23.7	91	107	95
Proseed	RR50-07	4.9	9-14-06	00.7	27.3	115	98	105
Prairie Brand	PB-00845RR	4.9	9-14-06	00.8	26.3	113	98	103
Mustang	M-0096RR	5.4	9-14-06	00.9	26.8	109	99	104
Thunder	26006RR	5.7	9-14-06	00.6	24.5	106	100	101
Proseed	RR60-05	5.0	9-14-06	00.5	26.2	105	98	101
Prairie Brand	PB-00645RR	5.6	9-14-06	00.6	26.3	104	98	102
Prairie Brand	PB-00965RR	5.7	9-14-06	00.9	26.3	104	101	103
Thunder	26009RR	5.2	9-14-06	00.9	25.8	104	102	99
Dyna-Gro	30M09	5.8	9-14-06	00.9	24.8	93	106	98

Table continues on following page. See footnotes on Page 13.

Soybean Varietal Trials — Pennington and Roseau County (*continued*)

Company	Variety	Visual[1] Maturity score (1-9)	Maturity[2] date	Company Maturity Rating	Crop[3] Height (Inches)	Yield[2] Percent of mean (%)	Protein[2] Percent of mean (%)	Oil[2] Percent of mean (%)
DairyLand	DSR-C700RRSTS	6.0	9-14-06	00.7	29.2	92	97	96
Legend	LS0065RR	5.5	9-15-06	00.6	24.6	111	97	106
Thompson Seeds	T-0090RR	5.8	9-15-06	00.8	26.0	108	101	102
PFS	07009RR	5.7	9-15-06	00.9	28.5	105	99	102
Kruger	K-009+RR	6.3	9-15-06	00.9	26.4	104	100	103
Wensman	W20092RR	6.3	9-15-06	00.9	26.5	102	103	99
N.D. AES	Traill	5.6	9-15-06	0.0	28.0	101	103	94
Earthwise	Atwood	7.8	9-15-06	00.6	24.8	100	101	98
Kruger	K-008RR	6.8	9-16-06	00.8	25.3	113	99	101
NK Brand	S01-T5	5.6	9-16-06	0.1	24.7	110	107	94
Rough Rider Genetics	RG200	5.1	9-16-06	0.0	25.2	98	107	92
Mustang	M-0087RR	7.8	9-17-06	00.8	25.0	118	97	101
Hyland Seeds	RR Royal	7.3	9-17-06	00.9	30.0	105	101	98
Garst Seed	0188RR	6.8	9-17-06	0.1	25.5	102	103	96
Minn. AES	MN0101	6.2	9-17-06	0.1	27.6	101	104	95
NuTech	NT-0220RR	5.8	9-18-06	0.1	27.8	114	96	96
NuTech	NT-0088RR	7.8	9-18-06	00.7	24.5	100	97	103
DairyLand	DSR-C800/RR	7.7	9-18-06	00.8	25.5	100	102	98
Pioneer Brand	90M20	6.8	9-18-06	0.2	23.4	97	93	103
Earthwise	Bravado	4.4	9-18-06	00.8	25.1	91	118	81
Richland Organics	MK0205	8.0	9-19-06	0.1	25.6	93	104	93
Thompson Seeds	T-0252+RR	9.0	9-20-06	0.1	27.3	110	104	95
Pioneer Brand	90M01	7.0	9-23-06	0.0	25.2	95	99	100
North Star Genetics	NS0021RR	9.0	9-28-06	0.4	29.0	80	102	95
	Grand Mean	5.5	9-14-06		25.1	49.5 bu/a	34.7%	18.4%
	LSD. 0.05	1.2			4.3			
	LSD 0.20					6%		

[1]Visual score is a combined number of observations in Thief River Falls on 8-31-06 and Roseau on 9-6-06 this is an approximate for an average frost date. The crop was about two weeks earlier this year compared with a normal year.

Maturity scale:

9 plants still green

8 plants mostly green some yellowing of the leaves

7 Yellowing more than half of the plants still green

6 half yellow half green plants

5 mostly yellow little green on plants left

4 all plants yellow

3 yellow plants with browning pods

2 plant nearly mature

1 plant mature

[2]Data average for far northern zone, Roseau, Thief River Falls and Crookston.
[3]Crop height data from Thief River Falls and Roseau only.

Source and more information can be found at http://www.soybeans.umn.edu/crop/variety

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Soybean Conventional and Roundup Ready Varietal Trials McIntosh and Crookston—Polk County

Crookston Site
Tyler and HD Ross

Roundup Ready Varieties

Planting Date: 5-16-06

Soil Test:
P = 11 ppm
K = 139 ppm
O.M. = 3.9%
Carb. = 1.1%
Salts = .31 mmho
pH = 8.3

Herbicides: PPI = None

Conventional: 5-26-06
Raptor 2 oz./a
Rezult 1.6 + 1.6 pt./a
Crop Oil 1.5 pt/a

Roundup Varieties: 6-13-06, 7-6-06
1 qt. Roundup Original
+3.2 oz. Warrior 7-7-06
+1/2 pt. Lorsban 8-7-06

Harvest Date 9-25-06

Company	Variety	Rel. Maturity	Yield (bu/a)	Protein (%)	Oil (%)
Stine Seed	S0306-4	0.3	66.6	33.0	20.2
Legend Seeds	LS0624	0.5	66.4	34.5	19.0
Wensman Seed	W2030RR	0.3	66.0	33.5	20.1
AgSource Seed	9037	0.3	65.0	33.4	20.1
Asgrow Seed	AG0401	0.4	64.9	33.4	19.9
Wensman Seed	W2064RR	0.5	64.8	34.6	18.9
Dyna-Gro	32T03	0.3	64.7	33.5	20.2
NK Brand Seed	S01-T5	0.1	62.8	36.4	18.7
Pioneer Seed	90M60	0.6	61.2	34.4	19.1
Mustang Seeds	M-036 RR	0.3	61.1	33.3	19.4
Peterson Farm Seed	07009RR	00.9	60.9	34.6	19.9
Croplan Genetics	RT406	0.4	60.7	33.7	20.1
RoughRider Genetics	RG604RR	0.4	60.7	33.8	19.3
Thunder Seed Inc.	2505RR	0.5	60.7	34.5	19.1
NK Brand Seed	S02-M9	0.2	60.6	36.2	19.6
Dyna-Gro	36N05	0.5	60.5	35.0	19.1
Gold Country Seed	2703RR	0.3	59.8	33.5	20.1
Peterson Farm Seed	07008RR	00.8	59.8	33.4	20.2
Wensman Seed	W20074RR	00.7	58.1	33.6	20.1
Proseed	40-20	0.2	57.6	33.2	19.5
Stine Seed	S0090-84	00.9	57.1	34.6	19.4
Hyland Seeds	RR Royal	00.9	57.0	35.5	18.8
AgSource Seed	9057	0.5	56.8	32.9	19.7
Pioneer Seed	90M01	0.0	56.8	34.1	19.9
Asgrow Seed	AG0301	0.3	56.5	33.5	19.3
Seeds 2000	Exp0081RR	0.08	55.7	32.7	20.5
Northstar Genetics Limited	NS0011RR	00.4	55.4	33.5	20.1
Asgrow Seed	AG0202	0.2	55.0	33.7	19.1
Legend Seeds	LS0065	00.9	54.4	33.3	20.3
Northstar Genetics Limited	NS0031RR	00.8	54.4	34.2	19.7
Proseed	20-11	0.1	53.6	34.2	19.9
RoughRider Genetics	RG600RR	0.0	53.5	34.2	19.7
Pioneer Seed	90M20	0.2	53.4	33.9	19.5
Peterson Farm Seed	04009RR	00.9	53.0	33.7	19.7
Dekalb Seed	DKB009-51	00.9	52.9	35.0	18.8
Mycogen Seed	5A009RR	00.9	52.8	34.6	20.0
Proseed	50-30	0.3	52.8	34.9	19.5
Croplan Genetics	RT0103	0.1	52.5	35.5	19.7
Mycogen Seed	5B008RR	00.8	52.4	34.1	19.6
Hyland Seeds	RR Rugged	0.3	52.2	34.2	20.0
RoughRider Genetics	RG601NRR	0.1	52.1	34.6	19.1
Garst Seed	0312RR	0.3	52.0	37.0	18.5
Mycogen Seed	5B004RR	00.4	51.6	33.1	20.3
Garst Seed	0188RR	0.1	51.1	34.0	19.6
Dekalb Seed	DKB 5007	00.7	50.7	33.4	20.2
Gold Country Seed	426RR	00.8	49.9	32.9	20.5
AgSource Seed	9026	0.2	49.6	32.9	19.8
NK Brand Seed	S00-K5	00.5	49.2	35.6	18.8
Northstar Genetics Limited	NS0021RR	00.9	48.8	33.9	20.0
Hyland Seeds	RR Ridgeway	0.2	48.5	33.8	19.4
Thunder Seed Inc.	2502RR	0.3	48.4	33.6	19.4
Thunder Seed Inc.	26004RR	00.4	48.3	35.4	19.1
Dyna-Gro	30B04	00.4	47.1	33.2	20.2
Legend Seeds	LS0255	0.2	47.1	33.9	19.4
Croplan Genetics	RT0043	00.4	46.4	33.2	20.3
Asgrow Seed	AG00603	00.6	44.9	33.2	19.6
LSD 0.05			8.2	0.8	0.3

Partnership/Funding: Polk County Extension Service and Polk County Soybean Growers Association, NW Research and Outreach Center

For additional information:
Russ Severson and Jim Stordahl

Soybean Varietal Trials —Polk County *(continued)*

Fosston Site
Rick Roed

Roundup Ready Varieties

Planting Date: 5-16-06

Soil Test :
P = 8 ppm
K = 169 ppm
O.M. = 2.7%
Carb. = 0.1%
Salts = .18 mmho
pH = 7.2

Herbicides: PPI = Prowl

Conventional Varieties: 6-28-06
Hand weeded escapes due to early flowering of soybeans

Roundup Varieties—6-28-05
1 qt Roundup Original

Harvest Date 9-14-06

Company	Variety	Rel. Maturity	Yield (bu/a)	Protein (%)	Oil (%)
Pioneer Seed	90M60	0.6	49.6	34.9	18.9
Proseed	60-40	0.4	46.8	34.6	19.7
Asgrow Seed	AG0401	0.4	46.1	33.9	19.5
AgSource Seed	9037	0.3	44.4	34.3	19.7
Croplan Genetics	RT406	0.4	43.6	34.2	19.7
Dyna-Gro	33T06	0.6	43.4	34.5	18.8
Thunder Seed Inc.	2505RR	0.5	42.8	34.6	18.7
Wensman Seed	W2030RR	0.3	42.4	34.4	19.7
Pioneer Seed	90M40	0.4	42.1	33.9	19.1
Stine Seed	S0306-4	0.3	41.8	34.1	19.8
Gold Country Seed	2703RR	0.3	41.6	34.1	19.8
Dyna-Gro	30M09	00.9	39.5	34.1	20.0
Pioneer Seed	90M20	0.2	39.5	33.9	19.0
Proseed	20-40	0.4	39.0	33.4	19.8
Asgrow Seed	AG0202	0.2	38.9	33.4	18.5
Mustang Seeds	M-036	0.3	38.9	32.6	19.3
Dyna-Gro	33K02	0.2	38.5	33.3	19.6
Wensman Seed	W2064RR	0.5	38.5	34.0	18.9
AgSource Seed	9057	0.5	38.1	34.2	19.0
Garst Seed	0188RR	0.1	38.1	33.2	19.5
Hyland Seeds	RR Reliant	0.3	37.2	35.6	18.3
Peterson Farm Seed	07009RR	00.9	36.7	34.4	20.0
Wensman Seed	W20074RR	00.7	36.2	32.3	20.3
NK Brand Seed	S02-M9	0.2	36.0	35.9	19.7
Peterson Farm Seed	07008RR	00.8	35.9	31.8	20.3
Seeds 2000	Exp0081RR	00.8	35.0	31.9	20.3
AgSource Seed	9026	0.2	34.8	32.3	19.5
Asgrow Seed	AG0301	0.3	34.5	33.3	19.2
Stine Seed	S0090-84	00.9	34.4	32.5	19.7
Mycogen Seed	5B004RR	00.4	34.1	32.6	19.9
NK Brand Seed	S01-T5	0.1	34.0	35.7	18.9
Hyland Seeds	RR Rugged	0.3	33.4	34.1	19.9
Mycogen Seed	5A009RR	00.9	33.4	33.8	20.0
Thunder Seed Inc.	26004RR	00.4	33.4	34.3	19.3
RoughRider Genetics	RG601NRR	0.1	32.7	34.0	19.2
Peterson Farm Seed	04009RR	00.9	32.6	33.5	19.3
Proseed	50-30	0.3	32.5	34.8	19.5
Croplan Genetics	RT0103	0.1	32.0	34.9	19.7
Garst Seed	0312RR	0.3	31.7	36.5	18.5
Northstar Genetics Limited	NS0031RR	00.8	31.2	32.5	19.7
Hyland Seeds	RR Ridgeway	0.2	30.9	32.7	19.1
Dekalb Seed	DKB009-51	00.9	30.8	34.8	18.6
RoughRider Genetics	RG604RR	0.4	30.7	33.1	19.4
Mycogen Seed	5B008RR	00.8	30.4	34.1	18.9
Northstar Genetics Limited	NS0021RR	00.9	30.4	32.8	19.9
Asgrow Seed	AG00603	00.6	30.1	33.4	18.9
Dekalb Seed	DKB 5007	00.7	29.7	32.6	20.0
Croplan Genetics	RT0043	00.4	29.1	33.1	19.7
Legend Seeds	LS0255	0.2	28.2	32.5	19.2
Legend Seeds	LS0036	00.3	27.4	33.6	19.7
Thunder Seed Inc.	2502RR	0.3	27.4	32.5	19.3
Gold Country Seed	426RR	00.8	27.2	33.2	19.7
RoughRider Genetics	RG600RR	0.0	27.2	33.1	19.8
Legend Seeds	LS0094	00.9	27.1	33.8	19.5
NK Brand Seed	S00-K5	00.5	25.5	35.6	18.8
Northstar Genetics Limited	NS0011RR	00.4	25.1	33.3	19.8
LSD 0.05			7.8	1.4	0.6

Soybean Varietal Trials —Polk County *(continued)*

Conventional Varieties

Crookston: Tyler and HD Ross

Company	Variety	Rel.Maturity	Yield (bu/a)	Protein (%)	Oil (%)
Hyland Seeds	T 2014	0.4	63.0	34.4	19.2
Thunder Seed Inc.	0598	0.5	61.6	34.5	19.2
Northstar Genetics Limited	NS0333	0.3	57.0	35.0	18.8
SunOpta	Panther	0.5	56.0	37.8	17.9
NDSU	Traill	0.0	53.3	36.9	18.1
Hyland Seeds	Emerson	00.6	53.1	33.4	20.1
U of M	MN0101	0.1	50.7	36.4	18.2
Northstar Genetics Limited	NS0002	00.9	47.5	33.5	19.2
SunOpta	Colibri	00.3	47.4	33.9	17.5
NDSU	Jim	00.7	41.3	35.7	18.4
LSD 0.05			8.8*	0.6	0.4

Fosston: Rick Roed

Company	Variety	Rel. Maturity	Yield (bu/a)	Protein (%)	Oil (%)
Thunder Seed Inc.	0598	0.5	35.9	35.1	19.0
Northstar Genetics Limited	NS0002	00.9	33.8	33.4	19.1
Hyland Seeds	Emerson	00.6	30.7	33.9	19.9
Northstar Genetics Limited	NS0333	0.3	30.2	35.1	18.7
NDSU	Traill	0.0	30.1	35.8	18.5
SunOpta	Panther	0.5	29.8	38.0	17.9
U of M	MN0101	0.1	28.0	35.0	18.8
Hyland Seeds	T 2014	0.4	27.9	33.2	19.7
SunOpta	Colibri	00.3	24.8	32.0	18.1
NDSU	Jim	00.7	20.8	35.7	18.0
LSD 0.05			6.5	1.0	0.4

Soybean Varietal Trials —Norman County

Cooperator: Lynn Johnson
Nearest Town: Ada
Tillage: Fall DMI ripper, spring field cultivated
Previous Crop: Corn
Planting Date: 5-31-06
Row Width: 22 inches
Fertilizer: None
Herbicide: 2 applications of Roundup Ultra Max at 22 oz/a
Harvest Date: 10-2-06
Experimental Design: Randomized complete block (3 reps)

Companies	Variety	Maturity	Population x 1000 (plants/a)	Harvest Moist (%)	Protein (%)	Oil (%)	Yield Adj 13% (bu/a)
Legend Seeds	0065	00.6	158	11.8	32.2	20.4	32.1
Seeds 2000	Exp 008	00.8	153	11.5	32.5	20.2	32.5
Peterson Farm Seeds	07008	00.8	162	11.7	32.4	20.3	32.3
Pioneer Hi-bred	90M01	0.0	161	11.2	33.6	19.4	31.0
Dekalb	DKB009-51	0.1	161	11.7	34.6	19.0	30.7
Roughrider	Rg601N	0.1	159	11.2	33.2	19.3	30.2
Legend Seeds	0255	0.2	161	11.1	32.2	19.7	31.5
Pioneer	90M20	0.2	161	11.5	32.9	19.7	30.8
Hyland Seeds	Ridgeway	0.2	159	11.2	32.5	19.7	29.6
Stine	S0306-4	0.3	165	10.7	32.4	20.0	39.4
AgSource	9037	0.3	173	11.0	32.7	19.8	38.0
Dyna-Gro[1]	30B04	0.3	174	10.9	31.5	20.5	31.2
Garst Seeds[1]	0312	0.3	157	11.6	36.0	18.7	30.4
SOI	0375	0.3	174	10.2	32.2	19.8	30.2
Asgrow	Ag0401	0.4	158	10.9	32.5	19.9	35.2
Roughrider	Rg604	0.4	163	10.4	31.8	19.9	33.4
Croplan Genetics[2]	RTO 541	0.5	137	11.5	33.0	19.8	37.5
Dyna-Gro[1]	36N05	0.5	160	11.1	32.6	19.5	37.2
SOI	0579	0.5	154	11.3	32.4	19.7	37.0
Thunder Seeds	2505	0.5	158	10.6	33.4	19.1	34.8
AgSource	9057	0.5	162	10.3	32.4	19.4	33.2
Garst Seeds[1]	0549	0.5	157	11.5	33.2	20.0	32.5
Hyland Seeds	Regal	0.5	168	11.5	33.2	19.3	29.9
Dyna-Gro[1]	33T06	0.6	166	10.7	32.6	19.6	40.5
Stine	S0608-4	0.6	152	10.6	32.3	19.2	40.5
Asgrow	Ag0604	0.6	163	10.7	32.3	20.0	40.2
Legend Seeds	0624	0.6	168	11.1	33.3	19.4	38.4
Pioneer Hi-bred	90M60	0.6	149	10.7	33.8	19.2	38.1
AgSource[3]	9065	0.6	178	11.1	32.6	19.5	36.8
Hyland Seeds	Rockport	0.6	146	11.8	32.9	19.9	36.3
SOI	0660	0.6	160	10.7	32.6	19.5	34.4
Garst Seeds[1]	0188	0.6	158	10.5	33.4	19.5	33.5
Peterson Farm Seeds[3]	0707	0.7	138	11.0	32.1	19.5	38.1
Roughrider	Rg607	0.7	148	11.1	33.4	19.4	36.0
LSD 0.05			**14**	**0.5**	**0.7**	**0.3**	**5.1**

[1] Seed treatment Cruiser Maxx; [2] Seed treatment Cruiser Maxx Pak; [3] Only two reps were used for final data

For additional information: Ray Bisek and Ken Pazdernik

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Determining Crop Loss Resulting from Cold Water Imbibition of Soybean Seed

Cooperator: H.D. and Tyler Ross
Nearest Town: Crookston
Previous Crop: Sugar beet
Varieties: AgSource 9026, Pioneer 90M60, Pioneer 90M20
Planting Date: 5-19-06
Row Width: 18 inches
Herbicide: 1 qt/a Roundup Original applied 6-13-06 and 7-7-06
Insecticide: 3.2 oz/a Warrior applied 7-7-06
and 0.5 pt./a Lorsban applied 8-7-06
Harvest Date: 9-25-06

Purpose of Study:
To determine the potential for soybean seed imbibition injury occurring at three soil temperatures (45, 50, and 55°F), and to evaluate variety and seed treatment management responses.

Precipitation:

	April (inches)	May (inches)	June (inches)	July (inches)	August (inches)
2006	1.3	2.4	1.1	1	3.5
115 Year Average	1.4	2.9	3.7	3.4	3.2

Experimental Design: Randomized complete block with 4 replications

Results:

Seeds soaked at three water temperatures were planted into a dry seedbed that remained that way until August. Seedling emergence was not uniform and stand establishment was slow due to the dry conditions

Significant differences were noted among treatments for root rot symptom ratings, protein, oil (Table 1), test weight, and 1000 seed weight (data not shown). Some trends can be explained by differences in varieties, rather than water temperatures or fungicide seed treatment. Overall, warmer water temperatures, a seed treatment, or both resulted in significantly less severe disease symptoms on roots compared with cooler water temperatures (Table 1). There were no treatment differences for yield, nodule counts, and physical root system dimensions.

Table 1. Results from three soybean varieties after seeds were soaked in water held at one of three different temperatures, air dried briefly, and later planted into a producer cooperator's field.

Seed treatment[1]	Water[2] (°F)	Variety	Root rot rating[3]	Protein (%)	Oil (%)	Yield (bu/a)
None	45	9026	3.9	33.9	20.1	42.0
None	45	90M20	3.8	34.1	20.0	45.2
None	45	90M60	4.1	34.8	19.3	46.6
Apron Maxx	45	9026	4.5	33.6	20.3	45.1
Apron Maxx	45	90M20	3.4	33.9	20.1	46.3
Apron Maxx	45	90M60	3.5	34.9	19.1	50.6
None	50	9026	4.0	34.0	20.1	41.7
None	50	90M20	3.3	33.8	20.0	43.8
None	50	90M60	3.5	35.1	19.2	43.2
Apron Maxx	50	9026	3.9	33.9	20.0	40.2
Apron Maxx	50	90M20	2.4	34.0	19.8	49.9
Apron Maxx	50	90M60	2.8	35.0	19.3	50.2
None	55	9026	3.5	33.7	20.2	43.5
None	55	90M20	3.0	33.8	19.9	47.1
None	55	90M60	3.1	35.0	19.2	51.6
Apron Maxx	55	9026	3.4	33.6	20.1	46.5
Apron Maxx	55	90M20	2.3	33.7	20.0	52.6
Apron Maxx	55	90M60	2.9	34.9	18.9	49.8
LSD 0.05			1.1	0.6	0.3	NS

[1]5 oz/cwt of Apron Maxx was applied to seed prior to planting.

[2]Seeds were soaked in water at three temperatures prior to planting to simulate different soil water temperatures.

[3]Roots of 10 plants/plot were rated at the R5 growth stage for disease on a 0 to 8 scale where 0=healthy and 8= 75% or more of root was discolored.

Partnership and Funding Information:
Funded by the Soybean Research and Promotion Council and supported by BASF, Syngenta, and Capistran Seed Co.

For additional information:
Charla Hollingsworth Lorilie Atkinson
Chris Motteberg Russ Severson

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Soil-Borne Disease Management Strategies for Soybean

Cooperator: H.D. and Tyler Ross
Nearest Town: Crookston
Previous Crop: Sugar beet
Variety: Legend 0255
Planting Date: 5-19-06
Row Width: 18 inches
Herbicide: 1 qt/a Roundup Original applied 6-13-06 and 7-7-06
Insecticide: 3.2 oz/a Warrior applied 7-7-06 and 0.5 pt./a Lorsban applied 8-7-06
Harvest Date: 9-25-06
Precipitation:

	April (inches)	May (inches)	June (inches)	July (inches)	August (inches)
2006	1.3	2.4	1.1	1	3.5
115 Year Average	1.4	2.9	3.7	3.4	3.2

Experimental Design: Randomized complete block with 4 replications

Purpose of Study:
To determine the effects of fungicide seed treatment, soil-applied fungicide drench, and seeding population combinations on soybean root health and crop production.

Results:

This test was planted into a dry seedbed which remained that way until August. Precipitation amounts recorded at the Northwest Research and Outreach Center were not favorable for development of root rot or other soil-borne disease problems.

Neither seeding population, seed fungicide treatment, or drench-applied fungicides resulted in measurable treatment differences for root rot ratings, root nodule counts, yield (Table 1), protein, oil, test weight, 1000 seed weight, or physical root system dimensions (data not shown). Root rot disease symptoms were present at low levels, but were not a production issue.

Table 1. Soil-borne disease management strategies tested included combinations of two seeding populations, two fungicide seed treatments and two drench-applied treatments.

Seed treatment	Drench rate and product[1]	Seeding population[2]	Root rot rating[3]	Nodule mean/plant	Yield (bu/a)
None	None	100	3.7	11.4	46.3
Apron Maxx 5 oz/cwt	None	100	3.5	12.6	44.4
None	None	150	4.1	11.5	47.0
Apron Maxx 5 oz/cwt	None	150	3.2	11.0	46.8
None	0.6 ml/gal applied 4 gal/120 ft row, Ridomil Gold EC	100	3.7	7.6	45.6
Apron Maxx 5 oz/cwt	0.6 ml/gal applied 4 gal/120 ft row, Ridomil Gold EC	100	4.4	10.6	45.9
None	0.6 ml/gal Ridomil Gold EC applied 4 gal/120 ft row	150	3.2	11.2	46.7
Apron Maxx 5 oz/cwt	0.6 ml/gal applied 4 gal/120 ft row, Ridomil Gold EC	150	3.6	11.7	46.5
None	0.6 ml/gal Ridomil Gold EC + 1.7 ml/gal Quadris + 4.5 ml/gal RTU-Vitavax applied 4 gal/120 ft row	100	2.7	9.8	47.9
Apron Maxx 5 oz/cwt	0.6 ml/gal Ridomil Gold EC + 1.7 ml/gal Quadris + 4.5 ml/gal RTU-Vitavax applied 4 gal/120 ft row	100	4.5	10.8	47.5
None	0.6 ml/gal Ridomil Gold EC + 1.7 ml/gal Quadris + 4.5 ml/gal RTU-Vitavax applied 4 gal/120 ft row	150	4.3	10.1	44.1
Apron Maxx 5 oz/cwt	0.6 ml/gal Ridomil Gold EC + 1.7 ml/gal Quadris + 4.5 ml/gal RTU-Vitavax applied 4 gal/120 ft row	150	3.8	7.5	47.1
LSD 0.05			NS	NS	NS

[1]Plots were drenched with fungicides at the unifoliate growth stage (2 June) and again at the V5-V6 growth stages (29 June).
[2]Seeding populations of 100,000 and 150,000/a were used.
[3]Roots of 10 plants/plot were rated at the R5 growth stage (20 July) for disease on a 0 to 8 scale where 0=healthy and 8= 75% or more of root was discolored.

Funding: Minnesota Soybean Research and Promotion Council and supported by BASF and Capistran Seed Co.

For additional information:
Charla Hollingsworth Lorilie Atkinson
Chris Motteberg Russ Severson

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Evaluation of Foliar and Heading Fungicide Application on Spring Wheat to Improve Plant Health

Nearest Town: Crookston
Previous Crop: Wheat
Planting Date: 5-6-06
Experimental Design: Small plots arranged in a split plot statistical design with fungicide treatment as main plot factor and fungicide application timing as the sub-plot factor.

Purpose of Study:
To determine whether an application of fungicide (i.e., nontreated control, 4 oz/a Folicur, 3 oz/a Headline, 6 oz/A Headline) at different plant growth stages (i.e., 4-5 leaf stage, 6-7 leaf stage, flag leaf stage, or at heading) during a year with little foliar or head disease pressure would result in increased grain yield or kernel quality.

Results:
Dry, warm weather during much of the spring wheat growing season resulted in little foliar and head disease pressures. Diseases commonly observed during other years such as tan spot, bacterial leaf stripe, leaf and stripe rusts, and Fusarium head blight were largely absent. Some lower leaf lesions caused by tan spot were detected early in the growing season and a few scattered pustules of leaf rust on upper leaves were noted late in the growing season. Disease symptoms were few and far between and were not expected to contribute toward reducing plant productivity.

Neither fungicide treatment nor application timing resulted in significant differences in any measured parameter compared with the nontreated control. Harvest data included yield, test weight, 1000 kernel weight, and protein (Table 1). Mycotoxin content in grain, resulting from Fusarium head blight, was either at very low levels (0.02 – 0.04 ppm) or at levels that were not readily detectable (<0.01 ppm).

These results indicate that fungicide application in the absence of disease, during dry growing seasons, does not significantly enhance grain yield or quality.

Table 1. Grain yield and quality data on hard red spring wheat.

Treatment[1]/a and Timing	Yield (bu/a)	Test Wt.2 (lb/bu)	1000 K (g)	Protein (%)
Non treated / 4-5 Leaf	62.8	61.4	27.9	15.1
Non treated / 6-7 Leaf	63.0	61.2	28.0	15.3
Non treated / Flag Leaf	63.6	61.0	28.5	15.5
Non treated / Head Emerged	60.4	61.1	27.3	15.4
Headline 3 oz / 4-5 Leaf	60.6	61.0	28.0	15.3
Headline 3 oz / 6-7 Leaf	62.4	61.6	28.0	15.3
Headline 3 oz / Flag Leaf	64.2	61.1	28.4	15.5
Headline 3 oz / Head Emerged	59.4	60.8	27.4	15.6
Headline 6 oz / 4-5 Leaf	61.5	61.1	27.7	15.5
Headline 6 oz / 6-7 Leaf	61.7	61.0	27.5	15.5
Headline 6 oz / Flag Leaf	60.9	61.2	27.6	15.4
Headline 6 oz / Head Emerged	61.1	60.5	28.0	15.4
Folicur 4 oz / 4-5 Leaf	67.9	61.6	27.9	15.5
Folicur 4 oz / 6-7 Leaf	62.9	61.0	27.5	15.3
Folicur 4 oz / Flag Leaf	68.5	61.3	29.0	15.5
Folicur 4 oz / Head Emerged	62.8	61.4	28.0	15.2
LSD 0.05	NS	NS	NS	NS

[1] Fungicide treatments/acre also include 0.125% Induce, a nonionic surfactant.
[2] Response abbreviations: Test Wt, bushel test weight; 1000 K, Thousand kernel weights.

Funded by: Funded by the NWROC Extension Plant Pathology Program

For additional information:
Charla Hollingsworth, Chris Motteberg

2006 Red River Valley On-Farm Disease Management Trials

		Dates		Previous
Nearest Town	**Cooperators**	**Planted**	**Harvest**	**Crop**
Oklee	Ray and Barbara Swenson	4-18-06	7-27-06	soybean
Foxhome	Dave and Matt Hasbargen	4-24-06	8-2-06	soybean

Tillage: Each spring wheat field was tilled and fertilized according to the best management production practices of the farm.

Experimental Design: Small plots arranged in a split plot statistical design with variety as main plot factor and fungicide treatment as the sub-plot factor.

Purpose of Study:
1. Determine yield and quality responses of hard red spring wheat varieties when exposed to different environments using common disease management strategies.
2. Estimate the resulting economic returns.

Results:

The 2006 growing season started out with good soil moisture and timely, localized rain showers until wheat plant growth reached the 3-4 leaf stage. The experiment near Oklee was dry during the growing season compared with the Foxhome location. Plants at the Oklee test site suffered from drought conditions, cut worms, and powdery mildew. Leaf rust was severe on susceptible varieties late in the season there as well. Conversely, timely rain events promoted dense plant canopy development at the Foxhome test site. Leaf and stripe rusts, Septoria leaf blotch, powdery mildew, and bacterial leaf stripe were noted at that location. Plants with symptoms of wheat streak mosaic and barley yellow dwarf or aster yellows were widespread at the Foxhome site.

When averaged across both test sites, two disease management treatments resulted in greater estimated returns (Table 1). An application of Headline at the 4-5 leaf stage followed by Folicur at early flower increased estimated revenues above the $300/a level for six of the varieties tested, likewise a solitary fungicide application in the form of a seed treatment (without later foliar or head fungicide applications) resulted in similar returns for a comparable number of varieties.

The drier growing season resulted in few production issues related to disease. Economically speaking, varieties known for having good disease resistance packages such as Glenn and Alsen did not respond to fungicide treatments in the absence of disease. Several management strategies on these two varieties were ranked lowest in estimated revenue (Table 1). However, having little disease development is unusual in the Valley. Since the early 1990s, disease has proved to be one of the greatest limiting factors for wheat production.

Table on following pages

Partnership and Funding Information: MN Wheat Research and Promotion, AgriPro Wheat, Trigen Seed, WestBred, and the Northwest Research and Outreach Center Extension Plant Pathology Program. It was conducted with support from Dr. Yanhong Dong, Univ. of Minnesota Mycotoxin Laboratory; Jim Tholund and Rick Meine from Mid-Valley Grain Co-op; BASF; Bayer CropScience; and Syngenta.

For additional information:
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Chris Motteberg Doug Holen

2006 Red River Valley On-Farm Disease Management Trials *(continued)*

Table 1. Combined means of harvest data and economic outcomes from the 2006 On-Farm Disease Management Trials conducted on spring wheat at two locations (near Oklee and Foxhome) in the Red River Valley.

Variety	Treatment[1]	Protein (%)	Test Wt (lb/bu)	Yield (bu/a)	Premium/ Discount[2] ($)	Cash price ($)	Gross/a ($)	Fung appl cost $/a	Estimated Return $/a
Walworth	NONE	14.4	59.5	65.5	0.02	4.68	306.54	0	306.54
Steele ND	NONE	14.5	60.2	63.8	0.02	4.68	298.58	0	298.58
Knudson	NONE	14.4	61.3	63.6	0.02	4.68	297.41	0	297.41
Briggs	NONE	14.7	60.8	63.2	0.03	4.69	296.41	0	296.41
Oklee	NONE	15.1	61.6	61.5	0.05	4.71	289.67	0	289.67
Ulen	NONE	14.8	60.4	61.0	0.04	4.70	286.47	0	286.47
Freyr	NONE	14.4	60.3	60.8	0.02	4.68	284.54	0	284.54
Banton	NONE	14.7	62.9	60.6	0.03	4.69	283.98	0	283.98
Bigg Red	NONE	13.6	63.2	61.4	0.04	4.62	283.44	0	283.44
Ada	NONE	14.4	61.5	60.1	0.02	4.68	281.27	0	281.27
Glenn	NONE	15.3	61.5	59.4	0.06	4.72	280.37	0	280.37
Alsen	NONE	15.2	60.5	56.4	0.06	4.72	266.21	0	266.21
	Mean	**14.6**	**61.1**	**61.4**	**0.03**	**4.69**	**287.91**	**0**	**287.91**
Steele ND	SD	14.2	61.6	70.4	0.01	4.67	328.77	3.84	324.93
Ulen	SD	14.5	61.6	70.0	0.02	4.68	327.60	3.84	323.76
Briggs	SD	14.8	61.5	69.1	0.04	4.70	324.77	3.84	320.93
Walworth	SD	14.5	59.8	68.6	0.02	4.68	321.05	3.84	317.21
Knudson	SD	14.4	61.1	66.6	0.02	4.68	311.45	3.84	307.61
Oklee	SD	15.1	61.4	64.8	0.05	4.71	305.21	3.84	301.37
Banton	SD	14.5	63.0	64.4	0.02	4.68	301.16	3.84	297.32
Bigg Red	SD	13.8	62.7	63.7	0.02	4.64	295.57	3.84	291.73
Glenn	SD	15.1	62.3	62.5	0.05	4.71	294.14	3.84	290.30
Ada	SD	14.7	61.3	61.2	0.03	4.69	287.03	3.84	283.19
Freyr	SD	14.3	60.8	61.2	0.01	4.67	285.57	3.84	281.73
Alsen	SD	14.8	60.9	60.6	0.04	4.70	284.59	3.84	280.75
	Mean	**14.5**	**61.5**	**65.2**	**0.02**	**4.68**	**305.57**	**3.84**	**301.73**
Steele ND	H-F	14.2	61.0	72.0	0.01	4.67	336.01	17.08	318.93
Ada	H-F	14.4	62.3	70.5	0.02	4.68	329.94	17.08	312.86
Oklee	H-F	14.6	61.8	69.6	0.03	4.69	326.42	17.08	309.34
Briggs	H-F	14.3	61.7	69.2	0.01	4.67	323.16	17.08	306.08
Walworth	H-F	14.6	59.3	68.8	0.03	4.69	322.67	17.08	305.59
Knudson	H-F	14.5	61.3	68.0	0.02	4.68	318.01	17.08	300.93
Ulen	H-F	14.6	60.5	67.4	0.03	4.69	316.11	17.08	299.03
Bigg Red	H-F	13.7	62.9	67.7	0.04	4.62	312.77	17.08	295.69
Freyr	H-F	14.2	61.1	66.7	0.01	4.67	311.26	17.08	294.18
Banton	H-F	14.4	62.9	66.2	0.02	4.68	309.58	17.08	292.50
Glenn	H-F	15.0	62.0	64.4	0.05	4.71	303.32	17.08	286.24
Alsen	H-F	15.2	60.3	59.2	0.06	4.72	279.42	17.08	262.34
	Mean	**14.4**	**61.4**	**67.5**	**0.02**	**4.68**	**315.72**	**17.08**	**298.64**

[1]Fungicide treatment product, rate and timing: NONE= No fungicide treatment; SD= Dividend Extreme, 3 oz/100 lbs as a seed treatment; H-F= Headline, 3 fl oz/a at the 4-5 leaf stage and Folicur 4 fl oz/a at early flower; SD-H-F= Dividend Extreme, 3 oz/100 lbs as a seed treatment followed by Headline, 3 fl oz/a at the 4-5 leaf stage and Folicur 4 fl oz/a at early flower; SD-F= Dividend Extreme, 3 oz/100 lbs as a seed treatment and Folicur 4 fl oz/a at early flower; F= Folicur 4 fl oz/a at early flower.
NOTE: Headline and Folicur treatments included 0.125% Induce, a nonionic surfactant.

[2]On 11-13-06, started with a base price of $4.66/bu. Protein premiums based on +1 cent/bu per 0.2% over 14% protein. Protein discounts based on -2 cents/bu per 0.2 under 14% protein.

2006 Red River Valley On-Farm Disease Management Trials *(continued)*

Table 1. Continued

Variety	Treatment[1]	Protein (%)	Test Wt (lb/bu)	Yield (bu/a)	Premium/ Discount[2] ($)	Cash price ($)	Gross/a ($)	Fung appl cost $/a	Estimated Return $/a
Steele ND	SD-H-F	14.4	60.7	67.7	0.02	4.68	316.84	20.92	295.92
Bigg Red	SD-H-F	14.4	62.6	67.2	0.02	4.68	314.50	20.92	293.58
Walworth	SD-H-F	14.7	58.6	66.6	0.03	4.69	312.12	20.92	291.20
Briggs	SD-H-F	14.7	61.2	65.9	0.03	4.69	308.84	20.92	287.92
Oklee	SD-H-F	14.5	61.2	65.8	0.02	4.68	307.94	20.92	287.02
Ulen	SD-H-F	14.7	60.4	64.7	0.03	4.69	303.21	20.92	282.29
Knudson	SD-H-F	14.2	60.7	64.1	0.01	4.67	299.11	20.92	278.19
Freyr	SD-H-F	14.5	60.3	63.3	0.02	4.68	296.01	20.92	275.09
Ada	SD-H-F	14.3	61.1	63.4	0.01	4.67	295.84	20.92	274.92
Banton	SD-H-F	14.5	62.8	62.8	0.02	4.68	293.90	20.92	272.98
Glenn	SD-H-F	14.9	60.9	61.4	0.04	4.70	288.35	20.92	267.43
Alsen	SD-H-F	15.0	60.9	57.5	0.05	4.71	270.83	20.92	249.91
	Mean	**14.6**	**60.9**	**64.2**	**0.03**	**4.69**	**300.62**	**20.92**	**279.70**
Ulen	SD-F	14.8	61.5	68.2	0.04	4.70	320.54	16.03	304.51
Walworth	SD-F	14.2	60.0	67.7	0.04	4.70	317.96	16.03	301.93
Ada	SD-F	14.5	62.0	65.7	0.02	4.68	307.48	16.03	291.45
Oklee	SD-F	14.8	61.5	64.8	0.04	4.70	304.56	16.03	288.53
Steele ND	SD-F	14.3	61.2	64.4	0.01	4.67	300.75	16.03	284.72
Freyr	SD-F	14.2	61.4	64.0	0.01	4.67	298.88	16.03	282.85
Bigg Red	SD-F	14.6	62.4	61.8	0.03	4.69	289.84	16.03	273.81
Alsen	SD-F	14.5	61.5	61.5	0.02	4.68	287.82	16.03	271.79
Banton	SD-F	14.5	63.1	61.5	0.02	4.68	287.82	16.03	271.79
Knudson	SD-F	14.5	60.7	61.5	0.02	4.68	287.82	16.03	271.79
Briggs	SD-F	14.7	61.1	61.2	0.03	4.69	286.79	16.03	270.76
Glenn	SD-F	14.8	61.3	60.7	0.04	4.70	285.29	16.03	269.26
	Mean	**14.5**	**61.5**	**63.6**	**0.03**	**4.69**	**297.96**	**16.03**	**281.93**
Walworth	F	14.7	59.0	66.4	0.03	4.69	311.18	12.19	298.99
Steele ND	F	14.7	60.4	65.9	0.03	4.69	309.07	12.19	296.88
Knudson	F	14.4	61.5	65.6	0.02	4.68	306.77	12.19	294.58
Ulen	F	14.8	60.7	65.0	0.04	4.70	305.27	12.19	293.08
Briggs	F	14.5	61.6	65.0	0.02	4.68	303.97	12.19	291.78
Oklee	F	14.9	61.6	64.3	0.04	4.70	301.98	12.19	289.79
Freyr	F	14.4	61.2	63.3	0.02	4.68	296.01	12.19	283.82
Ada	F	15.0	61.1	62.7	0.05	4.71	295.08	12.19	282.89
Banton	F	14.5	63.0	62.7	0.02	4.68	293.44	12.19	281.25
Bigg Red	F	14.0	62.7	62.5	0.00	4.66	291.25	12.19	279.06
Glenn	F	14.5	62.1	59.4	0.02	4.68	277.99	12.19	265.80
Alsen	F	14.9	60.5	57.5	0.04	4.70	270.02	12.19	257.83
	Mean	**14.6**	**61.3**	**63.3**	**0.03**	**4.69**	**296.83**	**12.19**	**284.64**

[1]Fungicide treatment product, rate and timing: NONE= No fungicide treatment; SD= Dividend Extreme, 3 oz/100 lbs as a seed treatment; H-F= Headline, 3 fl oz/a at the 4-5 leaf stage and Folicur 4 fl oz/a at early flower; SD-H-F= Dividend Extreme, 3 oz/100 lbs as a seed treatment followed by Headline, 3 fl oz/a at the 4-5 leaf stage and Folicur 4 fl oz/a at early flower; SD-F= Dividend Extreme, 3 oz/100 lbs as a seed treatment and Folicur 4 fl oz/a at early flower; F= Folicur 4 fl oz/a at early flower.
NOTE: Headline and Folicur treatments included 0.125% Induce, a nonionic surfactant.

[2]On 11-13-06, started with a base price of $4.66/bu. Protein premiums based on +1 cent/bu per 0.2% over 14% protein. Protein discounts based on -2 cents/bu per 0.2 under 14% protein.

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Red River Valley On-Farm Yield Trials—Spring Barley

About the Trials:

The 2006 Red River Valley On-Farm Yield Trials were grown in 5 locations throughout northwest Minnesota. The locations, cooperators, and planting dates are summarized in Table 1. Conditions were dry for most of the season. The drought caused a very uneven stand and variable growth in Perley. All trials were harvested, but the results of the Perley locations were not included in the data analysis. Very little, if any, lodging was observed this summer as evidenced by the lodging scores in Table 3.

Table 1. Locations of the 2006 Red River Valley On-Farm Yield Trials.

Location	Cooperator	Planting Date	Harvest Date
Foxhome	Dave Hasbargen	4-24-06	7-20-06
Perley	Brian Hest	4-25-06	7-20-06
Oklee	Ray Swenson	4-18-06	7-18-06
Strathcona	Jim Kukowski	4-27-06	7-18-06
Humboldt	Gerald Olsonowski	5-12-06	8-1-06

About the Entries:

The entries of the 2006 Red River On-Farm Yield Trials, including the breeder and the year of release, are listed in Table 2. Testing of Conlon was discontinued.

Interpretation of the Data:

This year one-, two-, and three-year averages are reported. Within the table, the varieties are listed alphabetically. No single location data is presented to avoid misinterpretation of data. Single environment data has to be interpreted with caution. Performance data across multiple environments; single location/multiple years, or multiple locations/single year, and/or a combination of years and locations is more reliable. Performance data of individual locations is only available upon request. No data may be reproduced without written consent of the author.

In each table, the highest performer for each trait is printed in bold. The grain yield in each table is expressed as a percentage of the trial mean with the overall mean in bu/a listed below. Presenting the data this way allows for better comparisons over years. Secondly, variety selection is based on the relative ranking of the cultivars, rather than the absolute yield. Comparisons between varieties should only be made within each column and not between columns or between tables. In addition to the overall mean for the trial, the Least Significant Difference is printed at the bottom of each column. The LSD is calculated using an alpha level of 5%. This indicates, if and when the observed difference between two varieties is larger than LSD unit that with 95% confidence the observed difference is a real difference rather than experimental error.

For additional information:
Jochum Wiersma

Red River Valley On-Farm Yield Trials—Spring Barley *(continued)*

Table 2. Spring barley entries on the Red River Valley On-Farm Yield Trials (2004-2006).

Breeder	Cultivar[1]	Type	Year Released	2004	2005	2006
Anheuser Busch	Legacy	6-row	2000	x	x	x
	Tradition	6-row	2004	x	x	x
NDSU	Drummond	6-row	2000	x	x	x
	Stellar	6-row	2005		x	x
U of MN	Robust	6-row	1983	x	x	x
	Lacey	6-row	2000	x	x	x

[1] AMBA approved malting barley cultivars.

Table 3. Grain yield expressed as a percentage of the trial mean across locations for 2006 and multi-year (2004-2006) comparisons and agronomic characteristics of cultivars entered in the Red River Valley On-Farm Yield Trials.

Cultivar	Across All Locations							
	Grain Yield			3-Year Data				
	1 year[1]	2 year	3 year	Plant Height[2]	Lodging[3]	Plump	Test Weight	Protein
	------ (% of mean) -----			(inches)	(1-9)	(%)	(lb/bu)	(%)
Drummond	103.8	**104.6**	102.1	31.6	**8.8**	80.6	44.9	13.5
Lacey	99.8	100.7	**103.5**	**29.8**	8.3	80.3	**45.5**	13.8
Legacy	88.2	91.9	96.6	30.3	7.5	69.6	41.7	13.4
Robust	94.2	93.6	93.2	31.3	7.9	77.0	44.7	**13.9**
Stellar	**105.2**	100.3	-	30.7	8.8	**81.3**	44.5	13.4
Tradition	101.7	101.1	99.7	31.0	7.9	79.9	45.2	13.4
CV	8.5	7.9	7.7	5.2	8.6	8.2	2.7	3.3
LSD 0.05	10.7	8.5	7.2	2.1	1.2	6.1	1.0	0.4
Mean	(bu/a) 107.9	(bu/a) 103.3	(bu/a) 109.8	30.7	8.3	76.9	44.4	13.5

[1] 1 year = 2006, 2 year = 2005-06, 3 year 2004-06
[2] Two-year data (2005-2006)
[3] 1=flat and 9=erect

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Red River Valley On-Farm Yield Trials—Spring Wheat

About the Trials:

The 2006 Red River Valley On-Farm Yield Trials were grown in 5 locations throughout the region. The locations, cooperators, and planting dates are summarized in Table 1. Conditions were dry for most of the season. Oklee suffered the most severe drought stress. The drought also caused a very uneven stand and variable growth in Perley. All trials were harvested, but the results of the Perley locations were not included in the data analysis. Very little, if any, lodging was observed this summer as evidenced by the lodging scores in Table 3.

Table 1. Location of the 2006 Red River Valley On-Farm Yield Trials.

Location	Cooperator	Planting Date	Harvest Date
Foxhome	Dave Hasbargen	4-24-06	8-2-06
Perley	Brian Hest	4-25-06	8-4-06
Oklee	Ray Swenson	4-18-06	7-19-06
Strathcona	Jim Kukowski	4-27-06	8-7-06
Humboldt	Gerald Olsonowski	5-12-06	8-10-06

Interpretation of the Data:

One-, two-, and three-year averages for grain yield are reported. Within the table, the varieties are listed alphabetically. No single location data is presented to avoid misinterpretation of data. Single environment data has to be interpreted with caution. Performance data across multiple environments, either single location/ multiple year, or multiple location/ single year, and/or a combination of years and locations is more reliable. Performance data of individual locations is only available upon request. No data may be reproduced without written consent of the author.

In each table, the highest performer for each trait is printed in bold. The grain yield in each table is expressed as a percentage of the trial mean with the overall mean (bu/a) listed below. Presenting the data this way allows for better comparisons over years. Secondly, variety selection is based on the relative ranking of the cultivars, rather than the absolute yield. Comparisons between varieties should only be made within each column and not between columns or between tables. In addition to the overall mean for the trial, the Least Significant Difference (LSD) is printed at the bottom of each column. The LSD is calculated using an alpha level of 5%. This indicates that, if and when the observed difference between two varieties is larger than the LSD unit, with 95% confidence the observed difference is a real difference rather than experimental error.

Table 2. Hard Red Spring Wheat entries in the Red River On-Farm Yield Trials (2004-2006).

Breeder	Cultivar	Year Released	2004	2005	2006
AgriPro Wheat	Knudson	2001	x	x	x
	Freyr	2005		x	x
	Kelby	2006			x
NorthStar Genetics	Polaris	2005		x	x
	Bakker	2006			x
	Fire Ball	2006			x
NDSU	Reeder	1999	x	x	x
	Alsen	2000	x	x	x
	Steele-ND	2004	x	x	x
	Glenn	2005		x	x
	Howard	2006			x
SDSU	Oxen	1996	x	x	x
	Walworth	2000	x	x	x
	Briggs	2002	x	x	x
	Granger	2004	x	x	x
	Traverse	2006			x
Trigen Seed Services	Banton	2004		x	x
Univ. of Minnesota	Oklee	2003	x	x	x
	Ulen	2005	x	x	x
	Ada	2006		x	x
WestBred	Granite	2001	x	x	x
	Trooper	2005		x	x
	Rush	2006			x

For additional information:
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Red River Valley On-Farm Yield Trials—Spring Wheat *(continued)*

Table 3. Grain yield expressed as a percentage of the trial mean across all locations 2006 and multi-year (2004-2006) comparisons and agronomic characteristics of cultivars entered in the Red River Valley On-Farm Yield Trials.

Cultivar	Across All Locations						
	Grain Yield			1-Year data (2006)			
	1 year[1]	2 year	3 year	Plant Height	Lodging[2]	Test Weight	Protein
	---------- (% of mean)----------			(inches)	(1-9)	(lb/bu)	(%)
Ada	97.2	97.6	-	28.0	8.4	60.8	14.8
Alsen	96.6	94.5	95.8	30.3	8.5	59.5	14.9
Bakker	91.8	-	-	30.3	9.0	54.6	**15.5**
Banton	110.0	100.4	-	31.1	9.0	**61.1**	14.9
Bigg Red	96.1	-	-	33.0	8.1	59.6	14.4
Briggs	**110.9**	104.7	101.5	31.5	7.5	60.4	14.7
Fire Ball	91.9	-	-	28.0	8.6	57.6	16.1
Freyr	98.1	101.5	99.6	32.3	8.1	59.2	14.3
Glenn	103.5	102.7	-	32.3	8.6	60.3	15.2
Granger	107.6	105.2	**106.2**	33.0	8.0	60.2	14.7
Granite	94.2	87.1	92.4	29.1	9.0	57.2	16.1
Howard	106.0	-	-	31.5	8.0	58.6	14.6
Kelby	100.9	-	-	26.4	8.5	60.4	15.0
Knudson	107.8	**106.8**	105.0	28.1	8.4	60.2	14.2
Marshall[3]	83.8		-	26.0	8.8	55.3	15.2
Oklee	102.7	101.9	99.0	29.0	8.3	60.0	14.9
Oxen	94.9	93.4	95.6	29.8	8.4	59.4	15.0
Polaris	87.3	93.5	100.0	31.1	9.0	53.5	14.8
Reeder	97.3	93.0	95.0	31.8	8.4	57.4	14.9
Rush	90.3	-	-	28.9	9.0	60.9	15.3
Steele-ND	109.4	105.0	100.8	32.0	8.4	59.2	14.9
Traverse	109.6	-	-	32.5	8.6	57.8	14.1
Trooper	98.5	98.3	100.5	25.4	9.0	57.5	14.5
Ulen	106.0	104.2	101.9	31.1	8.6	59.4	14.7
Walworth	102.6	103.3	99.7	30.3	8.3	59.1	14.7
C.V.	13.6	13.5	11.4	7.8	8.7	3.8	4.3
LSD 0.05	13.5	10.1	6.5	2.3	0.7	2.2	0.6
Mean	(bu/a) 64.9	(bu/a) 64.8	(bu/a) 74.7	29.9	8.5	59.0	14.9

[1] 1 year = 2006, 2 year = 2005-06, 3 year 2004-06
[2] 1=flat and 9 =erect
[3] Historical check

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Evaluation of Sunflower Germplasm for Resistance to Sclerotinia Head Rot

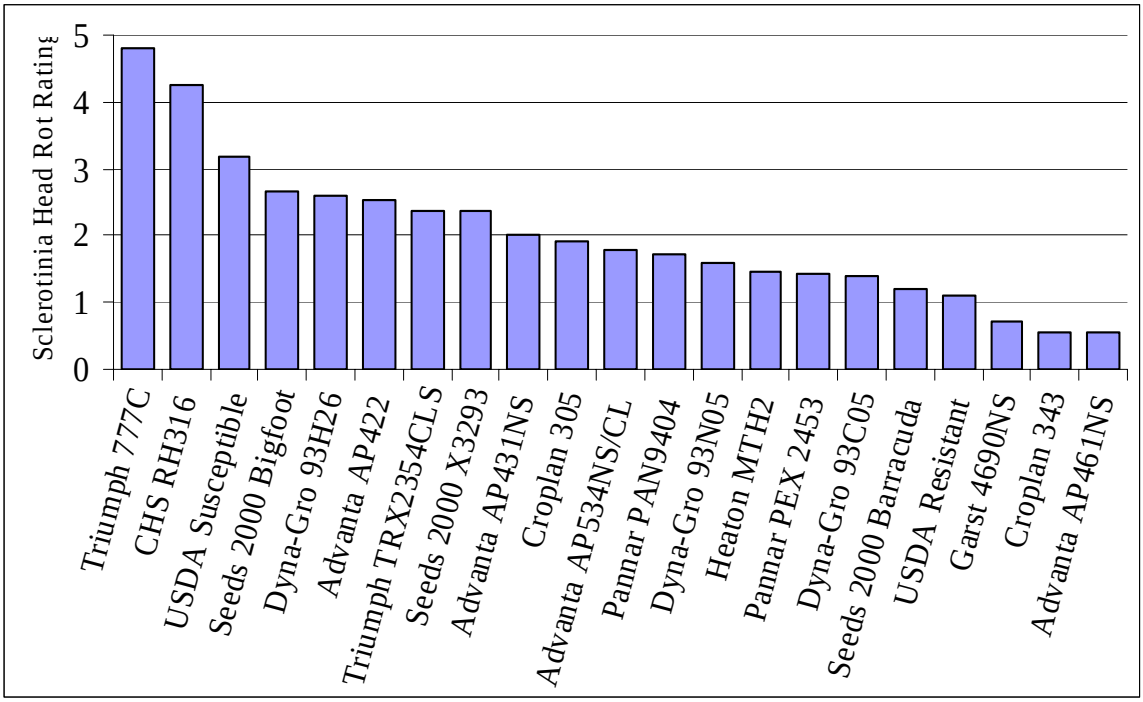
Nearest Town: Crookston
Previous Crop: Soybean
Planting Date: 6-1-06
Experimental Design: Randomized complete block with four replications

Purpose of Study:
To identify sunflower lines/ entries with increased resistance to Sclerotinia head rot in an inoculated, misted disease nursery located at the Northwest Research and Outreach Center.

Results:
The USDA susceptible control entry (three test plots planted, data from two not shown) had damaging levels of Sclerotinia head rot (Figure 1). Those entries that were not statistically different from the susceptible line were Triumph 777C, CHS RH316, Seeds 2000 Bigfoot, Dyna-Gro 93H26, Advanta Pacific AP422, Triumph Seed TRX2354CLS, Seeds 2000 X3293. The USDA resistant entry (three test plots planted, data of two not shown) developed low levels of disease. Those entries shown in Fig 1 and not mentioned above were comparable to the resistant USDA entries (LSD 0.05).

Increasing varietal resistance to Sclerotinia head rot of sunflower shows promise in controlling the disease.

Figure 1. Head rot ratings from the 2006 Sclerotinia head rot trial conducted at the NWROC.



NOTE: Head disease rating scale of 0 to 5 used where: 0=healthy and 5=dead.

Funding: National Sclerotinia Initiative and the National Sunflower Association.
Partnership: Tom Guyla, Research Plant Pathologist and Scot Radi of the USDA Sunflower Unit, Northern Crop Science Lab, researchers at North Dakota State University (NDSU) Carrington Research Extension Center, NDSU Langdon Research and Extension Center, and Khalid Rashid, Agriculture and Agri-Food Canada, Morden Research Station, Manitoba Canada.

For additional information:
Charla Hollingsworth
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Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Irrigated Corn Silage Hybrid Performance Evaluation—Otter Tail

Purpose of study:
Evaluate the silage yield and forage quality of commercial corn hybrids.

Cooperator: Dan Dreyer
Nearest Town: Ottertail City
Soil Type: Sandy Loam
Tillage: Moldboard plow and field cultivator
Previous Crop: Alfalfa (4 production years)
Planting Date: 5-3-06 (good soil moisture)
Planting Rate Target: 30,850 seeds/a—standard disk 11# vacuum pressure
Row Width: 30 inches
Fertilizer: 15 ton of solid (dry) dairy manure - spring applied
Herbicide: Pre-emergence = Lumax
Post emergence = Northstar at 4 to 5 leaf stage
Insecticide Treatments: Planter Box applied "Agrox" insecticide and fungicide
Harvest Date: 9-5-06; circular harvest pattern using 3-row pull-behind chopper into dump box and transported with 2 grain trucks. Weights taken in the field with load cell pads scale. Chopper has kernel processor. Cutting height of 12 inches.
Experimental Design: Randomized complete block (3 replications)

Results:
Whole-plant dry-matter and silage yields averaged 8.5 and 19.2 ton/a, respectively. The average harvest moisture of 55% indicates that harvest timing was later than is desirable for optimum silage fermentation and quality. NuTech QFO3100, Pioneer 38B86, and Dekalb DKC48-53 produced forage with the greatest milk production potential per acre (combined yield and quality). Based on milk production potential per ton, the highest quality forage was produced by NuTech QFO5191, Dekalb DKC42-95, Pioneer 38B86, Pioneer 37A93, and Hyland HL S041.

Brand/ Hybrid entry	RM	Moisture	Yield [1]		Forage quality [2]					Milk Yield [3]	
			DM	Silage	CP	NDF	IVD	NDFD	Starch	/Ton	/Acre
		(%)	(t/a)	(t/a)			(%)			(lb/ton)	(lb/a)
Nu Tech QFO3100	100	66.0	10.1	29.7	5.5	50	72	44	26	3,110	31,500
Pioneer 38B86	98	57.4	9.1	21.4	6.5	37	77	38	41	3,350	30,400
Dekalb DKC 48-53	98	51.7	9.3	19.3	6.0	38	77	38	42	3,150	29,400
Pioneer 37A93	97	54.6	8.6	19.0	6.7	35	79	38	44	3,270	28,200
NK Seed N33-H6	94	59.7	8.9	22.0	6.2	46	73	42	33	3,190	28,200
Dekalb DKC 42-95	92	51.9	8.2	17.0	6.3	31	80	36	49	3,370	27,500
Hyland HL S047	100	53.6	8.8	19.0	6.6	48	73	43	29	3,000	26,500
Pioneer 38H65	99	56.0	8.3	18.9	5.9	40	75	38	37	3,180	26,400
Pioneer 38W22	92	45.0	8.2	14.8	5.9	41	75	39	39	3,150	25,700
Hyland HL S041	100	56.0	7.8	17.7	6.3	42	76	43	37	3,230	25,200
Nu Tech QFO5191	91	52.6	7.3	15.5	6.1	34	79	39	45	3,380	24,800
Nu Tech QFO3088	99	56.7	7.7	17.7	6.3	42	74	38	36	3,190	24,500
Hyland HL S034	92	51.8	8.2	16.9	5.9	45	73	39	35	2,930	23,900
Mean		**54.8**	**8.5**	**19.2**	**6.2**	**41**	**76**	**40**	**38**	**3,190**	**27,100**
LSD 0.10		**2.6**	**0.7**	**1.8**	**NS**	**7**	**3**	**3**	**6**	**160**	**2,900**

1 DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.
2 Quality expressed as a % of DM, except NDFD which is expressed as a % of NDF. CP=crude protein, NDF=neutral detergent fiber, IVD=48-hour in vitro dry matter digestiblity, and NDFD=NDF digestibility.
3 Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin.

Partnership: U of MN Forage Program
Funding: Private Seed Companies

For additional information:
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C. Sheaffer D. Swanson J. Halgerson

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Corn Variety Yield Study—Mahnomen County

Cooperator: Dale Pazdernik (Owner) and Bryan Klabunde (Operator)
Nearest Town: Waubun
Soil Type: Hamerly Vallers complex
Tillage: Fall chiseled, spring field cultivated
Previous Crop: Soybeans
Planting Date: 4-26-06
Row Width: 22 inches
Fertilizer: 100-60-80, with planter 5.5 gal/a 10-34-0
Herbicide: Generic Roundup Ready at 32 oz/a and Resolve at 1 oz/a
Harvest Date: 10-26-06
Experimental Design: Randomized complete block (3 reps)

Results:
The field was quite uniform. Wet cool weather played a major factor in stand establishment. Heavy 2-inch rain during early May caused some stand losses. The rest of the year was quite dry. Significant yield differences were observed.

Company	Name	Maturity	GMO type	Seed Treatment[1]	Population x 1000 (plants/a)	Harvest Moist (%)	Test Weight (lb/bu)	Yield[2] (bu/a)
Kussmaul	SB-2979	79	RR	1	28.0	17.7	58.2	160
Pannar Seeds	2E790	79	RR	1	27.8	18.4	58.1	148
Legend Seeds	9680	80	RR	3	34.2	17.9	57.9	156
AgSource	2666	81	RR/CB	0	29.5	18.7	57.0	177
Dyna-Gro	CX06481	81	RR/YGCB	2	29.3	20.3	57.8	169
Hyland Seeds	HLB25R	82	RR/Bt	3	30.2	20.2	58.1	173
Pioneer Hi-bred	39H86	82	RR2/Bt	4	27.2	17.6	57.9	157
Seeds 2000	2821	83	RR/Bt	2	28.8	18.3	57.0	177
Legend Seeds	9483	83	RR/YG+	3	31.3	18.2	57.1	164
Peterson Seeds	34M83	83	RR/YGCB	2	32.5	18.5	57.4	162
Dekalb	DKC 33-11	83	RR/Bt	0	27.2	17.1	59.2	156
Garst Seeds	8982	84	RR/YG1	2	30.7	17.3	56.4	183
Pioneer Hi-bred	39D80	84	RR2	3	28.0	17.9	57.1	170
Legend Seeds	9584	84	RR/Bt	3	40.1	18.9	57.4	159
Carhart Seeds	1857	85	RR/YGCB	5	26.7	19.5	55.5	194
Hyland Seeds	HLR228	85	RR	3	29.0	17.3	57.0	177
Croplan Genetics	238	85	RR/Bt	2	27.8	18.3	56.8	172
Peterson Seeds	36-E85	85	RR/YGCB	2	31.8	17.9	57.3	171
Dyna-Gro	51P53	85	RR/YGCB	3	37.2	18.0	57.7	170
Pannar Seeds	3A130	85	RR/Bt	2	27.2	18.2	57.1	169
Dyna-Gro	51P15	85	RR/YGCB	3	30.7	17.6	58.4	167
Garst Seeds	8986	85	RR/YG1	2	27.0	17.9	57.2	166
Dekalb	DKC 35-51	85	RR/Bt	3	30.2	17.7	56.8	165
Kussmaul	SB-592	85	RR	1	31.3	17.5	58.7	157
NK Brand	M22-C2	87	RR/LLBt	0	27.5	18.0	56.8	178
Pioneer Hi-bred	39D85	87	RR2/Bt	2+4	29.3	18.3	57.4	173
Hyland Seeds	HLB33R	88	RR/Bt	3	29.7	18.9	56.2	196
Dekalb	DKC 38-33	88	RR/Bt	3	29.0	18.7	56.5	188
Average					30.0	18.2	57.4	170
LSD 0.05					**3.6**	**0.7**	**0.8**	**16**

[1] 0 = No seed treatment; 1 = Actellic + Captan, 2 = Cruiser + , 3 = Poncho 250, 4 = Herculex, 5 = Gustafson
[2] Adjusted to 15.5% moisture content.

For additional information:
Ray Bisek and Ken Pazdernik

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Roundup Ready Alfalfa Management Trial—Otter Tail County

Cooperator: Paul Beckman
Nearest Town: Underwood
Soil Type: Silty Loam
Tillage: Chisel Plow and Field Cultivator
Previous Crop: Wheat
Variety: Dekalb RR05-060104
Planting Date: 5-17-06
Emergence Date: 5-27-06
Planting Rate: 16 Lbs. PLS/a
Row Width: 6 inches
Fertilizer: Spring Applied Dairy Manure
Treatment: 6-7-06 Alfalfa = 3rd trifoiliate
Weeds = 3-6 inches
Herbicide Treatments: Roundup WeatherMax @ .56 lb + AMS @ 2.5 lb
Roundup WeatherMax @ .56 lb + AMS @ 2.5 lb
Raptor @ .031 lb. + COC @ 1 Qt + 28% @ 2Qt
Select @ .125 lb + COC @ 1 Qt + 28% @ 2Qt
Select @ .156 lb + Buctril @ .312 lb + COC @ 1 Qt
Harvest Dates: 7-28-06 and 10-6-06
Experimental Design: Randomized Complete Block (4 reps)
Plot Size: 10 feet by 20 feet (center 6' sprayed and center 3 harvested)

Purpose of study:
Evaluate the performance of herbicide chemistries on establishment year Roundup Ready alfalfa yield, quality, and weed control.

Results:
Herbicide applications did result in visual differences with alfalfa injury (data not shown) expressed as discoloration and height reductions but did not factor significantly into first harvest yield. Alfalfa yields are reported as clean yields using visual and plant separation harvests to determine weed composition. Forage quality work is currently being conducted and subsequent years of yield will be gathered to develop an analysis of the economic feasibility of incorporating Round Up Ready alfalfa into livestock cropping systems.

Treatment: Product (spray rate)/a	1st harvest		2nd harvest		Total
	Alfalfa Yield (ton/a)	Weed comp[1] (%)	Alfalfa Yield (ton/a)	Weed comp (%)	Alfalfa Yield (ton/a)
Round Up (16 oz)	1.7	1	1.4	0	3.1
Round Up (22 oz)	1.7	1	1.3	0	3.0
Raptor (4 oz)	1.5	5	1.2	0	2.7
Select (8 oz)	1.1	58	1.1	3	2.2
Select + Buctril (10 + 20 oz)	1.5	7	1.2	1	2.7
Untreated control	1.4	55	1.3	4	2.7
Mean	1.5	21	1.2	1	2.7
LSD 0.05	NS	19	0.1	2	0.6

[1]Weeds present included foxtail, pigweed, lambsquarters, mustard, and w. buckwheat.

Partnership: U of M Forage Program
Funding: Private Seed Companies

For additional information:
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P. Peterson C. Schaeffer

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

2006 Alfalfa Variety Trial—Otter Tail County

Cooperator: Paul Beckman
Nearest Town: Underwood
Previous Crop: Wheat
Soil Type: Silty Loam
Tillage: Chisel Plow and Field Cultivator
Planting Date: 5-17-06
Emergence Date: 5-27-06
Planting Rate: 16 lbs PLS/a
Row Width: 6 inches
Fertilizer: Spring applied dairy manure
Herbicide: 6-7-04 Raptor .031 lbs + COC 1 qt. + 28% 2 qt./a
Harvest Dates 2006: 7-28-06 and 10-6-06
Experimental Design: Randomized Complete Block (4 reps)
Plot Size: 3 feet by 20 feet

Purpose of study:
Evaluate the yield potential and stand persistence of commercial and experimental alfalfa varieties.

Results:
A dry growing season limited seeding-year yields of all varieties. All but one commercial variety (WL343HQ) had statistically similar seeding-year yields to the average of the check varieties.

Entry (by total yield)		2006 Harvest (tons DM/acre)		Seeding-Yr Total	Relative Seeding-Year Yield (as % of Checks)
Released Varieties	**Marketer**	**7-28-06**	**10-6-06**	**(t/a)**	**(%)**
6400 HT	Garst	1.3	1.5	2.8	103
6200 HT	Garst	1.3	1.5	2.7	102
GENOA	NK Brand	1.2	1.4	2.6	98
54V46	Pioneer	1.3	1.3	2.6	98
AMERISTAND 407TQ	America's Alfalfa	1.3	1.3	2.6	96
6415	Garst	1.3	1.3	2.6	95
53Q30	Pioneer	1.3	1.2	2.5	94
6443 RR	Garst	1.2	1.2	2.4	90
PHABULOUS III	Trelay	1.3	1.2	2.4	90
WL 343 HQ	W-L	1.2	1.1	2.3	87
Checks					
5312		1.3	1.4	2.7	102
ONEIDA VR		1.2	1.5	2.7	100
VERNAL		1.2	1.5	2.7	98
...3 Checks Mean		1.2	1.5	2.7	100
Mean (Total)		**1.3**	**1.3**	**2.6**	**100**
LSD 0.05		0.2	0.2	0.3	11
CV		9.4	9.8	7.7	7.7

Partnership: U of M Forage Program
Funding: Private Seed Companies

For additional information:
D. Holen P. Peterson C. Sheaffer
D. Swanson J. Larson

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

2005—2006 Alfalfa Variety Trial—Otter Tail County

Cooperator: John Wold
Nearest Town: Underwood
Previous Crop: RR Corn
Soil Type: Silty Clay Loam
Tillage: Chisel Plow and Field Cultivator (2x)
Planting Date: 5-6-04 (good soil moisture)
Emergence Date: 5-17-04
Planting Rate: 15 lbs PLS/a
Row Width: 6 inches
Fertilizer: Heavy manure in spring 2003
5-31-06 = 132 units K (0-0-60)
Herbicide: 6-8-04 Raptor 4 oz+NIS .25%/a
Harvest Dates: 2004 = 7-22 and 9-3
2005 = 6-1, 7-6, 8-15, and 10-10
2006 = 5-31, 6-30, 8-1, and 10-6
Experimental Design: Randomized Complete Block (4 reps)

Purpose of study:
Evaluate the yield potential and stand persistence of commercial alfalfa varieties.

Results:
Despite a dry growing season, yields were high (avg. 8.2 ton DM/a). During 2006, three varieties (Rebound 5.0, 6415, and Bobwhite) statistically out-yielded the average of the check varieties. Totaled over two production years (2005 and 2006), only Rebound 5.0 and 6415 have statistically out-yielded (by 15%) the average of the check varieties.

Entry (by total yield) Released Varieties	Marketer	2005 Yield (t/a)	Stand 4-24-06 (%)	2006 Harvests (tons DM/acre) 5-31-06	6-30-06	8-1-06	10-6-06	Total	2-Yr Total Yield (t/a)	Relative 2-Yr Yield (% of Checks)
REBOUND 5.0	Croplan	7.3	84	2.7	2.8	2.0	1.8	9.2	16.5	115
6415	Garst	7.2	85	2.8	2.7	2.0	1.6	9.1	16.3	114
EXTREME	LG Seeds	7.3	78	2.5	2.4	1.8	1.8	8.5	15.7	110
LIGHTNING III	Jung	7.0	81	2.5	2.5	1.9	1.7	8.6	15.7	110
BOBWHITE	NC+	6.9	77	2.6	2.5	1.8	1.8	8.7	15.6	109
FSG 408DP	Allied	7.1	78	2.4	2.4	1.7	1.7	8.2	15.3	107
FSG 351	Allied	7.1	82	2.4	2.4	1.8	1.7	8.2	15.3	107
WL 319 HQ	W-L	6.7	81	2.6	2.6	1.8	1.6	8.5	15.2	106
6400HT	Garst	7.0	75	2.6	2.3	1.7	1.6	8.2	15.2	106
54Q25	Pioneer	7.0	77	2.4	2.4	1.7	1.6	8.1	15.1	106
54V46	Pioneer	6.7	79	2.5	2.4	1.8	1.7	8.4	15.1	106
LEGENDAIRY 5.0	Croplan	6.3	82	2.5	2.6	1.9	1.6	8.5	14.9	104
HYBRIFORCE-420/WET	Dairyland	6.7	81	2.6	2.2	1.6	1.7	8.1	14.8	104
6200HT	Garst	6.7	76	2.2	2.0	1.5	1.5	7.3	14.0	98
A 30-06	PGI Alfalfa	6.7	68	2.1	2.0	1.6	1.6	7.2	13.9	97
Experimentals										
Wyo. BRR - Resistant		6.5	71	2.2	2.2	1.7	1.5	7.6	14.1	99
Checks										
5312		6.9	70	2.4	2.2	1.6	1.7	8.0	14.9	104
ONEIDA VR		6.4	73	2.3	2.2	1.6	1.7	7.7	14.1	99
VERNAL		6.5	75	2.3	2.1	1.4	1.6	7.5	13.9	98
…3 Checks Mean		6.6	72	2.4	2.2	1.5	1.7	7.7	14.3	100
Mean (Total)		**6.8**	**77**	**2.5**	**2.4**	**1.7**	**1.7**	**8.2**	**15.0**	**105**
LSD 0.05		0.8	9.2	0.4	0.4	0.3	0.2	1.0	1.6	11
CV		7.8	8.4	10.8	10.7	13.1	6.8	9.0	7.7	7.7

Partnership: U of M Forage Program
Funding: Private Seed Companies

For additional information:
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Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Canada Thistle Control on Conservation Reserve Program Land

Canada thistle is a highly invasive perennial plant that requires annual suppression measures by landowners enrolled in the Conservation Reserve Program (CRP). Historically, herbicides have not been very effective in managing this plant on non-cropland acres and many CRP land owners have been using annual mowing of infested areas as their primary control practice. The objective of this long term research was to evaluate existing and newly registered herbicides, evaluate spring applications of herbicides compared to fall applications, and to evaluate the influence of mowing on Canada thistle. The total number of Canada thistle stems was counted in each plot at regular intervals and was used to calculate the percent control, which is the percent reduction in the number of Canada thistle stems in a treatment over time.

The CRP land in this research had a very high Canada thistle infestation (approx. 4 stems/sq yd) and had been mowed annually for the past several seasons. This land was a mixed stand of smooth brome, Kentucky bluegrass, alfalfa and many other forbs and grasses. Treatments were arranged in a randomized complete block design with four replications. Herbicides were applied with a tractor mounted CO_2 sprayer delivering 10 gpa at 35 psi and equipped with XR8001 flat fan nozzles. Plots were mowed with a 5 ft flail type mower at a 6 inch height. Plots are 30 by 30 ft with 3 ft mowed alleyways between treatments.

Acknowledgements: The authors wish to thank the NWROC for their generous assistance with equipment and labor. We also thank Lynn Haake and Jim Cameron, NWROC for technical assistance. We appreciate the support provided by Dow AgroSciences and from DuPont Crop Protection.

Results and Discussion:

Complete control of Canada thistle on CRP land is rarely successful with a single application of any herbicide. However, there are clear differences between treatments in the initial level of control and the residual control 10 to 12 months after treatment (MAT) (Table 2). Two newly registered herbicides, Milestone* and ForeFront* R&P, have provided better stand reduction of Canada thistle than existing herbicide options. This is the second year (2006) of a long term trial and each treatment is considered as a management scheme and will be reapplied whenever the level of Canada thistle control drops below a set level. For example, the spring application timing at 14 MAT has both single and sequential herbicide applications. Milestone and ForeFront R&P at 14 MAT with a single herbicide application have control equal to the other treatments with two applications.

Fall treatments to Canada thistle (where the Canada thistle has been mowed to keep it in the rosette stage of development) are often recommended as a good time to apply herbicides when the perennial plant is moving sugars to the roots. This research shows that timing of application can make a difference with certain herbicides. Better control was achieved with a spring application timing for Curtail, Redeem, Cimarron Max and the 2,4-D+Clarity treatments when you compare the results of fall and spring timings at 12 MAT. Canada thistle control was the same with Tordon 22K, Milestone or ForeFront R&P treatments applied in either the spring or fall.

Mowing has traditionally been the control strategy of choice for CRP contract holders. In this research mowing resulted in an increased number of Canada thistle stems compared to treatments that were not mowed, although the increased number is not always statistically significant. Mowing stimulates the plants to release dormant root buds present on roots and new plants emerge in canopies that are less competitive because the foliage on these plants has also been cut. In some situations where fall applications are desired, mowing should be part of the control strategy, to prevent seed production and allow fall treatments on rosette stage plants.

Conclusion: Based on results from the past two years, the most effective and economical herbicide treatments for Canada thistle stand reduction are either Milestone or ForeFront R&P applied in the spring or fall.

For additional information:
C. Holen, H. Person, B. Holder, R. Severson, M. Halstvedt

Canada Thistle Control on Conservation Reserve Program Land (continued)

Table 1. Application information

Treatment	Application date	Mowed	Thistle stage at treatment
Spring application	7-7-05	No	Late bud (1% bloom)
Fall application	9-23-05	Yes (on 7-13-05)	rosette
Spring Application	7-5-06	No	Early bloom (40 % bloom)

Table 2. Effects of selected herbicides, application timings, and mowing on Canada thistle population (results shown as calculated Canada thistle stem reduction).

Treatment	Rate/a	% Control[1] 7-5-06	7-6-06	Cost/a[3]	% Control[1] 9-20-06
Spring applications		**12 MAT[2]**	**(# applications)**	**($)**	**14 MAT**
Curtail*	2 pt	77	2	28.50	83
Curtail	4 pt	79	2	57.00	88
Redeem*+NIS	3 pt+.5%v/v	92	2	79.00	92
Cimarron^ Max A+B+NIS	.25 oz+1pt+.25%	71	2	23.00	82
2,4-D Ester+Clarity**	2pt+1pt	79	2	40.00	87
Tordon* 22K	1.5 pt	91	1	22.25	74
Milestone*	5 oz	95	1	17.90	91
Milestone	7 oz	98	1	23.06	93
ForeFront* R&P	2 pt	95	1	18.75	87
ForeFront R&P	2.6 pt	99	1	22.88	95
Mowing		-1	-		-43[4]
Fall applications		**10 MAT**			**12 MAT**
Curtail	2 pt	40	1	14.25	-13
Curtail	4 pt	64	1	28.50	32
Redeem+NIS	3 pt+.5%v/v	61	1	39.50	20
Cimarron Max A+B+NIS	.25 oz+1pt+.25%	-53	1	11.50	-94
2,4-D Ester+Clarity	2pt+1pt	22	1	20.00	-20
Tordon 22K	1.5 pt	95	1	22.25	80
Milestone	5 oz	92	1	17.90	82
Milestone	7 oz	99	1	23.06	93
ForeFront R&P	2 pt	99	1	18.75	93
ForeFront R&P	2.6 pt	99	1	22.88	94
Untreated		-15			-17
LSD 0.05		44			58

[1] % Control - is not a visual rating but a calculation of the % reduction in stem number from the initial count of Canada thistle stems in each treatment.
[2] MAT – months after treatment
[3] Cost includes application cost ($5.00/treatment/a) and estimated herbicide cost (this can vary from area to area)
[4] Negative number indicates an increase in Canada Thistle.
* Trademark of Dow AgroSciences
^ Trademark of E.I. du Pont de Nemours
** Trademark of BASF

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Management of Canada Thistle on a CRP Field at Crookston

Canada thistle is difficult to manage on non-cropland sites. An extensive perennial root system with numerous dormant root buds makes Canada thistle a persistent plant on sites like Conservation Reserve Program (CRP) land. This research was conducted to evaluate selected herbicides, the influence of mowing, and herbicide application timing on Canada thistle control in a mixed grass/native plant CRP field at Crookston, MN. Treatments were arranged in a randomized complete block design with four replications. Herbicides were applied with a hydraulic sprayer delivering 10 gpa at 30 psi and equipped with XR8002 flat fan nozzles. Plots were mowed with a 5 ft flail type mower at a 6 inch height. Plots were 30 by 300 ft with 5 ft alleyways between treatments. Canada thistle stand counts were made in 3 locations in each plot with 29 inch diameter hoop centered over permanent fiberglass pole locations. Stand counts were used to calculate the percent control, which is the percent reduction in the number of Canada thistle stems over time. Environmental conditions and application information are listed in Table 1.

Fall applied treatments

The trial area was mowed in July 2005 to minimize Canada thistle seed production and to keep plants in rosette stages of development for treatment in the fall. All treatments provide excellent initial burndown of existing Canada thistle foliage, and there was almost no regrowth in any treatments before freeze-up later in the fall. Canada thistle was only partially controlled in most treatments at 9 MAT (months after application) with the exception of Milestone. Treatments that provided partial control of Canada thistle were rapidly re-colonized over the summer and the level of control declined from the 9 to 12 MAT evaluation. Milestone was the most effective treatment in the trial and provided 100% control 12 MAT.

Spring applied treatments

The trial area was not mowed and treatments were applied in June 2006 to Canada thistle in the early bud stage of development. At 3 MAT, Milestone, Grazon and both rates of Curtail were providing very good control. As with the fall application timing, all of the herbicide treatments initially provided complete control of the existing top growth, but only Milestone and Grazon provided 100 % control at 3 MAT.

Mowing

Mowing is a common practice by CRP contract holders and is used to prevent Canada thistle seed production. Mowing also influences Canada thistle infestations in CRP land in a couple of other important ways. Mowing removes part of the foliage of all plants in the field and lessens the competition they provide to Canada thistle growth.

Table 1. Environmental conditions at time of herbicide application.

Application Date	9-14-05	6-12-06
Application timing	Fall	Spring
Sky	Clear	Cloudy
Wind mph	3-4 W NW	3-6 S
Temp	55°F	65 F
Thistle stage	rosette	Early bud
Thistle height	4- 12 inches	18 inches
Mowing	Yes	no

Table 2. Canada thistle control with fall applied herbicides.

Treatment	Rate/a	% Control 9 MAT[1]	% Control 12 MAT
Milestone	7 oz	100	100
Grazon	4pt	95	79
Curtail	4 pt	70	38
Curtail	2 pt	65	48
Cimarron Max (Rate 1) + NIS	.25 oz + 1pt + 0.25% v/v	52	25
Mowing		20	-75[2]
LSD 0.05		23	32

Table 3. Canada thistle control with spring applied herbicides.

Treatment	Rate/a	% Control 3 MAT[1]
Milestone	7 oz	100
Grazon	4pt	100
Curtail	4 pt	93
Curtail	2 pt	92
Cimarron Max (Rate 1) + NIS	.25 oz + 1pt + 0.25% v/v	64
Mowing		-67
LSD 0.05		26

[1]MAT- months after treatment
[2]Negative number indicates an increase in Canada Thistle.

This opens the canopy and creates an improved environment for growth of new Canada thistle shoots. Mowing also stimulates Canada thistle to release dormant root buds on roots resulting in many more Canada thistle stems at the end of the growing season in a mowed area than in the same area if it were un-mowed.

Acknowledgements: The authors wish to thank the NWROC for their generous assistance with equipment and labor. We also thank Jim Cameron, NWROC for technical assistance. We appreciate the partial support provided by Dow AgroSciences and from DuPont Crop Protection.

For additional information:
C. Holen, R. Severson, H. Person, B. Holder, M. Halstvedt

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Canada Thistle Suppression with Burning

Conservation Reserve Program (CRP) acres are occasionally burned in the spring to remove dead grass and litter for improved wildlife habitat, to stimulate germination of legumes, forbs and other plants, and to kill or set back encroaching woody vegetation. Some individuals have reported that burning has decreased the Canada thistle infestation in their fields. The objective of this research was to evaluate the effects of burning on Canada thistle in CRP land.

The research site was located near Lake Bronson, MN and the CRP land was a mixed stand of grasses and forbs with brome as the most common species. Plots are 30 by 30 ft with 3 ft mowed alleyways between treatments. The plots were burned on June 2 and there was a moderate canopy of green and dead plant material (Photo 1). The treatments were burned at a date later than that of a typical CRP contract holder who may tend to burn before there is significant early season growth of plants. Burning was delayed with the intent of allowing more Canada thistle plants to emerge, thereby increasing the amount of injury on the Canada thistle infestation. Canada thistle plants were at rosette stages of development and were from 6 to12 inches tall. The total numbers of Canada thistle stems were counted in each plot in June before burning and again in October. The number of stems per plot was used to calculate the percent control, which is percent reduction in the number of Canada thistle stems in a treatment over time.

Results:

Burning increased Canada thistle density compared to unburned plots (Table 1). The increase in stem number from June to October in the burned treatment was over five times larger than in unburned plots. Canada thistle in burned areas were slightly shorter and flowering was delayed. Plants in the burning treatment (immediately after treatment) were either killed or strongly injured (Photo 2), however, the effect seems to be similar to that of mowing. Mowing Canada thistle stimulates the release of dormant root buds on roots and as a consequence increases the density of plants compared to un-mowed areas by the end of the growing season.

Table 1. Effects of burning on Canada thistle

Treatment	% Control[1]
Burned	-231[2]
Unburned	-42
LSD 0.05	69

[1] % Control - is not a visual rating but a calculation of the % reduction in stem number from the initial count of Canada thistle stems in each treatment to the final count.

[2]Negative number indicates an increase in Canada Thistle.

Photo 1. Burned compared to unburned plots at Lake Bronson.

Photo 2. Canada thistle plants injured by burning

For additional information:
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Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Long Term Management of Spotted Knapweed in a Pasture

Spotted knapweed (*Centaurea maculosa*) is a highly invasive biennial/short lived perennial plant found primarily in roadsides, pastures and non-cropland areas and is often the dominant plant species in infested areas. The allelopathic compound, catechin, which is released through spotted knapweed roots, allows the plant to form dense, monoculture stands and, as a result, the native vegetation is either replaced or stunted (Photo 1). Spotted knapweed vegetation also contains a sesquiterpene lactone called cinicin, which is a bitter tasting compound that reduces the palatability of the forage for wildlife and livestock.

Spotted knapweed produces a large amount of seed and up to 80% of the seed may be dormant. Seed dormancy, which may prevent viable seeds from germinating for a period of years, means control practices must be effective over several growing seasons or the site will be re-infested. The objective of this research was to evaluate the level of control from newly registered and existing herbicides at two application timings. Treatments will be reapplied when control drops below a pre-determined level to evaluate the time necessary to deplete the spotted knapweed seed bank on the site.

Treatments were arranged in a randomized complete block design with four replications. Herbicide treatments were made to the center 6.6 feet of 10x25 ft plots with a CO_2 backpack sprayer delivering 10 gpa at 30 psi and equipped with XR80015 flat fan nozzles. Environmental conditions and application information are listed in Table 1.

Results:

Spotted knapweed is not difficult to control with many broadleaf herbicides and at 3 MAT (months after treatment) all of the treatments and application timings provided excellent control except for the Cimarron Max treatments. Cimarron Max provides good control of existing plants but has limited residual control of new seedlings that are initiated through the growing season. Cimarron Max was applied in June/July (treatment date varies with knapweed stage) of 2005 and was the only treatment to be reapplied in June/July of 2006.

Residual control of spotted knapweed was very good at 16 MAT with 2,4-D, Curtail, Milestone, ForeFront R&P and 2,4-D + Rifle although control is beginning to decline. Only ForeFront R&P and Milestone applied at bloom stage had maintained 100 % control at 16 MAT.

Control of spotted knapweed was not different at either the rosette or bloom stage of development.

Table 1. Environmental conditions at treatment.

Date	6-9-05	7-9-05	6-6-06	7-14-06
Knapweed Stage	Rosette	Bloom	Rosette	bloom
Temp (^oF)	68	85	77	75
Sky	cloudy	clear	clear	clear
Wind (mph)	1-3 W	2 W	2-3 SW	0
Soil	Moist	Dry	Moist	Very dry

For additional information:
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Jim Storahl

Long Term Management of Spotted Knapweed in a Pasture (*continued*)

Table 2. Spotted knapweed control with selected herbicides at two application timings.

Treatment	Rate/a	timing	9-13-05 3 MAT[1]	7-31-06 13 MAT	10-9-06 16 MAT
2,4-D Ester	4 pt	rosette	100	95	90
2,4-D Ester	4 pt	bloom	97	87	62
Curtail	2 pt	rosette	100	97	93
Curtail	2 pt	bloom	100	95	92
Milestone	5 oz	rosette	100	98	99
Milestone	5 oz	bloom	100	100	100
ForeFront R&P	2 pt	rosette	100	100	100
ForeFront R&P	2 pt	bloom	100	100	100
Cimarron Max	.25 oz+1pt+.25%	rosette	67	96[2]	69
Cimarron Max	.25 oz+1pt+.25%	bloom	61	94[3]	15
2,4-D Ester+Rifle	2pt+1pt	rosette	98	91	74
2,4-D Ester+Rifle	2pt+1pt	bloom	100	97	95
LSD 0.05			5	5	8

[1]MAT = months after treatment for rosette timing; subtract 1 month for bloom stage treatments
[2]This treatment was reapplied on 6-6-06
[3]This treatment was reapplied on 7-14-06

Photo 1. Growth differences in treated area (on right) compared to spotted knapweed infested strip (on left).

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Influence of Fish Emulsion + Humic Acid Applied In-Furrow on Yield and Quality of Organic Soybean

Cooperator: Bill Langlois
Nearest Towns: Dorothy
Soil Type: Sandy loam
Tillage: Field cultivator
Variety: Attwood
Planting Date: 6-7-06
Row Width: 22 inch
Fertilizer: 2 gal. fish emulsion + 1 gal. molasses broadcast/a
Herbicide: None
Harvest Populations: 200,000
Harvest Date: 10-27-06
Experimental Design: RCB with 2 replications

Purpose of study:
To measure the influence of fish emulsion + humic acid applied in-furrow on yield and quality of organic soybean.

Results:
The treatments were established by injecting 3gal. fish emulsion + 1pt. humic acid in-furrow on 2 of the 4 replicated strips the length of the field with a 24 row planter. Harvest area was the centermost 9 rows by 2373 feet combined and weighed with a weigh wagon. The field had virtually no rain during the growing season and became severely infested with soybean aphids (>500 aphids/plant) in June which persisted for several weeks. Weed control was excellent until we received rain in August and a major flush of pigweed infested the row area. As a result of these environmental conditions and uncontrollable pest in an organic system, yields were dramatically reduced. As a result there were no measured advantages for the fish + humic acid treatment in regard to yield, protein percent, oil percent, test weight or seed size as can be noted in Table 1.

Table1. Influence of fish emulsion + humic acid applied in-furrow on yield and quality of organic soybean - 2006

Treatment	Yield (bu/a)	Protein (%)	Oil (%)	Test wt. (lb/bu)	Seed size (seeds/lb)
Fish + humic acid	6.3	36.1	18.1	58.1	3388
Control[1]	5.8	36.2	18.1	58.1	3423
LSD 0.05	NS	NS	NS	NS	NS

[1] No in-furrow fertilization

For additional information:
Russ Severson

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Flax Variety Evaluation Under an Organic Production System – Polk County

Cooperators: Jim and Pat Todahl
Nearest Towns: Fertile
Soil Type: Flaming sandy loam
Tillage: Fall chiseled, spring cultivated
Previous Crop: Sunflower
Planting Date: 5-20-06
Row Width: 6 inches
Fertilizer: 3 ton/a turkey manure, fall 2004
Harvest Date: 8-9-06
Experimental Design: Randomized complete block with 4 replications

Purpose of study:
To evaluate five flax varieties underseeded with red clover for differences in population, bloom, height, biomass production of weeds and flax, and yield. Also included in the trial was Norlin with weedy and weed free conditions (only treatment where weeds were controlled by hand weeding, until the flax started to bloom).

Results:
After seeding the flax, there was virtually no rain during the growing season. The weeds (predominantly pigweed and lambsquarter) were able to grow abundantly. The weeds accounted for approximately 80% of the plot biomass as they out-competed the flax for moisture and outgrew (plant height wise) the flax. As a result there were no yield differences observed between the different flax varieties. Hanley was the first to flower. The legume (Red clover) came up, but due to the competition with weeds and flax, died out completely. The hand weeded Norlin yielded 16 bu/a compared with the weedy Norlin which yielded 5 bu/a. Although this was a dry year, there was sufficient sub-soil moisture to produce on average 4377 lb/a weed biomass. Controlling weeds is important to grow flax organically.

	Population per square foot (plants)	Bloom 7-5-06 (%)	Flax height 8-10-06 (inch)	Weed height 8-10-06 (inch)	Weed biomass (lb/a)	Flax whole plant (lb/a)	Weeds in total biomass (%)	Flax Yield (bu/a)
Carter[1] with Red Clover[2]	29.0	4	25.4	29.3	4605	940	82	2.9
Bethune with Red Clover	28.2	2	29.4	32.5	4327	791	84	2.3
Hanley with Red Clover	36.2	13	27.3	30.8	4139	1002	81	3.5
York with Red Clover	39.0	7	27.3	31.3	3985	1143	77	4.0
Norlin with Red Clover	27.6	8	26.5	32.3	4507	927	83	3.5
Norlin with 2x Red Clover	25.8	6	27.8	32.5	4551	924	82	3.4
Norlin hand weeded	28.8	19	27.4	n.a.	5	3249	0	16.0
Norlin weedy	26.8	8	27.5	32.3	4524	1180	79	5.0
LSD 0.05	8.60	4	2.1	NS	1335	603	14	2.4

[1]Carter has a yellow seed coat.
[2]Red clover was seeded at the same time as flax at 14 lb/a; 2x = 28 lb/a.

Funding: Northwest Regional Sustainable Development Partnership

For additional information:
Hans Kandel and Paul Porter

Source: 2006 On-Farm Cropping Trials Northwest and West Central Minnesota
U of MN Extension Service, published January 2007

Winter Canola Variety Trial, Pennington County

Cooperators: Monte Cassavan
Nearest Towns: St. Hilaire
Soil Type: Clearwater Clay
Tillage: No-till, into spring wheat
Previous Crop: Spring Wheat
Planting Date: 9-16-05
Row Width: 6 inches
Fertilizer: 100 lb N/a
Swathing Date: 7-3-06
Harvest Date: 7-11-06
Experimental Design: Randomized complete block with 4 replications

Purpose of study:
To evaluate the overwintering ability and yield response of winter canola in Northern Minnesota.

Results:
The winter of 2005-2006 was sufficiently mild to allow great success in overwintering of winter canola. Exceptional snow cover and higher than average temperatures resulted in early spring emergence from dormancy. On June 2 at mid-bloom a score was given to each plot combining stand (winter survival) and visual performance of the crop. 1 no crop – 9 excellent stand and good yield potential. Dry conditions in summer of 2006 resulted in relatively early maturation, and harvest was completed on July 11. There were significant differences in how the crop looked on June 2 but the visual score did not consistently match the measured yield. Differences in yields were observed and KS3018 was the highest yielding variety.

Variety	2005 Yield (lb/a)	2006 Yield (lb/a)	2006 Visual[1] Rating 2-Jun (1 - 9)
KS3018	717	2246	5.5
KS7436	1076	1897	7.3
KS3350		1778	5.3
VSX-2		1771	4.8
Baldur		1760	5.8
ARC2180-1		1632	6.3
ARC97019		1619	5.8
ARC97018		1613	5.3
KS3067		1604	7.3
Jetton		1573	5.0
Virginia		1572	4.5
Rasmus		1559	5.0
ARC98007		1539	6.8
Casino	1051	1537	5.3
KS3068		1536	5.5
DSV 05100		1530	4.5
KS9135	1069	1504	7.0
KS2064	1006	1467	5.5
DSV 05101		1465	5.3
Sumner	987	1462	4.8
KS9124	1017	1458	6.5
Wichita	1074	1446	4.5
ARC98015		1424	7.0
Kronos	1134	1395	5.8
DSV 05104		1385	4.5
KS3254		1366	6.5
DSV 05102		1351	4.8
KS3074		1331	6.5
Ceres		1326	4.5
KS2185	1244	1316	4.0
DSV 05103		1294	5.0
Abilene		1282	5.0
TCI Exp 983		1277	3.0
Plainsman	555	1111	4.5
Mean	**958**	**1513**	**5.4**
LSD 0.05	297	419	2.0

[1]1 no crop – 9 excellent stand and good yield potential

Funding: Minnesota Canola Council
Partnership: Kansas State University

For additional information:
Paul Porter, Hans Kandel, and Derek Crompton

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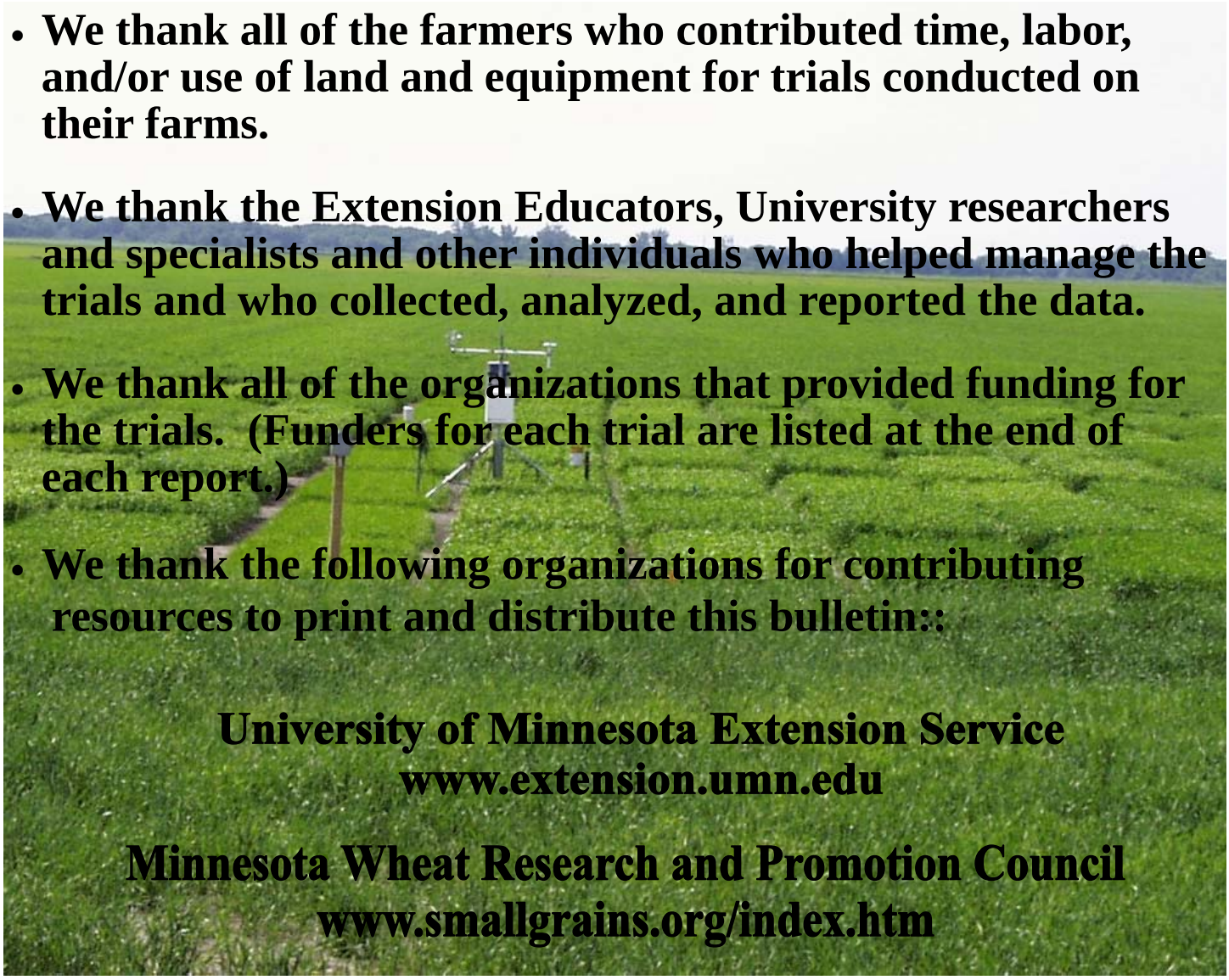

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