Northwestern Agricultural Research Center
of the
Department of Research Centers
Montana Agricultural Experiment Station
Montana State University

ANNUAL REPORT
2012 CROP YEAR

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CLIMATOLOGY

Weather information as recorded at the
Northwestern Agricultural Research Center, Kalispell, Montana.

Climate Overview for the Crop Year 2012

Precipitation for the 2012 Crop Year, which is September 2011-August 2012, was 103% of the average of the past 32 years. Though 8 months experienced precipitation levels less than 90% of average, two months recorded levels well above average.

October 2011 precipitation was at 184% of average and June 2012 precipitation was recorded at 210% of average. Two months recorded precipitation at or below 30% of the 32 year average. November 2011 precipitation was at 29%, while December 2011 precipitation was 27% of average.

Temperatures for the year were slightly above normal, averaging 44°F, compared to the 32 year average of 43.2°F.

Despite the warmer average temperature, the frost-free period was shorter than average at 97 days, which is 79% of the average of 123 days. The last frost at the beginning of the growing season was recorded on June 7, 2012, while the first frost at the end of the growing season was recorded on September 12, 2012.

The lowest temperature for the crop year was 3°F, recorded February 28, 2012. This was only the second time in the last 32 years that the low temperature did not register below 0°F. The highest temperature was 89°F, recorded on August 15, 2012.

Summary of Climatic Data by Months for the 2012 Crop Year: September 2011 - August 2012
and Averages for the Years 1980-2012 at the
Northwestern Agricultural Research Center, Kalispell, Montana

	Sept. 2011	Oct. 2011	Nov. 2011	Dec. 2011	Jan. 2012	Feb. 2012	Mar. 2012	Apr. 2012	May 2012	June 2012	July 2012	Aug. 2012	Total or Average
Precipitation (inches)													
Current Year	0.91	2.46	0.46	0.4	1.08	1.15	1.16	1.35	2.11	7.11	1.41	0.56	20.16
1980-2012	1.59	1.31	1.57	1.50	1.39	1.18	1.29	1.83	2.43	3.38	1.66	1.11	20.24
Average Temperature (F°)													
Current Year	56.2	43.3	31.6	28.0	26.4	28.2	36.7	45.2	48.8	54.9	65.2	63.1	44.0
1980-2012	53.7	42.2	32.4	24.1	24.6	27.1	34.9	43.0	51.3	57.7	64.3	65.4	43.4

Last killing frost[1] in spring		
Spring 2012	June 7	32°F
Median for 1980-2011	May 20	
First killing frost[1] in fall		
Fall 2011	September 29	29°F
Median for 1980-2011	September 17	
Frost Free Period		
Avg. 1980-2011	123	
Growing Degree Days April - August 2012		
Base 50	1,481.5	
Base 40	2,521.5	
Base 32	3,568.5	
Maximum summer temperature	89°F	Aug. , 2012
Minimum winter temperature	3°F	Feb , 2012

1. In this summary 32 degrees is considered a killing frost.

MAXIMUM / MINIMUM TEMPERATURES BY MONTH & DAY
JANUARY 2012- DECEMBER 2012

2012

YR	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	35	19	42	28	35	19	62	36	52	36	53	46	80	56	81	48	83	43	72	37	52	40	43	28
2	35	17	36	28	34	20	47	31	52	32	65	M	69	40	81	50	75	44	73	38	48	40	44	M
3	M	M	39	20	34	21	48	24	52	27	62	42	77	53	74	40	75	38	70	37	48	31	43	35
4	49	17	36	20	46	33	57	26	52	39	63	42	65	42	71	44	74	45	47	22	49	32	42	33
5	53	31	30	20	50	40	52	32	52	33	73	50	69	40	79	48	72	40	49	20	55	47	48	34
6	46	25	26	20	50	29	44	25	52	33	57	38	74	45	84	51	74	42	51	20	65	35	35	28
7	38	21	34	16	36	20	41	28	52	30	45	32	78	46	83	51	64	37	51	23	57	36	32	28
8	35	24	36	12	39	19	46	20	52	36	66	M	85	49	87	51	71	38	59	23	52	24	31	23
9	35	24	28	12	48	25	54	27	52	43	56	M	84	52	84	50	78	40	53	33	38	26	33	9
10	45	25	31	23	61	29	61	29	52	40	52	M	89	56	86	48	76	43	58	27	30	19	33	9
11	38	9	34	25	58	33	65	33	52	24	49	40	85	52	86	48	63	38	63	28	28	13	34	21
12	27	9	32	28	44	28	69	40	52	28	66	41	89	52	85	49	62	27	57	25	30	23	39	31
13	24	10	33	30	46	30	54	31	52	M	66	48	89	60	85	48	61	31	66	26	35	28	34	29
14	28	18	36	26	49	26	56	26	52	35	63	45	89	65	85	50	71	33	56	46	40	30	34	15
15	43	20	38	11	40	35	58	40	52	38	68	M	73	61	89	50	75	37	61	50	42	25	27	15
16	28	9	31	15	47	37	44	31	52	43	68	M	70	51	70	39	75	38	63	49	45	26	31	24
17	25	10	34	19	47	27	51	39	52	52	68	53	81	55	76	42	74	37	56	28	41	28	33	27
18	31	10	34	24	34	29	54	38	52	39	71	46	73	53	81	46	72	36	52	28	44	15	34	26
19	20	5	40	28	35	30	50	M	52	33	59	37	82	54	87	47	77	38	54	29	43	33	31	19
20	12	7	35	27	41	26	53	38	52	33	57	M	87	56	86	50	78	39	54	M	50	38	29	19
21	23	11	36	27	41	28	56	30	52	45	65	37	82	53	86	49	77	39	49	30	46	37	36	29
22	M	M	39	32	35	30	60	34	52	50	75	M	77	48	74	54	77	40	45	22	43	32	35	M
23	39	23	46	28	46	27	74	41	52	42	78	M	85	54	79	40	72	38	42	27	39	28	39	28
24	39	6	38	24	37	31	79	47	52	43	80	52	71	43	76	46	73	39	39	27	41	31	39	M
25	42	7	36	29	46	28	76	48	52	36	79	54	73	47	67	35	69	40	42	27	41	28	20	15
26	40	33	35	26	52	28	71	50	52	39	81	51	77	51	71	36	69	40	34	27	38	22	23	15
27	42	14	33	18	50	28	67	35	52	42	62	48	80	50	80	42	69	36	40	27	35	20	23	17
28	31	15	32	3	55	30	43	35	52	40	64	39	81	56	87	45	68	35	40	27	30	22	27	19
29	4	18	29	8	51	35	53	36	52	41	78	47	83	45	88	45	73	37	47	36	37	22	31	18
30	43	37			52	36	56	37	52	39	71	48	81	46	72	38	75	43	53	38	43	32	29	20
31	42	30			45	36			52	39			83	50	74	38			56	44			25	20
AVG	35.4	17.4	34.8	21.6	44.6	28.8	56.7	33.7	60.1	37.5	65.3	44.5	79.4	51.0	80.5	45.7	72.4	38.4	53.3	30.5	42.8	28.8	33.5	23.0

MAXIMUM TEMPERATURE	89°F	MINIMUM TEMPERATURE	3°F

"M": missing data

Precipitation by Day for Crop Year September 2011- August 2012
Northwest Agriculture Research Center, Kalispell Montana

DAY	SEPT. 2011	OCT. 2011	NOV. 2011	DEC. 2011	JAN. 2012	FEB. 2012	MAR. 2012	APR. 2012	MAY 2012	JUNE 2012	JULY 2012	AUG. 2012	Year to Date
1	0.24	0.00	0.00	0.00	0.00	0.00	0.03	0.10	0.23	0.03	0.40	0.00	1.03
2	M	0.01	0.00	0.00	0.00	0.14	0.08	0.00	0.01	0.06	0.13	0.00	0.43
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.33	0.10	0.09	0.53
4	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.06	0.08	0.00	0.19
5	0.00	0.09	0.08	0.00	0.00	0.00	0.00	0.05	0.06	0.00	0.00	0.00	0.28
6	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.32	0.00	0.00	2.07
7	0.00	0.14	0.00	0.00	0.00	0.00	T	0.00	0.00	0.23	0.00	0.00	0.37
8	0.00	0.99	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.09	0.00	0.00	1.15
9	0.00	0.00	0.04	0.00	0.00	0.18	0.00	0.00	0.00	1.03	0.00	0.00	1.25
10	0.00	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.87
11	0.00	M	0.00	0.00	0.05	M	0.00	0.00	0.00	0.40	0.00	0.00	0.45
12	0.00	0.14	0.06	0.03	0.00	M	0.02	0.33	0.00	0.01	0.00	0.00	0.59
13	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.48	0.00	0.00	0.52
14	0.00	0.00	0.03	0.01	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.17
15	0.00	0.15	0.05	0.04	0.00	0.00	0.00	0.10	0.00	0.00	0.11	0.40	0.85
16	0.17	0.00	0.00	0.02	0.00	0.00	0.04	0.01	0.00	0.00	0.36	0.00	0.60
17	0.00	0.01	0.08	0.00	0.01	0.10	0.02	0.03	0.00	0.15	0.00	0.00	0.40
18	0.00	0.00	0.01	0.00	0.02	0.04	0.22	0.01	0.00	0.13	0.06	0.00	0.49
19	0.09	0.00	0.01	0.00	0.24	0.00	0.06	0.06	0.00	0.61	0.00	0.00	1.07
20	0.33	0.00	0.01	0.00	0.35	0.09	0.01	0.10	0.00	0.19	0.00	0.00	1.08
21	0.00	0.00	0.00	0.07	0.00	0.15	0.08	0.03	0.00	0.00	0.09	0.00	0.42
22	0.00	0.00	0.00	0.00	0.00	0.02	0.32	0.00	0.57	0.00	0.00	0.07	0.98
23	0.00	0.27	0.00	0.00	0.01	0.08	0.08	M	0.17	0.00	0.00	0.00	0.61
24	0.00	0.00	0.00	0.00	0.00	0.00	T	M	0.12	0.00	0.00	0.00	0.12
25	0.00	0.00	0.01	0.00	0.19	0.05	0.00	M	0.04	0.00	0.00	0.00	0.29
26	0.08	0.00	0.00	0.00	0.00	0.20	0.00	0.01	0.11	0.55	0.00	0.00	0.95
27	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.46	0.11	0.60	0.00	0.00	1.23
28	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.11	0.00	0.08	0.00	0.23
29	0.00	0.01	0.00	0.12	0.03	0.00	0.05	M	0.11	0.00	0.00	0.00	0.32
30	0.00	0.00	0.06	0.09	0.08		0.00	0.02	0.23	0.00	0.00	0.00	0.48
31		0.07		0.00	0.00		0.07		0.00		0.00	0.00	0.14
TOTAL	0.91	2.46	0.46	0.40	1.08	1.15	1.16	1.35	2.11	7.11	1.41	0.56	20.16

Summary of Precipitation at the Northwestern Agricultural Research Center On a Crop Year Basis

Total Precipitation in Inches by Year and Month

YEAR	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	TOTAL
1980-81	1.20	0.83	0.78	2.58	1.81	1.85	2.17	1.75	3.86	4.70	1.17	0.96	23.66
1981-82	0.77	0.56	1.49	1.91	2.38	1.48	1.16	1.60	1.25	2.41	2.06	1.17	18.24
1982-83	2.37	0.75	1.39	1.60	0.93	0.85	1.71	2.41	1.20	2.96	3.66	1.16	20.99
1983-84	1.70	1.13	1.96	2.57	0.80	2.19	1.81	1.93	2.91	2.07	0.31	0.55	19.93
1984-85	2.15	2.25	1.40	1.29	0.31	1.28	0.90	1.31	2.81	1.89	0.35	1.62	17.56
1985-86	5.35	1.55	1.61	0.51	2.39	2.33	0.50	1.34	2.92	1.83	2.09	0.81	23.23
1986-87	3.63	0.80	1.78	0.63	0.38	0.46	3.47	1.15	1.89	1.95	4.85	0.98	21.97
1987-88	0.81	0.12	0.91	1.18	0.98	1.03	0.77	1.36	3.60	1.98	1.07	0.13	13.94
1988-89	2.30	0.62	1.39	1.69	1.39	1.48	2.29	1.09	2.70	2.05	2.70	3.69	23.39
1989-90	1.50	2.29	3.75	1.92	0.96	1.00	1.76	1.63	3.74	2.68	2.34	2.44	26.01
1990-91	T	2.32	1.37	2.60	1.41	0.41	0.72	1.21	2.72	5.36	0.77	1.15	20.04
1991-92	0.80	0.75	2.26	0.58	1.17	0.61	0.83	1.18	1.65	5.34	2.24	0.94	18.35
1992-93	1.21	1.07	2.37	1.53	1.68	0.60	0.73	3.77	2.22	4.00	7.00	1.19	27.37
1993-94	1.54	0.83	1.23	1.27	1.43	1.49	0.11	2.01	1.79	2.59	0.10	0.23	14.62
1994-95	0.46	2.12	1.89	1.07	1.17	0.90	2.33	2.25	1.44	5.63	1.91	1.47	22.64
1995-96	1.21	2.75	2.33	1.91	2.22	1.18	1.19	3.32	4.58	2.05	0.95	0.80	24.49
1996-97	2.67	1.58	3.99	3.52	1.50	1.62	1.18	1.69	2.62	3.41	0.99	1.94	26.71
1997-98	2.36	0.94	0.33	0.42	0.77	0.33	2.64	1.80	5.14	4.64	1.18	0.72	21.27
1998-99	1.48	0.71	1.11	1.47	1.05	1.18	0.90	0.55	1.32	2.74	1.63	1.93	16.07
1999-00	0.36	1.72	2.33	1.08	1.46	1.81	1.30	2.21	0.89	1.80	0.84	0.35	16.15
2000-01	1.40	1.23	0.62	1.23	0.75	1.54	1.03	2.62	0.57	3.29	0.91	0.54	15.73
2001-02	0.32	1.80	1.44	0.59	1.21	1.66	1.48	0.91	2.72	2.39	1.45	1.44	17.41
2002-03	1.18	0.25	0.87	1.67	1.63	1.01	2.32	2.23	1.78	1.57	0.05	0.35	14.91
2003-04	2.56	1.29	0.59	1.04	2.02	0.42	0.57	2.23	1.97	1.31	1.24	3.60	18.84
2004-05	1.89	1.62	0.84	1.49	1.38	0.01	1.41	2.21	1.73	8.44	0.26	0.56	21.84
2005-06	2.28	2.20	1.45	1.42	3.04	1.14	0.55	2.12	2.89	5.50	0.51	0.24	23.34
2006-07	1.95	1.10	2.28	0.95	0.39	2.26	0.54	1.62	3.29	1.35	0.75	0.23	16.71
2007-08	1.28	1.11	1.02	1.13	1.31	0.76	0.61	0.90	2.33	3.65	3.80	1.15	19.05
2008-09	1.57	0.61	1.71	2.37	1.72	1.59	1.43	0.98	1.62	1.98	2.44	0.99	19.01
2009-10	0.04	1.72	0.37	2.66	1.42	0.66	0.72	3.47	2.45	5.03	1.25	1.35	21.14
2010-11	1.71	0.74	2.77	1.69	2.43	1.61	0.87	2.25	3.20	4.48	0.99	0.24	22.98
2011-12	0.91	2.46	0.46	0.40	1.08	1.15	1.16	1.35	2.11	7.11	1.41	0.56	20.16
MEAN	1.54	1.27	1.52	1.45	1.39	1.18	1.29	1.83	2.43	3.38	1.66	1.11	19.61
	SEPT	OCT	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	TOTAL

Mean monthly precipitation for all crop years = 1.67

Summary of precipitation records at the Northwestern Agricultural Research Center
Total Precipitation (inches) by Months and Years

DATE	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
1981	1.81	1.85	2.17	1.75	3.86	4.70	1.17	0.96	0.77	0.56	1.49	1.91	23.00
1982	2.38	1.48	1.16	1.60	1.25	2.41	2.06	1.17	2.37	0.75	1.39	1.60	19.62
1983	0.93	0.85	1.71	2.41	1.20	2.96	3.66	1.16	1.70	1.13	1.96	2.57	22.24
1984	0.80	2.19	1.81	1.93	2.91	2.07	0.31	0.55	2.15	2.25	1.40	1.29	19.66
1985	0.31	1.28	0.90	1.31	2.81	1.89	0.35	1.62	5.35	1.55	1.61	0.51	19.49
1986	2.39	2.33	0.50	1.34	2.92	1.83	2.09	0.81	3.63	0.80	1.78	0.63	21.05
1987	0.38	0.46	3.47	1.15	1.89	1.95	4.85	0.98	0.81	0.12	0.91	1.18	18.15
1988	0.98	1.03	0.77	1.36	3.60	1.98	1.07	0.13	2.30	0.62	1.39	1.69	16.92
1989	1.39	1.48	2.29	1.09	2.70	2.05	2.70	3.69	1.50	2.29	3.75	1.92	26.85
1990	0.96	1.00	1.76	1.63	3.74	2.68	2.34	2.44	T	2.32	1.37	2.60	22.84
1991	1.41	0.41	0.72	1.21	2.72	5.36	0.77	1.15	0.80	0.75	2.26	0.58	18.14
1992	1.17	0.61	0.83	1.18	1.65	5.34	2.24	0.94	1.21	1.07	2.37	1.53	20.14
1993	1.68	0.60	0.73	3.77	2.22	4.00	7.00	1.19	1.54	0.83	1.23	1.27	26.06
1994	1.43	1.49	0.11	2.01	1.79	2.59	0.10	0.23	0.46	2.12	1.89	1.07	15.29
1995	1.17	0.90	2.33	2.25	1.44	5.63	1.91	1.47	1.21	2.75	2.33	1.91	25.30
1996	2.22	1.18	1.19	3.32	4.58	2.05	0.95	0.80	2.67	1.58	3.99	3.52	28.05
1997	1.50	1.62	1.18	1.69	2.62	3.41	0.99	1.94	2.36	0.94	0.33	0.42	19.00
1998	0.77	0.33	2.64	1.80	5.14	4.64	1.18	0.72	1.48	0.71	1.11	1.47	21.99
1999	1.05	1.18	0.90	0.55	1.32	2.74	1.63	1.93	0.36	1.72	2.33	1.08	16.79
2000	1.46	1.81	1.30	2.21	0.89	1.80	0.84	0.35	1.40	0.62	0.46	1.23	14.37
2001	0.75	1.54	1.03	2.62	0.57	3.29	0.91	0.54	0.32	1.80	1.44	0.59	15.40
2002	1.21	1.66	1.48	0.91	2.72	2.39	1.45	1.44	1.18	0.25	0.87	1.67	17.23
2003	1.63	1.01	2.32	2.23	1.78	1.57	0.05	0.35	2.56	1.29	0.59	1.04	16.42
2004	2.02	0.42	0.57	2.23	1.97	1.31	1.24	3.60	1.89	1.62	0.84	1.49	19.20
2005	2.46	0.01	1.41	2.21	1.73	8.44	0.26	0.60	2.28	2.20	1.45	1.42	24.47
2006	3.04	1.10	0.55	2.12	2.89	5.50	0.51	0.71	1.95	1.10	2.28	0.24	21.99
2007	0.39	2.26	0.54	1.62	3.29	1.35	0.75	0.23	1.28	1.11	1.02	1.13	14.97
2008	1.31	0.76	0.61	0.90	2.33	3.65	3.80	1.15	1.57	0.61	1.71	2.37	20.77
2009	1.72	1.59	1.43	0.98	1.62	1.98	2.44	0.99	0.04	1.72	0.37	2.66	17.54
2010	1.42	0.66	0.72	3.47	2.45	5.03	1.25	1.35	1.71	0.74	2.77	1.69	23.26
2011	2.43	1.61	0.87	2.25	3.20	4.48	0.99	0.24	0.91	2.46	0.46	0.40	20.30
2012	1.08	1.15	1.16	1.35	2.11	7.11	1.41	0.56	0.75	2.46	1.66	1.84	22.64
MEAN	1.43	1.18	1.29	1.83	2.43	3.38	1.66	1.12	1.58	1.34	1.59	1.45	20.29
-	-	-	-	-	-	-	-	-	-	-	-	-	-
DATE	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL

YEAR 2012 - GROWING DEGREE DAYS JANUARY THROUGH OCTOBER
CALCULATED AT BASE 50, BASE 40, AND BASE 32
Page 1: January - May

JANUARY

	Temperatures		Growing Degree Days		
Day	MAX	MIN	Base 50	Base 40	Base 32
1	35	19	0.0	0.0	1.5
2	35	17	0.0	0.0	1.5
3	M	M	0.0	0.0	0.0
4	49	17	0.0	4.5	8.5
5	53	31	1.5	6.5	10.5
6	46	25	0.0	3.0	7.0
7	38	21	0.0	0.0	3.0
8	35	24	0.0	0.0	1.5
9	35	24	0.0	0.0	1.5
10	45	25	0.0	2.5	6.5
11	38	9	0.0	0.0	3.0
12	27	9	0.0	0.0	0.0
13	24	10	0.0	0.0	0.0
14	28	18	0.0	0.0	0.0
15	43	20	0.0	1.5	5.5
16	28	9	0.0	0.0	0.0
17	25	10	0.0	0.0	0.0
18	31	10	0.0	0.0	0.0
19	20	5	0.0	0.0	0.0
20	12	7	0.0	0.0	0.0
21	23	11	0.0	0.0	0.0
22	M	M	0.0	0.0	0.0
23	39	23	0.0	0.0	3.5
24	39	6	0.0	0.0	3.5
25	42	7	0.0	1.0	5.0
26	40	33	0.0	0.0	4.5
27	42	14	0.0	1.0	5.0
28	31	15	0.0	0.0	0.0
29	4	18	0.0	0.0	0.0
30	43	37	0.0	1.5	8.0
31	42	30	0.0	1.0	5.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
35.4	17.4	1.5	22.5	84.5

February

	Temperatures		Growing Degree Days		
Day	MAX	MIN	Base 50	Base 40	Base 32
1	42	28	0.0	1.0	5.0
2	36	28	0.0	0.0	2.0
3	39	20	0.0	0.0	3.5
4	36	20	0.0	0.0	2.0
5	30	20	0.0	0.0	0.0
6	26	20	0.0	0.0	0.0
7	34	16	0.0	0.0	1.0
8	36	12	0.0	0.0	2.0
9	28	12	0.0	0.0	0.0
10	31	23	0.0	0.0	0.0
11	34	25	0.0	0.0	1.0
12	32	28	0.0	0.0	0.0
13	33	30	0.0	0.0	0.5
14	36	26	0.0	0.0	2.0
15	38	11	0.0	0.0	3.0
16	31	15	0.0	0.0	0.0
17	34	19	0.0	0.0	1.0
18	34	24	0.0	0.0	1.0
19	40	28	0.0	0.0	4.0
20	35	27	0.0	0.0	1.5
21	36	27	0.0	0.0	2.0
22	39	32	0.0	0.0	3.5
23	46	28	0.0	3.0	7.0
24	38	24	0.0	0.0	3.0
25	36	29	0.0	0.0	2.0
26	35	26	0.0	0.0	1.5
27	33	18	0.0	0.0	0.5
28	32	3	0.0	0.0	0.0
29	29	8			

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
34.8	21.6	0.0	4.0	49.0

March

	Temperatures		Growing Degree Days		
Day	MAX	MIN	Base 50	Base 40	Base 32
1	35	19	0.0	0.0	1.5
2	34	20	0.0	0.0	1.0
3	34	21	0.0	0.0	1.0
4	46	33	0.0	3.0	7.5
5	50	40	0.0	5.0	13.0
6	50	29	0.0	5.0	9.0
7	36	20	0.0	0.0	2.0
8	39	19	0.0	0.0	3.5
9	48	25	0.0	4.0	8.0
10	61	29	5.5	10.5	14.5
11	58	33	4.0	9.0	13.5
12	44	28	0.0	2.0	6.0
13	46	30	0.0	3.0	7.0
14	49	26	0.0	4.5	8.5
15	40	35	0.0	0.0	5.5
16	47	37	0.0	3.5	10.0
17	47	27	0.0	3.5	7.5
18	34	29	0.0	0.0	1.0
19	35	30	0.0	0.0	1.5
20	41	26	0.0	0.5	4.5
21	41	28	0.0	0.5	4.5
22	35	30	0.0	0.0	1.5
23	46	27	0.0	3.0	7.0
24	37	31	0.0	0.0	2.5
25	46	28	0.0	3.0	7.0
26	52	28	1.0	6.0	10.0
27	50	28	0.0	5.0	9.0
28	55	30	2.5	7.5	11.5
29	51	35	0.5	5.5	11.0
30	52	36	1.0	6.0	12.0
31	45	36	0.0	2.5	8.5

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
44.6	28.8	14.5	92.5	210.5

April

	Temperatures		Growing Degree Days		
Day	MAX	MIN	Base 50	Base 40	Base 32
1	62	36	6.0	11.0	17.0
2	47	31	0.0	3.5	7.5
3	48	24	0.0	4.0	8.0
4	57	26	3.5	8.5	12.5
5	52	32	1.0	6.0	10.0
6	44	25	0.0	2.0	6.0
7	41	28	0.0	0.5	4.5
8	46	20	0.0	3.0	7.0
9	54	27	2.0	7.0	11.0
10	61	29	5.5	10.5	14.5
11	65	33	7.5	12.5	17.0
12	69	40	9.5	14.5	22.5
13	54	31	2.0	7.0	11.0
14	56	26	3.0	8.0	12.0
15	58	40	4.0	9.0	17.0
16	44	31	0.0	2.0	6.0
17	51	39	0.5	5.5	13.0
18	54	38	2.0	7.0	14.0
19	50	M	0.0	5.0	9.0
20	53	38	1.5	6.5	13.5
21	56	30	3.0	8.0	12.0
22	60	34	5.0	10.0	15.0
23	74	41	12.0	17.5	25.5
24	79	47	14.5	23.0	31.0
25	76	48	13.0	22.0	30.0
26	71	50	10.5	20.5	28.5
27	67	35	8.5	13.5	19.0
28	43	35	0.0	1.5	7.0
29	53	36	1.5	6.5	12.5
30	56	37	3.0	8.0	14.5

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
56.7	33.7	119.0	263.5	428.0

May

	Temperatures		Growing Degree Days		
Day	MAX	MIN	Base 50	Base 40	Base 32
1	52	36	1.0	6.0	12.0
2	50	32	0.0	5.0	9.0
3	50	27	0.0	5.0	9.0
4	46	39	0.0	3.0	10.5
5	57	33	3.5	8.5	13.0
6	44	33	0.0	2.0	6.5
7	55	30	2.5	7.5	11.5
8	62	36	6.0	11.0	17.0
9	72	43	11.0	17.5	25.5
10	67	40	8.5	13.5	21.5
11	54	24	2.0	7.0	11.0
12	58	28	4.0	9.0	13.0
13	65	M	7.5	12.5	16.5
14	73	35	11.5	16.5	22.0
15	78	38	14.0	19.0	26.0
16	80	43	15.0	21.5	29.5
17	79	52	15.5	25.5	33.5
18	67	39	8.5	13.5	21.0
19	60	33	5.0	10.0	14.5
20	62	33	6.0	11.0	15.5
21	67	45	8.5	16.0	24.0
22	60	50	5.0	15.0	23.0
23	57	42	3.5	9.5	17.5
24	54	43	2.0	8.5	16.5
25	54	36	2.0	7.0	13.0
26	57	39	3.5	8.5	16.0
27	54	42	2.0	8.0	16.0
28	50	40	0.0	5.0	13.0
29	61	41	5.5	11.0	19.0
30	58	39	4.0	9.0	16.5
31	59	39	4.5	9.5	17.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
		162.0	331.5	529.5

YEAR 2012- GROWING DEGREE DAYS JANUARY THROUGH OCTOBER
CALCULATED AT BASE 50, BASE 40, AND BASE 32
Page 2: June - October

JUNE

Day	Temperatures MAX	MIN	Growing Degree Days Base 50	Base 40	Base 32
1	53	46	1.5	9.5	17.5
2	65	M	7.5	12.5	16.5
3	62	42	6.0	12.0	20.0
4	63	42	6.5	12.5	20.5
5	73	50	11.5	21.5	29.5
6	57	38	3.5	8.5	15.5
7	45	32	0.0	2.5	6.5
8	66	M	8.0	13.0	17.0
9	56	M	3.0	8.0	12.0
10	52	M	1.0	6.0	10.0
11	49	40	0.0	4.5	12.5
12	66	41	8.0	13.5	21.5
13	66	48	8.0	17.0	25.0
14	63	45	6.5	14.0	22.0
15	68	M	9.0	14.0	18.0
16	68	M	9.0	14.0	18.0
17	68	53	10.5	20.5	28.5
18	71	46	10.5	18.5	26.5
19	59	37	4.5	9.5	16.0
20	57	M	3.5	8.5	12.5
21	65	37	7.5	12.5	19.0
22	75	M	12.5	17.5	21.5
23	78	M	14.0	19.0	23.0
24	80	52	16.0	26.0	34.0
25	79	54	16.5	26.5	34.5
26	81	51	16.0	26.0	34.0
27	62	48	6.0	15.0	23.0
28	64	39	7.0	12.0	19.5
29	78	47	14.0	22.5	30.5
30	71	48	10.5	19.5	27.5

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
65.3	44.5	238.0	436.5	632.0

JULY

Day	Temperatures MAX	MIN	Growing Degree Days Base 50	Base 40	Base 32
1	80	56	18.0	28.0	36.0
2	69	40	9.5	14.5	22.5
3	77	53	15.0	25.0	33.0
4	65	42	7.5	13.5	21.5
5	69	40	9.5	14.5	22.5
6	74	45	12.0	19.5	27.5
7	78	46	14.0	22.0	30.0
8	85	49	17.5	27.0	35.0
9	84	52	18.0	28.0	36.0
10	89	49	18.0	27.5	35.5
11	85	52	18.5	28.5	36.5
12	89	52	19.0	29.0	37.0
13	89	60	23.0	33.0	41.0
14	89	65	25.5	35.5	43.5
15	73	61	17.0	27.0	35.0
16	70	51	10.5	20.5	28.5
17	81	55	18.0	28.0	36.0
18	73	53	13.0	23.0	31.0
19	82	54	18.0	28.0	36.0
20	87	56	21.0	31.0	39.0
21	82	53	17.5	27.5	35.5
22	77	48	13.5	22.5	30.5
23	85	54	19.5	29.5	37.5
24	71	43	10.5	17.0	25.0
25	73	47	11.5	20.0	28.0
26	77	51	14.0	24.0	32.0
27	80	50	15.0	25.0	33.0
28	81	56	18.5	28.5	36.5
29	83	45	16.5	24.0	32.0
30	81	46	15.5	23.5	31.5
31	83	50	16.5	26.5	34.5

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
79.4	51.0	491.0	771.0	1019

AUGUST

Day	Temperatures MAX	MIN	Growing Degree Days Base 50	Base 40	Base 32
1	81	48	15.5	24.5	32.5
2	81	50	15.5	25.5	33.5
3	74	40	12.0	17.0	25.0
4	71	44	10.5	17.5	25.5
5	79	48	14.5	23.5	31.5
6	84	51	17.5	27.5	35.5
7	83	51	17.0	27.0	35.0
8	87	51	18.5	28.5	36.5
9	84	50	17.0	27.0	35.0
10	86	48	18.0	27.0	35.0
11	86	48	18.0	27.0	35.0
12	85	49	17.5	27.0	35.0
13	85	48	17.5	26.5	34.5
14	85	50	17.5	27.5	35.5
15	89	50	18.0	28.0	36.0
16	70	39	10.0	15.0	22.5
17	76	42	13.0	19.0	27.0
18	81	46	15.5	23.5	31.5
19	87	47	18.0	26.5	34.5
20	86	50	18.0	28.0	36.0
21	86	49	18.0	27.5	35.5
22	74	54	14.0	24.0	32.0
23	79	40	14.5	19.5	27.5
24	76	46	13.0	21.0	29.0
25	67	35	8.5	13.5	19.0
26	71	36	10.5	15.5	21.5
27	80	42	15.0	21.0	29.0
28	87	45	18.0	25.5	33.5
29	88	45	18.0	25.5	33.5
30	72	38	11.0	16.0	23.0
31	74	38	12.0	17.0	24.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
80.5	45.7	471.5	719.0	960.0

SEPTEMBER

Day	Temperatures MAX	MIN	Growing Degree Days Base 50	Base 40	Base 32
1	83	43	16.5	23.0	31.0
2	75	44	12.5	19.5	27.5
3	75	38	12.5	17.5	24.5
4	74	45	12.0	19.5	27.5
5	72	40	11.0	16.0	24.0
6	74	42	12.0	18.0	26.0
7	64	37	7.0	12.0	18.5
8	71	38	10.5	15.5	22.5
9	78	40	14.0	19.0	27.0
10	76	43	13.0	19.5	27.5
11	63	38	6.5	11.5	18.5
12	62	27	6.0	11.0	15.0
13	61	31	5.5	10.5	14.5
14	71	33	10.5	15.5	20.0
15	75	37	12.5	17.5	24.0
16	75	38	12.5	17.5	24.5
17	74	37	12.0	17.0	23.5
18	72	36	11.0	16.0	22.0
19	77	38	13.5	18.5	25.5
20	78	39	14.0	19.0	26.5
21	77	39	13.5	18.5	26.0
22	77	40	13.5	18.5	26.5
23	72	38	11.0	16.0	23.0
24	73	39	11.5	16.5	24.0
25	69	40	9.5	14.5	22.5
26	69	40	9.5	14.5	22.5
27	69	36	9.5	14.5	20.5
28	68	35	9.0	14.0	19.5
29	73	37	11.5	16.5	23.0
30	75	43	12.5	19.0	27.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
72.4	38.4	336.0	496.0	704.5

OCTOBER

Day	Temperatures MAX	MIN	Growing Degree Days Base 50	Base 40	Base 32
1	72	37	11.0	16.0	22.5
2	73	38	11.5	16.5	23.5
3	70	37	10.0	15.0	21.5
4	47	22	0.0	3.5	7.5
5	49	20	0.0	4.5	8.5
6	51	20	0.5	5.5	9.5
7	51	23	0.5	5.5	9.5
8	59	23	4.5	9.5	13.5
9	53	33	1.5	6.5	11.0
10	58	27	4.0	9.0	13.0
11	63	28	6.5	11.5	15.5
12	57	25	3.5	8.5	12.5
13	66	26	8.0	13.0	17.0
14	56	46	3.0	11.0	19.0
15	61	50	5.5	15.5	23.5
16	63	49	6.5	16.0	24.0
17	56	28	3.0	8.0	12.0
18	52	28	1.0	6.0	10.0
19	54	29	2.0	7.0	11.0
20	54	M	2.0	7.0	11.0
21	49	30	0.0	4.5	8.5
22	45	20	0.0	2.5	6.5
23	42	22	0.0	1.0	5.0
24	39	27	0.0	0.0	3.5
25	42	27	0.0	1.0	5.0
26	34	27	0.0	0.0	1.0
27	40	27	0.0	0.0	4.0
28	40	27	0.0	0.0	4.0
29	47	38	0.0	3.5	10.5
30	53	38	1.5	6.5	13.5
31	56	44	3.0	10.0	18.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
53.3	30.5	89.0	224.0	375.0

CEREALS

Project Title: Intrastate Barley Evaluation – 2012

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon and Tom Blake

Objective: To evaluate barley varieties and experimental lines for agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

The average Julian heading days was 179 (June 27) and the average height was 38 inches. Lodging was observed in 18 out of the 64 cultivars in the evaluation. Yields averaged 120 bu/A with MT100128 and MT090190 yielding the highest at 142 bu/A and MT100170 yielding the lowest at 86 bu/A. Test weight averaged 51 lb/bu and percent plumpness averaged 86%. Protein content averaged 14% and ranged from 18% for MT100170 to 12% for MT100064 and MT09000.

Summary:

The highest yielding commercially available cultivars were Cowboy, Champion, Geraldine, Conrad and Pinnacle.

Table 1. Material and Methods - Evaluation of intrastate barley cultivars - 2012

Seeding Date:	4/10/2012	Soil Type:	Kalispell vfSL	Harvest Date:	8/17/2012
Seeding Rate:	80 lb/A	Soil Test:	57-12-110-42		
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	None	Insecticide:	None		

Table 2. Agronomic data from the barley intrastate nursery, Kalispell MT 2012

Cultivar	Heading Julian	Height inch	Lodging %	Yield bu/A	TWT lb/bu	Plump %	Protein %
MT100128	179	38	0	142	53	96	13
MT090190	179	39	0	142	53	93	13
MT100125	181	42	16	141	53	93	13
MT090193	180	41	4	140	52	93	14
EM090081	185	43	0	137	51	94	15
MT090180	178	40	0	137	52	93	13
MT090184	179	41	0	137	52	92	13
MT100124	178	41	10	136	52	95	14
MT100120	180	41	0	136	52	94	13
MT070111	183	40	0	133	52	92	14
MT100132	180	42	0	133	52	92	13
MT090181	179	41	21	132	53	93	13
MT100126	182	39	0	132	53	93	14
MT100060	177	38	1	132	53	91	13
MT090186	180	39	0	132	52	91	13
MT090182	178	41	30	131	50	92	13
MT100136	178	40	0	131	52	91	13
MT061035	181	37	0	129	51	86	14
MT070161	177	36	0	129	52	94	14
MT100070	178	40	0	129	51	91	14
MT080285	177	34	0	128	52	91	14
MT080279	178	34	0	127	51	90	14
MT100130	179	42	3	126	51	92	13
COWBOY	182	50	0	126	50	98	14
Champion	178	40	4	125	50	95	14
MT070158	178	36	0	124	52	94	14
Geraldine	180	38	29	123	52	82	14
MT080243	178	41	8	123	51	83	15
CONRAD	178	38	0	123	51	91	15
MT080281	177	35	0	123	52	89	14
Pinnacle	177	42	3	123	51	95	13
MT080179	178	42	0	122	53	94	15

Table 2. continued

Cultivar	Heading Julian	Height inch	Lodging %	Yield bu/A	TWT lb/bu	Plump %	Protein %
MT100051	177	37	0	122	52	91	14
EM090061	183	35	0	122	51	95	14
MT061169	179	37	0	121	52	94	14
MT103022	180	38	0	121	51	92	15
MT090001	180	40	0	121	49	57	12
MT070159	178	35	0	121	52	94	14
Eslick	181	35	0	121	50	78	14
MT070125	178	38	0	120	51	88	15
Scarlett	179	33	0	120	51	96	14
MT020155	175	39	0	120	51	83	14
Craft	176	41	0	120	52	82	15
MT010160	179	38	0	120	52	91	15
MT070175	177	41	0	119	53	91	13
MT100113	176	36	0	119	50	83	13
Metcalfe	180	43	18	118	52	91	15
EM090105	178	38	0	117	51	91	14
MT100074	178	40	0	117	52	88	13
Tradition	176	41	0	117	48	70	15
MT080081	183	35	1	116	51	91	15
Hockett	177	38	8	116	51	78	15
MT100063	178	39	0	116	52	86	13
Haxby	178	38	0	113	53	91	15
MT100064	178	39	0	112	52	83	12
MT070086	179	30	1	110	51	88	14
Expedition	182	33	0	110	51	91	14
Hays	178	36	33	99	48	69	15
Harrington	178	41	0	99	50	85	14
MT010158	178	39	0	98	51	87	15
MT103031	178	39	0	95	54	46	16
MT103015	175	41	0	92	47	57	15
MT103043	177	38	5	92	49	62	16
MT100170	180	45	4	86	58	90	18
Mean	179	38	3	120	51	86	14.03
CV	0.55	4.10	379.00	6.03	NA	NA	NA
LSD	1.6	2.6	19.2	11.9	NA	NA	NA
PR>F	0.0001	0.0001	0.1761	0.0001	NA	NA	NA

TWT: test weight

Project Title:	Off Station Barley Evaluation – 2012
Project Leader:	Bob Stougaard
Project Personnel:	Brooke Bohannon and Tom Blake
Objective:	To evaluate barley varieties and experimental lines for agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

Heading date averaged 184 days (July 2) ranging from 181 days for Tradition and Gallatin to 188 days for Eslick. The average plant height was 37 inches, ranging from 30 inches to 51 inches. Lodging was not detected. The average yield was 98 bu/A with Champion having the highest yield at 107 bu/A, and Amsterdam was the lowest yielding at 80 bu/A. Of the 16 barley entries in the evaluation fifteen of them yielded statistically equal to Champion. Test weights averaged 52 lb/bu and ranged from 53 lb/bu to 50 lb/bu. Percent plumpness averaged 93% with a range from 99% for CDC Cowboy to 83% for Tradition.

Summary:

High spring rainfall and slightly above average growing temperatures provided an ideal growing season for barley in northwestern Montana.

Table 1. Materials and Methods - Barley off station evaluation - 2012

Seeding Date:	4/13/2012	Soil Type:	Creston SiL	Harvest Date:	8/21/2012
Seeding Rate:	80 lb/A	Soil Test:	124-18-144-30		
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	None	Insecticide:	None		

Table 1. Agronomic data from the barley off-station nursery, Kalispell MT 2012

Cultivar	Heading Julian	Height inches	Yield bu/A	TWT lb/bu	Plump %	Moisture %
Champion	183	39	107	52	97	14
Metcalf	185	39	106	52	96	14
MT010160	184	38	106	52	92	13
MT070159	183	34	103	52	94	13
Geraldine	187	35	102	52	86	14
Haxby	184	38	101	52	94	14
Hockett	182	38	99	53	90	14
Tradition	181	40	98	50	83	11
Conrad	186	33	97	52	98	14
Gallatin	181	39	96	52	89	14
MT080279	184	32	95	52	95	13
CDC Cowboy	184	51	94	53	99	13
MT070158	185	33	93	50	95	13
Eslick	188	30	92	50	91	15
Harrington	185	36	92	51	93	13
Amsterdam	185	32	80	52	96	16
Mean	184	37	98	52	93	14
CV	0.51	6.42	12.07	2.05	NA	6.33
LSD	1.6	3.9	19.6	1.8	NA	1.5
Pr>F	0.0001	0.0001	0.4631	0.0236	NA	0.0007

TWT: test weight

Project Title: Evaluation of chitosan on spring wheat performance – 2012

Principal investigator: Bob Stougaard

Project personnel: Brooke Bohannon

Objectives: Determine the effect of chitosan concentration and timing for disease and insect management in spring wheat.

Results:

Chitosan is thought to act as a signal to activate plant defense responses. This study was conducted to determine if chitosan possessed activity against either stripe rust or the orange wheat blossom midge. The study area had been planted to spring wheat the previous seven years and had a history of moderate orange wheat blossom midge densities. The soil type was a Creston silt loam, with a pH of 7.5 and an organic matter content of 4.5 percent. The site was fertilized with a blend of N-P-K-S at rates of 12-40-30-10 lb/A, respectively. Hank spring wheat was seeded on May 4 at a rate of 85 lb/A in 8-inch wide rows. Treatments were applied to 10 by 15 foot plots as a randomized complete block with three replications.

The factorial treatment design consisted of chitosan applied at five rates and two spring wheat growth stage. Chitosan was applied at 0, 0.25, 0.33, 0.50, and 1.00% v/v in 20 GPA of water using a CO_2 backpack sprayer. Applications were made at boot and 80% heading to coincide with the application timings for the control of strip rust and the orange wheat blossom midge, respectively. The boot treatments were applied on June 29 when the crop had a 30% strip rust infection level, while the headed treatments were applied on July 6 to coincide with peak adult female emergence.

Chitosan applications had no impact on stripe rust (data not presented). Further, chitosan treatments had no effect on orange wheat blossom midge densities (Table 2). Treatment differences were detected for yield and thousand kernel weight, but the response was erratic and did not appear to relate to the applied treatments. For example the 0 rate applied at boot stage produced a higher yield than the corresponding heading treatment. In all, chitosan had no effect on the agronomic performance of spring wheat.

Table 1. Materials and Methods - chitosan in spring wheat - 2012.

Seeding Date:	05/04/2012	Soil Type:	Creston SiL	Insecticide:	None
Seeding Rate:	80 lb/A	Soil Test:	292-34-228	Harvest Date:	08/24/2012
Previous Crop:	Spring Wheat	Fertilizer:	12-40-30-10-1		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	0.4" on 5/9 & 5/16				

Table 2. Effect of chitosan timing and concentration on spring wheat performance, Kalispell, 2012

Timing	Rate % v/v	OWBM no/spk	Yield bu/A	Protein %	TWT lb/bu	TKW g	FN sec
Boot	0.00	43	37	14.66	54	35	362
	0.25	69	36	14.75	54	34	361
	0.33	47	33	14.46	53	32	369
	0.50	27	33	14.20	52	32	373
	1.00	28	35	14.52	52	36	362
Headed	0.00	28	33	14.35	53	33	355
	0.25	17	31	14.35	52	34	361
	0.33	37	32	14.46	53	35	344
	0.50	57	32	14.52	52	34	350
	1.00	29	33	14.60	51	35	367
	mean	38	34	14.49	53	34	360
	CV	61	4	1.84	3	4	5
	LSD	40	3	0.457	3	2	31
	TRT Pr>F	0.2576	0.0024	0.4044	0.3649	0.0397	0.7004

OWBM: Orange wheat blossom midge, TWT: test weight, TKW: thousand kernel weight, FN: falling number.

Project Title:	Effect of fungicide rate and time of application on stripe rust control in spring wheat – 2012.
Principal Investigator:	Bob Stougaard
Project Personnel:	Brooke Bohannon
Objective:	To evaluate the effect of Stratego rate and application timing for stripe rust control in spring wheat.

Results:

The factorial treatment design consisted of Stratego applied at six rates and three application timings. Stratego rates included 0.125, 0.25., 0.50, 0.75, and 1.0X of the labeled rate (10 oz/A) as well as a non-treated control. Application timings consisted of tillering, flag leaf, and tillering plus flag leaf. The tillering treatments were applied on June 11 and the flag leaf treatments were applied on June 25 when the crop was 11 and 20 inches in height, respectively. At the same time, stripe rust infection levels were 5 and 35 percent. Stratego was applied with a backpack sprayer in 20 GPA of water to individual plots which measured 10 by 15 feet. The experimental design was a randomized complete block with three replications. The treatments were assessed for percent stripe rust infection on July 13, 2012.

Stripe rust infection levels ranged from a high of 80% in the non-treated control to a low of 14% when the 0.50X rate was applied at tillering plus flag leaf growth stages. Strip rust control did not increase much at rates above 0.50X. Indeed, application timing was more important than use rate in terms of the level of control. The poorest control was obtained when Stratego was applied at tillering. There was no difference in control between applications made at flag leaf compared to the sequential applications made at tiller plus flag leaf. These results demonstrate that applications made at flag leaf were most critical in terms of controlling strip rust. More to the point, applications made at the tillering stage were ineffective.

The tillering applications were ineffective due to rapid plant growth and the corresponding dilution effect on fungicide concentration. Crop heights increased from 11 to 20 inches within the 14 day period that separated the tillering and flag leaf application stages, respectively. The newly formed, non-treated tissue was vulnerable to infection and the corresponding negative effects on plant growth and development. The effect of application timing also was evident for grain yield, test weight, and thousand kernel weight. Stratego rate and timing had no effect on protein or falling numbers.

Table1. Material and Methods - Effect of fungcide rate and time of application on stripe rust in spring wheat - 2012

Seeding Date:	05/04/2012	Soil Type:	Creston SiL	Insecticide:	1 pt/A Lorsban
Seeding Rate:	80 lb/A	Soil Test:	292-34-228	Harvest Date:	09/04/2012
Previous Crop:	Spring Wheat	Fertilizer:	12-40-30-10-1		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	0.4" on 5/9 & 5/16				

Table 2. Effect of Stratego rate and timing on stripe rust control in spring wheat, 2012.

Application timing	Rate oz/A	SR %	Yield bu/A	Protein %	TWT lb/bu	TKW g	FN sec
Control	0.00	80	48	13.40	57	37	330
Tiller	1.25	71	55	13.14	57	36	341
Flag	1.25	42	57	13.34	58	41	319
Tiller plus flag	1.25	24	62	13.14	58	43	330
Tiller	2.50	60	60	13.14	58	42	333
Flag	2.50	19	68	13.46	59	45	302
Tiller plus flag	2.50	32	64	13.03	58	46	334
Tiller	5.00	49	60	13.31	57	37	308
Flag	5.00	19	66	13.80	59	43	317
Tiller plus flag	5.00	14	75	13.49	59	45	330
Tiller	7.50	49	63	13.29	57	38	331
Flag	7.50	28	65	13.46	58	44	325
Tiller plus flag	7.50	16	70	13.83	59	44	321
Tiller	10.00	51	56	13.06	57	39	321
Flag	10.00	18	60	13.23	59	45	310
Tiller plus flag	10.00	20	67	13.34	59	44	322
	Mean	37	62.26	13.34	57.92	41.85	323.29
	CV	26	11.75	3.06	1.7	5.41	7.19
	LSD (P=.05)	16.24	12.2	0.681	1.645	3.776	38.777
	Pr>F	0.0001	0.0222	0.4991	0.0481	0.0001	0.848

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling number

Project Title: Effect of genetic resistance and insecticide application on Orange Wheat Blossom Midge (OWBM) control.

Principal Investigator: Bob Stougaard

Project Personnel: Brooke Bohannon, Luther Talbert, and Susan Lanning

Objectives: To evaluate the interactive effects of spring wheat genetic resistance and insecticide application on orange wheat blossom midge control.

Results:

Fourteen spring wheat cultivars were screened for resistance to the OWBM. The cultivars included eight experimental lines (CAP) containing the Sm1 gene, two commercially available varieties, Hank and Reeder, and four experimental lines derived from crosses between Hank and Reeder (MQTL). The experimental design was a split plot where one set of fourteen cultivars were left untreated and another set was treated with 1 pt/A of Lorsban on July 11, when the majority of the plots were 70 percent headed.

Stripe rust was evident throughout the nursery with an average infection rate of 60 percent. CAP400-1 demonstrated the lowest rate of infection at 11% while Hank was the most susceptible variety with an infection rating of 97 percent. Hank also was the most susceptible to the orange wheat blossom midge, having 102 larvae per spike. Overall midge pressure was low this year in comparison to previous years. The average number of OWBM was only eighteen per spike. However, this number is biased since OWBM were generally not found on lines with the Sm1 gene. To be sure, the Sm1 gene was very efficacious and lines with this trait performed better than lines without it.

While the Sm1 gene resulted in almost complete mortality, the effect of the insecticide treatment was still apparent. Grain yields and falling numbers both increased when treated with Lorsban, regardless of the cultivar. This indicates that the young midge manage to cause damage to the wheat seed before the Sm1 gene can elicit its lethal effect. The data also demonstrate an inverse relationship between midge infestation and falling numbers. As midge numbers increased, falling numbers decreased (Graph 1).

Summary:

Stripe rust infection and OWBM infestation both negatively affected grain yield and quality. The use of Lorsban increased yields for Hank from 15 bu/A to 44 bu/A. Likewise, yields for CAP400-1, a Sm1 gene experimental line, increased from 52 bu/A to 75 bu/A. CAP400-1 demonstrated excellent resistance to both stripe rust and the midge.

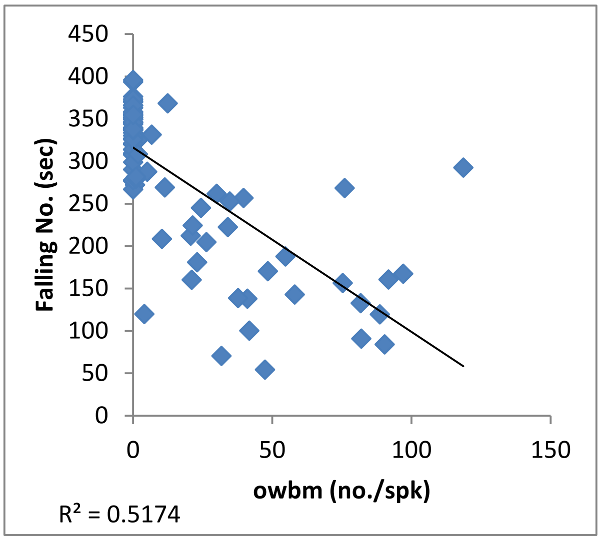
Funding Summary: Budget information to be provided by OSP. No other grant support for this project.

MWBC FY 2013 Grant Submission Plans: Resubmittal is planned.

Table 1.Material and Methods - Effect of genetic resistance and insecticide application on owbm control.

Seeding Date:	05/07/2012	Soil Type:	Creston SiL	Insecticide:	None
Seeding Rate:	80 lb/A	Soil Test:	292-34-228	Harvest Date:	09/05/2012
Previous Crop:	Spring Wheat	Fertilizer:	12-40-30-10-1		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	0.4" on 5/9 & 5/16				

Graph 1.



Graph 2.

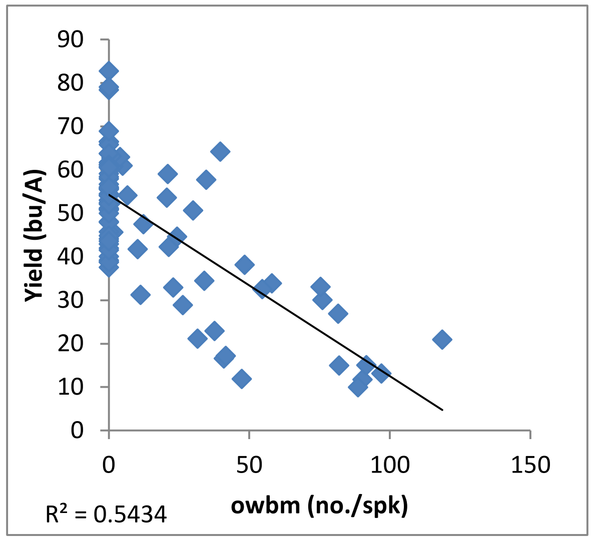


Table 1. Effect of genetic resistance and insecticide application on OWBM, 2012.

Cultivar	SR %	Height inch	Lodging %	Yield bu/A	Protein %	TWT lb/bu	TKW g	FN sec	OWBM no./spk
				Treated					
CAP34-1	89	32	11	58	12.4	62	30	353	0
CAP84-1	62	32	0	59	14.0	61	32	335	0
CAP84-2	60	33	4	58	14.1	61	32	363	0
CAP108-3	53	32	14	67	14.0	61	33	362	0
CAP197-3	65	35	31	61	12.3	60	31	345	0
CAP201-2	64	33	2	61	13.4	62	33	330	0
CAP219-3	68	34	5	56	13.0	61	31	323	0
CAP400-1	11	35	0	75	16.3	59	33	380	0
MQTL 1075	40	35	57	51	16.1	58	37	183	34
MQTL 1076	33	36	61	47	16.6	59	34	219	41
MQTL 3042	59	36	5	54	14.8	60	38	253	17
MQTL 3043	72	36	2	50	15.2	60	35	226	26
REEDER	33	37	16	56	15.5	61	36	251	18
HANK	97	31	0	44	13.3	57	39	323	10
				Nontreated					
CAP34-1	81	31	0	49	14.0	60	29	333	0
CAP84-1	68	32	0	41	15.5	59	29	320	1
CAP84-2	66	32	0	42	15.5	60	30	328	0
CAP108-3	49	31	0	51	15.1	59	31	338	0
CAP197-3	69	32	0	51	13.1	60	28	350	0
CAP201-2	72	32	0	46	14.1	60	29	303	0
CAP219-3	81	31	0	42	13.7	60	29	301	0
CAP400-1	18	33	0	52	17.8	56	27	326	0
MQTL 1075	38	34	0	20	17.6	55	33	86	54
MQTL 1076	37	35	22	25	17.8	56	30	174	51
MQTL 3042	77	35	0	27	16.4	58	37	176	34
MQTL 3043	81	34	0	20	17.4	57	33	119	65
REEDER	34	34	0	34	16.7	59	34	180	46
HANK	99	29	0	15	16.1	52	35	193	102
Mean	60	33	8	47	15.1	59	32	278	18
CV	15.31	3.83	208.39	14.69	2.30	1.26	4.04	11.70	91.88
LSD	15.0	2.1	28.0	11.2	0.57	1.2	2.1	53	27
Pr>F	0.0001	0.0001	0.0010	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight,

FN: falling number, OWBM: orange wheat blossom midge.

Project Title: Orange wheat blossom midge (OWBM) response to spring wheat varieties and insecticides

Principal Investigator: Bob Stougaard

Project Personnel: Brooke Bohannon

Objectives: To evaluate insecticide efficacy when applied to spring wheat varieties differing in susceptibility to OWBM.

Materials and Methods:

The factorial treatment arrangement consisted of three insecticide treatments and eight spring wheat varieties that varied in susceptibility to the orange wheat blossom midge (OWBM). The spring wheat varieties consisted of Brennan, Hank, Kuntz, McNeal, Reeder, Treasure, MT0802 and MT1073. The insecticide treatments included Lorsban, Warrior, and a non-treated control. The study was planted on April 13, and individual plots consisted of seven, 6-inch rows, 15 feet in length, with each variety-insecticide combination replicated 3 times in a split plot design. Warrior and Lorsban were applied on June 30 at 1.9 oz/A and 1 pt/A, respectively. Treatments were applied with a backpack sprayer in 20 GPA of water. The developmental stage for the study averaged 67% headed, but varied from 0 to 100% depending on the variety (Table 1 and 2).

The previous crop was alfalfa. The soil type was a Creston silt loam, with a pH of 7.5 and an organic matter content of 4.5 percent. The site was fertilized with a blend of N-P-K-S at rates of 138-0-75-14 lb/A, respectively. The herbicide Wolverine was applied on May 16 at 1.7 pt/A. The fungicide Headline was applied at 9 oz/A on June 21 to control stripe rust.

Results:

Wheat varieties varied greatly in susceptibility to stripe rust, despite being treated with a fungicide. Hank was the most susceptible and averaged 60%, while MT0802 demonstrated the greatest resistance with an infection level of 17 percent (Table 1). Differences in OWBM levels also were detected among varieties. MT0802 and Hank had the highest infestations while MT1073 and Treasure had the lowest populations. Although differences in midge densities were detected among varieties, the overall level of infestation was negligible and insect populations had no direct impact on grain yield or quality. As a consequence, insecticide application had no effect on any of the response variables (Table 1).

Table 1. Spring wheat response to the main effects of insecticide and variety for management of the OWBM, Kalispell, 2012.

	% head June 30	SR July 13	SR July 31	HT inches	LOD %	owbm no/spk	Yield bu/A	PRO %	TWT lb/bu	TKW g
Variety										
Brennan	100	14	30	34	0	1.44	101	13.93	60	34
Hank	93	36	60	37	1	7.30	96	13.81	57	42
Kuntz	93	14	26	34	11	2.63	98	14.00	61	33
McNeal	59	9	20	40	10	3.04	105	14.41	59	40
Reeder	84	11	27	42	40	3.11	102	14.99	60	38
Treasure	3	13	22	40	77	0.30	102	11.74	59	36
MT0802	9	10	17	42	1	11.08	96	15.43	59	44
MT1073	100	7	21	36	1	0.54	110	14.30	60	37
LSD	11	3	6	1	21	5	8.2	0.3	1.8	1.1
Insecticide										
None	74	14	29	38	14	4.20	99	13.98	59	38
Warrior	66	14	29	38	20	2.39	105	14.00	60	38
Lorsban	63	15	26	38	19	4.45	100	14.26	59	38
LSD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

head: Heading, SR: stripe rust, HT: height, LOD: lodging, OWBM: orange wheat blossom midge, PRO: protein, TWT: test weight, TKW: thousand kernel weight.

Table 2. Spring wheat response to the effects of insecticide and variety on the management of the OWBM, Kalispell, 2012.

	% head June 30	SR July 13	SR July 31	HT inches	LOD %	owbm no/spk	Yield bu/A	PRO %	TWT lb/bu	TKW g
Variety					**None**					
Brennan	100	12	33	33	0	2.90	96	13.90	61	34
Hank	88	40	70	37	0	12.10	89	13.83	56	42
Kuntz	97	14	26	33	0	2.90	95	13.87	61	33
McNeal	90	9	20	40	0	3.87	102	14.43	57	40
Reeder	93	11	25	42	32	4.43	96	15.03	60	38
Treasure	10	13	19	39	79	0.10	107	11.57	59	37
MT0802	17	8	17	42	0	7.23	92	15.03	58	44
MT1073	100	5	22	36	0	0.10	113	14.17	60	36
					Warrior					
Brennan	100	13	28	34	0	0.00	102	13.97	62	34
Hank	97	33	56	37	3	5.23	103	13.63	57	41
Kuntz	90	14	27	34	33	0.00	101	14.03	60	33
McNeal	50	8	23	40	30	2.13	111	14.17	61	41
Reeder	87	13	29	43	24	0.00	109	14.67	60	39
Treasure	0	12	25	40	61	0.23	99	11.80	59	36
MT0802	7	10	18	42	2	10.77	108	15.43	60	45
MT1073	100	6	22	37	3	0.77	110	14.27	61	37
					Lorsban					
Brennan	100	17	28	34	0	1.43	105	13.93	57	34
Hank	93	34	55	36	0	4.57	97	13.97	57	42
Kuntz	93	13	26	34	0	5.00	99	14.10	61	32
McNeal	37	8	16	38	0	3.13	101	14.63	60	40
Reeder	73	10	27	42	63	4.90	101	15.27	60	37
Treasure	0	15	22	40	90	0.57	100	11.87	59	36
MT0802	3	14	17	42	0	15.23	89	15.83	58	43
MT1073	100	8	20	36	0	0.77	109	14.47	59	37
Mean	67	14	27	38	17	3.60	101	14	59	38
CV	17	25	23	3	123	152	9	2	3	3
LSD (TMT)	19.5	6.0	10.6	1.8	35.7	9.2	14.2	0.5	3.0	1.8
Pr>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0912	0.0497	0.0001	0.0185	0.0001

head: Heading, SR: stripe rust, HT: height, LOD: lodging, OWBM: orange wheat blossom midge, PRO: protein, TWT: test weight, TKW: thousand kernel weight.

Project Title: Plant growth regulator (PGR) and insecticide effects on spring wheat agronomic performance

Principle Investigator: Bob Stougaard

Project Personnel: Brooke Bohannon

Objective: Evaluate the interactive effects of combining plant growth regulators with insecticides on spring wheat grain yield and quality.

Results:

This study was conducted to compare the effect of the PGR Cerone and the insecticide Lorsban when applied alone or in combination to spring wheat. The study area had been planted to spring wheat the previous seven years and had a history of moderate orange wheat blossom midge densities. The soil type was a Creston silt loam, with a pH of 7.5 and an organic matter content of 4.5 percent. The site was fertilized with a blend of N-P-K-S at rates of 12-40-30-10 lb/A, respectively. Hank spring wheat was seeded on May 4 at a rate of 80 lb/A in 8-inch wide rows. Headline was applied at 9 oz/A on June 21 to control stripe rust. The treatments were applied on July 6, 2012 when the crop was 80 percent headed and the average crop height was 24 inches. Treatments were applied to plot areas measuring 10 by 15 feet in 20 GPA with a backpack sprayer. The study was harvested on August 24, 2012.

All treatments reduced plant height compared to the check, but there were no differences in height among the treatments. Modest levels of the orange wheat blossom midge were present, but no treatment effects were observed. Nevertheless, the highest yields were obtained with treatments that included Lorsban. At the same time, treatments that contained Lorsban also had the highest falling numbers.

Summary:

Although there were no differences in owbm populations, treatments that included Lorsban produced the highest yields and the highest falling numbers.

Table 1. Material and Methods - plant growth regulator-insecticide - 2012

Seeding Date:	05/04/2012	Soil Type:	Creston SiL	Fungicide:	9 oz Headline + 0.25% NIS
Seeding Rate:	80 lb/A	Soil Test:	292-34-228		
Previous Crop:	Spring Wheat	Fertilizer:	12-40-30-10-1	Insecticide:	None
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine	Harvest Date:	08/24/2012
Irrigation:	0.4" on 5/9 & 5/16				

Table 2. Plant growth regulator-insecticides effects on spring wheat, Kalispell 2012

Treatment	Rate pt/A	OWBM Aug 8	Height inches	Yield Bu/A	Protein %	TWT lb/bu	TKW g	FN sec
Check	0	42	34	54.9	14	59	43	319
Lorsban	1	20	30	69.3	13	59	43	365
Cerone	0.5	17	30	53.2	14	58	41	330
Lorsban + Cerone	1 + 0.5	13	29	71.4	14	60	43	377
Mean		23	31	62	13.73	59	43	348
CV		67.54	4.98	7.72	2.36	1.62	2.11	6.23
LSD		31.2	3.1	9.6	0.60	1.9	1.8	43.2
Pr>F		0.2100	0.0314	0.0066	0.2000	0.2970	0.1723	0.0467

TWT: test weight, TKW: thousand kernel weight, FN: falling number, OWBM: orange wheat blossom midge.

Project Title: Effects of Plant Growth Regulators (PGR's) and Growth Stage (GS) on Spring Wheat Yield and Quality, 2012.

Principal Investigator: Bob Stougaard

Objective: To evaluate the effect of plant growth stage on spring wheat response to plant growth regulators.

Materials and Methods:

This study was conducted to compare the efficacy of the PGR's Cerone and Palisade when applied alone or in combination to spring wheat at five growth stages. The study area had been planted to spring wheat the previous seven years and had a history of moderate orange wheat blossom midge densities. The soil type was a Creston silt loam, with a pH of 7.5 and an organic matter content of 4.5 percent. The site was fertilized with a blend of N-P-K-S at rates of 12-40-30-10 lb/A, respectively. Hank spring wheat was seeded on May 4 at a rate of 85 lb/A in 8-inch wide rows.

The treatments were applied at jointing, flag leaf, boot, heading, and watery ripe GS's, on June 14,25, 29, July 4, and 9, respectively. Crop height at application measured 17, 20, 23, 24, and 34 inches, respectively. Treatments were applied to plot areas measuring 10 by 15 feet in 20 GPA with a backpack sprayer. Headline was applied at 9 oz/A on June 21 to control stripe rust. The study was harvested on August 31.

Results:

Both PGR's reduced plant height, but height reductions were greatest with the combination of the two products. Growth stage impacted efficacy, with the greatest height reductions being observed with applications made at the boot stage. The reduction in height was associated with corresponding delay in heading. When compared to the check, the greatest delay in heading was two days, and was associated with applications made at flag leaf stage. The combination of products resulted in a greater delay in heading then when either product was applied separately. Averaged over growth stages, Palisade and Cerone resulted in Julian heading dates of 185, while in combination resulted in an average heading date of 187 days. While height was reduced and heading was delayed, none of the treatments had any effect on midge densities or wheat yield. Yields were low, averaging only 50 bu/A. This occurred as a result of an average orange wheat blossom midge infestation of 43 larvae/spk. Yields were not affected by PGR, but GS did impact yields. The lowest yields were observed when treatments were applied at the jointing stage.

Summary:

Cerone and Palisade reduced plant height with the greatest impact being observed when treatments were applied at boot stage.

Table 1. Plant growth regulator effects on spring wheat yield and quality, 2012.

Growth stage	Height inches	Yield bu/A	Protein %	TWT lb/bu	TKW g	OWBM no./spk	Heading Julian	FN sec	moist %
Palisade									
Check	31	50	14.15	57	42	65	185	274	11
Jointing	29	51	13.60	59	43	38	186	293	11
Flag leaf	29	52	13.34	58	44	49	186	279	11
Boot	27	47	14.15	58	43	79	186	248	11
Heading	30	50	14.09	59	44	20	185	278	11
Watery ripe	30	51	13.72	59	44	53	185	276	11
Cerone									
Check	31	49	13.66	57	43	39	185	278	11
Jointing	32	47	14.40	57	43	69	185	249	11
Flag leaf	29	50	13.57	58	43	69	186	312	11
Boot	28	53	13.60	58	43	18	186	326	11
Heading	29	53	14.12	58	43	30	185	311	11
Watery ripe	30	54	14.46	58	44	24	186	312	11
Palisade + Cerone									
Check	30	47	14.72	57	41	55	185	259	11
Jointing	29	42	14.55	58	41	60	189	292	12
Flag leaf	25	49	15.01	58	41	46	190	249	12
Boot	23	48	14.23	58	40	17	188	268	12
Heading	26	51	13.57	59	42	19	186	282	11
Watery ripe	29	52	14.38	59	44	14	186	231	12
Mean	28.77	49.76	14.07	58.02	42.72	42.43	186.2	278.7	11.27
CV	3.73	8.45	5.55	1.56	4.7	75.81	0.53	14.52	5.16
LSD	1.789	7.01	1.301	1.506	3.345	53.627	1.644	67.468	0.969
TRT Pr>F	0.0001	0.2045	0.4211	0.0803	0.2634	0.2693	0.0001	0.2903	0.3417

PGR LSD	*0.73*	*NS*	*0.53*	*0.61*	*1.36*	*NS*	*0.67*	*27.40*	*0.39*
Palisade	29.4	50.3	13.84	58.3	43.6	50.7	185.7	274.6	11.1
Cerone	29.7	50.9	13.97	57.5	43.2	41.4	185.6	297.9	11.0
Palisade + Cerone	27.1	48.2	14.41	58.2	41.4	35.2	187.2	263.5	11.6

Growth stage LSD	*1.04*	*3.95*	*NS*	*0.86*	*NS*	*NS*	*0.94*	*NS*	*NS*
Check	30.6	48.5	14.17	57.1	42.2	53.0	185.1	270.4	11.0
Jointing	30.0	46.7	14.18	57.8	42.2	55.7	186.8	278.1	11.4
Flag leaf	27.6	50.2	13.97	58.0	42.6	54.6	187.3	280.1	11.2
Boot	26.3	49.4	13.99	58.0	42.0	38.0	186.7	280.4	11.4
Heading	28.3	51.2	13.92	58.5	43.2	23.0	185.4	290.2	11.3
Watery ripe	29.6	52.5	14.18	58.5	44.0	30.0	185.6	272.8	11.3

Project Title: Evaluation of Advanced Spring Wheat Experimental Lines – 2012

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon, Luther Talbert, and Susan Lanning

Objectives: To evaluate spring wheat varieties and experimental lines for agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

Stripe rust was prevalent throughout the nursery and the average percent infection increased from 36% on July 1 to 72% on July 13. Volt, CAP 400-1 and Rockland exhibited the lowest level of stripe rust infection (5, 8, and 4% respectively on July 13) while AP604 CL was the most susceptible variety with a rating of 100 percent. Heading dates averaged 181 (June 28) while plant heights averaged 34 inches. Fortuna and Thatcher were the tallest varieties (43 inches) and Jedd was the shortest (27 inches). Lodging averaged 2 percent throughout the nursery with the majority of the plots exhibiting little to no lodging. MT 1173 was the cultivar that had the greatest percent lodging (58%). Cultivars that demonstrated a high level of stripe rust resistance yielded well in 2012 but those that had a low or no resistance experienced very low yields. Yields averaged 51 bu/A, ranging from a high of 89 bu/A for Volt to a low of 16 bu/A for Jedd. Test weight averaged 58 lb/bu ranging from a high of 63 lb/bu for Volt to a low of 51 lb/bu for Hank WHT1. Protein content averaged 14.3% with CAP 400-1 having the highest at 16.2% and CAP 197-3 the lowest at 13.0 percent. The number of orange wheat blossom midge per spike was down from 2011, averaging 1.8 midge per spike in 2012 compared to 80.79 midge per spike in 2011.

Summary:

Grain yield and quality was affected by stripe rust resistance. Volt, WB Rockland and Buckpronto were the top yielding commercial varieties.

Table 1. Material and Methods - Advanced spring wheat experimental lines - 2012

Seeding Date:	4/13/2012	Soil Type:	Creston SiL	Harvest Date:	8/29/2012
Seeding Rate:	80 lb/A	Soil Test:	124-18-144-30		
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	None	Insecticide:	None		

Table 2. Agronomic data from the evaluation of advanced spring wheat experimental lines

Cultivar	SR % 7/1	SR % 7/13	Heading Julian	Height inch	Lodging %	Yield bu/A	TWT lb/bu	Protein %	OWBM no./spk
VOLT	3	5	184	34	0	89	63	14.0	3
CAP 400-1	0	8	185	37	0	83	61	16.2	0
WB ROCKLANI	0	4	178	29	0	78	59	16.1	0
MT 1172	16	26	184	36	13	76	59	15.1	1
MT 1073	16	33	180	34	0	75	61	14.4	1
BUCKPRONTO	16	60	177	34	0	75	60	14.6	0
11FX MN	25	71	178	34	0	67	61	13.1	0
MTHW1064	31	73	181	36	0	67	59	13.1	8
MTHW1057	21	61	183	37	0	64	60	13.6	15
BRENNAN	43	79	178	32	0	63	61	13.6	1
REEDER	22	50	182	40	15	63	61	14.9	0
MT 1142	32	72	181	38	0	62	60	15.5	0
MT 1118	29	62	181	33	0	61	57	14.8	1
MT 1133	34	49	184	34	0	61	60	15.4	1
FORTUNA	35	73	183	43	5	60	61	13.2	2
AGRIPR13	42	87	177	38	2	59	60	14.4	0
KELBY	47	74	178	32	0	59	61	13.7	0
MT 1166	37	70	181	38	0	59	58	14.3	0
MT 1146	32	75	182	36	5	58	59	15.1	3
WB MAYVILLE	35	74	180	32	0	58	60	14.7	0
MCNEAL	14	62	184	37	0	57	59	13.8	1
MT 1120	43	69	182	35	0	57	58	14.4	0
DUCLAIR	22	66	181	35	0	56	57	15.2	3
MT 1106	22	60	184	35	0	55	59	14.5	1
WB GUNNISON	23	64	180	34	0	54	60	13.0	0
MTHW1150	21	65	185	38	0	53	60	14.1	6
MTHW1152	28	75	177	33	0	53	56	13.9	5
VIDAWHT1	23	61	183	36	0	53	59	14.8	5
MT 1016	33	77	183	37	7	53	58	13.4	2
MT 1156	47	93	180	32	0	52	58	15.2	1
SY SOREN	42	75	182	33	0	52	59	14.1	1
VIDA	28	58	183	35	0	52	58	14.9	1

Table 2. continued

Cultivar	SR % 7/1	SR % 7/13	Heading Julian	Height inch	Lodging %	Yield bu/A	TWT lb/bu	Protein %	OWBM no./spk
CAP 197-3	53	80	184	34	3	51	58	13.0	0
MT 1168	32	78	180	34	0	51	53	15.4	0
MT 1113	37	82	178	33	0	50	56	13.0	0
WB9879CLP	40	76	181	33	0	50	58	14.3	0
MT 1164	34	85	181	33	0	50	57	15.1	1
CHOTWHT1	43	85	179	34	0	49	56	15.0	0
MT 1112	37	76	179	35	0	49	55	13.8	1
MT 1154	46	81	182	35	0	47	57	13.2	0
CAP 34-1	63	88	181	31	0	46	56	14.1	0
MT 1108	45	83	181	30	0	46	57	13.9	1
MT 1103	30	58	185	33	0	45	59	14.3	2
CORBIN	36	82	179	35	3	44	57	14.6	3
MT 1157	48	94	182	33	0	42	58	13.9	1
MT 1119	53	92	179	35	0	42	55	14.6	1
MT 1002	27	59	184	35	1	42	57	14.2	1
CAP219-3	55	85	181	32	0	42	56	13.2	0
SY TYRA	47	91	181	30	0	42	54	13.7	2
MT 1008	34	64	184	33	0	41	57	14.4	2
CHOTEAU	39	76	183	32	0	41	57	14.4	0
VANTAGE	44	66	187	34	0	41	61	15.9	8
MT 1053	40	71	182	34	0	39	56	14.8	0
MT 1173	32	74	186	37	58	35	57	14.3	5
ONEAL	58	87	183	33	0	34	56	14.2	3
MOTT	50	97	186	36	0	34	59	13.5	4
CONAN	28	77	181	35	0	33	56	14.4	0
AP604 CL	65	100	179	36	0	33	54	13.2	0
MTHW1060	52	92	177	32	0	32	53	15.9	0
HANKWHT1	72	94	179	31	0	32	51	14.3	4
MT 1007	58	93	183	31	0	30	55	14.6	0
MT 1111	50	96	178	33	0	29	50	14.1	0
THATCHER	37	92	187	43	0	27	60	13.6	11
JEDD	55	98	179	27	0	16	53	14.2	0
Mean	36	72	181	34	2	51	58	14.30	2
CV	21.00	11.00	0.50	4.00	443.00	11.00	2.00	NA	NA
LSD	12.4	13.1	1.7	2.5	12.5	9.1	2.1	NA	NA
Pr>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	NA

SR: Stripe rust, TWT: test weight, TKW: thousand kernel weight, OWBM: Orange wheat blossom midge, No./Spk: number per spike.

Project Title:	Western Regional Soft White Spring Wheat Evaluation – 2012
Project Leader:	Bob Stougaard
Project Personnel:	Brooke Bohannon, Luther Talbert, and Susan Lanning
Objective:	To evaluate soft white spring wheat varieties and experimental lines for agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

Stripe rust was prevalent throughout the nursery. The average level of infection increased from 27% on July 2 to 70% on July 31. Average heading date was 183 Julian (July 1) and the average height was 38 inches. Lodging averaged 17% and was observed primarily in four out of the fourteen varieties. Yields averaged 75 bu/A with experimental line S0900230 yielding the highest at 114 bu/A and ARS03171LS-12 being the lowest yielding at 87 lb/A. Protein averaged 12 % and ranged from 11 to 14 percent. Test weights averaged 58 lb/bu and thousand kernel weights averaged 36 grams. Falling numbers averaged 231 seconds and ranged from 312 seconds for Nick to 124 seconds for S0900317.

Summary:

The experimental lines S0900230 and S0900317 exhibited a significant level of resistance to stripe rust (Table 2) and S0900230 also yielded well at 114 bu/A. Yet, not surprisingly, falling numbers for the soft white spring wheat cultivars were less than 300 seconds for all entries except Nick.

Table 1. Material and Methods - soft white spring wheat nursery - 2012

Seeding Date:	4/13/2012	Soil Type:	Creston SiL	Harvest Date:	9/4/2012
Seeding Rate:	80 lb/A	Soil Test:	124-18-144-30		
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	None	Insecticide:	None		

Table 2. Agronomic data from the soft white spring wheat nursery - 2012

Cultivar	SR % 7/2	SR % 7/13	SR % 7/31	Heading Julian	Height inches	Lodging %	Yield bu/A	Protein %	TWT lb/bu	TKW g	FN sec
S0900230	5	6	19	184	37	2	114	13	61	39	271
S0900163	5	8	88	179	40	63	96	13	58	41	224
C0900046	5	5	46	184	36	0	85	12	59	35	184
ARS03415LS	10	24	52	178	38	0	82	14	58	38	239
IDO852	23	77	95	181	37	0	80	11	58	29	286
C0900004	5	9	49	184	37	0	79	13	59	32	151
ALTURAS	23	70	88	183	37	2	78	11	56	33	265
IDO851	28	67	88	183	36	0	75	11	58	34	263
S0900317	5	1	18	184	38	0	74	14	56	42	124
IDO854	23	72	89	183	38	0	74	12	58	39	215
LOUISE	23	49	63	184	40	63	67	13	56	42	220
ALPOWA	80	77	93	184	37	29	56	12	58	34	282
NICK	90	93	98	180	33	0	48	12	53	27	312
ARS03171LS-12	53	83	94	185	41	87	44	13	56	37	204
Mean	27	46	70	183	38	17	75	12.43	58	36	231
CV	14.26	13.14	9.13	0.38	3.26	107.19	8.54	2.82	2.46	4.84	8.22
LSD	6.5	10.1	10.7	1.2	2.1	31.4	10.8	0.60	2.4	2.9	31.9
Pr>F	0	0	0	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling number

Project Title: Wild Oat Herbicide Screening Trial - 2012

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon

Objective: To evaluate the effects of herbicides on wild oat control in spring wheat.

Results:

Four herbicide treatments were compared to evaluate the consistency of wild oat control. The experimental design was a randomized complete block with three replications. Buckpronto spring wheat was planted at a rate of 80 lb/A on April 16th. Wild oats were seeded into the center of each plot on April 23 at a rate of 60lb/A. Herbicide treatments were applied on May 19th when the wild oats were in the 2.5 to 3 leaf stage and approximately 4 inches tall. Crop height was 7 inches and the growth stage ranged from 4 leaf to two tillers.

Minor crop injury was observed with all treatments but symptoms diminished by July 5th (Table 2). All herbicide treatments evaluated provided 88% wild oat control or greater, with Wolverine being the least effective treatment. Although differences in wild oat control were noted among the treatments, no differences were observed in yield.

Summary:

All herbicide treatments provided excellent control of wild oats in spring wheat.

Table 1. Material and Methods - wild oat herbicide evaluation - 201

Seeding Date:	4/16/2012	Soil Type:	Kalispell vf SL	Insecticide:	None
Seeding Rate:	80 lb/A	Soil Test:	57-12-110-42	Harvest Date:	8/20/2012
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14 broadcast,		
Tillage:	Conventional		12-40-0-10 with seed		
Irrigation:	None	Herbicide:	None		

Table 2. Herbicide evaluation for wild oat control in spring wheat, Kalispell MT 2012

		Crop Injury			Wild oat control		Dockage	Yield	TWT
Treatment	Rate	5/31	6/7	7/5	6/7	7/5	%	bu/A	lb/bu
Untreated		0	0	0	0	0	5	43	57
Rimfire Max	3 OZ/A	33	0	0	53	97	1	97	59
Huskie	11 FL OZ/A								
MSO	1.5 PT/A								
Rimfire Max	3 OZ/A	23	3	0	57	97	1	98	59
Huskie	11 FL OZ/A								
QUAD 7	1 % V/V								
Wolverine	27.4 FL OZ/A	27	6	0	92	88	1	97	59
Huskie Complete	13.7 FL OZ/A	23	0	0	43	98	1	97	59
AMS	0.5 LB/A								
Mean		21	2	0	49	76	1	86	59
CV		21.18	182.29	0.00	21.96	1.63	0.93	5.15	0.76
LSD		8.5	6.2	0.0	20.3	2.3	0.0	8.4	0.8
Pr>F		0.0002	0.2070	1.0000	0.0001	0.0001	0.0017	0.0001	0.0018

TWT: test weight

Project Title: Fungicide Evaluation in Winter Wheat – 2012

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon

Objective: To evaluate fungicides for stripe rust control and yield response in winter wheat.

Results:

Three registered broad spectrum fungicides (Stratego YLD, Prosaro 421 and Headline) were evaluated for their efficacy against stripe rust as well as their effect on grain yield and quality in "Norris" winter wheat.

Fungicide treatments were applied on June 3 when winter wheat was in the boot stage and flag leaf stripe rust infection averaged 10 percent. Treatments were applied with a CO_2 backpack sprayer in 20 GPA of water using 11002 flat fan nozzles. Plots measured 10 by 15 feet and the study was established as a randomized complete block design with three replications.

No crop injury was observed at one week after application. At one month after application, stripe rust infection ranged from a low of 11% to a high of 97 percent (Table 2). All fungicide treatments reduced stripe rust infection levels relative to the untreated check. There were no differences in control among fungicides on July 1, but by July 12, the high rate of Prosaro provided significantly better control compared to the low rate of Stratego YLD.

Yields ranged from a low of 51 bu/A for the untreated control, to a high of 100 bu/A for the low rate of Prosaro 421. All fungicides improved yields relative to the untreated check. When making comparisons among the fungicide treatments, grain yields were significantly lower for the high rate of Prosaro and the low rate of Stratego YLD. As yields increased, protein content decreased. As a consequence the highest protein content was found with the untreated control. All fungicide treatments improved test weight and thousand kernels weight as compared to the untreated control, but there were no significant differences in falling number values among any of the treatments.

Table 1. Material and Methods - Fungicide evaluation in winter wheat

Seeding Date:	09/15/2011	Soil Type:	Creston SiL	Harvest Date:	08/07/2012
Seeding Rate:	85 lb/A	Soil Test:	174-48-268-120		
Previous Crop:	Fallow	Fertilizer:	PP 10-35-90-8.5-0.85/TD 100-0-0		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	None	Insecticide:	None		

Table 2. Effect of fungicides on stripe rust control and yield in winter wheat, Kalispell MT 2012

Treatment	Rate	CI %	SR 7/1	SR 7/12	Yield bu/A	Protein %	TWT lb/bu	TKW g	FN sec
Untreated		0	97	97	51	13.9	49	26	409
Stratego YLD	2 FL OZ/A	0	22	43	82	12.7	57	34	369
Stratego YLD	4 FL OZ/A	0	20	33	91	12.5	59	37	383
Prosaro 421	5 FL OZ/A	0	28	28	100	12.1	57	39	388
Prosaro 421	6.5 FL OZ/A	0	11	17	89	12.6	59	37	392
Headline	6 FL OZ/A	0	25	35	91	12.7	58	37	378
Mean		0	34	42	84	12.7	56	35	387
CV		0	29.29	29.27	6.05	2.62	3.94	4.47	6.20
LSD		0	18.3	22.4	9.2	0.6	4.0	2.8	43.6
Pr>F		1	0.0001	0.0002	0.0001	0.0013	0.0018	0.0001	0.4689

CI: crop injury, SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling numbers

Project Title: Stripe rust response to winter wheat varieties and fungicides

Principal Investigator: Bob Stougaard

Project personnel: Brooke Bohannon

Objectives: To evaluate fungicide efficacy when applied to winter wheat varieties differing in susceptibility to stripe rust.

Materials and Methods:

The factorial treatment arrangement consisted of three fungicide treatments and seven winter wheat varieties that varied in susceptibility to stripe rust (*Puccinia striiformis tritici*). The fungicide treatments included Priaxor, Prosaro, Twinline plus a non-treated control. The winter wheat varieties consisted on Decade, Eddy, Jagalene, Paladin, Tucson, Whetstone, and Yellowstone. Individual plots consisted of seven, 6-inch rows, 15 feet in length, with each variety-fungicide combination replicated 3 times in a split plot design. Fungicide treatments were the whole plot effect and the varieties were the sub-plot factor.

The study site was a conventionally tilled field that had been fallowed during the previous year. The soil was a Creston silt loam (25-50-25/ S-Si-C) with an organic matter content of 4%, a C.E.C of 20, and a pH of 7.5. A preplant application of 10-35-90-8.5 lb/A of N-P-K-S was applied on September 15, 2011, and the wheat varieties were planted 1.5 inches deep on September 24, 2011 at a rate of 80 lb/A. A topdress application of nitrogen and sulfur (100-0-0) was applied on April 17, 2012.

Priaxor, Prosaro and Twinline were applied at 4.0, 6.5, and 9.0 oz/A, respectively on June 1 when the plants were in the flag leaf stage and ranged from 23 to 27 inches in height. The infection level was light and ranged from 0 to 20 percent of the leaf tissue. Treatments were applied with a non-ionic surfactant at 0.125% v/vi n 20 GPA of water using a backpack sprayer equipped with Tee Jet 11002 nozzles. The study was harvested on August 14. Yield and quality variables were then determined.

Results:

Wheat varieties varied greatly in susceptibility to the disease. On July 1, the most resistant variety was Yellowstone, which had overall infection levels of 40 percent (Table 2). In contrast, Decade (99%) was the most susceptible variety. However, by the July 30 rating, all non-treated varieties had been completely overtaken by stripe rust. The effect of the disease was so severe that infection level impacted plant height. Averaged over varieties, plant height was reduced by 2 to 3 inches (Table 1).

All three fungicides reduced the incidence of stripe rust, regardless of the level of resistance expressed by the individual cultivar. However, Priaxor was the least efficacious. While fungicide reduced the incidence of stripe rust, it did not change the relative ranking of the wheat cultivars. These results demonstrate that stripe rust management requires the use of resistant varieties as well as fungicide applications.

Table 1. Winter wheat response to the main effects of fungicide and variety for strip rust control, 2012.

	% SR June 7	% SR July 1	% SR July 12	% SR July 30	heading Julian	Height inch	lodging %	Yield bu/a	Protein 12 %	TWT 13%	TKW 13%	FN sec	moist %
Fungicide													
Control	6	77	88	99	167	41	0	57	14.10	53	26	408	11
Priaxor	5	25	32	58	165	43	0	100	13.63	57	33	358	12
Prosaro	4	17	19	79	166	43	0	107	13.92	58	34	369	12
Twinline	7	16	16	54	166	44	0	111	13.93	58	35	361	12
LSD	NS	7.25	10.07	13.09	0.65	1.00	NS	2.00	0.15	0.72	1.11	15.85	0.33
Variety													
Decade	5	45	48	83	165	42	0	54	16.05	46	22	429	10
Eddy	2	33	35	55	166	42	0	81	13.97	58	35	338	12
Jagalene	6	36	40	68	165	44	0	98	13.41	58	35	369	11
Paladin	3	36	40	66	167	41	0	88	13.59	58	32	379	13
Tucson	18	41	44	75	166	44	0	103	13.07	59	37	379	11
Whetstone	2	25	34	81	163	41	0	109	14.42	58	30	404	10
Yellowstone	2	22	30	78	170	46	1	122	12.74	59	34	321	14
LSD	2.91	5.24	5.82	8.04	0.93	1.00	0.58	4.00	0.19	0.61	1.07	11.94	0.28

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling number, Moist: grain moisture.

Table 2. Winter wheat response to the interactive effects of fungicide and variety on strip rust control, 2012.

	% SR June 7	% SR July 1	% SR July 12	% SR July 30	heading Julian	Height inch	lodging %	Yield bu/a	Protein 12 %	TWT 13%	TKW 13%	FN sec	moist %
						Control							
Decade	9	99	100	100	166	38	0	7	17.01	41	15	479	10
Eddy	2	87	99	99	166	42	0	41	14.09	53	26	377	10
Jagalene	6	85	95	99	166	42	0	59	13.52	52	26	389	10
Paladin	3	88	92	98	169	38	0	45	13.58	53	25	402	11
Tucson	18	78	79	99	166	43	0	74	13.11	57	30	413	11
Whetstone	1	65	85	99	163	40	0	81	14.63	55	26	433	10
Yellowstone	2	40	68	99	170	44	0	90	12.74	57	30	363	12
						Priaxor							
Decade	3	32	53	85	164	42	0	48	15.72	44	20	415	10
Eddy	2	20	24	37	165	43	0	90	13.74	59	37	317	12
Jagalene	5	32	33	62	165	44	0	105	13.06	60	35	358	11
Paladin	3	30	36	50	167	41	0	95	13.37	59	33	367	14
Tucson	15	37	41	53	164	44	0	112	12.83	60	39	363	11
Whetstone	1	11	20	65	163	41	0	116	14.06	59	32	392	11
Yellowstone	2	13	16	52	170	46	1	132	12.60	60	37	296	15
						Prosaro							
Decade	4	23	21	95	165	42	0	78	15.67	51	27	418	10
Eddy	3	9	10	52	166	42	0	94	13.92	59	37	322	12
Jagalene	4	16	23	69	165	45	2	112	13.60	60	37	371	11
Paladin	2	11	15	67	166	42	0	103	13.74	59	35	379	14
Tucson	14	25	30	83	166	45	0	115	13.14	59	39	382	11
Whetstone	2	15	15	94	163	41	0	116	14.49	58	31	400	10
Yellowstone	3	20	21	91	170	47	1	130	12.86	60	35	313	15
						Twinline							
Decade	3	26	20	52	165	45	0	81	15.81	50	25	405	10
Eddy	3	14	7	32	165	43	0	99	14.12	59	39	334	12
Jagalene	10	12	11	43	165	44	0	115	13.46	61	39	358	11
Paladin	5	13	17	49	167	42	0	109	13.66	60	35	368	15
Tucson	24	25	24	65	166	45	0	113	13.20	60	39	357	11
Whetstone	3	11	17	66	162	43	0	121	14.49	59	33	391	11
Yellowstone	1	14	16	72	170	46	2	138	12.77	60	36	311	15
LSD	NS	10.48	11.63	16.08	NS	2.00	NS	9.00	0.37	1.21	2.15	NS	0.55

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight, FN: falling number, Moist: grain moisture.

Project Title: Evaluation of Clearfield Winter Wheat Cultivars for Herbicide Tolerance - 2012

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon, Phil Bruckner and Jim Berg

Objective: To evaluate experimental lines for herbicide tolerance and agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

The factorial treatment design consisted of three herbicide treatments and 7 herbicide-tolerant winter wheat lines (Table 2). The three herbicide treatments consisted of a non-treated control, and Beyond applied at the 2X rate (12 oz/A) with either MSO or NIS adjuvants. Treatments were applied on April 17 with a backpack sprayer in 20 GPA of water to individual plots which measured 4 by 15 feet. The experimental design was a split plot with three replications, where herbicide treatments represented the whole plot factor and experimental lines were the sub-plot effect. The treatments were assessed for herbicide injury on May 8th and the 22nd. Heading was recorded when 50 percent of the plants in a plot had half the head exposed. Height measurements and lodging were recorded near maturity. Stripe rust ratings were taking on July 1st and the 12th.

All wheat lines demonstrated excellent herbicide tolerance. Towards that end, none of the measured variables showed any response to the main effect of herbicide. Concurrently, crop injury rates were minor and no differences were observed among wheat lines. Nevertheless, difference did exist among the wheat lines for all remaining variables.

The average heading date was 168 (June 17). MTCL1133 and MTCL1127 had the latest (171) and earliest (164) heading dates, respectively. Stripe rust was prevalent throughout the nursery and none of the material evaluated displayed resistance to the disease. The average infection level for the nursery on July 12 was 69 percent. MTCL1127 recorded the highest infection level at 98 %, while AP503 CL2 had the lowest infection level (54%) for the nursery. Plant height averaged 44 inches and ranged from a high of 47 inches for MTCL1067 to a low of 39 inches for AP503CL2. Lodging was prevalent throughout the nursery and averaged 44 percent. Lodging ranged from 79 5 for MTCL1133 to 0 for MTCL1127. Overall yields were low due to the combined effect of stripe rust and lodging, and averaged only 57 bu/A. MTCL1131 had the highest yield at 83 bu/A while MTCL1127 had the lowest yield at 83 bu/A. In summary, while the lines appear to have adequate herbicide tolerance, the utility of these materials is limited by excessive plant height, lodging and the lack of stripe rust resistance.

Table 1. Material and Methods - Winter Wheat Clearfield Qualification - 2012

Seeding Date:	9/24/2011	Soil Type:	Creston SiL	Harvest Date:	8/13/2012
Seeding Rate:	80 lb/A	Soil Test:	None		
Previous Crop:	Fallow	Fertilizer:	PP 10-35-90-8.5-0.85/ TD 100-0-0		
Tillage:	Conventional	Herbicide:	None		
Irrigation:	None	Insecticide:	None		

Winter Wheat Clearfield Qualification, Kalispell, MT - 2012.

Treatment	Yield	Test weight	% Injury rating day15	% Injury rating day30	Heading date	Plant height	Stripe Rust % 1-Jul	Stripe Rust % 12-Jul	Lodging
	- bu/a -	- lb/bu -				- in -			- % -
Herbicide									
0X	54.8	55.4	0.0	0.0	168.7	44.0	51.1	66.8	48
2XMSO	58.8	55.2	0.0	0.0	168.7	44.0	56.9	70.1	42
2XNIS	57.6	55.0	2.6	0.5	168.0	43.6	51.6	70.5	42
Rate PLSD (0.05)	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**	**ns**
Rate CV%	**15.0**	**1.5**	**306**	**628**	**0.5**	**3.5**	**17.1**	**17.2**	**41.9**
Experimental line									
AP503 CL2	53.7	**59.1****	2.2	0.9	165.8	39.1	41.1	53.9	66
MTCL1067	52.6	55.1	1.1	0.0	168.3	46.9	56.7	72.0	44
MTCL1077	56.4	55.4	0.0	0.0	169.8	46.1	55.3	72.2	43
MTCL1127	41.8	48.7	0.6	0.0	164.4	40.3	74.8	98.1	**0****
MTCL1131	**82.9****	57.5	0.0	0.0	170.0	46.7	43.3	58.3	**13***
MTCL1132	59.6	55.5	0.0	0.0	169.8	44.8	48.9	64.4	63
MTCL1133	52.6	55.0	2.2	0.2	171.2	43.3	52.2	65.0	79
ID PLSD (0.05)	**9.1**	**0.8**	**ns**	**ns**	**0.8**	**1.5**	**8.9**	**10.7**	**18.0**
ID CV%	**16.8**	**1.6**	**317**	**628**	**0.5**	**3.5**	**17.7**	**16.4**	**43.3**
Grand Mean	**57.1**	**55.2**	**0.9**	**0.2**	**168.5**	**43.9**	**53.2**	**69.1**	**44.0**

No Rate*ID interactions for all dependent variables, except Yield (P = .0482).

Project Title: Evaluation of Winter Wheat Cultivars for Agronomic Performance - 2012.

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon, Phil Bruckner, and Jim Berg

Objective: To evaluate winter wheat varieties and experimental lines for agronomic performance and disease resistance in environments and cropping systems representative of northwestern Montana.

Results:

Average percent stripe rust infection increased from 36% on June 7 to 71% on July 1 (Table 2). Promontory had the lowest level of stripe rust at 3% on July 1. The average days to heading was 181 (June 29) and the average height was 34 inches. Lodging averaged 2% throughout the nursery, but ranged from 0 to 86 percent. The average yield was 51 bu/A with Promontory yielding the highest at 107 bu/A and Carter and Decade yielding the lowest at 10 bu/A. Test weights averaged 58 lb/bu and thousand kernel weight averaged 25 grams.

Summary:

Stripe rust infection had a negative impact on yields and grain quality. Promontory, Radiant and Yellowstone were the top yielding commercially available varieties.

Table 1. Material and Methods - intrastate winter wheat nursery - 2012

Seeding Date:	9/24/2011	Soil Type:	Creston SiL	Harvest Date:	8/14/2012
Seeding Rate:	80 lb/A	Soil Test:	None		
Previous Crop:	Fallow	Fertilizer:	PP 10-35-90-8.5-0.85/ TD 100-0-0		
Tillage:	Conventional	Herbicide:	1.7 pt/A Wolverine		
Irrigation:	None	Insecticide:	None		

Table 2. Agronomic data from the intrastate winter wheat nursery, Kalispell MT 2012

Cultivar	SR % 6/7	SR % 7/1	Heading Julian	Height inch	Lodging %	Yield bu/A	Protein %	TWT lb/bu	TKW g
Promontory	1	3	166	45	11	107	13.6	60	28
MTW08168	3	21	172	48	22	98	14.7	59	28
MT08172	5	17	170	44	0	95	14.4	59	33
Radiant	3	22	170	48	0	86	14.4	59	34
Yellowstone	3	41	170	44	0	86	15.1	57	30
MT1092	8	27	170	44	12	85	14.4	57	37
MT10116	4	30	171	42	0	84	14.8	57	26
MT1090	6	32	168	44	0	84	14.5	57	29
MT1088	8	28	169	41	0	79	14.8	58	31
MTS0808	1	26	168	39	53	77	16.4	59	30
MTCL1077	2	37	168	44	0	77	15.5	56	29
MT1156	11	40	170	43	33	75	15.2	56	29
MT1091	4	50	169	43	0	74	15.3	55	25
MT1105	4	55	169	42	0	73	15.1	55	26
Curlew	3	28	165	44	61	73	15.8	58	32
MTS0819-98	3	11	169	38	32	73	16.4	54	28
WB-Quake	13	67	171	41	29	70	16.0	57	21
MTS1024	2	30	169	40	0	67	16.6	57	33
Jagalene	10	72	166	42	12	64	14.8	56	29
MT1078	5	39	167	42	0	63	16.6	56	33
SY Wolf	0	37	164	43	0	60	17.2	53	26
MT0978	8	36	170	41	3	60	16.9	54	27
Judee	2	26	167	41	27	59	16.9	52	28
MTCL1067	1	50	167	46	34	55	16.2	54	30
Peregrine	5	83	171	48	0	54	13.6	59	26
MT1155	13	74	169	41	86	51	16.8	53	27
MT0871	16	40	172	43	0	50	17.3	52	26
Robidoux	27	57	164	42	38	48	15.9	49	21
Bynum (CL)	1	63	164	46	55	48	16.0	58	29
AP 503 CL2	12	48	167	40	8	48	15.8	55	30
Rampart	0	90	171	43	62	47	16.5	59	31
Art	3	83	162	41	0	46	16.3	47	19
Ledger	6	96	165	40	0	44	14.9	56	23
CDC Falcon	21	96	167	39	0	39	15.0	51	18
Pryor	43	88	172	36	0	36	15.5	57	23

Table 2. continued

Cultivar	SR % 6/7	SR % 7/1	Heading Julian	Height inch	Lodging %	Yield bu/A	Protein %	TWT lb/bu	TKW g
MTS0819	3	63	169	40	0	36	16.7	48	20
Norris (CL)	5	93	163	45	0	29	17.2	45	19
Bearpaw	16	75	168	39	26	27	19.0	51	18
Accipiter	17	97	172	40	1	24	14.7	53	20
MTS0826	3	95	169	44	0	24	17.0	51	21
MTS0832	2	95	170	41	0	21	16.4	52	23
McGill	70	90	166	40	0	20	16.0	47	21
Overland	23	98	165	44	0	16	17.5	43	17
Genou	5	95	171	42	22	16	18.3	50	18
Jerry	24	94	171	45	0	16	15.8	49	21
MT10113	13	98	164	39	0	13	18.6	48	19
Broadview	48	99	171	39	0	12	16.2	50	20
Carter	28	98	169	35	0	10	18.6	48	17
Decade	18	96	165	40	0	10	17.7	44	19
Mean	11	60	168	42	13	53	16.00	54	25
CV	61.80	23.80	0.88	3.57	146.00	16.60	NA	3.10	NA
LSD	10.9	23.1	2.4	2.4	30.3	14.3	NA	2.7	NA
Pr>F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA

SR: stripe rust, TWT: test weight, TKW: thousand kernel weight

FORAGES

Project Title:	Alfalfa fungicide evaluation
Principal Investigator:	Bob Stougaard
Project Personnel:	Brooke Bohannon
Objective:	Compare commercially available fungicide products for disease management and forage quality

Results:

This study was conducted in an alfalfa field that had been established in 2010. The soil was a Creston silt loam (25-50-25/ S-Si-C) with an organic matter content of 4%, a C.E.C of 20, and a pH of 7.5. The study was established as a randomized complete block with three replications. The fungicide treatments include Headline, Endura, Pristine and Priaxor. Treatments were applied April 25 when the crop was about 6 inches in height. Treatments were applied to plot areas measuring 10 by 15 feet in 20 GPA with a backpack sprayer. Treatments were evaluated for height, percent senescence and percent sclerotinia infection on July 4, 2012. First cutting yields were also the same day. An alfalfa subsample was taken from each plot and placed in a drying room for three days. Samples were then analyzed for relative feed value (RFV).

Sclerotinia was observed, but a low infection levels. As a result, no differences were observed among the treatments.

Table 1. Agronomic data for the alfalfa fungicide trial, Kalispell MT 2012

Treatment	Rate FL OZ/A	Yield T/A	RFV	Height inches	Senescence %	Sclerotinia %
Check		3.8	123.33	43	37	13
Headline	6	3.2	128.67	44	34	10
Endura	6.5	3.5	132.33	45	38	12
Pristine	12	3.4	128.67	46	44	4
Priaxor	4	3.7	133.33	46	32	9
Mean		4	129	45	37	10
CV		9.02	6.53	3.90	43.46	105.88
LSD		0.6	15.9	3.3	30.2	19.1
Pr>F		0.2506	0.6426	0.2972	0.8974	0.8570

RFV: relative feed value

Project Title: White Cockle Control – 2012

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon

Objective: To evaluate herbicides for the control of white cockle in an alfalfa – orchardgrass hay field.

Results:

Raptor, Butyrac, Chateau and Karmex were either applied alone or in combination with Velpar for the control of white cockle. Raptor, Butyrac and Chateau were applied on October 17, 2011, when both white cockle and forages were 3 to 7 inches in height, while Karmex and Velpar were applied on November 2, 2011 as dormant applications. Treatments were evaluated for percent control on June 14, 2012.

None of the herbicides were effective in controlling white cockle, and statistically there were no differences between any of the treatments (p=0.17). Nevertheless, the dormant application of Velpar plus Karmex afforded the greatest level of suppression. Further, white cockle stands tended to be less where Velpar had been applied. In contrast to white cockle control, significant differences were observed among herbicide treatments for the control of orchardgrass. Raptor caused the greatest stand reductions. However, orchardgrass stands also were reduced where Velpar had been applied.

Summary:

None of the herbicides evaluated were effective in controlling white cockle. However, Raptor and Velpar reduced orchardgrass stands.

Table 1. Effect of herbicides on white cockle and orchardgrass control.

Treatment		Rate	White cockle % control	Orchardgrass % control
Check			0	0
Raptor	5	FL OZ/A	0	98
Raptor	5	FL OZ/A	20	95
Velpar	5	PT/A		
Butyrac	2	QT/A	20	0
Butyrac	2	QT/A	20	62
Velpar	5	PT/A		
Chateau	4	OZ/A	0	0
Chateau	4	OZ/A	13	62
Velpar	5	PT/A		
Karmex	2	LB/A	7	0
Karmex	2	LB/A	37	50
Velpar	5	PT/A		
Velpar	5	PT/A	10	33
		Mean	13	40
		CV	125.56	61.2
		LSD	27.28	41.89
		Pr>F	0.1712	0.0001

OILSEEDS

Project Title: Sclerotinia management in Canola

Project Leader: Bob Stougaard

Project Personnel: Brooke Bohannon and John Josephsen

Objective: To evaluate the effects of varietal resistance and fungicide application on sclerotinia control in canola.

Results:

The factorial treatment arrangement consisted of two Roundup resistant canola varieties (DeKalb 30-42 and Pioneer 45H29) and two fungicide treatments (none and Endura). The two varieties of canola were seeded on May 3rd using a Great Plains disk drill at a rate of 4 lb/A. Plots were about one half acre in size and measured 24 by 1000 feet. Endura was applied at 6 oz/A with a hi-boy sprayer when the crop was at 50% bloom (DeKalb on July 2nd and Pioneer on July 5th). The study was swathed then combined two weeks later (table 1).

Significant agronomic differences were observed between varieties (Table 2). DeKalb 30-42 flowered earlier, was shorter, lodged less and had a lower plant density. However, differences in population can be attributed to the variation in seed size between the DeKalb and Pioneer varieties (72,000 and 112,555 seeds/lb, respectively).

Sclerotinia infection levels were low due to hot and dry conditions during July and August. Nevertheless, differences in infection levels were observed among the treatments. DeKalb 30-42 was more susceptible to sclerotinia then Pioneer 45H29 (15% and 7% respectively). In addition, applications of Endura reduced sclerotinia infection levels in both varieties. Averaged over varieties, infection levels ranged from 11% in the untreated to 1% when treated with Endura. In the DeKalb variety, Endura reduce infection levels from 15% in the untreated to 2%, while infection levels were reduced from 7% to 0% in the Pioneer variety. The use of Endura had no significant effect on lodging, yield, test weight or thousand kernel weights. However, applications of Endura did result in higher canola biomass relative to the check. This effect on biomass was most apparent with the Pioneer variety.

Table 1. Material and Methods - Sclerotinia management in canola- 2012

Seeding Date:	5/3/2012	Soil Type:	Kalispell vf SL	Fungcide:	Endura 6 oz/ac
Seeding Rate:	4 lb/ac	Soil Test:	80-40-380-168	Harvest:	Swathed 8/13-14
Previous Crop:	Spring wheat	Fertilizer:	100-85-90-10		Combined 8/27-28
Tillage:	Conventional	Herbicide:	1 pt/A Cornerstone		
Irrigation:	None	Insecticide:	None		

Table 2. Sclerotinia management in canola, Kalispell MT 2012

		Flowering Julian	Height inches	Lodging %	Stand no/sqft	Biomass lb/ac	Sclerotinia %	Yield bu/A	TWT lb/bu	TKW g
Variety										
DKL30-42		184	45	13	9	372	8	62	48	5
Pioneer 45H29		186	58	46	13	479	3	60	49	4
LSD		1.1	4.2	17.3	3.7	NS	4.2	NS	NS	0.23
Fungicide										
Untreated		185	52	30	11	407	11	60	49	4
Endura		185	52	29	11	445	1	63	49	4
LSD		NS	NS	NS	NS	26.8	3.2	NS	NS	NS
Variety x Fungicide										
DKL30-42	Untreated	184	46	15	10	371	15	61	48	5
DKL30-42	Endura	184	45	11	9	373	2	63	49	5
Pioneer 45H29	Untreated	186	58	46	13	442	7	59	49	4
Pioneer 45H29	Endura	186	58	47	14	516	0	62	49	4
Mean		185	52	30	11	426	6	61	49	4
LSD		NS	NS	NS	NS	37.9	4.5	NS	NS	NS

TWT: test weight, TKW: thousand kernel weight

Project Title: Statewide Canola Variety Trial - 2012

Project Leader: Brooke Bohannon

Project Personnel: Bob Stougaard

Objective: To evaluate canola varieties for agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

This year's canola variety trial consisted of one industrial rapeseed,' Gem', and eleven canola varieties. The average day to 50% flowering was 76 days or June 28th (Table 1). There were significant differences in canola height with the average height being 52 inches. Heights ranged from 51 inches ('DKL 30-03' and 'HyClass 955') to 58 inches ('HyClass 988'). There were no significant differences in shatter, lodging or test weight. Canola yields averaged 2,214 lb/A and ranged from 1,394 lb/A for Gem to 2,575 lb/A for 'InVigor L150'. Seven of the 12 varieties yielded statistically equal to the highest yielding variety,' InVigor L150'. Oil Yield averaged 1,046 lb/A, and ranged from 648 lb/A (Gem) to 1,223 lb/A ('DKL 70-07').

Fatty acid constituents are presented in Table 2. Table 3 summarizes yields by entry from 2009 – 2012. The four year canola yield average for NWARC is 2,171 lb/A. In 2012 the average canola yield was 2,214 lb/A.

Future Plans:

With continued support from both industry and research center personnel, the trial will continue in order to identify varieties suitable to northwestern Montana.

2012 Montana Statewide Canola Variety Trial at Northwestern Agricultural Research Center, Kalispell, MT.

Seeding Date:	4/11/2012	Soil Type:	Kalispell Sandy Loam	Harvest Date:	8/21/2012
Seeding Rate:	6.5 lb/A 6" rows	Soil Test:	57-6-55-42 pH 7.1		
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14 spring application		
Tillage:	Conventional	Herbicide:	NA		
Irrigation:	None	Insecticide:	NA		

Table 13. Performance of canola varieties tested at Kalispell, MT, 2012.

Variety	Flowering Days	Stand no/sqft	Height inches	Shatter %	Lodging %	Yield lb/A	TWT lb/bu	Oil Content %	Oil Yield lb/A	Protein Content %
DKL 30-03	75	7	51	1	0	2107	49	48.0	1011	23.2
DKL 30-42	76	3	46	0	0	1611	49	46.8	757	24.1
DKL 51-45	74	8	49	1	3	1896	47	47.1	893	23.3
DKL 55-55	75	8	53	0	1	**2462**	49	47.6	1172	23.4
DKL 70-07	77	7	53	0	0	**2552**	49	47.9	1223	23.2
HyCLASS 955	75	9	51	0	1	**2197**	49	47.6	1045	23.2
HyCLASS 947	76	6	54	0	5	**2359**	49	48.6	1146	22.6
HyCLASS 988	77	10	58	0	0	**2430**	49	46.7	1136	23.8
Gem[1]	76	9	45	1	5	1394	48	46.3	648	24.3
InVigor L130	75	6	53	0	0	**2528**	48	46.3	1172	24.2
InVigor L150	77	7	54	0	3	<u>**2575**</u>	49	47.1	1211	23.9
InVigor L120	75	5	53	0	1	**2457**	48	46.5	1142	24.5
Mean	76	7	52	0.3	1	2214	48	47.2	1046	23.6
CV	1.7	30.7	3.3	NA	NA	12.8	3.3	1.25	13.1	1.52
LSD	1.9	3.1	2.5	1.80	5.6	406.9	2.3	0.85	197.2	0.52
Pr>F	0.0145	0.0040	<.0001	0.6077	0.5431	<.0001	0.7308	<.0001	<.0001	<.0001

Yields and test weights adjusted to 8% moisture.

Oil yield and protein content presented on a dry matter basis.

<u>**Bold**</u> indicates highest yielding variety. **Bold** indicates varieties yielding equal to hightest yielding variety.

[1] industrial rapeseed

TWT: test weight, NA denotes data not available or not observed.

Table 2. Fatty acid constituents of oil from canola varieties tested in the Montana Statewide Canola Variety Trial at NWARC, Kalispell, MT - 2012

Variety	Palmitic Acid C16:0	Stearatic Acid C18:0	Oleic Acid C18:1	Linoleic Acid C18:2	α-Linolenic Acid C18:3
DKL 30-03	3.8	2.3	68.6	18.8	8.7
DKL 30-42	4.1	2.3	64.8	18.5	8.9
DKL 51-45	4.1	2.3	66.0	19.9	9.5
DKL 55-55	4.0	2.4	68.8	18.5	8.2
DKL 70-07	3.9	2.4	66.6	18.6	8.9
HyCLASS 955	4.0	2.4	66.4	18.8	8.3
HyCLASS 947	3.6	2.3	69.7	18.7	8.3
HyCLASS 988	4.0	2.8	68.6	17.0	8.3
Gem[1]	2.6	1.8	6.8	11.3	8.0
InVigor L130	4.1	2.5	66.3	17.5	9.8
InVigor L150	3.7	2.3	64.5	19.0	9.5
InVigor L120	3.8	2.6	63.7	18.3	9.6
Mean	3.8	2.4	61.7	17.9	8.8
CV	4.02	3.50	3.31	3.16	6.20
LSD	0.22	0.12	2.94	0.81	0.79
Pr>F	<.0001	<.0001	<.0001	<.0001	<.0001

Fatty acid constituents reported on a dry matter basis of the whole seed.

[1] industrial rapeseed

Table 3. Seed Yield (lb/A) Summary by Entry 2009 - 2012, NWARC, Kalispell, MT

Entry	2009	2010	2011	2012
	Yield (lb/A)			
InVigor 5440 LL	**2434**	**1893**	**2856**	.
InVigor 5550 LL	2310	**1599**	.	.
InVigor 5630 LL	**2519**	.	.	.
InVigor 8440 LL	**2524**	1540	**2759**	.
InVigor L150	.	.	**2621**	**2575**
InVigor L130	.	.	**2606**	**2528**
InVigor L120	.	.	.	**2457**
OasisCL	.	638	1345	.
XCEED 8571 CL	.	846	.	.
HyCLASS 921 RR	.	1381	**2483**	.
HyCLASS 940 RR	**2576**	**1718**	**2817**	.
HyCLASS 924 RR	2310	.	.	.
HyCLASS 947 RR		**1841**	**2844**	**2359**
HyCLASS 988 RR	.	**1756**	2219	**2430**
HyCLASS 955 RR	.	.	**2579**	**2197**
DKL 30-42 RR	**2578**	**2011**	**2636**	1611
DKL 52-41 RR	**2539**	**1642**	2128	.
DKL 72-55 RR	**2518**	**1954**	2348	.
DKL 51-45 RR	.	**1940**	**2671**	1896
DKL 70-07 RR	.	.	**2964**	**2552**
DKL 55-55 RR	.	.	**2940**	**2462**
DKL 30-03 RR	.	.	.	2107
Hyola 357 Magnum RR	**2526**	**1996**	.	.
IS 3057 RR	2226	.	.	.
IS 7145 RR	**2442**	.	.	.
UISC00.1.3.5	2102	1354	.	.
UISC00.3.1.17	1835	**1756**	1902	.
UISC00.3.8.DE	.	1183	2016	.
03.IL.5.6.1	.	1388	.	.
Gem	.	.	.	1394
Oscar	2061	.	.	.
Exp Line 624	.	**2040**	.	.
Exp Line 642	.	**1786**	.	.
Mean	2367	1613	2490	2214
LSD	263.5	450.0	518.5	406.9

PULSES

Project Title:	Statewide Pea Variety Evaluation
Project Leader:	Brooke Bohannon
Project Personnel:	Chengci Chen
Project Objective:	To evaluate seed yield and agronomic performance of 13 pea cultivars in northwestern Montana.

Results:

The average days to flowering was 78 days after planting (June 28) and the nursery was harvested on August 6th. Mature plant canopy height averaged 30.4 inches with a range from 24.5 to 37.3 inches. Pea grain yield differences across cultivars were significant. Trial yields averaged 3323 lb/A (Table 4), ranging from 2761 lb/A (Cruiser) to 4013 lb/A (Montech 4152). Bridger and Spider yield statistically equal to Montech 4152, across the entire evaluation as well as within the yellow color class (Table 3). Trial test weights averaged 64 lb/bu and thousand kernel weights averaged 229 grams. Within the green color class Arcadia yield the highest at 3542 lb/A and Stirling, CDC Striker and Majoret yielded equally to Arcadia (Table 2).

Summary:

Deer have consumed the 2010 and 2011 pea variety evaluation; however, the 2012 average yields were comparable to those obtained in 2009.

Future Plans:

Pea cultivar evaluations will continue to be conducted each year in order to identify cultivars suitable to our growing region.

Table 1. Statewide Dry Pea Evaluation - 2012

Seeding Date:	4/11/2012	Soil Type:	Kalispell vfSL	Harvest Date: 8/6/2012
Seeding Rate:	172 lb/A (avg.)	Soil Test:	57-12-110-42	
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14	
Tillage:	Conventional	Herbicide:	None	
Irrigation:	None	Insecticide:	None	

Table 2. Green pea agronomic data

Cultivar	Days to Flower days	Height at Pod Fill inches	Height at Maturity inches	Yield lb/A	Yield bu/A	TWT lb/bu	TKW g
Arcadia	79	30.8	25.5	**<u>3542</u>**	56	63	208
Stirling	74	29.3	24.5	**3275**	51	64	202
CDC Striker	79	31.5	31.3	**3123**	49	65	245
Majoret	79	31.0	28.3	**3080**	48	65	226
K2	79	31.8	29.0	2979	46	64	216
Cruiser	78	34.8	30.8	2761	43	63	227
Green Pea Means	78	31.5	28.2	3127	49	64	221
CV	2.48	5.85	12.18	10.25	10.38	1.68	2.50
LSD	2.9	2.8	5.3	482.8	7.6	1.6	8.3
Pr>F	0.0088	0.0186	0.0744	0.0594	0.0519	0.1027	<.0001

TWT: Test weight, TKW: Thousand kernel weight.

Grain yield is adjusted to 13% moisture.

<u>Bold</u> highest yielding variety, **bolded** grain yields are equal to highest yielding cultivar.

Table 3. Yellow pea agronomic data

Cultivar	Days to Flower days	Height at Pod inches	Height at Maturity inches	Yield lb/A	Yield bu/A	TWT lb/bu	TKW g
Montech 4152	75	39.0	37.3	**<u>4013</u>**	63	67	255
Bridger (LL7020)	78	34.5	31.8	**3744**	58	65	222
Spider	79	36.8	33.5	**3654**	57	63	249
DS Admiral	78	38.0	34.5	3465	54	65	249
Delta	76	30.5	28.8	3349	53	67	242
SW Midas	78	33.3	29.8	3337	52	63	208
Agassiz	81	32.8	31.0	2880	45	65	230
Yellow Pea Means	78	35.0	32.4	3492	55	65	236
CV	1.78	5.22	5.61	9.50	9.50	3.50	2.80
LSD	2.1	2.7	2.7	494.7	7.7	3.4	9.8
Pr>F	0.0002	<0.0001	<.0001	0.0048	0.0050	0.1419	<.0001

TWT: Test weight, TKW: Thousand kernel weight. Grain yield is adjusted to 13% moisture.

<u>Bold</u> highest yielding variety, **bolded** grain yields are equal to highest yielding cultivar.

Table 4. Combined agronomic data analysis								
	Color	Days to Flower	Height at Pod Fill	Height at Maturity	Yield	Yield	TWT	TKW
Cultivar		days	inches	inches	lb/A	bu/A	lb/bu	g
Montech 4152	Yellow	75	39.0	37.3	**<u>4013</u>**	63	67	255
Bridger (LL7020)	Yellow	78	34.5	31.8	**3744**	58	65	222
Spider	Yellow	79	36.8	33.5	**3654**	57	63	249
Arcadia	Green	79	30.8	25.5	3542	56	63	208
DS Admiral	Yellow	78	38.0	34.5	3465	54	65	249
Delta	Yellow	76	30.5	28.8	3349	53	67	242
SW Midas	Yellow	78	33.3	29.8	3337	52	63	208
Stirling	Green	74	29.3	24.5	3275	51	64	202
CDC Striker	Green	79	31.5	31.3	3123	49	65	245
Majoret	Green	79	31.0	28.3	3080	48	65	226
K2	Green	79	31.8	29.0	2979	46	64	216
Agassiz	Yellow	81	32.8	31.0	2880	45	65	230
Cruiser	Green	78	34.8	30.8	2761	43	63	227
Trial Analysis:								
Mean		78	33.4	30.4	3323	52	64	229
CV		2.11	5.36	9.41	9.69	9.75	2.84	2.70
LSD		2.4	2.6	4.1	461.7	7.3	2.6	8.9
Pr>F		<.0001	<.0001	<.0001	<.0001	<.0001	0.0587	<.0001

TWT: Test weight, TKW: Thousand kernel weight.

Grain yield is adjusted to 13% moisture.

<u>Bold</u> highest yielding variety, **bolded** grain yields are equal to highest yielding cultivar.

Project Title: Statewide Lentil Variety Evaluation - 2012

Project Leader: Brooke Bohannon

Project Personnel: Chengci Chen

Objective: To evaluate seed yield and agronomic performance of ten lentil cultivars in northwestern Montana.

Results:

Plots were seeded two weeks earlier than in 2011 yet the average days to maturity was seventeen days longer in 2012 than in 2011. The average time to flower was 76 days after planting (June 26) and plants reached grain maturity an average of 123 days after planting (August 12) (Table 2). Canopy height at physiological maturity ranged from 10.1 to 14.7 inches.

Grain yields ranged from 995 lb/A (16 bu/A) for Merrit to 1726 lb/A (27 bu/A) for LC01602300R. The top producing commercially available cultivar was CDC Richlea with 1565 lb/A (24 bu/A). Overall lentil yield across all varieties was 1293 lb/A (20.0 bu/A), which is a slight decrease from 2011 yields. CDC Richlea and Morena were the highest yielding commercially available varieties.

Summary:

The above average rain fall in June of 2012, most likely had an adverse impact on the lentil crop. Average grain yield and test weight (1293 lb/A and 60.8 lb/bu respectively) were slightly lower than in 2011 (1739 lb/A and 63.1 lb/bu respectively).

Future Plans:

Trials will continue to be conducted each year in order to identify cultivars suitable to the region.

Table 1. Statewide lentil evaluations - 2012

Seeding Date:	4/11/2012	Soil Type:	Kalispell vf SL	Harvest Date:	8/16/2012
Seeding Rate:	51 lb/A (ave.)	Soil Test:	57-12-110-42		
Previous Crop:	Alfalfa	Fertilizer:	138-0-75-14		
Tillage:	Conventional	Herbicide:	None		
Irrigation:	None	Insecticide:	None		

Table 2. Lentil agronomic analysis

Cultivar		Days to Flower	Height at Maturity	Days to Maturity	Grain Yield		TWT	TKW
		days	*inches*	*days*	*lb/A*	*bu/A*	*lb/bu*	*grams*
Merrit	Large Green	74	13.2	122	995	16	59	62
Riveland	Large Green	75	14.7	126	1267	20	59	74
Brewer	Med. Green	74	12.8	123	1198	19	59	58
CDC Richlea	Med. Green	78	13.3	123	**1565**	24	60	55
LC01602300R	Med. Green	79	14.7	125	**<u>1726</u>**	27	61	54
Essex	Small Green	78	12.3	123	1362	21	63	48
Eston	Small Green	78	13.2	124	1250	20	60	35
Crimson	Small Red	77	10.1	117	1189	19	63	34
CDC Impact	Extra Small Red	78	10.3	122	968	15	61	36
Morena	Pardina	76	13.2	124	**1411**	22	64	41
Mean		76	12.8	123	1293	20	61	50
CV		1.24	7.93	1.07	17.99	18.00	4.31	2.29
LSD		1.4	1.5	1.9	337.6	5.3	3.8	1.6
Pr>F		<.0001	<.0001	<.0001	0.0021	0.0022	0.1079	<.0001

TWT: Test weight, TKW: Thousand kernel weight

Grain yield adjusted to 13% moisture

<u>Bold</u> highest yielding variety, **bolded** grain yields are equal to highest yielding cultivar.