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

ANNUAL REPORT
2006 CROP YEAR

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Full Time Staff Members	**Years in Service**
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Gary R. Haaven – Ag Research Specialist Began April 1982	24
Barbara F. Honeycutt – Administrative Support Began December 1999	6
Paul P. Koch – Ag Research Technician Began May 1995	10
Janice Haaven – Research Aide Began March 2003	4

Vern R. Stewart – Professor Emeritus
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Part-Time Seasonal Employees

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CLIMATOLOGY

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

CLIMATOLOGICAL OVERVIEW 2006
NORTHWESTERN AGRICULTURAL RESEARCH CENTER
Kalispell, Montana

The 2005/2006 crop year began with a slightly wetter than normal September and October. The combined September-October accumulation was 3.95 inches, contrasting with an average combined accumulation of 2.93 inches. This precipitation trend continued into the spring, which produced ideal planting conditions. By the end of April, 13.67 inches of accumulated precipitation had been recorded, as compared to the long-term average of 11.83 inches. June rain brought the accumulated precipitation for the crop year to 22.0 inches, 4.46 inches above the average accumulation for the end of June. July and August precipitation fell significantly below 25-year averages so that the 2005 crop year ended just 2.45 inches above the average. The 2005/2006 temperatures did not significantly deviate from long-term records. The 2005/2006 season averaged 44.03 degrees as compared to the long-term average of 43.30 degrees.

Summary of Climatic Data by Months for the 2005-2006 Crop Year - September 2005 - August 2006 and Averages for the Period 1980-2006 at the Northwestern Agricultural Research Center
Kalispell, Montana

ITEM	Sept. 2005	Oct. 2005	Nov. 2005	Dec. 2005	Jan. 2006	Feb. 2006	Mar. 2006	Apr. 2006	May 2006	June 2006	July 2006	Aug. 2006	Total or Average
-													
Precipitation (inches)													
Current Year	2.28	1.67	1.45	1.42	3.04	1.14	0.55	2.12	2.89	5.50	0.51	0.24	22.81
Avg. 1980-81 to 2005-06	1.67	1.31	1.60	1.49	1.39	1.15	1.38	1.84	2.46	3.25	1.64	1.17	20.35
Average Temperature (F)													
Current Year	51.0	43.6	32.6	18.1	33.2	24.2	35.5	43.9	52.6	60.7	69.1	63.8	44.03
Avg. 1980-81 to 2005-06	53.5	42.2	32.4	24.4	24.9	27.1	35.0	43.4	51.6	57.7	64.0	63.4	43.30

Last killing frost in spring
- Spring 2006 May 15 32°F
- Median for 1980-2006 May 20

First killing frost in fall
- Fall 2006 September 17
- Median for 1980-2006 September 13

Frost Free Period 124
- Avg. 1980-2006 126

Growing Degree Days (base 50): April 1 - August 31, 2006: 1618 degree days

Growing Degree Days (base 40): April 1 - August 31, 2006: 2707 degree days

Growing Degree Days (base 32): April 1 - August 31, 2006: 3746 degree days

Maximum summer temperature 96°F July 24

Minimum winter temperature -15°F February 16

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

MAXIMUM / MINIMUM TEMPERATURES BY MONTH & DAY
JANUARY 2006- DECEMBER 2006

2006

YR	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
06	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	42	32	47	29	55	33	54	33	45	33	72	45	79	52	74	41	57	33	77	37	27	8	21	12
2	41	32	41	33	44	23	54	32	53	32	80	50	81	52	76	44	71	34	77	34	31	9	26	8
3	38	29	44	31	54	23	47	26	54	33	80	54	84	53	79	43	77	34	67	34	30	16	26	8
4	40	27	42	31	40	26	51	27	55	27	71	46	85	52	81	44	80	34	67	37	47	29	26	8
5	42	25	42	31	36	26	45	38	59	29	63	49	89	60	82	45	82	34	69	40	50	29	33	21
6	38	26	37	29	44	28	55	39	67	36	68	43	88	58	80	43	84	44	69	39	51	36	39	19
7	37	31	38	21	45	32	43	38	67	46	78	43	81	57	85	48	85	47	66	34	59	57	31	15
8	37	31	39	22	42	32	55	32	52	39	81	55	78	46	91	53	86	44	66	33	59	39	30	25
9	33	29	33	20	42	29	56	35	52	28	65	52	81	50	92	57	80	45	66	28	48	26	29	23
10	35	28	29	11	32	21	47	29	56	33	71	49	85	54	74	48	80	44	54	26	41	28	29	21
11	43	34	34	12	36	22	53	30	62	33	60	50	80	50	84	52	80	39	48	27	42	28	30	21
12	42	33	36	13	37	15	54	34	67	41	67	50	86	52	71	48	76	38	59	26	43	28	42	27
13	42	30	31	14	37	14	54	34	64	29	75	53	78	55	74	46	80	41	60	27	43	28	41	32
14	39	32	31	0	39	16	52	42	68	32	83	55	78	47	74	41	71	45	61	27	45	31	42	31
15	39	32	26	1	37	20	50	37	76	32	61	49	M	M	81	45	53	34	62	27	42	30	43	30
16	39	23	12	-15	41	25	44	33	84	45	53	48	88	49	80	49	47	37	62	27	48	32	40	23
17	25	33	7	-14	47	25	44	33	83	45	67	49	86	45	77	54	49	31	62	27	46	19	40	8
18	39	31	16	-7	54	29	48	28	83	47	62	43	88	50	73	45	62	31	47	29	38	19	40	5
19	34	23	23	-5	47	29	50	26	85	53	69	43	82	46	77	45	64	32	45	39	43	19	20	8
20	33	20	27	12	40	21	54	28	76	47	65	41	84	54	82	45	60	47	48	40	48	19	23	8
21	34	27	32	20	44	25	65	32	66	46	66	40	87	52	86	43	55	43	52	36	49	30	24	7
22	34	26	40	27	50	30	71	38	76	47	69	43	92	56	85	50	55	38	52	28	48	31	24	13
23	37	28	40	17	51	28	52	28	76	54	74	44	93	62	88	48	59	36	52	24	41	31	32	14
24	40	28	32	4	57	27	50	28	70	42	75	44	96	61	83	51	58	34	53	25	41	29	32	14
25	45	22	27	5	53	30	56	30	72	50	81	48	95	56	76	52	64	34	52	25	41	24	34	14
26	38	21	38	24	43	35	59	35	68	46	86	51	93	55	80	50	69	35	46	35	41	6	40	14
27	39	28	36	30	43	28	64	45	M	M	88	55	90	55	83	51	71	35	49	35	41	7	33	29
28	36	30	44	35	47	24	64	36	58	39	90	56	91	55	85	42	67	39	54	35	41	2	35	27
29	38	28			50	29	68	37	52	43	88	50	92	51	87	48	73	40	61	28	8	4	31	7
30	38	25			47	40	72	42	57	46	78	56	88	49	86	54	75	37	61	13	17	4	21	8
31	47	29			50	30			64	37			75	39	64	43			29	13			23	17
AVG	38.2	28.2	33.0	15.4	44.6	26.3	54.4	33.5	63.5	38.4	72.9	48.5	85.8	52.4	80.3	47.4	69.0	38.0	57.8	30.2	41.6	23.3	31.6	16.7

MAXIMUM TEMPERATURE	-15°F	MINIMUM TEMPERATURE	96°F

"M": missing data

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	0.71	21.99
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
MEAN	1.67	1.31	1.60	1.49	1.39	1.15	1.38	1.84	2.42	3.25	1.64	1.20	20.22
	SEPT	OCT	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	TOTAL

Mean precipitation for all crop years = 20.22

Precipitation by Day for Crop Year September 2005 - August 2006
Northwest Agriculture Research Center, Kalispell Montana

DAY	SEPT. 2005	OCT. 2005	NOV. 2005	DEC. 2005	JAN. 2006	FEB. 2006	MAR. 2006	APR. 2006	MAY 2006	JUNE 2006	JULY 2006	AUG. 2006	YTD
1		0.92	0.22	0.05	0.45	0.01	0.02	0.09	0.10				
2		0.16	0.14	0.02	0.07	T		0.55	0.19		0.03		
3		0.14		T	0.17	0.34	0.01		0.03	0.20			
4			T				T		T				
5			0.02	0.20		T		0.20		0.20			
6			0.03	0.20				0.22			0.05		
7		T	T		0.29		0.04	0.40			0.28		
8		0.38	0.09		0.55		0.01	0.01	0.10	0.18			
9		0.01			0.04		T	0.14	0.05	0.33		0.02	
10	0.59				0.35		0.01			0.49		0.08	
11	1.01		0.02		0.16		0.01	0.06		0.05	0.14	0.23	
12	0.18		0.22					T			0.01	T	
13	0.24	0.02	T	0.12	0.08			0.02				0.24	
14	0.06			0.06	0.08	0.12				0.55			
15		0.01	0.21		0.38			0.10		0.78			
16			T				T	0.02		2.20		T	
17	0.01			T	0.08			T		0.36		0.06	
18					0.23		0.09	0.01		T			
19	T				0.02							T	
20		0.25		0.05	0.01				0.05	0.09			
21		0.05		0.02	0.02	T			0.46				
22		0.01		0.05	T	T		0.02					
23		0.02	0.02	0.22		0.16		0.01	0.09				
24				0.03		0.16							
25			T	0.02			0.04					0.05	
26			0.01	0.01		T	0.31		0.31				
27			0.25	T	T	0.14			M				
28		0.20	0.18		0.01	0.17			1.05				
29		0.03	T		0.04		0.01		0.44				
30	0.19	T	0.04	0.01			T	0.27	0.02	0.07		0.03	
31				0.36	0.01		T						
TOTAL	2.28	2.20	1.45	1.42	3.04	1.10	0.55	2.12	2.89	5.50	0.51	0.71	23.77

YEAR 2006 - GROWING DEGREE DAYS APRIL THROUGH SEPTEMBER 2006
Calculated at Base 50 Base 40, and Base 32

APRIL

Day	MAX	MIN	Base 50	Base 40	Base 32
1	54	33	2.0	7.0	11.5
2	54	32	2.0	7.0	11.0
3	47	26	0.0	3.5	7.5
4	51	27	0.5	5.5	9.5
5	45	38	0.0	2.5	9.5
6	55	39	2.5	7.5	15.0
7	43	38	0.0	1.5	8.5
8	55	32	2.5	7.5	11.5
9	56	35	3.0	8.0	13.5
10	47	29	0.0	3.5	7.5
11	53	30	1.5	6.5	10.5
12	54	34	2.0	7.0	12.0
13	54	34	2.0	7.0	12.0
14	52	42	1.0	7.0	15.0
15	50	37	0.0	5.0	11.5
16	44	33	0.0	2.0	6.5
17	44	33	0.0	2.0	6.5
18	48	28	0.0	4.0	8.0
19	50	26	0.0	5.0	9.0
20	54	28	2.0	7.0	11.0
21	65	32	7.5	12.5	16.5
22	71	38	10.5	15.5	22.5
23	52	28	1.0	6.0	10.0
24	50	28	0.0	5.0	9.0
25	56	30	3.0	8.0	12.0
26	59	35	4.5	9.5	15.0
27	64	45	7.0	14.5	22.5
28	64	36	7.0	12.0	18.0
29	68	37	9.0	14.0	20.5
30	72	42	11.0	17.0	25.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
54.4	33.5	81.5	220.0	378.0

MAY

Day	MAX	MIN	Base 50	Base 40	Base 32
1	45	33	0.0	2.5	7.0
2	53	32	1.5	6.5	10.5
3	54	33	2.0	7.0	11.5
4	55	27	2.5	7.5	11.5
5	59	29	4.5	9.5	13.5
6	67	36	8.5	13.5	19.5
7	67	46	8.5	16.5	24.5
8	52	39	1.0	6.0	13.5
9	52	28	1.0	6.0	10.0
10	56	33	3.0	8.0	12.5
11	62	33	6.0	11.0	15.5
12	67	41	8.5	14.0	22.0
13	64	29	7.0	12.0	16.0
14	68	32	9.0	14.0	18.0
15	76	32	13.0	18.0	22.0
16	84	45	17.0	24.5	32.5
17	83	45	16.5	24.0	32.0
18	83	47	16.5	25.0	33.0
19	85	53	19.0	29.0	37.0
20	76	47	13.0	21.5	29.5
21	66	46	8.0	16.0	24.0
22	76	47	13.0	21.5	29.5
23	76	54	15.0	25.0	33.0
24	70	42	10.0	16.0	24.0
25	72	50	11.0	21.0	29.0
26	68	46	9.0	17.0	25.0
27	M	M	0.0	0.0	0.0
28	58	39	4.0	9.0	16.5
29	52	43	1.0	7.5	15.5
30	57	46	3.5	11.5	19.5
31	64	37	7.0	12.0	18.5

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
63.4	38.4	239.5	432.5	626.0

JUNE

Day	MAX	MIN	Base 50	Base 40	Base 32
1	72	45	11.0	18.5	26.5
2	80	50	15.0	25.0	33.0
3	80	54	17.0	27.0	35.0
4	71	46	10.5	18.5	26.5
5	63	49	6.5	16.0	24.0
6	68	43	9.0	15.5	23.5
7	78	43	14.0	20.5	28.5
8	81	55	18.0	28.0	36.0
9	65	52	8.5	18.5	26.5
10	71	49	10.5	20.0	28.0
11	60	50	5.0	15.0	23.0
12	67	50	8.5	18.5	26.5
13	75	53	14.0	24.0	32.0
14	83	55	19.0	29.0	37.0
15	61	49	5.5	15.0	23.0
16	53	48	1.5	10.5	18.5
17	67	49	8.5	18.0	26.0
18	62	43	6.0	12.5	20.5
19	69	43	9.5	16.0	24.0
20	65	41	7.5	13.0	21.0
21	66	40	8.0	13.0	21.0
22	69	43	9.5	16.0	24.0
23	74	44	12.0	19.0	27.0
24	75	44	12.5	19.5	27.5
25	81	48	15.5	24.5	32.5
26	86	51	18.5	28.5	36.5
27	88	55	20.5	30.5	38.5
28	90	56	21.0	31.0	39.0
29	88	50	18.0	28.0	36.0
30	78	56	17.0	27.0	35.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
72.9	48.5	357.5	616.0	856.0

JULY

Day	MAX	MIN	Base 50	Base 40	Base 32
1	79	52	15.5	25.5	33.5
2	81	52	16.5	26.5	34.5
3	84	53	18.5	28.5	36.5
4	85	52	18.5	28.5	36.5
5	89	60	23.0	33.0	41.0
6	88	58	22.0	32.0	40.0
7	81	57	19.0	29.0	37.0
8	78	46	14.0	22.0	30.0
9	81	50	15.5	25.5	33.5
10	85	54	19.5	29.5	37.5
11	80	50	15.0	25.0	33.0
12	86	52	19.0	29.0	37.0
13	78	55	16.5	26.5	34.5
14	78	47	14.0	22.5	30.5
15	M	M	0.0	0.0	0.0
16	88	49	18.0	27.5	35.5
17	86	45	18.0	25.5	33.5
18	88	50	18.0	28.0	36.0
19	82	46	16.0	24.0	32.0
20	84	54	19.0	29.0	37.0
21	87	52	19.0	29.0	37.0
22	92	56	21.0	31.0	39.0
23	93	62	24.0	34.0	42.0
24	96	61	23.5	33.5	41.5
25	95	56	21.0	31.0	39.0
26	93	55	20.5	30.5	38.5
27	90	55	20.5	30.5	38.5
28	91	55	20.5	30.5	38.5
29	92	51	18.5	28.5	36.5
30	88	49	18.0	27.5	35.5
31	75	39	12.5	17.5	25.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
85.8	52.4	464.5	706.0	906.0

YEAR 2006 - GROWING DEGREE DAYS APRIL THROUGH SEPTEMBER 2006
Calculated at Base 50 Base 40, and Base 32

AUGUST

Day	MAX	MIN	Base 50	Base 40	Base 32
1	74	41	12.0	17.5	25.5
2	76	44	13.0	20.0	28.0
3	79	43	14.5	21.0	29.0
4	81	44	15.5	22.5	30.5
5	82	45	16.0	23.5	31.5
6	80	43	15.0	21.5	29.5
7	85	48	17.5	26.5	34.5
8	91	53	19.5	29.5	37.5
9	92	57	21.5	31.5	39.5
10	74	48	12.0	21.0	29.0
11	84	52	18.0	28.0	36.0
12	71	48	10.5	19.5	27.5
13	74	46	12.0	20.0	28.0
14	74	41	12.0	17.5	25.5
15	81	45	15.5	23.0	31.0
16	80	49	15.0	24.5	32.5
17	77	54	15.5	25.5	33.5
18	73	45	11.5	19.0	27.0
19	77	45	13.5	21.0	29.0
20	82	45	16.0	23.5	31.5
21	86	43	18.0	24.5	32.5
22	85	50	17.5	27.5	35.5
23	88	48	18.0	27.0	35.0
24	83	51	17.0	27.0	35.0
25	76	52	14.0	24.0	32.0
26	80	50	15.0	25.0	33.0
27	83	51	17.0	27.0	35.0
28	85	42	17.5	23.5	31.5
29	87	48	18.0	27.0	35.0
30	86	54	20.0	30.0	38.0
31	64	43	7.0	13.5	21.5

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
80.9	47.4	475.0	732.0	980.0

SEPTEMBER

Day	MAX	MIN	Base 50	Base 40	Base 32
1	57	33	3.5	8.5	13.0
2	71	34	10.5	15.5	20.5
3	77	34	13.5	18.5	23.5
4	80	34	15.0	20.0	25.0
5	82	34	16.0	21.0	26.0
6	84	44	17.0	24.0	32.0
7	85	47	17.5	26.0	34.0
8	86	44	18.0	25.0	33.0
9	80	45	15.0	22.5	30.5
10	80	44	15.0	22.0	30.0
11	80	39	15.0	20.0	27.5
12	76	38	13.0	18.0	25.0
13	80	41	15.0	20.5	28.5
14	71	45	10.5	18.0	26.0
15	53	34	1.5	6.5	11.5
16	47	37	0.0	3.5	10.0
17	49	31	0.0	4.5	8.5
18	62	31	6.0	11.0	15.0
19	64	32	7.0	12.0	16.0
20	60	47	5.0	13.5	21.5
21	55	43	2.5	9.0	17.0
22	55	38	2.5	7.5	14.5
23	59	36	4.5	9.5	15.5
24	58	34	4.0	9.0	14.0
25	64	34	7.0	12.0	17.0
26	69	35	9.5	14.5	20.0
27	71	35	10.5	15.5	21.0
28	67	39	8.5	13.5	21.0
29	73	40	11.5	16.5	24.5
30	75	37	12.5	17.5	24.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
69.0	38.0	287.0	455.0	645.5

October

Day	MAX	MIN	Base 50	Base 40	Base 32
1	77	37	13.5	18.5	25.0
2	77	34	13.5	18.5	23.5
3	67	34	8.5	13.5	18.5
4	67	37	8.5	13.5	20.0
5	69	40	9.5	14.5	22.5
6	69	39	9.5	14.5	22.0
7	66	34	8.0	13.0	18.0
8	66	33	8.0	13.0	17.5
9	66	28	8.0	13.0	17.0
10	54	26	2.0	7.0	11.0
11	48	27	0.0	4.0	8.0
12	59	26	4.5	9.5	13.5
13	60	27	5.0	10.0	14.0
14	61	27	5.5	10.5	14.5
15	62	27	6.0	11.0	15.0
16	62	27	6.0	11.0	15.0
17	62	27	6.0	11.0	15.0
18	47	29	0.0	3.5	7.5
19	45	39	0.0	2.5	10.0
20	48	40	0.0	4.0	12.0
21	52	36	1.0	6.0	12.0
22	52	28	1.0	6.0	10.0
23	52	24	1.0	6.0	10.0
24	53	25	1.5	6.5	10.5
25	52	25	1.0	6.0	10.0
26	46	35	0.0	3.0	8.5
27	49	35	0.0	4.5	10.0
28	54	35	2.0	7.0	12.5
29	61	28	5.5	10.5	14.5
30	61	13	5.5	10.5	14.5
31	29	13	0.0	0.0	0.0

AV MAX	AV MIN	Total Base 50	Total Base 40	Total Base 32
58.8	30.2	140.5	282.0	432.0

WEED AND SMALL GRAIN MANAGEMENT FOR WESTERN MONTANA

754

The Weed and Small Grain Management Project (754) includes research related to all types of weeds and small grains from seeding to data collection to publications.

Project Title: Evaluation of Clearmax and Tank Mix Partners for Crop Injury and Yield in Clearfield Spring Wheat

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To compare crop selectivity to various tank mix partners of Clearmax herbicide in Clearfield spring wheat

Results:

Clearmax herbicide (a combination of Beyond and MCPA) and its tank mix partners were evaluated for crop injury and yield in Clearfield spring wheat. Clearfield spring wheat (cv. Gunner 2-gene) was planted on April 21, 2006 at a seeding rate of 85 lb/ac in 6” rows to a depth of 1.5 inches. Herbicide treatments included Beyond and Clearmax applied alone and mixed with various broadleaf herbicides. The herbicides were applied on May 19, 2006 using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA. The environmental conditions were ideal at application (clear sky, no wind, and 74°F air and soil temperatures) and the crop was at the 3-5 main-stem-leaf stage with 1-2 tillers.

In general, no crop injury was observed when Beyond and Clearmax were applied alone or mixed with various broadleaf partners except for treatments containing Clarity. Crop injury with Clarity was significant (34-36%) at 10 days after application; however, seven weeks after application the injury was minimal. Applications of Beyond and Clearmax, as well as and their tank mix partners did not affect yield.

Summary:

Clearfield spring wheat had excellent tolerance to Clearmax and its tank mix partners in 2006. However, crop injury occurred early in the season when Clearmax was mixed with Clarity.

Table 1. Effects of Clearmax herbicide and its tank mix partners on crop injury and yield in Clearfield spring wheat in 2006 season at Kalispell, MT.

Trt No.	Treatment Name	Rate lb ai/ac	Crop injury (%)			Chlorosis (%)			Stunt (%)			Yield bu/ac
			5/30/06	6/12/06	7/11/06	5/30/06	6/12/06	7/11/06	5/30/06	6/12/06	7/11/06	8/10/06
1	Check		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.7
2	Beyond	0.0625	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.7
3	Beyond Rhonox	0.0625 0.4620	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.5
4	Beyond Rhonox Starane	0.0625 0.4620 0.0937	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.1
5	Beyond Rhonox Starane	0.0625 0.4620 0.1875	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.6
6	Beyond Rhonox Buctril 2EC	0.0625 0.4620 0.2500	2.5	1.3	0.0	2.5	0.0	0.0	0.0	1.3	0.0	83.9
7	Beyond Rhonox Buctril 2EC	0.0625 0.4620 0.5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.8
8	Beyond Rhonox Clarity	0.0625 0.4620 0.0625	33.8	1.3	1.3	25.0	0.0	0.0	8.8	1.3	1.3	82.7

Table 1. (continued) Effects of Clearmax herbicide and its tank mix partners on crop injury and yield in Clearfield spring wheat in 2006 season at Kalispell, MT.

Trt	Treatment	Rate	Crop injury (%)			Chlorosis (%)			Stunt (%)			Yield
No.	Name	lb ai/ac	5/30/06	6/12/06	7/11/06	5/30/06	6/12/06	7/11/06	5/30/06	6/12/06	7/11/06	bu/ac 8/10/06
9	Beyond	0.0625	36.3	7.5	0.0	26.3	0.0	0.0	10.0	7.5	0.0	78.4
	Rhonox	0.4620										
	Clarity	0.1250										
10	Beyond	0.0625	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.4
	Rhonox	0.4620										
	Weedar 64	0.1250										
11	Beyond	0.0625	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	2.5	82.9
	Rhonox	0.4620										
	Weedar 64	0.2500										
	LSD (P=0.05)		3.86	2.74	1.61	2.93	0	0	2.01	2.74	1.61	11.00
	CV		40.60	208.67	327.96	41.58	0	0	81.54	208.67	327.96	9.07
	Treatment F		110.71	5.59	2.09	102.47	0	0	29.94	5.59	2.09	0.73
	Treatment Prob(F)		0.0001	0.0001	0.058	0.0001	1	1	0.0001	0.0001	0.058	0.6896

Project Title: Evaluation of Clearmax and Tank Mix Partners for Weed Control and Crop Injury in Clearfield Spring Wheat

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To compare weed control efficacy and crop tolerance to various Clearmax tank mix combinations in Clearfield spring wheat

Results:

Clearmax herbicide (a combination of Beyond and MCPA) and its tank mix partners were evaluated for weed control and crop injury in Clearfield spring wheat. Clearfield spring wheat (cv. Gunner 2-gene) was planted on April 21, 2006 at a seeding rate of 85 lb/ac in 6" rows to a depth of 1.5 inches. Wild oat was planted at a density of 25 seeds per square foot. Wild buckwheat emerged naturally in the experimental plots. Herbicide treatments included Beyond and Clearmax alone and mixed with various broadleaf herbicides. The herbicides were applied on May 19, 2006 using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA. Environmental conditions were ideal at application (clear sky, no wind, and 74°F air and soil temperatures). The crop was at the 3-5 main-stem-leaf (MSL) stage with 1-2 tillers, wild oat was at the 3 MSL stage, and wild buckwheat had 1-2 true leaves.

In general, crop injury was minimal when Clearmax was applied alone or mixed with different herbicides. Treatments that contained Clarity initially resulted in some crop injury (18%). However, the injury diminished as the growing season progressed. All herbicide treatments provided excellent control for wild oat and wild buckwheat (>99%).

Summary:

Clearmax applied alone or in combination with other herbicides provided excellent control of wild oat and wild buckwheat.

Table 1. Effects of Clearmax herbicide and its tank mix partners on crop injury in Clearfield spring wheat in 2006 season Kalispell, MT.

Trt	Treatment	Rate	Crop injury (%)			Chlorosis (%)			Stunt (%)		
No.	Name	lb ai/ac	5/30/06	6/12/06	7/11/206	5/30/06	6/12/06	7/11/06	5/30/06	6/12/06	7/11/06
1	Check		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Beyond	0.0234	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Beyond	0.0312	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Beyond Rhonox	0.0625 0.173	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	Beyond Rhonox	0.0625 0.231	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	1.7
6	Beyond Rhonox Starane	0.0312 0.231 0.0937	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Beyond Rhonox Buctril 2EC	0.0312 0.231 0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Beyond Rhonox Clarity	0.0312 0.231 0.0625	18.3	0.0	0.0	15.0	0.0	0.0	3.3	0.0	0.0
9	Beyond Rhonox Weedar 64	0.0312 0.231 0.125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 1 (continued). Effects of Clearmax herbicide and its tank mix partners on crop injury in Clearfield spring wheat in 2006 season at Kalispell, MT.

Trt No.	Treatment Name	Rate lb ai/ac	Crop injury (%) 5/30/06	Crop injury (%) 6/12/06	Crop injury (%) 7/11/206	Chlorosis (%) 5/30/06	Chlorosis (%) 6/12/06	Chlorosis (%) 7/11/06	Stunt (%) 5/30/06	Stunt (%) 6/12/06	Stunt (%) 7/11/06
10	Achieve	0.18	8.3	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0
	Bronate Adv.	0.50									
11	Discover	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Bronate Adv.	0.50									
	LSD (P=.05)		4.22	0	1.48	3.92	0	0	1.48	0	1.48
	CV		102.18	0	574.46	108.56	0	0	287.23	0	574.46
	Treatment F		16.67	0	1.00	13.86	0	0	4	0	1
	Treatment Prob(F)		0.0001	1	0.4755	0.0001	1	1	0.004	1	0.4755

Table 2. Effects of Clearmax herbicide and its tank mix partners on wild oat and wild buckwheat control in Clearfield spring wheat in 2006 season at Kalispell, MT.

Trt	Treatment	Rate	Wild oat control (%)			Wild buckwheat control (%)		
No.	Name	lb ai/ac	5/30/06	6/12/06	7/11/06	5/30/06	6/12/06	7/11/06
1	Check		0.0	0.0	0.0	0.0	0.0	0.0
2	Beyond	0.0234	80.0	97.0	99.3	83.3	97.0	100.0
3	Beyond	0.0312	88.3	97.0	100.0	85.0	97.0	99.7
4	Beyond Rhonox	0.0625 0.173	85.0	97.0	100.0	85.0	97.0	100.0
5	Beyond Rhonox	0.0625 0.231	86.7	97.0	100.0	88.3	97.0	99.0
6	Beyond Rhonox Starane	0.0312 0.231 0.0937	85.0	97.0	100.0	85.0	97.0	100.0
7	Beyond Rhonox Buctril 2EC	0.0312 0.231 0.25	90.0	96.3	100.0	88.3	97.0	100.0
8	Beyond Rhonox Clarity	0.0312 0.231 0.0625	83.3	97.0	100.0	85.0	97.0	100.0
9	Beyond Rhonox Weedar 64	0.0312 0.231 0.125	80.0	97.0	99.3	83.3	97.0	98.7
10	Achieve Bronate Adv.	0.18 0.50	63.3	97.0	98.3	85.0	96.3	100.0
11	Discover Bronate Adv.	0.05 0.50	40.0	95.7	96.7	83.3	97.0	99.0
	LSD (P=.05)		17.19	0.88	1.9	5.01	0.59	1.47
	CV		14.21	0.59	1.24	3.8	0.4	0.95
	Treatment F		22.59	9585.25	2159.47	230.105	21142.2	3632.78
	Treatment Prob(F)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Project Title: Gibberellin (GA) Effect on Spring Wheat Vigor and Yield

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate GA effect on seedling vigor, yield and grain quality in spring wheat cultivars differing in height

Results:

Three semi-dwarf (Nick, Explorer, and Jefferson) and three standard height (Fortuna, Scholar and Thatcher) spring wheat cultivars were evaluated for their response to the gibberellin (GA) seed treatment, Release. Each cultivar was treated at a rate of 3 oz of Release/100 lb seeds. The study was planted on April 19, 2006 at a seeding rate of 65 lb/ac, to a depth of 2 inches, using a double disk drill equipped with 6-inch row spacings.

The main effect of GA on the width of the first true leaf was non-significant. However, the leaf length of the first main stem leaf was positively affected. In general, GA resulted in longer, narrower leaves. Explorer and Scholar were more responsive to GA treatment than the other cultivars. The overall effect of GA on the length of leaf-2 was less apparent. Yet, Explorer and Scholar again responded positively to GA.

While the length of leaf-2 did not consistently respond to GA, the width of the second leaf did. The main effect of GA on the width of leaf-2 was significant. In general, GA caused a reduction in leaf width across all cultivars tested.

GA treatment did not affect culms or biomass per square meter. However, GA interacted with cultivar to affect stand density (plants/m^2). In general, GA improved stand densities for the semi-dwarf cultivars, especially Explorer. This in turn had an indirect effect on compensatory processes within the plant, which confounded the treatment effects on culms/plant and culms/m^2. GA had no effect on final plant height, grain yield, or grain end-use quality parameters.

Summary:

GA seed treatments affected leaf length and width in the first two main stem leaves.

Table 1. Effect of GA seed treatment on leaf length and width in leaf 1 and leaf 2, and seedling density, number of tillers and biomass at jointing in six spring wheat cultivars during 2006 season.

Cultivar	HT	Leaf length (mm)				Leaf width (mm)				Plants /m^2		Culms/m^2		Culms/plant		Biomass (g/m^2)	
		Leaf 1		Leaf 2		Leaf 1		Leaf 2									
		U	T	U	T	U	T	U	T	U	T	U	T	U	T	U	T
Nick	SD	97.8	103.3	142.7	139.2	4.1	3.7	4.5	4.0	234.3	290.6	658.4	800.7	2.8	2.8	248.8	250.6
Explorer	SD	89.8	100.5	118.7	131.6	2.9	2.9	3.3	3.1	391.5	519.0	1049.8	1156.6	2.7	2.2	278.2	274.0
Jefferson	SD	87.1	88.6	123.9	121.0	3.4	3.6	3.8	3.7	311.4	397.4	910.4	975.7	3.0	2.5	256.8	244.4
Fortuna	SH	107.3	111.6	142.1	140.2	3.3	3.4	3.6	3.7	305.5	308.4	774.0	889.7	2.6	2.9	215.0	221.3
Scholar	SH	94.6	110.9	127.9	136.1	3.7	3.5	3.8	3.6	296.6	299.5	934.2	925.3	3.1	3.2	270.2	247.3
Thatcher	SH	92.5	96.4	125.4	123.4	2.8	2.7	3.1	2.8	468.6	376.6	1174.4	1201.0	2.5	3.2	236.6	232.8
LSD (0.05)	GA	2.64		NS		0.19		0.16		NS		NS		NS		NS	
	CV	4.57		6.48		0.33		0.29		71.56		176.1		0.38		NS	
	GA*CV	6.47		9.17		0.47		0.41		101.2		249.04		0.53		NS	
ANOVA	GA	***		NS		NS		**		NS		NS		NS		NS	
	CV	***		***		***		***		***		***		*		NS	
	GA*CV	*		*		NS		NS		*		NS		*		NS	

HT: height SD: semidwarf SH: standard height GA: Gibberellin CV: cultivar U: untreated T: GA treated
NS: Not significant (P>0.05) *, **,***: Significant (P<0.05, 0.01 and 0.001, respectively)

Table 2. Effect of GA seed treatment on plant height, yield, grain moisture, test weight, 100 kernel weight and lodging in six spring wheat cultivars during 2006 season.

Cultivar	HT	Plant height (cm)		Yield (bu/ac)		Grain moisture (%)		Test weight (lb/bu)		TKW (g)		Lodging (%)	
		U	T	U	T	U	T	U	T	U	T	U	T
Nick	SD	83.0	82.3	96.8	110.0	10.1	10.0	60.5	60.5	34.72	33.64	0	0
Explorer	SD	81.3	81.3	87.9	94.1	10.2	10.1	60.0	60.5	29.50	28.71	0	0
Jefferson	SD	84.7	82.7	110.1	104.1	10.8	10.5	61.0	60.7	35.72	35.18	0	0
Fortuna	SH	102.7	99.3	87.9	83.6	10.6	10.8	62.2	61.8	42.64	42.68	0	0
Scholar	SH	104.7	102.0	101.7	97.4	10.6	10.5	62.6	62.7	39.99	36.34	0	0
Thatcher	SH	105.0	100.0	78.4	69.7	10.9	11.3	60.5	59.8	30.03	28.67	0	0
LSD (0.05)	GA	NS		NS		NS		NS					
	CV	11.81		6.77		0.25		0.39					
	GA*CV	NS		9.58		0.36		0.56					
ANOVA	GA	NS		NS		NS		NS					
	CV	***		***		***		***					
	GA*CV	NS		*		0.09		*					

HT: height; SD: semidwarf; SH: standard height; GA: Gibberellinic acid; CV: cultivar; U: untreated; T: GA treated; TKW: 1000 kernel weight; NS: Not significant (P>0.05); *, **, ***: Significant (P<0.05, 0.01 and 0.001, respectively).

Project Title: Effects of Herbicides on Spring Wheat Stem Solidness and Agronomic Performance

Project Leaders: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate herbicides effects on spring wheat stem solidness

Results:

Twelve herbicides, representing three different modes of action, were evaluated for their effects on spring wheat stem solidness and agronomic performance. Scholar spring wheat was planted on April 28, 2006 at a seeding rate of 75 lb/ac in 7" rows to a depth of 1.5 inches. Four representative herbicides from the auxinic, ALS, and ACCase herbicide classes were applied on May 24 when the crop was at the 4-leaf state. In addition, an individual member of each herbicide class was applied on June 21 during the boot stage of development. The herbicides were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Individual effects of herbicides on stem solidness were only observed with the third and fourth internodes. None of the treatments increased pith development compared to the check. However, several herbicides did cause a slight reduction in stem solidness. This was most evident for Discover applied at the boot stage. When herbicides were grouped based on their modes of action, internodes 3 and 5 showed differences among herbicide classes. The ACCase group had less pith in the third internode, while the ALS group tended to produce more pith in the fifth internode. Overall, herbicide effects were minor and were not consistent across the range of internodes.

It is notable that the lowest yields were associated with the ALS group of herbicides. This was largely attributed to phytotoxic effects of Silverado.

Summary:

Herbicide effects on pith development were minor, with the ACCase group causing the greatest reduction in stem solidness.

Table 1. Effects of herbicides on stem solidness and agronomic performance in spring wheat grown at Kalispell, MT in 2006 season.

Trt No.	Treatment Name	Rate (lb ai/ac)	Appl Code	Stem solidness: Internodes 1	2	3	4	5	Total	Yield bu/ac	Grain moisture %	Test weight lb/bu	Protein %
1	Clarity	0.1250	A	2.8	1.9	2.6	2.3	1.2	10.9	61.3	10.6	62.7	14.9
2	2,4-D ester	0.9500	A	1.9	1.8	2.2	1.6	1.4	8.6	61.1	11.0	61.9	15.1
3	Stinger	0.1240	A	3.1	1.8	2.6	2.4	1.2	11.0	66.1	12.2	62.3	14.6
4	Starane	0.1250	A	2.6	2.2	2.8	1.9	1.4	10.9	64.6	10.8	63.6	14.8
5	Everest	0.0262	A	2.4	1.8	2.5	1.7	1.6	10.0	59.9	11.9	58.2	14.9
6	Silverado	0.0028	A	2.5	1.8	2.3	1.6	1.3	9.4	55.1	11.0	61.6	15.3
7	Express	0.0156	A	2.5	2.1	2.3	1.6	1.6	10.0	59.0	11.0	62.1	15.0
8	Ally	0.0038	A	3.0	2.3	3.1	2.3	1.8	12.4	60.1	11.2	62.5	14.7
9	Axial	0.0520	A	2.6	2.0	2.4	2.0	1.2	10.1	61.5	11.2	61.7	15.0
10	Hoelon	1.0000	A	2.1	1.6	2.0	1.6	1.4	8.7	63.1	11.3	62.8	15.0
11	Discover	0.0500	A	2.2	1.7	2.2	1.6	1.3	9.0	59.5	10.7	62.5	14.9
12	Achieve	0.1800	A	2.4	1.9	2.4	1.9	1.5	10.0	60.9	11.1	62.2	14.9
13	Stinger	0.1240	B	2.6	1.9	2.3	2.1	1.2	10.0	59.4	10.6	62.2	15.1
14	Express	0.0156	B	2.3	1.7	2.4	1.8	1.8	10.0	59.7	10.9	62.0	15.0
15	Discover	0.0500	B	1.8	1.4	1.9	1.5	1.8	8.3	62.9	10.8	62.6	14.7
16	Check			2.9	1.9	2.7	2.4	1.5	11.3	60.6	10.4	62.6	14.7
	Mean			**2.5**	**1.9**	**2.4**	**1.9**	**1.5**	**10.0**	**60.9**	**11.0**	**62.1**	**14.9**
	LSD (P=0.05)			**NS**	**NS**	**0.57**	**0.72**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**

A: 4-leaf stage; B: booting; NS: not significant (P>0.05).

Table 2. The effect of mode of action on stem solidness and agronomic performance in spring wheat grown at Kalispell, MT in 2006 season.

Trt No.	Mode of action	Appl Code	Stem solidness						Yield	Grain moisture	Test weight	Protein
			Internodes					Total				
			1	2	3	4	5		bu/ac	%	lb/bu	%
1-4	Auxinic	A	2.6	1.9	2.6	2.1	1.3	10.4	63.3	11.1	62.6	14.8
5-8	ALS	A	2.6	2.0	2.5	1.8	1.6	10.5	58.5	11.3	61.1	15.0
9-12	ACC	A	2.3	1.8	2.2	1.8	1.4	9.4	61.3	11.1	62.3	15.0
Mean			**2.5**	**1.9**	**2.4**	**1.9**	**1.4**	**10.1**	**61.0**	**11.2**	**62.0**	**14.9**
LSD (0.05)			**NS**	**NS**	**0.31**	**NS**	**0.23**	**NS**	**3.1**	**NS**	**NS**	**NS**

A: 4-leaf stage; NS: not significant (P>0.05).

Project Title: Wild Buckwheat Control by Beyond Herbicide in Clearfield Spring Wheat: Dose Response

Project Leaders: Bob Stougaard, Luther Talbert and Phil Bruckner

Project Personnel: Qingwu Xue

Objective: To evaluate the response of wild buckwheat and other broadleaf weeds to Beyond.

Results:

This experiment was conducted to determine the optimum rate of Beyond for broadleaf weed control in the Clearfield spring wheat system. Clearfield spring wheat (cv. Gunner 2-gene) was planted on April 14, 2006 at a seeding rate of 75 lb/ac in 6" rows to a depth of 1.5 inches. Wild buckwheat was immediately planted between the rows at a rate of 20 plants per square foot. In addition, high densities of common lambsquarters and redroot pigweed also were present in the study area.

Beyond was applied at 1X, 1/2X, 1/4X, 1/8X, and 1/16X of the normal use rate. An untreated check also was included. The treatments were applied on May 23, 2006 when spring wheat plants were at the 4-main-stem-leaf stage with 1-2 tillers. At the same time, wild buckwheat plants were at the 1-4 leaf stage, common lambsquarters were 2 inches tall, and redroot pigweed was 1 inch tall. Treatments were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Beyond demonstrated excellent crop tolerance. The 1/2X and 1X rates provided excellent control of wild buckwheat, common lambsquarters and redroot pigweed. Although control decreased as the herbicide rate decreased, the lowest rate (1/16X) still afforded greater than 50% control of all three weed species. Weed biomass data showed similar trends.

There were no differences in spring wheat density, height, yield or test weight among treatments. However, weed competition increased grain moisture and dockage but reduced protein content.

Summary:

Beyond provided excellent control of wild buckwheat, lambsquarters and redroot pigweed. Although herbicide efficacy was reduced at lower rates, the 1/16X rate still resulted in more than 50% weed control.

Table 1. Effect of Beyond herbicide on spring wheat injury and wild buckwheat control in 2006 season.

Treatment	Rate	Spring wheat		Wild buckwheat			
	lb ai/ac	% injury		% control		Plants	Biomass
						No./m^2	g/m^2
		6/5/06	6/19/06	6/5/06	6/19/06	------ 7/5/06 -----	
Beyond 1X	0.047	0	0	94.3	95	4.9	0.6
Beyond 1/2X	0.0234	0	0	88.8	90	46.7	2.1
Beyond 1/4X	0.0117	0	0	80	76.7	71.3	3.6
Beyond 1/8X	0.00586	0	0	60	63.3	79.9	4.8
Beyond 1/16X	0.00293	0	0	45	60	73.7	4.1
Check		0	0	0	0	127.8	35.3
LSD (P=.05)		0	0	13.27	5.75	54.57	15.09
CV		0	0	14.35	4.93	44.51	98.75
Treatment F		0	0	64.14	354.58	5.47	7.66
Treatment Prob(F)		1	1	0.0001	0.0001	0.0111	0.0034

Table 2. Effect of Beyond herbicide on labmsquarters and redroot pigweed control in 2006 season.

Treatment	Rate	Lambsquarters			Redroot pigweed		
	lb ai/ac	% control	Plants	Biomass	% control	Plants	Biomass
			No./m^2	g/m^2		No./m^2	g/m^2
		6/19/06	------ 7/5/06 ------		6/19/06	------ 7/5/06 ------	
Beyond 1X	0.047	98.3	0	2.5	100	0	0
Beyond 1/2X	0.0234	100	0	2.5	100	2.5	0
Beyond 1/4X	0.0117	90	2.5	2.5	75	0	0.4
Beyond 1/8X	0.00586	90	4.9	0	80	0	3.6
Beyond 1/16X	0.00293	63.3	6.1	2.9	50	7.4	3.7
Check		0	7.4	12.3	0	94.6	68
LSD (P=.05)		19.63	10.37	6.7	30.25	59.99	45.49
CV		14.66	163.66	97.78	22.43	189.39	198.47
Treatment F		37.99	0.92	4.10	18.82	3.97	3.55
Treatment Prob(F)		0.0001	0.5084	0.0277	0.0013	0.0303	0.042

Table 3. Effect of Beyond herbicide on spring wheat yield and agronomic performance in 2006 season.

Treatment	Rate lb ai/ac	Plants ------ 7/5/06 --------	Biomass	Plant height	Yield	Grain moisture	Test weight	Dockage	Protein
		No./m^2	g/m^2	cm	bu/ac	%	lb/bu	%	%
Beyond 1X	0.047	187.9	836.7	85.5	47.2	9.5	59.8	0.8	15.0
Beyond 1/2X	0.0234	184.6	945.1	88.3	53.2	9.9	60.4	0.5	14.4
Beyond 1/4X	0.0117	195.7	869.2	86.3	50.7	10.1	60.1	2.3	14.4
Beyond 1/8X	0.00586	160.1	772.7	85.8	47.2	10.5	59.3	3.3	14.6
Beyond 1/16X	0.00293	180.2	773.1	86.3	44.3	10.4	58.9	3.0	14.9
Check		182.4	873.7	86.0	46.6	13.0	57.6	14.1	14.0
LSD (P=.05)		41.9	98.52	4.21	10.36	2.25	3.06	9.33	0.73
CV		15.29	7.74	3.23	14.27	14.11	3.42	153.14	3.34
Treatment F		0.74	4.10	0.50	0.87	2.85	1.01	2.74	2.22
Treatment Prob(F)		0.6078	0.0152	0.7746	0.526	0.0526	0.4475	0.0628	0.1065

Project Title: Wild Oat Control by Beyond Herbicide in Clearfield Spring Wheat: Dose Response

Project Leaders: Bob Stougaard, Luther Talbert and Phil Bruckner

Project Personnel: Qingwu Xue

Objective: To evaluate the response of wild oat to Beyond

Results:

This experiment was conducted to determine the optimum rate of Beyond for wild oat control in the Clearfield spring wheat system. Clearfield spring wheat (cv. Gunner 2-gene) was planted on April 14, 2006 at a seeding rate of 75 lb/ac, to a depth of 1.5” using a double disk drill equipped with 6” row spacings. Wild oat was immediately planted between spring wheat rows at a rate of 20 plants per square foot.

Beyond was applied at 1X, 1/2X, 1/4X, 1/8X and 1/16X of the normal rate. An untreated control also was included. The treatments were applied on May 15, 2006 when spring wheat plants were at the 4-5 main-stem-leaf stage with 1-2 tillers and wild oat plants were at 3-4 leaf stage with 1-2 tillers. Treatments were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Crop injury from Beyond applications was minimal. Herbicide rate had a significant effect on wild oat control. As the herbicide rate decreased from 1X to 1/16X, percent of wild oat control decreased from 88 to 30 percent. At the same time biomass increased from 0 to 400 g/m^2. Nevertheless, the 1X and 1/2X rates still provided good wild oat control. Wild oat competition reduced spring wheat plant density, biomass, yield and grain test weight, but increased grain protein content. Spring wheat yields increased from 22 bu/A in the untreated check to 53 bu/A at the1X rate, demonstrating the utility of Beyond, as well as the competitive ability of wild oat.

Summary:

Beyond herbicide at 1X and 1/2X rates provided greater than 80 percent wild oat control. However, herbicide efficacy declined sharply as the rate was further reduced. These results indicate that Beyond must be applied at the labeled rate to ensure adequate wild oat control and optimum spring wheat yield.

Table 1. The effect of Beyond herbicide rate on spring wheat injury and wild oat control in 2006 season.

Treatment	Rate	Spring wheat		Wild oat			
	lb ai/ac	% injury		% control		Plants	Biomass
						No./m²	g/m²
		5/31/06	6/12/06	5/31/06	6/12/06	------- 7/3/06 ------	
Beyond 1X	0.047	0	1.3	70.0	88.8	0	0
Beyond 1/2X	0.0234	0	0	67.5	82.5	32.3	8.0
Beyond 1/4X	0.0117	0	0	60.0	65.0	104.2	67.1
Beyond 1/8X	0.00586	0	0	47.5	47.5	138.3	247.2
Beyond 1/16X	0.00293	0	0	35.0	30.0	123.5	401.5
Check		0	0	0	0	152.1	672.4
LSD (P=.05)		0	1.54	11.99	8.62	38.98	75.17
CV		0	489.9	17.05	10.94	28.20	21.44
Treatment F		0	1	43.84	138.38	22.63	113.83
Treatment Prob(F)		1	0.45	0.0001	0.0001	0.0001	0.0001

Table 2. The effect of Beyond herbicide rate on spring wheat plant density, biomass, yield and other agronomic variables in 2006 season.

Treatment	Rate	Plants	Biomass	Plant	Yield	Grain	Test	Dockage	Protein
	lb ai/ac	------- 7/3/06 -------		height		moisture	weight		
		No./m^2	g/m^2	cm	bu/ac	%	lb/bu	--------- % ----------	
Beyond 1X	0.047	231.3	813.8	88.8	53.3	10.1	62.1	0.5	14.1
Beyond 1/2X	0.0234	175.7	778.6	84.8	46.1	10.2	61.9	0.9	14.0
Beyond 1/4X	0.0117	140.1	707.1	87.0	48.1	9.9	61.9	4.0	13.8
Beyond 1/8X	0.00586	171.3	620.0	89.3	40.1	9.9	61.1	10.6	14.1
Beyond 1/16X	0.00293	192.4	549.9	88.8	33.2	9.8	60.6	13.9	14.4
Check		208.0	395.6	87.0	21.9	10.0	59.4	24.0	15.0
LSD (P=.05)		49.62	108.45	4.14	8.62	0.54	0.43	7	0.45
CV		17.66	11.17	3.14	14.14	3.62	0.47	51.68	2.11
Treatment F		3.70	18.85	1.50	15.92	0.76	53.57	15.25	7.79
Treatment Prob(F)		0.0223	0.0001	0.2475	0.0001	0.5941	0.0001	0.0001	0.0009

Project Title: Wild Buckwheat Control with Beyond in Clearfield Winter Wheat: Dose Response

Project Leaders: Bob Stougaard, Luther Talbert and Phil Bruckner

Project Personnel: Qingwu Xue

Objective: To evaluate the response of wild buckwheat to Beyond in the Clearfield winter wheat system

Results:

This experiment was conducted to determine the optimum rate of Beyond for wild buckwheat control in the Clearfield winter wheat system. Bynum Clearfield winter wheat was planted on September 22, 2005 at a seeding rate of 75 lb/ac in 6" rows to a depth of 1.5 inches. Wild buckwheat was planted between wheat rows at a rate of 20 plants per square foot before winter dormancy.

Treatments included five rates of Beyond (1X, 1/2X, 1/4X, 1/8X and 1/16X) and an untreated check. The herbicide treatments were applied on May 17, 2006 when the crop was at the early flag leaf stage and wild buckwheat plants were at the 3-5 leaf stage. The delayed herbicide application was due to the late population establishment of wild buckwheat. Herbicide treatments were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Winter wheat injury was significant when the herbicide was applied at the 1X rate. This injury likely occurred due to the late application timing. Nonetheless, Beyond provided very good wild buckwheat control and resulted in low weed biomass. Even at the 1/16X rate, wild buckwheat control was greater than 60%.

Herbicide rate had a significant effect on yield and grain quality. The 1X rate resulted in shorter plants, and lower yield and test weight as compared to other rates due to the associated crop injury. Treatment with Beyond did not affect winter wheat plant density or biomass.

Summary:

Beyond herbicide provided good control of wild buckwheat in winter wheat. Although herbicide efficacy was reduced at lower rates, the 1/16X rate still resulted in 65% weed control. The 1X rate resulted in crop injury and yield reduction. However this was attributed to the late application.

Table 1. Effect of winter wheat injury and wild buckwheat control in 2006 season.

Treatment	Rate lb ai/ac	Winter wheat % injury		Wild buckwheat % control		Wild buckwheat Plants No./m^2	Wild buckwheat Biomass g/m^2
		5/31/06	6/12/06	5/31/06	6/12/06	6/29/06	6/29/06
Beyond 1X	0.047	6.3	10.5	77.5	93.8	11.2	0.6
Beyond 1/2X	0.0234	3.8	1.3	75.0	87.5	29.5	1.9
Beyond 1/4X	0.0117	1.3	1.3	72.5	82.5	16.1	0.9
Beyond 1/8X	0.00586	0.0	1.3	52.5	70.0	17.3	1.9
Beyond 1/16X	0.00293	0.0	0.0	52.5	65.0	27.7	2.7
Check		0.0	0.0	0.0	0.0	34.1	16.0
LSD (P=.05)		3.62	4.52	12.90	10.10	15.17	3.54
CV		128.04	126.22	15.57	10.09	43.49	57.79
Treatment F		4.66	7.22	46.36	104.63	3.35	26.52
Treatment Prob(F)		0.0091	0.0013	0.0001	0.0001	0.0401	0.0001

Table 2. Effect of Beyond herbicide on winter wheat yield and agronomic performance in 2006 season.

Treatment	Rate	Plants	Biomass	Plant height	Yield	Grain moisture	Test weight	Protein	Dockage
	lb ai/ac	----- 6/29/06 -----							
		No./m^2	g/m^2	cm	bu/ac	%	lb/bu	%	%
Beyond 1X	0.047	211.3	1012.9	76.0	49.2	9.1	62.0	15.0	1.02
Beyond 1/2X	0.0234	194.6	1056.2	82.5	68.7	9.2	64.8	13.9	0.32
Beyond 1/4X	0.0117	198.0	1007.8	81.8	66.7	9.3	65.3	14.0	0.30
Beyond 1/8X	0.00586	225.8	910.5	83.3	69.0	9.2	65.7	13.8	0.32
Beyond 1/16X	0.00293	229.1	1175.7	83.3	74.2	9.3	65.7	13.6	0.26
Check		183.5	1092.2	85.3	71.8	9.4	65.4	13.4	0.37
LSD (P=.05)		60.87	235.79	8.15	9.96	0.20	0.53	0.93	0.196
CV		19.51	15.01	6.59	9.93	1.45	0.54	4.44	30.11
Treatment F		0.81	1.30	1.37	7.24	3.01	63.02	3.17	19.67
Treatment Prob(F)		0.562	0.3141	0.2909	0.0012	0.0447	0.0001	0.0376	0.0001

Project Title: Wild Oat Control by Beyond Herbicide in Clearfield Winter Wheat: Dose Response

Project Leaders: Bob Stougaard, Luther Talbert and Phil Bruckner

Project Personnel: Qingwu Xue

Objective: To evaluate the response of wild buckwheat to Beyond in the Clearfield winter wheat system.

Results:

This experiment was conducted to determine the optimum rate of Beyond for wild buckwheat control in the Clearfield winter wheat system. Bynum Clearfield winter wheat was planted on September 22, 2005 at a seeding rate of 75 lb/ac in 6" rows to a depth of 1.5 inches. Wild buckwheat was planted between wheat rows at a rate of 20 plants per square foot before winter dormancy.

Treatments included five rates of Beyond (1X, 1/2X, 1/4X, 1/8X and 1/16X) and an untreated check. The herbicide treatments were applied on May 17, 2006 when the crop was at the early flag leaf stage and wild oats were at the 3-5 leaf stage. The delayed herbicide application was due to the late establishment of wild oat. Herbicide treatments were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

The delayed herbicide application resulted in unacceptable crop injury at rates greater than 1/4X. The 1/2X and 1X rates generally provided good wild oat control (>90%) and resulted in very low wild oat biomass. However, herbicide efficacy declined as application rates decreased. Overall, wild oat biomass was minor owing to the combined effects of late wild oat establishment plus a well developed winter wheat canopy. Wild oat biomass in the untreated check was only 21 g/m^2 in winter wheat as compared to 672 g/m^2 in spring wheat.

Beyond affected winter wheat height, yield, test weight, and protein content. The higher herbicide rates (>1/2X) resulted in shorter plants, lower yield and test weight, but higher protein. Treatments did not impact wheat density, biomass, grain moisture, or dockage.

Summary:

Beyond herbicide provided good control of wild oat in winter wheat. The 1X rate resulted in unacceptable crop injury and resulted in a significant yield reduction. While this may be attributed to the late application, it also high lights the need to incorporate two herbicide resistant genes into winter wheat.

(edited 5-9-08)

Table 1. Effect of Beyond herbicide rates on winter wheat injury and wild oat control in 2006.

Treatment	Rate	Winter wheat		Wild oat			
	lb ai/ac	% injury		% control		Plants	Biomass
						No./m²	g/m²
		5/31/06	6/12/06	5/31/06	6/12/06	------ 6/29/06 ------	
Beyond 1X	0.047	10.0	6.3	55.0	93.8	23.0	0.7
Beyond 1/2X	0.0234	6.3	3.8	55.0	91.3	71.9	2.6
Beyond 1/4X	0.0117	5.0	1.3	50.0	67.5	101.4	5.1
Beyond 1/8X	0.00586	1.3	0.0	37.5	45.0	176.1	12.4
Beyond 1/16X	0.00293	0.0	0.0	30.0	32.5	167.8	14.5
Check		0.0	0.0	0.0	0.0	174.2	20.9
LSD (P=.05)		5.39	3.62	12.07	7.9	66.19	4.77
CV		95.32	128.04	21.13	9.53	36.89	33.8
Treatment F		5.09	4.66	27.81	192.09	8.467	24.631
Treatment Prob(F)		0.0063	0.0091	0.0001	0.0001	0.0006	0.0001

Table 2. Effect of Beyond herbicide rates on winter wheat plant density, biomass, yield and grain quality in 2006.

Treatment	Rate	Plants	Biomass	Plant	Yield	Grain	Test	Protein	Dockage
	lb ai/ac	------ 6/29/06 ------		height		moisture	weight		
		No./m^2	g/m^2	cm	bu/ac	%	lb/bu	%	%
Beyond 1X	0.047	213.5	977.8	65.8	41.7	9.4	61.8	15.4	1.01
Beyond 1/2X	0.0234	214.6	912.9	75.0	56.1	9.1	64.2	14.3	0.47
Beyond 1/4X	0.0117	195.7	799.2	75.5	57.1	9.2	65.4	14.0	0.69
Beyond 1/8X	0.00586	263.6	993.4	75.5	60.9	9.3	65.7	14.0	0.75
Beyond 1/16X	0.00293	233.5	1011.5	81.0	64.5	9.3	65.8	13.8	0.49
Check		241.3	960.0	80.8	62.8	9.2	65.9	13.6	0.72
LSD (P=.05)		93.78	234.17	6.33	11.63	0.31	0.71	0.69	0.463
CV		27.41	16.49	5.56	13.5	2.24	0.72	3.23	44.66
Treatment F		0.60	1.00	6.941	4.563	0.41	44.98	8.29	1.64
Treatment Prob(F)		0.702	0.4486	0.0015	0.0099	0.8354	0.0001	0.0006	0.21

Project Title: Effect of Auxinic Herbicides on Peppermint Tolerance

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate the mint tolerance to different auxinic herbicides

Results:

This is the third year of study which evaluates mint tolerance to different auxinic herbicides. The study was conducted in an established field of Black Mitchum peppermint, planted in the fall of 2000. The treatments included 3 application rates of Banvel, Tordon, Garlon, Stinger and Starane, and an untreated check. The herbicides were applied at 0.125, 0.25, and 0.5 lb ai/ac on May 22, 2006 when the crop was 5-10 inches tall. The treatments were applied using a CO_2 backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Crop injury was evaluated by visually assessing the degree of stunting and discoloration. Stunting and discoloration were minimal (<5%) in the treatments with Stinger. However, stunting was significant, and increased with rate, for all other herbicides. Except for the high rate of Banvel, stunting generally decreased as the season progressed. Nonetheless, the high rate of Banvel, Tordon and Starane still resulted in more than 10% stunting at nine weeks after application. Plants treated with Banvel and Tordon showed discoloration at nine weeks after application.

While visual injury symptoms were significant, the high rate of Tordon was the only treatment to negatively impact mint biomass. In turn, Tordon applied at the high rate produced the lowest oil yield. In general, mint plants treated with Banvel and Tordon had lower oil yield than other treatments. Garlon, Stinger and Starane did not affect mint oil yield.

Summary:

The mint generally had good tolerance to Banvel, Tordon, and Starane when applied at medium to low rates (0.125-0.25 lb ai/ac). The crop had excellent tolerance to Stinger and Garlon even at the high rate (0.5 lb ai/ac).

Table 1. Effects of Banvel, Tordon, Garlon, Stinger and Starane on mint injury, yield and oil content in 2006.

Trt No.	Treatment Name	Rate lb ai/ac	Crop injury (%) Stunting 6/5/06	Stunting 6/19/06	Stunting 7/25/06	Discoloration 6/5/06	Discoloration 6/19/06	Discoloration 7/25/06	Height cm 7/10/06	Biomass ton/ac 8/1/06	Oil yield lb/ac 8/1/06
1	Banvel SGF	0.125	8.3	13.3	8.3	6.7	18.3	3.3	59.3	2.0	27.3
2	Banvel SGF	0.250	8.3	15.0	10.0	8.3	23.3	5.0	60.7	2.6	23.2
3	Banvel SGF	0.500	15.0	15.0	18.3	10.0	38.3	5.0	58.3	2.4	24.5
4	Tordon 22K	0.125	8.3	11.7	6.7	5.0	13.3	3.3	66.7	2.1	29.7
5	Tordon 22K	0.250	10.0	21.7	3.3	16.7	23.3	5.0	59.0	2.5	32.2
6	Tordon 22K	0.500	21.7	28.3	15.0	33.3	33.3	8.3	53.7	1.4	21.6
7	Garlon	0.125	8.3	6.7	5.0	5.0	8.3	0.0	64.3	2.6	30.8
8	Garlon	0.250	13.3	16.7	3.3	5.7	10.0	0.0	64.0	2.9	44.2
9	Garlon	0.500	23.3	40.0	6.7	16.7	8.3	0.0	54.7	3.0	41.0
10	Stinger	0.125	1.7	0.0	1.7	0.0	0.0	0.0	67.3	2.4	36.7
11	Stinger	0.250	1.7	1.7	1.7	0.0	1.7	0.0	75.7	3.1	43.0
12	Stinger	0.500	3.3	5.0	3.3	0.0	6.7	0.0	72.0	2.8	37.6
13	Starane	0.125	8.3	6.7	5.0	5.0	0.0	0.0	68.3	2.3	39.3
14	Starane	0.250	11.7	13.3	3.3	16.7	3.3	0.0	68.7	2.7	51.9
15	Starane	0.500	23.3	40.0	11.7	33.3	15.0	0.0	50.3	2.1	43.4
16	Untreated		0.0	0.0	0.0	0.0	0.0	0.0	77.0	2.6	42.1
LSD (P=.05)			8.04	8.83	6.21	6.25	8.95	2.08	8.9	0.66	18.4
CV			46.27	36.04	57.7	36.92	42.22	66.67	8.37	16.1	31.07
Treatment F			7.10	16.82	5.59	24.65	14.74	14.13	6.31	3.36	1.9
Treatment Prob(F)			0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0023	0.0656

Project Title: Effects of Plant Growth Regulators (PGRs) on Spring Wheat Stem Solidness and Agronomic Performance

Project Leaders: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate PGRs effects on spring wheat stem solidness

Results:

Five PGRs (Cerone, Palisade, Apogee, Cycocel, and Trimmit), and two fungicides (Tilt and Headline), were evaluated for their effects on spring wheat stem solidness and agronomic performance. Scholar spring wheat was planted on April 28, 2006 at a seeding rate of 75 lb/ac, in 7" rows to a depth of 1.5 inches. All compounds were applied on June 20, during the boot stage, using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Treatment effects on stem solidness were significant. All of the compounds evaluated, except for Headline and Cerone, increased stem solidness when compared to the nontreated check. The relative treatment rankings for stem solidness were as follows: Palisade>Apogee>Cycocel>Trimmit=Tilt.

All PGRs reduced plant height and delayed heading, with Palisade resulting in the greatest effect. However, Palisade treatments also reduced yields. All other treatments produced yields similar to the untreated check. None of the treatments affected spike length, grain moisture, test weight or 1000 kernel weight (TKW).

Summary:

Several compounds could be used to successfully increase stem solidness in spring wheat. However, additional research should be done with Palisade in an effort to minimize yield reductions.

Table 1. Effects of PGRs and fungicides on spring wheat stem solidness in 2006 season.

Trt No.	Treatment	Rate lb ai/ac	Stem solidness					
			Internodes					Total
			1	2	3	4	5	
			1-5	1-5	1-5	1-5	1-5	5-25
1	Cerone	0.375	2.6	1.8	1.9	1.8	1.6	9.6
2	Palisade	0.375	3.2	2.6	2.6	2.5	3.5	14.4
3	Apogee	0.137	3.0	2.4	2.5	2.2	2.6	12.8
4	Cycocel	0.500	2.7	2.0	2.3	2.1	2.4	11.4
5	Trimmit	0.250	2.7	2.1	2.4	1.9	1.6	10.6
6	Tilt	0.112	3.1	1.9	2.4	2.2	1.2	10.9
7	Headline	0.100	2.5	1.7	2.0	1.9	1.5	9.5
8	Untreated		2.0	1.5	2.1	1.6	1.2	8.5
	LSD (P=.05)		0.72	0.36	0.49	0.56	0.59	2.01
	CV		15.11	10.2	12.3	15.89	17.29	10.45
	Treatment F		2.72	9.37	2.78	2.51	17.36	8.42
	Treatment Prob(F)		0.053	0.0002	0.0492	0.0678	0.0001	0.0004

Table 2. Effects of PGRs and fungicides on spring wheat yield and agronomic performance in 2006 season.

Trt No.	Treatment	Rate lb ai/ac	Plant height	Lodging	Heading	Spike length	Yield	Grain moisture	Test weight	TKW
			cm	%	Julian	mm	bu/ac	%	lb/bu	g
1	Cerone	0.375	94.3	0	180.3	91.7	65.1	14.5	60.0	35.1
2	Palisade	0.375	69.0	0	182.3	93.4	48.0	16.0	58.6	33.3
3	Apogee	0.137	88.0	0	181.0	94.1	64.0	15.8	59.4	36.7
4	Cycocel	0.500	88.3	0	180.7	88.3	60.5	14.4	59.1	35.5
5	Trimmit	0.250	98.3	0	180.0	97.2	63.8	14.9	59.4	35.0
6	Tilt	0.112	105.0	0	179.0	89.0	64.3	14.9	59.3	35.9
7	Headline	0.100	106.0	0	179.0	91.2	63.9	14.8	59.0	35.9
8	Untreated		108.3	0	179.3	92.7	63.3	15.1	59.6	37.4
	LSD (P=.05)		7.52	0	1	5.83	7.19	1.25	1.54	2.91
	CV		4.54	0	0.32	3.61	6.67	4.76	1.49	4.67
	Treatment F		27.41	0	11.91	2.21	5.67	1.84	0.64	1.59
	Treatment Prob(F)		0.0001	1	0.0001	0.0978	0.0029	0.158	0.7187	0.2167

Project Title: Evaluation of Prowl H_2O in Spring Wheat

Project Leaders: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate Prowl H_2O for wild oat control and crop tolerance

Results:

This study was conducted to evaluate crop tolerance and weed control efficacy of Prowl H2O in spring wheat. Clearfield spring wheat (cv. Gunner 2-gene) was planted on May 5, 2006 at a seeding rate of 70 lb/ac, in 6” rows at a depth of 1.5 inches. Wild oat was then planted in the center of each plot at a density of 25 seeds per square foot. Preemergence applications of Prowl H2O were applied the same day. Postemergence applications were made on May 25, 2006 when the crop was at the 4-leaf stage. All treatments were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Crop injury was not observed with any of the treatments. Although preemergence applications of Prowl H2O did not cause any crop injury, wild oat control was inadequate. Beyond plus MCPA afforded excellent control of wild oat. There were no antagonistic effects between Prowl H_2O, Beyond, MCPA ester, or Headline.

Summary:

It appears that Prowl H_2O can be used in spring wheat without causing crop injury. However, wild oat control was inadequate when applied alone.

Table 1. Effects of Prowl H_2O applied alone and mixed with Beyond and other tank mix partners on crop injury, wild oat control and yield in Clearfield spring wheat grown in 2006 at Kalispell, MT.

Trt	Treatment	Rate	Appl	Crop injury (%)			Wild oat control (%)			Yield
No.		lb ai/ac		6/5/06	6/19/06	8/3/06	6/5/06	6/19/06	8/3/06	bu/ac
1	Untreated			0	0	0	0	0	0	30.6
2	Prowl H_2O	0.950	A	0	0	0	46.7	73.3	46.7	42.3
3	Beyond	0.039	B	0	0	0	76.7	98.3	98.3	58.3
	MCPA ester	0.297	B							
4	Prowl H_2O	0.950	A	0	0	0	90.0	100.0	99.0	57.7
	Beyond	0.039	B							
	MCPA ester	0.297	B							
5	Prowl H_2O	0.950	A	0	0	0	88.3	100.0	99.0	57.5
	Beyond	0.039	B							
	MCPA ester	0.297	B							
	Headline	0.098								
6	Prowl H_2O	0.950	B	0	0	0	70.0	100.0	98.0	55.3
	Beyond	0.039	B							
	MCPA ester	0.297	B							
	LSD (P=.05)			0	0	0	6.57	4.6	5.82	7.31
	CV			0	0	0	5.83	3.22	4.35	7.99
	Treatment F			0	0	0	268.19	748.39	506.56	23.94
	Treatment Prob(F)			1	1	1	0.0001	0.0001	0.0001	0.0001

A: pre-emergence application; B: post-emergence application.

Project Title: Roundup Ready Alfalfa Trial

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate crop tolerance and weed control with Roundup in Roundup Ready alfalfa

Results:

This study was conducted to evaluate crop tolerance and weed control efficacy of Roundup in the Roundup Ready alfalfa system. Roundup Ready alfalfa (cv. DKA41-18RR) was planted on May 9, 2006 at a seeding rate of 14.2 lb/ac, in 7-inch rows, to a depth of 1 inch. High densities of pennycress, witchgrass, redroot pigweed, and common lambsquarters were present throughout the site. Herbicides were applied using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA.

Roundup Ready alfalfa demonstrated excellent crop tolerance to Roundup, regardless of the rate or application timing. In contrast, Buctril plus Select resulted in significant crop injury one week after application.

Roundup WM provided excellent control of all weeds regardless of application rate and timing. Raptor also provided good weed control. However, Buctril plus Select provided unacceptable control of most weed present.

There were no differences in alfalfa dry weights between treatments at either harvest, except for treatments with Buctril and Select. In this instance, alfalfa dry weight was significantly lower due to poor redroot pigweed control. No weeds were found in plots treated with Roundup WM in either harvest.

Summary:

Roundup WM provided excellent weed control regardless of the rate applied or growth stage.

Table 1. Effect of Roundup WM on crop injury and chlorosis in Roundup ready alfalfa during 2006 season.

Trt	Treatment	Rate	Appl	Crop injury (%)					Chlorosis (%)				
No.	Name	lb ai/ac		6/12/06	6/19/06	6/28/06	7/5/06	7/11/06	6/12/06	6/19/06	6/28/06	7/5/06	7/11/06
1	Untreated			0	0	0	0	0	0	0	0	0	0
2	Roundup WM	0.75	A	1.3	0	1.3	0	0	1.3	0	1.3	0	0
	Roundup WM	0.75	B										
3	Roundup WM	1.50	A	3.8	0	0	1.3	0	2.5	0	0	0	0
	Roundup WM	1.50	B										
4	Roundup WM	0.75	C		0	0	1.3	0		0	0	0	0
5	Roundup WM	1.50	C		0	0	0	0		0	0	0	0
6	Buctril	0.25	C		20	5	6	4.3		10	1.3	0	0
	Select	0.094	C										
7	Raptor	0.0312	C		2.5	0	1.3	1.3		2.5	0	0	0
LSD (P=.05)				3.2	1.6	2.7	2.7	1.6	3.2	1.6	2.0	0	0
CV				111.8	34.0	202.7	129.4	136.8	149.1	61.1	384.4	0	0
Treatment F				4.2	187.0	4.3	5.6	8.8	1.8	47.0	0.8	0	0
Treatment Prob(F)				0.0723	0.0001	0.0075	0.002	0.0001	0.2441	0.0001	0.5897	1	1

Roundup WM: Roundup WeatherMax; A: 1-2 trifoliate; B: three weeks after 1-2 trifoliate application; C: 3-4 trifoliate.

Table 2. Effect of Roundup WM on crop stunting and penny cress control in Roundup ready alfalfa during 2006 season.

Trt	Treatment	Rate	Appl	Stunting (%)					Penny cress control (%)				
No.	Name	lb ai/ac	Code	6/12/06	6/19/06	6/28/06	7/5/06	7/11/06	6/12/06	6/19/06	6/28/06	7/5/06	7/11/06
1	Untreated			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Roundup WM	0.75	A	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0	100.0
	Roundup WM	0.75	B										
3	Roundup WM	1.50	A	1.3	0.0	0.0	1.3	0.0	100.0	100.0	100.0	100.0	100.0
	Roundup WM	1.50	B										
4	Roundup WM	0.75	C		0.0	0.0	1.3	0.0		92.5	100.0	95.0	100.0
5	Roundup WM	1.50	C		0.0	0.0	0.0	0.0		93.8	100.0	100.0	100.0
6	Buctril	0.25	C		10.0	3.8	5.5	4.3		85.0	50.0	50.0	58.8
	Select	0.094	C										
7	Raptor	0.0312	C		0.0	0.0	1.3	1.3		50.0	62.5	92.5	100.0
LSD (P=.05)				2.5	0	1.4	2.61	1.6	0	3.94	11.11	13.85	19.5
CV				346.41	0	176.38	132.8	136.77	0	3.56	10.22	12.14	16.45
Treatment F				1	0	9	4.918	8.835	0	781.39	105.85	67.58	34.244
Treatment Prob(F)				0.4219	1	0.0001	0.004	0.0001	1	0.0001	0.0001	1E-04	0.0001

Roundup WM: Roundup WeatherMax; A: 1-2 trifoliate; B: three weeks after 1-2 trifoliate application; C: 3-4 trifoliate.

Table 3. Effect of Roundup WM on witchgraa, redroot pigweed and lambsquarters control in Roundup ready alfalfa during 2006 season.

Trt	Treatment	Rate	Appl	Witchgrass control (%)					Redroot pigweed control (%)					Lambsquarters control (%)		
No.	Name	lb ai/ac		6/12/06	6/19/06	6/28/06	7/5/06	7/11/06	6/12/06	6/19/06	6/28/06	7/5/06	7/11/06	6/28/06	7/5/06	7/11/06
1	Untreated			0	0	0	0	0	0	0	0	0	0	0	0	0
2	Roundup WM	0.75	A	100	100	100	100	100	100	100	100	100	100	100	100	100
	Roundup WM	0.75	B													
3	Roundup WM	1.50	A	100	100	100	100	100	100	100	100	100	100	100	100	100
	Roundup WM	1.50	B													
4	Roundup WM	0.75	C		93.8	100	97.5	100		93.8	100	100	100	100	95	100
5	Roundup WM	1.50	C		95	100	100	100		95	100	100	100	100	100	100
6	Buctril	0.25	C		83.8	85	87.5	77.5		73.8	8.8	7.5	0	75	77.5	47.5
	Select	0.094	C													
7	Raptor	0.0312	C		42.5	86.3	95	98.8		70	72.5	100	100	82.5	95	100
LSD (P=.05)				0	7.11	8.94	5.21	11.83	0	21.46	19.78	2.81	0	19.79	14.04	23.1
CV				0	6.51	7.37	4.23	9.67	0	18.99	19.37	2.61	0	16.72	11.66	19.88
Treatment F				0	254.4	148.13	440.6	87.498	0	24.429	46.054	2476	0	30.181	60.093	26.025
Treatment Prob(F)				1	0.0001	0.0001	1E-04	0.0001	1	0.0001	0.0001	1E-04	1	0.0001	0.0001	0.0001

Roundup WM: Roundup WeatherMax; A: 1-2 trifoliate; B: three weeks after 1-2 trifoliate application; C: 3-4 trifoliate.

Table 4. Effect of Roundup WM on alfalfa stands, dry weight and botanical ratio at two harvests during 2006 season.

Trt No.	Treatment Name	Rate lb ai/ac	Appl	First cut (7/28/06) Stands No./m²	First cut Dry weight (ton/ac) alfalfa	First cut Dry weight (ton/ac) weeds	First cut Botanical ratio alfalfa	First cut Botanical ratio weeds	Second cut (9/25/06) Stands No./m²	Second cut Dry weight (ton/ac) alfalfa	Second cut Dry weight (ton/ac) weeds	Second cut Botanical ratio alfalfa	Second cut Botanical ratio weeds
1	Untreated			248.9	1.38	0.61	0.73	0.27	250.7	0.76	0.02	0.98	0.03
2	Roundup WM	0.75	A	202.8	1.45	0.00	1.00	0.00	274.7	0.87	0.00	1.00	0.00
	Roundup WM	0.75	B										
3	Roundup WM	1.50	A	232.3	1.60	0.00	1.00	0.00	252.6	0.82	0.00	1.00	0.00
	Roundup WM	1.50	B										
4	Roundup WM	0.75	C	228.6	1.51	0.00	1.00	0.00	260.0	0.87	0.01	0.99	0.01
5	Roundup WM	1.50	C	226.8	1.44	0.00	1.00	0.00	230.4	0.81	0.00	1.00	0.00
6	Buctril	0.25	C	234.1	1.10	0.52	0.71	0.29	267.3	0.67	0.02	0.96	0.04
	Select	0.094	C										
7	Raptor	0.0312	C	225.0	1.38	0.01	0.99	0.01	248.9	0.82	0.00	1.00	0.00
LSD (P=.05)				48.91	0.268	0.494	0.21	0.21	29.9	0.133	0.026	0.035	0.035
CV				14.42	12.78	15.37	170.97	162.19	7.89	11.21	246.15	2.37	226.27
Treatment F				0.7	3.013	2.779	3.811	3.811	2.022	2.458	1.359	1.633	1.63
Treatment Prob(F)				0.6535	0.0322	0.0431	0.0126	0.0126	0.1154	0.0649	0.2832	0.1954	0.1962

Roundup WM: Roundup WeatherMax; A: 1-2 trifoliate; B: three weeks after 1-2 trifoliate application; C: 3-4 trifoliate.

Table 5. Effect of Roundup WM on major quality parameters in Roundup ready alfalfa at first harvest during 2006 season.

Trt	Treatment	Rate	Appl	CP	ADF	NDF	ADL	IVTD	NDFD	TDN	RFV	RFQ	ASH	Milk/T
No.	Name	lb ai/ac	code	%										lb/ton
1	Untreated			19.9	33.4	40.6	6.8	77.4	40.8	59.0	144.3	136.5	9.9	2683.8
2	Roundup WM	0.75	A	20.8	35.2	41.5	6.7	76.3	40.2	58.5	138.0	131.5	9.6	2637.5
	Roundup WM	0.75	B											
3	Roundup WM	1.50	A	21.1	34.3	40.3	6.3	77.3	41.0	59.2	144.0	138.5	10.0	2690.3
	Roundup WM	1.50	B											
4	Roundup WM	0.75	C	20.1	35.5	41.8	6.7	76.2	40.6	58.6	136.5	131.5	9.6	2645.5
5	Roundup WM	1.50	C	20.8	35.5	41.6	6.7	76.4	40.8	58.4	137.3	132.0	9.8	2636.3
6	Buctril	0.25	C	20.4	33.3	39.2	6.2	78.5	41.9	60.2	150.0	146.3	9.9	2775.0
	Select	0.094	C											
7	Raptor	0.0312	C	20.2	35.5	41.5	6.7	76.0	39.8	58.6	137.3	131.0	9.4	2640.3
LSD (P=.05)				1.85	2.22	2.50	0.73	2.42	2.44	1.54	12.58	14.59	0.90	126.59
CV				6.08	4.31	4.11	7.43	2.12	4.02	1.76	6.00	7.26	6.21	3.19
Treatment F				0.50	1.72	1.32	0.78	1.19	0.65	1.46	1.47	1.31	0.49	1.40
Treatment Prob(F)				0.80	0.17	0.30	0.60	0.36	0.69	0.25	0.24	0.30	0.80	0.27

Roundup WM: Roundup WeatherMax; A: 1-2 trifoliate; B: three weeks after 1-2 trifoliate application; C: 3-4 trifoliate.
CP: Crude Protein; ADF: Acid Detergent Fiber; NDF: Neutral Detergent Fiber; ADL: Acid Detergent Lignin; IVTD: In-vitro True Digestibility; NDFD: NDF Digestibility; TDN: Total Digestible Nutrients; RFV: Relative Feed Value; RFQ: Relative Forage Quality; ASH: Ash; Milk/T: Pounds of Milk per ton of feed.

Project Title: Herbicide Injury Potential to Montana Spring Wheat Varieties

Project Leaders: Bob Stougaard and Steve King

Project Personnel: Qingwu Xue

Objective: To evaluate herbicide tolerance among genetically diverse spring wheats

Results:

Eight spring wheats were evaluated for their tolerance to Everest and Silverado. Non-treated controls were included for each cultivar in order to assess crop damage. This study was conducted at Kalispell and Huntley, Montana. At Kalispell, the cultivars were planted on April 19, 2006 at a seeding rate of 90 lb/ac in 6" rows to a depth of 2 inches. At Huntley, the cultivars were planted on April 15, 2006 at a seeding rate of 100 lb/ac. Everest and Silverado were applied on May 19, 2006 at Huntley and on May 16, 2006 at Kalispell. At the time of application, wheat plants were about 4 inches tall and at the 4-leaf stage at both locations.

Both Silverado and Everest caused crop injury at Kalispell. Symptoms were generally more severe with Silverado. Injury symptoms mainly took the form of stunting, with herbicide effects being most evident at the June 23 rating (Table 1). Height reductions were observed with all cultivars, but more so for Choteau and MTHW0202. For these cultivars, plant heights were reduced by approximately 10 cm. The heights of Outlook, MT0260 and MT0245 were hardly affected.

The yields of Outlook, MT0260 and MT0245 were unaffected by the herbicide treatments (Table 2). The yields of all other cultivars were reduced by at least 8 bu/A. The negative effect of herbicide applications on yield was especially apparent for Choteau and MTHW0202. For these two cultivars, herbicide applications reduced yields by approximately 14 bu/A. Yield reductions of 14 bu/A were also observed with McNeal, even though stunting was less apparent. Overall, there was a strong association between stunting and yield loss.

Results differed somewhat at Huntley (Table 3). Generally, injury was less at Huntley compared to Kalispell. Further, while Silverado caused the greatest injury at Kalispell, Everest was the most phytotoxic herbicide at Huntley. There was general agreement between the two locations regarding cultivar susceptibility, with injury being most severe for Choteau, followed by MTHW0202 and McNeal. Yields were variable at Huntley and herbicide effects were not apparent.

Summary:

The extent of herbicide-induced crop injury varied by location, with damage being more apparent at Kalispell than Huntley. Silverado was generally more phytotoxic at Kalispell, while Everest caused the greatest degree of injury at Huntley. However, there was general agreement between the two locations regarding cultivar susceptibility, with injury being most severe for Choteau, MTHW0202 and McNeal.

Table 1. Crop injury and plant height in spring wheat cultivars as influenced by Everest and Silverado herbicides at Kalispell, MT during 2006 season.

Cultivar	Treatment	Crop injury			Plant height (cm)			
		%	%	%				
		5/23/06	5/30/06	6/12/06	5/30/06	6/13/06	6/23/06	7/19/06
Choteau	Untreated	0.0	0.0	0.0	21.4	44.0	62.3	87.5
	Everest	25.0	15.0	11.8	16.6	39.0	52.5	82.3
	Silverado	35.0	15.0	13.0	18.3	38.8	55.3	83.0
Hank	Untreated	0.0	0.0	0.0	22.6	46.5	65.5	86.8
	Everest	16.3	11.3	8.8	19.9	45.3	60.5	85.5
	Silverado	20.0	12.5	7.5	18.3	45.5	62.0	85.0
McNeal	Untreated	0.0	0.0	0.0	18.6	44.3	63.3	93.5
	Everest	17.5	11.3	10.0	19.6	41.3	59.0	90.3
	Silverado	22.5	12.5	8.0	18.3	42.8	57.5	86.8
Outlook	Untreated	0.0	0.0	0.0	17.4	39.3	58.0	90.3
	Everest	18.8	8.8	13.0	13.9	37.3	55.3	87.8
	Silverado	18.8	13.8	10.0	17.0	39.5	57.3	89.8
Reeder	Untreated	0.0	0.0	0.0	23.4	48.8	68.0	93.0
	Everest	16.3	11.3	6.3	20.9	43.8	62.0	93.0
	Silverado	17.5	11.3	5.5	22.6	47.3	62.5	88.3
MT0245	Untreated	0.0	0.0	0.0	20.6	45.8	60.8	92.0
	Everest	15.0	8.8	6.3	19.4	43.5	58.3	93.3
	Silverado	16.3	12.5	7.5	22.3	45.3	59.8	91.0
MT0260	Untreated	0.0	0.0	0.0	23.3	43.5	62.3	92.0
	Everest	11.3	10.0	6.8	21.1	44.3	59.3	93.3
	Silverado	15.0	12.5	8.8	21.6	43.8	58.8	90.8
MTHW0202	Untreated	0.0	0.0	0.0	22.6	51.3	70.5	87.0
	Everest	15.0	11.3	11.3	20.9	45.8	59.8	84.5
	Silverado	17.5	15.0	8.8	21.9	46.0	62.0	85.0
LSD (0.05)	Herbicide (A)	2.7	2.3	2.5	1.1	1.2	1.7	1.6
	Cultivar (B)	4.4	NS	NS	1.8	2.0	2.8	2.6
	AxB	NS	NS	NS	NS	NS	NS	NS

NS: Not significant (P>0.05).

Table 2. Chlorophyll content (SPAD), yield and other agronomic data in spring wheat cultivars as influenced by Everest and Silverado herbicides at Kalispell, MT during 2006.

Cultivar	Treatment	SPAD		Stripe rust	Heading	Yield	Grain Moisture	Test weight	Protein
				%	Julian	bu/ac	%	lb/bu	%
		6/13/06	7/6/06	6/22/06		---- 8/7/06 ----			
Choteau	Untreated	47.9	46.7	7.5	169.3	84.0	10.0	61.9	14.5
	Everest	47.1	43.7	9.5	171.5	72.4	9.9	61.3	14.8
	Silverado	46.7	46.4	6.8	170.8	70.1	10.1	60.4	14.9
Hank	Untreated	48.0	46.1	6.5	166.8	81.6	10.1	59.4	13.2
	Everest	49.1	46.2	5.0	167.8	74.2	10.2	58.6	13.4
	Silverado	47.5	46.8	5.3	168.3	71.5	10.2	59.1	13.2
McNeal	Untreated	45.8	44.7	13.8	172.3	70.9	10.0	59.7	13.2
	Everest	47.4	46.4	16.3	172.8	65.2	10.3	58.9	13.3
	Silverado	44.7	44.5	18.8	174.3	56.2	9.8	58.0	14.2
Outlook	Untreated	42.0	45.3	13.8	174.5	73.7	10.3	59.7	13.3
	Everest	43.2	44.1	13.8	174.5	71.9	10.5	58.5	13.5
	Silverado	42.2	43.2	12.5	175.0	75.2	10.8	59.1	13.3
Reeder	Untreated	42.8	43.9	5.3	168.5	90.2	11.6	61.8	14.0
	Everest	43.1	43.6	5.3	169.3	83.1	11.9	60.8	14.4
	Silverado	41.6	43.8	8.0	169.5	82.4	12.2	61.3	14.3
MT0245	Untreated	40.0	42.7	7.8	171.5	90.1	11.1	61.6	13.5
	Everest	38.5	41.4	6.3	172.5	88.2	11.1	61.4	13.6
	Silverado	39.1	40.8	9.0	171.8	90.3	12.0	61.0	13.5
MT0260	Untreated	44.3	45.9	11.0	172.3	85.8	11.9	61.0	12.5
	Everest	44.7	46.2	16.3	172.5	82.3	12.1	60.6	12.8
	Silverado	45.7	45.1	14.5	173.8	81.2	11.9	60.7	12.8
MTHW0202	Untreated	49.0	45.5	2.8	164.0	87.0	10.0	62.2	12.9
	Everest	48.1	48.4	3.0	164.8	71.6	9.5	61.4	13.2
	Silverado	47.0	48.9	6.3	164.3	74.8	9.8	61.9	13.1
LSD (0.05)	Herbicide (A)	NS	NS	NS	0.4	3.5	NS	0.4	0.1
	Cultivar (B)	1.8	2.1	4.3	0.7	5.7	0.5	0.6	0.2
	AxB	NS	NS	NS	NS	NS	NS	NS	0.4

NS: Not significant (P>0.05).

Table 3. Crop injury, yield and grain quality in spring wheat cultivars as influenced by Everest and Silverado herbicides at Huntley, MT during 2006 season.

Cultivar	Treatment	Crop injury (%)					Yield	Test weight	Grain moisture	Protein
		5/26/06	6/2/06	6/9/06	6/16/06	7/14/06	bu/ac	lb/bu	%	%
Choteau	Untreated	0.0	0.0	0.0	0.0	0.0	94.1	62.9	9.7	12.7
	Everest	30.0	33.8	28.8	25.0	18.8	96.1	63.6	9.8	12.2
	Silverado	1.3	2.5	0.0	0.0	0.0	106.1	63.1	9.7	12.3
Hank	Untreated	0.0	0.0	0.0	0.0	0.0	113.6	62.1	9.5	11.9
	Everest	0.0	0.0	0.0	0.0	0.0	118.3	61.9	9.6	11.6
	Silverado	0.0	0.0	0.0	0.0	0.0	110.0	61.8	9.4	11.7
McNeal	Untreated	0.0	0.0	0.0	0.0	0.0	103.0	61.3	9.4	11.8
	Everest	16.7	18.4	11.7	10.0	8.4	100.1	60.3	9.5	12.9
	Silverado	2.5	0.0	0.0	0.0	0.0	95.7	61.1	9.3	12.6
Outlook	Untreated	0.0	0.0	0.0	0.0	0.0	95.9	62.2	9.3	11.5
	Everest	16.3	13.8	6.3	4.3	3.8	91.9	62.0	9.4	11.9
	Silverado	0.0	1.3	0.0	0.0	0.0	113.9	61.4	9.5	11.9
Reeder	Untreated	0.0	0.0	0.0	0.0	0.0	100.9	63.3	9.8	12.0
	Everest	9.5	7.8	5.8	5.8	6.3	95.1	63.5	9.8	11.7
	Silverado	0.0	0.0	0.0	0.0	0.0	110.0	63.2	9.6	12.4
MT0245	Untreated	0.0	0.0	0.0	0.0	0.0	110.1	62.6	10.0	11.2
	Everest	7.8	7.5	3.3	4.5	5.0	83.2	62.6	10.0	11.7
	Silverado	1.3	1.3	0.0	0.0	0.0	98.3	62.4	9.9	11.8
MT0260	Untreated	0.0	0.0	0.0	0.0	0.0	90.6	63.0	10.6	11.3
	Everest	10.0	7.5	2.5	2.0	2.0	120.7	62.7	10.9	11.7
	Silverado	0.0	0.0	0.0	0.0	0.0	88.1	63.1	10.1	11.1
MTHW0202	Untreated	0.0	0.0	0.0	0.0	0.0	78.9	62.7	9.9	12.0
	Everest	8.3	7.0	10.5	9.5	7.0	93.4	63.5	9.7	11.6
	Silverado	0.0	0.0	0.0	0.0	0.0	93.7	64.0	9.8	11.6
LSD (0.05)	Herbicide (A)	1.2	1.1	1.2	1.1	1.0	NS	NS	NS	
	Cultivar (B)	1.9	1.8	2.0	1.8	1.6	12.6	0.9	0.3	
	AxB	3.3	3.1	3.4	3.0	2.8	21.9	NS	NS	

NS: Not significant (P>0.05).

Project Title: White Cockle Control by Auxinic Herbicides

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate auxinic herbicides for white cockle control

Results:

This study was conducted to evaluate auxinic herbicides for the control of white cockle. White cockle was seeded on May 5, 2005 to insure adequate perennial weed pressure. Treatments included four auxinic herbicides (Clarity, Tordon, Garlon and Starane) applied at three rates (0.125, 0.25 and 0.5 lb ai/ac) and an untreated check, totaling 13 treatments. The herbicides were applied on April 21, 2006 using a CO_2 backpack sprayer in 20 GPA of water using XR11002 nozzles. At application, there were abundant established plants (1-2" tall and 5" in diameter) and a high-density of newly-emerged seedlings.

All auxinic herbicides resulted in weed injury, ranging from 23% to 80% for perennials and from 27% to 93% for seedlings. In general, injury increased as the herbicide rate increased. Garlon at all three rates, and Clarity and Tordon at 0.5 lb ai/ac resulted in more weed injury (>40%). Starane provided less than 30% weed injury regardless of rate. Except for Starane treatments, white cockle fresh and dry weights decreased as herbicide rates increased. The high rates of Clarity and Garlon produced the lowest fresh and dry weights of white cockle.

Summary:

Consistent last year's study, Clarity and Garlon resulted in greater injury to white cockle.

Table 1. Effects of Clarity, Tordon, Garlon, and Starane on white cockle control in 2006.

Trt No.	Treatment Name	Rate lb ai/ac	Weed injury (%) perennial	Weed injury (%) seedling	Fresh weight ton/ac	Dry weight ton/ac
			-------- 5/18/06 -------		------- 6/27/06------	
1	Clarity	0.125	30.0	70.0	5.7	1.1
2	Clarity	0.250	40.0	91.7	4.3	0.8
3	Clarity	0.500	63.3	93.3	2.4	0.4
4	Tordon 22K	0.125	30.0	63.3	5.2	1.0
5	Tordon 22K	0.250	33.3	70.0	4.2	0.8
6	Tordon 22K	0.500	46.7	66.7	4.3	0.9
7	Garlon	0.125	60.0	70.0	5.1	0.9
8	Garlon	0.250	63.3	83.3	4.6	0.9
9	Garlon	0.500	80.0	91.7	3.8	0.6
10	Starane	0.125	23.3	26.7	5.7	1.1
11	Starane	0.250	23.3	33.3	7.4	1.4
12	Starane	0.500	26.7	43.3	6.3	1.2
13	Untreated		0.0	0.0	8.3	1.6
LSD (P=0.05)			13.45	16.37	2.47	0.469
CV			19.95	15.72	28.3	28.45
Treatment F			22.42	25.64	3.39	3.99
Treatment Prob(F)			0.0001	0.0001	0.0052	0.0019

Project Title: Evaluation of Wild Oat Herbicides in Spring Wheat

Project Leaders: Bob Stougaard

Project Personnel: Qingwu Xue

Objective: To evaluate reduced rate herbicide performance in spring wheat

Results:

Seven herbicides were applied at their respective label 1X and half-label 1/2X rates to evaluate the consistency of wild oat control in spring wheat. The experiment design was a randomized complete block with 3 replications. Scholar spring wheat was planted on April 28, 2006 at a seeding rate of 75 lb/ac in 7" rows to a depth of 1.5 inches. Wild oat was planted within each plot at a density of 25 seeds per square foot. Herbicides were applied on May 24, 2006 using a backpack sprayer with Teejet XR11002 nozzles in 20 GPA. Spring wheat and wild oat were at 4- and 3-leaf stages, respectively, at the time of application.

Crop injury was initially observed with most herbicides, particularly at the labeled rate, but only Silverado and Everest resulted in noticeable injury as the season progressed. However, the effects were transitory and injury was minimal by 8 weeks after application.

Except for Puma at 1/2X rate, all herbicides provided excellent wild oat control (>93%) regardless of the rate. However, herbicide rate did impact wild oat biomass, which was generally greater when herbicides were applied at the half rate as compared to the labeled rate. Correspondingly, yields tended to be slightly less for the half-labeled rate treatments. Herbicide rate did not affect dockage, grain moisture or test weight.

Summary:

All herbicides treatments provided excellent wild oat control except Puma at the reduced rate. Application of herbicides at half-label rates resulted in slightly lower yields and more wild oat biomass than at label rates.

Table 1. Effects of reduced herbicide rates on crop injury and wild oat control at Kalispell, MT during 2006.

Treatment	Label rate (1X, lb ai/ac)	Crop injury (%)								Wild oat control (%)					
		5/30/06		6/5/06		7/6/06		8/3/06		6/5/06		7/5/06		8/3/06	
		1X	1/2X	1X	1/2X	1X	1/2X	1X	1/2X	1X	1/2X	1X	1/2X	1X	1/2X
Achieve	0.1800	1.7	0.0	0.0	0.0	0.0	1.7	0.0	0.0	91.7	83.3	100.0	98.3	99.3	99.0
Axial	0.0540	0.0	0.0	0.0	3.3	0.0	1.7	0.0	0.0	91.7	91.7	100.0	95.0	100.0	99.0
Everest	0.0262	6.7	6.7	11.7	3.3	3.3	1.7	1.7	0.0	83.3	76.7	91.7	88.3	100.0	100.0
Silverado	0.0028	8.3	6.7	16.7	13.3	5.0	1.7	0.0	0.0	81.7	83.3	99.0	83.3	99.3	95.0
Hoelon	1.0000	8.3	3.3	0.0	0.0	1.7	0.0	0.0	0.0	88.3	80.0	100.0	93.3	100.0	98.3
Puma	0.0830	8.3	1.7	0.0	0.0	0.0	0.0	0.0	0.0	91.7	83.3	96.7	76.7	96.3	85.0
Discover	0.0500	1.7	0.0	1.7	0.0	0.0	0.0	0.0	0.0	78.3	81.7	100.0	93.3	99.0	93.3
Control		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LSD (0.05)	Herbicide (A)	5.7		3.5		2.3		NS		NS		4.1		1.3	
	Rate (B)	NS		1.9		NS		NS		NS		2.2		0.7	
	AxB	NS		4.9		NS		NS		NS		5.8		1.9	

Data from the control plots were excluded from the analysis.

Table 2. Effects of reduced herbicide rates on wild oat (WO) biomass, dockage, and spring wheat yield, grain moisture and test weight at Kalispell MT, during 2006.

Treatment	Label rate (1X, lb ai/ac)	WO Biomass (g/m^2) 7/7/06		Dockage (%) 8/8/06		Yield (bu/ac) 8/8/06		Grain moisture (%) 8/8/06		Test weight (lb/bu) 8/8/06	
		1X	1/2X	1X	1/2X	1X	1/2X	1X	1/2X	1X	1/2X
Achieve	0.1800	4.7	0.0	0.6	0.8	62.7	57.0	11.6	10.9	63.3	62.6
Axial	0.0540	0.0	5.9	1.2	0.8	63.5	56.7	14.0	11.4	62.3	62.6
Everest	0.0262	5.5	27.7	0.7	0.7	54.1	56.7	11.0	11.3	62.1	62.9
Silverado	0.0028	7.2	38.7	0.7	0.9	55.3	54.6	11.5	12.0	62.3	62.4
Hoelon	1.0000	0.0	4.9	0.9	0.8	58.8	58.8	11.8	11.1	62.4	62.7
Puma	0.0830	6.7	21.6	0.9	1.3	61.3	51.3	12.1	10.3	62.7	62.7
Discover	0.0500	0.0	9.1	0.9	1.2	66.0	61.4	12.9	12.2	62.8	62.9
Control		376.1	434.7	7.9	8.9	35.3	37.4	12.0	12.5	62.0	63.0
LSD (0.05)	Herbicide (A)	10.2		NS		5.1		NS		NS	
	Rate (B)	5.5		NS		2.7		NS		NS	
	AxB	14.5		NS		NS		NS		NS	

Data from the control plots were excluded from the analysis.

Project Title: Evaluation of Clearfield Winter Wheat Lines for Herbicide Tolerance.

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue, Qasim Khan, Phil Bruckner, and Jim Berg

Objectives: Evaluate crop tolerance, yield potential and agronomic attributes of experimental herbicide resistant winter wheat lines.

Results:

During the 2005-06 season, twelve herbicide resistant (Clearfield) winter wheat lines were evaluated for their agronomic performance when treated with Beyond (imazamox) applied at 1 and 2 times the label rate (6 and 12 oz/ac, respectively). Herbicides were applied on April 25, 2006 when plants were at the jointing stage. Non-treated controls were included for comparison.

Adequate soil moisture at planting resulted in a good stands. However, tillering was reduced due to low winter temperatures and dry spring conditions. These abiotic stress factors caused heading to occur one week earlier than the previous season and also caused a reduction in plant height. Stripe rust resurfaced during 2006, which negatively affected yields. Stripe rust infection ranged form 2 to 95 percent, depending on the cultivar, while yields varied from 43 to 84 bu/ac. Despite the stripe rust, test weight was above normal and ranged from 61 to 66 lb/bu. Herbicide injury was minimal among the entries evaluated. Herbicide treatments had no effect on yield or yield-related traits.

Summary:

Several entries (MTCL0509, MTCL0538 and MTCL0550) showed excellent resistance to stripe rust, and all materials demonstrated excellent herbicide tolerance.

Future Plans:

Continue to evaluate herbicide resistant winter wheat materials for herbicide tolerance and agronomic attributes.

Table 1. Agronomic data from the Clearfield winter wheat lines grown at the Northwestern Agricultural Research Center, Kalispell, MT in 2005-06 season.

Planted: September 22, 2005

Harvested: August 2, 2006

Entry	ID	Yield (bu/ac)			Test weight (lb/bu)			Grain moisture (%)			Protein (%)		
		0X	1X	2X	0X	1X	2X	0X	1X	2X	0X	1X	2X
11	MTCL0549	80.9	83.9	84.4	64.4	64.7	64.6	10.0	10.0	9.8	10.4	11.0	10.6
5	MTCL0489	73.1	65.1	68.8	64.4	64.2	64.5	9.9	9.9	9.9	10.7	11.4	11.1
12	MTCL0550	72.3	71.1	70.7	64.5	64.7	64.7	9.9	9.7	10.0	11.7	11.7	11.7
9	MTCL0537	71.7	71.5	76.4	65.6	65.7	66.2	9.9	10.0	9.9	12.1	12.1	12.0
7	MTCL0508	67.5	63.0	61.9	65.8	65.6	65.9	9.4	9.5	9.2	12.9	13.8	13.8
8	MTCL0509	67.5	75.1	72.0	65.4	66.1	65.7	9.8	9.4	9.5	12.7	13.4	12.7
3	MTCL0477	61.2	78.3	75.9	65.4	65.6	65.7	10.0	9.7	9.9	11.4	11.3	11.2
4	MTCL0486	58.8	55.4	59.8	64.3	64.5	64.1	9.6	9.7	10.0	12.3	12.4	11.9
10	MTCL0538	57.4	61.2	58.8	65.4	65.8	65.6	10.3	9.8	10.1	14.1	13.9	13.6
2	MTCL0316	55.3	59.2	55.8	65.8	65.6	65.4	9.9	10.0	9.7	12.4	12.6	12.5
1	Above	46.5	51.1	49.3	60.9	61.7	61.0	9.9	9.6	9.7	12.0	11.6	11.5
6	MTCL0501	44.1	42.9	43.8	64.2	65.1	65.3	9.7	9.7	9.8	12.9	13.3	13.1
	Mean	63.0	64.8	64.8	64.7	64.9	64.9	9.9	9.7	9.8	12.1	12.4	12.2
	LSD (0.05)												
	Entry		**5.59**			**0.56**			**0.21**				
	Rate		**NS**			**NS**			**NS**				

NS: Not significant at 0.05 level.

Table 2. Heading, plant height, crop injury and stripe rust infection in Clearfield winter wheat lines grown at the Northwestern Agricultural Research Center, Kalispell, MT in 2005-06 season.

Planted: September 22, 2005 Harvested: August 2, 2006

Entry	ID	Heading date (Julian)			Plant height (in)			Crop injury (14 DAT) (%)			Crop injury (28 DAT) (%)			Stripe rust (%)		
		0X	1X	2X	0X	1X	2X	0X	1X	2X	0X	1X	2X	0X	1X	2X
11	MTCL0549	152.3	152.7	152.7	32.0	33.1	31.9	0.0	0.0	0.0	0.0	0.0	1.7	15.0	10.0	8.3
5	MTCL0489	146.3	146.0	146.3	28.2	27.6	28.2	0.0	0.0	0.0	0.0	0.0	0.0	31.7	53.3	33.3
12	MTCL0550	146.0	146.0	146.7	29.1	28.9	27.8	0.0	0.0	0.0	0.0	0.0	3.3	4.0	5.0	5.0
9	MTCL0537	153.0	152.3	153.0	34.3	35.6	35.4	0.0	0.0	0.0	0.0	0.0	0.0	21.7	10.7	10.0
7	MTCL0508	146.0	146.0	146.0	32.0	29.1	29.9	0.0	0.0	1.7	0.0	1.7	0.7	10.0	6.7	8.3
8	MTCL0509	148.0	149.3	149.0	32.5	33.1	31.9	0.0	0.0	2.3	0.0	0.0	1.7	2.5	1.7	3.0
3	MTCL0477	149.0	149.0	148.3	31.6	32.9	31.9	0.0	0.0	1.7	0.0	0.0	1.7	40.0	26.7	23.3
4	MTCL0486	148.3	149.0	149.0	30.6	29.7	31.0	0.0	0.0	1.7	0.0	0.0	1.7	80.0	73.3	66.7
10	MTCL0538	146.3	146.7	147.0	29.8	31.1	29.8	0.0	0.0	0.0	0.0	1.7	3.3	5.0	10.0	6.7
2	MTCL0316	144.7	144.7	144.7	30.6	29.9	29.1	0.0	0.7	0.0	0.0	0.0	0.0	50.0	46.7	46.7
1	Above	142.0	142.0	142.0	28.7	27.2	26.4	0.0	0.0	0.0	0.0	0.0	0.0	92.5	93.3	95.0
6	MTCL0501	149.7	149.0	150.0	31.5	28.9	26.9	0.0	0.0	0.7	0.0	0.0	1.7	83.3	76.7	56.7
	Mean	147.6	147.7	147.9	30.9	30.6	30.0	0.0	0.1	0.7	0.0	0.3	1.3	36.3	34.5	30.3
	LSD (0.05)															
	Entry		**0.42**			**1.45**			**NS**			**NS**			**6.6**	
	Rate		**NS**			**NS**			**0.47**			**NS**			**NS**	

DAT: Days after herbicide application.
NS: Not significant at 0.05 level.

Project Title: Agronomic Performance Evaluation of Intrastate Winter Wheat Cultivars

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue, Qasim Khan, Phil Bruckner, and Jim Berg

Objectives: To evaluate the agronomic performance of winter wheat cultivars in environments and cropping systems representative of northwestern Montana.

Results:

Adequate soil moisture at planting resulted in good stands. However, low winter temperatures and dry spring conditions resulted in reduced tillering. These abiotic stress factors cause winter wheat to head earlier, and also reduced plant height compared to last year. Most importantly, stripe rust resurfaced during 2006. Percent infection ranged from 0 for Willow Creek to 96% for MTW01133. The combination of stripe rust and poor tillering contributed to low yields in 2006. Yields ranged from 35 bu/ac for MTW01133 to 83 bu/ac for Bauermeister with an average of 59 bu/ac. Despite the severe stripe rust infection, test weight was much higher than previous years and ranged from 61.5 to 66.6 lb/bu. Grain protein average was 12.7% and ranged from 10.1 to 15.1%.

Summary:

Stripe rust resurfaced during 2006 and negatively impacted yields. Rampart, Promontory, and Yellowstone were resistant while NuSky, NuWest, MTW01133 and Paul were very susceptible.

Future Plans:

Continue winter wheat evaluations for the purpose of identifying those cultivars best suited for production in northwestern Montana.

Table 1. Agronomic data from the Intrastate Winter Wheat Nursery Grown at the Northwestern Agricultural Research Center, Kalispell MT in 2005-06.

Planted: September 22, 2005 Harvested: August 1, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	Heading date	Plant height	Stripe rust	Protein
		bu/ac	lb/bu	%	Julian	in	%	%
25	Bauermeister	83.6	64.0	11.2	155.3	31.0	5.0	11.1
20	Yellowstone	77.7	65.0	9.9	148.7	29.7	5.0	12.2
41	MT0495	75.9	65.2	9.7	148.3	28.5	4.7	13.4
38	Golden Spike	74.6	65.5	9.9	152.3	31.8	10.0	11.2
1	Rampart	73.9	66.3	9.4	147.7	33.6	5.0	13.7
26	MDM (HWW)	73.7	64.5	11.0	156.0	29.8	5.0	10.1
8	Pryor	71.1	65.9	10.2	151.3	26.2	11.7	12.4
9	Promontory	71.0	66.4	10.0	149.0	30.3	3.0	12.6
12	NuFrontier (HWW)	70.9	66.6	9.8	145.0	27.6	9.0	12.5
47	MT0419	69.1	65.1	10.0	150.7	28.5	8.3	12.3
40	Willow Creek (forage)	67.5	64.6	10.4	158.0	47.8	0.0	12.5
19	Genou	67.3	66.5	9.8	147.7	32.8	60.0	12.5
49	MTR0441	67.0	65.3	10.2	146.0	26.6	6.7	12.2
35	MT03176	66.1	64.2	10.0	146.0	29.0	5.0	13.4
31	Hatcher	66.1	65.5	9.9	144.0	25.9	13.3	12.7
30	Bond CL	65.7	65.3	9.7	142.0	29.0	80.0	12.0
16	Wahoo	64.9	64.5	9.7	144.7	29.0	43.3	12.1
44	MTCL0477	64.2	65.5	10.1	146.7	30.3	18.3	12.4
23	MT01148	64.1	64.7	10.2	152.0	30.4	6.7	13.8
3	Tiber	64.0	65.7	10.2	152.0	32.4	50.0	12.8
21	Ledger	62.6	65.5	9.7	145.0	27.3	16.7	11.9
45	MTCL0486	62.3	65.0	9.7	147.7	29.5	46.7	12.1
5	Rocky	61.6	65.9	9.9	144.7	33.3	53.3	13.2
2	Neeley	61.3	65.1	9.8	152.7	33.2	73.3	11.9
22	Millenium	61.0	65.3	10.1	146.3	28.9	23.3	12.5
43	MTS04120	60.4	66.3	9.9	148.3	31.1	21.7	12.3
29	BZ9W02-2060	60.1	65.6	9.5	147.0	26.9	25.0	13.6
34	MTCL0318 (CL)	59.0	66.0	9.3	144.7	30.1	6.7	14.7
13	Jagalene	58.7	65.8	10.0	144.7	27.4	4.0	14.0
48	MT0423	58.6	65.8	9.9	146.0	30.1	20.0	11.9
18	Jerry	57.4	64.6	10.2	149.3	29.7	18.3	12.9
7	CDC Falcon	56.9	66.4	9.7	146.7	25.1	43.3	11.8
27	MT1159CL (CL)	55.1	63.7	9.7	152.0	30.2	10.0	13.5
17	Above (CL)	54.2	64.2	9.7	142.0	28.1	86.7	11.8
33	MTCL0316 (CL)	53.9	66.0	9.7	145.0	29.3	50.0	12.7

(Continued on next page)

Table 1 (continued). Agronomic data from the Intrastate Winter Wheat Nursery Grown at the Northwestern Agricultural Research Center, Kalispell MT in 2005-06.

Planted: September 22, 2005 Harvested: August 1, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	Heading date	Plant height	Stripe rust	Protein
		bu/ac	lb/bu	%	Julian	in	%	%
39	Wendy (HWW)	53.7	64.5	9.8	142.0	25.1	8.0	15.1
42	MTS04114 (HWW)	53.6	64.7	10.0	148.0	26.2	5.7	13.9
37	CDC Buteo	52.2	65.7	9.8	150.7	31.0	43.3	13.2
28	MT02113	51.6	64.4	9.8	151.7	29.3	71.7	11.4
32	MTCL0306 (CL, HWW)	51.2	65.0	9.9	144.7	29.3	53.3	12.2
6	Vanguard	50.3	65.6	9.7	146.3	29.3	6.7	14.0
11	BigSky	45.0	64.7	9.8	150.0	32.2	80.0	13.0
46	MT0403	44.9	64.6	9.9	146.7	28.7	60.0	12.4
4	Morgan	44.3	64.4	9.7	153.0	31.0	60.0	12.8
36	AP 50W	43.7	64.0	9.7	142.0	23.9	5.7	13.5
15	Paul	39.3	63.2	9.8	148.3	25.6	75.0	12.9
10	NuWest (HWW)	37.0	61.5	9.9	150.0	30.1	80.0	12.7
14	NuSky (HWW)	36.6	62.6	10.0	150.0	29.3	70.0	12.0
24	MTW01133	35.5	63.3	9.9	144.0	25.3	93.3	12.4
Mean		**59.6**	**65.0**	**9.9**	**148.0**	**29.5**	**31.9**	**12.7**
C.V. (%)		**15.49**	**0.98**	**2.10**	**0.66**	**6.11**	**29.36**	
LSD (0.05)		**14.96**	**1.04**	**0.34**	**1.58**	**2.92**	**15.17**	

CL: Herbicide resistant winter wheat;
HWW: Hard white winter wheat.

Project Title: Agronomic Performance Evaluation of Soft White Winter Wheat Cultivars.

Project Leader: Bob Stougaard

Project Personnel: Qingwu Xue, Qasim Khan, Phil Bruckner, and Jim Berg

Objectives: To evaluate the agronomic performance of soft white winter wheat cultivars in environments and cropping systems representative of northwestern Montana.

Results:

Adequate soil moisture at planting resulted in good stands. However, low winter temperatures and dry spring conditions reduced tillering. These abiotic stress factors caused winter wheat to head earlier and also reduced plant height compared to last year. The average Julian heading date was 152 and ranged from 146 to 157, while plant height averaged 30.5 inches. Stripe rust resurfaced during 2006, reconfirming the excellent resistance of the soft white market class to this disease. Yields ranged from 88.9 bu/ac (Finch) to 60.6 bu/ac (MTCL0489). Test weight was above normal, averaging 64 lb/bu. TKW ranged from 38.4 for Hubbard to 52 g for Lambert. Grain protein content ranged from 9.9 to 12.1%, and averaged 10.7%.

Summary:

Stripe rust resurfaced during the 2005-06 season. All soft white entries showed excellent resistance to stripe rust, had high TKW and above normal test weight.

Future Plans:

Continue to evaluate soft white winter wheat cultivars for adaptation in District 1.

Table 1. Agronomic data from the Soft White Winter Wheat Nursery Grown at the Northwestern Agricultural Research Center Kalispell, MT in 2006.

Planted: September 22, 2005 Harvested: August 2, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	TKW	Heading date	Plant height	Stripe rust	Protein
		bu/ac	lb/bu	%	g	Julian	in	%	%
9	Finch	88.9	63.9	9.9	41.9	157.0	31.1	0.0	9.9
3	Rod	85.5	62.5	9.9	42.7	154.0	29.5	0.0	10.2
8	Lambert	80.5	64.5	9.9	52.0	148.0	31.9	0.7	10.8
5	Kmor	80.1	63.5	10.0	38.9	154.7	30.7	2.3	10.4
11	Simon	80.0	63.9	9.9	43.8	152.7	30.2	5.0	10.6
7	Lewjain	79.3	64.0	10.7	41.3	156.3	31.9	5.0	10.0
6	MacVicar	75.9	64.5	9.9	49.8	153.0	29.4	3.0	10.2
12	Masami	75.6	63.1	9.7	40.3	154.0	29.1	7.3	9.9
10	Hubbard	74.7	64.1	10.0	38.4	153.0	34.8	10.7	10.5
15	MTCL0549	73.9	64.2	10.0	50.4	152.0	31.8	6.7	11.0
13	WA7935	72.7	63.2	11.3	41.8	157.3	29.1	4.0	10.0
4	MAC-1	71.2	64.7	10.1	51.9	152.3	31.6	5.0	11.6
2	Eltan	69.0	64.8	10.0	46.8	152.3	29.4	6.7	10.8
16	MTCL0550	66.8	64.8	9.9	54.7	146.0	27.4	4.0	12.1
14	MTCL0489	60.6	64.3	10.0	50.8	146.3	27.7	15.0	11.4
1	Neeley (HRW)	53.8	65.4	10.0	38.4	153.3	32.9	46.7	11.9
Mean		**74.3**	**64.1**	**10.1**	**45.2**	**152.6**	**30.5**	**7.6**	**10.7**
C.V. (%)		**7.46**	**0.70**	**1.95**		**0.53**	**3.74**	**36.0**	
LSD (0.05)		**3.25**	**0.45**	**0.33**		**1.36**	**1.91**	**4.58**	

TKW: Thousand kernel weight.
HRW: Hard-red winter wheat.

Project Title: Western Regional Soft White Spring Wheat Evaluation

Project Leader: Bob Stougaard

Project Personnel: Qasim Khan and Qingwu Xue

Objectives: To evaluate the agronomic performance of soft white spring wheat cultivars from throughout the Western Region

Results:

Adequate soil moisture at planting resulted in good stands and high yields. The average yield was 106.8 bu/ac and ranged from just over 91 bu/ac for WA000986 and WQL7PENWX-2 to 123 bu/ac for IDO669. All the entries had good test weights, ranging from 59.5 to 62.1 lb/bu. The Julian heading date ranged from 163 to 177. TKW were less than expected and ranged from 31.8 g for WA007986 to 42.9 g for Louise. Plant height averaged 34.6 inches and most entries did not lodge.

Summary:

Western Regional soft white spring wheats show promise for this area, with high yields and good test weights.

Future Plans:

Continue to evaluate Western Regional soft spring wheat for District 1.

Table 1. Agronomic performance of Western Regional Soft Spring Wheat Nursery at the Northwestern Agricultural Research Center Kalispell, MT in 2006.

Planted: April 19, 2006 Harvested: August 10, 2006

Entry	Genotype	Yield	Test weight	Grain moisture	TKW	Heading date	Plant height	Lodging
		bu/ac	lb/bu	%	g	Julian	in	%
14	IDO669	123.1	62.1	11.4	38.1	171.0	35.6	0.0
15	ML063SPC97	122.1	60.8	11.9	38.3	174.7	36.7	0.0
13	IDO668	121.8	61.8	10.8	38.1	169.3	34.1	0.0
2	ALTURAS	115.3	61.2	7.6	35.8	172.0	34.5	0.0
12	IDO644	114.7	59.5	10.7	33.7	165.3	32.7	0.0
10	WA007964	112.1	60.0	11.9	34.7	176.7	38.5	0.0
20	ARS05S303	110.7	57.2	11.6	41.1	175.0	33.2	0.0
5	IDO629	108.5	59.9	11.8	34.6	174.7	35.6	0.0
9	IDO645	106.3	61.7	11.3	35.9	170.0	35.7	0.0
8	IDO642	105.5	60.4	10.7	35.9	164.3	31.1	0.0
1	ALPOWA	104.4	61.7	12.4	40.9	174.0	35.3	0.0
6	IDO630	103.3	59.7	11.7	38.1	174.0	31.6	0.0
16	ML041-27B-2, 1	103.0	59.6	11.3	36.7	172.3	36.2	0.0
7	IDO632	102.2	61.5	11.1	32.9	163.0	28.5	0.0
3	LOUISE	101.6	59.5	12.7	42.9	172.7	37.8	26.7
4	NICK	100.6	60.4	10.1	35.5	167.0	32.3	0.0
17	ML505-4-130-4	99.5	61.9	11.6	41.1	175.0	40.3	0.0
19	WA007987	98.2	60.6	11.0	33.6	175.0	35.0	9.0
18	WA007986	91.6	60.9	10.7	31.8	176.0	34.1	1.0
11	WQL7PENWX-2	91.5	59.7	10.5	33.2	173.7	33.2	0.0
Mean		**106.8**	**60.5**	**11.3**	**36.6**	**171.8**	**34.6**	**1.8**
C.V. (%)		**8.3**	**1.4**	**6.2**	**4.8**	**0.5**	**6.4**	**578.9**
LSD (0.05)		**14.63**	**1.41**	**1.16**	**2.90**	**1.36**	**3.65**	**NS**

TKW: Thousand kernel weight.
NS: Non-significant.

Project Title: Intrastate Spring Barley Evaluation

Project Leader: Bob Stougaard

Project Personnel: Qasim Khan, Qingwu Xue, and Tom Blake

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

Results:

Above average temperatures and high precipitation provided ideal conditions for barley growth and development. The lack of stress delayed heading a few days compared to last year. Julian heading dates ranged from 176 to 180 and averaged around 178. At the same time, plant height was greater than the previous year, and ranged from 35 to 45 inches. Consequently, moderate to severe lodging occurred for most of the entries. Lodging ranged from 0 (Calgary) to 85% (MT040204).

Lodging had a negative effect on barley yields. Yields averaged 114 bu/ac and ranged from 90.4 to 144.6 bu/ac. Despite the severe lodging, test weights were relatively high and ranged from 46.2 to 53.4 lb/bu with an average of 51 lb/bu. Grain plumpness was less than previous year and averaged 85%. Average protein content was 14.7% and ranged from 12.5 to 17%.

Summary:

High soil moisture particularly during vegetative growth resulted in delayed heading, increased plant height, and increased lodging. Consequently, yield and plumpness were reduced. Top yielding cultivars Calgary, MT040114, and MT040106 experienced less lodging.

Future Plans:

Continue barley evaluations for the purpose of identifying cultivars best suited for District 1.

Table 1. Agronomic data from the Intrastate Spring Barley Nursery grown at the Northwestern Agricultural Research Center Kalispell, MT.

Planted: April 26, 2006 Harvested: August 28, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	Heading date	Plant height	Lodging	Plump	Protein
		bu/ac	lb/bu	%	Julian	in	-------- %		--------
49	MT040114	144.6	52.9	12.4	178.0	39.8	34.2	97.4	13.0
6	Calgary	144.5	51.8	11.7	178.0	35.0	0.0	93.5	13.3
46	MT040106	142.1	51.8	12.6	178.3	37.7	28.2	96.7	13.7
12	2B992657	141.0	48.4	12.1	178.3	40.8	70.0	84.2	15.0
44	MT040104	133.3	52.2	12.4	177.0	40.8	28.4	91.9	15.5
45	MT040105	128.6	53.0	12.3	179.7	39.6	28.6	97.5	12.9
15	MT960101	128.5	51.7	12.2	180.0	39.4	37.5	88.9	14.0
51	MT040130	127.5	53.2	12.6	178.0	40.6	39.5	99.2	12.5
4	WPB Xena	127.5	50.0	13.2	178.3	43.0	61.4	77.6	14.9
61	LR101 21	125.9	51.4	13.4	180.3	38.8	42.3	92.2	13.7
39	MT040021	122.9	51.0	13.8	177.3	40.8	57.6	95.7	15.4
57	MT040216	122.0	53.3	11.9	179.0	38.5	38.8	96.3	14.0
62	LR101 30	120.5	51.0	12.8	180.0	40.7	40.0	89.2	13.9
40	MT040024	120.0	51.8	13.3	177.0	39.5	50.2	89.9	14.1
22	MT010080	118.1	50.5	13.1	176.0	42.7	35.6	88.3	15.6
50	MT040129	117.9	52.3	12.9	180.0	40.4	55.0	93.9	14.1
3	Baronesse	117.9	49.5	12.4	178.3	38.7	64.8	79.1	14.9
41	MT040058	117.9	52.1	13.0	177.0	40.6	65.4	91.2	14.0
21	MT000138	117.9	53.4	12.2	176.3	42.7	40.8	99.6	14.5
42	MT040073	117.6	53.1	12.6	177.7	40.4	75.9	87.4	15.1
48	MT040110	117.4	52.9	13.1	179.3	39.5	50.9	93.7	14.3
1	Haxby	117.1	52.4	12.6	177.3	43.2	62.7	87.3	14.7
30	MT020167	117.0	51.7	15.0	177.3	41.5	69.0	87.0	15.7
38	MT040013	116.8	50.5	12.6	179.0	42.3	60.2	83.8	14.8
20	MT000125	116.7	52.2	14.4	177.3	42.4	36.8	94.4	14.2
13	YU501385	116.6	52.1	12.5	176.7	42.0	53.5	95.6	13.9
35	MT030079	116.6	52.5	13.3	178.0	41.2	59.4	93.0	13.7
52	MT040134	115.9	50.9	12.0	179.3	40.3	67.7	77.5	15.4
16	MT970116	115.5	51.8	13.9	177.3	43.0	60.9	94.2	14.5
14	MT910189	115.4	51.1	13.2	176.7	40.4	60.5	92.3	14.4
60	MT040231	114.4	52.1	12.8	177.0	41.9	65.9	90.7	15.1
32	MT020205	113.9	50.1	12.9	176.3	42.7	67.9	82.5	15.9
28	MT020155	113.7	51.3	13.0	173.3	43.4	63.7	82.5	14.1
26	MT010162	113.4	50.9	11.7	178.3	44.2	61.9	77.0	15.9
19	MT000047	113.4	52.2	12.4	177.0	41.9	33.8	87.3	14.4

Table 1 (Continued). Agronomic data from the Intrastate Spring Barley Nursery grown at the Northwestern Agricultural Research Center Kalispell, MT.

Planted: April 26, 2006 — Harvested: August 28, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	Heading date	Plant height	Lodging	Plump	Protein
		bu/ac	lb/bu	%	Julian	in	-------- %		--------
17	MT970229	112.9	52.2	13.2	179.0	42.0	46.2	91.0	13.8
29	MT020162	112.9	51.0	12.7	178.3	43.3	40.6	86.8	14.3
59	MT040226	112.4	52.3	12.6	177.3	44.6	71.3	73.1	15.1
34	MT030063	112.1	50.0	12.8	179.7	45.1	51.2	77.8	15.0
36	MT030137	110.9	50.4	12.2	176.0	40.0	59.6	82.4	17.1
64	LR116 6	110.7	51.8	12.5	177.0	43.8	32.5	87.0	13.7
10	Tradition	109.6	50.9	12.3	175.0	44.5	29.4	78.5	15.0
31	MT020204	109.1	50.9	13.1	176.7	41.3	70.1	82.5	16.0
54	MT040181	108.7	50.6	12.6	178.7	38.6	70.5	75.7	15.1
47	MT040107	108.2	51.8	12.5	178.7	38.7	66.5	84.4	14.8
24	MT010158	108.2	49.9	12.6	177.3	42.8	59.5	82.6	14.3
56	MT040209	107.2	49.1	14.6	178.7	39.9	71.3	71.6	14.1
27	MT020064	106.7	50.3	11.9	176.3	41.5	68.9	74.9	15.8
58	MT040220	106.6	50.3	12.8	179.3	39.9	70.5	84.0	14.0
33	MT030042	106.1	50.8	13.5	177.3	37.1	78.5	80.6	13.8
53	MT040136	105.9	50.0	11.9	178.0	40.6	70.6	71.7	16.1
43	MT040093	105.8	50.2	13.2	178.0	40.6	62.4	85.9	15.6
2	Eslick	105.2	51.4	12.8	178.0	40.9	64.2	89.7	14.6
9	Conrad	104.4	48.0	13.3	178.0	39.1	75.4	72.9	16.5
63	LR116 5	103.5	51.4	13.0	177.0	42.4	37.7	84.9	13.5
55	MT040204	102.9	47.4	12.8	180.0	40.7	85.2	73.5	15.6
5	Boulder	101.4	49.5	12.3	178.0	41.9	69.2	67.8	17.0
23	MT010081	101.2	51.6	12.9	177.0	42.4	46.0	90.1	14.9
37	MT030144	100.7	51.6	12.8	177.0	39.4	65.6	89.9	14.8
7	Harrington	97.8	48.3	13.1	179.3	41.1	59.8	78.4	14.0
8	Metcalfe	96.4	49.1	13.2	177.0	42.3	78.9	84.7	14.8
25	MT010160	95.8	49.1	12.4	178.3	42.0	57.0	78.0	14.0
11	2B992316	91.3	46.2	12.7	178.0	39.1	80.8	64.4	15.3
18	MT000040	90.4	50.7	13.2	178.0	39.9	63.9	84.7	15.6
Mean		**114.3**	**51.0**	**12.8**	**177.8**	**41.0**	**55.8**	**85.6**	**14.7**
CV (%)		**10.7**			**0.4**	**3.3**	**29.5**		
LSD (0.05)		**19.0**			**1.2**	**2.1**	**25.6**		

Project Title:	Agronomic Performance Evaluation of Advanced Spring Wheat Experimental Lines.
Project Leader:	Bob Stougaard
Project Personnel:	Qasim Khan, Qingwu Xue, Luther Talbert, and Susan Lanning
Objectives:	To evaluate spring wheat cultivars for agronomic performance in environments and cropping systems representative of northwestern Montana.

Results:

Above average temperatures and high precipitation provided ideal conditions for spring wheat growth and development. The lack of stress delayed heading a few days compared to last year. Julian heading dates ranged from 175 to 184 and averaged around 178. At the same time, plant height was greater than the previous year. Plant height averaged 38.3 inches and ranged from 31 inches for BZ9M1044 to 47.5 inches for Thatcher. Concurrently, moderate to severe lodging occurred for most of the entries.

The wet conditions not only contributed to lodging, but also caused a resurfacing of stripe rust. Stripe rust infection averaged 41%, and ranged from a low of 3% for MT0245 to a high of 94.5% for MT0523. Nonetheless, a new pest emerged that over-shadowed the combined effects of stripe rust and lodging – the Orange Wheat Blossom Midge (OWBM). Yields were greatly reduced compared to previous years. Yields ranged from 22 bu/ac for Thatcher to 98 bu/ac for MT 0412, and averaged 65 bu/ac. Average test weight (60.4 lb/bu) was higher than last year and ranged from 56.6 to 64.2 lb/bu. Grain protein content averaged 16% and ranged from 13.9 to 18.2%.

Summary:

Spring wheat yields suffered due to the combined effects of lodging, stripe rust and the OWBM. The top yielding entries were generally resistant to stripe rust, had low or no lodging, and headed early.

Future Plans:

Continue spring wheat evaluations for the purpose of identifying cultivars best suited for District 1.

Table 1. Agronomic data from the Advanced Spring Wheat Nursery grown at the Northwestern Agricultural Research Center Kalispell, MT.

Planted: April 19, 2006 Harvested: August 29, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	Heading date	Plant height	Lodging	Stripe rust	Protein
		bu/ac	lb/bu	%	Julian	in	----------- % -----------		
20	MT 0412	96.7	61.9	11.3	176.0	36.7	0.0	86.5	15.0
30	MT 0516	93.2	62.3	11.7	177.3	38.7	0.0	4.2	15.9
21	MT 0413	92.9	61.9	11.9	177.3	39.8	13.0	65.2	15.4
31	MT 0517	88.6	62.4	11.8	176.7	36.0	0.0	24.6	15.7
64	Agawam	87.0	62.7	11.6	175.3	34.9	0.0	63.0	14.3
19	MT 0405	86.6	63.6	11.4	177.0	35.3	3.3	46.3	13.9
56	WPB Germany	85.2	61.6	11.7	181.0	34.5	0.0	4.8	14.4
29	MT 0515	81.1	61.7	12.1	179.0	38.7	0.0	9.3	16.0
23	MT 0415	79.6	60.8	11.9	178.0	40.2	27.7	10.6	17.5
41	MT 0550	79.2	63.0	11.8	176.3	38.7	0.0	38.1	14.7
59	Kelby	77.9	61.9	11.7	177.3	34.6	0.0	14.7	15.8
24	MT 0416	76.4	62.6	11.5	178.0	37.4	31.7	22.7	15.7
6	Reeder	75.1	60.8	12.0	177.7	39.1	29.0	13.6	16.9
37	MT 0537	74.8	61.1	11.6	178.0	44.6	0.0	9.5	16.8
16	MT 0260	74.6	61.2	12.5	180.0	41.1	7.3	27.1	15.4
22	MT 0414	74.6	61.2	11.5	177.7	39.6	35.0	13.8	17.4
15	MT 0249	74.5	61.0	12.1	178.0	35.3	2.0	12.4	16.4
34	MT 0525	74.3	61.9	11.3	177.3	38.5	26.3	24.7	15.8
10	Choteau	74.2	61.6	11.4	178.7	36.6	0.0	13.2	16.0
8	Hank	74.0	56.6	13.3	177.7	37.5	0.0	72.3	15.5
62	MTHW0202	73.8	62.5	11.5	174.0	36.2	0.0	57.1	15.4
51	Glenn	73.5	63.8	11.6	176.7	39.5	13.7	12.8	16.4
12	Knudson	72.4	60.9	11.9	178.7	37.9	9.7	17.1	14.7
49	MT 0570	72.1	61.5	11.9	176.3	44.4	30.0	45.5	15.4
11	Norpro	70.7	60.5	12.7	179.3	35.7	14.3	43.9	15.0
13	Freyr	68.5	62.0	11.6	178.0	37.9	1.7	6.7	16.2
32	MT 0519	68.2	61.6	11.7	178.0	41.5	4.0	7.4	17.0
52	BW781	67.9	61.7	11.9	177.0	38.2	37.0	15.8	17.4
50	MT 0575	67.8	59.4	11.5	177.3	38.2	13.7	73.4	15.5
61	Explorer	67.6	60.1	12.0	177.3	38.2	21.7	62.4	16.2
60	98S0127-06	67.5	60.4	13.4	178.7	34.1	9.3	14.2	15.8
38	MT 0539	67.2	59.7	11.3	179.0	36.1	15.3	24.6	16.8
36	MT 0535	67.0	64.2	11.2	178.3	39.5	0.3	82.1	14.6
17	MT 0266	66.7	57.6	11.8	177.7	38.2	29.0	25.9	17.4
18	MT 0336	65.8	60.9	11.3	178.3	39.1	0.0	81.1	15.4

Table 1 (Continued). Agronomic data from the Advanced Spring Wheat Nursery grown at the Northwestern Agricultural Research Center Kalispell, MT.

Planted: April 19, 2006 Harvested: August 29, 2006

Entry	Cultivar	Yield	Test weight	Grain moisture	Heading date	Plant height	Lodging	Stripe rust	Protein
		bu/ac	lb/bu	%	Julian	in	----------- % -----------		
58	BZ9M1044	64.5	60.0	12.8	177.7	31.0	0.0	57.6	15.5
9	Outlook	63.0	58.6	11.4	181.3	38.2	3.7	21.0	16.4
42	MT 0551	62.4	60.1	11.3	179.0	38.5	3.3	12.9	16.3
40	MT 0544	61.2	57.7	11.3	178.3	36.6	0.0	23.8	15.4
43	MT 0553	61.0	59.6	12.0	179.3	36.2	0.0	27.4	16.1
39	MT 0540	59.5	60.8	11.4	177.0	38.6	30.0	82.8	16.2
27	MT 0508	59.5	60.0	11.5	179.0	38.7	3.0	85.5	15.5
53	BZ999592	58.8	59.2	13.6	180.0	38.2	12.0	74.2	16.1
25	MT 0421	58.6	58.6	11.1	179.7	36.6	0.0	79.8	15.9
28	MT 0509	57.8	58.7	11.4	178.7	36.1	18.3	84.2	15.1
47	MT 0566	57.7	57.3	11.9	178.7	36.9	18.3	73.7	16.8
35	MT 0534	56.9	57.6	11.5	179.0	38.6	7.3	86.9	15.9
7	Conan	56.5	61.1	11.1	178.7	35.7	1.7	10.1	15.1
14	MT 0245	54.5	60.6	11.9	179.7	38.2	40.0	3.1	16.4
46	MT 0564	54.5	59.2	12.2	178.3	37.0	12.3	91.0	15.8
57	BZ9M1024	53.2	62.6	11.5	178.0	36.5	40.0	5.8	15.6
44	MT 0562	52.9	58.6	11.8	179.7	37.0	53.3	59.0	16.4
26	MT 0502	52.4	60.1	11.4	182.7	40.7	0.0	87.6	15.9
48	MT 0567	52.0	58.8	11.5	179.0	39.4	2.0	13.2	16.5
33	MT 0523	51.5	58.2	12.1	178.7	36.9	42.7	94.5	14.8
3	McNeal	51.3	58.4	11.5	180.3	39.9	23.0	82.7	16.4
4	Ernest	50.2	61.4	10.8	178.7	44.9	58.0	29.2	16.3
55	BZ902413	49.0	59.1	13.9	177.3	36.7	4.0	21.3	16.0
45	MT 0563	46.5	58.2	11.1	179.0	36.0	13.7	18.9	16.2
54	Corbin	44.8	58.4	12.1	178.3	35.7	40.3	42.2	17.2
2	Fortuna	41.4	58.3	12.9	179.7	46.3	38.7	29.5	16.8
5	Scholar	37.9	59.8	12.3	181.0	42.8	61.7	64.0	18.2
63	MTHW0471	32.4	59.7	12.0	181.7	41.6	55.3	34.9	17.2
1	Thatcher	22.3	57.9	11.5	183.7	47.5	50.0	82.2	17.5
Mean		**65.3**	**60.4**	**11.8**	**178.5**	**38.3**	**15.7**	**41.0**	**16.0**
CV (%)		**9.6**			**0.4**	**3.9**	**86.5**	**26.7**	
LSD (0.05)		**10.0**			**1.0**	**2.3**	**21.0**	**16.1**	

Project Title: Montana Statewide Spring Oat Variety Performance

Project Leader: Bob Stougaard

Project Personnel: Qasim Khan, Qingwu Xue, and Tom Blake

Objectives: To evaluate the agronomic performance of oat varieties and experimental lines in environments and cropping systems representative of northwestern Montana.

Results:

Above average temperatures and soil moisture favored oat growth and development, resulting in high yields and test weights. All entries yielded over 200 bu/ac with an average yield of 228 bu/ac. Yields ranged from 204 for CDC Dancer to 246 bu/ac for OT383. Test weights were also good and averaged 38 lb/bu. Heading (Julian 175.5) was few days earlier than last year. Plant height averaged 44.6 inches. Lodging was less than last year and ranged from 0 to 34.7 %. Protein content ranged from 10.8 to 14.5% and averaged about 12%.

Summary:

Favorable growing conditions in 2006 season resulted in high yield and test weight in all oat entries.

Future Plans:

Cultivars will continue to be evaluated at Kalispell in an attempt to identify those cultivars best adapted to District 1.

e 1. Agronomic data from the State Oat Nursery grown at the Northwestern Agricultural Research Center Kalispell, MT.

Planted: April 20, 2006 Harvested: August 22, 2006

Entry	Cultivar	Yield	Grain moisture	Test weight	Heading date	Plant height	Lodging	Protein
		bu/ac	%	lb/bu	Julian	in	%	%
13	OT383	245.5	10.0	40.1	176.7	49.9	0.0	12.2
5	Maverick	244.0	9.5	38.3	174.7	39.6	0.3	12.5
10	98AB6491	241.4	9.5	36.3	175.3	41.5	0.0	12.3
3	Killdeer	239.6	9.9	37.7	173.0	42.3	8.0	12.3
9	98AB6646	235.6	10.0	40.5	175.3	40.9	0.0	12.8
4	CDC Pacer	235.2	10.3	40.1	175.7	50.0	10.3	12.2
8	87AB5633	234.7	9.3	36.4	175.7	44.6	24.7	12.3
12	96AB8796	230.0	9.2	35.9	176.3	40.9	18.0	11.2
11	96AB8597	226.3	9.9	38.6	178.0	43.6	4.3	10.8
1	Otana	219.4	9.9	38.9	176.3	50.0	20.3	14.5
14	94AB5944	215.3	9.2	38.2	174.3	42.8	0.0	11.8
2	Monida	213.5	10.0	37.3	176.7	46.2	34.7	11.7
6	Monico	207.4	10.3	39.8	174.7	43.7	6.3	12.3
7	CDC Dancer	203.9	10.0	40.0	175.7	49.1	0.0	11.3
Means		**228.0**	**9.8**	**38.4**	**175.6**	**44.6**	**9.1**	**12.2**
CV (%)		**10.5**			**0.6**	**4.3**	**129.5**	
LSD (0.05)		**NS**			**1.8**	**3.2**	**19.7**	

NS: Indicates not significant at 0.05 probability level.

FORAGE INVESTIGATION

759

Forage investigation is part of Project 759 and includes research related to all types of forage from seeding to data collection to publications

PROJECT TITLE: **2002 DRYLAND INTRASTATE ALFALFA YIELD TRIAL**

COOPERATORS: Dennis Cash, MSU – Bozeman
Duane Johnson, MSU – NWARC
Louise Strang, MSU - NWARC

OBJECTIVE: Compare yield potential of new releases and experimental lines with older, established cultivars.

METHODS: The experiment was established on 5/8/02. Fourteen cultivars were seeded in 5-ft by 20-ft plots consisting of 7 rows spaced 6-inches apart. Seeding rate was 5 lbs/acre pure live seed, and seeding depth was 0.5 in. Mono-ammonium phosphate fertilizer *(*11-52-0*)* was applied preplant at a rate of 400 lbs/acre and at 120 lbs/acre each spring following. The experimental design was a randomized complete block with 14 cultivars and four replications.

Crop year precipitation was 22.81 inches. Average monthly temperatures were 43.9, 52.6, 60.7, 69.1, and 63.8 degrees F from April to August, respectively.

Forage yield harvest dates were 6/19 and 7/25/06. The trial was terminated after the second harvest. Plots were harvested with a sickle-bar research plot swather. Harvest area was 100 ft^2. After recording the fresh harvest weight, a subsample of approximately 500 g was taken, weighed, dried at 60°C in a forced air oven for 48 to 72 h, and reweighed to determine DM content.

Analysis of variance was calculated by the ANOVA procedure of XLSTAT Ver.7.5 (2004). Critical value for a significant F-test was tested at P=0.05. Treatment effects were compared by protected LSD when the F test for treatment was significant.

RESULTS: The highest yields for 2006 included 'Shaw', 'Cooper', 'Plumas', 'Ladak DL', '6420', 'Rebel', 'Rugged', and 'WL319HQ'. Over the 4 years of the study, 'HybriForce 400' was most productive (15.84 t/a), and Ameristand 403T was least productive (11.32 t/a).

2006 Summary of the
2002 DRYLAND INTRASTATE ALFALFA YIELD TRIAL

Cultivar	Harvest-1	Harvest-2	2006 Total	2005 Total	2004 Total	2003 Total	2003-06 Total	%Mean
	t/a	*t/a*	*t/a*	*t/a*	*t/a*	*t/a*	*t/a*	
Ladak 65	1.20	1.25	2.45	2.72	**4.18**	2.65	11.99	86
Wrangler	1.29	1.41	2.70	3.21	**4.79**	**3.25**	**13.95**	101
Shaw	1.77	1.36	**3.13**	3.23	**4.25**	**3.03**	**13.63**	98
Cooper	1.58	1.43	**3.00**	3.37	**4.23**	**2.94**	**13.55**	98
Plumas	1.47	1.44	**2.91**	3.64	**4.61**	**3.14**	**14.30**	103
Ameristand 403T	1.23	1.40	2.62	2.93	3.39	2.38	11.32	82
Ladak DL	1.32	1.45	**2.78**	3.47	**4.89**	**3.08**	**14.21**	102
HybriForce 400	1.12	1.57	2.69	4.28	**5.34**	**3.52**	**15.84**	114
HybriForce-420/Wet	1.06	1.58	2.64	4.05	**4.91**	**3.07**	**14.68**	106
XTRA-3	1.28	1.45	2.73	3.48	**4.29**	2.85	**13.35**	96
6420	1.30	1.50	**2.80**	3.89	**5.07**	**3.00**	**14.77**	106
Rebel	1.36	1.44	**2.80**	3.67	**4.28**	**2.93**	**13.68**	99
Rugged	1.44	1.52	**2.96**	3.76	**4.52**	**3.07**	**14.31**	103
WL 319HQ	1.20	1.59	**2.79**	3.84	**4.84**	**3.12**	**14.59**	105
mean	1.33	1.46	2.79	3.54	4.54	3.00	13.87	
LSD(0.05)	NS	NS	0.38	0.81	1.38	0.63	2.61	
Pr>F	0.3030	0.5414	< 0.0001	0.603	0.00	0.00	< 0.0001	
CV(%mean)	9.4	8.9	9.6	16.2	21.3	20.1	13.2	

Planting date: 5/8/02

Fertilizer: 22 lbs N/a + 104 lbs P_2O_5/a - 4/15/05
13 lbs N + 62 lbs P_2O_5/a - 4/14/06

2006 Summary of the
2002 DRYLAND INTRASTATE ALFALFA YIELD TRIAL

Cultivar	Harvest-1	Harvest-2	2006 Total	2005 Total	2004 Total	2003 Total	2003-06 Total	%Mean
	t/a	*t/a*	*t/a*	*t/a*	*t/a*	*t/a*	*t/a*	
Ladak 65	1.20	1.25	2.45	2.72	**4.18**	2.65	11.99	86
Wrangler	1.29	1.41	2.70	3.21	**4.79**	**3.25**	**13.95**	101
Shaw	1.77	1.36	**3.13**	3.23	**4.25**	**3.03**	**13.63**	98
Cooper	1.58	1.43	**3.00**	3.37	**4.23**	**2.94**	**13.55**	98
Plumas	1.47	1.44	**2.91**	3.64	**4.61**	**3.14**	**14.30**	103
Ameristand 403T	1.23	1.40	2.62	2.93	3.39	2.38	11.32	82
Ladak DL	1.32	1.45	**2.78**	3.47	**4.89**	**3.08**	**14.21**	102
HybriForce 400	1.12	1.57	2.69	4.28	**5.34**	**3.52**	**15.84**	114
HybriForce-420/Wet	1.06	1.58	2.64	4.05	**4.91**	**3.07**	**14.68**	106
XTRA-3	1.28	1.45	2.73	3.48	**4.29**	2.85	**13.35**	96
6420	1.30	1.50	**2.80**	3.89	**5.07**	**3.00**	**14.77**	106
Rebel	1.36	1.44	**2.80**	3.67	**4.28**	**2.93**	**13.68**	99
Rugged	1.44	1.52	**2.96**	3.76	**4.52**	**3.07**	**14.31**	103
WL 319HQ	1.20	1.59	**2.79**	3.84	**4.84**	**3.12**	**14.59**	105
mean	1.33	1.46	2.79	3.54	4.54	3.00	13.87	
LSD(0.05)	NS	NS	0.38	0.81	1.38	0.63	2.61	
Pr>F	0.3030	0.5414	< 0.0001	0.603	0.00	0.00	< 0.0001	
CV(%mean)	9.4	8.9	9.6	16.2	21.3	20.1	13.2	

Planting date: 5/8/02

Fertilizer: 22 lbs N/a + 104 lbs P_2O_5/a - 4/15/05
13 lbs N + 62 lbs P_2O_5/a - 4/14/06

PROJECT TITLE: **2002 IRRIGATED INTRASTATE ALFALFA YIELD TRIAL**

PROJECT COOPERATORS: Dennis Cash, MSU – Bozeman
Duane Johnson, MSU – NWARC
Louise Strang, MSU - NWARC

OBJECTIVE: Compare yield potential of new releases and experimental lines with older, established cultivars in an irrigated/high rainfall environment.

METHODS:

The experiment was established on 5/8/02. Fourteen cultivars were seeded in 5-ft by 20-ft plots consisting of 7 rows spaced 6-inches apart. Seeding rate was 8 lbs/acre pure live seed, and seeding depth was 0.5 in. Monoammonium phosphate fertilizer (11-52-0) was applied preplant at a rate of 400 lbs/acre and at 120 lbs/acre each spring following. The experimental design was a randomized complete block with 14 cultivars and four replications.

Crop year precipitation was 22.81 inches. Average monthly temperatures were 43.9, 52.6, 60.7, 69.1, and 63.8 degrees F from April to August, respectively.

Forage yield harvest dates were 6/21and 7/27/06. The trial was terminated after the second harvest. Plots were harvested with a sickle-bar research plot swather. Harvest area was 100 ft^2. After recording the fresh harvest weight, a subsample of approximately 500 g was taken, weighed, dried at 60°C in a forced air oven for 48 to 72 h, and reweighed to determine DM content.

Analysis of variance was calculated by the ANOVA procedure of XLSTAT Ver.7.5 (2004). Critical value for a significant F-test was tested at P=0.05. Treatment effects were compared by protected LSD when the F test for treatment was significant.

RESULTS:

There were no significant differences in yield among the 14 varieties tested in 2006. Over the 4 years of the study, total production was statistically similar for all entries.

2006 Summary of the
2002 IRRIGATED INTRASTATE ALFALFA YIELD TRIAL

Cultivar	*H-1* Yield	*H-2* Yield	2006 Total Yield	2005 Total Yield	2004 Total Yield	2003 Total Yield	2003-06 Total Yield	%Mean
	--------------*tons DM/acre*--------------							
Ladak 65	1.79	1.48	3.26	**3.96**	6.13	5.32	18.66	95
Wrangler	1.78	1.59	3.37	3.76	6.09	5.28	18.50	94
Shaw	1.83	1.57	3.41	**4.01**	6.50	5.82	19.74	101
Cooper	1.94	1.58	3.52	**4.33**	6.75	5.82	20.42	104
Plumas	1.86	1.65	3.50	**4.30**	6.55	5.99	20.34	104
Ameristand 403T	1.77	1.50	3.28	**4.21**	6.31	5.61	19.40	99
Ladak DL	1.84	1.67	3.52	3.76	5.86	5.39	18.53	94
HybriForce 400	2.05	1.92	3.96	3.73	6.11	5.59	19.39	99
HybriForce-420/Wet	1.97	1.79	3.75	**4.24**	6.57	5.96	20.52	105
XTRA-3	1.97	1.71	3.68	**4.18**	6.43	5.79	20.08	102
6420	1.78	1.72	3.51	**3.96**	6.37	5.91	19.75	101
Rebel	2.01	1.62	3.63	**3.97**	6.31	5.73	19.64	100
Rugged	1.81	1.76	3.57	**4.07**	6.37	5.58	19.58	100
WL 319HQ	1.86	1.71	3.57	**4.08**	6.64	5.69	19.98	102
mean	1.88	1.66	3.54	4.04	6.36	5.68	19.61	
LSD(0.05)	NS	NS	NS	0.55	0.25	0.62	NS	
Pr>F	0.7530	0.3528	0.6306	0.047	0.228	0.375	0.4820	
CV(%mean)	11.8	13.2	11.6	9.5	2.8	7.6	7.2	

Yield values in **bold** are not significantly different (P=0.05) from the highest yield in the same column.

Seeded 5/8/02

Fertilizer: 13 lbs N + 62 lbs P_2O_5 - 4/15/05
Herbicide: 2,4-D + Banvel - 5/10/05

2006 Summary of the
2002 IRRIGATED INTRASTATE ALFALFA YIELD TRIAL

Cultivar	*H-1* Yield	*H-2* Yield	2006 Total Yield	2005 Total Yield	2004 Total Yield	2003 Total Yield	2003-06 Total Yield	%Mean
	--------------*tons DM/acre*--------------							
Ladak 65	1.79	1.48	3.26	**3.96**	6.13	5.32	18.66	95
Wrangler	1.78	1.59	3.37	3.76	6.09	5.28	18.50	94
Shaw	1.83	1.57	3.41	**4.01**	6.50	5.82	19.74	101
Cooper	1.94	1.58	3.52	**4.33**	6.75	5.82	20.42	104
Plumas	1.86	1.65	3.50	**4.30**	6.55	5.99	20.34	104
Ameristand 403T	1.77	1.50	3.28	**4.21**	6.31	5.61	19.40	99
Ladak DL	1.84	1.67	3.52	3.76	5.86	5.39	18.53	94
HybriForce 400	2.05	1.92	3.96	3.73	6.11	5.59	19.39	99
HybriForce-420/Wet	1.97	1.79	3.75	**4.24**	6.57	5.96	20.52	105
XTRA-3	1.97	1.71	3.68	**4.18**	6.43	5.79	20.08	102
6420	1.78	1.72	3.51	**3.96**	6.37	5.91	19.75	101
Rebel	2.01	1.62	3.63	**3.97**	6.31	5.73	19.64	100
Rugged	1.81	1.76	3.57	**4.07**	6.37	5.58	19.58	100
WL 319HQ	1.86	1.71	3.57	**4.08**	6.64	5.69	19.98	102
mean	1.88	1.66	3.54	4.04	6.36	5.68	19.61	
LSD(0.05)	NS	NS	NS	0.55	0.25	0.62	NS	
Pr>F	0.7530	0.3528	0.6306	0.047	0.228	0.375	0.4820	
CV(%mean)	11.8	13.2	11.6	9.5	2.8	7.6	7.2	

Yield values in **bold** are not significantly different (P=0.05) from the highest yield in the same column.

Seeded 5/8/02
Fertilizer: 13 lbs N + 62 lbs P_2O_5 - 4/15/05
Herbicide: 2,4-D + Banvel - 5/10/05

PROJECT TITLE: **2004 DRYLAND INTRASTATE ALFALFA YIELD TRIAL**

COOPERATORS: Dennis Cash, MSU – Bozeman
Duane Johnson, MSU – NWARC
Louise Strang, MSU - NWARC

OBJECTIVE: Compare yield potential of new releases and experimental lines with older, established cultivars under non-irrigated conditions.

METHODS:

The trial was seeded on 4/22/04. Thirteen cultivars were seeded in 5-ft by 20-ft plots consisting of 7 rows spaced 6-inches apart. Seeding rate was 9 lbs/acre pure live seed, and seeding depth was 0.5 in. Mono-ammonium phosphate fertilizer (11-52-0) was applied preplant at a rate of 120 lbs/acre. Pursuit (3 oz./a) and Prowl (1.8 pt/a) were preplant incorporated for weed control. The experimental design was a randomized complete block with 13 cultivars and four replications.

Crop year precipitation was 22.81 inches. Average monthly temperatures were 43.9, 52.6, 60.7, 69.1, and 63.8 degrees F from April to August, respectively.

Forage yield harvest dates were 6/20, 7/24, and 9/26/06. Plots were harvested with a sickle-bar research plot swather. Harvest area was 100 ft^2. After recording the fresh harvest weight, a subsample of approximately 500 g was taken, weighed, dried at 60°C in a forced air oven for 48 to 72 h, and reweighed to determine DM content.

Analysis of variance was calculated by the ANOVA procedure of XLSTAT Ver.7.5 (2004). Critical value for a significant F-test was tested at P=0.05. Treatment effects were compared by protected LSD when the F test for treatment was significant.

RESULTS:

The total yields for 2006 were statistically similar.

2006 Summary of the
2004 DRYLAND INTRASTATE ALFALFA YIELD TRIAL

Cultivar	Harvest-1	Harvest-2	Harvest-3	2006 Total	2005 Total	2005-06 Total	% Mean	2004 Total
	t/a	*t/a*	*t/a*	*t/a*	*t/a*	*t/a*		*t/a*
VL02	1.55	1.28	1.32	4.15	3.38	7.53	98	**1.64**
54Q25	1.88	1.36	1.29	4.53	3.47	8.01	104	**1.72**
Lightening Xtra	1.69	1.42	1.29	4.40	3.44	7.84	102	1.53
DKA 33-16	1.62	1.30	1.28	4.19	3.34	7.54	98	**1.65**
DKA 50-18	1.83	1.38	1.36	4.57	3.31	7.89	103	**1.59**
Boulder	1.43	1.39	1.44	4.27	3.22	7.49	98	**1.74**
Rebound 5.0	1.82	1.25	1.18	4.24	3.21	7.45	97	1.48
6400HT	1.71	1.34	1.13	4.17	**3.58**	7.76	101	**1.55**
MT-9321	1.60	1.33	1.21	4.14	3.37	7.51	98	**1.68**
MT-2003-1	1.65	1.37	1.27	4.29	3.22	7.50	98	**1.63**
Ladak 65	1.63	1.36	1.47	4.46	3.33	7.79	102	**1.80**
Shaw	1.87	1.34	1.24	4.44	3.27	7.71	100	**1.75**
Cooper	1.52	1.43	1.39	4.34	3.32	7.67	100	**1.79**
mean	1.68	1.35	1.30	4.32	3.34	7.67		1.66
Pr>F	0.6699	0.5378	0.7813	0.8959	0.02	0.7975		0.26
LSD(0.05)	NS	NS	NS	NS	0.029	NS		< 0.0001
CV(%mean)	18.9	8.1	19.0	9.0	0.3	16.7		10.8

Planting date: 4/22/04
Harv-1: 6/20/06
Harv-2: 7/24/06
Harv-3: 9/26/06

Fertilizer: 22 lbs N/a + 104 lbs P_2O_5/a - 4/15/05

2006 Summary of the
2004 DRYLAND INTRASTATE ALFALFA YIELD TRIAL

Cultivar	Harvest-1	Harvest-2	Harvest-3	2006 Total	2005 Total	2005-06 Total	% Mean	2004 Total
	t/a	*t/a*	*t/a*	*t/a*	*t/a*	*t/a*		*t/a*
VL02	1.55	1.28	1.32	4.15	3.38	7.53	98	**1.64**
54Q25	1.88	1.36	1.29	4.53	3.47	8.01	104	**1.72**
Lightening Xtra	1.69	1.42	1.29	4.40	3.44	7.84	102	1.53
DKA 33-16	1.62	1.30	1.28	4.19	3.34	7.54	98	**1.65**
DKA 50-18	1.83	1.38	1.36	4.57	3.31	7.89	103	**1.59**
Boulder	1.43	1.39	1.44	4.27	3.22	7.49	98	**1.74**
Rebound 5.0	1.82	1.25	1.18	4.24	3.21	7.45	97	1.48
6400HT	1.71	1.34	1.13	4.17	**3.58**	7.76	101	**1.55**
MT-9321	1.60	1.33	1.21	4.14	3.37	7.51	98	**1.68**
MT-2003-1	1.65	1.37	1.27	4.29	3.22	7.50	98	**1.63**
Ladak 65	1.63	1.36	1.47	4.46	3.33	7.79	102	**1.80**
Shaw	1.87	1.34	1.24	4.44	3.27	7.71	100	**1.75**
Cooper	1.52	1.43	1.39	4.34	3.32	7.67	100	**1.79**
mean	1.68	1.35	1.30	4.32	3.34	7.67		1.66
Pr>F	0.6699	0.5378	0.7813	0.8959	0.02	0.7975		0.26
LSD(0.05)	NS	NS	NS	NS	0.029	NS		< 0.0001
CV(%mean)	18.9	8.1	19.0	9.0	0.3	16.7		10.8

Planting date: 4/22/04
Harv-1: 6/20/06
Harv-2: 7/24/06
Harv-3: 9/26/06

Fertilizer: 22 lbs N/a + 104 lbs P_2O_5/a - 4/15/05

PROJECT TITLE: **2004 IRRIGATED INTRASTATE ALFALFA YIELD TRIAL**

PROJECT COOPERATORS: Dennis Cash, MSU – Bozeman
Duane Johnson, MSU – NWARC
Louise Strang, MSU - NWARC

OBJECTIVE: Compare yield potential of new releases and experimental lines with older, established cultivars under irrigated conditions.

METHODS: The trial was seeded on 4/23/04. Thirteen cultivars were seeded in 5-ft by 20-ft plots consisting of 7 rows spaced 6-inches apart. Seeding rate was 9 lbs/acre pure live seed, and seeding depth was 0.5 in. Mono-ammonium phosphate fertilizer *(*11-52-0*)* was applied preplant at a rate of 120 lbs/acre. Pursuit (3 oz./a) and Prowl (1.8 pt/a) were preplant incorporated for weed control. The experimental design was a randomized complete block with 13 cultivars and four replications*.*

Crop year precipitation was 22.81 inches. Average monthly temperatures were 43.9, 52.6, 60.7, 69.1, and 63.8 degrees F from April to August, respectively.

Forage yield harvest dates were 6/22, 7/27, and 9/28/06. Plots were harvested with a sickle-bar research plot swather. Harvest area was 100 ft^2. After recording the fresh harvest weight, a subsample of approximately 500 g was taken, weighed, dried at 60°C in a forced air oven for 48 to 72 h, and reweighed to determine DM content.

Analysis of variance was calculated by the ANOVA procedure of XLSTAT Ver.7.5 (2004). Critical value for a significant F-test was tested at P=0.05. Treatment effects were compared by protected LSD when the F test for treatment was significant.

RESULTS: The total yields for 2006 ranged from 3.87 t/a ('Ladak 65') to 4.72 t/a ('Shaw'). There were no significant yield differences in 2006.

2004 INTRASTATE ALFALFA YIELD TRIAL - Irrigated
Kalispell, 2005

		Total Dry Matter Yield			2005		2004
		Harv-1	Harv-2	Harv-3	Total	%Mean	Total
Variety	MTNO	*t/a*	*t/a*	*t/a*	*t/a*		*t/a*
Lightening Xtra	394	1.70	1.54	0.70	**3.94**	108.9	3.16
Boulder	397	1.59	1.60	0.70	**3.89**	107.4	2.89
Shaw	328	1.67	1.48	0.58	**3.74**	103.3	3.08
VL02	392	1.65	1.33	0.71	**3.69**	101.9	2.83
Cooper	335	1.62	1.49	0.54	**3.65**	100.7	3.19
MT-9321	333	1.72	1.42	0.48	**3.62**	100.1	3.11
DKA 50-18	396	1.51	1.35	0.74	**3.60**	99.4	2.76
54Q25	393	1.62	1.36	0.61	**3.59**	99.2	3.06
MT-2003-1	400	1.54	1.35	0.67	3.56	98.4	2.93
Ladak 65	2	1.75	1.37	0.38	3.49	96.5	2.98
DKA 33-16	395	1.46	1.40	0.60	3.45	95.3	2.68
6400HT	399	1.56	1.40	0.48	3.45	95.3	2.76
Rebound 5.0	398	1.46	1.33	0.62	3.41	94.2	2.95
mean		1.60	1.42	0.60	3.62		2.95
LSD(0.05)		0.11	0.25	0.17	0.38		0.46
Pr>F		0.380	0.723	0.578	0.015		0.44
CV(%mean)		5.0	12.3	20.4	7.4		10.9

Seeded 4/23/04
Harv-1: 7/1/05 -ebl
Harv-2: 8/5/05 - mbl
Harv-3: 10/10/05

Fertilizer: 22 lbs N/a + 104 lbs P_2O_5/a - 4/15/05

.

2004 INTRASTATE ALFALFA YIELD TRIAL - Irrigated

Kalispell, 2006

Variety	MTNO	Total Dry Matter Yield Harv-1 t/a	Harv-2 t/a	Harv-3 t/a	2006 Total t/a	2005 Total t/a	2005-06 Total t/a	%Mean	2004 Total t/a
Ladak 65	2	1.64	1.37	0.86	3.87	3.49	7.36	93	2.98
Shaw	328	2.04	**1.52**	1.15	4.72	**3.74**	8.46	107	3.08
MT-9321	333	1.84	1.37	1.04	4.25	**3.62**	7.87	100	3.11
Cooper	335	1.74	1.29	1.02	4.04	**3.65**	7.69	97	3.19
VL02	392	1.95	**1.60**	1.10	4.65	**3.69**	8.34	106	2.83
54Q25	393	1.72	**1.62**	0.92	4.26	**3.59**	7.85	99	3.06
Lightening Xtra	394	1.80	**1.58**	1.01	4.38	**3.94**	8.32	105	3.16
DKA 33-16	395	1.55	**1.63**	1.10	4.29	3.45	7.74	98	2.68
DKA 50-18	396	1.63	**1.47**	1.10	4.20	**3.60**	7.80	99	2.76
Boulder	397	1.92	1.36	1.05	4.34	**3.89**	8.22	104	2.89
Rebound 5.0	398	1.62	**1.45**	1.10	4.17	3.41	7.57	96	2.95
6400HT	399	1.57	1.41	1.03	4.01	3.45	7.46	95	2.76
MT-2003-1	400	1.73	**1.44**	1.16	4.32	3.56	7.88	100	2.93
mean		1.75	1.47	1.05	4.27	3.62	7.89		2.95
Pr>F		0.1516	0.0006	0.3870	0.4231	0.3800	0.3852		0.46
LSD(0.05)		NS	0.22	NS	NS	0.015	0.97		0.44
CV(%mean)		14.1	10.71	15.89	10.8	7.4	8.6		10.9

Seeded 4/23/04
Harv-1: 6/22/06
Harv-2: 7/27/06
Harv-3: 9/28/06

Fertilizer: 22 lbs N/a + 104 lbs P_2O_5/a - 4/15/05

PROJECT TITLE: **TIMOTHY HARVEST TIMING/FORAGE YIELD TRIAL**

PROJECT LEADER: Duane Johnson, NWARC
Louise Strang, NWARC

OBJECTIVE: This study was initiated in 2005 to compare the forage yield potential of several germplasm lines of timothy grass (*Phleum pratense*) harvested at three different maturity stages.

METHODS:

The seed was collected in August, 2004, from a nursery containing 359 different germplasm accessions. Five of these accessions plus a bulk sample of common timothy seed were seeded at 3.6 lbs/a in 100 ft2 plots arranged in a split block design with harvest maturity stages as main plots and germplasm lines as subplots randomized within each main plot. Each set of treatments was replicated 3 times. All maturity treatments were harvested twice, and the jointing and flag leaf treatments were harvested 3 times.

RESULTS:

For first cutting yields, timothy cut at the heading stage produced the most forage for all lines tested. When harvested at the flag leaf stage, however, PI 206717 produced significantly more forage than line PI 262469. At the second cutting, the heading stage harvest treatment again produced more forage than the earlier stages, and line PI 419641 produced significantly more forage than PI 419615, 235548, and 206717. Over the whole season, harvesting at the jointing stage resulted in significantly less forage yield than harvesting at the later stages. Although not significant, PI 419641 and 262469 had the highest yields when harvested at heading and PI 419615 when harvested at jointing.

Timothy Harvest Timing/Forage Yield Trial
Kalispell, 2006

First Cutting

	Stage			
Cultivar	jointing	flag leaf	heading	mean
235548	1.07	1.55	**2.26**	1.63
206717	0.97	**1.90**	**2.27**	1.71
262469	1.08	1.26	**2.30**	1.55
419641	1.14	1.83	**2.31**	1.76
419615	1.06	1.78	**2.11**	1.65
bulk	1.30	1.43	**2.00**	1.58
mean	1.10	1.63	**2.21**	

	Cultivar means	Stage means	Cult x Stg
Pr>F	0.0002		
LSD(0.05)	0.40	0.28	0.48
CV(%mean)	24.9		

Second Cutting

	Stage			
Cultivar	jointing	flag leaf	heading	mean
235548	0.24	0.46	0.62	0.44
206717	0.30	0.38	0.57	0.41
262469	0.33	0.46	**0.79**	**0.53**
419641	0.25	0.52	**0.91**	**0.56**
419615	0.31	0.58	0.70	**0.53**
bulk	0.18	0.45	**0.87**	**0.50**
mean	0.27	0.48	**0.75**	

	Cultivar means	Stage means	Cult x Stg
Pr>F	< 0.0001		
LSD(0.05)	0.11	0.08	0.19
CV(%mean)	23.6		

Third Cutting

	Stage		
Cultivar	jointing	flag leaf	mean
235548	0.51	0.64	0.57
206717	0.46	0.60	0.53
262469	0.51	0.39	0.45
419641	0.51	0.59	0.55
419615	0.51	0.78	0.64
bulk	0.48	0.49	0.48
mean	0.50	0.58	

	Cultivar means	Stage means	Cult x Stg
Pr>F	0.5506		
LSD(0.05)	NS	NS	NS
CV(%mean)	33.8		

Total Yield

	Stage			
Cultivar	jointing	flag leaf	heading	mean
235548	1.82	**2.65**	**2.88**	**2.45**
206717	1.40	**2.88**	**2.83**	**2.37**
262469	1.91	2.12	**3.10**	**2.38**
419641	1.89	**2.94**	**3.22**	**2.69**
419615	1.88	**3.14**	**2.81**	**2.61**
bulk	1.95	**2.38**	**2.87**	**2.40**
mean	1.81	**2.69**	**2.95**	

	Cultivar means	Stage means	Cult x Stg
Pr>F	0.0011		
LSD(0.05)	0.51	0.36	0.88
CV(%mean)	21.4		

Timothy Harvest Timing/Forage Yield Trial
Kalispell, 2006

First Cutting

		Stage		
Cultivar	jointing	flag leaf	heading	mean
235548	1.07	1.55	**2.26**	1.63
206717	0.97	**1.90**	**2.27**	1.71
262469	1.08	1.26	**2.30**	1.55
419641	1.14	1.83	**2.31**	1.76
419615	1.06	1.78	**2.11**	1.65
bulk	1.30	1.43	**2.00**	1.58
mean	1.10	1.63	**2.21**	

	Cultivar means	Stage means	Cult x Stg
Pr>F	0.0002		
LSD(0.05)	0.40	0.28	0.48
CV(%mean)	24.9		

Second Cutting

		Stage		
Cultivar	jointing	flag leaf	heading	mean
235548	0.24	0.46	0.62	0.44
206717	0.30	0.38	0.57	0.41
262469	0.33	0.46	**0.79**	**0.53**
419641	0.25	0.52	**0.91**	**0.56**
419615	0.31	0.58	0.70	**0.53**
bulk	0.18	0.45	**0.87**	**0.50**
mean	0.27	0.48	**0.75**	

	Cultivar means	Stage means	Cult x Stg
Pr>F	< 0.0001		
LSD(0.05)	0.11	0.08	0.19
CV(%mean)	23.6		

Third Cutting

		Stage	
Cultivar	jointing	flag leaf	mean
235548	0.51	0.64	0.57
206717	0.46	0.60	0.53
262469	0.51	0.39	0.45
419641	0.51	0.59	0.55
419615	0.51	0.78	0.64
bulk	0.48	0.49	0.48
mean	0.50	0.58	

	Cultivar means	Stage means	Cult x Stg
Pr>F	0.5506		
LSD(0.05)	NS	NS	NS
CV(%mean)	33.8		

Total Yield

		Stage		
Cultivar	jointing	flag leaf	heading	mean
235548	1.82	**2.65**	**2.88**	**2.45**
206717	1.40	**2.88**	**2.83**	**2.37**
262469	1.91	2.12	**3.10**	**2.38**
419641	1.89	**2.94**	**3.22**	**2.69**
419615	1.88	**3.14**	**2.81**	**2.61**
bulk	1.95	**2.38**	**2.87**	**2.40**
mean	1.81	**2.69**	**2.95**	

	Cultivar means	Stage means	Cult x Stg
Pr>F	0.0011		
LSD(0.05)	0.51	0.36	0.88
CV(%mean)	21.4		

SPECIALTY CROP EVALUATION

759

Specialty crop evaluation is part of Project 759 and includes research related to a wide variety of unique crops from seeding to data collection to publications.

PROJECT TITLE: **CAMELINA FERTILITY TRIAL**

PROJECT LEADER: Duane Johnson, NWARC
Louise Strang, Research Asst.

OBJECTIVE: Assess the effect of different fertilizer rates of phosphorus and sulfur on camelina yield and test weight in northwest Montana.

METHODS:

Three rates of P (0, 15, 30 lbs/a) and 2 rates of S (0 and 15 lbs/a) were applied in a randomized complete block design on 4/11/06 at the Cross Bow ranch near Bigfork, MT. Camelina was seeded at 3 lbs PLS/a on 4/12/06 in 100 ft^2 plots at the Cross Bow Ranch, Bigfork, MT. Seeding depth was ¼ inch.

On 5/20/06 plants were counted in linear foot sections of each row. The height of the mature plants, relative maturity time, and % of plot with shattered seed were recorded. The mature seed was harvested by direct combining.

There were no significant differences in stand establishment, seed yield, or test weight among the treatments. Seed yield averaged 1500 lbs/a.

Camelina Fertility Trial

Crossbow Ranch, Bigfork

Stand Establishment (pl/sqft)

	S(lbs/a)				
P(lbs/a)	0	15	mean		
0	13.5	13.4	13.4	LSD(0.05)	NS
15	12.6	12.7	12.6	Pr>F	0.996613
30	12.9	12.5	12.7	CV(%mean)	42.7
mean	13.0	12.9			

Yield (lbs/a)

	S(lbs/a)				
P(lbs/a)	0	15	mean		
0	1525	1491	1508	LSD(0.05)	NS
15	1557	1504	1531	Pr>F	0.903595
30	1529	1465	1497	CV(%mean)	13.2
mean	1537	1487			

Test Weight (lbs/bu)

	S(lbs/a)				
P(lbs/a)	0	15	mean		
0	40.4	40.2	40.3	LSD(0.05)	NS
15	40.3	40.3	40.3	Pr>F	0.62449
30	40.3	40.5	40.4	CV(%mean)	1.2
mean	40.3	40.4			

Camelina Fertility Trial

Crossbow Ranch, Bigfork

Stand Establishment (pl/sqft)

	S(lbs/a)				
P(lbs/a)	0	15	mean		
0	13.5	13.4	13.4	LSD(0.05)	NS
15	12.6	12.7	12.6	Pr>F	0.996613
30	12.9	12.5	12.7	CV(%mean)	42.7
mean	13.0	12.9			

Yield (lbs/a)

	S(lbs/a)				
P(lbs/a)	0	15	mean		
0	1525	1491	1508	LSD(0.05)	NS
15	1557	1504	1531	Pr>F	0.903595
30	1529	1465	1497	CV(%mean)	13.2
mean	1537	1487			

Test Weight (lbs/bu)

	S(lbs/a)				
P(lbs/a)	0	15	mean		
0	40.4	40.2	40.3	LSD(0.05)	NS
15	40.3	40.3	40.3	Pr>F	0.62449
30	40.3	40.5	40.4	CV(%mean)	1.2
mean	40.3	40.4			

2006 Camelina Date of Planting Study

Kalispell

PD	D after 1/1	Stand *pl/sqft*	Height *in*	Yield *lbs/a*	Test Wt. *lbs/bu*
8-Feb	39	6.3	31.0	643.8	**41.2**
8-Mar	67	**12.7**	31.8	893.2	**41.3**
22-Mar	81	**9.0**	33.5	777.9	**41.1**
12-Apr	102	6.0	33.8	738.4	40.7
26-Apr	116	7.5	34.8	518.6	40.3
mean		8.3	33.0	714.4	40.9
Pr>F		0.051	0.283	0.083	0.000
LSD(0.05)		4.6	NS	NS	0.3
CV(%mean)		37.7	7.9	24.8	0.6

$Y=-80.27+25.58*X-0.1753*X^2$

$R^2=0.9065$

PROJECT TITLE: **CAMELINA PLANTING DATE TRIAL**

PROJECT LEADER: Duane Johnson, NWARC
Louise Strang, Research Asst.

OBJECTIVE: Compare the effectiveness of different spring seeding dates on stand establishment and yield of camelina.

METHODS:

Camelina was broadcast seeded at 3 lbs PLS/a on 5 dates in early spring: 2/8, 3/8, 3/22, 4/12, and 4/26/06. Plot size was 100 ft^2 with 4 replicates of each planting date. Forty lbs. of N and 15 lbs. of P_2O_5 were applied with the seed.

After emergence, plants were counted in linear foot sections of each row. The date on which 50% of the plants had bloomed in each plot was recorded. The height of the mature plants, relative maturity time, and amount of seed shatter were recorded. The mature seed was harvested by direct combining.

RESULTS:

The March seedings had the best stand establishment. Seed yield was greatest for the March 8 seeding (893 lbs/a) and least for the late April seeding.
Test weights of the February and March seedings were significantly higher than those of the late seedings.

2006 Camelina Date of Planting Study

Kalispell

PD	D after 1/1	Stand *pl/sqft*	Height *in*	Yield *lbs/a*	Test Wt. *lbs/bu*
8-Feb	39	6.3	31.0	643.8	**41.2**
8-Mar	67	**12.7**	31.8	893.2	**41.3**
22-Mar	81	**9.0**	33.5	777.9	**41.1**
12-Apr	102	6.0	33.8	738.4	40.7
26-Apr	116	7.5	34.8	518.6	40.3
mean		8.3	33.0	714.4	40.9
Pr>F		0.051	0.283	0.083	0.000
LSD(0.05)		4.6	NS	NS	0.3
CV(%mean)		37.7	7.9	24.8	0.6

$Y=-80.27+25.58*X-0.1753*X^2$

$R^2=0.9065$

PROJECT TITLE: **CAMELINA VARIETY TRIAL**

PROJECT LEADER: Duane Johnson, NWARC
Louise Strang, Research Asst.

OBJECTIVE: Assess the suitability of various camelina cultivars for production in northwest Montana.

METHODS:

Fifteen cultivars/breeding lines of camelina (*Camelina sativa*) were seeded at 2.5 lbs PLS/a on 3/23/06 in 100 ft^2 plots at the Cross Bow Ranch, Bigfork, MT. Seeding depth was ¼ inch.

After emergence, plants were counted in linear foot sections of each row. The date on which 50% of the plants had bloomed in each plot was recorded. The height of the mature plants, relative maturity time, and % of plot with shattered seed were recorded. The mature seed was harvested by direct combining.

'MT-12' and 'MT101' (a Ukrainian accession) had the best stand establishment. 'C-54', 'C-53', 'C-88', and 'Robbie' produced very poor stands. 'MT-102' (the other Ukrainian accession) matured early and lost almost half its seed by harvest time. Seed yield exceeded 1000 lbs/a for all the MT lines except MT102. (Table 1)

RESULTS:

Seeds from each plot were ground and the oil extracted with hexane and the fatty acids converted to methyl esters. The FAMEs were analyzed with a Shimadzu 17A gas chromatograph. Significant differences were observed among cultivars for EPA, an omega-3 fatty acid (Table 2).

Camelina 2006

Crossbow Ranch, Bigfork

Table 1. Varieties

Cv	Stand Plts/lin. ft	Bloom date	Plant Ht inches	Maturity	Shatter%	Seed Yld lbs/a	test wt lbs/bu
MT-12	**17.1**	6/2	33.3	early	11.3	**1215.0**	41.6
MT-32	12.6	6/3	34.3	earliest	2.5	**1074.7**	**42.3**
MT-15	14.2	6/3	33.8	early	5.0	**1193.1**	40.9
MT-38	13.9	6/1	33.5	earliest	6.3	**1306.5**	**42.3**
C-54	0.8	6/2	33.5	early	5.0	387.9	**42.0**
C-53	0.4	6/5	33.3	medium	0.0	328.1	41.4
C-88	0.8	6/3	31.0	early	3.8	485.5	**42.1**
C-37	0.8	6/4	33.0	medium	0.0	485.0	40.9
Robbie	0.8	6/5	29.8	later	0.0	490.3	41.4
Celine	15.7	6/5	**37.5**	early	1.3	**1334.5**	41.7
MT-1	13.0	6/2	33.5	early	1.3	**1155.2**	41.2
MT-3	11.2	6/2	34.0	early	3.8	**1279.4**	**42.2**
MT-5	14.8	6/3	33.0	early	1.3	**1070.5**	**42.0**
MT101*	**25.5**	6/5	33.0	early	2.5	**1034.7**	**42.3**
MT102*	13.3	5/31	28.5	earliest	**42.5**	643.3	38.4
mean	10.3		33.0		5.8	898.9	41.5
LSD(0.05)	6.3		2.4		6.5	328.2	0.5
Pr>F	< 0.0001		< 0.0001		< 0.0001	< 0.0001	< 0.0001
CV(%mean)	42.8		5.1		76.4	25.3	0.9

*	Species	Selection Line	Origin
MT101	*Camelina sativa* Grantz.	Stepovyi1'	Ukraine
MT102	*Camelina sativa* Grantz.	Prestyzh'	Ukraine

Camelina 2006

Crossbow Ranch, Bigfork

Table 2. Fatty Acids

	GC Area %					
	Stearic	Oleic	Linoleic	Linolenic	EPA	DHA
Cv	C18:0	C18:1	C18:2	C18:3	C20:5	C22:5
MT-12	**2.26**	**16.51**	16.25	36.90	2.63	0.50
MT-32	2.19	**16.97**	16.28	36.54	2.47	0.46
MT-15	**2.23**	15.73	16.63	35.87	**3.06**	0.52
MT-38	**2.25**	**16.61**	15.60	38.52	2.35	0.56
C-54	**2.38**	16.02	16.17	36.85	2.64	0.53
C-53	**2.35**	15.94	16.96	36.22	**2.71**	0.52
C-88	**2.30**	16.16	16.71	36.38	**2.69**	0.52
C-37	**2.30**	15.69	17.04	35.37	**3.04**	0.55
Robbie	**2.26**	15.68	17.63	36.82	2.43	0.52
Celine	**2.22**	15.59	18.50	36.52	2.30	0.54
MT-1	**2.23**	16.23	16.11	36.04	**3.00**	0.57
MT-3	**2.31**	15.83	17.29	36.06	2.58	0.52
MT-5	**2.22**	15.64	18.08	36.44	2.34	0.46
MT101	2.13	15.60	18.44	36.81	2.32	0.50
MT102	2.02	15.16	**19.42**	36.45	2.55	0.53
mean	2.24	15.96	17.14	36.52	2.61	0.52
Pr>F	0.0476	0.0002	< 0.0001	0.4218	0.0012	0.8331
LSD(0.05)	0.17	0.66	0.67	NS	0.39	NS
CV(%mean)	5.3	2.9	2.7	3.6	10.4	14.8

Camelina 2006

Crossbow Ranch, Bigfork

Table 1. Varieties

Cv	Stand *Plts/lin. ft*	Bloom date	Plant Ht *inches*	Maturity	Shatter%	Seed Yld *lbs/a*	test wt *lbs/bu*
MT-12	**17.1**	6/2	33.3	early	11.3	**1215.0**	41.6
MT-32	12.6	6/3	34.3	earliest	2.5	**1074.7**	**42.3**
MT-15	14.2	6/3	33.8	early	5.0	**1193.1**	40.9
MT-38	13.9	6/1	33.5	earliest	6.3	**1306.5**	**42.3**
C-54	0.8	6/2	33.5	early	5.0	387.9	**42.0**
C-53	0.4	6/5	33.3	medium	0.0	328.1	41.4
C-88	0.8	6/3	31.0	early	3.8	485.5	**42.1**
C-37	0.8	6/4	33.0	medium	0.0	485.0	40.9
Robbie	0.8	6/5	29.8	later	0.0	490.3	41.4
Celine	15.7	6/5	**37.5**	early	1.3	**1334.5**	41.7
MT-1	13.0	6/2	33.5	early	1.3	**1155.2**	41.2
MT-3	11.2	6/2	34.0	early	3.8	**1279.4**	**42.2**
MT-5	14.8	6/3	33.0	early	1.3	**1070.5**	**42.0**
MT101*	**25.5**	6/5	33.0	early	2.5	**1034.7**	**42.3**
MT102*	13.3	5/31	28.5	earliest	**42.5**	643.3	38.4
mean	10.3		33.0		5.8	898.9	41.5
LSD(0.05)	6.3		2.4		6.5	328.2	0.5
Pr>F	< 0.0001		< 0.0001		< 0.0001	< 0.0001	< 0.0001
CV(%mean)	42.8		5.1		76.4	25.3	0.9

*	Species	Selection Line	Origin
MT101	*Camelina sativa* Grantz.	Stepovyi1'	Ukraine
MT102	*Camelina sativa* Grantz.	Prestyzh'	Ukraine

Camelina 2006

Crossbow Ranch, Bigfork

Table 2. Fatty Acids

	GC Area %					
Cv	Stearic C18:0	Oleic C18:1	Linoleic C18:2	Linolenic C18:3	EPA C20:5	DHA C22:5
MT-12	**2.26**	**16.51**	16.25	36.90	2.63	0.50
MT-32	2.19	**16.97**	16.28	36.54	2.47	0.46
MT-15	**2.23**	15.73	16.63	35.87	**3.06**	0.52
MT-38	**2.25**	**16.61**	15.60	38.52	2.35	0.56
C-54	**2.38**	16.02	16.17	36.85	2.64	0.53
C-53	**2.35**	15.94	16.96	36.22	**2.71**	0.52
C-88	**2.30**	16.16	16.71	36.38	**2.69**	0.52
C-37	**2.30**	15.69	17.04	35.37	**3.04**	0.55
Robbie	**2.26**	15.68	17.63	36.82	2.43	0.52
Celine	**2.22**	15.59	18.50	36.52	2.30	0.54
MT-1	**2.23**	16.23	16.11	36.04	**3.00**	0.57
MT-3	**2.31**	15.83	17.29	36.06	2.58	0.52
MT-5	**2.22**	15.64	18.08	36.44	2.34	0.46
MT101	2.13	15.60	18.44	36.81	2.32	0.50
MT102	2.02	15.16	**19.42**	36.45	2.55	0.53
mean	2.24	15.96	17.14	36.52	2.61	0.52
Pr>F	0.0476	0.0002	< 0.0001	0.4218	0.0012	0.8331
LSD(0.05)	0.17	0.66	0.67	NS	0.39	NS
CV(%mear	5.3	2.9	2.7	3.6	10.4	14.8

2005-2006 Winter Camelina Insecticide Trial

Kalispell

Treatment	Fall	Spring	Spring Std *pl/sqft*	Yield *lbs/a*	TestWt *lbs/bu*
1	Prosper	Warrier	25.1	347	41.6
2	Prosper	0	**35.9**	318	41.6
3	0	Warrier	26.0	354	41.5
4	0	0	25.3	385	41.4
		mean	28.1	351	42
		LSD(0.05)	6.8	NS	NS
		Pr>F	0.011	0.958	0.824
		CV(%mean)	18.3	49.9	0.8

PROJECT TITLE: **WINTER CAMELINA INSECTICIDE TRIAL**

PROJECT LEADER: Duane Johnson, NWARC
Louise Strang, Research Asst.

OBJECTIVE: Compare the effectiveness of fall seed treatment with Prosper and spring application of Warrior, alone and in combination, on survival and yield of winter camelina.

METHODS:

'BSX-WG1' camelina seed, treated and untreated with Prosper insecticide was broadcast seeded at 5 lbs PLS/a on 9/15/05. Plot size was 100 ft^2 with 5 replicates of each treatment. Forty lbs. of N and 65 lbs. of P_2O_5, 40 lbs K_2O, and 25 lbs S were applied with the seed. Warrior was applied at the full labeled rate to one of each treated and untreated plot at spring green-up.

After emergence, plants were counted in linear foot sections of each row. The mature seed was harvested by direct combining. The seed was weighed to determine plot yield and sub samples taken to determine test weight.

RESULTS:

The Prosper seed treatment seemed to enhance winter survival. There were no significant differences in yield or seed weight among the treatments.

2005-2006 Winter Camelina Insecticide Trial

Kalispell

Treatment	Fall	Spring	Spring Std *pl/sqft*	Yield *lbs/a*	TestWt *lbs/bu*
1	Prosper	Warrier	25.1	347	41.6
2	Prosper	0	**35.9**	318	41.6
3	0	Warrier	26.0	354	41.5
4	0	0	25.3	385	41.4
		mean	28.1	351	42
		LSD(0.05)	6.8	NS	NS
		Pr>F	0.011	0.958	0.824
		CV(%mean)	18.3	49.9	0.8

PROJECT TITLE **PNW CANOLA VARIETY TRIAL 2006**

PROJECT LEADER: Jack Brown, University of Idaho

COOPERATORS: Duane Johnson, NWARC
Louise Strang, NWARC

OBJECTIVE: To evaluate germplasm and determine what canola varieties and experimental lines are adapted to a northwestern Montana environment.

METHODS:

Thirty cultivars/experimental lines of canola were seeded 4/18/06 at the Cross Bow ranch. Each plot consisted of 7-20' rows with 6" row spacing and 2' between plots. Seeding rate was 5 lbs/acre. The varieties were arranged in a randomized complete block configuration with 4 replicates. Stand establishment was evaluated by counting plants in square foot quadrats in each plot. The date on which 50% of the plants bloomed was recorded for each plot.

The trial was direct combined 8/28/06. Seed shatter was estimated for each variety and used to correct for yield loss. The seed was weighed for plot yield determination, and 1-pint samples from each were weighed to determine test weight.

RESULTS:

Stand establishment was best for the control variety 'Profit' and the Roundup-Ready variety 'Hyola357Magn RR'. Stand counts ranged from 3.4 plants/ft^2 to 17.9 plants/ft^2. The canola flowered between June 7 and June 19. Plant height varied from 45 to 68 inches. Seed yield ranged from 540 lbs/acre ('UISH00.3.19.23') to 2118 lbs/acre (Hyola357Magn RR). Test weight ranged from 45.2 lbs/bu ('03H580 RR') to 49.4 lbs/bu (the Clearfield variety 'US.040501 CF').

2006 PNW Canola Variety Trial

Kalispell

Cultivar	Entry	Stand *pl/sqft*	Bloom *date*	Ht *in*	Yield *lbs/a*	Test Wt. *lbs/bu*	Estimated Shatter %	Corrected Yield *lbs/a*
Hyola 401	1	9.7	6/10	48.0	1069	47.8	50	1603
Westar	2	6.4	6/15	55.3	912	46.8		912
Profit	3	8.5	6/12	57.8	1118	47.3	30	1454
Hero	4	**17.9**	6/12	54.3	933	48.2	30	1213
Goldrush	5	12.8	6/7	48.0	949	**48.5**	50	1424
Premier	6	3.8	6/12	53.2	1042	48.0	30	1354
Clearwater CF	7	7.0	6/14	58.5	1265	47.3	30	1645
Sterling	8	8.1	6/12	52.8	764	47.2	30	993
Gem CF	9	13.2	6/12	49.3	891	47.4	30	1158
UISC00.1.3.5	10	7.3	6/12	53.2	1147	47.0	30	1491
UISC00.3.1.17	11	6.8	6/12	51.5	1300	47.8	30	**1691**
UISC00.3.8.DE	12	12.3	6/10	50.7	920	48.4	50	1380
UISH00.3.19.23	13	10.7	6/12	52.3	415	47.6	30	540
Hyola357Magn RR	14	**13.8**	6/9	45.3	1412	46.2	50	**2118**
HyCLASS 431 RR	15	10.7	6/14	58.7	1143	47.0	30	1486
HyCLASS 712 RR	16	9.4	6/17	60.7	1434	47.2		1434
HyCLASS 905 RR	17	6.9	6/17	**63.0**	**1675**	47.0		**1675**
US.040501 CF	18	3.4	6/16	**65.0**	963	**49.4**		963
US.040503 CF	19	7.6	6/19	**64.0**	1469	46.4		1469
US.040504 CF	20	11.1	6/18	**68.3**	**1959**	**49.3**		**1959**
CNX.03 CF	21	8.7	6/14	61.2	1147	47.9	30	1491
CNX.06 CF	22	8.5	6/15	51.0	868	**48.7**		868
CNX.19 CF	23	12.6	6/17	56.5	**1658**	**48.6**		**1658**
V1030 RR	24	7.9	6/15	59.8	1178	47.1		1178
V1031 RR	25	5.1	6/16	**65.3**	1178	47.7		1178
03H252 RR	26	7.3	6/13	**63.2**	1434	47.0	30	**1864**
03H406 RR	27	4.4	6/16	61.0	1453	47.4		1453
03H411 RR	28	6.0	6/14	58.2	1355	47.0	30	**1761**
03H580 RR	29	5.8	6/15	56.7	**1611**	45.2		1611
03H631 RR	30	6.5	6/14	56.5	**1568**	47.3	30	**2038**
mean		8.7		56.6	1208	47.5		1435
Pr>F		< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001
LSD(0.05)		4.4		5.7	394	0.9		468
CV(%mean)		35.8		5.0	22.9	1.3		23

2006 PNW Canola Variety Trial

Kalispell

Cultivar	Entry	Stand *pl/sqft*	Bloom *date*	Ht *in*	Yield *lbs/a*	Test Wt. *lbs/bu*	Estimated Shatter %	Corrected Yield *lbs/a*
Hyola 401	1	9.7	6/10	48.0	1069	47.8	50	1603
Westar	2	6.4	6/15	55.3	912	46.8		912
Profit	3	8.5	6/12	57.8	1118	47.3	30	1454
Hero	4	**17.9**	6/12	54.3	933	48.2	30	1213
Goldrush	5	12.8	6/7	48.0	949	**48.5**	50	1424
Premier	6	3.8	6/12	53.2	1042	48.0	30	1354
Clearwater CF	7	7.0	6/14	58.5	1265	47.3	30	1645
Sterling	8	8.1	6/12	52.8	764	47.2	30	993
Gem CF	9	13.2	6/12	49.3	891	47.4	30	1158
UISC00.1.3.5	10	7.3	6/12	53.2	1147	47.0	30	1491
UISC00.3.1.17	11	6.8	6/12	51.5	1300	47.8	30	**1691**
UISC00.3.8.DE	12	12.3	6/10	50.7	920	48.4	50	1380
UISH00.3.19.23	13	10.7	6/12	52.3	415	47.6	30	540
Hyola357Magn RR	14	**13.8**	6/9	45.3	1412	46.2	50	**2118**
HyCLASS 431 RR	15	10.7	6/14	58.7	1143	47.0	30	1486
HyCLASS 712 RR	16	9.4	6/17	60.7	1434	47.2		1434
HyCLASS 905 RR	17	6.9	6/17	**63.0**	**1675**	47.0		**1675**
US.040501 CF	18	3.4	6/16	**65.0**	963	**49.4**		963
US.040503 CF	19	7.6	6/19	**64.0**	1469	46.4		1469
US.040504 CF	20	11.1	6/18	**68.3**	**1959**	**49.3**		**1959**
CNX.03 CF	21	8.7	6/14	61.2	1147	47.9	30	1491
CNX.06 CF	22	8.5	6/15	51.0	868	**48.7**		868
CNX.19 CF	23	12.6	6/17	56.5	**1658**	**48.6**		**1658**
V1030 RR	24	7.9	6/15	59.8	1178	47.1		1178
V1031 RR	25	5.1	6/16	**65.3**	1178	47.7		1178
03H252 RR	26	7.3	6/13	**63.2**	1434	47.0	30	**1864**
03H406 RR	27	4.4	6/16	61.0	1453	47.4		1453
03H411 RR	28	6.0	6/14	58.2	1355	47.0	30	**1761**
03H580 RR	29	5.8	6/15	56.7	**1611**	45.2		1611
03H631 RR	30	6.5	6/14	56.5	**1568**	47.3	30	**2038**
mean		8.7		56.6	1208	47.5		1435
Pr>F		< 0.0001		< 0.000	< 0.0001	< 0.0001		< 0.0001
LSD(0.05)		4.4		5.7	394	0.9		468
CV(%mean)		35.8		5.0	22.9	1.3		23

PROJECT TITLE: **OILSEED TRIAL**

PROJECT LEADER: Duane Johnson, NWARC
Louise Strang, Research Asst.

OBJECTIVE: Assess the suitability of various oilseed crops for production in northwest Montana.

METHODS:

The following oilseed cultivars were seeded at NWARC in 2006:

‘Celine’, ‘MT10’, ‘MT101’, ‘MT102’ camelina
‘Minot’, ‘Crosby’, and ‘905’ canola
‘Omega’, ‘Carter’, ‘Neche’, and ‘York’ flax

Each entry was seeded in 7-20’ rows spaced 6” apart. The experimental design was a randomized complete block with 4 replicates. The plot area had been fertilized with 35 lbs N, 35 lbs P_2O_5, 62 lbs K_2O and 24 lbs S/a. Stand establishment was visually estimated on 6/1/06. The camelina Crosby and Minot canola were harvested with a Hege plot combine on 9/1/06, and the flax and 905 canola on 9/7. Seeds from each plot were ground and the oil extracted with hexane and the fatty acids converted to methyl esters. The FAMEs were analyzed with a Shimadzu 17A gas chromatograph.

RESULTS:

The York flax, and the Celine, MT10, and MT101 camelinas produced the most seed (Table 1). Fatty acid composition of the oil is shown in Table 2. Of the “omega-3” fatty acids, flax (linseed oil) contained the highest linolenic content, and the camelinas were highest in EPA and DHA.

2006 OILSEED TRIAL

Kalispell

Table 1. Varieties

Cultivar	Species	Stand *#/sqft*	Maturity *(1-5)**	Height *in*	Yield *lbs/a*	TestWt *lbs/bu*
Crosby	Canola	11.0	3.8	43.8	570	44.6
Minot	Canola	13.0	3.5	41.0	688	**45.4**
905	Canola	11.9	3.3	44.0	852	**46.3**
Carter	Flax	26.6	3.3	35.3	828	43.0
Neche	Flax	21.1	4.0	35.0	760	43.4
Omega	Flax	11.5	3.5	30.8	432	43.4
York	Flax	**39.8**	4.0	34.0	**1316**	43.8
Celine	Camelina	9.8	3.0	37.5	**1293**	41.4
MT10	Camelina	9.6	3.5	38.3	**1139**	40.4
MT101	Camelina	10.3	3.3	37.3	**1340**	41.0
MT102	Camelina	8.8	**4.8**	37.0	768	38.3
	mean	15.8	3.6	37.6	907.6	42.8
	Pr>F	< 0.0001	0.0089	0.0902	0.0003	< 0.0001
	LSD(0.05)	5.8	0.8	NS	359	1.6
	CV(%mean)	25.6	15.8	15.8	26.1	2.6

* Maturity stage at harvest: 1=green; 5=shatter

Table 2. Fatty Acid Methyl Esters

Cultivar	Species	Stearic	Oleic	Linoleic	Linolenic	Arachidic	EPA	DHA	Erucic
		GC Area%							
Crosby	Canola	1.64	57.84	**19.40**	10.47	2.48	1.72	0.17	0.28
Minot	Canola	1.91	**59.14**	17.94	9.83	2.85	2.13	0.22	0.14
905	Canola	1.65	**60.20**	**20.21**	10.53	1.28	0.11	0.11	0.10
Carter	Flax	3.32	17.95	15.42	**56.89**	0.16	0.02	0.11	0.00
Neche	Flax	3.77	17.29	15.77	**56.78**	0.16	0.04	0.09	0.00
Omega	Flax	3.66	19.84	14.88	55.28	0.15	0.04	0.08	0.00
York	Flax	**4.13**	18.01	15.38	**55.85**	0.14	0.02	0.21	0.00
Celine	Camelina	2.34	15.96	19.05	34.99	13.19	**2.34**	**0.63**	0.07
MT10	Camelina	2.27	17.00	16.40	35.97	**14.05**	**2.76**	**0.50**	0.67
MT101	Camelina	2.31	16.36	18.69	35.65	13.14	2.22	**0.60**	**0.86**
MT102	Camelina	2.58	16.95	17.56	34.92	**14.08**	**2.54**	**1.07**	0.00
	mean	2.69	28.78	17.34	36.10	5.61	1.27	0.34	0.19
	Pr>F	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00
	LSD(0.05)	0.19	1.26	0.90	1.37	0.77	0.45	0.13	0.12
	CV(%mean)	4.7	3.0	3.5	2.6	9.0	22.93	27.7	36.7

2006 OILSEED TRIAL

Kalispell

Table 1. Varieties

Cultivar	Species	Stand *#/sqft*	Maturity *(1-5)**	Height *in*	Yield *lbs/a*	TestWt *lbs/bu*
Crosby	Canola	11.0	3.8	43.8	570	44.6
Minot	Canola	13.0	3.5	41.0	688	**45.4**
905	Canola	11.9	3.3	44.0	852	**46.3**
Carter	Flax	26.6	3.3	35.3	828	43.0
Neche	Flax	21.1	4.0	35.0	760	43.4
Omega	Flax	11.5	3.5	30.8	432	43.4
York	Flax	**39.8**	4.0	34.0	**1316**	43.8
Celine	Camelina	9.8	3.0	37.5	**1293**	41.4
MT10	Camelina	9.6	3.5	38.3	**1139**	40.4
MT101	Camelina	10.3	3.3	37.3	**1340**	41.0
MT102	Camelina	8.8	**4.8**	37.0	768	38.3
	mean	15.8	3.6	37.6	907.6	42.8
	Pr>F	< 0.0001	0.0089	0.0902	0.0003	< 0.0001
	LSD(0.05)	5.8	0.8	NS	359	1.6
	CV(%mean)	25.6	15.8	15.8	26.1	2.6

* Maturity stage at harvest: 1=green; 5=shatter

Table 2. Fatty Acid Methyl Esters

Cultivar	Species	Stearic	Oleic	Linoleic	Linolenic	Arachidic	EPA	DHA	Erucic
		GC Area%							
Crosby	Canola	1.64	57.84	**19.40**	10.47	2.48	1.72	0.17	0.28
Minot	Canola	1.91	**59.14**	17.94	9.83	2.85	2.13	0.22	0.14
905	Canola	1.65	**60.20**	**20.21**	10.53	1.28	0.11	0.11	0.10
Carter	Flax	3.32	17.95	15.42	**56.89**	0.16	0.02	0.11	0.00
Neche	Flax	3.77	17.29	15.77	**56.78**	0.16	0.04	0.09	0.00
Omega	Flax	3.66	19.84	14.88	55.28	0.15	0.04	0.08	0.00
York	Flax	**4.13**	18.01	15.38	**55.85**	0.14	0.02	0.21	0.00
Celine	Camelina	2.34	15.96	19.05	34.99	13.19	**2.34**	**0.63**	0.07
MT10	Camelina	2.27	17.00	16.40	35.97	**14.05**	**2.76**	**0.50**	0.67
MT101	Camelina	2.31	16.36	18.69	35.65	13.14	2.22	**0.60**	**0.86**
MT102	Camelina	2.58	16.95	17.56	34.92	**14.08**	**2.54**	**1.07**	0.00
	mean	2.69	28.78	17.34	36.10	5.61	1.27	0.34	0.19
	Pr>F	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00
	LSD(0.05)	0.19	1.26	0.90	1.37	0.77	0.45	0.13	0.12
	CV(%mean)	4.7	3.0	3.5	2.6	9.0	22.93	27.7	36.7

PROJECT TITLE: **WESTERN REGIONAL DRY PEA YIELD TRIAL**

PROJECT LEADER: Fred Muehlbauer, WSU

COOPERATORS: Duane Johnson, NWARC
Louise Strang, NWARC

OBJECTIVE: Compare yield potential of experimental spring pea breeding lines in a northwest Montana environment.

METHODS:

Eleven dry pea accessions from Washington State University and one named variety were seeded into 100 ft^2 plots at 8.3 seeds/ft^2 on 4/17/06. All entries were short vine, semi-leafless type. The soil was fertilized with 22 lbs. N/a and 104 lbs. P_2O_5/a. Entries were arranged in a randomized complete block design with 3 replicates. Stand counts were taken on 5/11. Dates were recorded when 50% of each plot had bloomed and when 50% had reached maturity (yellow leaves, hard seed). The plants were direct combined when they reached maturity. The peas from each plot were weighed to determine yield and 100-seed samples weighed to determine seed weight (no. of seed/lb).

RESULTS: Pea yields were highly variable within replicates of each cultivar; therefore, yield comparisons were not statistically significant. Yields ranged from 2740 lbs/acre ('Stirling') to 3905 lbs/acre ('PS02101137'). 'PS02100128' had the smallest seeds and 'PS02101119' had the largest.

2006 Western Regional Dry Pea Yield Trial

Kalispell

Entry	Cultivar	Stand *pl/sqft*	Bloom *date*	Nodes *to fst fl*	Height *in*	Yield *lbs/a*	Seed Size *#/lb*
2	PS0110745	14.0	6/14	12	27.0	2935	1949
3	PS0110767	15.2	6/14	12	**34.0**	3451	1809
4	PS0110805	13.2	6/18	10	**38.3**	3074	2020
5	PS02100026	13.6	6/16	10	31.0	2944	1769
6	PS02100128	13.3	6/16	12	**35.3**	3186	2394
7	Stirling	14.7	6/9	10	26.7	2740	2036
8	PS0010836	13.1	6/17	12	27.0	2949	1693
9	PS01102958	14.4	6/18	11	29.0	3038	1770
10	PS02101119	13.0	6/15	11	28.7	3429	**1531**
11	PS02101137	14.9	6/17	12	**35.3**	3905	1758
12	PS02101229	15.0	6/19	11	31.3	3485	1842
	mean	14.0		11	31.2	3194	1870
	Pr>F	0.5545		0.1902	0.0005	0.1562	< 0.0001
	LSD(0.05)	NS		NS	5.0	NS	131
	CV(%mean)	10.9		11.4	9.5	14.3	4.1

2006 Western Regional Dry Pea Yield Trial

Kalispell

Entry	Cultivar	Stand *pl/sqft*	Bloom *date*	Nodes *to fst fl*	Height *in*	Yield *lbs/a*	Seed Size *#/lb*
2	PS0110745	14.0	6/14	12	27.0	2935	1949
3	PS0110767	15.2	6/14	12	**34.0**	3451	1809
4	PS0110805	13.2	6/18	10	**38.3**	3074	2020
5	PS02100026	13.6	6/16	10	31.0	2944	1769
6	PS02100128	13.3	6/16	12	**35.3**	3186	2394
7	Stirling	14.7	6/9	10	26.7	2740	2036
8	PS0010836	13.1	6/17	12	27.0	2949	1693
9	PS01102958	14.4	6/18	11	29.0	3038	1770
10	PS02101119	13.0	6/15	11	28.7	3429	**1531**
11	PS02101137	14.9	6/17	12	**35.3**	3905	1758
12	PS02101229	15.0	6/19	11	31.3	3485	1842
	mean	14.0		11	31.2	3194	1870
	Pr>F	0.5545		0.1902	0.0005	0.1562	< 0.0001
	LSD(0.05)	NS		NS	5.0	NS	131
	CV(%mean)	10.9		11.4	9.5	14.3	4.1

PROJECT TITLE: **WESTERN REGIONAL SPRING LENTIL YIELD TRIAL**

PROJECT LEADER: Fred Muehlbauer, WSU

COOPERATORS: Duane Johnson, NWARC
Louise Strang, NWARC

OBJECTIVE: Compare yield potential of experimental lentil breeding lines with released varieties in a northwest Montana environment.

METHODS:

Fourteen experimental lentil accessions from Washington State University and 6 named cultivars were seeded into 100 ft^2 plots at 8.3 seeds/ft^2 on 4/17/06. The soil was fertilized with 22 lbs. N/a and 104 lbs. P_2O_5/a. Stand counts were taken 5/10/06. Dates were recorded when 50% of each plot had bloomed. When the plants reached maturity (yellow leaves, hard seed) they were harvested with a plot combine. The lentils from each plot were weighed to determine yield and 100-seed samples weighed to determine seed weight (no. seeds/lb).

RESULTS:

All the entries developed excellent stands. First blooms appeared between 6/16 and 6/21. The lentils were direct combined when each plot reached maturity. Lentil yields ranged from 913 lbs/acre (‘LC03600482T’) to 2369 lbs/acre (‘LC01602273E’). ‘LC02600793L’ had the largest seeds and ‘LC03600482T’ had the largest.

2006 Western Regional Lentil Yield Trial

Kalispell

Cultivar	Stand *pl/sqft*	Bloom *date*	Maturity *date*	Height *in*	Yield *lbs/a*	Seed Wt. *#/lb*
Pennell	14.9	6/18	8/6	20.7	1306	**6267**
LC860359L	15.4	6/21	8/7	**23.7**	1277	**6027**
LC860616L	15.7	6/16	8/8	**25.0**	1638	**6460**
LC99600747L	13.8	6/17	8/7	**24.7**	1270	**6551**
LC01600724L	15.1	6/20	8/6	20.3	1065	**6579**
LC02600793L	12.8	6/16	8/8	21.7	1144	**5782**
Merrit	13.0	6/16	8/7	21.7	1440	7008
Richlea	17.4	6/19	8/7	**24.3**	1704	8680
LC01602300R	16.8	6/19	8/8	**23.3**	1732	8934
LC02600193R	14.2	6/17	8/6	20.7	**1770**	8373
Eston	15.0	6/17	8/7	**22.3**	1235	13181
LC01602273E	16.1	6/17	8/6	**22.0**	**2369**	12506
LC01602307E	17.1	6/19	8/9	**24.3**	1706	10086
LC03601590E	16.1	6/18	8/7	**23.0**	**2174**	11279
Pardina	16.6	6/17	8/6	19.7	1699	11317
LC02601144P	14.8	6/17	8/8	21.7	1085	11267
Crimson	14.6	6/18	8/7	18.7	**2208**	12161
LC01602062T	14.9	6/17	8/8	**22.0**	**1811**	9500
LC02601276T	14.1	6/19	8/11	21.7	1358	12123
LC03600482T	13.6	6/16	8/8	16.7	913	14495
mean	15.1			21.9	1545	9429
Pr>F	0.7369			0.0003	0.0005	< 0.0001
LSD(0.05)	NS			3.2	609	856
CV(%mean)	17.4			8.7	24.0	5.5

2006 Western Regional Lentil Yield Trial

Kalispell

Cultivar	Stand *pl/sqft*	Bloom *date*	Maturity *date*	Height *in*	Yield *lbs/a*	Seed Wt. *#/lb*
Pennell	14.9	6/18	8/6	20.7	1306	**6267**
LC860359L	15.4	6/21	8/7	**23.7**	1277	**6027**
LC860616L	15.7	6/16	8/8	**25.0**	1638	**6460**
LC99600747L	13.8	6/17	8/7	**24.7**	1270	**6551**
LC01600724L	15.1	6/20	8/6	20.3	1065	**6579**
LC02600793L	12.8	6/16	8/8	21.7	1144	**5782**
Merrit	13.0	6/16	8/7	21.7	1440	7008
Richlea	17.4	6/19	8/7	**24.3**	1704	8680
LC01602300R	16.8	6/19	8/8	**23.3**	1732	8934
LC02600193R	14.2	6/17	8/6	20.7	**1770**	8373
Eston	15.0	6/17	8/7	**22.3**	1235	13181
LC01602273E	16.1	6/17	8/6	**22.0**	**2369**	12506
LC01602307E	17.1	6/19	8/9	**24.3**	1706	10086
LC03601590E	16.1	6/18	8/7	**23.0**	**2174**	11279
Pardina	16.6	6/17	8/6	19.7	1699	11317
LC02601144P	14.8	6/17	8/8	21.7	1085	11267
Crimson	14.6	6/18	8/7	18.7	**2208**	12161
LC01602062T	14.9	6/17	8/8	**22.0**	**1811**	9500
LC02601276T	14.1	6/19	8/11	21.7	1358	12123
LC03600482T	13.6	6/16	8/8	16.7	913	14495
mean	15.1			21.9	1545	9429
Pr>F	0.7369			0.0003	0.0005	< 0.0001
LSD(0.05)	NS			3.2	609	856
CV(%mean)	17.4			8.7	24.0	5.5

PROJECT TITLE: **WESTERN REGIONAL WINTER LENTIL YIELD TRIAL**

PROJECT LEADER: Fred Muehlbauer, WSU

COOPERATORS: Duane Johnson, NWARC
Louise Strang, NWARC

OBJECTIVE: Compare winter survival and yield potential of experimental lentil breeding lines in a northwest Montana environment.

METHODS:

Ten lentil accessions from Washington State University were seeded into 60 ft^2 plots at 14 seeds/ft^2 on 9/15/05. Stand counts were taken 10/19/05 and 5/10/06. Weed control was done by hand. Dates were recorded when 50% of each plot had bloomed and when 50% had reached maturity (yellow leaves, hard seed). The plants were direct combined when they reached maturity. The lentils from each plot were weighed to determine yield and 100-seed samples weighed to determine seed weight (# seed/lb).

RESULTS:

'WA8649041', 'LC9978057T', 'LC9979062T', 'LC9979065T', and 'Morton' survived the winter very well. 'LC02600449T', 'LC03600218T', and 'LC036002995T' had over 90% mortality. First blooms appeared between 5/29 and 6/2. The plants had matured by 7/19/06. Lentil yields ranged from 224 lbs/acre ('LC9440070r') to 1048 lbs/acre (LC9979062T). LC02600449T had the smallest seeds and 'LC9440070r' had the largest.

2005-2006 WESTERN REGIONAL WINTER LENTIL YIELD TRIAL

Kalispell

Entry	Cultivar	Fall Stand *pl/sqft*	Spring Stand *pl/sqft*	Survival *%*	Flower *date*	Ht *in*	Mat *date*	Yield *lbs/a*	Seed Size *#/lb*
1	WA8649041	**17.4**	**12.7**	**73**	6/2	**17.5**	7/19	663	16676
2	MORTON	15.3	8.8	**58**	5/31	14.5	7/16	324	15027
3	LC9440070r	**16.5**	5.0	30	6/1	12.5	7/19	224	**9201**
4	LC9978057T	**17.9**	**12.0**	**67**	5/29	**17.3**	7/15	**992**	15935
5	LC9979062T	15.9	10.7	**67**	5/30	**17.0**	7/16	**1048**	14905
6	LC9979065T	14.7	10.4	**71**	6/2	13.8	7/19	**751**	15842
7	LC02600449T	13.8	0.3	2	6/2		7/19	293	18160
8	LC03600218T	15.1	1.0	7	5/30	14.0	7/16	253	14419
9	LC03600232T	13.7	5.5	40	6/2	15.0	7/18	292	13529
10	LC03600295T	15.8	0.2	1	5/31		7/16	208	16214
	mean	15.6	6.7	42		15.2		505	15021
	Pr>F	0.0154	< 0.0001	< 0.0001		0.0135		0.0075	< 0.0001
	LSD(0.05)	1.8	2.0	16		2.1		356	1150
	CV(%mean)	10.8	28.7	35.8		12.8		69.5	7.4

2005-2006 WESTERN REGIONAL WINTER LENTIL YIELD TRIAL

Kalispell

Entry	Cultivar	Fall Stand *pl/sqft*	Spring Stand *pl/sqft*	Survival *%*	Flower *date*	Ht *in*	Mat *date*	Yield *lbs/a*	Seed Size *#/lb*
1	WA8649041	**17.4**	**12.7**	**73**	6/2	**17.5**	7/19	663	16676
2	MORTON	15.3	8.8	**58**	5/31	14.5	7/16	324	15027
3	LC9440070r	**16.5**	5.0	30	6/1	12.5	7/19	224	**9201**
4	LC9978057T	**17.9**	**12.0**	**67**	5/29	**17.3**	7/15	**992**	15935
5	LC9979062T	15.9	10.7	**67**	5/30	**17.0**	7/16	**1048**	14905
6	LC9979065T	14.7	10.4	**71**	6/2	13.8	7/19	**751**	15842
7	LC02600449T	13.8	0.3	2	6/2		7/19	293	18160
8	LC03600218T	15.1	1.0	7	5/30	14.0	7/16	253	14419
9	LC03600232T	13.7	5.5	40	6/2	15.0	7/18	292	13529
10	LC03600295T	15.8	0.2	1	5/31		7/16	208	16214
	mean	15.6	6.7	42		15.2		505	15021
	Pr>F	0.0154	< 0.0001	< 0.0001		0.0135		0.0075	< 0.0001
	LSD(0.05)	1.8	2.0	16		2.1		356	1150
	CV(%mean)	10.8	28.7	35.8		12.8		69.5	7.4