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of the

WESTERN TRIANGLE AGRICULTURAL RESEARCH CENTER

Montana Agricultural Experiment Station

Conrad, Montana

2010 Crop Year

Submitted by

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INTRODUCTION

The information and data reported are a compilation of ongoing or new research projects located at or near the Western Triangle Ag. Research Center, Conrad, Montana. Many projects are conducted in cooperation with faculty members and research associates from the Depts. of Plant Science and Plant Pathology and Land Resources and Environmental Science located on the campus of Montana State University, and Agricultural Research Centers: Central, Northern and Western of the Dept. of Research Centers.

These data should be used for comparative purposes rather than using absolute numbers. Statistics are used to indicate that treatment or variety differences are really different and are not different due to chance or error. The least significant difference (LSD) and coefficient of variability (CV) values are useful in comparing treatment or variety differences. The LSD value represents the smallest difference between two treatments at a given probably level. The LSD at $p=0.05$ or 5 % probability level is usually the statistic reported, and it means that the odds are 19 to 1 that treatment differences by the amount of the LSD are truly different. When no LSD is shown, then the treatments are not statistically different. The CV value measures the variability of the experiment or variety trial, and a CV greater than 15 % indicates a high degree of variability and less accuracy.

To simplify reading, trade or brand names of products, services, firms, or equipment are sometimes used. No endorsement of such names or firms is intended nor is criticism implied of those not mentioned.

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Dr. Greg Kushnak – Variety notes and comments

Summer Staff: Elizabeth Miller, Connie Miller, and Marliss Picard.

We would also like to extend a warm welcome to Dr. Olga Walsh to the Western Triangle Agricultural Research Center and wish her many productive years for agriculture.

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Summary of climatic data by month for the '09-'10 crop year (September thru August) at the Western Triangle Agricultural Research Center, Conrad, MT.

Month	Precipitation (inches)		Mean Temperature (°F)	
	Current Year	Average (25-yr)	Current Year	Average (25-yr)
September, 2009	.41	1.22	62.6	57.1
October, 2009	.77	0.58	36.2	44.9
November, 2009	0	0.29	36.9	32.7
December, 2009	.41	0.18	12.6	24.3
January, 2010	.53	0.18	20.4	23.1
February, 2010	.14	0.23	22.9	24.9
March, 2010	.14	0.43	37.5	33.3
April, 2010	2.03	0.95	40.2	43.1
May, 2010	3.03	1.80	44.3	51.9
June, 2010	3.79	2.87	55.7	59.6
July, 2010	2.29	1.43	62.4	66.9
August, 2010	1.98	1.23	62.1	66.0
Total	15.52	--		--
Average	--	11.35	41.2	44.0

Last killing frost in Spring (32°F)

2010----- May 30
 Average 1986-2010----- May 19

First killing frost in Fall (32°F)

2010-----Oct 16
 Average 1986-2010----- Sept 25

Frost free period (days)

2010----- 139
 Average----- 128

Maximum summer temperature----- 95°F (September 27, 2010)

Minimum winter temperature----- -25°F (December 15, 2009)

2010 Winter Wheat Variety Evaluations in the Western Triangle Area.

Location: Western Triangle Agricultural Research Center (WTARC), Conrad, MT.

Personnel: John H. Miller and Grant Jackson, WTARC, Conrad, MT; and Phil Bruckner and Jim Berg, MSU Plant Science Dept., Bozeman, MT.

The uniform, winter wheat intrastate and preliminary variety nurseries, along with four off station locations were grown 2010. Off station trials were grown north of Cut Bank, MT, north of Devon, MT, near the 'Knees' east of Brady, MT, and northeast of Choteau, MT. All off station plots were planted into chemical fallow.

Results: Winter wheat variety data are shown in Tables 1 thru 6.

The growing season in 2010 was cooler and wetter than the 25 year average at the Western Triangle Agricultural Research Center, with an extended frost free growing season into October. Grain yields were about 20 bu/acre higher than the six year average, and grain protein levels were about average with test weights below the six year average. The winter wheat plants headed later and grew taller than the six year average. Harvest was four to five weeks later than normal. The intrastate and advance nurseries on station suffered hail damage on July 19. (Table 1 through 3)

Two of the off station plots were harvested and two were lost. The Cut Bank plot was hailed out on July 19 and there appeared to be severe wire worm damage at the Choteau plot. Off station plots harvested were, the 'Knees' and Devon. (Tables 5 and 6)

Top yielding varieties at the Knees were MTS0705, MTS832, and MT06103. MTS0826, Decade, and Jerry were the high yielding varieties at Devon. The plots north of Devon did not have much standing stubble and the varieties were exposed to wind and cold the last couple of weeks in October of 2009 before the plants were well established causing some winterkill in the not so winter hardy varieties.

Off station cooperators: Bradley Farms, north of Cut Bank, MT
Brian Aklestad, north of Devon, MT
Aaron Killion, east of Brady, MT
Roy and Scott Inbody, northeast of Choteau, MT

Detailed descriptions of most of the varieties tested are included in Extension Bulletin 1098 "Performance Summary of Winter Wheat Varieties in Montana", available at County Agent Offices. Additional observations concerning the varieties are presented in the following pages.

Winter Wheat Variety Notes & Comments

Western Triangle Agricultural Research Center, Conrad, MT

Winterhardiness ratings: 5 = very good; 1 = poor.

Coleoptile length: Long = 3.4" or more; Short = 3" or less.

Stem solidness scores of 19 or higher are generally required for reliable sawfly resistance.

Accipiter (Sask. DH0018196): First tested in 2008. High yield in 2008. 4" taller than Falcon. Similar to Falcon for test weight, head date and protein. Parentage = Raptor x Falcon.

Bauermeister (WA7939, 2005): Winterhardiness = 2. Medium height, med-strong straw. Medium coleoptile. Very late maturity. Very low test weight.

Big Sky (MT9432, 2001): Nuwest/Tiber cross, hard red kernels, white chaff. Good winterhardiness (4). Strong, stiff straw, very good lodging resistance, height equal to Tiber. Medium coleoptile. Medium maturity, heading 1-2 days later than Rocky, but 2 days earlier than Tiber and Morgan. Yield about equal to Rocky, and 2-3 bu higher than Tiber. High test weight and protein. Post-harvest seed dormancy is high, like Tiber. Septoria and tan spot resistance is good. A good alternative to Tiber.

Bond (CO 2004): Winterhardiness = 2. Clearfield system IMI resistant. Stiff straw, medium height & coleoptile, early maturity. Above average yield. Average test weight. Resistant to biotype 1 Russian wheat aphid. Low protein and poor quality.

Buteo (CDC, WPB, Sask., 2006): Winterhardiness = 4. Standard height, medium coleoptile. Medium-late maturity. Below average yield. Above average test wt. Average protein.

Bynum (MSU & WPB, 2005): Clearfield system single-gene resistance to imazamox or 'Beyond' herbicide. Winterhardiness = 2. Medium strong straw, medium height, long coleoptile. Stem solidness = 20 (compared to 22 for Rampart), which typically provides a reliable level of sawfly tolerance. Similar in yield and other characteristics to Rampart. Sawfly resistant, low yield, high protein, and excellent baking quality.

Carter (WestBred, 2007): Winterhardiness = 3. Semidwarf height, stiff straw, short coleoptile. Stem solidness score = 15. Medium early heading. Average yield. Above average test weight. Average protein. Moderate resistance to stripe rust.

Darrell (S. Dak., 2006): Medium height and coleoptile. Medium-early heading. High yield. Average test weight and protein.

Decade (MSU/NDSU, 2009): White chaffed, hard red winter wheat, with winter hardiness almost equal to Jerry. High yield potential, medium to high test weight, early maturity, and medium to high grain protein.

Falcon (CDC, WPB, Sask. 1999): Good winterhardiness (4). Semidwarf, stiff straw, 4" shorter than Rocky. Short coleoptile. The first true winterhardy semidwarf available for irrigated conditions in Montana. Heading 1 day later than Rocky, 2 days earlier than Neeley & Tiber. Above average yield and test weight on dryland, good performance for irrigated or high rainfall conditions. Protein similar to Rocky. Not for stripe rust areas.

Genou (MSU, 2004): Sawfly resistant. Stem solidness not quite as solid as Rampart; and may be more sensitive to environmental factors than that of Rampart. Solid stem comparison: (max rating = 25): Rampart = 22, Genou = 19. Winterhardiness higher than Vanguard and Rampart, equal to Rocky. Medium stiff straw. Height similar to Vanguard, and 2" shorter than Rocky. Medium coleoptile. Maturity 1-2 days later than Rocky. Yield 7% higher than Vanguard & Rampart, 5% less than Rocky. Average test weight and protein.

Hawken (AgriPro, 2007): Semidwarf height, short coleoptile. Early maturity. Yield is below average. Above average test weight and protein.

Hatcher (CO 2004): Winterhardiness = 2. Strong straw, semidwarf height, medium coleoptile. Early maturity. Low protein. Resistant to biotype 1 Russian wheat aphid and Great Plains biotype Hessian fly. Very low quality.

Jagalene (AgriPro, 2002): Winterhardiness = 2. Semidwarf, stiff straw, medium coleoptile. Early maturity, 1 day earlier than Rocky. Shatter resistant. Average yield. Very high test weight. Avg protein, but higher than Rocky. Good milling quality. Good disease resistance package (stem & stripe rust, tan spot and Septoria).

Jerry (ND, 2001): Winterhardiness high (5). Medium-stiff, med-tall straw, medium coleoptile. Medium-late maturity. Yield is below average, except in winterkill areas where it's above average. Below-average test weight. Average protein. Has one of the worst sawfly stem-cutting ratings. Shatter susceptible.

Ledger (WestBred, 2005): Winterhardiness = 2. Semidwarf height & stiff straw, 4" less than Rocky. Medium coleoptile. Stem solidness = 10, variable & sensitive to cloudy conditions; not a reliable level of sawfly tolerance. Early heading. Above avg yield & test wt. Avg protein and acceptable quality. Moderate stripe rust resistance.

Morgan (Sask & WPB, 1996): High winterhardiness (5). Standard height. Medium stiff straw. Very short coleoptile. Three days later to head and slightly later maturity than Rocky; heading similar to Neeley. Below average yield. Test wt 1-lb less than Rocky or Tiber. Protein slightly

higher than Rocky, similar to Neeley. Milling and baking acceptable. Recommended for areas needing high levels of winterhardiness.

Neeley (Idaho, 1980): Winterhardiness medium (3). Medium short straw. Medium coleoptile. Medium-late maturity. Susceptible to stem rust. High yielder in good years, but does poor if stressed for moisture. Below average test weight. Good shatter resistance. Protein & quality are erratic, ranging from low to high. Not for stripe rust areas.

Norris (MSU & WPB, 2005): Clearfield system single-gene resistance to imazamox or 'Beyond' herbicide (which controls cheatgrass, goatgrass and wild oats). Winterhardiness = 3. Stiff straw, medium height, medium coleoptile. Early maturity. Above average yield and test weight. Average protein, good quality. Replaces MT1159CL.

Promontory (Utah, 1990): Red head. Winter hardiness poor (2 or less). Medium-short, medium-strong straw. Short coleoptile. Medium maturity. Excellent stripe rust & dwarf smut resistance; Stem rust susceptible. Average yield and above average test weight. Protein medium low. Has severe sawfly stem cutting ratings.

Pryor (WPB, 2002): Winterhardiness 3 = Neeley. Short stiff straw, 4" shorter than Neeley. Short coleoptile. Medium late maturity similar to Neeley & Tiber, 2 days later than Rocky. Above average yield. Average test weight and protein, good quality. Intended mainly for Central Montana as a replacement for Neeley. Not for stripe rust areas.

Rampart (MSU, 1996): Sawfly resistant (sister line to Vanguard). Solid stem rating = 22. Red chaff, upright head. Winterhardiness is marginal (2-). Should not be grown in areas where high levels of winterhardiness are needed, unless protected by stubble. Height 1 inch shorter than Neeley, med-stiff straw. Very long coleoptile. Matures 1 day later than Rocky, 2 days earlier than Neeley. Some resistance to stem rust, and some tolerance to wheat streak mv. Medium shatter resistance. Yield is below average, but is above average under heavy sawfly conditions. Does not seem as prone to shatter as Vanguard. Good test weight, protein and quality. See Genou.

Ripper (Colorado, 2006): Semidwarf height, medium coleoptile. Early maturity. Above average yield and test weight. Average protein.

Rocky (Agripro, 1978): A selection from Centurk for soil borne mosaic resistance. Winterhardiness = 2. Medium weak straw, medium height. Medium coleoptile. Early maturity. High yield. Very susceptible to yellow berry expression under low nitrogen conditions. Medium protein. See Jagalene and Ledger for shorter-straw alternatives.

Tiber (MSU, 1988): Dark Red head, (blackish-red in years of favorable moisture). Winterhardiness = 3. Medium height with good lodging resistance. Stiff straw, which may cause it to thresh a little harder than weaker-strawed varieties. Med-long coleoptile. Very resistant to sprouting, causing some dormancy. Medium maturity. Susceptible to stem rust. Very resistant to

shatter. Below average yield. Protein above average. Good milling and baking quality. Fdn seed being discontinued. See Big Sky for alternative.

Vanguard (MSU, 1995): Sawfly resistant. Good stem solidness. White chaff, nodding head. Winterhardness marginal (2-). Straw slightly stiffer and 1 inch shorter than Rocky, but moderately susceptible to lodging under high-yield conditions. Long coleoptile. Medium head date, 1 day later than Rocky, 3 days earlier than Neeley. Good wheat streak mv tolerance. Susceptible to stem & stripe rust. Below average yield; but under heavy sawfly infestation, yield is above average. Medium shatter resistance. Good test weight. Protein high; quality adequate. Not a satisfactory variety for non-sawfly areas, and should not be grown where high levels of winterhardness are needed unless protected by stubble. See Genou.

Wahoo (Nebr & Wyo, 2000): Winterhardness = 3. Semidwarf, 2" shorter than Rocky, stiff straw. Short coleoptile. Very early maturity. High yield. Average test weight & protein, marginally poor quality.

Willow Creek (MSU 2005):—Beardless forage winter wheat for hay. HRW class. Winterhardness = 5. Very tall straw, lodging susceptible. Long coleoptile. Very late maturity. High forage yield. Tends to be safer than barley for nitrates, because earlier seasonal development escapes heat stress better. Low grain yield and test weight. High protein.

Yellowstone (MSU, 2005): Winterhardness = 4. Medium height similar to Neeley, and taller than Falcon, and Pryor. Straw strength is excellent. Medium-short coleoptile length. Medium maturity. Broadly adapted state-wide, but is stem-rust susceptible (thus, not for District 6, eastern Montana). Moderate resistance to stripe rust. Very high-yielding, and 3% higher than Falcon. Below average test weight. Protein is medium. Excellent baking quality and good Asian noodle quality.

Hard White Winter Wheat

Protein of hard white wheat for bread baking needs to be higher than required for noodle markets. Some varieties are dual-purpose and can be used for both bread and noodles. Although not a concern for bread baking quality, varieties with low levels of polyphenol oxidase (PPO) are desirable for Chinese noodles, since high PPO levels are associated with noodle discoloration. Low PPO provides good noodle brightness and color stability. Some hard white varieties sprout more readily than hard reds, especially those developed from Australian germ-plasm. The pure white trait is difficult to maintain, as pollen from red wheats may pollinate a white variety, causing a mixture of red kernels. It is very important to clean the combine, storage bins and other grain handling equipment prior to harvest to avoid mixing hard white wheat with other wheat. Seeding equipment and seedbed must also be free of red wheat. It is important to have a market strategy in place before growing a hard white variety.

Alice (S. Dak., 2006): Hard white. Short straw, short coleoptile. Early heading. Above average yield, test weight and protein.

Golden Spike (UT, Gen Mills, 1998): Hard white, low PPO. Winterhardness 3. Height similar to Rocky, med-stiff straw. Medium coleoptile. Medium maturity. Below average yield. Low test weight & protein.

Hyalite (MSU & WPB, 2005): Hard White, low PPO with good noodle brightness and color stability. Clearfield system single-gene resistance to imazamox or 'Beyond' herbicide. Winterhardness = 3. Standard height, but stiff straw. Short coleoptile. Early maturity. Average yield and test weight. Red kernel occurrence is 0.7% (high, but still acceptable). Dual-purpose quality similar to NuWest & NuSky. Above average protein, good milling & baking quality. Stem rust resistant. Stripe rust susceptible.

MDM WA7936 (Wash., 2006): Hard white. Winterhardness = 2. Medium stiff straw. Medium coleoptile. Very late maturity. Yield similar to NuWest. Low test weight.

NuDakota (AgriPro, 2005): Hard white. Winterhardness = 2. Semidwarf height, stiff straw. Early heading. Average yield, test weight and protein. Medium PPO.

Nuwest (MSU, 1994): Hard white, low PPO. Dual purpose, noodle and bread. Winterhardness = 4. One inch shorter than Rocky. Stiff straw. Very short coleoptile. Two days later than Rocky. Resistant to stem rust but susceptible to stripe rust, dwarf bunt, and WSMV. Susceptible to sawfly, RWA, and Hessian fly. Average yield and well adapted to Montana. Medium test weight and protein. Good resistance to preharvest sprouting – (In 1993, everything sprouted - red or white). Contains 1 red kernal/1000. Protein medium to high. Good quality.

NuSky (MSU, 2001): Hard white, low PPO. (Sister line to the hard red var BigSky). Good dual purpose quality for noodles & bread. Winterhardness 4. Height and straw strength similar to Nuwest & Rocky, med-stiff. Short coleoptile. Heading similar to Nuwest, Tiber & Neeley; and 3 days later than Rocky. Shatter resistant. Average yield. Test weight similar to Nuwest. Medium to high protein. Quality similar to Nuwest. High level of post-harvest dormancy (similar to Tiber), and thus does not have the sprouting problems common to some of the other hard white wheats. NuSky is a public release.

Wendy (SD, 2004): Hard white. Winterhardness = 3. Semidwarf height, Short coleoptile. Early heading. Average yield. Above-average test weight and protein. Medium PPO.

Table 1. 2010 Intrastate Winter Wheat Variety Nursery, Western Triangle Ag. Research Center, Conrad, MT.

Variety and Class	Source	Solid Stem score*	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
MTS0819		17.3	114.0	60.8	176	34.0	11.8
Broadview	Alberta, 2009		112.6	60.3	176	35.9	11.7
Overland	Nebraska, 2007		112.5	59.8	173	35.8	11.4
MT0871			109.9	59.4	176	35.9	11.6
Yellowstone	MSU, 2005		108.9	60.0	176	35.9	11.6
CDC Falcon	Sask/WestBred, 1999	8.5	106.8	60.6	175	32.2	11.4
MTS0826		21.4	105.7	60.9	179	39.9	12.0
Accipiter	Saskatchewan, 2008		103.8	60.7	178	36.6	11.3
MT0861			103.6	60.2	176	35.5	11.5
MT0866			103.2	62.0	175	36.9	13.1
MTS0808		21.9	103.1	60.1	177	34.3	12.5
Promontory	Utah, 1990		102.8	60.1	176	35.2	11.4
Pryor	WestBred, 2002		102.0	59.4	177	33.0	10.3
MT0890			101.8	60.0	175	35.7	12.8
MTS0532 (HWW)		20.5	100.7	59.1	176	34.8	11.9
MTS0721		23.2	100.6	60.0	176	34.4	12.0
Boomer	WestBred, 2009		100.5	59.9	177	36.0	12.3
NI04421			100.2	60.2	173	33.2	11.7
Curlew	Utah, 2009		100.0	57.8	177	36.9	12.8
Hyalite (CL, HWW)	MSU/WestBred, 2005		99.9	59.5	175	37.1	12.6
Settler CL	Nebraska (SD, WY), 2008		99.8	59.1	172	30.5	12.1
MTS0832		23.2	99.3	59.1	179	39.2	11.5
CA9W07-817			99.0	60.3	177	35.9	13.3
MT06103			98.8	59.6	173	35.2	13.2
Decade	MSU/ND, 2010		98.7	58.7	175	35.5	12.0
Radiant	Alb, 2002 (Meridian Seeds)		98.5	58.8	175	37.8	12.4
MTS0827		22.9	97.7	60.4	178	39.4	12.2
Wahoo	Nebraska, 2001		97.5	55.3	172	33.7	11.3
Ledger	WestBred, 2004	10.4	96.1	59.6	176	33.3	11.5
MTS0713		19.3	96.0	60.0	174	33.3	11.3

Table 1 continued on next page

Variety and Class	Source	Solid Stem score*	Yield bu/ac	Test weight lb/bu	Heading Date Julian	Plant height In	Protein %
MTS0705		23.8	96.0	61.6	177	41.0	12.8
Striker	WestBred, 2009		95.9	60.5	175	32.3	12.7
Norris (CL)	MSU/WestBred, 2005		95.5	58.9	174	38.4	12.4
BZ9W05-2043		22.1	95.3	59.9	173	35.0	12.2
Genou	MSU, 2004	16.9	95.2	59.6	177	38.5	12.0
Jagalene	AgriPro, 2002		94.6	60.4	174	33.3	12.1
Neeley	Idaho, 1980	9.3	93.9	58.5	177	39.4	11.6
Peregrine	Saskatchewan, 2008		93.3	61.3	175	42.6	11.7
MTS04114L			92.1	58.1	177	32.5	13.2
Rocky	AgriPro, 1978		90.9	60.5	173	40.1	11.9
BZ9W05-2039			90.4	58.7	173	34.2	12.6
MTS0532L		20.3	89.3	58.6	177	31.2	12.6
Bynum (CL)	MSU/WestBred, 2005	20.6	89.3	60.1	175	37.8	13.3
Carter	WestBred, 2006	15.4	86.1	59.1	174	31.1	12.0
Jerry	North Dakota, 2001		86.1	59.9	176	39.9	13.0
MTS04114 (HWW)		19.7	86.0	58.7	177	33.4	13.3
AP 503 (CL2)	AgriPro, 2007		84.1	60.6	177	31.4	13.0
Rampart	MSU, 1996	20.9	82.6	60.2	177	38.7	13.4
Art	AgriPro, 2007		81.5	60.1	172	31.8	13.0
Mean		18.7	97.8	59.7	175.6	35.6	12.2
LSD (0.05)		1.7	12.2	1.3		2.2	
C. V. (%)		5.6	7.2	1.3		3.5	
P-value (Varieties)		<.0001	<.0001	<.0001		<.0001	

Planted: 9/17/2009 on conventional fallow and harvested on 9/4/2010. This nursery received hail on July 19.

Fertilized with actual pounds/a of N-P-K: 132-20-20. Sprayed with Huskie at 11 oz/a and Axial XL at 16.4 oz/a. Applied at a rate of 10 gal/a on 5/14/2010.

* Solid stem score of 19 or higher is generally required for reliable sawfly tolerance.

HWW = Hard White Wheat

CL = Clearfield System

Table 2. 2010 Intrastate Winter Wheat Variety Test Condensed list, Western Triangle Ag. Research Center, Conrad, MT.

Variety and Class	Source	Solid stem score*	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
Broadview	Alberta, 2009		112.6	60.3	176	35.9	11.7
Overland	Nebraska, 2007		112.5	59.8	173	35.8	11.4
Yellowstone	MSU, 2005		108.9	60.0	176	35.9	11.6
CDC Falcon	Sask/WestBred, 1999	8.5	106.8	60.6	175	32.2	11.4
MTS0826		21.4	105.7	60.9	179	39.9	12.0
Accipiter	Saskatchewan, 2008		103.8	60.7	178	36.6	11.3
Promontory	Utah, 1990		102.8	60.1	176	35.2	11.4
Pryor	WestBred, 2002		102.0	59.4	177	33.0	10.3
MTS0532 (HWW)		20.5	100.7	59.1	176	34.8	11.9
MTS0721		23.2	100.6	60.0	176	34.4	12.0
Boomer	WestBred, 2009		100.5	59.9	177	36.0	12.3
Curlew	Utah, 2009		100.0	57.8	177	36.9	12.8
Hyalite (CL, HWW)	MSU/WestBred, 2005		99.9	59.5	175	37.1	12.6
Settler CL	Nebraska (SD, WY), 2008		99.8	59.1	172	30.5	12.1
MTS0832		23.2	99.3	59.1	179	39.2	11.5
MT06103			98.8	59.6	173	35.2	13.2
Decade	MSU/ND, 2010		98.7	58.7	175	35.5	12.0
Radiant	Alb, 2002 (Meridian Seeds)		98.5	58.8	175	37.8	12.4
Wahoo	Nebraska, 2001		97.5	55.3	172	33.7	11.3
Ledger	WestBred, 2004	10.4	96.1	59.6	176	33.3	11.5
MTS0713		19.3	96.0	60.0	174	33.3	11.3
MTS0705		23.8	96.0	61.6	177	41.0	12.8
Striker	WestBred, 2009		95.9	60.5	175	32.3	12.7
Norris (CL)	MSU/WestBred, 2005		95.5	58.9	174	38.4	12.4
Genou	MSU, 2004	16.9	95.2	59.6	177	38.5	12.0
Jagalene	AgriPro, 2002		94.6	60.4	174	33.3	12.1
Neeley	Idaho, 1980	9.3	93.9	58.5	177	39.4	11.6
Peregrine	Saskatchewan, 2008		93.3	61.3	175	42.6	11.7
Rocky	AgriPro, 1978		90.9	60.5	173	40.1	11.9
Bynum (CL)	MSU/WestBred, 2005	20.6	89.3	60.1	175	37.8	13.3

Table 2 continued on next page

Variety and Class	Source	Solid stem score*	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Protein %
Carter	WestBred, 2006	15.4	86.1	59.1	174	31.1	12.0
Jerry	North Dakota, 2001		86.1	59.9	176	39.9	13.0
AP 503 (CL2)	AgriPro, 2007		84.1	60.6	177	31.4	13.0
Rampart	MSU, 1996	20.9	82.6	60.2	177	38.7	13.4
Art	AgriPro, 2007		81.5	60.1	172	31.8	13.0
Mean		18.7	97.8	59.7	175.6	35.6	12.2
LSD (0.05)		1.7	12.2	1.3		2.2	
C. V. (%)		5.6	7.2	1.3		3.5	
P-value (Varieties)		<.0001	<.0001	<.0001		<.0001	

Planted: 9/17/2009 on conventional fallow and harvested on 9/4/2010.

Fertilized with actual pounds/a of N-P-K: 132-20-20. Sprayed with Huskie at 11 oz/a and Axial XL at 16.4 oz/a. Applied at a rate of 10 gal/a on 5/14/2010.

* Solid stem score of 19 or higher is generally required for reliable sawfly tolerance.

HWW = Hard White Wheat

CL = Clearfield System

Table 3. Six-year averages, Winter Wheat varieties, Western Triangle Ag. Research Center, Conrad, MT. 2005 - 10.

Variety	Source	Class	Solid stem* score	6-Year Average					Winter survival class
				Yield bu/a	Test wt	Height in.	Head date	Protein %	
Decade				78.9	59.3	31.7	165.0	12.2	
MTS 0532		++ HW	20.2	78.6	61.4	32.0	165.7	12.4	
Pryor	WestBred			78.2	62.8	31.2	166.7	10.8	3
Norris	WestBred	CL		75.9	62.2	34.7	163.8	12.3	3
Yellowstone	MSU			74.5	61.5	34.0	167.3	11.9	4
Rocky	AgriPro			74.3	63.2	36.9	164.8	11.9	2
Genou	MSU	++	18.5	74.1	62.2	36.1	166.5	12.3	2
Ledger	WestBred		11.1	73.2	62.8	31.1	166.3	12.0	2
Hyalite	WestBred	CL HW		72.9	61.5	33.9	164.2	12.9	3
Falcon	WestBred		6.9	72.3	62.5	30.4	166.2	11.9	4
Neeley	Idaho			72.1	61.2	36.1	168.2	12.0	3
Jagalene	AgriPro			71.5	63.8	31.4	164.8	12.5	2
Carter	WestBred		14.1	71.0	62.3	29.2	165.2	12.6	3
Promontory	Utah			68.4	62.9	34.5	166.8	11.6	2-
Jerry	N. Dakota			65.4	61.3	37.1	166.7	12.7	5
Rampart	MSU	++	21.4	65.4	62.0	34.5	167.0	12.9	2-
Bynum	WestBred	++ CL	20.2	65.1	61.9	34.1	165.3	13.8	2
Wahoo	Nebraska			48.3	60.5	32.6	162.7	12.1	3
Mean				73.3	62.0	33.5	165.8	12.3	

Class: ++ = sawfly resistance; HW = Hard White; CL = Clearfield herbicide system.

* Solid stem score of 19 or higher is generally required for reliable sawfly resistance.

Winterhardiness: 5 = high, 1 = low.

Table 4. 2010 Advanced Yield Nursery, Western Triangle Ag. Research Center, Conrad, MT.

ID Or Variety	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Lodging %	Protein %
MT08177	123.7	61.1	179	36.1	0.0	11.4
MT0994	121.5	57.8	177	38.2	7.0	10.6
MT08172	118.9	59.9	176	37.3	1.1	12.0
MT08181	118.2	59.0	177	37.0	0.9	11.4
MT0977	115.9	60.2	178	35.6	0.9	11.6
MT08146	114.8	57.4	178	36.1	1.9	12.9
MT08189	114.8	60.0	178	36.5	1.5	11.8
MT08136	114.2	58.3	176	36.9	1.7	11.6
MT0951	113.2	60.3	174	37.3	3.3	11.8
MT0978	111.6	60.0	177	35.1	1.4	11.5
MT0972	111.5	61.2	179	32.6	0.7	12.4
MT0966	109.8	59.0	177	37.7	2.6	11.9
MT0993	109.6	59.3	178	35.6	0.9	12.2
Yellowstone	109.3	59.9	176	37.4	1.0	12.0
MT0948	107.8	59.8	177	36.9	3.9	12.2
MT0950	107.4	61.4	175	37.1	10.8	12.1
MT0990	107.2	60.1	178	34.8	0.0	11.6
MT08186	106.5	59.3	177	35.3	1.8	12.0
MT08180	106.3	61.6	179	34.8	1.0	11.7
MTS0921	104.7	60.6	181	35.7	1.5	12.4
MTS0924	103.9	58.5	178	34.3	1.9	12.3
MTCL1001	103.9	59.1	178	36.0	0.6	11.7
MTS0919	103.4	60.8	179	40.8	0.0	11.8
MTS0901	102.6	59.5	178	42.0	10.1	12.9
MTW08168	w 102.3	60.6	179	40.2	2.7	11.6
CDC Falcon	101.8	60.5	175	31.7	0.2	12.0
MT0954	100.5	59.4	177	38.2	5.6	11.2
MT0974	100.4	61.4	176	39.2	12.6	13.1
MTW0981	w 100.2	59.7	176	36.4	5.6	12.1
Genou	99.5	59.4	175	38.4	8.8	12.8

Table 4 continued on next page

ID or Variety	Yield bu/ac	Test weight lb/bu	Heading date Julian	Plant height in	Lodging %	Protein %
MT0949	96.0	60.6	175	36.1	3.3	12.3
MTW0980	w 94.4	58.5	175	32.7	22.5	12.0
MTS0915	93.7	60.6	176	36.0	22.3	12.6
MTS0925	92.6	56.8	178	34.0	1.1	13.0
MTS0916	88.6	59.0	176	32.1	0.9	12.4
Jagalene	86.9	59.4	177	33.5	1.2	12.6
Mean	106.0	59.7	177.1	36.3	3.9	12.0
LSD (0.05)	11.7	1.6		1.9	11.1	
C.V. (%)	6.1	1.5		2.9	165	
P-value (Varieties)	<.0001	<.0001		<.0001	0.0064	

Planted: 9/17/09 on conventional fallow and harvested on 9/4/2010. This nursery received hail on July 19.

Fertilizer, actual pounds/a of N-P-K: 132-20-20.

Sprayed with Huskie at 11 oz/a and Axial XL at 16.4 oz/a on 5/14/2010, applying a spray volume of 10 gal/a.

Table 9. Six-year averages, dryland Spring Wheat varieties,
Conrad area, Pondera Co. 2005 - 2010.

Variety	Source	Class	6-Year Average				
			Yield bu/a	Test Weight	Height in.	Head date	Protein %
Vida	MSU	+	59.5	59.9	32	183	13.6
Choteau	MSU	++	58.8	59.9	30	182	14.4
Oneal	WestBred		58.2	60.5	32	183	14.0
Corbin	WestBred	+	56.0	59.6	31	181	14.0
McNeal	MSU		54.4	59.5	32	183	13.8
Reeder	N. Dak.		53.9	60.3	32	181	14.4
Jedd	WestBred	CL	53.6	60.9	27	181	13.5
Hank	WestBred		53.2	58.6	30	181	14.0
Outlook	MSU		52.6	58.0	32	183	14.0
Conan	WestBred	+	51.9	60.4	30	182	14.2
Kuntz	AgriPro		51.0	60.7	29	182	13.6
Volt	WestBred		50.7	62.2	30	184	13.8
Freyr	AgriPro		49.1	60.8	33	181	14.3
Kelby	AgriPro		48.8	61.7	29	180	14.9
AP604 CL	AgriPro	CL	48.6	61.4	31	180	14.7
Fortuna		++	48.3	60.4	39	182	14.3
Mean			53.0	60.3	31.0	182.0	14.1

++ Sawfly resistant (solid stem score of 19 or higher).

+ Partial sawfly resistance

CL = Clearfield System (2-gene). HW = Hard White

Location: MSU Western Triangle Ag. Research Center, Conrad, MT

Table 10. 2010 Irrigated Spring Wheat variety trial, Conrad, MT.

Variety	Class	Yield bu/a	Test Wt lb/bu	Height in.	Head date	Protein %
MT 0832		81.8	60.3	34.0	185.7	14.8
MT 0852		77.6	61.8	35.7	189.0	14.3
Choteau	++	71.5	60.2	33.3	188.3	15.2
Jedd		68.0	61.0	28.3	186.0	13.7
Hank		67.6	59.7	32.3	185.3	14.1
Corbin		64.9	61.0	34.7	185.7	14.5
Vida		63.0	60.3	35.7	189.0	14.6
ONeal		60.9	62.2	36.0	189.7	14.4
MT 0827		60.5	61.0	35.0	185.3	15.1
Conan	+	59.2	60.7	34.3	187.0	14.7
Volt		59.1	63.1	32.3	189.7	14.4
Kuntz		57.2	62.0	31.7	188.3	14.4
McNeal		56.0	60.2	35.3	188.7	15.0
Fortuna	++	54.9	60.2	41.3	187.3	15.6
Reeder		51.9	61.4	36.3	186.7	15.0
Mott		49.0	61.4	39.0	190.0	15.0
AP604 CL		48.5	61.2	36.7	186.0	16.2
Outlook		48.4	59.3	36.0	190.0	14.7
Freyr		42.6	61.0	34.3	186.3	15.3
Kelby		40.4	59.2	29.0	185.7	15.9
Mean		60.0	60.9	34.3	187.5	14.8
LSD (.05)		7.0	7.0	1.8	1.4	
C.V. (s/mean)*100		7.0	7.0	3.2	0.46	

++ = sawfly resistant (solid stem score 19 or higher).

+ = partial sawfly resistance.

HW = hard white.

Location: MSU Western Triangle Ag Research Center, Conrad, MT

Planted April 20, 2010 on fallow. Harvested September 26, 2010.

Fertilizer, actual: 172-20-20

Sprayed with: Huskie @ 11 oz/a and Axial @ 16.4 oz/a on 6/3/10.

Table 11. Five-year averages, irrigated Spring Wheat varieties, Conrad area, Pondera County. 2004 - 07 and 2009 -2010.

Variety	Source	Class	5-Year Average				
			Yield bu/a	Test wt.	Height in.	Head date	Protein %
Choteau	MSU	++	85.9	61.8	33	183	14.1
Hank	WestBred		83.3	60.0	32	181	14.2
Vida	MSU		79.1	60.5	34	183	14.2
Reeder	ND		75.2	61.7	36	182	14.6
Outlook	MSU		73.0	60.0	35	184	13.8
McNeal	MSU		74.2	60.7	35	183	14.1
Conan	WestBred	+	71.8	60.9	33	182	14.0
Freyr	AgriPro		66.7	62.0	35	182	14.5
Fortuna	ND	++	65.3	61.7	41	182	14.5
Corbin	WestBred	+	77.2	61.5	36	181	14.0
nursery mean			75.2	61.1	35	182	14.2

++ Sawfly resistant (solid stem score of 19 or higher).

+ Partial sawfly resistance

Location: MSU Western Triangle Ag. Research Center, Conrad, MT

Table 12. Off-station spring wheat variety trial located near the Knees.
Chouteau county. Western Triangle Ag. Research Center. 2010.

Variety	Class	Yield bu/a	Test Wt lb/bu	Height in.	Protein %	Lodging %
MT 0832		58.5	58.3	29.3	15.0	8.3
MT 0827		58.4	59.8	31.3	15.0	43.3
ONeal		56.2	60.7	30.3	14.8	13.3
Corbin	*	54.8	59.1	28.0	14.6	66.6
Choteau	**	53.3	57.3	29.0	15.7	31.6
Vida		53.0	58.0	31.0	14.8	11.7
Jedd	CL	52.5	59.0	24.3	14.4	58.3
McNeal		51.2	57.9	31.7	15.2	85.0
MT 0852		50.8	59.9	30.7	15.0	3.0
Outlook		50.3	56.5	30.0	14.6	87.3
Mott		49.5	59.0	32.7	14.8	11.7
Conan	*	49.5	59.6	27.3	15.2	31.6
Volt		48.5	60.1	29.0	14.5	65.0
Reeder		48.5	58.6	29.7	15.3	58.3
Hank		27.3	57.1	27.3	14.8	86.7
Freyr		45.0	57.7	30.3	14.8	91.7
AP 604 CL		42.4	58.5	28.7	16.0	83.3
Kuntz		39.6	56.3	27.3	14.3	95.7
Kelby		37.5	58.4	25.3	15.9	85.7
Fortuna	**	35.3	59.2	34.0	16.0	12.3
Mean		49.1	58.6	29.4	15.0	51.5
LSD (.05)		8.6	1.3	2.3		29.0
C.V. 1 (%) (S/mean)*100		10.6	1.4	4.8		34.1

Cooperator and Location: Aaron Killion, western Chouteau county.

Planted April 7, 2010 on chem-fallow. Harvested August 19, 2010.

Fertilizer, actual lbs/a: 120-20-10. Sprayed with Starane at 1 pt/a, Salvo at 12 oz/a and Ally at 0.1 oz/a on 6/2/2010.

Precipitation from 4/7/2010 until harvest was: 6.8 inches.

** = Sawfly tolerant (solid stem score of 19 or higher). * = implies partial sawfly tolerance.

Conducted by MSU Western Triangle Ag. Research Center.

Table 13. Off-station spring wheat variety trial located north of Devon.
Toole county. Western Triangle Ag. Research Center. 2010.

Variety	Class	Yield bu/a	Test Wt lb/bu	Height in.	Protein %	Lodging %
MT 0852		45.3	58.7	27.7	15.3	5.0
Vida		44.0	57.9	28.3	13.9	33.3
ONeal		43.7	61.1	28.3	14.4	15.0
MT 0827		43.7	59.3	30.0	14.6	43.3
McNeal		43.5	58.3	28.7	14.8	40.0
MT 0832		43.3	55.3	29.0	15.2	8.3
Volt		43.1	60.9	27.3	14.0	23.3
Fortuna	++	42.4	57.3	32.7	15.2	8.3
Choteau	++	41.9	55.5	26.3	15.3	6.7
Outlook		41.7	56.5	28.3	14.5	23.3
Reeder		38.9	57.1	28.3	15.1	33.3
Corbin		38.8	58.9	27.3	15.5	20.0
Hank		38.0	57.0	26.7	15.0	36.7
AP 604 CL		37.9	55.6	30.3	15.3	20.0
Mott		37.3	55.9	28.7	16.5	18.3
Conan		36.5	57.4	26.0	15.9	11.7
Kelby		35.8	58.2	25.7	15.9	23.3
Freyer		35.4	56.9	29.0	14.1	73.3
Jedd	CL	34.5	58.0	25.7	14.9	23.3
Kuntz		30.9	56.2	26.3	14.4	50.0
Mean		39.3	57.4	27.8	15.0	26.8
LSD (.05)		5.7	2.1	1.5		14.1
C.V. 1 (%) (S/mean)*100		8.8	2.3	3.3		31.8

Cooperator and Location: Brian Aklestad, eastern Toole county.

Planted April 8, 2010 on chem-fallow. Harvested August 19, 2010.

Fertilizer, actual lbs/a: 120-20-10. Sprayed with Huskie at 11 oz/a and Axial XL at 16.4 oz/a on 5/15/2010.

Precipitation from 4/8/2010 until harvest was: 8.3 inches.

** = Sawfly tolerant (solid stem score of 19 or higher).

Conducted by MSU Western Triangle Ag. Research Center.

2010 Barley Variety Evaluations in the Western Triangle Area

Personnel: John H. Miller and Grant D. Jackson, Western Triangle Agricultural Research Center, Conrad, MT; and Tom Blake and Stan Bates, PSPP, MSU-Bozeman.

Dryland off-station barley variety trials were grown in Teton County northeast of Choteau, Glacier County north of Cut Bank, Chouteau County east of Brady near the 'Knees', and Toole County north of Devon. The Choteau, Cut Bank, Knees, and Devon trials were no-till planted on chem-fallow. The on-station trials seeded at Conrad were grown on dryland and irrigated conventional fallow in 2010. The growing season in 2010 was cooler and wetter than the 25 year average at the Western Triangle Agricultural Research Center, with an extended frost free growing season into October. **The on-station dryland and irrigated barley nurseries were hailed out on July 19, 2010!**

Results: Results are tabulated in Table 16 for the Knees location and Table 17 for the Devon site. The Cut Bank site was lost due to hail on July 19 and the Choteau site was lost due to probable wire worm damage to the plots. Grain yields averaged 71.4 bu/a at the Knees and 62.8 bu/a north of Devon. Kernel plumpness and test weight varied at the Devon site while kernel plumpness averaged 92.6% and test weight averaged 50.5 lbs/bu at the Knees. Top yielding varieties at the Knees were WPB BZ596-117, Conrad, and MT020155, whereas the top yielding barleys north of Devon were Pinnacle, Champion, and MT050030.

Summary: At Devon the spring barley yields, protein and test weights were a bit below what might have been expected. There was no soil test done, so there could have been a nitrogen deficit. Yields ranged from 61 to 85 bu/acre at the Knees, and 53 to 72 bu/acre at Devon. No long term data are reported for either location as this was the second year of reestablishing the off station barley plots at the Knees and the first year of data from north of Devon.

MWBC FY2012 Grant Submission Plans: A similar project will be proposed for FY 2012.

Barley Variety Notes & Comments

Western Triangle Agricultural Research Center, Conrad, MT

Baroness (WestBred): 2-row feed. Short straw and good lodging resistance; 2.5" shorter than Harrington. Equal or slightly later maturity than Harrington. High yield when tested in favorable moisture conditions. Average test weight. Stripe rust resistant.

Boulder (WestBred, 2005): 2-row feed. Composite-cross, non-Baroness derived. Height similar to Haxby. Heading 1 day later than Haxby, and 1 day earlier than Baroness. High yield, similar to Haxby. High test weight, 0.5 lb less than Haxby. Replacement for Baroness and Xena.

Challenger (WestBred, 2008): 2-row feed. Above average yield and test weight. Average height and maturity.

Champion (WestBred, 2007): 2-row feed. Medium stiff straw. Heading one day later than Haxby and Boulder. Very high yield, greater than for Boulder & Baroness. High test weight, 1 lb less than Haxby.

Charles: 2-row malt. Grown as a winter barley in Idaho, but has very low winter hardiness. Winter survival on tillage-fallow at Conrad was 40% in 2007, and 10% in 2008.

Conlon (ND, 1996): 2-row malt. Medium height, weak straw. Early maturity, 1-2 days earlier and higher test weight than Bowman. Developed for areas of heat & drought stress. High resistance to net blotch; susceptible to spot blotch & Fusarium head blight.

Conrad (Busch Ag): 2-row malt, Busch Agr Resources. About 2 inches shorter than Harrington. Medium maturity, similar maturity as Harrington. Higher yield than Harrington. Slightly higher test weight and plump than Harrington.

Copeland (Sask. Canada, 1999): 2-row malt. Better straw strength and earlier maturity than Harrington. Similar yield, test weight, and plump than Harrington. Net blotch resistant. Scald & Septoria susceptible.

Craft (MT970116; MSU, 2006): 2-row malt. Taller than Harrington & Merit. 2 days earlier heading than Harrington, but later heading than Hockett. High yield, test weight, & plump. Moderate stripe rust resistance. Susceptible to net blotch. European style of malt enzyme activity for microbrew market. AMBA approved for organic malt production.

Drummond (ND 15477): 6-row malt. Stronger straw than other 6-row malt types. Improved yield over Morex, Robust and Foster. Plump higher than Morex.

Eslick (MSU, 2005): 2-row feed. Height 1” taller than Baroness, 1” shorter than Haxby. Heading date similar to Harrington, and 1-2 days later than Haxby. Yield similar to Baroness and Haxby. Test wt = Baroness, greater than Harrington, and 2# less than Haxby. Eslick has superior performance in areas of ample moisture, while Haxby is preferred where lower moisture conditions are expected.

Geraldine (MT960101; MSU, Miller Brewing): 2-row malt for Miller Brewing Co. One day later heading than Harrington. Good performance on irrigated conditions; below average performance on dryland. Moderate stripe rust resistance.

Harrington (Sask. Can): 2-row malt. Medium height; medium weak straw. Medium-late maturity. Sensitive to hot dry areas; yields good in moist areas. Can sprout or germinate (internal falling number) at a lower moisture content than other varieties.

Haxby (MSU, 2002): 2-row feed. 3 inches taller and two days earlier than Baroness. Among highest yielders in Triangle Area. Highest test weight of all varieties. High feed quality. Non-Baroness derived, providing good diversity. Haxby has superior yield performance in lower moisture conditions, while Eslick has a yield advantage in high moisture conditions.

Hays (MSU, 2004): Hooded 2-row forage. Shorter than Haybet and more resistant to lodging. Higher grain yield than Haybet. Low test weight. Higher forage yield than Haybet and Westford (8%). Harvest between heading stage and 5 days post-heading for highest protein. Caution: any cereal grain grown for hay should be tested for nitrate level prior to cutting. Nitrates decrease during grain filling, but in drought conditions, nitrates may be high all season, unless irrigation is available.

Hockett (MSU, MT910189): 2-row malt for dryland. 4 days earlier than Harrington, and retains plump on dryland much better than Harrington. 5 bu/a higher yield than Harrington. Very susceptible to stripe rust.

Kendall (Can): 2-row malt. High irrigated yield.

Lacey (M98, MN 1999): 6-row malt. Intended to replace Robust. Height intermediate between Robust & Stander. Lodging resistance greater than Robust, but less than Stander.

Legacy (Busch Ag): 6-row malt. 2 to 4 inches taller than Harrington. Higher yield than Morex and Robust, but lower than Harrington. Has 30% resistance to vomatoxin. Very susceptible to stripe rust.

Merit (Busch Ag): 2-row malt. Late maturing, too late for dryland. Lodges easier than Harrington, but yields higher. Very high diastatic power for excellent malting ability. Net blotch resistance, and moderate Scald resistance.

Metcalfé (Manitoba Canada, 1994): 2-row malt. Replacement for Harrington in Canada. Medium straw strength. Latitude sensitive - higher yield, test weight and plump than Harrington in Canada, but similar to Harrington in Montana. Similar protein as Harrington. Medium-late, slightly earlier to head than Harrington. Moderate resistance to spot-form net blotch. Susceptible to scald and Septoria.

Stellar (ND16301, 2005): 6-row malt. Medium-short. Good straw strength and widely adapted across North Dakota. Medium maturity. High plump and low protein. Excellent malt quality. Moderate spot-blotch resistance. Net-blotch susceptible.

Stockford (WestBred, 2005). 2-row hooded hay barley. Height is 2" taller than Hays. Heading is 2 days earlier than Hays. Forage yield is similar to Hays and Haybet. Harvest between heading stage and 5 days post-heading for highest protein. Caution: any cereal grain grown for hay should be tested for nitrate level prior to cutting (see note for Hays).

Tradition (Busch Ag.): 6-row malt. Stiffer straw than Legacy, good lodging resistance. Higher yield, test weight and plump than Legacy and other 6-row varieties. Very susceptible to stripe rust.

Xena (WPB bz594-19): baroness/stark cross. 2-row feed. Two inches taller and better boot emergence than Baroness. Lodging resistance equal to Baroness. Late maturity, similar to Baroness. Better adapted to dryland than Baroness, (higher test wt and plump than Baroness on dryland). Equal or better yield than Baroness on dryland.

“BG Barley”: A food barley classification, and includes waxy hulless and waxy covered varieties. Beta glucan levels of BG varieties are 50% higher than for oats or pearled barley. Grain yields are generally lower than other barley varieties. End-use includes various foods, including rice-extender, ‘Heart Balance Cereal’ etc.

Table 16. Off-station spring barley variety trial located in the Knees area.
Chouteau County, Western Triangle Ag. Research Center, 2010.

Variety	Spike	Yield bu/a	Test Wt lb/bu	Plump %	Thin %	Protein %
WPB BZ596-117	2	85.4	50.4	95.0	2.7	13.1
Conrad	2	85.1	50.5	93.4	2.7	13.4
MT020155	2	81.0	49.0	90.3	4.6	13.0
Champion	2	79.7	51.4	90.9	4.5	12.4
Geraldine	2	77.1	51.3	89.5	4.6	12.3
MT050030	2	72.9	49.7	94.0	3.0	11.8
Harrington	2	72.8	50.6	93.5	4.4	13.0
Goldeneye	6	72.4	49.9	92.2	3.3	12.3
Haxby	2	70.3	52.2	93.2	3.1	13.4
MT030042	2	69.4	51.2	91.2	3.8	11.0
Metcalfe	2	66.9	50.3	91.8	3.8	12.4
Hockett	2	66.5	48.3	90.7	4.3	13.0
Gallatin	2	66.1	51.9	93.5	3.0	12.9
Pinnacle	2	64.9	50.0	95.1	2.9	11.0
MT010160	2	61.4	51.2	93.1	3.0	12.5
MT010158	2	61.4	50.5	93.7	2.6	12.1
Mean		71.4	50.5	92.6	3.5	12.5
LSD (.05) =		13.4	1.8	3.7	2.6	
C.V. =		11.2	2.1	2.4	44.4	
P-Value (0.05)		0.015	0.005	0.095	0.716	

Cooperator and Location: Aaron Killion, western Chouteau county.

Planted April 7, 2010 on chem-fallow. Harvested August 24, 2010.

Fertilizer, actual lbs/a: 6-20-10. Sprayed with Starane at 1 pt/a, Salvo at 12 oz/a and Ally at 0.1 oz/a on 6/2/2010.

Precipitation from 4/7/2010 until harvest was: 6.2 inches.

Conducted by MSU Western Triangle Ag. Research Center.

Table 17. Off-station spring barley variety trial located in the Devon area.
Toole County, Western Triangle Ag. Research Center, 2010.

Variety	Spike	Yield bu/a	Test Wt lb/bu	Plump %	Thin %	Protein %
Pinnacle	2	72.0	48.4	95.5	2.3	8.1
Champion	2	71.6	48.7	88.7	4.3	8.7
MT050030	2	71.5	48.2	90.9	3.1	8.8
WPB BZ596-117	2	67.9	50.6	88.5	4.7	8.8
MT010160	2	65.2	47.6	89.0	3.7	9.5
Conrad	2	64.0	46.3	91.1	2.9	9.1
MT020155	2	63.0	45.9	82.8	6.8	9.2
Gallatin	2	62.1	47.2	85.5	6.0	9.2
Harrington	2	61.4	46.0	90.2	3.6	8.7
Goldeneye	6	61.1	44.2	80.2	7.0	8.5
Geraldine	2	61.0	47.5	82.1	10.0	8.9
MT010158	2	60.4	47.3	89.1	3.9	9.7
MT030042	2	59.7	48.4	81.1	7.9	8.4
Metcalfe	2	59.1	46.5	89.4	4.4	8.8
Haxby	2	57.5	50.2	85.3	4.8	9.1
Hockett	2	52.9	46.2	86.7	5.6	9.2
Mean		62.8	47.4	87.3	5.1	8.9
LSD (.05) =		9.2	1.9	5.2	2.4	
C.V. =		8.7	2.4	3.6	28.3	
P-Value (0.05)		0.033	0.000	0.000	0.000	

Cooperator and Location: Brian Aklestad, eastern Toole county.

Planted April 8, 2010 on chem-fallow. Harvested August 10, 2010.

Fertilizer, actual lbs/a: 6-20-10. Sprayed with Huskie at 11 oz/a and Axial XL at 16.4 oz/a on 5/15/2010.

Precipitation from 4/8/2010 until harvest was: 7.9 inches.

Conducted by MSU Western Triangle Ag. Research Center.

Title: Spring lentil and pea variety evaluation.

Year: 2010

Location: Western Triangle Agriculture Research Center, Conrad, MT and Joplin, MT.

Personnel: Grant Jackson and John Miller, Western Triangle Ag. Research Center, Conrad, MT;

Objectives: To evaluate the performance of pea and lentil varieties under dryland conditions.

Procedures: Thirteen lentil and 19 (13 at Joplin) pea varieties were seeded into fallow at Conrad and spring wheat stubble (no-till) at Joplin with a 5-row, 12 inch spaced, plot planter equipped with Conserv-a-Pac openers. Phosphorus and potash fertilizers and granular inoculant were placed with the seed while planting. Plot size was five by 25 feet with four replicates. Plots were direct cut with a Hege plot combine.

Results: The data are summarized in Tables 18, 19, 20, and 21. All the pea varieties tested this year were semi-leafless with white flowers. The nurseries at Conrad were affected by hail on July 19, thus the data should be interpreted with caution. Kochia control and shatter were major problems at Joplin.

Table 18. Lentil variety performance trial. Western Triangle Ag. Research Center, Conrad, MT. 2010.

Entry	Cotyledon Color	Seed Yield lbs/acre	Flower Date	Plant Ht., in	Test Wt. lbs/bu
CDC Redberry	Red	833 a	July 1	16.5 de	60.6 a
LC01602245P	Red	701 ab	June 28	16.5 de	58.5 abc
LC01602300R	Green	687 ab	June 30	18.8 abcd	58.2 abc
CDC Richlea	Green	623 abc	July 1	20.5 a	56.5 bcde
CDC Meteor	Green	583 bcd	July 1	19.3 abc	57.5 bc
Pennell	Green	562 bcd	June 28	19.5 ab	56.2 cde
Crimson	Red	544 bcd	July 1	16.0 e	58.9 ab
CDC Vantage	Green	464 cde	June 30	17.3 bcde	57.2 bcd
LC01602307E	Green	436 cde	July 1	20.3 a	57.4 bcd
LC01602062T	Red	405 de	June 28	16.8 cde	54.8 def
Merrit	Green	385 de	June 29	15.8 e	54.4 ef
Brewer	Green	381 de	June 28	18.3 abcde	53.7 f
Riveland	Green	324 e	June 29	18.0 abcde	52.4 f
Summary Statistics					
Mean		533		17.9	56.6
LSD (0.05)		214		2.5	2.6
CV (%)		28.0		9.9	3.2

Data with the same letter are not significantly different according to the LSD at p=0.05.

Notes:

Seeding Date: April 13

Harvest Date: September 8

Growing Season ppt: 13.1 inches; Hail on July 19 and September 5

Planting Rate: 12 seeds/ft²

Previous Crop: Fallow

Fertilizer: 4-20-10, seed placed

Inoculant: granular at 5 lbs/acre

Cooperator: Moog Farms, Joplin, MT.

Table 19. Lentil variety performance trial. Location – North of Joplin.
Western Triangle Ag. Research Center. Conrad, MT. 2010.

Entry	Cotyledon Color	Seed Yield lbs/acre	1000 Seed Wt. gms	Test Wt. lbs/bu
CDC Richlea	Green	1731 a	48.0 d	58.5 abc
CDC Meteor	Green	1558 ab	43.8 de	59.7 ab
LC01602300E	Green	1439 abc	40.8 ef	60.4 a
CDC Vantage	Green	1422 abc	49.4 cd	58.7 abc
Riveland	Green	1285 bcd	66.3 a	56.0 c
LC01602062T	Red	1246 bcd	44.3 de	60.3 a
Merrit	Green	1175 bcd	60.3 ab	56.6 c
Pennell	Green	1118 cde	59.5 b	56.0 c
Brewer	Green	1102 cde	55.1 bc	57.4 bc
LC01602245P	Red	1092 cde	36.1 fg	60.4 a
LC01602307R	Green	1069 cde	43.8 de	57.4 bc
Crimson	Red	988 de	33.8 g	59.5 ab
CDC Redberry	Red	749 e	39.9 efg	56.4 c
Summary Statistics				
Mean		1229	47.8	58.3
LSD (0.05)		402	6.3	2.8
CV (%)		22.8	9.1	3.3

Data with the same letter are not significantly different according to the LSD at p=0.05.

Notes:

Seeding Date: April 6

Harvest Date: August 18

Growing Season ppt:

Planting Rate: 12 seeds/ft²

Previous Crop: Spring wheat, no-till

Fertilizer: 4-20-10, seed placed

Inoculant: granular at 5 lbs/acre, seed placed

Kochia control and shatter were the major causes of the high variability in this variety test.

Cooperator: Moog Farms, Joplin, MT

Table 20. Pea variety performance trial. Western Triangle Ag. Research Center.
Conrad, MT. 2010

Entry	Cotyledon Color	Seed Yield lbs/acre	Flower Date	1000 Seed Weight grams	Test Weight lbs/bu
CDC Centennial		1807 a	5 July	308.8 a	64.0
PS9910140	Yellow	1609 ab	2 July	275.0 b	63.0
Majoret	Green	1569 abc	3 July	257.5 bcde	64.1
CDC Patrick		1420 bcd	5 July	224.8 g	63.7
CDC Meadow		1265 cde	1 July	239.5 efg	64.3
K2		1260 cde	30 Jun	252.0 cdef	63.5
SW Midas	Yellow	1172 def	4 July	243.0 defg	62.6
DS Admiral	Yellow	1172 def	3 July	255.5 bcdef	64.0
PS01102958	Yellow	1171 def	4 July	275.3 b	63.9
CDC Mozart	Yellow	1152 def	30 Jun	275.5 b	63.8
Medora	Green	1123 def	4 July	243.0 defg	62.8
CDC Golden	Yellow	1116 def	5 July	258.5 bcde	61.3
CDC Striker	Green	1108 def	1 July	264.8 bcd	64.0
Spider		1064 ef	3 July	272.5 bc	64.2
Cruiser	Green	933 ef	30 Jun	233.0 fg	62.5
Aragorn	Green	913 f	1 July	239.5 efg	62.2
PS0010836	Yellow	901 f	3 July	268.5 bc	62.1
Stirling	Green	894 f	29 Jun	238.5 efg	62.8
Delta	Yellow	840 f	1 July	250.5 cdef	61.0
Summary Statistics					
Mean		1184		256.5	63.1
LSD (0.05)		322		22.5	NS
CV (%)		19.8		6.2	2.7

Data with the same letter are not significantly different according to the LSD at $p=0.05$.
NS denotes means are not significantly different at $p=0.05$.

Notes:

Seeding Date: April 22

Harvest Date: August 20

Growing Season ppt: 11.56 inches; Hail on July 19

Planting Rate: 12 seeds/ft²

Previous Crop: Fallow

Fertilizer: 4-20-10, seed placed

Inoculant: granular at 5 lbs/acre

Cooperator: Moog Farms, Joplin, MT

Table 21. Pea variety performance nursery. Location – North of Joplin.
Western Triangle Ag. Research Center. Conrad, MT. 2010.

Entry	Cotyledon Color	Seed Yield lbs/acre	1000 Seed Weight grams	Test Weight lbs/bu
PS 9910140	Yellow	2733 a	254 b	61.0 ab
Stirling	Green	2542 ab	220 d	61.3 ab
PS0010836	Yellow	2464 abc	269 a	59.5 bc
Majoret	Green	2430 abcd	212 d	61.4 ab
Delta	Yellow	2408 abcd	254 b	62.5 a
SW Midas	Yellow	2292 abcde	212 d	63.0 a
CDC Mozart	Yellow	2234 abcde	236 c	62.6 a
PS 01102958	Yellow	2175 bcde	251 b	62.3 a
DS Admiral	Yellow	2161 bcde	244 bc	58.1 c
Cruiser	Green	2090 bcde	217 d	60.9 ab
CDC Striker	Green	1948 cde	245 bc	62.5 a
Medora	Green	1907 de	214 d	60.3 abc
CDC Golden	Yellow	1820 e	213 d	60.3 abc
Summary Statistics				
Mean		2247	234	61.2
LSD (0.05)		543	12.4	2.7
CV (%)		16.9	3.7	3.1

Data with the same letter are not significantly different according to the LSD at $p=0.05$.

Notes: Notes:

Seeding Date: April 6

Harvest Date: August 18

Growing Season ppt:

Planting Rate: 12 seeds/ft²

Previous Crop: Spring wheat, no-till

Fertilizer: 4-20-10, seed placed

Inoculant: granular at 5 lbs/acre, seed placed

Kochia control and shatter were the major causes of the high variability in this variety test.

Cooperator: Moog Farms, Joplin, MT

Title: Camelina, canola, and yellow mustard variety evaluation.

Year: 2010

Location: Western Triangle Agriculture Research Center, Conrad, MT.

Personnel: Grant Jackson and John Miller, Western Triangle Ag. Research Center, Conrad, MT;

Objectives: To evaluate the performance of camelina, canola, and yellow mustard varieties or hybrids under dryland, fallow conditions.

Procedures: Eighteen camelina varieties, 16 canola varieties or hybrids, and six mustard varieties were planted into fallow with a five-row, 12 inch spaced, plot planter equipped with Conserv-a-Pac openers. Nitrogen, potash, and sulfur fertilizers were broadcast, and phosphorus was placed with the seed while planting. Plot size was five by 25 feet with four replicates. Plots were swathed with a Swift plot swather and threshed with a Hege plot combine.

Results: Seed yields and camelina seed oil content were affected by hail this year on July 19; however, the later maturing canola seemed to recover more than the mustard or camelina experiments. The camelina nursery (Table 22) averaged 873 lbs/acre, the canola nursery (Table 23) averaged 1608 lbs/acre, and the mustard nursery (Table 24) averaged 992 lbs/acre. The camelina nursery suffered 100 % lodging damage and did not recover like the canola and mustard trials.

Table 22. Camelina variety performance trial. Western Triangle Ag. Research Center.
Conrad, MT. 2010.

Entry	Seed Yield lbs/acre	Flower Date	Test Weight lbs/bu	Plant Height inches	Oil Content %	Protein Content %
Ligena	1196 a	June 21	51.7 defgh	34 ab	37.1 a	22.2 e
SO-9	1065 ab	June 21	52.6 abc	34 abc	36.4 abc	22.6 de
SO-5	1063 ab	June 21	53.1 a	36 a	36.2 abcd	23.3 bcde
SO-12	993 abc	June 21	52.0 cdef	36 a	37.0 a	22.8 de
GP-12	990 abc	June 21	51.4 fgghi	31 bcdefgh	36.9 a	22.7 de
Calena	966 abc	June 21	52.2 bcde	32 bcdefg	35.7 bcde	23.6 bcd
GP-10	947 abcd	June 21	52.4 abcd	30 defgh	36.7 ab	23.1 cde
GP-43	911 bcd	June 21	52.6 abc	32 bcdefg	36.5 abc	23.0 cde
GP-42	895 bcde	June 21	52.7 abc	33 abcde	36.1 abcd	23.6 bcde
GP-73	863 bcde	June 17	51.5 efghi	29 gh	36.9 a	23.4 bcde
SO-8	863 bcde	June 21	51.3 fgghi	34 ab	35.6 cde	23.2 bcde
GP-68	829 bcde	June 21	50.9 hi	29 fgh	35.0 ef	24.4 bc
S0-7	789 bcdef	June 20	51.2 fgghi	32 bcdef	34.4 f	24.5 b
S0-11	764 cdef	June 21	51.2 ghi	29 h	36.4 abc	23.5 bcde
Blaine Cr.	748 cdef	June 21	51.8 defg	33 abcd	36.3 abcd	23.4 bcde
Suneson	674 def	June 21	52.8 ab	32 bcdef	36.6 ab	23.0 de
GP-69	623 ef	June 21	50.7 i	31 cdefgh	35.7 bcde	23.2 cde
GP-07	541 f	June 17	52.0 cdefg	30 efgh	35.3 def	25.9 a
Summary Statistics						
Mean	873		51.9	32	36.2	23.4
LSD (0.05)	282		0.8	3	1.1	1.4
CV (%)	22.8		1.1	6.8	2.1	4.1

Data with the same letter are not significantly different according to the LSD at $p=0.05$.

Notes:

Seed yields are reported at 10% moisture

Seeding Date: March 29

Swathed: August 12

Threshed: August 18

Growing Season ppt: 10.4 inches, hail on July 19.

Planting Rate: 5 lbs/acre

Previous Crop: Conventional Fallow

Fertilizer: 20-20-10-24

Table 23. Canola hybrid and variety performance trial. Western Triangle Ag. Research Center. Conrad, MT. 2010.

Entry	Seed Yield lbs/acre	Flowering Date	Plant Height inches	Test Weight lbs/bu	Oil Content %	Protein Content %
InVigor 8440	1812 a	June 25	39 c	48.9 bcd	48.4	20.4
InVigor 5440	1805 a	June 25	43 b	50.5 a	48.9	20.7
HyClass 921-RR	1783 a	June 25	42 bc	50.0 ab	47.1	22.4
Dekalb DKL 52-41	1735 ab	June 26	41 bc	48.7 bcde	48.2	21.3
Hyola 357 Magnum	1709 ab	June 22	35 d	48.7 bcde	48.3	21.2
Dekalb DKL 51-45	1703 ab	June 22	38 cd	49.2 abcd	49.9	20.5
Exp 988-RR	1671 ab	June 27	41 bc	48.5 cde	48.6	20.9
HyClass 947-RR	1651 abc	June 26	41 bc	49.2 abcd	49.2	21.0
Dekalb DKL 30-42	1646 abc	June 24	38 cd	49.6 abc	48.6	20.5
Dekalb DKL 72-55	1633 abc	June 27	39 c	49.5 abc	48.7	21.1
InVigor 5550	1573 abcd	June 27	43 b	50.4 a	47.9	21.2
HyClass 940-RR	1554 abcd	June 27	39 c	49.1 abcd	48.3	21.8
XCEED 8571-CL	1464 bcd	June 25	53 a	47.3 e	48.3	21.3
UISC003117	1371 cd	June 25	38 cd	48.7 bcde	47.4	21.6
UISC0135	1331 d	June 27	40 bc	47.8 de	46.9	21.8
Exp 8470-CL	1293 d	June 24	41 bc	48.0 de	48.6	21.0
Summary Statistics						
Overall Mean	1608		40	49.0	48.3	21.2
LSD (0.05)	281		3	1.4	NS	NS
CV (%)	12.3		5.2	2.1	4.6	7.1

Data with the same letter are not significantly different according to the LSD at p=0.05.

NS denotes means are not significantly different at p=0.05.

Notes:

Seed yields are reported at 10% moisture.

Seeding Date: April 22

Swathed: August 11

Threshed: August 20

Growing Season ppt: 10.4 inches, Hail on July 19

Planting Rate: 5 lbs/acre

Previous Crop: Conventional Fallow

Fertilizer: 20-20-10-24

Table 24. Yellow mustard variety performance trial. Western Triangle Ag. Research Center. Conrad, MT. 2010.

Entry	Seed Yield lbs/acre	Flowering Date	Plant Height inches	Test Weight lb/bu
Pacific Gold	1266 a	June 25	48 a	31.4
Pennant	1103 ab	June 18	36 c	33.6
Ida Gold	1092 ab	June 21	40 bc	34.4
Tilney	1046 b	June 21	38 c	34.7
Andante	1027 b	June 22	37 c	34.1
Forge	418 c	June 28	44 ab	38.8
Summary Statistics				
Overall Mean	992		40	34.5
LSD (0.05)	202		4	NS
CV (%)	13.5		7.6	18.0

Data with the same letter are not significantly different according to the LSD at $p=0.05$. NS denotes means are not significantly different at $p=0.05$.

Notes:

Seed yields are reported at 10% moisture.

Seeding Date: April 22

Swathed: August 11

Threshed: August 20

Growing Season ppt: 10.4 inches, Hail on July 19

Planting Rate: 5 lbs/acre

Previous Crop: Conventional Fallow

Fertilizer: 20-20-10-15

Title: Evaluation of solid- and hollow-stem spring wheat variety blends for controlling sawfly-induced stem lodging.

Personnel: John H. Miller and Grant D. Jackson, Western Triangle Agricultural Research Center, Conrad; David Weaver, Dept. of Land Resources and Environmental Science, MSU-Bozeman.

Objective: To evaluate seed blending of sawfly resistant and susceptible spring wheat varieties for agronomic performance and effectiveness in controlling sawfly damage.

Results: Stem lodging from sawfly cutting was non-existent for Choteau, McNeal, and Choteau/McNeal blends, even though the sawfly was very prevalent in the plots during plant elongation. Grain yields were different for the mixtures, as well as the pure stands. Pure Choteau yielded 85 bu/a, with the pure stand of McNeal yielding 68 bu/a. The mixtures fit in the middle with yields in the mid 70's bu/a. Test weight and protein were not significantly different among treatments. (Table 25).

Summary: The effectiveness of blending solid and hollow stem varieties for controlling lodging could not be determined because of the lack of cutting.

MWBC FY2012 Grant Submission Plans: It is not planned to submit this project for funding consideration in the next fiscal year.

Table 25. Effect of seed-blending of solid and hollow stem spring wheat varieties on agronomic performance. Western Triangle Ag. Research Center. 2010.

Variety and Blend	Yield bu/a	Test Wt lb/bu	Protein %	% Stem lodging
100% Choteau	85.0 a	61.0 a	13.8 a	0.0
50% Choteau+50% McNeal	74.8 b	60.8 a	14.1 a	0.0
25% Choteau + 75% McNeal	72.2 b	60.3 a	14.2 a	0.0
100% McNeal	68.6 c	60.7 a	14.0 a	0.0
Mean	75.2	60.7	14.0	
LSD (p=0.05)	3.3	0.8	0.6	
CV (%)	2.7	0.9	2.6	

Planted April 15, 2010. Harvested September 8, 2010.

Fertilizer, actual: 120-20-20

Sprayed with Huskie @ 11oz/a and Axial @ 16.4 oz/a on 6/4/2010.

Title: Planting Date and Rate Study with Spring Wheat and Barley.
Year: 2010
Location: Western Triangle Research Center, Conrad, MT
Personnel: John H. Miller and Grant Jackson, Western Triangle Ag. Research Center, Conrad, MT.

Introduction: The optimum window of April 7 to May 7 for planting small grains at Conrad was determined from planting date studies conducted nearly 30 years ago¹. A planting date study for spring grains was initiated in 2007 and continued in 2008, by Dr. Greg Kushnak, the study was not planted in 2009 and was resumed in 2010 to determine whether previous planting-date recommendations are still applicable.

Methods: In 2010, spring wheat 'Choteau' was planted on three dates: April 5, April 20, and May 13. The plan to plant every two weeks from the first date of planting was followed as closely as weather would allow. Being able to start planting in early April allowed for a mid and late planting season date. Within each date, three rates of seeding were applied: 15, 23 and 30 seeds/ft². 120-20-20 pounds per acre of fertilizer was applied to the spring wheat.

Results, Spring Wheat Dates: The early April date was planted in cold and dry conditions and the second date was planted when the plot area was dry enough to plant after a significant rainfall event. The second date was followed by more rainfall events and cool temperatures, keeping the soil temperatures cool, delaying germination and emergence of both early planting dates. Essentially, the spring wheat for the early and mid planting season dates stayed at the same growth stages for the entire growing season. The May planting date was about two weeks behind the early planting dates throughout the 2010 growing season. Unusually cold temperatures and wet conditions delayed all plant maturity in 2010. In 2010, yield and test weight, while protein increased for the May 13 planting date (Table 1). These plots also received significant hail events on July 19 and September 5.

Yield for the April plantings were 12 or more bu/a greater than for the May 13 planting. Test weight declined with later planting dates, but was still above 60 lbs/bu. Protein was highest for the May 13 planting. In 2007, protein also increased with delayed planting (Table 2)¹.

Protein decreased slightly with the 30 seeds/ft² seeding rate when compared to the 15 seeds/ft². Yields were almost 5 bu/a higher for the two higher seeding rates, although, the higher seeding rates were not different from each other with respect to yield. Test weights were slightly higher for the higher seeding rates, whereas, protein was higher for the lowest seeding rate (Table 1).

Results, Barley Dates: **The barley plot was lost due to hail on July 19 and again on September 5.**

Future Plans: The study needs to be redesigned to include four seeding rates between 15 and 21 seeds/ft², and to include both day-length sensitive and insensitive varieties¹ of spring wheat and barley.

¹ Dr. Gregory D. Kushnak, Western Triangle Ag. Research Center 2008 Annual Report.

Table 26. Planting dates and seeding rates for 'Choteau' spring wheat.
Western Triangle Ag. Research Center, Conrad, MT. 2010.

Rate (seeds/ft)	Planting Date	Yield (bu/a)	Test		Protein %	Harvest date
			Wt (lbs/bu)	Head date 1 Rep		
15	5-Apr	88.3	62.2	July 6	13.0	8-Sep
23	5-Apr	90.8	62.5	July 6	12.7	8-Sep
30	5-Apr	89.4	62.4	July 6	12.7	8-Sep
5-Apr	means:	89.5 a	62.3 a		12.8 b	
15	20-Apr	82.9	60.8	July 8	13.3	8-Sep
23	20-Apr	89.1	62.1	July 8	13.0	8-Sep
30	20-Apr	90.0	62.8	July 8	12.8	8-Sep
20-Apr	means:	87.3 a	61.9 b		13.0 b	
15	13-May	70.1	61.2	July 16	13.7	27-Sep
23	13-May	75.4	61.2	July 16	13.6	27-Sep
30	13-May	79.7	61.6	July 16	13.4	27-Sep
13-May	means:	75.1 b	61.3 c		13.6 a	
15	5-Apr	88.3	62.2	July 6	13.0	8-Sep
15	20-Apr	82.9	61.2	July 8	13.3	8-Sep
15	13-May	70.1	60.8	July 16	13.7	27-Sep
rate 15	means:	80.4 a	61.4 a		13.3 a	
23	5-Apr	90.8	62.5	July 6	13.6	8-Sep
23	20-Apr	89.1	62.1	July 8	13.0	8-Sep
23	13-May	75.4	61.2	July 16	13.3	27-Sep
rate 23	means:	85.1 b	61.9 b		13.1 ab	
30	5-Apr	89.4	62.4	July 6	12.7	8-Sep
30	20-Apr	90.0	62.8	July 8	12.8	8-Sep
30	13-May	79.7	61.6	July 16	13.4	27-Sep
rate 30	means:	86.4 b	62.2 b		13.0 b	
LSD (.05)		3.70	0.41		0.26	
C.V. %		5.20	0.78		2.35	
Date P		0.0000	0.0001		0.0000	
Rate P		0.0067	0.0008		0.0372	
Interaction P		0.3901 ns	0.0068		0.859 ns	

Planted on conventional fallow. Fertilizer, actual lbs/a: 120-20-20. Sprayed with Huskie at 11 oz/a and Axial XL at 16.4 oz/a on 6/4/2010.

Different letters associated with the means, indicate treatment difference at p=0.05.

Table 27. 3-year summary for planting date and rates for 'Choteau' spring wheat.
Western Triangle Ag. Research Center, Conrad, MT. 2010.

Planting Date	Yield bu/a	Test Wt lbs/bu	Protein %	Ripening date*	PPT* (inches)
Apr 27, 2007	34.9	57.7	15.5	Aug 8	2.95
May 5, 2008	53.3	61.7	13.1	Aug 25	7.79
April 5, 2010	89.5	62.3	12.8	8-Sep	13.46
3-yr avg.	59.2	60.6	13.8		
May 7, 2007	33.7	57.1	16.2	Aug 8	2.61
May 14, 2008	52.2	62.0	12.7	Sep 1	7.45
April 20, 2010	87.3	61.9	13.0	8-Sep	12.47
3-yr avg.	57.7	60.3	14.0		
May 17, 2007	25.7	56.7	16.7	Aug 15	2.61
May 31, 2008	42.7	59.4	13.3	Sep 6	5.80
May 13, 2010	75.1	61.3	13.6	27-Sep	12.27
3-yr avg.	47.8	59.1	14.5		
Seeding Rate** (seeds/ft)					
rate 15	30.0	57.0	16.2		
rate 15	46.2	60.8	13.1		
rate 15	80.4	61.4	13.7		
3-yr avg.	52.2	59.7	14.3		
rate 23	32.3	57.2	16.2		
rate 23	50.7	61.1	13.0		
rate 23	85.1	61.9	13.1		
3-yr avg.	56.0	60.1	14.1		
rate 30	31.9	57.3	16.1		
rate 30	51.3	61.1	13.1		
rate 30	86.4	62.2	13.4		
3-yr avg.	56.5	60.2	14.2		

* Growing season precipitation. ** Seed rates are pure live seeds per square foot: 15/ft² = 653,400 seeds/a; 23/ft² = 1,001,880 seeds/a; and 30/ft² = 1,306,800 seeds/a.

Title: Response of irrigated spring wheat to Nutrisphere-N® treated urea and Avail® treated phosphorus fertilizer.

Year: 2010

Locations: Western Triangle Ag. Research Center, Conrad, MT 59425.

Personnel: Grant Jackson and Clint Rouns, Western Triangle Ag. Research Center, Conrad, MT 59425;

Objectives: To compare spring wheat response to Nutrisphere-N® (NSN) treated urea, urea, and monoammonium phosphate (11-52-0) with and without Avail®.

Procedures: NSN treated urea, urea, and monoammonium phosphorus (11-52-0) with and without Avail® fertilizers were applied in a RCB field plot design with four replications to Choteau spring wheat according to the treatments listed in Table 29. Except for treatment 26, all plots received 25 lbs K/acre as KCl, and all plots including treatment 26 received 5 lbs Zn/acre as zinc sulfate. Phosphorus and Zn fertilizers were applied with the seed, and N fertilizers and KCl were applied broadcast while planting. Nitrogen fertilizer rates were adjusted to account for the varying N content of the P fertilizer rate. Soil test results and other site characteristics are shown in Table 28. Plot size was four rows wide and 12 feet long. Row spacing was 12". Plots were harvested with a small plot combine, and grain samples were cleaned, dried to about 10 % moisture, weighted, and sampled for grain protein analysis via a NIR.

Results: Grain yield, test weight, and protein content data are summarized in Table 29. Contrasts were used to compare the effectiveness of NSN and Avail® by summarizing N and P effects over all P or N fertilizer treatments. The 2010 growing season was cooler and received significant more precipitation than average (see weather summary); however, grain yields were reduced by hail storms on June 19 and September 5. The storm on June 19 reduced yields about 5%, but the storm on September 5 was much more severe reducing yields by at least 30%. Grain yield and protein content were unaffected by NSN treated urea and Avail treated 11-52-0. These responses were similar to previous year's data.

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Table 28. Site characteristics and soil test results. Western Triangle Ag. Research Center. 2010.

Character	Irrigated Spring Wheat
Planting Date	4-22-2010
Previous Crop	Fallow
Blanket Fertilizer	0-0-25-5 -Zn
Growing Season Precipitation(inches)	12.47
Harvest Date	9-8-2010
Soil Series	Scobey Clay Loam
Soil Test	
pH	7.8
O.M. (%)	2.6
P (ppm)	20
K (ppm)	380
EC (mmhos/cm)	0.44
NO ₃ -N (0-3', lb/ac)	92

Title: An examination of hard red spring wheat variety responses to wheat stem sawfly under phosphorus and nitrogen supplemented conditions.

Year: 2010

Location: Northeast of Conrad, Western Triangle Ag. Research Center, Conrad, MT. 59425.

Personnel: Kevin Delaney, David Weaver, and Grant Jackson.

Objectives: To examine how wheat stem sawfly mining herbivory interacts with 1) phosphorus (P) deficiency and 2) nitrogen (N) deficiency in a factorial design under field conditions using spring wheat varieties that vary in sawfly host plant resistance levels.

Procedures: Four spring wheat varieties, Ernest, Choteau, Conan, and Reeder were planted into chemical fallow with a five-row, 12 inch spaced, plot planter equipped with Conserv-a-Pac openers. Nitrogen fertilizer at the rates of 0 and 120 lbs N/acre in combination with 0 and 43 lbs P₂O₅ were applied while planting to each variety, in addition each plot received 25 K as KCl. Nitrogen as urea was applied broadcast (KCl was applied broadcast also), and P as monoammonium phosphate was placed with the seed while planting. Plot size was five by 25 feet with four replicates. Plots were harvested with a Hege plot combine. Soil test results and other site characteristics are shown in Table 31. Plots were located on a site previously in CRP about three miles east of the research center. The 2010 crop was the second one since the area was converted back to cropland.

Results: Grain yield, test weight, and grain protein content are shown in Table 32. The spring wheat varieties yielded as one would expect; however, the varieties did not respond to N or P fertilizer. With the yield level around 70 bu/acre, responses to both nutrients would be expected given the N and P soil test levels. This response was probably due to the increased mineralization of nutrients from the CRP residue that one would expect during a cool and moist growing season that was experienced in 2010.

Table 31. Site characteristics and soil test results. Western Triangle Ag. Research Center. 2010.

Character	
Planting Date	4-7-2010
Previous Crop	Chemical Fallow
Blanket Fertilizer	0-0-25
Growing Season Precipitation(inches)	12.4
Harvest Date	8-26-2010
Soil Series	Joplin loam
Soil Test	
pH	7.2
O.M. (%)	2.5
P (ppm)	13
K (ppm)	360
EC (mmhos/cm)	0.41
NO ₃ -N (0-3', lb/ac)	149

Table 32. Effect of variety, nitrogen, and phosphorus on yield and quality of spring wheat. Western Triangle Ag. Research Center, Conrad, MT 59425

Variety	N Rate lbs N/ac	P Rate lbs P ₂ O ₅ /ac	Grain Yield bu/ac	Test Weight lbs/bu	Grain Protein %
Reeder	0	0	76	62.2	14.2
Reeder	120	0	75	61.1	15.6
Reeder	0	43	74	62.4	14.4
Reeder	120	43	69	60.8	15.7
Conan	0	0	71	61.2	14.3
Conan	120	0	69	59.2	15.6
Conan	0	43	71	61.2	14.2
Conan	120	43	71	60.1	15.4
Choteau	0	0	70	61.2	14.6
Choteau	120	0	63	59.2	15.8
Choteau	0	43	70	61.2	14.2
Choteau	120	43	67	58.3	15.9
Ernest	0	0	63	61.5	15.1
Ernest	120	0	59	60.8	16.5
Ernest	0	43	61	60.9	15.5
Ernest	120	43	62	61.1	16.5
Variety Summary					
	Reeder		74 a	61.7 a	14.9 bc
	Conan		71 ab	60.6 b	14.9 c
	Choteau		68 b	59.5 c	15.1 b
	Ernest		61 c	61.1 ab	15.9 a
Nitrogen Summary					
	0		69 a	61.2 a	14.6 a
	120		67 a	90.1 b	15.9 b
Phosphorus Summary					
	0		68 a	60.7 a	15.2 a
	43		68 a	60.7 a	15.2 a
Summary Statistics					
	Mean		68	60.7	15.2
	CV (%)		8.0	1.4	2.4
Interaction p value Summary					
	Variety x N Rate		0.771	0.232	0.684
	Variety x P rate		0.537	0.664	0.321
	N rate x P rate		0.535	0.848	0.962
	Variety x N rate x P rate		0.695	0.567	0.363

Cooperator: Mark Grubb