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**PROJECT TITLE:** Long-Term Small Grain Variety Performance Evaluation Under Mechanical or Chemical Fallow Conditions Off- Station in Three Northern Montana Counties.

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**OBJECTIVES:**

Diverse cropping environments exist within that five-county area most closely served by this Research Center (Blaine, Chouteau, Hill, Liberty, and Phillips counties). Winter and spring wheat, barley, and oat production together in the five counties represents 28% of the 1993-1998 statewide total (38% and 30% for winter and spring wheat alone, respectively). Producers are keenly interested in variety performance data generated under local conditions. It is our objective, within budget and other resource limitations, to evaluate small grain variety performance, over time, under conditions representative of specific areas of Northern Montana yet differing from those of the Research Center at Havre.

It is also our objective to develop and maintain databases which are not only specific to differing major crop environments, but which are further augmented by as much associated climatic and production management information as is practical and feasible to collect. Since 1982 we have recorded and reported supportive information of this nature along with the crop performance data for each investigation. A new, standardized system was initiated in 1995 for better management and dissemination of such 'base data' in more detail than that provided previously. However, such 'base data' for 1999 is not included in this report as the information is yet pending final summarization due to a vacancy in NARC-Agronomy's technical support position throughout the 1999 crop and data season.

**RESULTS:**

Data details for individual trials conducted from 1983-1998 were included in respective previous annual reports, but long-term yield and test weight data from the past ten years are presented in abridged form for summary purposes here as applicable. For winter and spring wheat, selected variety performance comparisons on the basis of gross dollar return for these off-station locations as well as the principal statewide trials conducted on-station at Havre are included in a separate report.

1999 cropping environments ranged from poor to excellent across North Central Montana. At Havre, total annual growing season precipitation (9/1/98 through 8/31/99) was 14.30 inches, 18.5 percent greater than the average for all years since 1916. However, other conditions did not afford the full development of crop production potential that would normally be associated with above normal precipitation. April 1 through July 31 precipitation was 8.57 inches or 126 percent of the 84-year average. Heat units expressed as "Growing Degree Days" (GDD, base 50) were 90 percent of the average for the last 49 years (1951-1997). The last spring frost was 3 days early with the first fall frost 8 days late resulting in 139 frost free days, 11 days longer than the 84-year average. September 1998 through March 1999 precipitation was 115 percent of the long-

term average providing generally good to excellent stored soil moisture. However, seedbed moisture at normal planting time was somewhat lacking due to dry conditions in March and the first half of April. The April through July growing season saw an average daily temperature at 56 degrees F, 3 percent below normal. Although July average temperatures were 3.5 percent lower than normal, the last week in July was extremely hot with maximum temperatures near 100 degrees F. During that week, the countryside in the northern Triangle Area actually had an afternoon aroma similar to "roasted wheat. These conditions resulted in severe reductions in spring wheat test weights while winter wheat test weights and yields were substantially higher than normal. August was 3 percent warmer than the long-term average. Maximum summer temperature was recorded on July 29 at 100 degrees F. Minimum winter temperature was -20 degrees F on December 20. Crop outlook was initially fair with limited surface soil moisture and seemingly sluggish early crop development. Yield and test weight comparisons with long-term averages varied according to crop and location (WW=high yields and high test weights, SW=normal yields and low test weights, BLY=high yields and normal to high test weights, and OAT=normal yields and normal test weights). The above trends were largely associated with timeliness of planting which was of greater importance than normal in 1998. Later plantings and greater stress associated with recrop plantings resulted in lower yields and severely decreased test weights in 1998.

Off-station cropping environments were extremely variable in 1998. The Loma location had below-average precipitation, suffered from extreme heat stress during the end of July, and further suffered substantial hail damage. All plots there were harvested, but coefficient of variation values were expectedly high. The Loring and North Havre locations had above-average precipitation, but the North Havre area in general saw wide variability in precipitation from very poor to excellent – often only a few miles apart. Most locations recorded yields commensurate with moisture, and test weights were generally lower at all off-station locations. Protein levels for appropriately fertilized wheat and barley were generally very good to excellent.

Stand percent, plant height, yield, test weight, and protein data for the McKeever and Morse dryland winter wheat trials conducted in 1999 are summarized in Tables 1 and 2, respectively. As both the McKeever and Morse locations were new in 1998, replacing the former long-term Myers and Peterson locations; multi-year data will not be reported until after the third year in 2000.

Stand percent, plant height, yield, test weight and protein data for the 1999 McKeever and Flansaas/Lumsden dryland spring wheat trials are summarized in Tables 3 and 4, respectively. The Flansaas/Lumsden location is relatively new (4<sup>th</sup> year) at Loring in Phillips County replacing the 10-year Solberg location at Dodson (1986-1995). As the McKeever location was new in 1998, replacing the former long-term Myers location; multi-year data will not be reported until after the third year in 2000. The long-term Cederberg location at Turner in Blaine County was cancelled for 1999 due to conditions too wet for planting until well into the month of June. The Turner location, in place since 1982, further featured "fertilized vs unfertilized" variety performance evaluations (1994-1998). Those data were reported in the 1998 MWBC report, but an additional summary table prepared in 1999 is included in a separate report under "Crop Fertility Investigations." Multi-year yield and test weight summaries for selected spring wheat entries at the Flansaas/Lumsden location are presented in Table 5.

Stand percent, plant height, yield, test weight, plump/thin and protein data for the 1999 McKeever and Flansaas/Lumsden dryland spring barley trials are summarized in Tables 6 and 7, respectively. The Flansaas/Lumsden location is relatively new (4<sup>th</sup> year) at Loring in Phillips County replacing the 10-year Solberg location at Dodson (1986-1995). As barley evaluation at the McKeever location was new in 1999, replacing the former long-term Myers location; multi-year data will not be reported until after the third year in 2001. The long-term Cederberg location at Turner in Blaine County was cancelled for 1999 due to conditions too wet for planting until well into the month of June. Multi-year yield and test weight summaries for selected barley entries at the Flansaas/Lumsden location are presented in Table 8.

**SUMMARY:**

Six, 1999 off-station variety performance trials were conducted on mechanical or chemical fallow at three locations in three northern Montana counties.

**Dryland Winter Wheat Trials:**

- |   |                               |
|---|-------------------------------|
| 1. McKeever Farms, Chouteau County (12N Loma) | <u>        </u>               |
| 2. Brian Morse Farm, Hill County (30NW Havre) | <u>        </u><br>36-36N-12E |

**Dryland Spring Wheat Trials:**

- |  |                               |
|--|-------------------------------|
| 1. *L. Cederberg Farm, Blaine County (3NE Turner)  | 13-36N-25E                    |
| 2. McKeever Farms, Chouteau County (12N Loma)      | <u>        </u>               |
| 3. Flansaas/Lumsden Farm, Phillips Co (1SW Loring) | <u>        </u><br>24-35N-29E |

**Dryland Spring Barley Trials:**

- |  |                               |
|--|-------------------------------|
| 1. *L. Cederberg Farm, Blaine County (3NE Turner)  | 13-36N-25E                    |
| 2. McKeever Farms, Chouteau County (12N Loma)      | <u>        </u>               |
| 3. Flansaas/Lumsden Farm, Phillips Co (1SW Loring) | <u>        </u><br>24-35N-29E |

\* Active location not established in 1999 due to conditions too wet for planting well into the month of June.

All trials were seeded in replicated, 3-row, 20-foot plots on a 12-inch row spacing utilizing a self-propelled cone seeder. Trials (1988-1991) were planted with hoe openers fitted with 'Acra-Plant' or JD 3" shovels. Beginning with spring planting in 1992, all off-station trials were planted with modified 'Haybuster' openers. A randomized complete block design was standard for all trials with three replications. Beginning in 1997, a 'Wintersteiger 1541-21' plot combine, funded in part by MWBC was used to harvest each 3-row plot after end-trimming to 16'. Prior to 1997, a 'Hege 125C' plot combine, also funded in part by MWBC in 1984, was used. Some 1991 plots were harvested via the former binder/thresher method due to breakdown of the Hege plot combine. Other variables specific to each individual trial are listed in the data tables.

**FUTURE PLANS:**

It is planned, budget and other resources allowing, to continue off-station cereal variety investigations in the five-county area. This work has been strongly supported by producers near most of the locations, and by the Northern Ag Research Center Advisory Committee. Budgets aside, expanded overall workload suggests that the number of replicated, off-station variety trial locations needs to be reduced - at least for the time being. Spring grains were dropped in 1997 (after 10 years of data) at the Myers/ Big Sandy location. This was an excellent location with truly outstanding producer cooperation and support. However, current sawfly-resistant variety development efforts involve establishment and maintenance of 7,000-8,000 plots on the McKeever Farm only a few miles away where conditions (other than sawfly pressure) are quite similar. Thus, the Big Sandy location has been put on hold for the time being; and standard off-station winter wheat, spring wheat and barley variety trials have been established at the Loma sawfly research site. In addition, spring grains were dropped from the North Havre location when it was relocated from the Peterson Farm to the Morse Farm for winter wheat variety evaluation only, in the fall of 1997. And, although the cooperating producer interest and support at the former Graff location north of Joplin (spring wheat and barley varieties) was excellent, general interest in the trials at this location on the part of area producers was seemingly low.

Since the 1998 data year marked completion of 10 years at this site, variety evaluation work there has been terminated. It is planned to continue off-station spring wheat and barley variety evaluations at the Cederberg/Turner and Flansaas-Lumsden/Loring locations. The Loring location is only in its' fourth year, and the cooperator and area producer interest and support is outstanding. The Turner location is only 32 miles from the Loring site, but conditions there are quite different; and it is our opinion that this location should be continued at least until 2002 which will mark 15 years at the present site (plus 5 years on a different soil series at a site nearby). However, the double plantings at Turner comparing fertilized vs unfertilized plots were terminated following the 1998 crop year as originally planned.

Data processed by the Center will normally be limited to trials where the Center performs all field functions from planting to harvest. Special arrangements may be made with Extension Agents desiring to conduct additional replicated trials on their own. Packaged seed can likely again be provided to the County Extension Agents as per their needs for non-replicated demonstration locations. Such demonstrations will be for display and discussion use by the County Extension Agent; and performance data will not be collected or processed by the Research Center for any such demonstration plantings.

Efforts are continuing in the use of computer mapping to augment identification and selection of appropriate sites for off-station work. The former Graff and current Flansaas/Lumsden locations in Liberty and Phillips Counties were selected in this manner.

It is our current opinion that effort put forth to generate quality multi-year data at a few sites, carefully chosen to represent principal differences in average growing season conditions, is superior to an approach involving less concentrated work at greater numbers of locations. This is particularly true when critical season workload results in less than timely planting and maintenance of certain sites.

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TABLE 1. DRYLAND FALLOW WINTER WHEAT VARIETY NURSERY GROWN OFF-STATION AT MCKEEVER FARMS, LOMA. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1999.

ID	VARIETY or SELECTION	STAND %	PLNT Inches	HT	YIELD Bu/Ac	TESTWWT Lbs/Bu	PROTEIN %
MTS9720	NUWEST/MT88001//MT7863	98.73	32.94		45.20	60.77	13.40
PI584526	JUDITH	99.37	33.73		43.70	61.37	12.60
MT 9409	TIBER/MT8030	100.00	29.07		43.50	60.43	13.10
CI 17844	REDWIN	98.77	33.33		43.10	63.10	13.70
PI599336	MORGAN	99.07	33.66		40.60	61.80	12.90
MT 9432	BIG SKY	98.77	33.99		39.57	63.17	12.80
PI564761	ERHARDT	99.37	29.40		38.30	62.37	14.10
RH78W296	BIGHORN	100.00	29.66		37.30	62.67	12.80
PI517194	TIBER	100.00	35.37		36.67	62.43	13.80
PI593889	RAMPART	100.00	31.43		35.90	61.77	13.40
CI 17735	NORSTAR	100.00	38.58		35.83	61.07	13.20
PI555458	PROMONTORY	99.37	29.46		35.80	63.47	13.00
MTW9441	NUWEST/TIBER	97.83	30.91		35.80	61.83	12.60
CI 17860	NEELEY	97.23	31.69		34.90	61.60	13.10
MTS9719	NUWEST/MT88001//MT7863	100.00	33.33		34.87	60.20	12.90
PI593890	MCGUIRE	98.13	30.12		34.63	62.40	14.60
PI593047	PRONGHORN	98.43	34.51		33.57	62.93	13.00
MT9524	NUWEST/TIBER	100.00	32.22		33.43	61.43	13.90
CI 17879	ROCKY	99.07	31.76		33.17	62.80	13.20
PI584505	HALT	100.00	27.10		33.13	62.57	13.90
PI586806	NUWEST	99.37	32.55		32.80	60.87	13.60
PI593891	VANGUARD	100.00	31.56		32.57	62.30	14.70
QT 542	HYBRITECH 542	99.37	36.22		32.23	63.13	13.20
PI596352	ELKHORN	98.47	32.30		25.10	59.93	14.10
EXPERIMENTAL MEANS		99.22	32.29		36.32	61.93	13.40
C.V. 2: (S OF MEAN/MEAN)*100		.76	3.69		6.67	.59	-
LSD (0.05)		2.16	3.39		6.90	1.04	-

Note: This nursery suffered late July heat stress and significant hail damage.

CLIMATIC and NURSERY MANAGEMENT DATA

Summarization Pending...

TABLE 2. DRYLAND FALLOW WINTER WHEAT VARIETY NURSERY GROWN OFF-STATION AT THE BRIAN MORSE FARM, NORTH HAVRE. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1999.

ID	VARIETY or SELECTION	STAND %	PLNT Inches	HT	YIELD Bu/Ac	TESTWT Lbs/Bu	PROTEIN %
MTW9441	NUWEST/TIBER	96.87	30.71		83.10	63.30	11.40
MT 9409	TIBER/MT8030	90.63	29.15		82.37	61.47	12.50
CI 17860	NEELEY	97.20	32.74		82.13	64.07	12.00
PI586806	NUWEST	95.17	32.61		82.10	62.70	12.40
PI584526	JUDITH	90.27	31.04		80.47	61.40	13.40
MT 9432	BIG SKY	94.43	34.06		77.63	63.73	11.60
PI599336	MORGAN	94.10	31.89		77.00	62.93	14.30
PI555458	PROMONTORY	89.90	33.53		76.37	64.47	10.70
RH78W296	BIGHORN	89.93	27.03		75.23	61.70	13.60
MTS9720	NUWEST/MT88001//MT7863	96.87	30.98		74.00	61.50	14.30
PI593889	RAMPART	90.97	31.17		72.93	63.07	13.30
MT9524	NUWEST/TIBER	91.33	32.80		72.77	62.97	14.30
PI564761	ERHARDT	92.00	30.05		70.43	63.27	14.20
MTS9719	NUWEST/MT88001//MT7863	96.53	33.27		70.03	62.07	13.70
CI 17879	ROCKY	100.00	29.92		69.67	63.33	13.60
PI593047	PRONGHORN	74.67	33.99		68.70	62.20	14.20
CI 17844	REDWIN	96.87	34.65		68.37	61.80	14.40
PI593890	MCGUIRE	92.00	30.05		68.17	62.43	15.10
QT 542	HYBRITECH 542	97.20	32.94		68.07	62.90	13.50
PI593891	VANGUARD	96.53	32.97		66.90	62.77	14.40
PI584505	HALT	83.37	24.80		63.97	60.77	14.10
PI596352	ELKHORN	94.80	34.84		63.10	63.10	12.60
PI517194	TIBER	95.13	33.62		62.77	63.37	14.20
CI 17735	NORSTAR	99.30	33.79		61.50	62.97	14.00
EXPERIMENTAL MEANS		93.17	31.77		72.41	62.68	13.41
C.V. 2: (S OF MEAN/MEAN)*100		3.57	3.88		5.07	.92	-
LSD (0.05)		9.46	3.51		10.45	1.64	-

CLIMATIC and NURSERY MANAGEMENT DATA

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TABLE 3. DRYLAND FALLOW SPRING WHEAT VARIETY NURSERY GROWN OFF-STATION IN A WHEAT STEM SAWFLY ENVIRONMENT AT McKEEVER FARMS, LOMA. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1999.

ID	VARIETY or SELECTION	STAND %	PLNT Inches	HT	YIELD Bu/Ac	TESTWT Lbs/Bu	PROTEIN %
CI 17430	NEWANA	100.00	26.38		37.27	54.83	16.10
PI527682	AMIDON	100.00	32.65		37.00	53.73	15.80
BZ992588	CONAN	100.00	30.12		36.73	55.27	16.70
PI574642	MCNEAL	100.00	28.61		35.70	52.17	16.80
MT 9433	SCHOLAR	100.00	28.79		34.83	54.73	17.90
ND 695	REEDER	100.00	28.08		34.20	55.50	16.80
C982-324	RAMBO	100.00	26.77		34.07	54.77	16.30
ND 694	PARSHALL	100.00	31.89		32.40	55.10	16.50
CI 13596	FORTUNA	100.00	33.04		31.67	54.37	16.00
PI549275	HI-LINE	100.00	24.48		30.70	52.97	16.90
MTHW9701	CYMMIT204//MT8182/FORTUNA	100.00	25.85		29.97	52.27	16.60
PI592761	ERNEST	100.00	28.87		29.93	53.30	17.00
CI 17429	LEW	100.00	31.76		29.80	54.40	17.50
MTHW9420	MT8182/MT8289	100.00	25.59		26.67	51.37	16.80
EXPERIMENTAL MEANS		100.00	28.78		32.92	53.91	16.69
C.V. 2: (S OF MEAN/MEAN)*100		-	5.66		6.91	.72	-
LSD (0.05)		-	4.74		6.61	1.13	-

Note: This nursery suffered late July heat stress and significant hail damage.

CLIMATIC and NURSERY MANAGEMENT DATA

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TABLE 4. DRYLAND FALLOW SPRING WHEAT VARIETY NURSERY GROWN OFF-STATION AT THE FLANSAAS/LUMSDEN FARM, LORING. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1999.

ID	VARIETY or SELECTION	STAND %	PLNT HT Inches	YIELD Bu/Ac	TESTWT Lbs/Bu	PROTEIN %
ND 695	REEDER	99.30	29.53	49.43	60.10	14.30
WBEXPRES	WESTBRED EXPRESS	97.90	24.80	47.83	58.80	13.20
CI 17430	NEWANA	97.90	27.56	47.73	58.83	13.20
PI574642	McNEAL	97.23	27.95	47.00	59.10	14.40
ND 694	PARSHALL	98.60	31.23	46.50	60.23	14.50
MTHW9701	CYMMIT204//MT8182/FORTUNA	95.47	29.53	46.30	57.23	13.80
MT 9433	SCHOLAR	97.93	32.35	45.40	59.03	13.20
PI549275	HI-LINE	95.13	28.61	45.30	58.17	14.30
PI527682	AMIDON	98.27	30.31	45.27	57.63	14.40
TR983239	FERGUS	92.37	28.48	45.13	58.97	14.50
PI531005	GRANDIN	98.97	30.05	44.87	58.17	13.80
C982-324	RAMBO	97.93	30.18	43.97	59.47	12.80
BZ987558	CONAN	98.63	27.82	42.97	60.57	15.30
WB 936	WESTBRED 936	94.13	25.46	42.57	58.00	14.60
PI592761	ERNEST	97.57	31.63	40.40	57.73	15.60
MTHW9420	MT8182/MT8289	97.93	28.24	40.13	58.00	13.10
PNR 2375	OLAF//ERA/SUQAMUXI 68/3/C	96.17	27.82	39.20	58.17	14.20
WB 926	WESTBRED 926	97.57	26.38	38.47	57.73	15.00
CI 17429	LEW	95.13	32.61	38.37	59.73	14.00
CI 13596	FORTUNA	95.83	31.44	34.43	58.17	14.80
EXPERIMENTAL MEANS		97.00	29.10	43.56	58.69	14.15
C.V. 2: (S OF MEAN/MEAN)*100		1.61	3.27	2.48	.45	-
LSD (0.05)		4.47	2.73	3.09	.75	-

CLIMATIC and NURSERY MANAGEMENT DATA

Summarization Pending....

TABLE 5. FOUR-YEAR YIELD AND TEST WEIGHT SUMMARY OF SELECTED ENTRIES FROM DRYLAND FALLOW SPRING WHEAT VARIETY NURSERIES GROWN OFF-STATION AT THE FLANSAAS/LUMSDEN FARM, LORING. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1996-1999.

2/ VARIETY OR SELECTION	-NO. OF YEARS TESTED	1/ YIELD (BUSHELS PER ACRE)					TEST WEIGHT (POUNDS PER BUSHEL)					AVERAGE FOR YEARS TESTED	3-YR. COMPAR. AVERAGE TEST WT 3/	PERCENT OF FORTUNA TEST WT. 4/			
		1996	1997	1998	1999	2000	AVERAGE FOR YEARS TESTED	3-YR. COMPAR. AVERAGE YIELD 3/	PERCENT OF FORTUNA YIELD 4/	1996	1997				1998	1999	2000
PI574642 McNEAL	4	28.6	35.2	31.7	47.0	-	35.6	35.6	127.6	59.9	55.4	54.2	59.1	-	57.1	57.1	98.4
CI 17430 NEWANA	4	30.2	35.9	28.2	47.7	-	35.5	35.5	127.3	61.6	56.8	52.7	58.8	-	57.5	57.5	99.0
MT 9433 SCHOLAR (+)	4	28.7	35.3	31.4	45.4	-	35.2	35.2	126.0	61.8	58.5	57.3	59.0	-	59.2	59.2	101.9
ND 606 AMIDON	4	29.3	36.1	26.9	45.3	-	34.4	34.4	123.2	61.0	57.5	54.9	57.6	-	57.8	57.8	99.5
WB 936 WB 936 (P+)	4	26.9	37.9	30.1	42.6	-	34.4	34.4	123.2	60.5	56.6	52.8	58.0	-	57.0	57.0	98.1
WBEXPRES WB EXPRESS(P+)	4	27.8	31.2	30.5	47.8	-	34.3	34.3	123.0	60.3	55.9	54.3	58.8	-	57.3	57.3	98.7
ND 626 GRANDIN	4	26.9	35.4	29.8	44.9	-	34.2	34.2	122.6	61.4	56.3	51.8	58.2	-	56.9	56.9	98.1
PI549275 HI-LINE	4	28.3	32.7	29.5	45.3	-	33.9	33.9	121.6	60.5	55.1	51.6	58.2	-	56.4	56.4	97.1
TR983239 WB FERGUS (P+)	4	25.5	34.6	28.8	45.1	-	33.5	33.5	120.0	62.0	56.6	54.6	59.0	-	58.0	58.0	100.0
PNR 2375 PIONEER 2375	4	27.8	34.7	29.2	39.2	-	32.7	32.7	117.3	61.0	56.8	54.7	58.2	-	57.7	57.7	99.3
MTHW9420 MT8182/MT8289 (	4	27.0	33.6	29.7	40.1	-	32.6	32.6	116.8	61.1	55.8	53.3	58.0	-	57.1	57.1	98.3
ND 677 ERNEST (+)	4	27.1	34.8	27.3	40.4	-	32.4	32.4	116.1	61.5	57.1	54.8	57.7	-	57.8	57.8	99.5
WPB 926R WB 926R (P)	4	25.7	34.1	28.1	38.5	-	31.6	31.6	113.1	61.0	56.2	53.6	57.7	-	57.1	57.1	98.4
C982-324 WB RAMBO (P+)	4	26.6	27.8	27.4	44.0	-	31.4	31.4	112.6	61.6	57.6	55.6	59.5	-	58.6	58.6	100.9
PI483235 GLENMAN	3	28.8	33.8	23.9	-	-	28.8	31.3	112.0	58.7	56.1	52.6	-	-	55.8	55.9	96.2
ND 582 STOA	3	26.6	32.8	27.0	-	-	28.8	31.2	111.9	59.9	55.1	53.5	-	-	56.2	56.2	96.8
CI 17790 LEN	3	26.9	31.4	27.2	-	-	28.5	30.9	110.7	61.2	55.4	52.8	-	-	56.5	56.5	97.4
ND 673 TRENTON	3	25.9	33.4	25.5	-	-	28.3	30.7	109.8	60.7	56.8	54.2	-	-	57.2	57.2	98.6
CI 17429 LEW	4	27.1	30.7	24.7	38.4	-	30.2	30.2	108.3	61.3	57.1	56.5	59.7	-	58.7	58.7	101.1
CI 13596 FORTUNA	4	23.0	29.7	24.5	34.4	-	27.9	27.9	100.0	61.2	57.6	55.3	58.2	-	58.1	58.1	100.0
MEAN (ENTRIES LISTED)		27.2	33.6	28.1	42.9	-	-	32.7	-	60.9	56.5	54.1	58.5	-	-	57.4	-
5/ Growing Season Precip. (in.)		3.19	7.36	5.20	Pndg		5.25										
Soil PAW (in.) to SD at Planting.		5.26	5.55	6.30	Pndg		5.70										
Total Plant Avail. Water (in.)		8.45	12.91	11.50	Pndg		10.95										
Soil NO3 (lbs.) to SD at Planting.		40.0	40.0	130.0	Pndg												
SD (Sampling Depth in inches)		48.0	48.0	48.0	Pndg												
Fertilizer Applied (# N)		57.0	90.0	70.0	70.0												
(# P2O5)		28.0	48.0	40.0	40.0												
(#K)		0.0	21.0	25.0	25.0												

Check variety is Fortuna.

1/ See MCES Bulletin 1093 for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making variety selection decisions.

2/ P = Private variety, + = Protected variety.

3/ 4-yr. CA = (x/y) \* z where x = average yield or test weight of the entry for years tested, y = average yield or test weight for Fortuna for the same years, and z = 4-yr. average yield or test weight for the check variety Fortuna.

4/ Percent of Fortuna yield or test weight for the same data years as those in which the entry was tested.

5/ Seeding to 14 days prior to harvest maturity.

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TABLE 6. DRYLAND FALLOW SPRING BARLEY VARIETY NURSERY GROWN OFF-STATION IN A WHEAT STEM SAWFLY ENVIRONMENT AT McKEEVER FARMS, LOMA. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1999.

ID	VARIETY or SELECTION	PLNT HT Inches	HT Bu/Ac	YIELD Lbs/Bu	TEST WT %	PLUMP %	THIN %	PROTEIN @100%DM
MT960228	MT960228	23.88	56.27	49.40	38.20	19.50	15.80	
MT950186	MT950186	26.25	54.77	52.57	67.40	8.00	15.45	
MTLB 6	MTLB 6	23.36	53.10	51.57	54.10	12.70	17.28	
MT920073	MT920073	24.41	50.30	48.53	44.10	23.80	16.64	
PI491534	GALLATIN	24.12	48.93	50.57	45.70	17.50	16.84	
SK 76333	HARRINGTON	23.91	48.40	48.63	28.60	27.80	17.18	
CI 15514	HECTOR	24.02	47.97	50.53	47.90	16.50	16.78	
PI591823	CHINOOK	23.88	47.43	51.13	40.70	19.30	17.57	
MTLB 13	MTLB 13	20.34	47.27	49.93	39.70	18.10	16.78	
MTLB 30	VALIER	24.67	46.20	49.90	25.50	23.30	17.14	
CI 15856	LEWIS	22.47	43.33	51.30	53.60	14.70	17.37	
BZ594-19	XENA	22.23	42.70	49.60	52.90	13.40	17.39	
PI568246	BARONESSE	20.34	42.70	50.57	51.70	12.50	17.97	
MTLB 5	MTLB 5	21.26	42.27	50.90	29.40	22.20	18.21	
ND 9866	STARK	24.41	40.97	50.77	78.00	5.00	15.68	
PI483237	BOWMAN	22.31	37.93	49.83	62.40	13.00	16.26	
EXPERIMENTAL MEANS		23.24	46.91	50.36	47.49	16.71	16.90	
C.V. 2: (S OF MEAN/MEAN)*100		5.95	8.71	.71	-	-	-	
LSD (0.05)		4.00	11.80	1.04	-	-	-	

Note: This nursery suffered late July heat stress and significant hail damage.

#### CLIMATIC and NURSERY MANAGEMENT DATA

Summarization Pending...

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TABLE 7. DRYLAND FALLOW SPRING BARLEY VARIETY NURSERY GROWN OFF-STATION AT THE FLANSAAS/LUMSDEN FARM, LORING. NORTHERN AGRICULTURAL RESEARCH CENTER. HAVRE, MONTANA. 1999.

ID	VARIETY or SELECTION	STAND %	PLNT Inches	HT	YIELD Bu/Ac	TEST WT Lbs/Bu	PLUMP %	THIN %	PROTEIN @100%DM
PI568246	BARONESSE	95.13	23.36		79.47	49.40	84.20	5.20	13.51
BZ594-19	XENA	97.90	26.96		77.27	49.17	88.90	4.30	12.49
MT950186	MT950186	97.20	27.56		74.90	52.53	94.10	2.20	12.15
MT960228	MT960228	96.53	24.54		74.60	50.97	90.90	3.40	13.07
MTLB 13	MTLB 13	95.83	25.98		73.93	50.10	85.30	6.10	13.71
MTLB 30	VALIER	97.27	26.05		73.23	50.63	86.70	4.20	13.59
MTLB 6	MTLB 6	97.23	25.85		73.20	51.30	91.50	2.80	13.70
MTLB 5	MTLB 5	99.67	28.87		73.00	50.90	84.10	5.60	13.78
MT920073	MT920073	97.90	25.46		71.97	51.03	91.80	3.60	13.53
CI 15856	LEWIS	97.20	25.85		69.97	51.67	88.10	5.10	13.50
SK 76333	HARRINGTON	93.10	26.94		69.90	49.63	88.10	5.20	13.50
CI 15514	HECTOR	96.50	26.68		69.63	51.33	86.80	5.10	13.13
PI491534	GALLATIN	98.60	27.69		69.40	51.67	88.40	5.00	12.76
PI483237	BOWMAN	96.53	27.95		67.67	52.00	96.40	1.40	14.11
PI591823	CHINOOK	95.83	26.51		64.77	52.03	88.70	5.00	13.52
ND 9866	STARK	99.30	26.68		60.80	50.87	94.30	2.50	14.12
EXPERIMENTAL MEANS		96.98	26.43		71.48	50.95	89.27	4.17	13.39
C.V. 2: (S OF MEAN/MEAN)*100		1.26	3.98		3.29	.75	-	-	-
LSD (0.05)		3.53	3.04		6.79	1.11	-	-	-

CLIMATIC and NURSERY MANAGEMENT DATA

Summarization Pending...

TABLE 8. FOUR-YEAR YIELD AND TEST WEIGHT SUMMARY OF SELECTED ENTRIES FROM DRYLAND FALLOW SPRING BARLEY VARIETY NURSERIES GROWN OFF-STATION AT THE FLANSAAS/LUMSDEN FARM, LORING. NORTHERN AGRICULTURAL RESEARCH CENTER. 1996-1999.

2/ VARIETY OR SELECTION	NO. OF YEARS TESTED	1/ YIELD (BUSHEL PER ACRE)					TEST WEIGHT (POUNDS PER BUSHEL)					AVERAGE FOR YEARS TESTED	4-YR. COMPAR. AVERAGE TEST WT 3/	PERCENT OF HECTOR TEST WT 4/			
		1996	1997	1998	1999	2000	1996	1997	1998	1999	2000						
NS 78054 BARONESSE (P+)	4	38.1	47.6	46.9	79.5	-	53.0	53.0	111.5	48.0	46.9	44.6	49.4	-	47.2	47.2	97.2
N1123111 LOGAN	3	37.7	50.3	43.7	-	-	43.9	51.9	109.1	47.3	50.5	46.3	-	-	48.0	49.0	100.7
PI491534 GALLATIN	4	37.9	49.5	45.1	69.4	-	50.5	50.5	106.1	48.5	48.9	45.7	51.7	-	48.7	48.7	100.2
CI 15856 LEWIS	4	39.1	48.4	34.9	70.0	-	48.1	48.1	101.1	48.9	49.0	47.3	51.7	-	49.2	49.2	101.3
PI591823 CHINOOK (+)	4	38.8	47.1	41.1	64.8	-	47.9	47.9	100.8	47.0	48.6	46.7	52.0	-	48.6	48.6	99.9
CI 15514 HECTOR	4	39.3	43.0	38.4	69.6	-	47.6	47.6	100.0	48.6	48.6	45.9	51.3	-	48.6	48.6	100.0
SK 76333 HARRINGTON	4	36.5	44.6	37.7	69.0	-	46.9	46.9	98.7	47.5	48.3	45.6	49.6	-	47.8	47.8	98.3
PI483237 BOWMAN	4	36.4	40.1	39.1	67.7	-	45.8	45.8	96.3	49.8	50.2	47.2	52.0	-	49.8	49.8	102.5
ND 9866 STARK	4	37.2	38.1	43.2	60.8	-	44.8	44.8	94.2	49.6	50.2	46.4	50.9	-	49.3	49.3	101.4
MEANS (ENTRIES LISTED)		37.9	45.4	41.1	68.8	-	-	48.5	-	48.3	49.0	46.2	51.1	-	-	48.7	-
5/ Growing Season Precip. (in.)		3.19	6.79	5.20	Pndg		5.06										
Soil PAW (in.) to SD at Planting.		5.26	5.55	6.30	Pndg		5.70										
Total Plant Avail. Water (in.)		8.45	12.34	11.50	Pndg		10.76										
Soil NO3 (lbs.) to SD at Planting.		40.0	40.0	130.0	Pndg												
SD (Sampling Depth in inches)		48.0	48.0	48.0	Pndg												
Fertilizer Applied (# N)		57.0	90.0	70.0	70.0												
(# P2O5)		28.0	48.0	40.0	40.0												
(#K)		0.0	21.0	25.0	25.0												

Check variety is Hector.

1/ See MCES Bulletin 1094 for evaluation of other important variety performance characteristics to include malting potential, disease resistance, etc. before making variety selection decisions.

2/ P = Private variety, + = Protected variety.

3/ 4-yr. CA = (x/y) \* z where x = average yield or test weight of the entry for years tested, y = average yield or test weight for Hector for the same years, and z = 4-yr. average yield or test weight for the check variety Hector.

4/ Percent of Hector yield or test weight for the same data years as those in which the entry was tested.

5/ Seeding to 14 days prior to harvest maturity.