

**PROJECT TITLE:** Spring wheat variety evaluation in off-station and re-crop trials near Moccasin, Denton, Fort Benton, and Winifred.

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**OBJECTIVES:**

To evaluate the performance of spring wheat varieties in environments and cropping methods representative of the southern triangle and central Montana.

**RESULTS:**

Yield – Yields ranged from 11 to 34 bu/a with the highest yields at the Moccasin site (Table 11). Low moisture at the Fort Benton site contributed to lower than average yields. The yields at all other sites were lower than average as well. MT 9955, Fortuna, Reeder, McNeal, and Scholar were the top yielding cultivars when averaged across the four locations. Multi-year summaries for each location are reported in Tables 12, 13, 14, and 15.

Test Weight – Test weights obtained in 2000 were higher than those obtained in 1999, but low moisture conditions still contributed to smaller sized kernels. Test weights averaged 57.3 lbs/bu across all locations and all cultivars (Table 16). Test weights at Winifred and Denton averaged 58.88 and 57.51 lbs/bu, respectively. Test weights for the Moccasin site were unavailable.

Protein – Grain protein at Fort Benton averaged 18.6% corresponding to the low test weights obtained at this site (Table 17). Grain protein at the Moccasin and Denton sites averaged 15.5% and the average at Winifred was 17%. Grain protein averaged over the four locations varied by only 1% with the exception of MTHW 9420 which was 2% lower than the top performers Fergus, Ernest, Hi-Line, Scholar, and two WestBred selections.

Heading Date – Heading date as recorded in days from January 1 averaged 184.7 days at the Moccasin site (Table 3). Cultivars ranged in heading from 181 to 187 days. Lew, Scholar, and McNeal headed latest at 187 days while Fergus and MTHW 9710 headed soonest at 181 days.

Plant Height – Lew, Fortuna, Amidon, and Grandin were the tallest cultivars, while WestBred Express and Newana were among the shortest (Table 18). Heights varied from one location to another based on the amount and timing of rainfall. Plants were shortest at the Fort Benton site where only 3.9 inches of moisture was recorded for the period April through July. Plants were tallest at the Moccasin site where seasonal rainfall was recorded at 7.33 inches.

**SUMMARY:**

Spring wheat yields were below average at all four locations and varied greatly depending on available moisture. McNeal and Scholar, both released by Montana State University, yielded well as did Reeder, a new release from North Dakota. The average yield across all locations and all cultivars was 24.8 bu/a. The above average grain protein measured at all sites was accompanied by lower than average test weights. Heading date among cultivars was fairly uniform with all entries heading within the same week. Equations predicting spring wheat yields based on past variety performance are presented in Table 19.

**FUTURE PLANS:**

Spring wheat variety evaluations will continue at Moccasin, Denton, Fort Benton, and Winifred.

Table 11. 2000 Multi-Location Spring Wheat Yield (bu/a) Performance.  
Central Agricultural Research Center, Moccasin, Montana.

Multi-Location Grain Yield	CARC-NT 9970	Denton 9971	FtBenton 9972	Winifred 9973	Mean
MT 9955	33.6	27.6	15.3	<b>31.9</b>	27.1
FORTUNA	33.3	28.9	<b>15.9</b>	29.1	26.8
REEDER	<b>34.5</b>	27.9	14.9	29.7	26.7
MCNEAL	33.5	<b>29.1</b>	13.6	30.5	26.7
SCHOLAR	33.3	29.0	15.7	27.1	26.3
NEWANA	30.6	27.8	15.4	28.4	25.5
ID377S	31.3	26.0	11.8	31.0	25.0
MTHW 9420	32.8	26.0	13.5	27.8	25.0
MTHW 9710	30.3	27.4	15.1	26.7	24.9
HI-LINE	32.7	26.1	13.5	27.2	24.9
WESTBRED 936	32.3	26.2	13.6	27.1	24.8
AMIDON	30.8	27.7	13.5	27.2	24.8
WESTBRED EXPRESS	31.5	25.4	<b>11.4</b>	29.7	24.5
GRANDIN	31.2	26.1	12.3	27.7	24.3
ERNEST	30.4	24.4	13.0	28.0	23.9
WESTBRED 926	31.2	27.0	13.8	23.4	23.8
LEW	29.0	25.0	13.1	28.1	23.8
RAMBO	30.6	25.3	12.9	23.0	23.0
CONAN	<b>28.4</b>	25.9	13.3	<b>22.0</b>	22.4
FERGUS	30.4	<b>23.3</b>	11.8	24.0	22.4
MEAN	31.6	26.6	13.6	27.5	24.8
LSD (0.05)	3.25	3.42	2.11	4.93	

High and low entries for each location are in bold and entries are listed by mean yield.

Planting Date:	4/12/00	4/28/00	4/28/00	4/17/00
Harvest Date:		8/8/00	8/10/00	8/8/00
Previous Crop:		Lentils		Fallow
Fertilizer (lbs N/a):	90	90	90	90
Precipitation (inches);	7.33	8.31	3.9	9.49
Producer/Cooperator:		Barber	Birkeland	Udelhoven

Table 12. Moccasin Re-Crop Spring Wheat Multi-Year Summary of Selected Varieties.  
Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	Mean	McNeal Same Years
	----- bu/a -----											
McNeal		39	52	22	45	24	63	37	42	33	39.6	-
Amidon	20	35	55	23	40	22	52	34	39	31	35.1	39.6
WestBred 926	20	29	51	23	42	23	58	36	34	31	34.7	39.6
Grandin	22	30	54	20	40	20	52	35	33	31	33.7	39.6
Fortuna	15	27	44	24	35	22	48	33	37	33	31.7	39.6
Rambo	21	34	43	23	39	21	55	33	36	31	33.5	39.6
Lew		34	46	20	36	19	52	35	35	29	32.4	39.6
Newana	19	35	48	25	47	23	49	35	36	31	34.8	39.6
Hi-Line	19	29	49	21	39	22	57	35	31	33	33.5	39.6
Ernest				21	40	20	48	34	30	30	32.0	37.9
Fergus					41	20	56	34	33	30	35.7	40.5
WB Express					39	23	57	34	40	31	37.3	40.5
WestBred 936					43	23	53	34	37	32	36.9	40.5
Scholar						24	51	33	35	33	35.1	39.6
MTHW 9420						23	66	38	37	33	39.4	39.6
Nursery Mean	20.4	31.1	48.1	22.4	40.4	21.9	54.8	34.5	35.5	31.6		

Table 13. Denton Re-Crop Spring Wheat Multi-Year Summary of Selected Varieties.  
Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	Mean	McNeal Same Years
	----- bu/a -----											
McNeal		27	92	22	43	24	47	34	17	29	37.2	-
Amidon	60	23	83	23	39	23	47	30	14	28	37.0	37.2
WestBred 926	61	19	78	25	41	25	46	31	16	27	36.9	37.2
Grandin	60	25	81	24	36	20	44	32	15	26	36.3	37.2
Fortuna	62	17	66	20	33	22	42	32	18	29	34.1	37.2
Rambo	49	25	74	20	37	23	43	29	12	25	33.7	37.2
Lew	50	27	65	20	36	23	40	29	13	25	32.8	37.2
Newana	65	25	81	20	44	27	45	33	18	28	38.6	37.2
Hi-Line	59	26	76	23	45	23	46	32	12	26	36.8	37.2
Ernest				19	41	25	46	29	17	24	28.7	30.8
Fergus					36	26	43	28	15	23	28.4	30.8
WB Express					41	24	41	30	13	25	29.0	30.8
WestBred 936					39	26	43	35	16	26	30.8	30.8
Scholar						26	46	37	16	29	30.8	30.2
MTHW 9420						24	44	30	12	26	27.1	30.2
Nursery Mean	57.0	24.0	77.0	22.0	38.0	24.0	44.0	32.0	15.0	26.6		

The variety trial was planted re-crop on pea ground in 1992, re-crop on buckwheat in 1996, and re-crop following millet in 1997. All other years the trial was planted on fallow ground.

Table 14. Fort Benton Re-Crop Spring Wheat Multi-Year Summary of Selected Varieties.  
Central Agricultural Research Center, Moccasin, MT.

Selected Varieties	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	Mean	McNeal Same Years
	----- bu/a -----											
McNeal			18	47	37	45	32	22	28	14	30.4	-
Amidon	45	25	15	40	36	46	34	20	25	14	30.0	30.4
WestBred 926	44	31	11	41	34	37	34	21	17	14	28.4	30.4
Grandin	41	29	10	43	35	32	33	17	23	12	27.5	30.4
Fortuna	36	33	12	36	35	42	31	21	27	16	28.9	30.4
Rambo	35	27	15	43	36	46	35	19	24	13	29.3	30.4
Lew	40	24	23	41	31	43	32	21	26	13	29.4	30.4
Newana	35	29	14	42	32	39	33	19	22	15	28.0	30.4
Hi-Line	40	22	12	44	32	44	34	19	26	13	28.6	30.4
Ernest						45	34	19	21	13	26.4	28.2
Fergus						34	33	20	17	12	23.2	28.2
WB Express						41	33	19	17	11	24.1	28.2
WestBred 936						34	32	19	19	14	23.6	28.2
Scholar							36	19	20	16	22.6	24.0
MTHW 9420							30	19	20	14	20.7	24.0
Nursery Mean	38.9	28.2	14.2	40.8	34.3	40.8	32.9	19.1	22.4	13.6		

The 1991-1996 variety trials were located on Ron Long's farm; the 1997-2000 trials were located at the Birkeland farm. 1997 trial was abandoned due to an extreme wild oat infestation. All trials were planted on re-crop ground.

Table 15. Winifred Re-Crop Spring Wheat Multi-Year Summary of Selected Varieties.  
Central Agricultural Research Center, Moccasin,  
MT.

Selected Varieties	1998	1999	2000	Mean	McNeal Same Years
	----- bu/a -----				
McNeal	47	37	31	38	-
Amidon	40	31	27	32	38
WestBred 926	47	36	23	35	38
Grandin	46	36	28	37	38
Fortuna	39	36	29	35	38
Rambo	43	35	23	34	38
Lew	34	31	28	31	38
Newana	42	33	28	35	38
Hi-Line	46	35	27	36	38
Ernest	41	32	28	34	38
Fergus	44	34	24	34	38
WB Express	48	43	30	40	38
WestBred 936	53	38	27	39	38
Scholar	38	37	27	34	38
MTHW 9420	44	37	28	37	38
Nursery Mean	42.5	35.5	27.5		

Table 16. 2000 Spring Wheat Multi-Location Grain Test Weight (lbs/bu).  
Central Agricultural Research Center, Moccasin, Montana.

Multi-Location Test Weight	CARC-NT 9970	Denton 9971	FtBenton 9972	Winifred 9973	Mean
REEDER	*	58.6	57.0	<b>60.3</b>	58.6
SCHOLAR		<b>59.4</b>	<b>57.3</b>	59.1	58.6
ERNEST		58.5	57.0	60.1	58.5
FORTUNA		58.7	56.6	59.3	58.2
NEWANA		58.6	56.4	59.4	58.1
AMIDON		58.5	56.9	58.7	58.0
MTHW 9710		58.0	56.2	59.2	57.8
CONAN		58.4	56.5	57.9	57.6
WESTBRED 926		57.3	56.6	58.5	57.5
LEW		57.9	54.8	59.4	57.4
WESTBRED 936		56.9	56.4	58.5	57.3
RAMBO		57.1	56.3	58.2	57.2
GRANDIN		56.6	55.6	59.3	57.2
ID377S		56.8	53.9	59.7	56.8
MTHW 9420		57.2	53.7	59.3	56.7
FERGUS		56.6	55.0	58.4	56.7
HI-LINE		56.8	54.1	58.0	56.3
MCNEAL		56.3	54.3	<b>57.8</b>	56.1
MT 9955		<b>55.9</b>	53.4	58.3	55.9
WESTBRED EXPRESS		<b>55.9</b>	<b>53.0</b>	58.1	55.7
MEAN		57.51	55.5	58.88	57.3
LSD (0.05)		1.04	1.3	0.62	

High and low entries for each location are in bold and entries are listed by mean test weight.



Table 17. 2000 Spring Wheat Multi-Location Grain Protein.  
Central Agricultural Research Center, Moccasin, Montana.

Multi-Location Protein	CARC-NT 19970	Denton 19971	FtBenton 19972	Winifred 19973	Mean
	%	%	%	%	%
FERGUS	<b>17.3</b>	16.1	19.1	<b>17.7</b>	17.5
ERNEST	16.9	<b>16.3</b>	<b>19.5</b>	17.5	17.5
WESTBRED 926	16.8	15.9	18.7	17.6	17.3
HI-LINE	16.5	15.6	19.4	17.5	17.2
SCHOLAR	17.0	15.7	18.5	<b>17.7</b>	17.2
WESTBRED 936	16.8	16.0	18.6	17.4	17.2
GRANDIN	15.7	15.6	19.4	17.4	17.0
MCNEAL	16.8	15.3	19.1	17.0	17.0
LEW	16.6	15.6	18.8	17.0	17.0
CONAN	16.9	15.9	17.9	17.1	16.9
AMIDON	16.4	15.2	18.8	17.0	16.8
MTHW 9710	16.0	15.7	18.4	17.2	16.8
RAMBO	16.3	15.6	18.7	16.6	16.8
MT 9955	15.6	15.9	18.5	17.0	16.7
REEDER	16.0	15.6	18.4	16.8	16.7
WESTBRED EXPRESS	16.0	15.6	18.6	16.6	16.7
ID377S	~	14.9	18.9	<b>15.8</b>	16.6
FORTUNA	15.8	15.2	<b>17.6</b>	17.0	16.4
NEWANA	16.1	14.9	17.7	16.3	16.2
MTHW 9420	<b>14.8</b>	<b>14.1</b>	17.7	16.0	15.6
MEAN	15.5	15.54	18.6	17.01	16.7
LSD (0.05)		0.756	0.7	0.5631	

High and low entries for each location are in bold and entries are listed by mean grain protein.

Table 18. 2000 Spring Wheat Multi-Location Heading Date and Plant Height.  
Central Agricultural Research Center, Moccasin, Montana.

Multi-Location Protein	CARC-NT Head Date	CARC-NT 9970	Denton 9971	FtBenton 9972	Winifred 9973	Mean
LEW	187	34	31	27	<b>37</b>	32
FORTUNA	186	<b>35</b>	32	<b>29</b>	32	32
AMIDON	186	32	<b>33</b>	24	30	30
GRANDIN	184	33	31	25	30	30
ERNEST	184	34	33	25	25	29
SCHOLAR	187	34	31	24	24	28
ID377S	184	28	30	23	27	27
FERGUS	181	31	27	24	25	27
MT 9955	186	30	28	24	25	27
REEDER	186	33	29	21	23	26
WESTBRED 926	182	30	27	23	25	26
MCNEAL	187	29	26	21	28	26
HI-LINE	184	28	27	22	26	26
MTHW 9710	182	30	27	21	24	25
CONAN	184	29	<b>25</b>	22	24	25
RAMBO	186	28	27	<b>19</b>	26	25
MTHW 9420	184	29	27	21	23	25
WESTBRED 936	183	28	27	20	23	25
NEWANA	188	27	<b>25</b>	21	24	24
WESTBRED EXPRESS	185	<b>26</b>	26	<b>19</b>	<b>22</b>	23
MEAN	184.72	30.2	28.4	23	26.2	27

High and low entries for each location are in bold and entries are listed by mean plant height.  
Heading Date is number of days from January 1.