PROJECT TITLE: Advanced Yield and Preliminary Spring Wheat Variety Performance Trials.

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OBJECTIVES:
To evaluate agronomic performance of new experimental lines and existing hard red spring wheat varieties in Central Montana.

RESULTS:
Advanced Yield – Yields ranged from 34.3 to 47.5 bu/a and averaged 40.5 bu/a (Table 22). McNeal and several experimental lines having McNeal as a recent parent were the highest yielding varieties in this trial. Hank, a new spring wheat variety released from Western Plant Breeders, yielded well in this nursery out-ranking both Reeder and Amidon. Thatcher and Ernest yielded the lowest. Due to low precipitation, grain yields were lower than average. Long-term averages for yield and other characteristics are reported in Tables 23-26. Test weights averaged below normal at 58 lbs/bu and proteins averaged 17.3 percent. The average heading date occurred 177 days after January 1 on June 26. Varieties headed within seven days of one another with eight experimental lines heading on day 174 while Thatcher headed on day 181. Plant heights ranged form 24 to 37 inches with the average height being 31.6 inches.

Preliminary Yield – Grain yields ranged from 29.8 to 44.6 bu/a with the average yield being 35.7 bu/a (Table 27). Experimental lines topped the list with Reeder ranking fifth for yield. Test weights averaged 57.4 lbs/bu and grain protein averaged 18.3 percent. The average heading date was 177 days after January 1 on June 26. Seven experimental lines headed on day 174 while the latest maturing line headed on day 182. Plant heights averaged 32 inches.

SUMMARY:
Broken stems were noticed in the nurseries this year and were attributed to strawbreaker, a disease of wheat caused by the fungus *Pseudocercosporella herpotrichoides*. This fungus attacks the stem of the plant at the soil level and is characterized by an elliptical lesion that weakens the stem. Stem breakage in the Advanced Yield grain nursery was not significant and averaged less than 0.1 percent of the total plot. Stem breakage in the Preliminary Yield grain nursery ranged from 0 to 2 percent except for one experimental line where breakage was recorded at 14 percent of the total plot. High protein levels accompanied lower than average test weights in both nurseries indicative of the low level of moisture received this year. McNeal, Scholar, and Amidon ranked 10th, 21st, and 33rd, respectively indicating the progress breeders have made in developing higher yielding varieties. Experimental lines heading at day 174 headed 3 to 6 days earlier than named cultivars currently being grown by producers. These experimental lines generally had good yields and protein.

FUTURE PLANS:
The Advanced Yield and Preliminary Yield Spring Wheat Trials will continue to be evaluated at the Central Agricultural Research Center.

Table 22. 2001 Advanced Yield Spring Wheat Nursery
Exp. 3107 Central Agricultural Research Center, Moccasin, MT

ID	Pedigree	Heading Date	Plant Height	Grain Yield	Test Weight	Grain Protein	Straw-breaker
		days	inches	bu/a	lbs/a	%	%
MT 0008	MCNEAL/MT9408	175	35	**47.5**	60.2	16.8	0.0
PI574642	McNeal	179	31	**47.5**	58.3	16.2	0.0
MT 0009	MCNEAL/MT9410	177	30	46.4	60.0	16.6	0.0
MT 9955	MCNEAL/KS27//MCNEAL	178	31	45.9	57.1	17.7	0.0
BZ992322	Hank	176	30	45.6	56.6	16.4	0.0
MT 0013	MCNEAL/MT9410	177	28	44.9	57.4	16.7	0.0
ND 695	Reeder	176	31	43.6	57.7	17.0	0.0
PI527682	Amidon	177	35	43.4	58.7	17.7	0.3
MT 0053	MT9410/MT9406	**174**	35	43.0	58.6	18.0	0.0
GM40003	GENERAL MILLS GM40003	176	29	42.8	57.6	15.4	0.0
MT 0064	REDWIN/LEW//MT9406	**174**	35	42.6	60.5	18.4	0.0
MT 0012	MCNEAL/MT9410	175	30	42.5	56.9	17.1	0.0
BZ996472	WPB BZ996472	177	29	42.4	58.8	15.5	0.0
MT 9755	MTRWA141/PONDERA	177	29	42.4	57.4	18.1	0.0
MT 9874	RGABC199/MT9312	180	31	42.3	56.6	16.9	0.0
MT 0018	MT9406/MCNEAL	176	35	42.3	59.3	18.2	0.0
MTHW9908	CAN1/MT8182 (HW952014)	178	31	42.2	57.7	16.8	0.0
MT 0042	MT9408/MT9406	**174**	34	42.2	59.1	16.9	0.3
MT 0063	REDWIN/LEW//MT9406	177	34	42.2	56.4	**15.3**	0.3
MT 9806	MINNPRO/AMIDON	178	30	42.0	57.7	18.6	0.0
MT 0076	MT9406/MTHW9520	175	33	41.9	60.4	16.7	0.0
MT 9931	MT9401/MT9328	178	32	41.9	57.7	17.1	0.0
BZ991019	WPB BZ 9M 99-1019	176	29	41.6	57.4	19.0	1.3
MTHW9901	MT9311/MTHW9417	176	35	41.6	57.9	16.9	0.0
MT 0007	MCNEAL/MT9408	175	35	41.4	59.5	17.7	0.0
MTHW9716	KLASIC/PONDERA//PONDERA/M	175	30	41.4	58.7	17.3	0.3
MT 0037	MT9408/MCNEAL	176	26	41.3	58.6	17.2	0.3
GM40002	GENERAL MILLS GM40002	175	31	41.2	56.9	17.9	0.0
MT 9923	MT9401/MT9311	177	32	40.9	58.4	18.4	0.0
MTHW0002	MTHW9520/MTHW9427	176	28	40.8	58.0	16.5	0.0
SLW97606	WPB SLW97606	179	32	40.7	59.5	**19.4**	0.1
GM40020	GENERAL MILLS GM40020	177	29	40.5	56.5	17.5	0.3
CI 13596	Fortuna	175	34	40.4	58.6	16.4	0.0
BZ992588	Conan	178	33	40.3	58.6	16.8	0.3
MT 0054	MT9410/MT9406	**174**	34	40.3	57.2	17.7	0.3
GM40004	GENERAL MILLS GM40004	178	29	40.1	57.9	15.9	0.0
MTHW0001	MTHW9520/MTHW9427	176	33	40.1	55.4	18.3	0.3
MTHW9710	MT8182/FORTUNA//PONDERA/M	175	29	40.0	58.0	17.7	0.0
PI607557	Scholar	179	32	39.9	58.4	19.3	0.3

(Continued)
Table 22. 2001 Advanced Yield Spring Wheat Nursery
Exp. 3107 (continued)

ID	Pedigree	Heading Date	Plant Height	Grain Yield	Test Weight	Grain Protein	Straw-breaker
		days	inches	bu/a	lbs/a	%	%
MT 0032	MT9406/MT9410	**174**	35	39.4	59.4	17.1	0.0
MT 9905	MT9311/MT9328	179	32	39.3	**63.4**	18.1	0.7
MTHW9420	MT8182/MT8289	176	28	39.2	56.1	17.1	0.3
MT 0069	REDWIN/LEW//MT9408	175	35	38.9	57.3	18.0	0.0
PI486139	KLASIC/PONDERA//PONDERA/M	178	**24**	38.9	59.7	16.7	0.0
CI 17430	Newana	180	30	38.7	**55.0**	16.2	0.3
MT 0066	REDWIN/LEW//MT9406	**174**	36	38.7	56.8	16.6	0.3
MT 9960	MCNEAL/KS27//MT9311	180	33	38.5	58.0	15.9	0.0
MTHW9904	MTHW9417/MT9311	177	**37**	38.4	57.8	17.6	0.0
MT 9929	MT9401/MT9328	177	29	38.3	57.2	17.3	0.0
MT 0039	MT9408/MCNEAL	**181**	**37**	38.3	56.8	17.1	0.7
MT 0031	MT9406/MT9410	**174**	30	38.1	58.1	17.6	0.0
MTHW0005	MTHW9520/MTHW9427	178	28	38.1	56.5	16.6	0.0
WB 926	WESTBRED 926	176	28	38.1	58.1	18.1	0.0
PI549275	Hi-Line	177	30	38.0	58.1	18.4	0.0
BZ991210	WPB BZ 9M 99-1210	178	29	38.0	57.1	17.6	0.0
MT 9918	MT9328/MT9419	175	33	37.7	56.2	16.4	0.0
BZ996434	WPB BZ996434	175	29	37.3	56.0	17.6	0.0
MT 0021	MT9406/MT9410	176	34	36.8	57.4	17.4	0.0
CI 17429	Lew	180	36	36.8	58.7	18.3	0.0
MT 0050	MT9408/MT9410	**174**	29	36.6	56.0	17.4	0.0
GM40019	GENERAL MILLS GM40019	177	27	36.5	56.9	17.3	0.0
MTHW9905	MTHW9417/MTHW9430	176	30	35.1	58.7	17.3	0.0
CI 10003	Thatcher	**181**	36	35.0	59.6	17.2	0.4
PI592761	Ernest	177	33	**34.3**	58.6	18.0	0.3
Average		176.7	31.6	40.5	58.0	17.3	0.1
CV (s/mean)*100		0.48	8.04	7.63	3.35	0	291.0
LSD (0.05)		1.42	4.15	5.39	3.15	0	ns

Seeded: April 18, 2001 at a depth of 3/4 inch
Fertilizer: 50 lbs of 20-20-0 placed with the seed and 67 lbs of N were broadcast in fall of 2000
Previous Crop: Fallow
Soil Temp: 45 F
Emergence: 1 leaf on May 4, 2001
Precipitation: 7.29 inches
Weed Control: none
Harvested: August 13, 2001

Table 23. Yield summary of selected spring wheat varieties, 1992-2001.
Exp. 3107 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2001	Average	McNeal Same Years
	bu/a										
McNeal	51	78	31	34	25	66	56	49	48	48.6	-
Newana	41	72	31	30	24	65	49	42	39	43.6	48.6
Fortuna	28	64	26	28	25	61	45	43	40	40.0	48.6
Lew	50	59	29	28	22	57	42	42	37	40.6	48.6
Hi-Line	40	69	26	26	22	70	61	47	38	44.3	48.6
Amidon	39	72	28	35	28	55	51	44	43	43.9	48.6
Westbred 926	37	74	32	34	23	58	48	45	38	43.2	48.6
Ernest	-	-	29	30	29	57	48	42	34	38.3	44.1
Scholar	-	-	-	29	27	57	48	46	40	41.2	46.3
Nursery Mean	39.6	69.8	28.6	31.9	24.9	61.6	48.8	44.8	40.5		

Table 24. Test weight summary of selected spring wheat varieties, 1992-2001.
Exp. 3107 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2001	Average	McNeal Same Years
	lbs/bu										
McNeal	60.7	59.8	58.9	61.5	56.5	62.7	57.3	55.1	58.3	59.0	-
Newana	61.9	58.0	60.9	62.1	56.7	62.0	55.3	57.5	55.0	58.8	59.0
Fortuna	61.4	59.1	61.7	59.9	59.6	63.0	57.9	57.9	58.6	59.9	59.0
Lew	63.5	61.1	61.0	61.5	57.7	64.4	57.2	58.8	58.7	60.4	59.0
Hi-Line	61.1	59.2	57.3	61.3	55.3	63.1	56.1	56.1	58.1	58.6	59.0
Amidon	60.9	59.6	60.9	60.6	58.4	61.7	56.4	58.0	58.7	59.5	59.0
Westbred 926	61.1	58.1	59.6	60.6	57.7	62.2	54.5	56.6	58.1	58.7	59.0
Ernest	-	-	62.1	60.7	59.5	62.6	56.2	58.8	58.6	59.8	58.6
Scholar	-	-	-	61.8	59.1	63.4	55.8	59.9	58.4	59.7	58.6
Nursery Mean	61.3	59.1	60.4	61.0	57.8	62.9	56.5	57.6	58.0		

Table 25. Protein summary of selected spring wheat varieties, 1992-2001.
Exp. 3107 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2001	Average	McNeal Same Years
	---------- % ----------										
McNeal	14.9	12.3	15.7	12.1	16.9	12.4	14.8	16.1	16.2	14.6	-
Newana	13.9	11.2	15.3	10.6	16.9	11.9	14.4	15.8	16.2	14.0	14.6
Fortuna	15.5	13.6	15.7	11.0	15.5	13.0	15.4	15.4	16.4	14.6	14.6
Lew	13.6	13.5	15.1	10.4	17.4	11.6	17.1	15.4	18.3	14.7	14.6
Hi-Line	15.0	13.3	16.4	10.0	17.1	12.8	15.0	16.3	18.4	14.9	14.6
Amidon	14.4	13.4	15.1	11.1	15.5	13.1	15.4	15.2	17.7	14.5	14.6
Westbred 926	14.6	13.6	16.5	11.1	17.8	12.7	15.4	16.4	18.1	15.1	14.6
Ernest	-	-	16.4	10.9	16.0	13.0	16.7	16.1	18.0	15.3	14.9
Scholar	-	-	-	11.9	16.9	12.8	16.8	15.5	19.3	15.5	14.7
Nursery Mean	14.5	13.1	15.8	11.3	16.5	12.6	15.5	15.7	17.3	14.7	

Table 26. Plant height summary of selected spring wheat varieties, 1992-2001.
Exp. 3107 Central Agricultural Research Center, Moccasin, MT

Selected Varieties	1992	1993	1994	1995	1996	1997	1998	1999	2001	Average	McNeal Same Years
	---------- inches ----------										
McNeal	30	38	26	31	25	37	37	33	31	32.1	-
Newana	30	36	24	28	23	34	34	29	30	29.7	32.1
Fortuna	32	37	27	32	26	41	43	36	34	34.2	32.1
Lew	37	40	29	34	25	41	44	37	36	35.8	32.1
Hi-Line	27	32	23	27	22	32	34	31	30	28.7	32.1
Amidon	35	40	27	34	26	40	43	37	35	35.2	32.1
Westbred 926	31	30	25	28	24	32	34	31	28	29.3	32.1
Ernest	-	-	29	35	26	41	42	35	33	34.4	31.5
Scholar	-	-	-	34	25	39	41	33	32	34.1	32.3
Nursery Mean		35.5	25.4	31.0	25.0	37.0	37.9	32.8	31.6		

Table 27. 2001 Preliminary Yield Spring Wheat Nursery
Exp. 3307 Central Agricultural Research Center, Moccasin, MT

ID	Pedigree	Heading Date	Plant Height	Grain Yield	Test Weight	Grain Protein	Straw-breaker
		day	inches	bu/a	lbs/bu	%	%
MT 0101	BZ992632/ERNEST	**174**	33	**44.6**	58.8	17.3	0.0
MT 0167	MTHW9420/SRHW4	177	32	43.2	55.8	17.5	0.0
MT 0149	MT9565/MCNEAL	178	33	41.4	60.2	18.0	0.0
MT 0153	MT9565/MONROE	176	29	40.7	56.8	17.7	0.0
ND 695	Reeder	177	30	40.2	57.2	17.2	0.0
MT 0148	MT9565/MCNEAL	178	30	40.1	59.2	17.8	0.0
MT 0102	BZ992632/MCNEAL	177	33	39.9	59.8	**16.3**	0.0
MT 0107	BZ992632/MT9668	175	36	39.9	60.1	16.8	0.1
MT 0144	MT9410/MT9619	176	36	39.9	60.7	18.3	0.4
PI574642	McNeal	180	32	39.9	56.4	18.9	0.3
MT 0103	BZ992632/MCNEAL	179	30	39.3	57.9	17.0	0.0
MT 0152	MT9565/MONROE	175	32	38.9	60.6	18.0	0.1
MT 0154	MT9565/MONROE	181	29	38.2	59.9	18.1	0.0
MT 0145	MT9565/ERNEST	175	29	38.0	57.6	20.3	0.0
MT 0165	MTHW9420/ID493	177	30	37.9	53.8	17.6	0.0
MT 0156	MT9619/BZ992632	178	28	37.8	56.4	17.1	0.0
MT 0151	MT9565/MT9410	176	34	37.7	60.6	18.1	0.1
MT 0122	ERNEST/MT9619	**174**	33	37.7	58.5	18.9	0.3
MT 0125	ERNEST/MT9668	176	34	37.6	58.1	18.7	0.4
MT 0127	MCNEAL/MT9410	176	30	37.6	55.1	19.7	0.0
PI607557	Scholar	180	35	37.6	59.0	18.0	0.1
MT 0112	ERNEST/MT9410	176	32	37.1	56.6	18.0	0.4
MT 0175	MT9619/MCNEAL	183	27	37.0	58.0	17.7	0.0
MT 0164	MTHW9420/ID493	177	29	37.0	57.0	17.3	0.0
MT 0130	MT9410/BZ992632	178	29	36.7	54.3	17.3	0.0
MT 0118	ERNEST/MT9410	176	32	36.6	55.1	19.0	0.1
MT 0121	ERNEST/MT9619	175	32	36.6	60.1	17.6	0.1
MT 0133	MT9410/ERNEST	**174**	31	36.6	57.2	18.9	0.0
MT 0111	ERNEST/MCNEAL	178	33	36.6	54.7	19.5	1.3
MT 0126	MCNEAL/ERNEST	178	35	36.6	57.6	**20.5**	0.0
MT 0116	ERNEST/MT9410	**174**	33	36.5	57.4	17.7	1.7
MT 0129	MT9410/BZ992632	175	32	36.5	57.9	18.4	0.4
PI527682	Amidon	178	35	36.4	57.5	19.0	2.0
MT 0108	ERNEST/MCNEAL	177	36	36.3	57.5	19.3	1.0
MT 0168	MTHW9520/ID493	179	29	36.3	56.6	17.0	0.7
MT 0128	MCNEAL/MT9410	175	34	36.2	56.8	20.1	0.4
MT 0172	96WSMV48/MCNEAL	180	**37**	36.2	60.5	17.8	2.0
MT 0104	BZ992632/MT9410	177	35	35.8	55.5	17.2	0.0
MT 0109	ERNEST/MCNEAL	176	36	35.8	56.0	18.1	0.0
MT 0146	MT9565/ERNEST	177	34	35.7	55.8	20.1	0.0
MT 0136	MT9410/MCNEAL	177	35	35.2	58.9	17.7	0.4
MT 0110	ERNEST/MCNEAL	177	34	35.1	56.5	19.0	1.3
MT 0105	BZ992632/MT9619	180	29	35.1	56.8	16.5	0.0

(Continued)

Table 27. 2001 Preliminary Yield Spring Wheat Nursery
Exp. 3307 (continued)

ID	Pedigree	Heading Date	Plant Height	Grain Yield	Test Weight	Grain Protein	Straw-breaker
		day	inches	bu/a	lbs/bu	%	%
MT 0137	MT9410/MCNEAL	176	35	35.0	57.9	18.5	1.4
MT 0106	BZ992632/MT9619	176	34	34.8	58.3	17.3	0.1
MT 0159	MT9619/ERNEST	178	33	34.7	57.5	18.5	0.0
MT 0123	ERNEST/MT9668	177	34	34.7	58.0	17.2	0.0
MT 0140	MT9410/MT9619	180	33	34.5	**61.0**	19.2	0.4
MT 0171	96WSMV45/MT9433	178	28	34.5	58.2	18.4	0.7
MTHW9420	MT8182/MT8289	177	29	34.5	54.1	17.5	0.0
MT 0173	96WSMV49/MT9410	178	32	34.5	59.8	17.2	0.7
MT 0134	MT9410/ERNEST	178	33	34.4	57.3	19.1	0.1
MT 0170	96WSMV44/HI-LINE	179	28	34.4	56.9	18.2	0.0
MT 0132	MT9410/BZ992632	178	34	34.3	57.3	18.7	0.1
MT 0150	MT9565/MT9410	177	35	34.2	58.9	17.6	0.0
MT 0114	ERNEST/MT9410	176	35	34.1	58.6	18.9	0.0
MT 0117	ERNEST/MT9410	176	34	34.1	58.8	19.2	0.0
MT 0120	ERNEST/MT9565	**174**	29	34.1	57.2	19.5	0.0
MT 0161	MT9668/MT9410	**174**	33	34.1	58.6	19.2	0.4
CI 13596	Fortuna	177	**37**	34.0	57.3	17.9	0.4
MT 0113	ERNEST/MT9410	176	34	34.0	57.7	19.3	0.3
MT 0160	MT9668/BZ992632	176	33	34.0	56.9	17.1	0.0
MT 0147	MT9565/ERNEST	176	27	33.9	57.0	19.7	0.0
MT 0162	MT9668/MT9619	179	32	33.9	58.0	16.8	0.7
MT 0135	MT9410/ERNEST	176	34	33.8	58.3	18.2	0.1
MT 0115	ERNEST/MT9410	176	33	33.5	57.8	17.6	0.0
MT 0163	ID493/MTHW9420	177	29	33.0	55.9	20.4	0.0
MT 0138	MT9410/MT9619	177	31	33.0	55.4	18.7	0.0
MT 0124	ERNEST/MT9668	179	34	32.9	58.3	18.9	0.3
MT 0131	MT9410/BZ992632	175	34	32.6	54.3	18.4	0.0
MT 0141	MT9410/MT9619	179	35	32.6	57.8	18.3	0.4
MT 0142	MT9410/MT9619	176	33	32.3	57.3	16.7	0.7
MT 0155	MT9619/BZ992632	178	29	32.2	56.0	17.9	0.0
MT 0157	MT9619/ERNEST	**174**	32	32.2	55.2	19.2	0.0
MT 0166	MTHW9420/SRHW4	177	**27**	32.0	**51.0**	20.3	0.0
MT 0139	MT9410/MT9619	178	33	31.6	56.6	17.7	1.0
MT 0119	ERNEST/MT9410	176	32	31.2	55.8	18.4	0.0
MT 0174	96WSMV49/MT9433	**182**	31	30.9	60.7	17.2	**14.0**
MT 0169	MTHW9520/SRHW4	176	28	30.4	56.0	19.5	0.0
MT 0143	MT9410/MT9619	177	31	**29.8**	55.6	18.1	0.0
MT 0158	MT9619/ERNEST	177	34	**29.8**	57.6	19.7	0.1
Average		177.0	32.3	35.7	57.4	18.3	0.4
CV (s/mean)*100		0.5	3.8	9.1	2.0	0.0	276.3
LSD (0.05)		1.5	2.0	5.6	2.0	0.0	2.0

Seeded April 18 on fallow, harvested August 14, growing season precipitation was 7.29 inches.
Fertilizer: 50 lbs of 20-20-0 placed with the seed and 67 lbs of N were broadcast in fall of 2000.