

PROJECT TITLE: The effect of rate of seeding and planting date on yield and quality of Bowman, Clark, and Gallatin spring barley varieties. 1991.

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PROJECT LOCATION: MSU - Southern Agricultural Research Center, Huntley, MT 59037

OBJECTIVES: To evaluate the yield and quality of three spring barley varieties grown under dryland cropping. By comparing two Montana barley selections to the North Dakota variety Bowman, which has demonstrated superior yield and test weight under severe moisture stress conditions.

SUMMARY AND RESULTS: The data for the effect of planting date and seeding rates on yield, test weight, 1000 kernel weight, heads/meter row, percent plump, percent thin, seeds/head, plant height, and heading date are given in Tables 1-10. Gallatin at 18 and 23 seeds/ft. was highest yielding at the first two dates. Gallatin at 23 seeds/ft. and 18 seeds/ft. was highest yielding at the third date, while Bowman at 23 and 18 seeds/ft was highest at the fourth, fifth, and sixth dates. Overall, as planting date advanced, yields and most other characteristics decreased. As seeding rate (seeds/ft.) increased, yields increased. Most other characteristics were not affected by seeding rate. These data were very similar to the previous years data.

Future Plans: This should be the last year of this study, it will be further analyzed and written up for publication.

TABLE 1. INFLUENCE OF 3 VARIETIES AT 6 PLANTING DATES AND 4 SEEDING RATES OF DRYLAND SPRING BARLEY, SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT. 1st Date Planted 3-25-91

VARIETY	SEED RATE	YIELD BU/AC	TESTWT LB/BU	PLUMP %	TEINPER %	1000/K WT	PLANTS /METER	HEAD DATE	PLANTHT INCHES
GALLATIN	18 sd/ft	87.44 G	52.45 GF	89.82 BC	5.275 CB	47.25 ABC	127.0 A	162.3 B	31.00 A
GALLATIN	23 sd/ft	86.47 FG	52.17 EF	90.85 C	4.625 B	44.50 A	162.5 CDE	162.3 B	31.25 A
BOWMAN	23 sd/ft	84.57 FEG	52.78 G	93.47 D	3.050 A	49.00 BCD	160.0 BCDE	159.3 A	31.00 A
GALLATIN	13 sd/ft	80.66 FED	51.75 DE	90.78 C	4.625 B	50.00 CD	185.0 E	163.0 CB	32.50 BC
BOWMAN	18 sd/ft	79.67 ED	52.13 EF	93.82 D	3.150 A	49.75 CD	173.0 DE	159.3 A	32.00 AB
BOWMAN	13 sd/ft	78.71 ED	51.97 EF	94.30 D	2.575 A	54.25 E	164.5 CDE	159.5 A	32.00 AB
GALLATIN	8 sd/ft	75.90 CD	52.10 EF	89.82 BC	5.700 CB	49.75 CD	131.0 AE	164.0 C	31.75 AB
CLARK	23 sd/ft	75.01 CD	51.60 DE	90.43 BC	4.925 B	47.25 ABC	127.5 A	162.5 CB	32.50 BC
BOWMAN	8 sd/ft	71.29 CB	50.95 BC	91.25 C	4.950 B	51.75 ED	139.5 ABC	162.0 B	32.00 AB
CLARK	18 sd/ft	70.75 CB	51.38 DC	90.68 BC	5.600 CB	51.25 ED	180.5 E	165.8 D	33.75 D
CLARK	13 sd/ft	67.04 B	50.57 AB	88.70 AB	6.475 CD	45.00 A	177.0 E	166.5 D	34.00 D
CLARK	8 sd/ft	59.24 A	50.18 A	87.60 A	7.200 D	46.25 AB	146.5 ABCD	166.3 D	33.50 D C

**** SUMMARY STATISTICS:****

OVERALL MEAN =	76.39	51.67	90.96	4.846	48.83	156.2	162.7	32.27
P-VALUE TRTS =	.0000	.0000	.0009	.0003	.0043	.0475	.0000	.0040
CV (S/MEAN) =	7.777	1.130	2.242	26.80	6.655	18.81	1.004	3.552
CV (SE/MEAN) =	3.868	.5648	1.121	13.40	3.327	9.406	.5021	1.776
LSD(0.05 by t)=	8.547	.8396	2.934	1.868	4.675	42.27	2.350	1.649

TABLE 2. INFLUENCE OF 3 VARIETIES AT 6 PLANTING DATES AND 4 SEEDING RATES OF DRYLAND SPRING BARLEY, SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT. 2nd Date Planted 4-03-91

VARIETY	SEED RATE	YIELD BU/AC	TESTWT LB/BU	PLUMP %	TEINPER %	1000/K WT	PLANTS /METER	HEAD DATE	PLANTHT INCHES
GALLATIN	23 sd/ft	101.1 G	51.60 DEF	84.83 E	6.650 ECD	47.25 ECD	155.0 CDE	166.3 C	31.75 AE
GALLATIN	18 sd/ft	94.34 F	51.86 EF	84.38 E	5.400 EFD	45.50 AE	127.0 AEC	166.5 C	32.00 AE
GALLATIN	13 sd/ft	90.02 FE	51.48 DEF	90.00 C	6.175 AEC	47.75 EBCD	177.5 E	168.0 D	33.00 E
BOWMAN	13 sd/ft	86.26 FE	51.25 DEF	93.78 C	3.675 AE	50.00 ECD	150.0 ECDE	162.5 A	31.75 AE
BOWMAN	18 sd/ft	88.01 E	52.00 F	94.18 C	3.550 A	51.00 E	154.5 BCDE	163.3 A	31.00 A
CLARK	23 sd/ft	84.31 ED	50.90 DC	83.15 B	10.90 EF	45.00 AE	117.5 A	169.8 E	36.25 D
BOWMAN	13 sd/ft	84.16 ED	51.20 DE	94.18 C	3.650 AE	50.25 ED	123.5 AE	163.3 A	31.75 AE
GALLATIN	8 sd/ft	81.44 CD	51.15 DE	83.55 B	9.475 EFD	43.00 A	130.5 AECD	166.0 D	34.50 C
CLARK	18 sd/ft	80.65 CD	50.22 EC	82.00 B	12.02 FG	43.67 A	171.5 E	170.5 EF	34.50 C
CLARK	13 sd/ft	75.55 CE	49.67 AE	83.43 E	6.350 ECD	46.50 AEC	154.0 ECDE	170.3 EF	35.50 CD
BOWMAN	8 sd/ft	74.39 B	51.43 DEF	92.13 C	4.675 AE	47.25 ECD	159.5 DE	164.3 B	32.50 B
CLARK	8 sd/ft	63.44 A	49.28 A	75.85 A	14.87 G	44.50 AE	137.5 AECD	170.6 F	36.00 D

**** SUMMARY STATISTICS:****

OVERALL MEAN =	83.82	51.00	86.79	7.608	46.81	146.5	166.9	33.38
P-VALUE TRTS =	.0000	.0001	.0000	.0000	.0310	.1568	.0000	.0000
CV (S/MEAN) =	7.106	1.450	4.816	38.14	7.433	21.05	.4705	3.768
CV (SE/MEAN) =	3.554	.7249	2.408	19.07	3.716	10.53	.2352	1.654
LSD(0.05 by t)=	8.572	1.064	6.013	4.284	5.005	44.37	1.130	1.619

TABLE 3. INFLUENCE OF 3 VARIETIES AT 6 PLANTING DATES AND 4 SEEDING RATES OF DRYLAND SPRING BARLEY, SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT. 3rd Date Planted 4-23-91

VARIETY	SEED RATE	YIELD BU/AC	TESTWT LB/BU	PLUMP %	TEINPER %	1000/K WT	PLANTS /METER	HEAD DATE	PLANTHT INCHES
GALLATIN	23 sd/ft	78.27 F	48.63 D	47.85 A	28.05 C	38.00 A	132.5 AB	173.8 C	34.50 AB
GALLATIN	18 sd/ft	77.33 F	48.13 D	53.88 AB	27.13 C	36.25 A	164.0 BC	174.0 C	33.13 A
BOWMAN	23 sd/ft	77.27 F	50.97 E	87.52 C	8.000 A	47.00 B	127.5 A	170.8 A	34.00 AB
BOWMAN	18 sd/ft	74.99 FE	51.08 E	88.53 C	7.400 A	48.50 CB	121.5 A	170.8 A	34.00 AB
GALLATIN	13 sd/ft	71.20 DE	48.57 D	52.63 AB	26.85 C	38.00 A	136.0 ABC	176.0 D	33.50 A
BOWMAN	13 sd/ft	71.14 DE	51.05 E	90.07 C	6.175 A	50.75 C	129.5 A	171.8 B	34.50 AB
CLARK	23 sd/ft	69.22 CD	46.70 C	48.25 A	24.95 CB	38.75 A	163.5 BC	178.5 F	35.75 B
GALLATIN	8 sd/ft	67.88 CD	47.08 C	57.90 B	20.25 B	38.50 A	140.0 ABC	177.5 E	34.25 AB
CLARK	18 sd/ft	65.28 C	47.20 C	57.18 B	25.60 C	39.25 A	154.0 ABC	179.3 G	33.50 A
BOWMAN	8 sd/ft	64.87 C	50.92 E	89.20 C	6.550 A	47.75 CB	149.0 ABC	171.3 AB	33.50 A
CLARK	13 sd/ft	58.48 B	44.72 B	47.00 A	26.95 C	37.25 A	167.0 C	179.3 G	33.75 A
CLARK	8 sd/ft	49.06 A	42.60 A	47.95 A	24.92 CB	38.50 A	144.0 ABC	179.5 G	33.50 A

****SUMMARY STATISTICS:****

OVERALL MEAN =	68.75	48.14	64.00	19.40	41.54	144.0	175.2	33.99
P-VALUE TRTS =	.0000	.0000	.0000	.0000	.0000	.5481	.0000	.8537
CV (S/MEAN) =	6.490	1.728	12.81	24.44	7.874	22.54	.3936	5.510
CV (SE/MEAN) =	3.245	.8641	6.405	12.22	3.937	11.27	.1968	2.755
LSD(0.05 by t)=	6.419	1.197	11.79	6.823	4.706	46.70	.9919	2.694

TABLE 4. INFLUENCE OF 3 VARIETIES AT 6 PLANTING DATES AND 4 SEEDING RATES OF DRYLAND SPRING BARLEY, SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT. 4th Date Planted 5-01-91

VARIETY	SEED RATE	YIELD BU/AC	TESTWT LB/BU	PLUMP %	TEINPER %	1000/K WT	PLANTS /METER	HEAD DATE	PLANTHT INCHES
BOWMAN	18 sd/ft	87.97 E	50.66 E	89.95 E	6.250 A	44.50 GFE	146.5 AB	174.0 A	33.75 D
BOWMAN	23 sd/ft	86.17 E	50.18 GH	86.55 E	9.525 AB	45.75 GF	177.0 BCD	174.0 A	22.50 DEC
GALLATIN	23 sd/ft	80.65 D	47.75 F	51.40 C	25.70 D	39.50 CDE	171.0 ABCD	177.3 C	32.50 DEC
GALLATIN	18 sd/ft	79.91 CD	46.73 ED	55.45 C	24.03 D	39.25 CDE	167.5 ABCD	178.3 D	32.75 DEC
GALLATIN	13 sd/ft	75.48 C	46.13 D	46.50 BC	26.65 D	36.50 CB	196.5 D	178.5 D	32.25 DEC
BOWMAN	13 sd/ft	75.36 C	49.97 G	89.07 E	6.900 A	48.25 G	161.0 ABC	174.5 AB	33.50 DC
GALLATIN	8 sd/ft	66.82 E	47.05 E	54.85 C	18.52 C	37.75 CBD	174.0 BCD	179.3 E	32.25 DEC
BOWMAN	8 sd/ft	66.38 B	47.70 F	73.32 D	14.25 BC	42.75 FDE	165.5 ABCD	175.0 E	33.25 DEC
CLARK	23 sd/ft	65.19 B	43.45 C	40.93 AE	27.35 D	34.25 CE	184.0 CD	181.8 F	32.00 EC
CLARK	18 sd/ft	62.15 B	42.68 E	40.13 AE	27.98 D	38.25 CED	148.0 AE	182.5 G	32.75 DEC
CLARK	13 sd/ft	50.67 A	41.30 A	33.72 A	36.70 E	28.00 A	160.5 AEC	183.0 G	31.75 AE
CLARK	8 sd/ft	47.75 A	42.10 E	40.03 AE	28.03 D	33.50 E	136.0 A	184.0 E	30.25 A

****SUMMARY STATISTICS:****

OVERALL MEAN =	70.48	46.31	58.49	20.99	39.02	165.8	178.5	32.46
P-VALUE TRTS =	.0000	.0000	.0000	.0000	.0002	.5120	.0000	.2216
CV (S/MEAN) =	6.685	1.337	15.39	22.69	13.38	20.47	.3160	4.794
CV (SE/MEAN) =	3.443	.6667	7.694	11.45	6.669	10.23	.1560	2.397
LSD(0.05 by t)=	6.981	.8910	12.95	6.512	7.510	48.82	.6115	2.239

TABLE 5. INFLUENCE OF 3 VARIETIES AT 6 PLANTING DATES AND 4 SEEDING RATES OF DRYLAND SPRING BARLEY, SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT. 5th Date Planted 5-10-91

VARIETY	SEED RATE	YIELD BU/AC	TESTWT LB/BU	PLUMP %	TEINPER %	1000/K WT	PLANTS /METER	HEAD DATE	PLANTHT INCEES
BOWMAN	23 sd/ft	73.54 G	48.28 E	70.50 E	18.52 AB	40.25 C	140.8 BC	177.0 A	32.25 DC
BOWMAN	13 sd/ft	67.54 F	48.13 E	73.58 E	16.92 A	41.00 C	178.0 E	178.3 B	34.25 E
GALLATIN	23 sd/ft	67.21 F	45.78 D	21.47 BCD	28.70 C	31.00 B	171.5 DE	181.3 D	31.75 BC
BOWMAN	18 sd/ft	65.58 F	48.20 E	68.10 E	18.22 A	43.75 C	160.5 DCE	178.3 B	33.50 DE
GALLATIN	18 sd/ft	65.46 F	43.92 B	27.40 D	25.75 C	31.50 B	152.5 DBCE	181.5 ED	31.50 BC
GALLATIN	13 sd/ft	57.65 E	44.88 C	23.80 CD	29.35 C	31.75 B	161.0 DCE	182.0 E	32.50 DC
BOWMAN	8 sd/ft	57.05 DE	47.55 E	67.73 E	18.70 AB	38.50 C	109.0 A	179.5 C	32.50 DC
GALLATIN	8 sd/ft	52.61 CD	44.35 CB	28.62 D	26.35 C	27.75 AB	155.5 DBCE	182.8 F	31.50 BC
CLARK	23 sd/ft	51.52 C	41.38 A	11.85 A	24.42 BC	28.50 B	152.5 DBCE	185.8 G	31.00 ABC
CLARK	18 sd/ft	45.78 B	41.45 A	15.25 ABC	24.45 BC	29.25 B	144.0 DBC	186.0 G	30.50 AB
CLARK	13 sd/ft	43.42 B	42.00 A	14.17 AB	26.50 C	22.25 A	127.3 AB	186.0 G	29.75 A
CLARK	8 sd/ft	35.22 A	41.50 A	16.98 ABC	26.83 C	28.75 B	132.8 ABC	186.0 G	30.25 AB

****SUMMARY STATISTICS:****

OVERALL MEAN =	56.88	44.78	36.62	23.73	32.85	148.8	182.0	31.77
F-VALUE TRTS =	.0000	.0000	.0000	.0357	.0000	.0865	.0000	.0132
CV (S/MEAN) =	8.041	1.888	24.50	25.05	16.61	19.30	.3127	5.106
CV (SE/MEAN) =	4.021	.9442	12.25	12.52	8.306	9.652	.1563	2.553
LSD(0.05 by t)=	6.580	1.217	12.91	8.550	7.852	41.32	.8188	2.334

TABLE 6. INFLUENCE OF 3 VARIETIES AT 6 PLANTING DATES AND 4 SEEDING RATES OF DRYLAND SPRING BARLEY, SOUTHERN AG RESEARCH CENTER, HUNTLEY, MT. 6th Date Planted 5-21-91

VARIETY	SEED RATE	YIELD BU/AC	TESTWT LB/BU	PLUMP %	TEINPER %	1000/K WT	PLANTS /METER	HEAD DATE	PLANTHT INCEES
BOWMAN	23 sd/ft	60.39 G	46.10 F	50.38 DE	26.13 BC	37.75 B	139.3 AECD	187.5 A	27.50 ECD
BOWMAN	18 sd/ft	55.83 FG	45.95 EF	53.92 E	25.02 AE	41.75 CD	162.5 FCDE	186.5 AE	26.25 EFD
GALLATIN	18 sd/ft	52.09 EF	40.83 C	16.55 AB	26.40 ABC	30.50 A	174.5 FE	189.3 AE	27.50 ECD
GALLATIN	23 sd/ft	51.77 EF	40.45 C	14.73 A	27.40 AEC	29.25 A	167.5 F	189.0 AE	27.25 BCD
BOWMAN	13 sd/ft	49.73 E	45.33 E	47.50 D	27.50 ABC	38.25 CB	134.8 AEC	189.6 E	29.00 EFG
GALLATIN	13 sd/ft	43.06 D	41.03 CD	24.17 BC	27.40 ABC	30.50 A	129.5 AB	189.3 AE	27.25 BCD
CLARK	23 sd/ft	40.16 D	39.02 B	13.77 A	27.72 BC	30.00 A	132.0 AEC	193.8 C	27.00 BCD
GALLATIN	8 sd/ft	40.02 CD	41.60 D	26.38 C	25.78 AEC	30.00 A	149.5 BCDE	190.3 B	30.00 G
BOWMAN	8 sd/ft	39.50 CD	45.80 EF	55.03 E	24.56 A	42.75 D	124.0 AE	189.0 AE	29.25 FG
CLARK	18 sd/ft	34.76 CB	36.63 B	16.05 A	26.40 C	30.00 A	170.5 FDE	193.5 C	25.75 AE
CLARK	13 sd/ft	30.74 B	37.63 A	16.02 A	26.97 ABC	30.25 A	118.0 A	193.8 C	25.25 A
CLARK	8 sd/ft	20.96 A	37.10 A	17.30 A	26.17 C	31.75 A	132.0 AEC	192.8 C	26.00 ABC

****SUMMARY STATISTICS:****

OVERALL MEAN =	43.25	41.62	29.65	26.96	33.56	146.2	190.5	27.50
F-VALUE TRTS =	.0000	.0000	.0000	.7667	.0000	.0448	.0001	.0015
CV (S/MEAN) =	12.00	1.763	19.26	11.39	10.36	21.12	1.034	5.476
CV (SE/MEAN) =	6.002	.8915	9.631	5.697	5.161	10.56	.5169	2.738
LSD(0.05 by t)=	7.469	1.066	6.217	4.418	5.004	44.40	2.834	2.166

TABLE 7 .

1991 Barley Rate x Date Trial
Individual cultivars at each planting date (over all rates).

Cultivar	Date	Yield Bu/A	Test Wt. Lb/BU	Kernel Wt. gms.	Plump %	Thin %
Bowman	3/25	78.6 D	52.0 E	51.2 D	93.2 D	3.4 A
	4/3	83.7 E	51.5 DE	49.6 CD	93.6 D	3.9 AB
	4/23	72.1 C	51.0 D	48.5 C	88.0 CD	7.0 BC
	5/1	79.0 D	49.6 C	45.3 B	84.7 C	9.2 C
	5/10	65.9 B	48.0 B	40.9 A	70.0 B	18.1 D
	5/21	51.4 A	45.8 A	40.1 A	51.7 A	26.3 E
Clark	3/25	68.0 E	50.9 F	47.4 F	89.4 E	6.0 A
	4/3	76.0 F	50.0 E	44.9 E	81.1 D	11.6 B
	4/23	60.5 D	45.3 D	38.4 D	50.1 C	25.6 C
	5/1	56.7 C	42.4 C	33.5 C	38.7 B	30.0 C
	5/10	44.0 B	41.6 B	27.2 A	14.6 A	25.6 C
	5/21	31.7 A	38.1 A	30.5 B	16.3 A	27.8 C
Gallatin	3/25	82.6 D	52.1 E	47.9 C	90.3 C	5.1 A
	4/3	91.7 E	51.5 E	45.9 C	85.7 C	7.9 B
	4/23	73.7 C	48.1 D	37.7 B	53.1 B	25.6 CD
	5/1	75.7 C	46.9 C	38.2 B	52.0 B	23.7 C
	5/10	60.7 B	44.7 B	30.5 A	25.3 A	27.5 D
	5/21	46.7 A	41.0 A	30.1 A	21.0 A	26.7 D

Values within columns followed by the same letter are not significantly different at the 5% level.

TABLE 8 . 1991 Barley Rate x Date Trial
Individual cultivars at each planting date (over all rates)

Cultivar	Date	Plants /meter	Plant Ht. in.	Head Date
Bowman	3/25	159.3 B	31.8 B	160.0 A
	4/3	146.9 A	31.8 B	163.3 B
	4/23	131.9 A	34.0 D	171.1 C
	5/1	162.5 B	33.2 CD	174.4 D
	5/10	147.1 AB	33.1 C	178.3 E
	5/21	140.1 A	28.5 A	188.7 F
Clark	3/25	157.9 B	33.4 D	165.3 A
	4/3	145.1 AB	35.6 E	170.3 B
	4/23	157.1 B	34.1 D	179.1 C
	5/1	157.6 B	31.7 C	182.8 D
	5/10	139.1 A	30.4 B	185.9 E
	5/21	138.1 A	26.0 A	193.4 F
Gallatin	3/25	151.4 A	31.6 B	162.9 A
	4/3	147.5 A	32.8 D	167.2 B
	4/23	143.1 A	33.8 E	175.3 C
	5/1	177.3 B	32.4 CD	178.3 D
	5/10	160.1 AB	31.8 CD	181.9 E
	5/21	160.3 AB	28.0 A	189.4 F

Values within columns followed by the same letter are not significantly different at the 5% level.

TABLE 9. 1991 Barley Rate x Date Trial
Individual varieties at each rate (over all dates).

Cultivar	Rate	Yield Bu/A	Test Wt. Lb/BU	Kernel Wt. gms.	Plump %	Thin %
Bowman	8	62.2 CD	49.1 C	45.1 C	78.1 D	12.3 A
	13	71.1 E	49.6 G	47.1 C	81.4 D	10.6 A
	18	75.3 F	50.0 G	46.5 C	81.4 D	10.6 A
	23	78.4 F	49.9 G	45.0 C	80.4 D	11.8 A
Clark	8	46.0 A	43.8 A	37.2 AB	47.6 A	21.7 C
	13	54.4 B	44.3 B	34.9 A	47.5 A	22.0 C
	18	59.9 C	45.3 C	38.6 B	50.2 AB	20.7 C
	23	64.4 D	45.5 C	37.3 AB	48.1 A	20.0 BC
Gallatin	8	64.1 D	47.2 D	37.8 B	56.8 C	17.7 B
	13	69.7 E	47.3 DE	39.1 B	54.6 BC	20.2 BC
	18	76.1 F	47.3 DE	38.4 B	54.9 BC	19.7 BC
	23	77.6 F	47.7 E	38.2 B	51.9 AB	20.2 BC

Values within columns followed by the same letter are not significantly different at the 5% level.

TABLE 10 . 1991 Barley Rate x Date Trial
 Individual cultivars at each rate (over all dates).

Cultivar	Rate	Plants /meter	Plant Ht. in.	Head Date
Bowman	8	141.1 A	32.2 ABCD	173.5 C
	13	148.5 AB	32.5 D	172.8 BC
	18	153.1 AB	32.1 ABCD	172.3 AB
	23	149.1 AB	31.5 AB	171.8 A
Clark	8	138.5 A	31.6 ABC	179.9 H
	13	150.6 AB	31.7 ABCD	179.8 H
	18	161.4 B	31.8 ABCD	179.6 H
	23	146.2 AB	32.4 CD	178.7 G
Gallatin	8	146.8 AB	32.4 BCD	177.0 F
	13	164.3 B	31.8 ABCD	176.1 E
	18	152.1 AB	31.3 A	175.3 D
	23	163.3 B	31.5 AB	175.0 D

Values within columns followed by the same letter are not significantly different at the 5% level.