

PROJECT TITLE: Evaluation of experimental winter triticale lines for adaptation in Montana.

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PROJECT PERSONNEL: M.F. Kolding, Plant Breeder, Pendleton, OR
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OBJECTIVES:

To observe winter triticale lines to determine if any perform well in Central Montana.

RESULTS:

Winter Survival – Triticale plots were seeded on a west-facing slope to obtain maximum exposure to winter temperatures and wind. Plant densities and percent stand indicate no significant differences among the triticale lines in their ability to survive winter. Triticale lines did not differ significantly from Tiber winter wheat in winter hardiness or in grain yield. Grain yields averaged 2520 lbs/a and test weights were above average at 53.6 lbs/bu (Table 66). Similar results were obtained in the Statewide Triticale Nursery (Tables 63 and 64) planted in a more protected area on the research center.

Hensleigh Triticale – Experimental lines obtained from Pat Hensleigh were compared to Tiber winter wheat and triticale lines from Matt Kolding's breeding program in Oregon. Some of the Hensleigh lines had a satisfactory test weight but as a group tended to have test weights lower than the Kolding lines. Hensleigh lines headed 6-9 days later than Tiber winter wheat but had similar yields (Table 67).

1998 Single Row – Grain yields averaged 2498 lbs/a and test weights averaged 53.5 lbs/bu (Table 68). Heading dates were equal to that of Tiber winter wheat planted in adjacent trials.

1999 Single Row #1 – Grain yields averaged 2628 lbs/a and test weights averaged 52.2 lbs/bu. Heading dates were generally 3 days later than Tiber winter wheat planted in adjacent trials (Table 69).

1999 Single Row #2 – Line rows from the 1999 single row nursery were planted for observation purposes. Heading dates were 3 to 10 days later than Tiber winter wheat. No visually superior lines were noted and grain was not harvested (Table 70).

Kolding 1996 Selections – Heading dates ranged from 165 to 173 days. Visually superior lines were not identified in this nursery and grain was not harvested (Table 71).

Kolding 1998 Selections – Heading dates ranged from 159 to 170 days. Visually superior lines were not identified in this nursery and grain was not harvested (Table 72).

Kolding 100 Single Plot – Superior lines for this nursery were harvested and will be planted in a Preliminary Triticale Nursery in 2002. Yields of selected lines ranged from 1413 to 4426 lbs/a in a non-replicated trial (Table 73). Heading dates ranged from 167 to 178 days. Several cereal forage lines as well as grain lines were identified for inclusion in subsequent trials.

SUMMARY:

Triticale lines tested had a wide range of heading dates and test weight values. Early maturing lines with acceptable test weights and yields comparable to Tiber winter wheat can be selected for and continued in subsequent yield trials.

FUTURE PLANS:

We will continue to observe winter triticale lines at the Central Agricultural Research Center.

Table 66. 2001 Triticale winter survival study.
 Exp. TRWS Central Agricultural Research Center, Moccasin, MT.

ID	Percent Stand	Plant Density	Plant Height	Heading Date	Grain Yield	Test Weight
	%	plts/3ft	inches	day	lbs/a	lbs/bu
Frostat	90	42	43	170	2598.0	54.2
RAH 173-F93	88	34	36	169	2589.0	52.9
KW940393W5001a	95	41	36	169	2409.0	52.9
K99SRT103	95	47	36	166	2347.0	56.2
KT941256-8006	89	43	36	172	2586.0	52.6
K99SRT119	96	55	34	164	2707.0	55.6
Tiber	80	45	32	175	2057.0	60.4
SR94719	92	41	35	176	2504.0	50.4
UGO	96	54	35	169	2514.0	49.8
KT941864-5002	96	40	35	171	2948.0	53.6
91T113-C12-5	89	42	35	163	2458.0	56.3
RAH 371-F93	99	48	36	168	2674.0	51.3
KT940874-8002	96	40	36	164	2431.0	56.1
B0010	98	46	32	175	2799.0	48.9
KT940794-8007	96	58	35	169	2337.0	53.1
KT941256-8007	88	41	33	171	2366.0	53.8
Average	92.7	44.9	35.2	169.4	2520.0	53.6
LSD (0.05)	ns	ns	3.2	2.4	ns	1.4
CV (s/mean)*100	9.5	22.6	5.5	0.8	13.1	1.6

Seeded: 10/4/2000

Harvested: 8/11/2001

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Table 67. 2001 Hensleigh Triticale
Exp. TRHN Central Agricultural Research Center, Moccasin, MT

ID	Plant Density	Plant Height	Heading Date	Grain Yield	Test Weight	Percent Stand	Grain Protein
	plf/3ft	in	day	lbs/a	lbs/bu	%	%
TR70712	32	28.0	174	2669.0	53.0	99.0	19.8
TR71011	34	34.0	174	2911.0	51.3	99.0	17.0
TR71201	32	33.3	174	2826.0	51.7	98.7	17.3
TR71506	31	32.7	174	2748.0	50.3	99.0	17.3
TR71712	30	29.7	175	2684.0	52.7	99.0	18.7
TR71717	30	28.0	175	2669.0	52.3	98.7	18.1
TR71905	32	35.7	173	2675.0	49.0	99.0	18.6
TR71909	31	32.0	173	2793.0	48.0	99.0	19.6
TR72113	30	30.0	172	2783.0	52.7	99.0	17.1
92E005	24	32.7	163	2933.0	54.0	98.0	16.4
KT941776	27	35.0	167	3113.0	53.7	98.0	16.7
KT941864	30	32.0	166	3250.0	54.0	98.3	15.7
Tiber	30	30.7	166	2730.0	61.3	95.7	17.8
91T113C125	26	32.3	159	3091.0	57.0	97.7	14.7
Average	30.0	31.9	170.4	2848.0	52.9	98.4	17.5
LSD (0.05)	ns	3.2	1.3	333.4	1.2	ns	
CV (s/mean)*100	13.8	6.1	0.5	7.0	1.3	1.5	

Seeded: 10/3/2000

Harvested: 8/10/2001

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Previous crop: Fallow

Table 68. 2001 Triticale selections from the 1998 single row nursery.
Exp. TR98SR Central Agricultural Research Center, Moccasin, MT

ID	Plant Density plts/3ft	Percent Stand (%)	Plant Height (in)	Heading Date (days)	Grain Yield (lbs/a)	Test Weight (lbs/bu)
KT940178-6001	26	98	27	169	2777.0	53.3
KT940178-6003	23	98	28	169	2202.0	53.0
KT943464-5005a	26	98	34	167	2227.0	55.0
92 E 005	31	98	35	163	2788.0	54.3
KW941531-6005	26	98	27	167	2889.0	54.7
KT943112	25	98	31	167	2954.0	54.3
KT943115-3-9	22	97	38	163	2366.0	55.3
99SRT6	26	98	32	168	2717.0	54.3
KW940393W5001a	25	96	36	167	1941.0	52.0
KT940794-8001	28	98	28	165	2221.0	54.0
KT940794-8007	24	99	30	167	2532.0	53.7
KT940874-8002	28	98	33	170	3012.0	53.3
KT941256-8004	29	98	37	169	2635.0	51.0
KT941256-8006	24	98	37	170	2729.0	50.0
KT941256-8007	23	90	29	175	2068.0	51.7
B 0010	29	99	34	171	2430.0	49.3
FT86042 h1007b	27	99	33	171	1842.0	53.7
KT940657-7005	22	98	31	168	2331.0	53.7
K99SRT103	31	99	37	163	2600.0	55.3
KT941268-7002	24	98	37	167	2850.0	51.0
KT943744-7004	29	96	35	168	2711.0	56.0
KT940516-7002	26	98	37	170	1993.0	55.7
KT241256-8004	27	98	34	165	2651.0	55.0
Average	26.1	97.5	33.0	167.8	2498.0	53.5
LSD (0.05)	ns	3.4		1.6	431.7	2.0
CV (s/mean)*100	14.7	2.1		0.6	10.5	2.3

Seeded: 10/3/2000

Harvested: 8/10/2001

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Previous crop: Fallow

Table 69. 2001 Triticale selections from the 1999 single row nursery.
 Exp. TR99SR1 Central Agricultural Research Center, Moccasin, MT

ID	Percent Stand	Plant Density	Plant Height	Heading Date	Grain Yield	Test Weight
	(%)	(plts/3ft)	(in)	(days)	(lbs/a)	(lbs/bu)
KT95G06-HR02	98	23	36	170	1929	48.3
KT95G06-HR03	96	21	33	172	2579	54.6
KT95G06-HR06	96	25	47	169	2441	53.1
KT95G06-HR07	98	25	36	168	2732	52.8
KT940608p8013	94	22	32	172	2721	50.3
KT940874p8015	97	23	36	168	2767	50.1
KT943112	98	24	28	170	2884	51.6
KT940874-8003	91	22	34	171	2463	50.0
KT940874-8001, 8002 & 8003	97	31	37	170	2946	56.0
KT941276-8004	99	26	34	168	2782	52.5
KT940511p8002	95	29	35	173	2655	54.9
KT940600p8001	97	25	34	171	2484	50.1
KT940872p8006	98	28	37	172	2866	51.1
KT940874p8012	99	25	35	169	2822	51.4
KT941312-7003	95	25	37	171	2341	53.2
KT970046p7049	97	29	37	164	2592	55.1
KT981426	98	29	33	167	2835	53.1
KT960177p8006	97	23	32	171	2463	51.5
Average	96.4	25.1	35.2	169.5	2628.0	52.2
LSD (0.05)	ns	ns		ns	ns	ns
CV (s/mean)*100	3.0	22.1		1.9	11.8	7.5

Seeded: 10/3/2000

Harvested: 8/10/2001

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Previous crop: Fallow

Table 70. Additional triticale entries from the 1999 single row nursery.
 Exp. TR99SR2 Central Agricultural Research Center, Moccasin, MT.

1999 Row #	Percent Stand	Plant Density	Plant Height	Heading Date
	%	plts/3ft	inches	days
2	94	29	39	173
6	97	30	37	171
7	96	25	31	169
9	95	22	31	170
10	95	25	34	172
13	74	24	27	176
15	91	25	27	174
16	95	27	35	170
17	92	26	36	170
19	96	25	36	171
21	98	26	33	171
Average	95	26	33	171
LSD (0.05)	4	ns		2
CV (s/mean)*100	2	19		1

Seeded: 10/4/2000

Not Harvested

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Previous crop: Fallow

Table 71. 2001 Kolding winter triticale selections from 1996 nurseries.
Exp. WTK96 Central Agricultural Research Center, Moccasin, MT

ID	Percent Stand	Plant Density	Plant Height	Heading Date
	%	plts/3 ft	in	day
Tiber	77	30	31	169
KT956-06 ROW-2	82	18	37	173
95A229	43	14	36	168
KT943322-6001	87	26	28	166
92E005	93	29	32	165
KT940023	87	21	35	168
KT943747-6001	58	13	37	171
KT942608	60	16	31	169
KT95G-06-ROW5	72	22	36	172
EMP-1	73	21	29	171
KT943536-5006	78	18	35	165
96E001	5	2	30	168
95A231	68	15	34	169
KT941776-5002	90	29	35	170
KT941289	75	16	35	168
92E008	92	27	31	168
KT943322-6004	80	22	25	168
Average	71.8	19.9	32.8	168.7
LSD (0.05)	24.0	8.8		3.0
CV (s/mean)*100	20.1	26.7		1.1

Seeded: 9/27/2000

Not Harvested

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Previous crop: Fallow

Table 72. 2001 Kolding winter triticale selections from 1998 nurseries.
Exp. WTK98 Central Agricultural Research Center, Moccasin, MT

ID	Percent Stand	Plant Density	Plant Height	Heading Date
	%	plt/3ft	in	day
KW94568H	92	46	27.0	169
KT990102	95	39	33.3	166
KT960033	98	52	38.0	170
KT941289	93	39	32.3	163
KW943683	88	39	28.3	169
EMP-1	97	46	28.3	167
KT942608	95	50	34.3	163
KT990101	90	33	32.0	159
M96-3182-7001	93	33	35.7	160
KT943464-5005a	93	39	38.3	162
KT940023	95	40	34.0	163
KT982230	95	36	34.0	163
KT94G06-HR08	95	26	35.7	167
KT90456-p7001	96	36	28.7	168
Frostat	95	35	31.7	167
Tiber	95	35	30.7	166
Average	94.1	39.1	32.7	165.0
LSD (0.05)	4.6	8.1	2.8	2.3
CV (s/mean)*100	2.9	12.5	5.2	0.8

Seeded: 9/28/2000

Not Harvested

Fertilizer: 67 lbs N broadcast in fall of 2000; 50 lbs of 20-20-0 placed with the seed

Herbicide: Bronate at 1 1/2 pts/a on May 11, 2001

Growing season precipitation: 7.29 inches

Crop year precipitation: 10.6 inches

Previous crop: Fallow

Table 73. 2001 Kolding 100 single plot observation nursery.
Exp. WTK100 Central Agricultural Research Center, Moccasin, MT.

Plot	Ent	ID	Plant Density (plts/3ft)	Heading Date (days)	Percent Stand (%)	Grain Yield (lbs/a)	Test Weight (lbs/bu)
101	1	D98SRT99-7	22	172	50	2488.9	54.4
118	18	KT940506-5004	16	177	60	1290.5	48.5
122	22	KT940608p9003	26	171	93	3456.0	54.0
123	23	KT940608p9028	24	171	95	2891.4	52.1
131	31	KT940872p8006	24	173	98	4426.3	51.1
133	33	KT940874p8012	21	174	97	3376.4	50.3
137	37	KT940608p9029	21	172	93	2270.8	52.2
154	54	KT941276-8004	23	172	93	2833.8	50.9
160	60	KT981146p9001	24	170	97	3075.8	55.6
161	61	KT981146p9006	19	170	85	2636.9	56.3
162	62	KT981146p9007	24	170	90	2902.6	55.8
167	67	KT981146p9033	20	171	93	2672.4	54.9
170	70	KT981146p9036	16	171	85	2175.1	56.3
174	74	KT981146p9031	20	171	97	2362.7	55.5
176	76	KT982021	18	178	97	2539.7	49.4
177	77	KT982022	21	178	95	2797.1	48.4
178	78	KT982034	23	177	98	2754.9	50.7
179	79	KT982088hd-902	16	171	97	2684.6	53.0
187	87	KT990174	22	167	90	3723.7	56.7
193	93	KT991034	19	169	85	2959.5	49.2
194	94	KT991116	18	174	70	1413.1	52.9
198	98	KT991381	22	172	95	2898.3	
102	2	D98SRT99-3	18	174	60		
103	3	KT200005	17	171	40		
104	4	KT200040	17	171	70		
105	5	KT200041	21	170	80		
106	6	KT200079	15	169	85		
107	7	KT200141	10	177	30		
108	8	KT200142	12	178	15		
109	9	KT200143	13	177	50		
112	10	KT200356	23	169	90		
111	11	KT200471	18	170	93		
	12	KT200523	18	171	90		

(Continued)

Table 73. 2001 Kolding 100 single plot observation nursery.

Exp. WTK100 (continued)

Plot	Ent	ID	Plant Density (plts/3ft)	Heading Date (days)	Percent Stand (%)	Grain Yield (lbs/a)	Test Weight (lbs/bu)
113	13	KT200524	28	171	85		
114	14	KT90492 p9018	15	174	95		
115	15	KT90492 p9024	15	171	93		
116	16	KT90492 p9025	21	171	90		
117	17	KT940506-5002	20	169	95		
119	19	KT940516-5005	17	174	93		
120	20	KT940608p8013	24	171	95		
121	21	KT940608p8013	20	174	85		
124	24	KT940608p9034	30	171	93		
125	25	KT940608p9034	20	170	90		
126	26	KT940608p9037	20	169	93		
127	27	KT940608p9039	22	171	85		
128	28	KT940608p9040	17	171	93		
129	29	KT940608p9042	18	169	93		
130	30	KT940608p9045	22	167	97		
132	32	KT940874-8002	27	173	98		
134	34	KT940874p8012	19	173	97		
135	35	KT940874p8015	11	177	60		
136	36	KT940874p9002	17	172	93		
138	38	KT940874p9005	13	171	85		
139	39	KT940874p9008	20	168	90		
140	40	KT940874p9009	20	175	80		
141	41	KT940874p9016	21	171	93		
142	42	KT940874p9020	24	168	93		
143	43	KT940874p9022	21	169	95		
144	44	KT940874p9023	26	168	98		
145	45	KT940874p9024	19	169	98		
146	46	KT940874p9025	19	170	97		
147	47	KT940874p9026	26	171	98		
148	48	KT940874p9027	19	171	97		
149	49	KT940874p9035	26	170	98		
150	50	KT940874p9038	15	168	98		
151	51	KT940874p9039	19	167	93		

(Continued)

Table 73. 2001 Kolding 100 single plot observation nursery.
Exp. WTK100 (continued)

Plot	Ent	ID	Plant Density (plts/3ft)	Heading Date (days)	Percent Stand (%)	Grain Yield (lbs/a)	Test Weight (lbs/bu)
152	52	KT941256-8008	17	174	40		
153	53	KT941276-8004	12	174	30		
155	55	KT943112	18	170	90		
156	56	KT943322p9020	16	172	80		
157	57	KT943744-5003	23	171	90		
158	58	KT970001H9052	15	171	95		
159	59	KT970046p7049	15	174	90		
163	63	KT981146p9011	21	168	90		
164	64	KT981146p9012	19	171	85		
165	65	KT981146p9014	20	170	93		
166	66	KT981146p9030	21	168	97		
168	68	KT981146p9034	26	170	95		
169	69	KT981146p9035	9	175	20		
171	71	KT981426	20	163	93		
172	72	KT981941	20	165	93		
173	73	KT981941p9001	26	167	90		
175	75	KT981950p9023	20	163	95		
180	80	KT982095	17	173	97		
181	81	KT982129-B	19	171	95		
182	82	KT982230-bulk A	19	170	90		
183	83	KT990129	15	163	90		
184	84	KT990130	14	163	85		
185	85	KT990143	21	163	90		
186	86	KT990166	20	168	10		
188	88	KT990200	14	174	40		
189	89	KT990213	24	165	70		
190	90	KT990216	20	172	80		
191	91	KT990223	22	171	85		
192	92	KT990251	20	165	90		
195	95	KT991134	17	174	70		
196	96	KT991155	19	174	80		
197	97	KT991185	17	174	90		
199	99	KT991402	27	174	85		
200	100	KW940426-7011	19	168	85		

