PROJECT TITLE: 2000 Evaluation of winter triticale lines for grain yield and adaptation to dryland cropping in Montana.

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OBJECTIVES:
To identify winter triticale selections which exhibit high yield, quality and winter hardiness when grown in environments and cropping methods representative of Montana. To develop a winter feed grain adapted to livestock production areas in eastern Montana because seeding spring grains conflicts with calving and lambing.

RESULTS:
Germplasm for the nurseries originated from Mathias Kolding's breeding program, Polish breeding programs, and Phil Bruckner's Georgia program. Yield evaluation trials were established at Bozeman, Huntley, Moccasin and Winifred. 2000 yield, test weight, plant height, and heading date results for trials established at Bozeman, Huntley, Moccasin, and Winifred are presented in Tables WT 1-4. Multiple year and location yield results are presented in Table WT 5. The relative yield levels of winter triticale to Tiber hard red winter wheat are presented in Table WT 6.

The yields of all fifteen triticale entries in the Montana Statewide Winter Triticale nursery exceeded the yield of Tiber at four locations. The top five winter triticale for grain averaged 1000 lbs/a or more than Tiber HRWW. Triticale average test weights ranged 49.9 to 54.5 lbs per bushel. Triticale average plant height ranged from 28 to 36 inches compared to an average Tiber height of 31inches. Triticale heading date ranged from June 2 to June 14 compared to an average heading date of June 13 for Tiber.

The multiple year and location yield comparisons show winter triticale consistently out yield the Tiber winter wheat check. Triticale varieties show similar yield ranking across multiple locations and years.

Hail destroyed several winter triticale nurseries at Moccasin and seed increase plots. In general, the triticale appear to withstand the hail better than the winter wheat.

SUMMARY:
Winter triticale development lines exhibit yield levels superior to Tiber hard red winter wheat. The winter triticale have acceptable plant heights and heading date. Test weights are generally 8-10 lbs/bu lower than Tiber winter wheat. Winter triticale is an agronomically suitable crop for much of Montana. The challenge is to find a market for the grain. Extensive quality assessment would be premature where the market standards are unknown.

FUTURE PLANS:
Nurseries were established in the fall of 2000 at Bozeman, Huntley and Moccasin. Moccasin established trials on expose ridge to enhance winter hardiness evaluations. Following the 2001 sufficient data should be secured to recommend some lines for release as varieties. Also, seed increase plots can be seeded the fall of 2001. The next step will be up to food and feed processors to develop markets for triticale.

Table WT 1. 2000 Winter triticale multi-location grain yield results.
EXP WTR Central Agricultural Research Center, Moccasin, Montana.

		---------- Grain Yield (lbs/a)----------				
ID	Variety	Bozeman	Huntley	Moccasin	Winifred	Average
T35	RAH173-F93	7093	3864	3341	2714	4253
TR01	91T113-C12-5	7232	3851	3045	2354	4120
T34	UGO	6898	3936	2755	2642	4058
KT25	KT25 92E005	6570	3686	3176	2724	4039
T37	RAH371-F93	6757	3363	3096	2700	3979
T32	ALMO	7079	3333	3069	2052	3883
KT33	KT941776-5002	6035	3811	2986	2262	3774
KT32	KT941289	6325	3217	2989	2322	3713
KT3	KT941864-5002	6352	3235	3076	2116	3695
KT35	KT941256-8004	6537	2873	3121	2100	3657
KT27	KT940794-8007	6122	2768	2855	2489	3558
T26	B0010	5510	3114	2812	1954	3348
KT30	KT940874-8002	5026	3336	2605	2319	3322
TR18	SR94719	5119	3271	2639	1858	3222
TR19	SR94721	5211	3163	2449	1858	3170
PI517194	**Tiber**	**4985**	**2890**	**2159**	**1778**	**2953**
MEANS		6178.13	3356.96	2885.8	2265.1	3672
F VAR.	df=30	16.56	1.39	6.84	1.32	
C.V. 1: (S/Mn)		5.4	16.33	6.98	15.64	
LSD (0.05)		556.5	914.28	336.03	590.85	

Table WT 2. 2000 Winter triticale multi-location test weight results.
EXP WTR Central Agricultural Research Center, Moccasin, Montana.

		---------- Test Weight (lbs/bu) ----------				
ID	Variety	Bozeman	Huntley	Moccasin	Winifred	Average
KT25	92E005	54.4	54.8	53.3	55.1	54.4
KT27	KT940794-8007	54.6	54.3	51.7	54.5	53.8
KT3	KT941864-5002	54.1	52.3	52.1	52.1	52.6
KT30	KT940874-8002	50.5	50.8	50.3	52.7	51.1
KT32	KT941289	56.0	54.5	53.3	54.3	54.5
KT33	KT941776-5002	52.4	53.5	53.2	54.4	53.4
KT35	KT941256-8004	54.5	55.0	53.5	54.4	54.4
PI517194	**Tiber**	**62.0**	**60.5**	**59.9**	**59.5**	**60.5**
T26	B0010	53.2	49.2	49.9	51.0	50.8
T32	ALMO	54.5	52.0	51.2	52.4	52.5
T34	UGO	51.7	49.6	49.7	49.8	50.2
T35	RAH173-F93	51.6	47.5	51.5	52.8	50.9
T37	RAH371-F93	54.7	49.3	51.2	52.2	51.8
TR01	91T113-C12-5	50.2	54.9	54.5	55.5	53.8
TR18	SR94719	49.2	48.8	50.8	50.8	49.9
TR19	SR94721	51.1	52.4	51.5	52.5	51.9
MEANS		53.4	52.5	52.35	53.38	52.9
F VAR.		219.8		50.63	48	
C.V. 1: (S/Mn)		0.7		1.14	37.04	
LSD (0.05)		0.6		0.99	1.23	

Table WT 3. 2000 Winter triticale multi-location plant height results.
Exp WT00 Central Agricultural Research Center, Moccasin, Montana.

		---------- Plant Height (inches) ----------				
ID	Variety	Bozeman	Huntley	Moccasin	Winifred	Average
KT30	KT940874-8002	50	20	36	36	36
TR01	91T113-C12-5	43	22	34	26	31
KT25	92E005	45	22	31	28	31
KT32	KT941289	44	22	31	27	31
KT27	KT940794-8007	45	22	33	25	31
T35	RAH173-F93	45	19	33	27	31
KT3	KT941864-5002	43	21	31	29	31
KT33	KT941776-5002	42	21	33	27	31
T37	RAH371-F93	43	20	33	28	31
PI517194	**Tiber**	**42**	**24**	**30**	**26**	**31**
KT35	KT941256-8004	42	22	32	25	30
T32	ALMO	43	21	31	27	30
TR18	SR94719	40	20	31	28	30
T34	UGO	43	20	29	26	30
T26	B0010	40	20	31	26	29
TR19	SR94721	35	21	30	25	28
MEANS		42.79	21	31.81	27.25	32
F VAR.		12.66	3	1.29		
C.V. 1: (S/Mn)		3.59	8	8.91		
LSD (0.05)		2.56	5	4.73		

Table WT 4. 2000 Winter triticale multi-location heading date results.
EXP WTR Central Agricultural Research Center, Moccasin, Montana.

		---------- Day of the Year ----------				
ID	Variety	Bozeman	Huntley	Moccasin	Winifred	Average
TR19	SR94721	166	158	172		165
T26	B0010	165	158	170		164
PI517194	**Tiber**	**168**	**156**	**169**		**164**
TR18	SR94719	166	157	169		164
KT30	KT940874-8002	165	156	168		163
KT33	KT941776-5002	161	154	165		160
KT35	KT941256-8004	161	152	165		159
KT3	KT941864-5002	160	153	163		159
KT27	KT940794-8007	160	150	161		157
T34	UGO	159	149	162		157
T37	RAH371-F93	160	148	161		156
KT32	KT941289	160	147	162		156
T32	ALMO	159	148	160		155
KT25	92E005	158	148	159		155
T35	RAH173-F93	159	147	159		155
TR01	91T113-C12-5	156	146	156		153
MEANS		161.38	151.71	164		159.0
F VAR.		133.76	179.82	69.47		
C.V. 1: (S/Mn)		0.32	0.37	0.59		
LSD (0.05)		0.85	0.92	1.62		

Day 150 = May 30, 2000

Table WT 5. Two year yield summary of selected promising winter triticale development lines and varieties.
Exp WT Montana Agricultural Experiment Station - Research Centers

Trt ID	Line/Var.	Moccasin Fallow99	Moccasin Re-Crop99	Sidney Fallow99	Huntley Fallow99	Bozeman Fallow99	Boz200 Fallow	MoccNt20 RC	Winfrd200 Fallow	Hunt200 Fallow	2-year Average
T34	UGO	4507	3353	4714	4655	7660	6898	2755	2642	3936	4568.9
T35	RAH173-F93	3999	3126	4225	4057	8440	7093	3341	2714	3864	4539.9
KT25	92 E005	4253	2801	4731	4298	8224	6570	3176	2724	3686	4495.9
T37	RAH371-F93	3819	2865	4691	4349	7916	6757	3096	2700	3363	4395.1
TR01	91T113-C12-5	3839	2583	3942	4510	7862	7232	3045	2354	3851	4357.5
T32	ALMO	4043	2588	4868	4355	7168	7079	3069	2052	3333	4283.8
KT3	KT941864-5002	4372	3323	5398	3877	6222	6352	3076	2116	3235	4219.0
KT33	KT941776-5002	4299	3835	4620	3783	6788	6035	2986	2262	3811	4268.8
KT32	KT941289	4316	2263	4201	3979	7366	6325	2989	2322	3217	4108.7
T26	B0010	3851	2987	4628	3671	6174	5510	2812	1954	3114	3855.7
TR18	SR94719	3545	2916	4573	3107	6034	5119	2639	1858	3271	3673.7
TR19	SR94721	3431	2487	4213	3152	6012	5211	2449	1858	3163	3552.9
PI517194	**TIBER**	**3394**	**2184**	**3517**	**4131**	**5878**	**4985**	**2159**	**1778**	**2890**	**3435.1**
MEAN		3855.6	2825.8	4403.6	3820.6	6890.9	6178.13	2885.8	2265.1	3356.96	

Table WT 6. 2000 Winter triticale multi-location yield comparison with Tiber HRWW.
EXP WTR Central Agricultural Research Center, Moccasin, Montana.

Year	loc./study	**High** Trit. lbs/a	Trit. **Mean** lbs/a	**Low** Trit. lbs/a	**Tiber lbs/a**	Trit. Entries #
1994	CARC	3153	2453	2023	**2338**	3
1995	CARC	3324	2449	1596	**2111**	19
1996	CARC	2204	1788	1377	**2116**	15
1996	CARC-G	2420	1797	899	**5028**	39
1996	Moore-G	2527	1744	1332	**1836**	39
1997	CARC-H	5470	4803	3654	**4395**	13
1997	CARC-K	4913	3752	2812	**4175**	23
1997	SARC-K	5545	4984	4025	**4070**	23
1997	CARC-G	5048	4303	3340	**4053**	16
1997	SARC-G	5067	4256	3008	**4308**	16
1998	CARC-Pre	5258	4128	1756	**4660**	20
1998	CARC	6201	4953	3507	**4547**	25
1998	CARC-G	4902	4165	3281	**3900**	15
1999	CARC-Fal	4507	3887	3070	**3394**	15
1999	CARC-RC	3835	2669	1731	**2184**	15
1999	EARC	5398	4463	3832	**3517**	15
1999	SARC	4655	3800	2625	**4131**	15
1999	POST-Boz	8440	6958	5602	**5878**	15
2000	SARC	3936	3388	2768	**2890**	15
2000	CARC-RC	3341	2934	2449	**2159**	15
2000	Winifred	2724	2297	1858	**1778**	15
2000	POST-Boz	7232	6258	5119	**4985**	15
Total sum		100100	82229	61664	**78453**	
Average		4766.7	3915.7	2936.4	**3735.9**	