

The 12th

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of the

WESTERN TRIANGLE AGRICULTURAL RESEARCH CENTER

Montana Agricultural Experiment Station

Conrad, Montana

1989

Submitted by

Dr. Gregory D. Kushnak, Superintendent & Crop Scientist

MSU-MAES Research Report

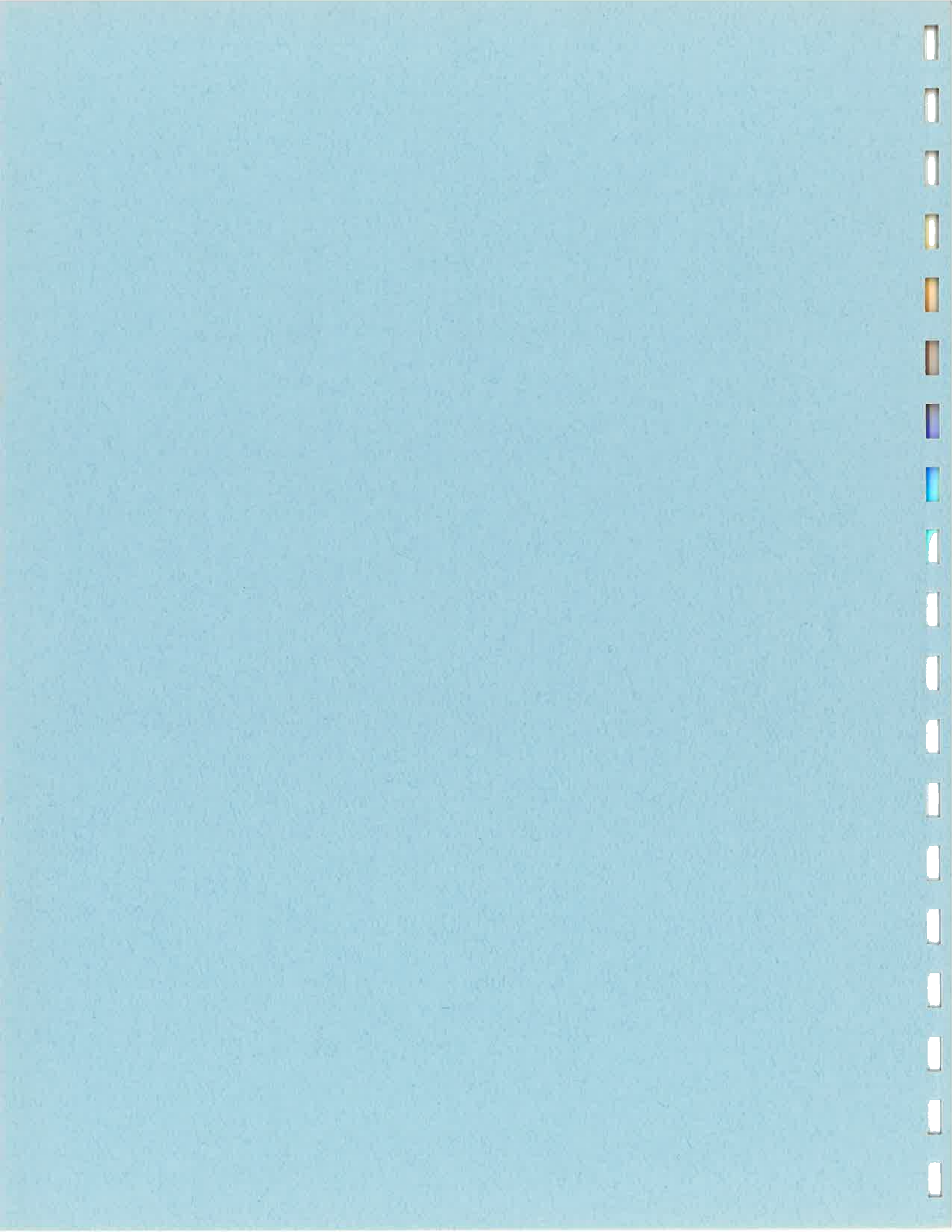


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1989 Research Center Activities

Crop seminars featuring Western Triangle Research Center data were presented by Extension Specialist Don Baldrige to Triangle Area Farmers at various locations in January. Off-station plot tours were conducted, in cooperation with Triangle Area County Agents and the Soil Conservation Service, in Chouteau and Glacier counties on July 6 and August 9, respectively. The Research Center hosted the Montana Wheat & Barley Committee on July 10-11 for their summer meeting and field tour.

Special tours were held at the Research Center on March 13 for Conrad grade school students; and May 1 for Lakeland College (Alberta) students. An ICPM field day, conducted by area County Agents, was hosted on May 22. A crop residue workshop for area Soil Conservation Service Staff was held at the Research Center on October 17.

A severe wind storm removed many shingles from the office roof on February 1. Insurance claim delays caused the repair project to be postponed until spring of 1990!

A small portion (1000 varieties) of the USDA's world collection of barley was planted in effort to screen for brown wheat mite/barley yellow streak mosaic virus resistance. Unusually wet weather killed most of the mites, preventing any selection for disease resistance.

MSU graduate students Chris Nordstrom and Vicki Bradley conducted summer research at the Station on alfalfa nodulation and sawflys in wheat, respectively.

Dr. Pat Gallagher, soil scientist at the Research Center, died on April 24. Much of his fertilizer work was continued in 1989 by the other staff.

Other Research Center staff during 1989 included Dr. Greg Kushnak, Superintendent; Research Technicians Ron Thaut and Larry Christiaens; and Gladys Dunahoo, secretary (half-time). Ross Moritz was a temporary summer employee.

Western Triangle Research Center Advisory Committee

Past Members

Richard Page, Bynum Teton Co.	1977-79
Dave Shane, Floweree, Cascade Co.	1977-82
Vade Hamma, Brady, Chouteau Co.	1977-82
Wilson Hodgskiss, Choteau, Teton Co.	1977-83
Don Buffington, Ledger, Liberty Co.	1977-83
Jerry Swenson, Cut Bank, Glacier Co.	1977-83
Karl Ratzburg, Ledger, Toole Co.	1977-84
Joe DeStaffany, Conrad, Pondera Co.	1977-84
Dale Vermulm, Cut Bank, Glacier Co.	1977-84
Jack Baringer, Conrad, Pondera Co.	1977-84
Bob LongCake, Shelby, Toole Co.	1982-84
Randy Weaver, Cut Bank, Glacier Co.	1982-84
Paul Kronebusch, Conrad, Pondera Co.	1977-85
Arnold Gettel, Power, Teton Co.	1980-85
Ted Neuman, Vaughn, Cascade Co.	1983-86

Current Members

Gary Iverson, Sunburst, Toole Co.
Dave Shane, Floweree, Cascade Co.
Bill McLean, Brady, Chouteau, Co.
Leif Larson, Choteau, Teton Co.
Miles Lewis, Cut Bank, Glacier Co.
Bruce Bradley, Cut Bank, Glacier Co.
Joe Larsen, Galata, Toole Co.
Bob Layne, Valier, Pondera Co.
Richard Thieltges, Chester, Liberty Co.
Bill Richter, Choteau, CES Representative (ex-officio)
Mark Grubb, Pondera Co.
Dave Gettel, Power, Teton Co.

Climatic summary for the 1989 calendar year at the Western Triangle Research Center, Conrad, MT.

1989 Month

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Spt.	Oct.	Nov.	Dec.	Total or average
Precipitation (inches)	0.24	0.41	0.67	2.06	2.70	2.45	2.09	4.66	1.05	0.33	0.20	0.50	17.90
Mean Temperature (°F)	24.0	7.8	24.0	43.8	50.8	61.4	67.5	63.2	55.8	46.1	33.3	21.4	41.6
Last killing frost in spring *	-----May 30 (30°)												
First killing frost in fall *	-----September 11 (28°)												
Frost free period	-----103 days												
Maximum summer temperature	-----July 10 (93°)												
Minimum winter temperature	-----February 2 (-33°)												

* In this summary, 32°F is considered killing frost.

Soil moisture probe depth = 42" on fallow (or 7" available water); 27" on stubble or 4½" available water).

Summary of climatic data by month for the 1988-89 crop year (September thru August) at the Western Triangle Agricultural Research Center, Conrad, MT.

	Sept 1988	Oct 1988	Nov 1988	Dec 1988	Jan 1989	Feb 1989	Mar 1989	Apr 1989	May 1989	June 1989	July 1989	Aug 1989	Total or avg.
Precipitation (inches)	2.04	0.36	0.29	0.21	0.24	0.41	0.67	2.06	2.70	2.45	2.09	4.66	18.18
Mean Temperature (°F)	55.7	46.6	33.0	26.0	24.0	7.8	24.0	43.8	50.8	61.4	67.5	63.2	42.0
Last killing frost in spring 1989*	-----May 30 (30°)												
First killing frost in fall 1989*	-----September 11 (28°)												
Frost free period 1989	-----103 days												
Maximum summer temperature	-----June 10 (93°)												
Minimum winter temperature	-----January 2 (-33°)												

* In this summary, 32°F is considered a killing frost.

Soil moisture probe depth = 42" on fallow (or 7" available water); 27" on stubble (or 4½" available water).

TITLE: Winter Wheat Variety Investigations
YEAR: 1989
LOCATION: Western Triangle Research Center, Conrad, Montana
PERSONNEL: Gregory D. Kushnak, Ron Thaut, and Larry Christiaens
- Research Center, Conrad; Dr. Allan Taylor, MSU,
Bozeman.

Winter wheat variety trials were grown at six locations in 1989: Conrad, Dutton, Chester, the "Knees Area", Sun River, and Eden. The Chester and Knees locations were lost to winterkill and hail, respectively. Winterkill at Chester was complete for all varieties, including Norstar. Data for the other locations are presented in Tables 1-8. Three-year summaries are included.

Rainfall at each harvested site was above normal, and was evenly distributed throughout the growing season. Differential lodging among varieties occurred at the Eden location (Table 7). Tiber and Redwin had the stiffest straw.

Heading dates were obtained at the Conrad site (Table 1). Compared to Rocky, Judith was 2 days later to head; Tiber 5 days later; and Neeley 8. In some years, sawfly damage was worse in late-heading varieties; suggesting the use of early-heading types to escape damage. However, sawfly damage was moderate in all varieties this year, except for the sawfly-resistant experimental lines. These experimental lines are marked with a star in the data tables, and are not yet available for release. Their resistance ranges from moderate to good, depending on environmental conditions.

Flora, a new winter triticale variety, showed considerable improvements for yield and shorter straw, but had very low test weight (Table 1). Straw height of Flora was similar to Rocky wheat, and was approximately 10 inches shorter than the other winter triticales tested. Yield calculations for triticale were based on a 50 pound/bushel test weight, which made the triticale yields appear higher than those of winter wheat. However, on a pounds/acre basis, triticale yields similar to wheat.

These trials were conducted by the Western Triangle Research Center, Conrad and the Cooperative Extension Service, in cooperation with Dr. Allan Taylor, Montana State University Plant and Soil Science Department.

The background, performance, and detailed descriptions of the varieties tested are included in Extension Bulletin 1098, "Performance Summary of Winter Wheat Varieties in Montana, 1989 revision", available at all county agent offices.

Table 1a. Winter wheat and winter triticale variety trials grown on fallow at the Mont. Agri. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1989.

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	Head date	% Protein
MT 88002 *	73.1	60.5	27	179	9.8
MT 88062	68.8	61.4	33	179	11.4
MT 88003 *	68.7	61.7	28	177	8.8
Winridge	68.4	62.0	34	174	9.3
MT 8726	67.3	62.2	30	177	9.8
Tiber	67.3	64.4	34	175	10.6
MT 8505	66.9	62.9	38	171	11.6
MT 7811	66.8	63.2	35	172	11.8
Weston	66.2	59.6	37	171	9.8
Thunderbird	66.2	64.6	31	167	11.6
Blizzard	65.7	63.2	36	180	11.6
MT 88001 *	65.4	62.5	26	179	11.7
MT 88005 *	65.3	63.2	39	173	11.2
MT 8713	64.8	64.4	28	173	11.0
MT 8502	63.4	61.4	32	177	12.4
Neeley	63.4	63.4	34	178	11.2
MT 85200	63.2	62.2	29	168	9.6
Judith	63.1	62.9	29	172	10.8
Winalta	62.6	64.9	37	171	13.2
MT 8719	62.5	64.3	29	177	11.2
QT 542	61.9	62.6	34	169	11.0
MT 8709	61.9	62.4	27	177	9.5
Roughrider	61.5	63.1	35	171	11.6
MT 85202	61.4	63.0	37	171	10.5
Norstar	61.1	64.8	42	180	10.9
Centurk	60.9	63.7	32	169	11.8
Rocky	60.8	63.9	33	170	10.2
MT 88008 *	60.6	64.6	39	174	11.0
Norwin	60.1	64.6	27	173	9.7
Cree	60.0	64.6	40	178	11.6
Agassiz	60.0	63.9	40	172	11.0
MT 85203	59.8	64.0	24	178	9.2
Abiline	59.6	64.1	25	169	12.4

(continued)

Table 1a. continued.

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	Head date	% Protein
MT 88065	59.3	62.7	32	178	11.2
MT 8599	59.0	61.5	31	170	9.4
Cheyenne	58.7	64.1	36	176	11.8
QT 546	58.4	62.8	30	170	11.7
MT 79125	57.5	61.7	30	173	12.2
Seward	57.3	63.5	34	173	9.3
Redwin	54.9	62.4	35	173	10.4
MT 88006 *	54.5	61.6	42	173	12.8
MT 88064	53.6	60.3	34	179	11.1
MT 7863	48.3	63.3	39	177	13.0
MT 8706	40.8	60.8	26	174	12.1

 Winter Triticale 1/ :

Flora	83.0	43.5	32	171	11.0
I-18	79.6	54.3	44	167	10.8
Decade	73.4	50.7	40	167	10.2
# 239	68.1	51.8	48	167	12.1

Location : Research Center, N. of Conrad

Date Seeded : September 16, 1988.

Harvest Date : August 14, 1989.

Precipitation : May 1 to harvest = 7.44".

Fertilizer : 100# 11-51-0 with seed and 45# N. actual topdressed
 in spring.

* Sawfly resistant varieties.

1/ Triticale yield based on 50-pound test weight.

Yield Experimental Mean : 61.61

Error Degrees of Freedom : 129

F. Test : 3.82

C.V. : 4.67

LSD (0.05) : 8.06

Table 1b. Winter wheat and winter triticale variety trials grown on fallow at the Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1989. 1/

Variety	Yield ^a bu/a	Test wt. lb/bu	Plant hgt. inches	Head date <u>3/</u>	% Protein
MT 88002 *	73.1	60.5	27	179	9.8
MT 88003 *	68.7	61.7	28	177	8.8
Winridge	68.4	62.0	34	174	9.3
Tiber	67.3	64.4	34	175	10.6
MT 7811 (Hard White)	66.8	63.2	35	172	11.8
Weston	66.2	59.6	37	171	9.8
Thunderbird	66.2	64.6	31	167	11.6
Blizzard	65.7	63.2	36	180	11.6
MT 88001 *	65.4	62.5	26	179	11.7
MT 88005 *	65.3	63.2	39	173	11.2
Neeley	63.4	63.4	34	178	11.2
Judith	63.1	62.9	29	172	10.8
Winalta	62.6	64.9	37	171	13.2
Quantum 542	61.9	62.6	34	169	11.0
Roughrider	61.5	63.1	35	171	11.6
Norstar	61.1	64.8	42	180	10.9
Centurk	60.9	63.7	32	169	11.8
Rocky	60.8	63.9	33	170	10.2
MT 88008 *	60.6	64.6	39	174	11.0
Norwin	60.1	64.6	27	173	9.7
Cree	60.0	64.6	40	178	11.6
Agassiz	60.0	63.9	40	172	11.0
Abiline	59.6	64.1	25	169	12.4
Cheyenne	58.7	64.1	36	176	11.8
QT 546	58.4	62.8	30	170	11.7
Seward	57.3	63.5	34	173	9.3
Redwin	54.9	62.4	35	173	10.4
MT 88006 *	54.5	61.6	42	173	12.8

Winter Triticale <u>2/</u> :					
Flora	83.0	43.5	32	171	11.0
I-18	79.6	54.3	44	167	10.8
Decade	73.4	50.7	40	167	10.2
# 239	68.1	51.8	48	167	12.1

(continued)

Table 1b. continued.

Location : Research Center, N. of Conrad
Date Seeded : September 16, 1988.
Harvest Date : August 14, 1989.
Precipitation : May 1 to harvest = 7.44".
Fertilizer : 100# 11-51-0 with seed and 45# N. actual topdressed
in spring.

* Sawfly resistant varieties.

1/ Abbreviated list.

2/ Triticale yield based on 50-pound test weight.

3/ Heading date : days from January 1.

Yield Experimental Mean : 61.61

Error Degrees of Freedom : 129

F. Test : 3.82

C.V. : 4.67

LSD (0.05) : 8.06

Table 2. Three year summary for winter wheat varieties grown at the Mont. Agr. Expt. Sta., 1987 - 1988 - 1989. Western Triangle Research Center, Conrad, MT.

Variety	3 - Year Comparable Average			
	Yield bu/a	Height inches	Test wt.	% Protein
Tiber	60.6	31	62.6	11.9
Winridge	60.0	30	61.0	10.5
Rocky	59.6	29	63.6	11.8
Neeley	59.3	29	62.0	12.7
Centurk	59.0	31	63.3	12.1
Cheyenne	58.6	33	62.6	12.4
Cree	58.3	34	63.0	12.4
MT 7811	58.3	30	62.3	12.8
Judith	57.6	28	62.0	11.7
Agassiz	57.0	34	63.0	12.6
Norstar	56.6	38	62.3	11.6
Winalta	56.0	34	64.0	14.3
Abiline	55.6	23	63.2	13.1
Thunderbird	54.6	28	64.3	13.2
Seward	52.9	31	63.2	11.2
Roughrider	52.6	33	62.3	13.7
Redwin	52.3	31	61.6	13.0
Norwin	51.6	24	63.6	12.6

Table 3. Winter wheat variety trial grown near Dutton, 1989.
 Mont. Agr. Expt. Sta., Western Triangle Research
 Center, Conrad, MT. 1/

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	Spring survival class	% Protein
Vona	64.0	58.9	33	1.5	10.3
Redwin	63.2	60.6	38	3	9.7
Neeley	63.2	60.7	37	3	8.9
Warrior	62.7	60.2	40	3	8.9
Norwin	62.1	62.0	27	5	10.3
Judith	60.6	59.4	34	3	10.6
Tiber	60.2	60.6	38	3	9.3
Quantum 542	59.9	60.8	37	3	10.1
MT 88003 *	59.4	58.6	31	-	9.0
Rocky	57.5	60.1	36	2	8.8
MT 88001 *	56.8	59.8	26	-	11.4
Cree	56.7	60.5	40	3	10.7
Norstar	56.5	61.5	41	5	11.9
Winalta	56.2	62.2	39	4	12.6
MT 79125	56.0	58.7	31	-	11.1
MT 88002 *	55.8	55.2	28	-	8.6
Cheyenne	54.9	60.6	40	3	11.5
MT 88005 *	54.4	59.6	40	-	11.6
Winridge	53.8	59.3	38	2	9.3
Centurk	50.2	59.8	36	2	9.1
MT 88008 *	48.4	60.4	39	-	9.5
MT 88006 *	43.2	58.9	40	-	10.3

Cooperator : Darryl Goodmundson, 1 mile east of Dutton.

Fertilizer : 100# 11-51-0 with seed, + 80# AA-N.

Previous Crop : Fallow

Date Seeded : September 8, 1989.

Date Harvested : August 1, 1989.

Rainfall : May 1 to harvest : over 6".

* Sawfly resistant varieties.

1/ Spring survival class : 5=best; 1=very low; based on several
 location-years of observation.

Yield Experimental Mean : 57

Error Degrees of Freedom : 42

F. Test : 2.06

C.V. : 6.29

LSD (0.05) : 10.23

Table 4. Three year summary for dryland winter wheat varieties grown near Dutton, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year comparable average			
	Yield bu/a	Height inches	Test wt.	% Protein
Judith	54.7	29	59.8	12.2
Neeley	54.0	30	61.6	11.4
Cheyenne	52.6	33	61.0	11.9
Redwin	52.3	32	62.3	12.5
Tiber	52.0	32	61.6	11.9
Rocky	51.6	29	61.6	11.6
Cree	51.6	33	61.3	11.9
Vona	51.6	27	60.3	11.6
Warrior	51.0	33	61.0	12.3
Norstar	50.0	36	62.0	11.8
Centurk	48.6	30	61.0	10.8
Winridge	48.3	31	60.0	10.8
Norwin	47.3	24	62.3	11.7
Winalta	47.0	33	62.3	13.3

Cooperator : Darryl Goodmundson, 1 mile east of Dutton.

Table 5. Winter wheat variety trial grown near Sun River, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1/

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	Spring survival class	% Protein
Judith	49.5	58.6	31	3	15.3
Warrior	48.8	60.0	31	3	15.4
Redwin	48.6	61.2	30	3	16.0
Vona	48.3	59.9	27	1.5	14.7
Neeley	47.9	58.0	30	3	14.9
Norstar	47.8	60.7	39	5	14.8
Tiber	47.6	60.4	30	3	14.9
Rocky	47.4	60.9	31	2	14.6
Winalta	46.7	61.5	35	4	14.8
Centurk	46.3	60.3	31	2	16.1
Norwin	45.5	60.1	22	5	15.1
Winridge	45.3	57.1	29	2	14.7
Cheyenne	45.1	60.3	33	3	14.2
Cree	44.7	60.3	33	3	14.6
Quantum 542	44.3	58.4	31	3	13.7
MT 88003 *	43.9	57.1	24	-	13.2
MT 79125	43.2	58.0	27	-	15.2
MT 88008 *	42.7	61.3	30	-	13.8
MT 88002 *	42.6	53.0	24	-	13.4
MT 88005 *	40.1	59.1	33	-	15.2
MT 88001 *	36.8	57.0	23	-	16.0
MT 88006 *	35.2	59.1	33	-	17.1

Cooperator : Chuck Merja, 2 miles southeast of Sun River.

Date Seeded : October 2, 1988.

Date Harvested : July 31, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with seed + 50# AA-N.

* Sawfly resistant varieties.

Rainfall : May 18 to harvest : over 6".

1/ Spring survival class : 5=best; 1=very low; based on several location-years of observation.

Yield Experimental Mean : 44.91

Error Degrees of Freedom : 42

F. Test : 2.34

C.V. : 5.45

LSD (0.05) : 6.99

Table 6. Three year summary for dryland winter wheat varieties grown near Sun River, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3 - year comparable average			
	Yield bu/a	Height inches	Test wt.	% Protein
Vona	34.5	22	59.9	14.7
Rocky	33.0	25	61.4	15.2
Judith	33.0	25	58.9	16.9
Tiber	33.0	25	60.6	15.1
Warrior	33.0	27	60.0	16.0
Cree	32.3	27	60.6	14.7
Centurk	32.0	25	60.6	15.8
Redwin	31.6	24	61.3	15.8
Cheyenne	31.3	27	61.0	14.8
Winridge	31.0	24	59.0	14.2
Neeley	31.0	24	58.6	15.3
Norstar	30.3	29	60.3	15.0
Norwin	29.3	20	61.0	14.8
Winalta	28.6	29	61.3	15.6

Cooperator : Chuck Merja, 2 miles SE of Sun River.

Table 7. Winter wheat variety trial grown near Eden (Cascade County), 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1/

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	Spring survival class	Lodging	% Protein
Quantum 542	72.5	62.7	40	3	slight	10.6
MT 88003 *	68.5	57.9	31	-	none	9.0
Neeley	67.2	61.7	36	3	none	10.9
Judith	64.0	59.6	33	3	none	12.0
Winridge	63.8	60.5	39	2	none	11.4
MT 88002 *	62.6	59.8	30	-	none	9.3
Vona	62.1	62.3	31	1.5	none	11.0
Norwin	60.9	62.2	30	5	none	11.5
Tiber	58.2	61.0	36	3	none	12.1
MT 88001 *	57.7	63.0	28	-	none	11.3
MT 79125	57.7	60.3	31	-	moderate	10.4
Redwin	57.4	60.5	36	3	none	10.3
Warrior	57.3	62.6	38	3	moderate	12.2
Norstar	55.5	62.3	47	5	moderate	12.4
Cree	53.6	63.3	39	3	moderate	12.6
Centurk	53.6	62.9	36	2	slight	10.6
MT 88005 *	52.3	60.3	42	-	moderate	13.4
Cheyenne	52.2	63.1	39	3	moderate	11.7
Winalta	51.6	62.9	44	4	moderate	12.0
Rocky	49.5	63.0	36	2	slight	11.2
MT 88008 *	48.4	62.3	41	-	severe	12.6
MT 88006 *	48.2	60.1	42	-	moderate	15.1

Cooperator & Location : Tom Lorang, Eden

Date Seeded : October 2, 1988

Date Harvested : August 7, 1989

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with seed.

Precipitation : May 18 to harvest : over 6".

* Sawfly resistant varieties.

1/ Spring survival class : 5=best; 1=very low; based on several location-years of observation.

Yield Experimental Mean : 57.87

Error Degrees of Freedom : 42

F. Test : 9

C.V. : 3.84

LSD (0.05) : 6.34

Table 8. Three year summary for dryland winter wheat varieties grown near Eden, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3 - year comparable average			
	Yield bu/a	Height inches	Test wt.	% Protein
Neeley	61.6	33	62.3	9.5
Judith	61.5	31	60.0	11.1
Vona	59.6	29	62.0	10.1
Winridge	59.3	36	59.0	9.7
Tiber	57.0	35	61.6	10.5
Cree	56.0	37	63.0	10.8
Norwin	55.0	27	62.6	10.9
Norstar	53.3	43	61.6	11.0
Warrior	53.0	36	62.6	11.0
Cheyenne	52.3	37	63.0	10.6
Redwin	52.3	35	62.3	10.3
Centurk	51.3	34	62.6	9.7
Winalta	50.0	39	63.0	11.1
Rocky	48.1	34	63.0	10.3

Cooperator : Tom Lorang; Eden, MT.

TITLE: Spring Wheat, Durum, and Triticale variety investigations.

YEAR: 1989

LOCATION: Western Triangle Research Center, Conrad, MT.

PERSONNEL: Gregory D. Kushnak, Ron Thaut, and Larry Christiaens, Research Center, Conrad; and the MSU Dept. of Plant & Soil Science.

Dryland spring wheat, durum, and triticale variety trials were grown near Conrad, Cut Bank, Oilmont, Choteau, and Sun River; and irrigated trials at Conrad and Fairfield. All trials were grown on fallow, except Fairfield irrigated. Soil moisture was good at all locations, and growing season rainfall above normal; resulting in lush plant growth.

Data for the 1989 spring wheat tests at the various locations are presented in Tables 10a-17a, with 3-year averages in Tables 10b-17b. Test weights were low at all locations except Choteau; most likely a result of excessive water demand from the lush plant growth.

Sawfly damage was severe at Cut Bank, Oilmont, and Choteau. Sawfly resistant varieties in the tests included three semidwarfs Glenman, Rambo and Cutless; and four standard height varieties Lew, Fortuna, Lancer, and Amidon. Rambo and Amidon showed only partial resistance to sawfly in 1989, and also in 1988. Amidon is a recent release from North Dakota.

Among the sawfly resistant varieties, Glenman had the highest 3-year average yield at all dryland locations; and Lancer and Cutless ranked lowest. Grain protein was generally inversely related to yield. The partially resistant Amidon ranked fairly high for both yield and protein at some locations. However, the level of resistance in Amidon was not considered high enough to offer protection from the sawfly infestations encountered in these trials. Weak, broken stems were observed from Amidon at the Sun River location.

Durum varieties were grown at the Conrad dryland and irrigated sites (Tables 18a-19b). The semidwarf types Stockholm, Lloyd, and Cando had the highest 3-year averages on both irrigated and dryland; followed by the medium-height Laker and Sceptre. Medora, a tall type ranked high only on dryland. Renville ranked fairly high on irrigated, but had tall weak straw.

Data from the triticale tests are presented in Tables 21-24. Ripening was later than Newana wheat for all triticale varieties. Kramer was the only triticale to completely ripen prior to a September 11 killing frost at the Cut Bank location; and Karl and Carman were mature, but not dry. The rest of the entries were fairly green. Thus, maturity class should be carefully considered when choosing triticale varieties; particularly in short growing season areas. Juan was considered too late for any of the test locations; and T-54, T-61, and Sunland were considered marginal.

Plant height was excessive for most triticales. The relatively early maturing varieties Kramer and Karl had the shortest straw - a combination which made these two varieties more agronomically desirable than the others. Wapiti had weak straw, and lodged easily.

Triticale yields were based on a 50-pound test weight. If direct comparisons to wheat yields are desired, the bushel-yield data should be converted to pounds per acre.

All triticale varieties suffered sawfly damage. Ergot was not detected in the test plots; but ergot has been observed in some triticale fields in the Triangle area during the previous year.

These trials were conducted by the MSU Western Triangle Research Center, Conrad; in cooperation with the MSU Plant and Soil Science Department.

The background and detailed descriptions of the varieties tested are included in MSU Extension Bulletin 1093, "Performance Summary of Spring Wheat Varieties in Montana," available at all County Agent offices.

Table 9. Advanced yield spring wheat variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head Date
MT 8804	72.5	59.0	33	14.0	191
WB Laker durum	69.7	59.5	32	13.8	194
Cutless *	69.3	59.6	36	15.3	192
MT 8651	68.6	59.7	33	14.1	193
MT 8182	68.4	56.3	29	14.7	193
MT 8801	68.3	56.2	35	13.8	195
Pondera	66.6	58.7	33	13.6	190
Rambo *	66.5	58.9	30	13.0	195
Amidon *	66.4	58.6	39	15.7	192
Tanager "S"	65.7	57.2	28	13.5	193
Newana	65.1	58.6	30	13.0	194
MT 8402	64.8	58.9	29	14.4	190
MT 8849	64.7	58.2	32	13.3	194
Renville durum	64.4	58.7	36	14.3	194
MT 8823	63.8	59.3	34	14.7	193
MT 8824	63.8	59.4	35	15.0	190
Penawawa	63.6	58.4	29	11.8	195
Ward durum	63.5	60.5	36	14.2	191
MT 8182SE	63.4	56.6	30	13.2	191
CO 982309	63.3	57.2	31	15.3	194
MT 8612	63.1	60.8	28	14.1	191
MT 8608	62.8	60.0	30	15.0	193
MT 8827	62.2	60.7	32	13.1	193
MT 8841	61.8	58.9	32	13.8	192
MT 8657	61.8	58.3	27	14.6	190
MT 8836	61.8	57.8	31	15.3	192
MT 8615	61.7	59.1	31	15.8	191
MT 8626	61.3	60.1	30	14.0	191
Owens (s. white)	60.8	56.7	29	11.7	191
Fortuna	60.4	59.6	40	14.6	192
MT 8846	60.3	55.5	30	13.7	191
MT 8826	59.9	58.4	36	15.8	191
MT 8641	59.8	57.9	30	14.7	191

(continued)

Table 9. Advanced yield spring wheat continued.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head Date
MT 8812	59.6	57.1	29	14.2	191
Glenman *	59.6	57.2	32	13.2	193
Crosby durum	59.4	60.1	39	14.0	190
MT 8845	58.5	56.3	29	13.7	193
MT 8645	58.2	59.6	29	14.4	190
Westbred Regal durum	57.8	57.2	41	14.1	194
MT 8653	55.6	59.6	33	15.7	189
Lew *	55.0	59.2	37	14.9	194
MT 8808	54.9	55.3	25	15.3	189
Thatcher	54.8	57.9	40	13.6	193
MT 8833	54.1	57.3	30	14.9	191
MT 8822	54.1	58.2	33	14.3	191
MT 8858	54.0	58.3	30	13.9	192
MT 8828	53.6	56.6	31	14.2	191
Kamut 1/	52.8	58.4	44	14.8	194
Klasic (H.white)	47.2	55.8	21	13.5	187

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : August 31, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 40# N actual topdressed.

Soil Moisture Probe at Seeding : More than 3 feet.

Rainfall from Seeding to Ripening : 8.17".

* Sawfly resistant varieties (Amidon & Rambo partial resistance).

1/ Kamut is a specialty class wheat.

Yield Experimental Mean : 61.4

Error Degrees of Freedom : 96

F. Test : 2.73

C.V. : 5.11

LSD. (0.05) : 8.80

Table 10a. Dryland spring wheat variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. (Abbreviated List).

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head Date
WB Laker durum	69.7	59.5	32	13.8	194
Cutless *	69.3	59.6	36	15.3	192
Pondera	66.6	58.7	33	13.6	190
Rambo *	66.5	58.9	30	13.0	195
Amidon *	66.4	58.5	39	15.7	192
Newana	65.1	58.6	30	13.0	194
Renville durum	64.4	58.7	36	14.3	194
Penawawa (s. white)	63.6	58.4	29	11.8	195
Ward durum	63.5	60.5	36	14.2	191
Owens (s. white)	60.4	56.7	29	11.7	191
Fortuna	60.4	59.6	40	14.6	192
Glenman *	59.6	57.2	32	13.2	193
Crosby durum	59.4	60.1	39	14.0	190
WB Regal durum	57.8	57.2	41	14.1	194
Lew *	55.0	59.2	37	14.9	194
Thatcher	54.8	57.9	40	13.6	193
Kamut <u>1/</u>	52.8	58.4	44	14.8	194
Klasic (h. white)	47.2	55.8	21	13.5	187

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : August 31, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 40# N actual topdressed.

Soil Moisture Probe at Seeding : More than 3 feet.

Rainfall from Seeding to Ripening : 8.17"

* Sawfly resistant varieties (Amidon & Rambo partial resistance).

1/ Kamut is a specialty class wheat.

Yield Experimental Mean : 61.4

Error Degrees of Freedom : 96

F. Test : 2.73

C.V. : 5.11

LSD (0.05) : 8.80

Table 10b. Three-year summary for dryland spring wheat varieties grown at the Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1987 - 1988 - 1989.

Variety	3-Year Comparable Average			
	Yield bu/a	Test wt.	Height inches	% Protein
WB Laker	65.4	62	29	14.2
Renville	59.8	60	33	14.7
Penawawa	59.8	59	26	12.1
Glenman	59.6	58	28	13.9
MT 8402	59.6	64	27	14.7
Rambo	59.3	62	28	14.0
Owens	58.6	59	27	11.6
Ward	58.0	62	33	14.3
Amidon	56.6	58	33	15.6
Newana	56.6	59	27	14.4
Cutless	56.0	61	30	15.9
Pondera	56.3	62	28	14.7
Fortuna	55.0	62	33	15.5
Crosby	54.6	62	33	14.5
WB Regal	54.2	58	37	14.2
Lew	54.0	62	32	15.1
Thatcher	50.3	59	34	14.2
Kamut	49.5	59	40	15.2
Klasic	43.9	57	19	13.9

Table 11. Advanced yield irrigated spring wheat trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head date
MT 8824	75.2	60.5	35	11.8	191
Penawawa (s. white)	74.7	57.5	32	9.6	194
Crosby	72.4	61.7	40	11.7	190
MT 8849	70.1	59.4	36	12.2	193
Lew *	69.9	61.4	41	12.3	194
Ward durum	68.9	61.0	41	10.9	192
Newana	68.8	59.6	32	11.2	195
WB Regal durum	67.9	57.4	43	9.8	196
MT 8608	66.8	59.8	30	13.5	192
WB Laker durum	66.7	57.7	33	13.0	194
MT 8612	66.1	61.2	33	12.5	190
Kamut	65.9	55.8	46	11.6	194
Amidon *	65.7	58.6	41	14.2	192
MT 8651	65.6	60.5	35	11.4	192
MT 8845	64.9	58.5	33	11.8	193
Renville durum	64.4	58.8	38	11.1	193
Glenman *	63.9	59.9	34	11.6	192
Thatcher	63.5	59.1	43	11.4	190
Pondera	63.4	60.5	33	12.1	190
Rambo *	62.4	58.6	32	12.2	192
MT 8812	62.7	59.2	30	11.7	191
MT 8836	62.6	58.4	36	11.9	193
MT 8858	62.4	58.6	35	11.5	192
Cutless *	61.9	60.7	39	12.1	191
MT 8828	61.7	58.7	37	11.8	191
Fortuna *	61.6	61.0	38	12.0	190
MT 8402	61.4	61.3	32	11.8	191
MT 8826	61.1	59.4	38	12.3	191
Tanger "S"	61.0	61.1	32	11.8	193
MT 8641	60.8	58.5	36	11.5	190
MT 8846	60.8	56.7	32	11.4	191
Owens (s. white)	60.4	56.7	32	10.0	192
MT 8615	60.4	61.1	33	12.8	191

(continued)

Table 11. Advanced yield continued.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head date
MT 8804	60.2	58.8	34	11.3	191
MT 8823	60.0	60.3	37	12.4	192
MT 8626	59.6	60.5	34	11.7	189
MT 8833	59.5	57.9	37	11.9	191
MT 8801	58.0	52.8	36	14.2	196
MT 8182 SE	57.7	56.7	33	12.4	195
MT 8841	57.4	60.1	32	11.8	193
MT 8653	56.9	61.4	38	11.4	189
MT 8827	56.1	61.1	35	11.9	193
MT 8808	55.9	57.7	30	12.0	189
MT 8182 (H. white)	55.3	55.4	32	12.9	193
MT 8645	55.3	60.5	31	12.5	188
CO 982309	54.9	55.1	33	11.3	193
MT 8822	53.1	59.0	35	12.7	191
MT 8657	53.0	59.1	31	12.4	191
Klasic (H. white)	45.5	57.5	23	11.8	189

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : September 1, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 40# N actual top dressed.

* Sawfly Resistant Varieties (Amidon partial resistance).

Irrigation method : Sprinkler; July 6 and July 25.

Yield Experimental Mean : 62.1

Error Degrees of Freedom : 96

F. Test : 1.76

C.V. : 6.95

LSD (0.05) : 12.11

Table 12a. Irrigated spring wheat trial north of Conrad, 1989.
 Mont. Agr. Expt. Sta., Western Triangle Research Center,
 Conrad, MT. (Abbreviated list).

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head date
Penawawa (s. white)	74.7	57.5	32	9.6	194
Crosby durum	72.4	61.7	40	11.7	190
Lew *	69.9	61.4	41	12.3	194
Ward durum	68.9	61.0	41	10.9	192
Newana	68.8	59.6	32	11.2	195
WB Regal durum	67.9	57.4	43	9.8	196
WB Laker durum	66.7	57.7	33	13.0	194
Kamut <u>1</u> /	65.9	55.8	46	11.6	194
Amidon *	65.7	58.6	41	14.2	192
Renville durum	64.4	58.8	38	11.1	193
Glenman *	63.9	59.9	34	11.6	192
Thatcher	63.5	59.1	43	11.4	190
Pondera	63.4	60.5	33	12.1	190
Rambo *	62.4	58.6	32	12.2	192
Cutless *	61.9	60.7	39	12.1	191
Fortuna *	61.6	61.0	38	12.0	190
Owens (s. white)	60.4	56.7	32	10.0	192
Klasic (h. white)	45.5	57.5	23	11.8	189

Location : Research Center, Conrad

Seeding Date : May 9, 1989.

Harvest Date : September 1, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 40# N actual top dressed.

* Sawfly resistant varieties (Amidon partial resistance).

Irrigation method : Sprinkler; July 6 and July 25.

1/ Kamut is a specialty class wheat.

Yield Experimental Mean : 62.1

Error Degrees of Freedom : 96

F. Test : 1.76

C.V. : 6.95

LSD (0.05) : 12.11

Table 12b. Three-year summary for irrigated spring wheat varieties grown at the Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1987 - 1988 - 1989.

Variety	3-Year Comparable Average			
	Yield bu/a	Test wt.	Height inches	% Protein
Penawawa	77.5	60	30	10.6
Newana	74.6	61	30	13.1
Glenman	73.0	61	33	13.3
Amidon	73.0	61	37	14.5
WB Regal	70.3	58	41	10.9
Owens	70.0	60	28	11.1
WB Laker	69.2	59	31	14.4
Rambo	68.6	62	31	13.8
Lew	68.6	62	38	14.5
Crosby	68.3	62	37	13.8
MT 8402	68.3	62	30	13.9
Kamut	68.2	57	44	12.9
Pondera	67.6	62	31	14.2
Renville	66.1	60	36	12.3
Ward	66.0	62	38	13.6
Fortuna	63.3	62	35	14.5
Tanger "S"	63.0	62	30	13.1
Thatcher	63.0	60	40	13.9
Cutless	62.6	61	34	14.7
Klasic	47.5	59	22	13.1

Table 13a. Spring wheat variety trial north of Cut Bank, 1989.
Mont. Agr. Expt. Sta., Western Triangle Research
Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein
Owens (s. White)	44.0	55.9	27	10.6
Marshall	42.1	53.2	27	12.1
Penawawa (s. white)	41.5	58.6	26	10.1
Lew *	40.9	58.3	35	13.3
Amidon *	40.3	55.5	36	11.9
MT 8182	39.7	52.4	30	12.8
Fortuna *	39.2	60.9	35	13.5
Pondera	38.0	60.5	28	13.4
Glenman *	37.9	57.4	29	12.5
Rambo *	37.6	54.9	27	11.5
NK 751	37.2	61.0	27	12.4
MT 8402	36.9	60.1	27	13.4
Stoa	36.2	56.9	32	13.4
Alex	34.8	54.4	32	12.9
Olaf	34.6	57.0	27	11.8
Lancer *	34.2	58.6	35	13.2
Westbred 906R	34.1	57.3	27	12.8
Len	33.6	57.9	27	13.0
Cutless *	33.5	59.4	30	13.3
Newana	29.8	56.8	27	13.1

Cooperator and Location : Don Bradley, 14 miles north of Cut Bank,
Glacier County.

Planting Date : May 10, 1989.

Harvest Date : September 11, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed.

Soil Moisture Probe Depth at Seeding : 24".

Rainfall, Planting to Maturity : More than 6".

* Sawfly Resistant Varieties (Amidon and Rambo partial resistance).

Yield Experimental Mean : 37.3

Error Degrees of Freedom : 38.0

F. Test : 1.45

C.V. : 7.88

LSD (0.05) : 8.41

Table 13b. Three-year summary for spring wheat varieties grown north of Cut Bank, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year comparable average			
	Yield bu/a	Test wt.	Height inches	% Protein
Owens	50.6	58	28	11.4
Penawawa	49.8	60	26	10.8
Glenman	49.6	58	29	13.1
Rambo	49.0	59	27	12.9
Marshall	49.0	57	27	13.2
Amidon	47.5	57	36	12.8
Pondera	47.0	60	28	14.0
Len	47.0	59	28	13.5
NK 751	47.0	60	26	12.6
Lew	46.3	60	34	14.2
Alex	45.6	59	33	14.1
Newana	45.3	59	27	13.8
Olaf	44.1	59	27	13.2
Stoa	44.0	58	31	14.3
Fortuna	44.0	61	34	14.7
MT 8402	43.5	60	29	14.2
Westbred 906R	42.2	59	28	14.0
Cutless	41.6	60	29	14.4
Lancer	40.6	60	35	14.5

Table 14a. Dryland spring wheat variety trial east of Oilmont, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein
Penawawa (S. White)	26.2	55.7	26	16.5
Glenman *	25.5	54.0	28	17.8
Fortuna *	25.3	57.2	33	17.5
Amidon	24.5	56.6	29	17.8
MT 8402	23.4	56.3	27	16.0
Lew *	23.4	55.8	32	16.1
Newana	23.3	54.1	27	17.6
Len	23.3	53.6	29	17.4
NK 751	23.2	53.8	28	17.0
Alex	23.2	55.7	32	16.8
Stoa	23.0	54.8	31	18.6
Westbred 906R	22.8	55.0	27	17.3
Marshall	22.5	53.9	24	18.5
Owens	22.5	52.2	26	18.3
Pondera	22.0	54.7	29	18.8
Lancer *	21.8	55.5	31	15.7
Rambo *	21.8	55.9	26	16.9
MT 8182	21.0	52.2	27	18.1
Cutless *	20.4	57.4	27	19.4
Olaf	19.9	55.5	26	17.6

Cooperator and Location : Terry Alme, 8 miles east of Oilmont,
Toole County.

Planting Date : April 18, 1989.

Harvest Date : August 3, 1989.

Previous Crop : Fallow

Soil Moisture Probe at Planting : 2' 6".

Rainfall, Planting to Harvest : 6"

Fertilizer : 100# 11-51-0 with the seed.

* Sawfly resistant varieties (Amidon & Rambo partial resistance).

Yield Experimental Mean : 22.75

Error Degrees of Freedom : 38.0

F. Test : 2.11

C.V. : 4.85

LSD (0.05) : 3.18

Table 14b. Two-year summary for dryland spring wheat varieties grown east of Oilmont, MT. 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	2-year comparable average			
	Yield bu/a	Test wt.	Plant height	% Protein
Glenman	20.8	55	23	16.8
Penawawa	20.8	59	21	16.5
Amidon	20.0	59	23	17.8
Stoa	19.8	57	25	18.0
Marshall	19.3	57	21	17.5
Len	19.3	56	24	17.0
Alex	18.7	58	27	17.4
Fortuna	18.7	58	25	17.5
Rambo	18.2	58	21	17.0
Pondera	18.2	58	23	18.6
Newana	18.2	57	21	17.9
Lancer	17.7	57	25	16.4
Owens	17.7	54	22	17.0
MT 8402	17.7	57	22	17.2
Olaf	17.2	57	21	17.6
Westbred 906R	17.2	56	22	17.7
Lew	17.2	57	25	17.0
Cutless	16.1	58	22	18.6

Table 15a. Dryland spring wheat variety trial east of Choteau, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein
Penawawa (s. white)	60.2	61.5	26	12.5
Owens (s. white)	60.1	60.1	31	12.6
MT 8402	55.5	62.5	28	15.4
MT 8182	53.6	58.4	31	15.0
Westbred 906R	53.4	60.5	29	13.9
Glenman *	52.9	61.2	30	14.1
Rambo *	52.6	62.2	27	14.1
Len	50.1	61.9	30	14.4
NK 751	50.1	60.9	28	13.4
Amidon *	49.7	61.0	33	16.2
Pondera	48.8	62.6	29	15.1
Lew *	48.6	63.2	38	14.9
Newana	47.6	59.8	27	15.2
Marshall	47.2	60.8	25	15.1
Lancer *	46.9	62.0	36	15.9
Fortuna *	45.1	62.5	38	15.6
Stoa	44.5	61.3	35	15.5
Cutless *	41.2	62.6	34	15.6
Alex	40.1	62.0	38	15.7
Olaf	38.1	60.6	29	15.4

Cooperator and Location : Rick Corey, northeast of Choteau, Teton County.

Planting Date : April 19, 1989.

Harvest Date : August 7, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed.

Soil Moisture Probe at Time of Seeding : 24".

Rainfall From May 16 to Harvest : 6".

* Sawfly Resistant Varieties (Amidon and Rambo partial resistance).

Yield Experimental Mean : 49.3

Error Degrees of Freedom : 38.0

F. Test : 6.95

C.V. : 4.55

LSD (0.05) : 6.42

Table 15b. Three-year summary for dryland spring wheat grown near Choteau, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year comparable average			
	Yield bu/a	Height inches	Test wt.	% Protein
Penawawa	48.1	24	61	12.0
MT 8402	44.7	26	63	14.9
Owens	44.6	28	60	11.5
Westbred 906R	42.4	28	61	14.2
NK 751	40.3	24	59	12.8
Amidon	40.1	30	60	15.5
Glenman	40.0	27	59	13.2
Lew	39.3	34	62	14.1
Rambo	39.3	25	60	13.4
Pondera	38.0	27	62	14.3
Len	38.0	27	61	13.5
Fortuna	37.3	33	61	14.8
Stoa	36.6	31	60	14.6
Marshall	36.0	24	60	14.0
Newana	36.0	26	59	14.3
Lancer	35.3	33	61	15.0
Alex	33.6	32	61	15.0
Cutless	32.6	30	62	15.2
Olaf	32.1	27	60	14.6

Table 15a. Dryland spring wheat variety trial south of Sun River, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein
Penawawa (S. White)	43.5	57.5	24	13.8
Newana	43.4	55.6	26	16.9
Owens (s. white)	41.8	53.1	28	14.5
Amidon *	41.7	56.6	32	16.8
MT 8402	41.6	56.2	27	17.9
Alex	41.4	57.1	34	17.5
Len	41.4	57.9	28	16.3
Glenman *	41.1	55.5	27	14.0
Westbred 906R	40.1	56.4	26	17.5
NK 751	39.5	58.1	24	15.6
Pondera	38.9	58.2	28	17.5
Marshall	38.9	55.3	24	18.3
Lew *	38.0	57.6	29	16.8
Stoa	37.8	58.1	30	17.2
Rambo *	37.3	55.5	26	17.1
Fortuna *	37.1	59.2	32	16.4
Olaf	36.3	55.4	27	18.2
Lancer *	36.0	55.3	31	18.1
MT 8182	35.4	54.0	26	17.4
Cutless *	35.1	58.4	27	18.6

Cooperator and Location : Chuck Merja, southeast of Sun River.

Planting Date : April 19, 1989.

Harvest Date : July 31, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 50# AA.

Soil Moisture Probe Depth at Seeding : 24".

Rainfall from May 18 to Harvest : 6".

* Sawfly resistant varieties (Amidon and Rambo partial resistance).

Yield Experimental Mean : 39.31

Error Degrees of Freedom : 38.0

F. Test : 2.99

C.V. : 3.86

LSD (0.05) : 4.34

Table 16b. Three year summary for dryland spring wheat grown near Sun River, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year Comparable Average			
	Yield bu/a	Test wt.	Plant hgt.	% Protein
Len	27.0	58	23	17.3
NK 751	27.0	56	20	16.8
Amidon	26.8	58	26	17.5
Westbred 906R	26.9	57	23	18.2
Newana	26.6	57	23	17.2
Stoa	25.6	57	26	17.6
Pondera	25.6	59	24	18.2
Owens	25.6	56	22	15.4
Glenman	25.0	55	24	16.0
Marshall	24.6	56	21	17.6
Lew	24.3	58	25	17.2
Alex	24.3	57	26	18.1
Rambo	24.0	58	22	17.2
Lancer	23.3	57	26	18.5
Cutless	22.7	59	23	18.6
Fortuna	21.6	59	26	17.2

Table 17a. Irrigated spring wheat variety trial north of Fairfield, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein
Penawawa (s. white)	86.7	56.8	32	9.9
Westbred 906R	79.8	58.2	33	11.3
Amidon *	73.8	58.3	43	11.5
Marshall	72.8	58.1	30	11.7
Newana	72.0	58.9	30	10.7
NK 751	71.0	56.7	32	10.7
MT 8402	70.3	59.6	31	12.3
Rambo *	70.2	59.4	34	11.1
Owens (s. white)	69.0	56.5	32	10.1
Fortuna *	68.3	56.5	41	11.1
Len	67.7	58.4	33	11.0
Lancer *	66.5	58.5	41	12.6
Lew *	65.8	58.2	43	12.2
Stoa	65.6	57.2	41	11.1
MT 8182	65.3	57.2	32	10.3
Pondera	64.7	57.8	32	12.4
Olaf	61.6	57.4	34	11.8
Glenman *	60.3	57.6	33	11.2
Cutless *	60.2	58.1	38	11.7
Alex	58.1	59.3	42	11.0

Cooperator and Location : Al Meyer, north of Fairfield, Teton County.

Planting Date : April 20, 1989.

Harvest Date : September 5, 1989.

Previous Crop : Barley

Fertilizer : 100# 11-51-0 with the seed and 100# N actual topdressed.

Irrigation Method : Flood

* Sawfly Resistant Varieties (Amidon and Rambo partial resistance).

Yield Experimental Mean : 68.49

Error Degrees of Freedom : 38

F. Test : 2.7

C.V. : 6

LSD (0.05) : 11.77

Table 17b. Three year summary for irrigated spring wheat varieties grown near Fairfield, MT. 1986 - 1987 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year Comparable Average			
	Yield bu/a	Test wt.	Plant hgt.	% Protein
Penawawa	100.3	59	31	10.2
Westbred 906R	92.3	60	32	11.6
Marshall	86.6	60	30	11.5
Owens	86.6	58	31	11.7
Newana	86.0	61	31	10.8
Amidon	85.3	60	41	11.8
Rambo	84.3	60	32	11.5
NK 751	82.6	59	30	11.4
Pondera	80.6	60	31	11.9
Len	79.0	60	31	11.0
Glenman	78.0	60	32	11.5
Lew	77.6	61	38	11.4
Stoa	77.3	60	37	11.3
Alex	75.4	60	39	11.8
Fortuna	73.6	60	37	12.0
Lancer	70.9	60	40	12.8
Cutless	70.4	59	36	12.4

Table 18a. Dryland durum variety trial north of Conrad, 1989.
 Mont. Agr. Expt. Sta., Western Triangle Research
 Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	Head date	% Protein
Stockholm	76.1	60.5	28	193	12.0
Lloyd	68.6	57.4	27	195	12.5
Cando	68.5	58.9	25	192	13.3
Laker	66.5	60.8	32	194	12.2
Crosby	63.3	62.0	40	191	13.6
Renville	63.0	60.4	39	193	13.4
Medora	62.5	61.4	40	193	13.1
Vic	62.3	61.1	39	193	13.5
Monroe	61.6	60.8	38	190	13.3
Sceptre	60.0	59.6	39	195	13.2
Ward	59.1	60.9	40	191	13.7
Rolette	57.7	61.1	36	189	13.4

Cooperator and Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : August 31, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 40# N actual topdressed.

Rainfall from Seeding to Maturity : 8.17".

Yield Experimental Mean : 64.09

Error Degrees of Freedom : 22.00

F. Test : 3.06

C.V. : 4.55

LSD (0.05) : 8.55

Table 18b. Three year summary for dryland durum grown at the Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year comparable average			
	Yield bu/a	Test wt.	Plant height	% Protein
Stockholm	71.2	62	26	13.1
Cando	66.3	61	24	13.6
Lloyd	65.6	60	25	13.2
Laker	63.7	62	30	13.2
Medora	63.3	62	35	14.5
Sceptre	61.6	62	32	13.7
Monroe	59.5	61	33	13.8
Renville	59.4	61	35	14.2
Crosby	56.6	62	34	14.8
Ward	56.3	62	33	14.2
Vic	55.3	62	33	14.7
Rolette	52.6	62	32	14.7

Table 19a. Irrigated durum variety trial north of Conrad, 1989.
 Mont. Agr. Expt. Sta., Western Triangle Research
 Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Protein	Head date
Crosby	74.7	61.3	37	10.4	191
Medora	73.8	61.2	40	10.0	191
Renville	70.9	60.4	38	9.6	192
Stockholm	70.2	60.6	30	9.1	193
Cando	69.7	61.3	29	9.1	193
Laker	66.7	60.0	30	9.5	194
Monroe	66.2	60.7	39	10.6	189
Ward	62.7	61.3	37	10.3	190
Sceptre	62.5	61.4	34	9.6	193
Rolette	59.2	61.5	39	10.3	188
Vic	59.0	60.7	39	10.1	192
Lloyd	52.1	58.5	27	8.6	196

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : September 1, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed, and 40# N actual top dressed.

Irrigation Method : Sprinkler; July 6 and July 25.

Yield Experimental Mean : 65.68

Errors Degrees of Freedom : 22.0

F. Test : 1.74

C.V. : 7.83

LSD (0.05) : 15.08

Table 19b. Three year summary for irrigated durum grown at the Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year comparable average			
	Yield bu/a	Test wt.	Plant height	% Protein
Cando	82.6	63	28	12.3
Stockholm	79.9	62	29	11.9
Lloyd	77.0	62	28	11.8
Renville	74.9	61	36	12.4
Sceptre	71.3	63	32	12.5
Laker	70.0	61	29	12.4
Medora	69.3	62	32	13.9
Crosby	69.0	62	37	13.8
Ward	67.3	62	35	13.3
Vic	64.6	61	37	13.5
Monroe	63.4	61	34	13.2
Rolette	58.0	62	36	14.2

Table 20. Dryland regional durum URDN variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	Head date	% Protein
D 86418	73.6	58.9	38	194	
D 8460	72.8	59.7	35	193	
CA 885312	72.6	59.4	28	196	
D 8370	71.8	60.1	27	194	
D 8291	71.7	54.6	26	192	
D 8302	71.1	61.8	33	190	
D 86013	70.6	60.8	33	195	
D 8475	70.1	60.4	35	190	
D 86061	70.1	59.2	26	196	
D 86078	69.3	59.6	39	196	
Sceptre	68.2	59.1	36	193	
D 8479	67.7	60.1	35	193	
Renville	67.7	59.6	39	194	
D 86237	66.4	60.1	35	192	
D 8380	66.0	58.3	29	196	
Rugby	64.3	60.1	39	191	
Medora	64.3	60.3	38	192	
D 86398	64.1	60.7	34	193	
D 86117	63.9	59.8	29	196	
Lloyd	63.1	56.0	27	195	
D 84130	62.8	56.3	28	195	
D 86464	62.5	59.4	39	195	
Vic	61.8	60.3	39	192	
Mindum	60.8	61.7	48	195	
Ward	59.7	61.2	36	192	
D 86468	59.3	58.5	38	195	
WB Regal	59.0	59.2	39	193	
Monroe	58.8	60.3	38	191	
Stoa	55.8	58.2	38	193	
D 86442	49.5	61.0	35	191	

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : August 31, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed, and 40# N actual topdressed.

Soil Moisture Probe Depth at Seeding : More than 3'.

Rainfall from Seeding to Maturity : 7.21".

Yield Experimental Mean : 65.62 Error Degrees of Freedom : 58.00

F. Test : 1.87 C.V. : 5.64 LSD (0.05) : 10.48

Table 21. Dryland spring triticale variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a 1/	Test wt.	Plant hgt. inches	Head date	% Protein	Relative maturity
Juan	78.0	52.4	42	195	11.3	extreme late
Ttitot 54	77.1	52.4	41	192	12.1	very late
Welsh	75.8	49.8	40	193	12.4	medium
Tritot 61	74.7	53.0	40	189	12.3	very late
Carman	73.7	49.5	43	190	12.8	early
Kramer	72.3	49.5	37	189	13.2	very early
Sunland	71.4	57.2	38	194	13.1	very late
Beagle 82	70.7	48.3	41	193	12.7	late
Wapiti	70.4	50.8	41	193	12.7	late
Karl	63.6	48.4	29	189	13.5	early
Marval	61.1	47.1	45	193	12.6	medium

Newana wheat	56.6	59.8	30	195	15.1	very early

Location : Research Center, Conrad.

Planting Date : May 9, 1989.

Harvest Date : September 6, 1989.

Previous Crop : Fallow.

Fertilizer : 100# 11-51-0 with the seed and 40# N actual top dressed.

Soil Moisture Probe at Seeding : More than 3 feet.

Rainfall, Planting to Maturity : 11.34".

1/ Triticale yield based on 50-lb/bu. test weight.

Yield Experimental Mean : 3569.66 lbs/acre

Error Degrees of Freedom : 22

F. Test : 4.91

C.V. : 3.25

LSD (0.05) : 340.4 lbs.

Table 22. Dryland spring triticale variety trial north of Cut Bank, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a <u>1/</u>	Test wt.	Plant hgt. inches	Relative maturity
Tritot 54	52.1	47.9	37	very late
Wapiti	51.6	45.2	39	late
Juan	51.4	43.4	39	extreme late
Welsh	50.8	44.8	39	medium
Kramer	49.5	47.4	33	very early
Marval	48.3	47.4	43	medium
Tritot 61	46.1	49.7	35	very late
Carman	45.6	45.3	36	early
Karl	45.4	48.6	28	early
Sunland	44.9	44.7	35	very late
Beagle 82	44.2	44.1	39	late

Newana wheat	30.9	58.2	26	very early

Cooperator and Location : Don Bradley, 14 miles north of Cut Bank,
Glacier County:

Planting Date : May 10, 1989.

Harvest Date : September 11, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed.

Soil Moisture Probe Depth at Seeding : 24".

Rainfall, Planting to Maturity : More than 6".

1/ Triticale yield calculated on a 50# test wt.; wheat yield 60# test wt.

Yield Experimental Mean : 2363.26 lbs/acre

Error Degrees of Freedom : 22.0

F. Test : 1.93

C.V. : 6.57

LSD. (0.05) : 455.13 lbs.

Table 23. Dryland spring triticale variety trial east of Oilmont, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a <u>1/</u>	Test wt.	Plant hgt. inches	% Protein	Relative maturity
Kramer	28.9	42.3	32	16.8	very early
Tritot 54	27.8	45.1	31	16.5	very late
Carman	25.0	40.4	37	16.7	early
Weish	24.1	40.0	35	16.5	medium
Sunland	24.0	40.6	30	16.7	very late
Marval	23.4	38.8	39	16.5	medium
Tritot 61	22.8	43.8	32	16.0	very late
Karl	22.8	42.9	28	16.7	early
Wapiti	22.6	40.7	32	16.6	late
Beagle 82	22.2	38.1	32	16.9	late
Juan	21.2	40.2	32	16.7	extreme late
<hr/>					
Newana wheat	19.1	54.5	25		very early

Cooperator and Location : Terry Alme, 8 miles east of Oilmont, Toole County.

Planting Date : April 18, 1989.

Harvest Date : August 3, 1989.

Previous Crop : Fallow

Soil Moisture Probe at Planting : 2' 6".

Rainfall, Planting to Harvest : 6"

1/ Triticale yield calculated on 50-lb test wt.

Fertilizer : 100# 11-51-0 with the seed.

Yield Experimental Mean : 1198.63 lbs/acre

Error Degrees of Freedom : 22

F. Test : 8.91

C.V. : 3.2

LSD. (0.05) : 112.39 lbs.

Table 24. Dryland spring triticale variety trial east of Choteau, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a 1/	Test wt.	Plant hgt. inches	Relative maturity
Tritot 54	76.4	51.3	38	very late
Tritot 61	73.4	54.2	38	very late
Juan	73.3	46.4	40	extreme late
Wapiti	70.0	49.0	40	late
Sunland	68.2	52.7	35	very late
Welsh	67.0	48.3	42	medium
Marval	65.6	48.6	40	medium
Kramer	65.3	49.5	34	very early
Carman	64.2	49.3	38	early
Beagle 82	62.9	47.2	40	late
Karl	57.8	51.6	33	early

Newana wheat	37.9	60.4	27	very early

Cooperator and Location: Rick Corey, northeast of Choteau, Teton County.
 Planting Date : April 19, 1989.
 Harvest Date : August 15, 1989.
 Previous Crop : Fallow
 Fertilizer : 100# 11-51-0 with the seed.
 Soil Moisture Probe Depth at Seeding : 24".
 1/ Triticale yield calculated on 50 lb. test wt.
 Yield Experimental Mean : 3290.14 lbs/acre
 Error Degrees of Freedom : 22
 F. Test : 6.82
 C.V. : 4.78
 LSD. (0.05) : 460.84 lbs.



TITLE: Barley Variety Investigations

YEAR: 1989

LOCATION: Western Triangle Research Center, Conrad

PERSONNEL: Gregory D. Kushnak, Ron Thaut, & Larry Christiaens,
Research Center, Conrad, MT; Dr. Tom Blake MSU, Bozeman

Dryland barley variety trials were grown near Conrad, Cut Bank, Oilmont, Choteau, and Sun River; and irrigated trials at Conrad and Fairfield. All trials were grown on fallow, except Fairfield irrigated. Soil moisture was good at all locations, and growing season rainfall above normal; resulting in lush plant growth.

Data for the various locations are presented in Tables 26a-34a, with 3-year averages in Tables 26b-34b. The feed types Gallatin, Lewis, and Hector were among the top yielders across the dryland locations. Gallatin also ranked high on irrigated, indicating its wide adaptation to various moisture conditions. Yield of Bowman ranked low at Cut Bank and Choteau, and medium at the other sites. Bearpaw had high yield at Cut Bank, but ranked medium at most other locations.

The malt types Clark and Harrington ranked low to medium at all locations; and Busch Ag's 2601 and 8529 were the top yielders at Conrad irrigated.

The waxy hulless Wanubet LR247 was grown only at Conrad, and was the lowest yielder. Waxy hulless barleys have potential for specialty markets, and varieties with improved agronomic traits are under development.

These trials were conducted by the MSU Western Triangle Research Center, Conrad and the Cooperative Extension Service, in cooperation with Dr. Tom Blake, Montana State University Plant and Soil Science Department.

The background and detailed descriptions of the varieties tested are included in MSU Extension Bulletin 1094, "Performance Summary of Barley Varieties in Montana," available at all County Agent offices.

Table 25. Dryland intrastate barley variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt.	% Plump	% Thin	% Protein	Head date
Lewis	104.1	53.6	32	92	3	11.8	197
MT 851161	103.3	51.7	29	90	4	11.0	201
Gallatin	103.2	52.7	32	88	4	11.5	197
MT 870031	102.8	52.9	28	91	3	11.2	193
MT 860326	102.6	53.9	30	94	2	10.9	196
MT 851224	102.0	50.2	28	90	3	10.8	200
MT 851195	101.3	53.1	29	97	1	11.9	198
Hector	100.7	52.2	30	90	2	10.9	198
Pirolina	100.2	54.1	29	95	2	12.5	193
MT 851088	99.2	52.3	30	89	4	11.0	198
BA 8529	98.8	52.0	27	87	5	10.6	200
MT 81161	98.7	51.2	32	90	3	11.6	197
MT 860224	98.2	54.3	30	92	2	10.1	201
MT 870120	98.1	48.4	31	91	3	9.2	190
MT 870070	97.8	47.9	30	84	5	10.8	191
MT 81143	97.7	54.1	30	96	2	12.1	197
MT 81502	97.1	52.6	31	87	3	11.4	198
MT 870105	96.6	50.6	32	89	3	12.3	191
Russell	96.4	49.5	29	92	3	11.2	188
MT 851005	96.1	52.2	32	93	2	11.4	198
MT 860756	95.8	52.9	30	95	1	11.8	196
MT 860219	95.5	52.2	28	95	2	11.9	200
MT 140523	95.4	50.3	27	95	5	11.6	197
MT 870109	95.3	53.1	29	86	4	11.0	191
Steptoe	94.7	46.3	32	89	4	10.7	187
MT 851177	94.2	50.2	28	92	2	10.6	198
Bowman	92.9	52.4	28	97	1	12.0	191
MT 861572	92.9	55.3	30	96	1	11.5	198
MT 860767	92.8	51.4	27	94	2	11.4	199
MT 83422	92.7	51.4	30	91	2	11.2	197
MT 861626	92.3	50.4	30	78	7	11.4	197
MT 83435	91.9	53.9	31	95	1	11.2	198
MT 851032	91.7	51.5	29	86	4	11.7	199
MT 860839	91.5	50.5	27	88	3	11.9	198
MT 851216	91.3	51.3	28	87	3	11.3	200
MT 870170	91.0	51.2	31	82	4	11.3	199

(continued)

Table 25. Dryland intrastate barley continued.

Variety	Yield bu/a	Test wt.	Plant hgt.	% Plump	% Thin	% Protein	Head date
MT 870246	90.1	48.0	27	91	3	10.3	190
MT 870098	89.4	48.6	31	95	1	11.7	189
MT 860186	88.4	50.7	25	89	3	11.8	200
Kimberly	88.0	51.3	31	84	5	10.5	201
MT 851012	87.9	50.7	31	86	5	11.3	200
Harrington	87.7	50.7	31	92	2	11.3	198
Robust	87.0	51.2	34	88	3	11.5	189
MT 851013	86.9	50.1	32	84	5	12.0	199
MT 870012	85.7	50.5	28	73	7	11.2	201
MT 870100	85.2	47.4	33	92	1	11.3	189
MT 860737	85.1	53.2	28	91	2	11.5	199
MT 83533	84.9	48.8	27	64	12	11.4	200
MT870216	84.8	48.4	34	94	2	11.1	188
MT 870056	84.7	47.6	32	62	14	11.2	196
MT 860463	84.4	50.2	26	90	3	12.0	198
MT 870160	84.2	50.2	34	90	3	11.9	190
MT 870062	84.1	49.2	30	58	26	11.5	190
Morex	84.0	50.0	30	81	4	11.5	191
MT 851051	84.0	48.0	30	81	6	10.2	196
MT 851031	83.7	49.1	30	78	5	11.5	198
MT 861183	82.9	49.4	29	85	3	12.4	197
MT 851011	82.4	50.5	33	81	5	11.2	199
Bearpaw (81616)	82.1	46.9	31	72	9	11.2	199
Clark	80.6	48.8	31	67	12	11.7	198
MT 870136	79.0	49.0	29	76	10	11.7	199
MT 870137	76.8	47.6	28	65	12	11.5	199
Klages	75.8	49.5	33	56	16	11.6	199
Wanubet LR247	74.5	53.1	34	57	13	10.7	197

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : August 21, 1989.

Previous Crop : Fallow

Fertilizer : 100 # 11-51-0 with the seed and 45# N actual topdressed.

Rainfall from seeding to ripening : 7.21".

Yield Experimental Means : 91.27

Error Degrees of Freedom : 126

F. Test : 4.94

C.V. : 3.69

LSD (0.05) : 9.42

Table 26a. Dryland intrastate barley variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. (Abbreviated List).

Variety	Yield bu/a	Test wt.	Plant hgt.	% Plump	% Thin	% Protein	Head date
Lewis	104.1	53.6	32	92	3	11.8	197
Gallatin	103.2	52.7	32	88	4	11.5	197
Hector	100.7	52.2	30	90	2	10.9	198
Piroline	100.2	54.1	29	95	2	12.5	193
BA 8529	89.8	52.0	27	87	5	10.6	200
MT 81161	98.7	51.2	32	90	3	11.6	197
Russell	96.4	49.5	29	92	3	11.2	188
Steptoe	94.7	46.3	32	89	4	10.7	187
Bowman	92.9	52.4	28	97	1	12.0	191
Kimberly	88.0	51.3	31	84	5	10.5	201
Harrington	87.7	50.7	31	92	2	11.3	198
Robust	87.0	51.2	34	88	3	11.5	189
Morex	84.0	50.0	30	81	4	11.5	191
Bearpaw (81616)	82.1	46.9	31	72	9	11.2	199
Clark	80.6	48.8	31	67	12	11.7	198
Klaiges	75.8	49.5	33	56	16	11.6	199
Wanubet LR247 <u>1/</u>	74.5	53.1	34	57	13	10.7	197

Location : Research Center, Conrad.

Seeding Date : May 9, 1989.

Harvest Date : August 21, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 45# N actual topdressed.

1/ Waxy Hulless, tentative name Shonkin

Yield Experimental Means : 91.27

Error Degrees of Freedom : 126

F. Test : 4.94

C.V. : 3.69

LSD (0.05) : 9.42

Table 26b. Three year summary for dryland barley varieties grown at the Mont. Agr. Expt. Sta., 1987 - 1988 - 1989. Western Triangle Research Center, Conrad, MT.

Variety	3 - Year Comparable Average					
	Yield bu/a	Hgt. inches	Test wt.	% Plump	% Thin	% Protein
Lewis	90.0	27	53.6	94	2	12.7
Hector	89.3	27	51.0	91	5	12.7
Gallatin	87.3	27	53.0	92	3	12.8
Piroline	85.6	27	53.0	93	2	13.2
Clark	83.6	26	50.3	83	7	12.6
MT 81161	83.6	27	49.6	89	4	12.8
Kimberly	82.6	27	50.6	90	3	12.7
Harrington	81.6	27	50.3	92	4	12.2
Bearpaw	81.6	27	50.0	86	6	12.2
Bowman	79.0	26	51.0	94	3	12.9
Russell	77.4	26	50.1	91	4	12.3
Robust	77.3	29	51.0	92	2	12.4
Steptoe	77.0	26	46.3	90	3	11.4
Klages	76.6	28	51.0	77	8	12.8
Morex	74.3	26	49.6	88	3	12.2
Wanubet (Shonkin) ^{1/}	68.3	27	54.7	59	10	14.4

^{1/} Waxy Hulless

Table 27. Irrigated intrastate barley variety trial grown north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	% Plump	% Thin	% Protein	Head date
BA 8529	114.6	52.4	31	94	2	9.2	199
BA 2601	114.6	49.4	30	89	1	10.6	193
MT 860224	111.5	52.9	33	95	2	10.5	197
MT 860219	109.1	52.9	30	96	0	9.7	197
Lewis	106.1	53.8	32	97	0	11.4	197
Baronesse	104.9	52.7	30	97	1	11.0	200
MT 870109	104.6	53.8	33	94	0	10.1	192
MT 851224	104.1	50.7	31	94	2	9.4	199
MT 81161	103.8	51.9	36	96	1	9.8	193
MT 851195	103.6	52.6	33	97	1	8.4	193
MT 83435	103.4	53.8	33	97	1	9.9	197
MT 861596	102.9	54.3	34	95	2	10.7	198
MT 860737	102.3	52.6	33	96	1	9.9	197
MT 870105	101.9	50.7	36	96	1	10.8	189
CO 89-1	101.8	51.3	36	91	2	10.7	195
Gallatin	101.2	53.5	33	94	1	10.3	191
MT 870031	100.9	51.5	32	90	4	9.3	198
MT 861572	100.7	54.3	34	96	1	9.9	193
Steffi	100.6	52.2	31	97	0	11.0	202
MT 81143	100.0	55.0	35	97	0	8.5	192
MT 870098	99.6	50.1	37	97	1	10.9	189
MT 851177	98.5	51.7	32	92	3	9.3	196
MT 870216	97.8	48.6	39	95	1	10.3	188
MT 860326	97.5	54.3	33	97	1	9.8	197
MT 851161	96.6	51.8	31	87	5	9.2	198
MT 851088	96.4	51.9	30	98	1	11.1	200
CO 89-4	94.9	49.3	28	88	4	9.3	201
MT 860463	94.8	51.2	35	94	2	9.8	198
MT 861626	94.6	50.8	34	91	4	9.3	197
Princesse	94.5	48.5	27	93	3	10.4	201
MT 851216	94.4	51.1	32	94	0	10.4	199
Steptoe	94.2	47.4	31	92	2	9.8	189
MT 83422	94.0	53.2	33	93	1	9.4	199

(continued)

Table 27. Irrigated intrastate barley continued.

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	% Plump	% Thin	% Protein	Head date
MT 870100	93.8	48.3	36	96	1	10.0	188
MT 870120	93.2	47.7	29	94	0	10.5	189
MT 81502	92.7	52.4	33	95	1	10.3	196
MT 860839	92.2	51.8	30	93	3	9.5	193
MT 851005	92.1	51.6	35	96	2	11.4	196
Hector	91.8	50.5	33	87	3	10.1	193
MT 861183	91.0	51.7	34	93	3	9.2	193
MT 140523	90.8	50.6	31	86	4	11.4	193
Russell	90.2	49.9	34	92	2	10.1	188
MT 870012	88.0	50.3	30	82	4	10.6	201
Harrington	87.1	51.2	35	93	3	9.9	198
CO-89-2	86.3	53.2	34	92	2	10.8	188
Morex	85.7	49.1	39	91	1	9.4	188
MT 83533	85.6	49.5	30	84	3	10.1	199
Piroline	84.9	52.5	36	91	3	11.9	191
MT 851012	84.9	50.7	32	87	5	9.8	197
MT 851011	84.7	51.5	33	93	2	10.0	199
MT 870056	84.7	46.4	32	75	10	10.6	192
Robust	82.8	51.0	34	96	1	10.2	190
MT 851031	82.5	50.6	34	87	4	10.2	196
MT 851032	81.3	50.1	32	80	9	9.3	198
Klages	80.2	48.8	31	62	14	10.9	199
MT 851051	79.1	49.3	33	87	3	11.0	197
MT 870160	77.9	50.1	40	94	2	11.2	189
MT 851013	77.7	50.3	34	89	3	9.6	193
Bearpaw (MT 81616)	75.7	47.6	37	78	9	11.1	197
Clark	75.4	50.1	33	82	6	9.2	197
MT 870136	74.0	49.6	34	89	4	11.3	197
MT 870137	72.9	47.7	32	70	10	12.2	199
Wanubet - 247 (Shonkin)	72.1	52.5	37	69	6	13.4	198
CO 89-3	68.9	44.0	26	59	15	10.9	209

Location : Research Center, Conrad

Seeding Date : May 9, 1989.

Harvest Date : August 21, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 45# N actual top dressed.

Soil Moisture Probe at Seeding : More than 3'

Rainfall from Seeding to Harvest : 7.21"

Irrigation Method : Sprinkler.

Yield Experimental Mean : 92.82 Error Degrees of Freedom : 126

F. Test : 4.48 C.V. : 5.48 LSD (0.05) : 14.23

Table 28a. Irrigated intrastate barley variety trial grown north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. (Abbreviated list).

Variety	Yield bu/a	Test wt. lb/bu	Plant hgt. inches	% Plump	% Thin	% Protein	Head date
BA 8529	114.6	52.4	31	94	2	9.2	199
BA 2601	114.6	49.4	30	89	1	10.6	193
Lewis	106.1	53.8	32	97	0	11.4	197
Baronesse	104.9	52.7	30	97	1	11.0	200
Gallatin	101.2	53.5	33	94	1	10.3	191
Steffi	100.6	52.2	33	94	1	11.0	191
Princesse	94.5	48.5	27	93	3	10.4	201
Steptoe	94.2	47.4	31	92	2	9.8	189
Hector	91.8	50.5	33	87	3	10.1	193
Russell	90.2	49.9	34	92	2	10.1	188
Harrington	87.1	51.2	35	93	3	9.9	198
Morex	85.7	49.1	39	91	1	9.4	188
Piroline	84.9	52.5	36	91	3	11.9	191
Robust	82.8	51.0	34	96	1	10.2	190
Klages	80.2	48.8	31	62	14	10.9	199
Bearpaw (MT 81616)	75.7	47.6	37	78	9	11.1	197
Clark	75.4	50.1	33	82	6	9.2	197
Wanubet-247 <u>1/</u>	72.1	52.5	37	69	6	13.4	198

Location : Research Center, Conrad

Seeding Date : May 9, 1989.

Harvest Date : August 21, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed and 45# N actual top dressed.

Soil Moisture Probe at Seeding : 40" +

Rainfall from Seeding to Harvest : 7.21".

Irrigation Method : Sprinkler.

1/ waxy hulless, tentative name Shonkin

Yield Experimental Mean : 92.82

Error Degrees of Freedom : 126

F. Test : 4.48

C.V. : 5.48

LSD (0.05) : 14.23

Table 28b. Three-year summary for irrigated barley grown at the Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT. 1987 - 1988 - 1989.

Variety	3 - year comparable average					
	Yield bu/a	Test wt.	Height inches	% Plump	% Thin	% Protein
BA 2601	121.0	50	28	92	1	11.5
BA 8529	121.0	53	29	97	2	10.0
Baronesse	110.9	54	28	99	1	11.9
Gallatin	107.6	53	31	95	2	11.8
Steffi	106.7	53	31	97	1	11.9
Lewis	104.3	54	30	97	3	11.9
MT 81161	104.3	52	30	95	2	12.0
Harrington	103.6	52	33	95	2	10.9
Steptoe	103.6	48	27	95	1	10.4
Princesse	100.4	50	25	96	2	11.3
Hector	98.4	52	34	92	3	12.4
Piroline	98.0	53	32	91	3	13.0
Bearpaw	97.6	51	32	89	5	11.5
Clark	96.0	51	30	89	4	11.2
Russell	95.6	51	30	92	2	11.9
Klages	94.0	51	27	80	8	11.8
Morex	82.0	50	34	92	2	11.3
Wanubet 247 (Shonkin)	76.1	54	35	71	5	14.5
Robust	76.0	51	32	94	1	11.8

Table 29. Western regional dryland barley variety trial north of Conrad, 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Plump	% Thin	% Protein	Head date
ID 71966	99.8	48.4	30	83	5		188
ND 9870	98.3	54.9	32	98	1		198
MT 83435	97.6	53.8	30	93	1		198
Step toe	96.9	46.4	29	89	4		188
MT 140523	96.9	52.6	31	84	5		199
ID 810099	96.8	51.7	31	85	5		200
Bowman	95.7	52.8	30	99	1		190
ID 85453	94.8	49.5	33	89	3		187
WA 102178	94.7	48.3	31	91	2		195
MT 851195	93.9	52.6	32	91	2		197
Hector	93.4	52.9	31	94	2		197
MT 83422	92.5	51.9	31	89	3		198
WA 755283	91.1	53.0	27	89	3		201
ID 82519	90.8	50.0	33	93	1		188
ND 9866	89.9	55.0	31	98	1		197
MT 851012	88.4	50.6	31	86	4		199
MT 851032	88.2	51.7	31	86	4		198
ND 10341	87.9	50.6	34	97	1		198
MT 83533	82.0	49.1	30	72	9		196
Clark	79.9	49.4	32	70	10		198
WA 777383	79.5	49.3	28	80	5		201
WA 944883	78.7	46.4	29	60	15		201
WA 136278	77.9	47.9	27	78	7		201
Munsing	65.7	49.8	26	77	9		199

Location : Research Center, Conrad.

Seeding Date : May 9, 1989

Harvest Date : August 21, 1989.

Previous Crop : Fallow.

Fertilizer : 100# 11-51-0 with the seed and 45# N. actual topdressed.

Rainfall from Seeding to Ripening : 7.21"

Soil Moisture Probe at Seeding : 40" +.

Yield Experimental Mean : 89.62

Error Degrees of Freedom : 69.0

F. Test : 13.57

C.V. : 2.54

LSD (0.05) : 6.43

Table 30a. Dryland barley variety trial north of Cut Bank, 1989.
 Mont. Agr. Expt. Sta., Western Triangle Research Center,
 Conrad, MT.

Variety	Yield bu/à	Test wt.	Plant hgt. inches	% Plump	% Thin	% Protein
Bearpaw (MT 81616)	54.9	50.2	26	96	1	8.2
Hector	54.6	49.9	28	94	2	8.6
Gallatin	54.6	51.4	28	96	1	8.9
Lewis	52.9	51.1	28	94	2	8.0
MT 81161	52.9	49.8	25	97	1	8.6
Clark	52.9	49.8	27	95	1	7.7
Busch Ag 1202	52.8	49.6	25	97	1	8.7
MT 140523	49.5	50.7	26	96	1	8.7
Steptoe	49.5	45.0	24	95	2	7.8
Harrington	46.0	50.0	25	96	1	8.6
Piroline	44.2	51.4	26	96	1	9.4
Bowman	40.6	50.7	26	98	0	9.7

Cooperator and Location : Don Bradley, north of Cut Bank, Glacier Co.

Planting Date : May 10, 1989.

Harvest Date : September 11, 1989.

Previous Crop : Fallow

Fertilizer : 100# 11-51-0 with the seed.

Rainfall Planting to Maturity : More than 6".

Soil Moisture Probe Depth at Time of Seeding : 24"

Yield Experimental Mean : 40.3

Error Degrees of Freedom : 22

F. Test : 0.85

C.V. : 10.14

LSD (0.05) : 11.97

Table 30b. Three-year summary for dryland barley varieties grown north of Cut Bank, MT. 1987 - 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	3-year Comparable Average					
	Yield bu/a	Test wt.	Plant hgt.	% Plump	% Thin	% Protein
Steptoe	70.0	46	27	88	4	9.6
Lewis	68.3	53	27	93	2	10.4
Bearpaw	68.3	51	26	92	2	10.9
Hector	68.0	52	28	92	2	10.5
Busch Ag. 1202	67.7	51	25	93	2	10.7
Gallatin	67.3	52	27	91	2	11.0
MT 81161	67.0	51	26	90	3	10.6
Clark	64.0	52	26	88	3	10.6
Harrington	63.3	52	26	94	2	10.6
Pirolina	62.3	52	26	90	2	11.6
Bowman	61.0	53	27	98	1	11.2

Table 31a. Dryland barley variety trial east of Oilmont, 1989.
 Mont. Agr. Expt. Sta., Western Triangle Research
 Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant hgt. inches	% Plump	% Thin	% Protein
Gallatin	47.3	47.9	28	7	57	14.7
Lewis	45.2	48.8	28	15	43	14.0
Hector	42.8	48.8	28	3	71	14.3
Bowman	41.6	48.2	27	25	33	14.5
Clark	40.9	46.8	28	16	34	14.6
MT 140523	40.9	46.8	27	3	79	15.4
Bearpaw (MT 81616)	40.6	47.1	25	10	47	16.2
MT 81161	40.3	44.7	26	9	58	14.0
Steptoe	39.8	39.9	29	11	52	11.7
Harrington	37.8	48.1	27	11	48	15.3
Busch Ag 1202	37.8	47.2	25	5	54	15.8
Piroline	37.5	45.2	26	2	86	14.4

Cooperator and Location : Terry Alme, 8 miles east of Oilmont, Toole Co.
 Planting Date : April 2, 1989.
 Harvest Date : August 3, 1989.
 Previous Crop : Fallow.
 Soil Moisture Probe Depth at Seeding : 2! 6".
 Fertilizer : 100# 11-51-0 with the seed.
 Rainfall, Planting to Harvest : 6".
 Yield Experimental Mean : 41.05
 Error Degrees of Freedom : 22
 F. Test : 1.69
 C.V. : 5.55
 LSD (0.05) : 6.68

Table 31b. Two-year summary for dryland barley varieties grown east of Oilmont, MT. 1988 - 1989. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

Variety	Yield bu/a	Test wt.	Plant height	% Plump	% Thin	% Protein
Gallatin	34.0	49	21	19	42	16.4
Hector	33.0	49	23	14	51	15.7
Steptoe	31.0	40	22	14	52	12.6
Bowman	30.4	48	22	35	25	15.5
Lewis	30.4	49	21	28	34	16.3
MT 81161	29.9	48	21	26	40	15.4
MT 140523	29.4	48	22	16	56	17.0
Piroline	28.4	46	20	5	72	16.4
Bearpaw	28.4	47	20	33	31	17.0
Clark	27.9	47	21	24	31	16.6
Busch Ag. 1202	27.3	48	20	11	42	17.4
Harrington	24.8	48	22	26	35	17.1