TITLE: Winter Wheat

PROJECT: Small Grain Investigations MS 756

YEAR: 1980

PERSONNEL: Leader - Vern R. Stewart
Technician - Todd K. Keener
Cooperator - G. Allen Taylor
Cooperating Agencies - Montana Agricultural Experiment Station, MSU
Montana Wheat Research & Marketing Committee
Pacific Northwest Regional Commission

LOCATION: Northwestern Agricultural Research Center and L. B. Claridge farm, Kalispell, MT

OBJECTIVES:

1. To obtain information necessary to make varietal recommendations and evaluate new varieties and selections.

2. To obtain from a cooperative program with the USDA-SEA-AR in the Pacific Northwest wheat germ plasm or varieties that have resistance to dwarf smut (Tilletia controversa Kuehn) and stripe rust (Puccinia striiformis West).

1979 EXPERIMENTS:

1. Western Regional Hard Red Winter Wheat Nursery
   (a) Kalispell
   (b) Stillwater
2. Western Regional White Winter Wheat Nursery
   (a) Kalispell
   (b) Stillwater
3. Intrastate Hard Red Winter Wheat Nursery
   (a) Stillwater
4. Preliminary Evaluation Hard Red Winter Wheat Nursery
   (a) Stillwater

1980 RESULTS:

Western Regional Hard Red Winter Wheat Nursery - Kalispell

Very little winter kill from snow mold and associated diseases was observed in the winter wheat nurseries at Kalispell. Although yields were very good this year, and were up from both 1977 and 1978, they were not equal to 1979 yields. Yields were reduced some because of hail storms.

High yields were obtained from the varieties of WA6695, MT77002, and Weston (ID745520). Weston had a high yield in 1979 and was the top yielding variety in 1978. The mean yield for the hard red winter wheat nursery was 74.46 bu/a.. Test weights were down from last year because of the frequent rains at harvest time. The high yielding varieties of Weston and MT 77002 also had good test weights (Table 1). The mean heading date was seven to eight days earlier than the average for the last five years. This is due in part to the favorable temperatures and moisture level in early spring.

Lodging was moderate to severe throughout the nursery, however eight varieties showed good resistance to lodging. WA6695, a high yielding line, had excellent lodging resistance.

Moisture conditions in mid-season favored infestations of both powdery mildew (Erysiphe graminis DC) and leaf rust (Puccinia recondita Rob ex Desm), Dwarf smut was not observed at the Kalispell location.

1980 Results (con't)

Western Regional Hard Red Winter Wheat Nursery - Stillwater

The winter wheat nursery yields at Stillwater were the best ever. Very little winter kill was observed throughout the location. The mean yield was 95.46 bu/a which tops any yields from the nurseries at this location. The three highest yielding entries were from Utah with yields exceeding 113 bu/a (Table 2). Test weights were about normal when compared to previous years. The only significantly high test weight was from the high yielding variety ID745520, which also did well at the Kalispell location. Plant height was above average for this location. Lodging was moderate througout the study although several varieties domonstrated excellent lodging resistance. Dwarf smut infections were evaluated and several resistant lines were noted (Table 2).

Western Regional White Winter Wheat Nursery - Kalispell

Yields from the white winter wheat nursery at Kalispell were excellent with the mean yield higher than the five year mean. Thirteen varieties yielded significantly more than Nugaines, the check (Table 3). The varieties OR680073, WA6470 and WA6363, all exceeded last season's yields. The test weight mean was less than last year's. This is due in part to heavy rain that occurred at harvest time. Early heading dates are a consequence of favorable temperature and moisture conditions in the spring. Plant height this year exceeded last year's heights. Moro and Kharkof were the only varieties lodging in this nursery. Leaf rust was severe only in a few varieties but was evident throughout the study. Powdery mildew was a significant factor within the study and was moderate to heavy on all varieties except WA6470, WA6363, ID745318 and CI17730. A ten year summary of white winter wheat is given in Table 4.

Western Regional White Winter Wheat - Stillwater

Excellent yields were obtained from the Stillwater location. The mean yield surpasses any yield ever obtained from nurseries in this location. OR7794 and WA6471 were significantly higher in yield than the check. WA6471 was the highest yielding variety in 1978, but did not perform as well in 1979. Test weight and plant height means were both about average when compared to the past five years. The high yielding variety of OR7794 was significantly higher than the check in both test weight and height (Table 5). Lodging was of no consequence in this test except in the variety Kharkof. Dwarf smut was found in the test, but these data were not accurately recorded and thus are not a part of this report.

Intrastate Hard Red Winter Wheat - Stillwater

Several first year entries were grown this year at the Stillwater location. Good yields of up to 100 bu/a were obtained from the 50 entries. One entry, which is being considered for state registration, is MT77077. This variety yielded 92 bu/a. Test weights were average and did not vary significantly. Plant height was above normal with the tallest variety, Winoka being 49 inches. Lodging was moderate to severe througout the study yet many varieties exhibited no lodging symptoms. Dwarf smut was observed throughout the study. Readings are found in Table 4.

1980 Results (con't)

Preliminary Evaluation Hard Red Winter Wheat Nursery - Stillwater

The purpose of this nursery grown at the Stillwater location was to investigate the potential of several Montana winter wheat varieties. Yields ranged from 59 bu/a to 92 bu/a with the mean yield being 75.96 bu/a. The test weights were high, compared to accompanying tests, as the mean value of 59.21 lbs/bu will indicate. Lodging which was a problem in this study, interferred with data collection and complicated harvest procedures. Several varieties showed good potential against lodging tendencies (Table 7). Dwarf smut also existed at unacceptable levels throughout this study and ran as high as 20% infestation in some plots.

WINTER WHEAT VARIETIES RECOMMENDED FOR WESTERN MONTANA

Hard Red Varieties

1. Crest - dryland
2. Winalta - dryland
3. Cheyenne - dryland
4. Winridge - dryland

Soft White Varieties

1. Luke - dryland or irrigated

CHARACTERISTICS OF RECOMMENDED VARIETIES

1. Crest
   a. Bearded variety, developed in Montana
   b. High yielding potential in dwarf smut and stripe rust areas
   c. Tall type
   d. Maturity - early to mid-season
   e. Good test weight
   f. Weak straw strength
   g. Moderate shattering resistance
   h. Resistant to stripe rust
   i. Moderate resistance to dwarf smut
   j. Susceptible to stem rust and sawfly infestation
   k. Not extremely winter hardy
   l. Adequate baking and milling quality

2. Winalta
   a. Bearded variety
   b. Fair yielding
   c. Tall type
   d. Maturity - early to mid-season
   e. Good test weight
   f. Weak straw strength
   g. Good shattering resistance
   h. Susceptible to dwarf smut and sawfly infestations
   i. Resistant to stripe rust
   j. Moderate resistance to stem rust

3. Cheyenne
   a. Bearded variety
   b. Good yielding ability
   c. Tall type
   d. Maturity - early to mid-season
   e. Good test weight
   f. Weak straw strength
   g. Susceptible to shattering
   h. Moderate resistance to stripe rust
   i. Susceptible to dwarf smut, stem rust and sawfly infestation
   j. Good milling and baking qualities

Recommended Winter Wheat Varieties (con't)

4. Winridge

a. High yielding ability
b. Tall type
c. Good test weight
d. Resistant to shattering
e. Resistant to lodging
f. Resistant to dwarf smut, stripe rust and cephalosporium strip
g. Winter hardy
h. Acceptable protein, milling and baking qualities

Soft White Varieties

1. Luke

a. Bearded variety
b. Good yielding ability
c. Semi-dwarf type
d. Maturity - mid-season
e. Fair test weight
f. Poor to fair straw strength
g. Resistant to shattering
h. Resistant to dwarf smut and stripe rust
i. Foot rot tolerant
j. Good baking and milling quality for cake flours

Table 1. Agronomic data from the Western Regional Hard Red Winter Wheat nursery grown on the Northwestern Agricultural Research Center at Kalispell, MT 1980. Random block design. Four replications. Field E-2

Date seeded: September 18, 1979 Date harvested: August 22, 1980 Size of plot: 32 sq. ft.

C. I. or State No.	Variety	Yield Bu/A	Test Wt. Lbs/Bu.	Heading Date	Height Inches	Lodging %	Lodging Angle	Mildew Sev.	Mildew 3/	Leaf Rust Sev.	Leaf Rust 3/
WA 6695	WA5836/KN700007	103.55	53.38	155.50	37.40b	.00b	.00	3.00b	7.25	25.25	8.00
MT 77002	FRD/BEZ	99.61	58.82a	154.75	44.49	71.25a	6.75a	15.00	7.00	2.00	8.00
ID 745520		96.27	58.00a	153.75b	44.78	43.75	3.50	16.25	8.00	2.00	8.00
OR 7930	BEZ/REW Sel 42-31	95.86	57.15	160.00a	40.35b	10.00	2.25	15.00	6.25	4.50	6.00
UT 930082	DM/178383//CLM/3/SCT/4/B	94.48	57.13	154.25	45.57	.00b	.00b	27.50	8.75	28.75a	8.00
ID 207	RGR/3/II-60-156/14107//I	90.53	56.13	158.50a	37.60b	86.25a	7.00a	.25b	2.00b	13.00	8.00
OR 7921	BEZ/Sprague Sel. 18-24	88.87	56.47	154.75	37.40b	.00b	.00b	6.00b	6.25	26.25	8.00
CI 13844	Wanser 1/	87.05	55.38	155.25	45.67	33.75	3.75	32.50	8.25	7.75	8.00
WA 6584	BEZ/BNK/13438//5435/4564	82.51	55.17	161.75a	40.94b	31.25	2.25	6.50b	6.25	1.75	6.00
OR 792	Triumph/Lancer, Sel. 126	80.31	52.75b	156.25	41.83b	7.50	2.25	18.75	8.00	7.50	7.75
ID 178	SNR64/II-60-155//Heglar/	77.28	53.47	155.50	42.13b	82.50a	6.50a	21.25	9.00	10.25	7.25
WA 6582	Suwon92/6*Burt//Falco/2*	76.73	49.00b	158.00a	36.52b	.00b	.00b	20.25	8.50	32.50a	8.00
ID 51002	BEZ//Burt/178383/3/ARK	76.23	56.10	151.50b	48.33	2.50b	1.75	40.00	9.00	4.50	8.00
ID 208	A667W-46/3/II-60-156/141	76.08	56.05	160.75a	46.85	61.25	6.25a	8.75b	8.50	15.00	8.00
UT 89099	Utah Sel. 89099	75.96	49.15b	154.25	39.07b	33.75	1.75	29.00	9.00	31.25a	8.00
ID 51021	BEZ//Burt/178383/3/ARK	75.02	56.88	152.75b	42.72b	2.50b	1.00b	10.00b	7.50	55.00a	8.00
OR 7925	Clarifen/WA5836Sel27-26	66.02b	48.92b	157.50a	33.17b	.00b	.00b	30.00	8.50	6.50	8.00
UT 927124	178383/IT//DM/3/WN/4/Bur	64.07b	56.22	158.75a	46.26	52.50	4.75	40.00	8.25	6.75	8.00
ID 51031	BEZ//BT/83/ID5011/ID5006	62.83b	52.75b	158.25a	48.23	85.00a	6.75a	22.50	8.75	21.50	8.00
MT 77077	C61-9/WLT//CRT	62.61b	55.57	160.50a	46.65	58.25	5.50	17.50	7.25	8.00	8.00
ID 51032	ID5011/WA4765//ID 5011	59.58b	54.22	163.00a	51.38a	77.50a	5.25	22.75	8.00	3.00	7.75
ID 157	CI14106/MC13/WRR//KO/178	59.54b	51.32b	158.75a	44.29	89.75a	6.50a	32.50	9.00	20.50	8.00
CI 1442	Kharkof	57.92b	54.02	161.00a	48.72a	73.75a	5.75	22.50	8.25	14.00	8.00
ID 158	Heglar/ID5006	57.88b	51.77b	159.25a	40.26b	21.25	3.50	26.25	8.75	61.25a	8.00
ID 179	A667W-46/Ranger	57.32b	51.35b	160.00a	43.70	97.00a	7.25a	23.75	9.00	6.75	8.00
ID 154	BSN//KO/83/3/156/14107	57.13b	53.55	160.25a	40.55b	92.50a	6.25a	15.00	8.00	12.75	8.00
UT 890152	DM/178383//CLM/4/DM/3/UT	51.82b	46.13b	161.75a	42.52b	67.50a	4.75	57.50a	9.00	20.25	8.00
MT 77066	C61-9/WLT//CRT	51.70b	53.57	161.25a	44.49	68.75a	6.00	8.75b	8.00	4.50	8.00
	$\bar{x}$	74.56	53.94	157.78	42.92	44.64	3.83	21.04	7.87	16.18	7.81
	F 2/	4.79**	11.61**	37.93**	19.78**	11.44**	8.70**	3.99**	3.15**	5.11**	.92NS
	S.E.$\bar{x}$	7.16	.90	.51	.96	10.36	.87	6.32	.81	6.69	.56
	L.S.D.(.05)	20.19	2.55	1.43	2.71	29.23	2.45	17.83	2.28	18.88	1.57
	C.V. %	9.62	1.68	.32	2.24	23.22	22.69	30.06	10.29	41.37	7.12

Table 1 . (con't)

1/ Check variety
2/ F value for variety comparison
3/ Interpretive scale for disease position and development: 0 = disease not present
9 = disease on all leaves including head

a/ Values significantly greater than the check at .05 level.
b/ Values significantly less than the check at the 05. level.
* Indicates statistical significance at the .05 level.
** Indicates statistical significance at the .01 level.

Table 2. Agronomic data from the Western Regional Hard Red Winter Wheat nursery grown on the Lance Claridge farm, Kalispell, MT, 1980. Random block design. Four replications.

Date seeded: September 26, 1979 Date harvested: August 26, 1980
Size of plot: 32 sq. ft.

C.I. or State No.	Variety	Yield Bu/A	Test Wt Lbs/Bu.	Height Inches	Lodging %	Lodging Angle	% Smut
UT 89099	Utah Sel. 89099	114.03	57.88	40.65b	6.25	2.13	0
UT 890152	DM/178383//CLM/4/DM/3/UT	113.98	58.20	42.72b	8.75	.15	0
UT 930082	DM/178383//CLM/3/SCT/4/B	113.34	59.97	44.49	.00	.00	0
ID 745520		111.24	61.47a	46.65	.00	.00	0
ID 158	Heglar/ID5006	110.75	59.70	41.54b	1.25	.88	20
WA 6582	Suwon92/6*Burt//Falco/2*	108.65	56.52	34.15b	.00	.00	40
MT 77066	C61-9/WLT//CRT	107.24	58.32	45.28	1.25	.50	0
WA 6695	WA5836/KN700007	106.90	58.77	34.45b	.00	.00	40
MT 77002	FRD/BEZ	106.50	59.00	45.87	17.00	1.50	30
MT 77077	C61-9/WLT//CRT	104.75	56.40	44.88	.00	.00	0
OR 7921	BEZ/Sprague Sel. 18-24	102.05	57.88	35.14b	.00	.00	30
OR 7930	BEZ/REW Sel 42-31	100.27	58.15	37.20b	2.50	.63	30
OR 7925	Clarifen/WA5836Sel27-26	98.76	55.32	31.10b	.00	.00	10
CI 13844	Wanser[1/]	97.04	52.77	46.46	.00	.00	40
ID 178	SNR64/II-60-155//Heglar/	96.29	58.55	45.57	24.50	7.25a	20
UT 927124	178383/II//DM/3/WN/4/Bur	96.26	60.55	48.72	13.75	3.00a	0
WA 6584	BEZ/BNK/13438//5435/4564	94.57	58.80	41.83b	.00	.00	10
ID 207	RGR/3/II-60-156/14107//I	89.94	58.30	39.37b	12.50	2.63a	0
ID 208	A667W-46/3/II-60-156/141	89.65	57.40	48.62	76.25a	3.63a	00
ID 51031	BEZ//BT/83/ID5011/ID5006	88.65	58.80	49.31a	.00	.00	0
ID 51021	BEZ//Burt/178383/3/ARK	85.67	60.32	42.32b	.00	.00	5
ID 157	C114106/MC13/WRR//KO/178	84.30	60.20	48.03	75.25a	7.50a	0
ID 51032	ID 5011/WA 4765//ID 5011	80.43	59.25	50.20a	13.75	.25	1
ID 179	A667W-46/Ranger	78.59	58.98	47.74	67.50a	7.00a	0
ID 51022	BEZ//Burt/178383/3/ARK	77.99b	59.27	45.87	.00	.00	0
ID 154	BSN//KO/83/3/156/14107	73.95b	44.55	43.21b	47.50a	5.13a	0
OR 792	Triumph/Lancer, Sel. 126	70.69b	57.13	48.72	12.50	.75	30
CI 1442	Kharkof	70.39b	58.60	53.15a	33.75a	5.75a	30
	$\bar{x}$	95.46	57.90	43.69	14.79	1.74	
	F[2/]	4.17**	1.06NS	29.39**	7.07**	8.01**	
	S.E.$\bar{x}$	6.71	3.04	1.00	8.87	.89	
	L.S.D.(.05)	18.93	8.56	2.83	25.00	2.50	
	C.V. %	7.03	5.25	2.29	59.93	51.11	

1/ Check variety
2/ F value for variety comparison
a/ Values significantly greater than the check at the .05 level
b/ Values significantly less than the check at the .05 level
* Indicates statistical significance at the .05 level
** Indicates statistical significance at the .01 level