TITLE: Winter Wheat

PROJECT: Small Grains Investigations MS756

YEAR: 1978

PERSONNEL: Leader - Vern R. Stewart
Research Technician - Todd Keener
Cooperator - G. A. Taylor
Cooperating Agencies - Montana Agricultural Experiment Station
Montana Wheat Research & Marketing Committee

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

OBJECTIVES:

1. To obtain information necessary to make varietal recommendations and evaluate new varieties and selections.
2. To cooperate in the breeding program in northwestern Montana designed to produce a high yielding variety with particular emphasis on quality, disease resistance to dwarf smut and stripe rust. Other agronomic characteristics such as straw strength and winter hardiness will be evaluated.

1978 EXPERIMENTS:

1. Western Regional Hard Red Winter Wheat Nursery
2. Western Regional White Winter Wheat Nursery
3. Elite Yellow Rust Nursery
4. Seed Treatment Study
5. Special lines from Sunderman

1978 RESULTS:

Western Regional Hard Red Winter Wheat Nursery - Kalispell

Yields in 1978 were very low with a mean of 25.07 bu/a. This low yield was caused by a high level of snow mold. Crest, the check variety, was about equal in yield to the other varieties and had a better than average survival level. ID745520 was the highest yielding entry but not statistically significant. The high C.V. can be accounted for in part because of the uneven stands. Test weights were all below standard in the test.

High levels of dwarf smut were found in this test. Only one variety ID154 was free of this disease. ID745520 the highest yielding line, had only 1.25% smut which does indicate some resistance. Table 1.

Western Regional Hard Red Winter Wheat Nursery - Stillwater

This was seeded later than the Creston location. This delay in seeding resulted significantly in better stands and little or no loss due to snow mold. There was a relatively high level of dwarf smut infection, therefore giving a significant reading as to resistance. The highest yielding entry is UT89099 with 97.29 bu/a. It had a relatively low level of dwarf smut - .75%. Three Utah lines were the highest yielding lines in this study.

Test weights were low and can be accounted for because of the heavy rainfall and delayed harvest. UT890152 showed no evidence of dwarf smut and was second in yield. ID126 also showed no dwarf smut, but had a very weak straw and a low yield.

Kharkof, one of the more susceptable checks had a dwarf smut level of 21.25%. Therefore, we feel this is a pretty good test of the varieties in the nursery. The mean yield for the nursery was 65.37 bu/a. The C.V. is somewhat higher than we would like to see, but this is due in part to lack of uniformity in the field. Table 2.

1978 Results (con't)

Western Regional White Winter Wheat Nursery - Kalispell

In 1978 we had the lowest yields of white wheats ever grown in this location. There was a very high level of dwarf smut. The mean yield for the nursery was 25 bu/a and we would anticipate a mean yield of 60 to 70 bu/a. Hyslop was the highest yielding entry at 36.94 bu/a. It had a smut reading of 5.75%. McDermid the check variety, was found to be significantly lower in yield than other lines and had a smut reading of 9.75%. There were no lines with 0.0% smut readings.

Stand loss is due to high levels of snow mold. The soft white variety survival level is much lower than the hard red winter varieties. In 1978 there are few or no promising lines in the white wheats. Luke had a smut reading of 7.25%, which is much higher than we can tolerate. Table 3.

Western Regional White Winter Wheat Nursery - Stillwater

Yields were above average for the Stillwater location. We had a mean yield of 69 bu/a, which ordinarily we would expect at the Kalispell location. McDermid was used as the check variety.

Smut levels were not as high as at Kalispell. We had excellent stand as seen by the yields. There are no varieties that have what I consider an acceptable dwarf bunt resistance level, however ID755312 was quite low at 1.25% and ID745318 at 1%. Luke, a smut resistant variety had a dwarf smut reading of 1.25%. Kharkof, one of the checks had a reading of 8.25%. Table 4.

In Table 5 is a summary of the yields for the Western Regional White Wheat Nurwery at the Northwestern Agricultural Research Center for 1968-78. Nugaines is used as the check. Hyslop compared over the 11 years is 11.4% higher in yield.

Elite Yellow Rust Nursery - Kalispell

The hard red wheat lines in this nursery are being evaluated for resistance to stripe rust and dwarf smut. There were differences in survival due to snow mold. MT7789 is the highest yielding entry in the test, but it is not significantly higher in yield than Crest which we used as a check. There were no lines in this test that were completely immuned to dwarf smut, however there were six lines that were less than 1% dwarf smut. Some varieties had very good straw strength. MT77077 and MT 77079 have some resistance to dwarf smut. MT77079 does not have as strong a straw, but probably would be acceptable. MT77066 has good straw but has a high dwarf smut reading. Westmont, which is a dwarf smut susceptable variety, has a smut reading of 30.75% which indicates that many of the lines in this test do show some promise for resistance. Table 6.

Elite Yellow Rust Nursery - Stillwater

This nursery has the same objectives as the previous one. Mean yield of 51.72 bu/a, is very high for this location for hard reds. The dwarf smut level was not as high as the Kalispell location, however high enough to give us information on the resistance of most lines. MT77056 showed no smut, had good straw strength and yielded 66.97 bu/a. MT77069 also had a 0.0% reading on dwarf smut. C.V.'s are very high, this can be accounted for in part because of the unevenness in stand at this location which was due to water standing in the field in early spring. Table 7.

Special Lines from Sunderman

Six hard red wheat lines from the breeding program at Aberdeen, Idaho were evaluated for yield and dwarf smut resistance. Two lines were found to be free of dwarf smut. A7014W-16-1 was the highest yielding line, had good straw strength, fair test weight and .0% smut. Two of these hard red lines need to be evaluated further. Table 8.

Table 3. Agronomic data from the western regional white winter wheat nursery grown at the Northwestern Agricultural Research Center, Kalispell, MT in 1978. Field No. E-1. Random block design, four replications.

Date seeded: September 15, 1977 Date harvested: August 29, 1978
Size of plot: 16 sq. ft.

C. I. or State No.	Variety	Yield Bu/A	Test Wt Lbs/Bu	Heading Date	Height Inches	% Survival	Dwarf Smut
CI 14564	Hyslop	36.94a	55.50	171.50	29.25	42.50	8.75
WA 6363	Luke/WA5829	34.16a	57.00	172.25	29.25	77.50a	2.00
ID 755312	WA4765//Burt/PI178383	30.21a	56.00	172.00	31.00	63.75a	1.00
WA 6472	Semidwarf Multiline Club	30.11a	53.50	172.00	29.25	58.75a	8.50
WA 6362	Luke Mutant, EMI14	29.98a	57.40	174.25a	28.25	83.75a	1.25
WA 6470	Luke/Norco,VH 74333	29.76a	56.20	173.25a	30.25	90.00a	3.75
CI 14586	Luke	29.66a	56.80	173.50a	29.75	78.75a	7.25
ID 755314	WA4765//Burt/PI178383	29.13a	55.70	172.00	36.75a	70.00a	2.50
OR 680073	Yamhill/Hyslop	29.11a	53.40	172.25	32.75a	55.00a	24.00a
ID 775323	WA4765//Burt/PI178383	28.66a	54.80	171.75	29.75	56.25a	1.25
OR 74131	Pendleton 1-372	28.41	54.50	171.75	29.25	66.25a	5.25
OR 7142	C.I.13748/Moro,142	28.33	53.70	168.75	30.25	60.00a	3.50
CI 13740	Moro	27.78	53.80	170.50	34.25a	75.00a	3.75
CI 17590	Faro	25.41	52.40	171.50	27.50	31.25	4.50
ID 745318	WA4765//Burt/PI178383	25.28	54.50	170.25	29.25	62.50a	1.25
OR 68007	Yamhill/Hyslop	25.11	53.60	172.25	31.00	58.75a	10.25
WA 6242	Luke//Itana/CI 13431	23.51	55.10	170.25	28.00	41.25	5.50
CI 17596	Stephens	23.43	53.70	166.50b	30.00	42.50	17.25
OR 7141	CI13748/Moro,Sel. 38	23.01	54.00	170.00	28.25	48.75	1.50
CI 17419	Daws	22.91	56.60	170.00	28.75	61.25a	15.25
OR 67237	CD/101//55-1744/3/DC	21.41	53.80	170.25	30.50	48.75	21.25a
CI 11755	Elgin	21.28	55.40	172.00	34.25a	52.50a	40.25a
WA 6471	CI 15923//N D/2*101	19.46	54.40	170.50	29.75	32.50	25.00a
CI 13968	Nugaines[1/]	18.93	56.50	171.50	28.50	27.50	17.00
CI 14565	McDermid[1/]	18.63	53.70	170.25	29.25	33.75	9.75
CI 1442	Kharkof	16.88	56.10	169.75	37.25a	52.50a	13.00
OR 739401	Oregon Sel. R73-9401	15.31	52.70	171.75	29.00	26.25	17.50
OR 7493	Pendleton I-607	10.40	52.20	172.75a	28.25	33.75	11.75
	$\bar{x}$	25.11	54.75	171.26	30.34	54.69	10.13
	F[2/]	2.86**	.00	4.38**	13.27**	10.08**	8.32**
	S.E.$\bar{x}$	3.50	.00	.75	.69	5.50	3.25
	L.S.D.(.05)	9.85	.00	2.10	1.93	15.48	9.13
	C.V.%	13.94	.00	.44	2.26	10.06	32.04

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

Table 4. Agronomic data from the western regional white winter wheat nursery grown on the Lance Claridge farm, Kalispell, MT in 1978. Random block design, four replications.

Date seeded: September 27, 1977 Date harvested: September 21, 1978
Plot size: 32 sq. ft.

C.I. or State No.	Variety	Yield Bu/A	Test Wt Lbs/Bu	Height Inches	Dwarf Smut
WA 6471	CI 15923//N D/2*101	99.37a	54.30	30.00	2.00
OR 680073	Yamhill/Hyslop	86.28	50.60	33.00	6.50a
WA 6242	Luke//Itana/CI13431	86.14	50.70	30.50	4.00
ID 755312	WA 4765//Burt/PI 178383	83.88	54.00	37.00a	1.25
ID 775323	WA 4765//Burt/PI 187383	83.60	51.20	32.00	1.50
WA 6363	Luke/WA 5829	82.93	55.70	28.50	2.75
ID 745318	WA 4765//Burt/PI 178383	82.05	52.60	31.25	1.00
OR 67237	CD/101//55-1744/3/DC	79.70	53.90	30.50	8.25a
OR 7493	Pendleton I-607	78.33	51.30	28.50	2.00
OR 7142	C.I. 13748/Moro,142	76.64	52.20	32.25	5.00
WA 6472	Semidwarf Multiline Club	74.22	52.50	32.50	5.75
CI 17419	Daws	73.25	55.50	32.00	5.75
CI 17596	Stephens	72.82	54.20	32.25	5.75
OR 74131	Pendleton I-372	72.15	53.60	32.00	6.75a
WA 6470	Luke/Norco, VH 74333	71.54	56.00	28.50	6.25a
WA 6362	Luke Mutant, LM-14	69.79	56.70	25.75	3.00
ID 755314	WA 4765//Burt/PI 178383	68.75	57.40	38.00a	1.25
CI 14586	Luke	67.62	52.70	29.25	1.25
OR 7141	CI 13748/Moro, Sel. 38	64.38	53.30	31.25	2.25
CI 13968	Nugaines	61.53	55.60	33.00	4.25
CI 14565	McDermid[1/]	60.76	54.00	29.50	2.25
CI 17590	Faro	59.76	51.60	30.75	3.00
CI 14564	Hyslop	59.43	54.50	28.50	5.50
CI 11755	Elgin	59.24	54.50	37.25a	9.50a
OR 68007	Yamhill/Hyslop	50.28	49.70	27.50	7.50a
CI 13740	Moro	47.84	49.40	32.50	1.25
CI 1442	Kharkof	47.08	55.20	38.50a	8.25a
OR 739401	Oregon Sel. R73-9401	37.89	52.30	24.75	4.25
	$\bar{x}$	69.90	53.40	31.33	4.21
	F[2/]	1.38	.00	2.22	3.87
	S.E.$\bar{x}$	11.93	.00	2.26	1.28
	L.S.D.(.05)	33.55	.00	6.36	3.61
	C.V.%	17.06	.00	7.22	30.43

1/ Check variety
2/ F-test 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

Table 5. Summary for yields for the western regional white winter wheat nursery grown at the Northwestern Agricultural Research Center, Kalispell, MT 1968-78.

C.I. or State No.	Variety	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	Ave.	Sta. Yrs.	% Mugaines
CI 1442	Kharkof	58.5	58.9	56.4	62.1	59.7	45.3	27.7	37.4	61.1	50.7	16.9	48.6	11	69.8
CI 11755	Elgin	80.5	51.2	74.1	73.0	70.8	50.9	59.2	42.3	67.6	57.8	21.3	59.0	11	84.7
CI 13740	Moro	86.3	65.7	75.4	68.3	68.5	65.6	60.3	44.0	69.8	57.0	27.8	62.6	11	89.9
CI 13968	Mugaines	85.8	63.2	77.6	102.8	73.0	68.5	77.9	51.8	80.2	66.0	18.9	69.6	11	100.0
CI 14564	Hyslop	90.1	62.7	87.3	113.1	90.1	63.1	96.3	56.8	87.7	68.3	36.9	77.5	11	111.4
CI 14565	McDermid			88.8	111.9	95.8	63.4	84.7	57.1	93.3	72.9	18.6	76.3	9	89.7
CI 17596	Stephens (OR 65116)						61.6	81.2	52.3	82.1	60.6	23.4	60.2	6	99.4
CI 17419	Daws							89.0	56.3	92.8	68.7	22.9	65.9	5	111.8
CI 17590	Faro							85.4	53.5	74.9	65.2	25.4	60.9	5	103.3
OR 7142	C.I. 13748/Moro,142								51.4	74.1	66.9	28.3	55.2	4	101.8
OR 68007	Yamhill/Hyslop									92.1	75.5	25.1	64.2	3	116.7
OR 67237	CD/101//55-1744/3/DC									89.9	68.8	21.4	60.0	3	109.1
ID 755312	WA 4765/Burt/PI 178383									88.4	66.9	30.2	61.8	3	112.4
ID 755314	WA 4765/Burt/PI 178383									86.5	60.6	29.1	58.7	3	106.7
OR 739401	Oregon Sel. R73-9401									83.8	66.4	15.3	55.2	3	100.2
WA 6242	Luke//Itana/CI 13431									83.2	61.7	23.5	56.1	3	102.0
OR 7141	CI 13748/Moro, Sel. 38									76.3	59.4	23.0	52.9	3	96.1
WA 6362	Luke Mutant LH-14, VH74629										66.1	30.0	48.0	2	113.2
WA 6363	Luke/WA 5829										70.2	34.2	52.2	2	123.0
OR 74131	Pendleton Sel. No. I-372										63.2	28.4	45.8	2	107.9
OR 7493	Pendleton Sel. No. I-607										63.2	10.4	36.8	2	86.7
ID 775323	WA4765//Burt/PI 178383											28.7	28.7	1	151.9
ID 754318	WA4765//Burt/PI 178383											25.3	25.3	1	133.9
WA 6470	Luke/Norco, VH 74333											29.8	29.8	1	157.7
WA 6471	CI 15923//ND/2*101											19.5	19.5	1	103.7
WA 6472	Semidwarf Multiline Club											30.1	30.1	1	159.3
CI 14586	Luke											30.0	30.0	1	158.7
OR 680073	Yamhill/Hyslop											29.1	29.1	1	154.0