

TITLE: Winter Wheat
PROJECT: Small Grains Investigations 756
YEAR: 1974
PERSONNEL: Leader - Vern R. Stewart
 Cooperator - G. A. Taylor
 Cooperating Agencies - Montana Agricultural Experiment Station
 Montana Wheat Research and Marketing
 Committee

OBJECTIVES:

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

1974 EXPERIMENTS:

1. Western Regional Hard Red Winter Nursery
2. Off Station Nurseries
3. Elite Yellow Rust Nursery
4. Western Regional White Winter Nursery

SUMMARY OF 1974 RESULTS:

Kalispell - This is the first year this nursery has been grown in Field E where we have high yields. Most of the entries in this nursery have a long straw and are very susceptible to lodging. Because of severe lodging no dwarf smut readings were obtained. ID725055 and ID725056 were the two highest yielding entries and have good straw strength. Mean yield for the nursery was 55.47 bu/acre, test weight mean was 60.13. See Table 1 for complete detail.

Stillwater - Stand loss was less severe than in most years in this location, however many varieties had less than 80% stand. Dwarf smut levels were lower than some years, but of sufficient magnitude to give good differential reading. MT 6930 had the highest level of dwarf smut. Crest had the highest level we have seen in this variety, 7.5%. UT 819188 was the only variety with no smut recorded in this nursery. Several lines had less than 1%. Yields were about average for this location with a mean of 24.72 bu/acre. Two lines were found significantly higher in yield than Crest. Table 2.

Table 3 gives a summary of the data from the two locations. UT 819188 is the only line found to be free of dwarf smut. Yields are fair this season, test weight is excellent, the line has fair straw strength. Stands are equal to or better than Crest.

Off Station: Four off station nurseries were seeded in the fall of 1973. Two were harvested and reported below. The nursery in Sanders County was abandoned because of grain mixtured. It should be noted that this nursery was stubbled in, no tillage of any kind.

The nursery in Ravalli County was not harvested because of the very uneven growth of the nursery. This was due to soil conditions in the location where it was planted.

Missoula County - Stands were reduced at this location, which resulted in lower yields. Luke and Paha were significantly better in yield than Crest, the check variety. Luke and Paha are soft white varieties. There was little or no difference in yield between the hard red varieties. Table 4.

Off Station (con't) -

Lake County - Yield data obtained from this nursery were found to be non-significant. Nugaines is the highest yielding entry and Centurk the lowest yielding entry.

Elite Yellow Rust Nursery - In this nursery, lines from the breeding program are evaluated. Many lines were not harvested this year because of milling quality evaluation received, after seeding, indicated poor quality. Data from the lines harvested are found in Table 6. MT 71105 was high in yield with excellent straw strength. No evaluation of dwarf smut was made in the test because of the severe lodging.

Western Regional White Winter Wheat Nursery - Twenty-four entries were included in this nursery. Grain samples were sent to the Western Wheat Quality Laboratory, Pullman, Washington for quality evaluation.

Six entries were found to be significantly higher in yield than Nuagines, the variety used as the check. Five entries were significantly lower in yield than Nugaines. Paha and Hyslop continue to outyield Nugaines. Both varieties have some degree of dwarf smut, however the level was significantly less than Nugaines. Hyslop and Paha are somewhat later in heading date than the check. Both of these varieties have less straw strength than Nugaines.

There were four entries in which no dwarf smut was observed. They were: Moro, Luke, C.I. 14565 and OR 7146. Thirteen entries were found to have good resistance to stripe rust, including three of the top yielding entries. See Table 7.

The mean for test weight was 60.56 lbs/bu, with Nugaines having the highest test weight at 62.20 lbs/bu.

Using Nugaines as a check variety for several years, 15 varieties are superior in yield. Luke and C.I. 14565 exceed Nugaines in yield and have good dwarf smut resistance. All the other high yielding entries have some dwarf smut. Table 8.

Seeding Rate Study - The 90 pound seeding rate of Crest resulted in the highest yield in this location, lowest yields were obtained at the 30 pound seeding rate. Table 9.

WINTER WHEAT VARIETIES

WINTER WHEAT VARIETIES RECOMMENDED FOR WESTERN MONTANAHard Red Varieties

1. Crest
2. Winalta
3. Cheyenne

Soft White Varieties

1. Nugaines
2. Luke

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 and dwarf smut
 - i. Susceptible to stem rust and sawfly infestation
 - j. Not extremely winter hardy
 - k. 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

Soft White Varieties1. Nugaines

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

2. 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 at the Northwestern Agricultural Research Center, Kalispell, MT, Random block design, 4 replications.

Date seeded: September 17, 1973 Date harvested: August 8, 1974
 Size of plot: 16 sq. ft.

C. I. or State No.	Variety	Yield Bu/A	Test Wt Lbs/Bu	Heading Date	Plant Height	Lodging	
						% Prev.	Sev.
ID 725055	ID 5011/ID 5006	78.93a	61.00	168.00a	38.00b	.00b	.00b
ID 725056	ID 5011/WA 4765, Sel. 1	75.83a	58.70	170.25a	38.75	.00b	.00b
ID 71040	Moscow 71040	72.85a	59.20	168.00a	37.75b	24.75b	2.25b
ID 92	II-60-155/14106//McCall	68.97a	60.60	166.75a	38.00b	99.00	8.75
WA 7003	PI173467/IT//Wanser	64.75a	60.70	168.00a	40.75	96.75	9.00
ID 725058	ID 5011/WA 4765, Sel. 3	64.37a	59.70	169.50a	45.00	80.75b	8.75
WA 7002	Gaines//Burt/Itana	62.90a	61.80	166.25a	40.00	90.75	9.00
UT 819096	DM/Clm//Eurt/PI178383	62.00a	62.50	164.00	42.75	96.75	8.25
MT 6827	Burt/PI 178383 14-1202	61.17a	58.40	165.25a	38.50b	93.00	9.00
UT 821252	Warrior//Burt/PI 178383	60.72a	59.10	168.75a	42.75	99.00	8.50
MT 6828	Burt/PI 178383 13-1201	60.34a	59.60	164.75	40.25	93.00	9.00
WA 7001	Omar/IT//13438/HNIII	57.72a	62.00	167.00a	41.75	99.00	9.00
UT 819116	DM/Clm//Burt/PI 178383	57.67a	60.10	165.25a	45.25	96.75	8.75
UT 84557	DM/173438//Clm/3/Dm/4/Co	54.97a	60.00	167.00a	46.25	99.00	9.00
UT 819188	DM/Clm//Burt/PI178383	52.42a	62.00	165.25a	44.75	96.75	8.50
CI 13844	Wanser	51.99a	60.30	165.00	46.50	96.75	8.75
MT 6829	Burt/PI 178383 101-1200	51.92a	58.10	164.50	38.25b	99.00	8.75
UT 819164	DM/Clm//Burt/PI178383	51.52a	61.00	168.75a	47.50a	99.00	8.75
ID 37	IT//KO/PI178383	48.97	60.00	165.50a	46.50	99.00	8.75
ID 72	Cnn*2/PI 178383	48.47	60.60	167.50a	43.25	99.00	8.50
UT 755090	DM/178383/Clm	45.72	60.20	167.00a	44.50	99.00	8.75
CI 15317	Franklin	44.91	60.10	167.00a	44.50	99.00	8.75
MT 6930	NB176/Y18181//YTO1174-3	44.86	60.30	165.50a	45.00	93.00	9.00
ID 701043	Eez/2/Eurt/178383/3/Wa47	40.71	61.00	166.25a	48.00	93.00	8.50
CI 1442	Kharkof	39.19	58.40	168.50a	46.75	99.00	8.50
CI 13880	Crest ^{1/}	37.06	59.40	164.00	42.75	99.00	9.00
UT 755204	DM/178383/Clm	36.91	58.60	166.50a	46.50	99.00	9.00
	\bar{x}	55.47	60.13	166.67	42.98	86.63	7.88
	F _{2/}	6.89**	.00	16.58**	5.32**	24.36**	31.19**
	S.E. \bar{x}	4.38	.00	.41	1.45	5.83	.47
	L.S.D. (.05)	12.31	.00	1.16	4.07	16.41	1.31
	C.V. %	7.89	.00	.25	3.36	6.73	5.91

1/ Check variety

2/ Value for variety comparison

* Indicates statistical significance .05 level

** Indicates statistical significance .01 level

a/ Value significantly greater than the check .05 level

b/ Value significantly less than the check .05 level

Table 2. Agronomic data from the western regional hard red winter wheat nursery, grown on the Lance Claridge farm, Kalispell, MT, 1974. Random block design, 4 replications.

Date seeded: September 24, 1974 Date harvested: August 30, 1974 Size of plot: 16 sq. ft.

C.I. or State No.	Variety	Yield Bu/A	Test Wt. Lbs/Bu.	Plant Height	Lodging		Dwarf Smut	% Stand
					% Prev	Sev.		
UT 819116	DM /Clm//Burt/PI 178383	33.34a	61.10	28.00a	75.75	3.50	.50	72.50
UT 755090	DM/178383/Clm	31.31a	61.10	26.50a	53.50	4.50	4.25	80.00
UT 819188	DM/Clm//Burt/PI 178383	29.98	61.80	27.00a	42.50	4.00	.00b	67.50
ID 71040	Moscow 71040	28.38	58.60	23.00a	74.25	.75b	15.50a	83.75
UT 819096	DM/Clm//Burt/PI 178383	28.06	61.70	24.75a	52.25	2.75b	2.00	72.50
MT 6827	Burt/PI 178383 14-1202	27.91	59.10	23.00a	74.25	.75b	.50	77.50
UT 819164	DM/Clm//Burt/PI 178383	27.38	62.00	25.75a	42.50	3.50	.50	67.50
ID 725056	ID 5011/WA 4765, Sel. 1	27.03	59.50	23.25a	31.00	1.00b	16.25a	80.00
MT 6828	Burt/PI 178383 13-1201	26.63	58.80	22.50a	74.25	.75b	5.75	75.00
MT 6829	Burt/PI 178383 101-1200	26.56	60.00	21.50	53.75	3.50	6.25	75.00
ID 37	IT//KO/PI 178383	26.28	62.10	24.50a	94.25	4.00	.25b	67.50
WA 7001	Omar/IT//13438/HNIII	26.08	60.60	23.50a	81.75	1.50b	26.25a	75.00
UT 821252	Warrior//Burt/PI 178383	26.03	59.50	25.00a	49.50	.50b	.25b	80.00
ID 92	II-60-155/14106//McCall	25.86	60.80	19.50	81.75	1.50	1.25	67.50
CI 15317	Franklin	25.86	60.80	24.00a	74.50	4.50	.25b	70.00
ID 72	Cnn*2/PI 178383	25.23	61.00	23.50a	95.50	4.50	.25b	70.00
UT 84557	DM/173438//Clm/3/DM/4/CO	25.01	61.00	25.50a	78.25	5.00	.75b	65.00
ID 725058	ID 5011/WA 4765, Sel. 3	24.76	59.60	25.25a	99.00	2.00b	21.25a	75.00
CI 13880	Crest	22.51	60.50	19.50	57.25	4.50	7.50	65.00
CI 1442	Kharkof	21.71	59.20	26.00a	99.00	2.75	25.00a	73.75
UT 755204	DM/178383/Clm	21.56	61.20	24.50a	63.50	5.25	.25b	65.00
ID 701043	Bez/2/Burt/178383/3/WA47	21.01	61.60	24.75a	99.00	1.50b	30.00a	77.50
CI 13844	Wanser	20.16	59.90	23.00a	99.00	1.00b	40.00a	75.00
WA 7002	Gaines/Burt/Itana	20.01	60.80	24.00a	86.75	1.50b	27.50a	77.50
WA 7003	PI173467/IT//Wanser	16.81	59.40	20.75	24.75	.25b	33.75a	70.00
ID 725055	ID 5011/ID 5006	16.58	60.60	20.75	5.00b	.75b	21.25a	80.00
MT 6930	NB176/Y18181//YTO1174-3	15.43	61.10	23.00a	80.75	3.50	43.75a	70.00
	\bar{x}	24.72	60.50	23.79	68.28	2.57	12.26	73.15
	$F^2/$	2.23**	.00	3.35**	2.33**	9.90**	24.74**	1.89NS
	S.E. \bar{x}	2.95	.00	1.17	16.33	.52	2.82	3.88
	L.S.D(.05)	8.30	.00	3.28	45.94	1.45	7.94	10.93
	C.V. %	11.94	.00	4.91	23.92	20.01	23.03	5.31NS

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

Table 3. Summary of agronomic data from the western regional hard red winter wheat nursery grown at the North-western Agricultural Research Center and Stillwater in 1974.

C. I. or State No.	Variety	Yield ^{1/} Bu/A ^{1/}	Test Wt. ^{1/} Lbs/Bu ^{1/}	Heading ^{2/} Date ^{2/}	Plant ^{1/} Height	Lodging ^{1/}		% ^{3/} Stand	% Dwarf ^{3/} Smut ^{3/}
						% Prev.	Sev.		
ID 725055	ID5011/ID5006	47.76	60.80	168.00a	30.50	40.38	1.75	80.00	21.25
ID 725056	ID5011/WA4765, Sel 1	51.43	59.10	170.25a	31.00	15.50	.50	80.00	16.25
ID 71040	Moscow 71040	50.62	58.90	168.00a	30.38	49.50	1.50	83.75	15.50
ID 92	11-60-155/14106//McCall	47.42	60.70	166.75a	28.75	90.38	5.13	67.50	1.25
WA 7003	PI173467/IT//Wanser	40.78	60.05	168.00a	30.75	60.75	4.63	70.00	33.75
ID 725058	ID5011/WA4765, Sel.3	44.57	59.65	169.50a	35.13	89.88	5.38	75.00	21.25
WA 7002	Gaines//Burt/Itana	41.46	61.30	166.25a	32.00	88.75	5.25	77.50	27.50
UT 819096	DM/Clm//Burt/PI178383	45.03	62.10	164.00	33.75	74.50	5.50	72.50	2.00
MT 6827	Burt/PI178383 14-1202	44.54	58.75	165.25a	30.75	83.63	4.88	77.50	.50
UT 821252	Warrior//Burt/PI178383	43.38	59.30	168.75a	33.88	74.25	4.50	80.00	.25
MT 6828	Burt/PI187383 13-1201	43.49	59.20	164.75	31.38	83.63	4.88	75.00	5.75
WA 7001	Omar/IT//13438/HNIII	41.90	61.30	167.00a	32.63	90.38	5.25	75.00	26.25
UT 819116	DM/Clm//Burt/PI178383	45.51	60.60	165.25a	36.63	86.25	6.13	72.50	.50
UT 84557	DM/173438//Clm/3/DM/4/CO	39.99	60.50	167.00a	35.88	88.63	7.00	65.00	.75
UT 819188	DM/Clm//Burt/PI178383	41.20	61.90	165.25a	35.88	69.63	6.25	67.50	.00
CI 13844	Wanser	36.08	60.10	165.00	34.75	97.88	4.88	75.00	40.00
MT 6829	Burt/PI178383 101-1200	39.24	59.05	164.50	29.88	76.38	6.13	75.00	6.25
UT 819164	DM/Clm//Burt/PI178383	39.45	61.50	168.75a	36.63	70.75	6.13	67.50	.50
ID 37	IT//KO/PI178383	37.63	61.05	165.50a	35.50	96.63	6.38	67.50	.25
ID 72	Cnn*2/PI178383	36.85	60.80	167.50a	33.38	97.25	6.50	70.00	.25
UT 755090	DM/178383/Clm	38.52	60.65	167.00a	35.50	76.25	6.63	80.00	4.25
CI 15317	Franklin	35.39	60.45	167.00a	34.25	86.75	6.63	70.00	.25
MT 6930	NB176/Y18181//YTo1174-3	30.15	60.70	165.50a	34.00	86.88	6.25	70.00	43.75
ID 701043	Bez/2/Burt/178383/3/WA47	30.86	61.30	166.25a	36.38	96.00	5.00	77.50	30.00
CI 1442	Kharkof	30.45	58.80	168.50a	36.38	99.00	5.63	73.75	25.00
CI 13880	Crest	29.79	59.95	164.00	31.13	78.13	6.75	65.00	7.50
UT 755204	DM/178383/CLM	29.24	59.90	166.50a	35.50	81.25	7.13	65.00	.25

1/ x for Northwestern Agricultural Research Center and Stillwater.

2/ x for Northwestern Agricultural Research Center only.

3/ x for Stillwater only.

4/ check variety

a/ values significantly greater than the check (.05)

Table 4. Agronomic data from the off station winter wheat nursery grown in Missoula County on the Al Goodan farm, Missoula, Montana, 1974.

Date seeded: September 20, 1973 Date harvested: August 13, 1974
 Size of plot: 16 sq. ft.

C. I. or State No.	Variety	Yield Bu/A	Test Wt. Lbs/Bu.	Plant Height (inches)	% Stand
CI 13844	Wanser	29.1	60.0	24.5	63.8
CI 8885	Cheyenne	29.1	60.4	26.8a	66.3
CI 15327	Sundance	30.6	59.5	27.0	67.5
CI 13442	Delmar	31.6	61.0	30.0a	68.8
MT 6827	Burt/PI178383	26.5	58.2	23.0	57.5
MT 6828	Burt/PI 178383	26.4	58.5	22.5	50.0
MT 6829	Burt/PI178383	34.1	59.5	25.0	71.3
NB 66425	Centurk	34.3	61.0	23.3	75.0
CI 13968	Nugaines	34.3	60.4	22.5	77.5
CI 14586	Luke	41.6a	61.0	24.0	67.5
CI 14564	Hyslop	31.9	59.5	22.3	76.3
CI 14565	McDermid	31.6	58.5	22.3	50.0
CI 14485	Paha	40.4a	59.1	21.5	81.3
WA 5826	Omar/1834-3// PI178383/CI13431	34.0	58.5	20.3	72.5
CI 13842	McCall	29.5	60.5	25.5	55.0
CI 13880	Crest ^{1/}	30.6	60.0	23.3	65.0
	\bar{x}	32.2	59.7	24.0	66.6
	F ^{2/}	3.00*	.00	7.76**	3.26**
	S.E. \bar{x}	2.44	.00	.87	5.22
	L.S.D.(.05)	6.94	.00	2.49	14.85
	C.V. %	7.58	.00	3.65	7.85

^{1/} Check variety

^{2/} Value for variety comparison

* Indicates significance at the .05 level.

** Indicates significance at the .01 level.

a Value significantly greater than the check .05 level.

b Value significantly less than the check .05 level.

Table 5 . Agronomic data from off station winter wheat nursery grown in Lake County on the George Piedalve farm, Ronan, MT., 1974. Random block design, four replications.

Date seeded: September 28, 1973 Date harvested: August 13, 1974
 Size of plot: 16 sq. ft.

C.I. or State No.	Variety	Yield Bu/A	Test Wt. Lbs/Bu.	Plant Height
CI 13844	Wanser	37.3	60.5	34.0
CI 8885	Cheyenne	41.4	60.2	31.5
CI 15327	Sundance	38.0	59.8	35.0a
CI 13442	Delmar	40.6	61.0	34.8a
MT 6827	Burt/PI 178383	37.0	59.2	32.0
MT 6828	Burt/PI 178383	35.8	59.1	32.8
MT 6829	Burt/PI 178383	39.0	60.2	33.3
NB 66425	Centurk	29.8	62.0	31.8
CI 13968	Nugaines	44.0	60.8	25.8b
CI 14586	Luke	43.2	59.5	26.3b
CI 14564	Hyslop	41.2	57.6	27.5b
CI 14565	McDermid	34.3	58.0	28.3
CI 14485	Paha	36.7	60.2	27.3b
WA 5826	Omar/1834-3//PI178383/CI13431	38.1	59.5	25.3b
CI 13842	McCall ^{1/}	34.0	60.6	32.8
CI 13880	Crest ^{1/}	34.1	61.6	30.8
	\bar{x}	37.8	60.0	30.6
	F ^{2/}	1.09NS	.00	10.13**
	S.E. \bar{x}	3.5853	.00	1.0447
	L.S.D. (.05) N.S.		.00	2.97
	C.V.%	9.49	.00	3.42

1/ Check variety

2/ Value for variety comparison

* Indicates statistical significance .05 level

** Indicates statistical significance .01 level

a/ Values significantly greater than the check .05 level

b/ Values significantly less than the check .05 level