

TITLE: Winter Wheat

PROJECT: Small Grain Investigations MS 756

YEAR: 1982

PERSONNEL: Leader - Vern R. Stewart
 Technician - Todd K. Keener
 Cooperators - G. A. Taylor, Plant and Soil Science, MSU
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 Cooperating Agencies - Montana Wheat Research Committee
 Montana Agricultural Experiment Station
 Montana Wheat Research & Marketing Committee
 Montana Cooperative Extension Service

LOCATIONS: Northwestern Agricultural Research Center
 Lance Claridge Farm, Kalispell
 Ross McInyre Farm, Stevensville
 Joe Holland Farm, Plains
 Arthur Mangles Farm, Polson
 Bill Lucier Farm, Missoula

- 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-ARS in the Pacific Northwest wheat germ plasm or varieties that have resistance to dwarf smut (Tilletia controversa Kuhn) and stripe rust (Puccinia striiformis West.)

INTRODUCTION:

The winter of 1982 was near normal for temperature, however precipitation levels were higher than normal in December, January and February. Because this precipitation came mainly as snow we did have relatively good snow cover during the winter season, and during the period when dwarf smut infections would be developing. With this snow cover we did not have the level of dwarf smut that I would have anticipated in the Stillwater area.

Precipitation levels were below normal in May and June and quite low in August. Somewhat higher in July, however the pattern was such that we did not have a high level of stripe rust or other foliar diseases developing in winter wheat.

In September and October of 1982 we established a new study to evaluate the effects of tillage on the levels of dwarf smut over a long period of time. In this study we will be evaluating three tillage types in our dwarf smut field laboratory located on the Lance Claridge farm northwest of Kalispell. This study is planned to run a minimum of five years, but we would prefer a 10 year period to determine the effect of tillage methods on dwarf smut inoculum levels.

1982 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. USDA-ARS Cooperative Studies - Stillwater
 - (a) Fungicide Evaluations
 - (b) Breeding Lines Tested for Smut Resistance
 - (c) Cooperative Dwarf Bunt Study with the Peoples Republic of China
4. Off Station Variety Nurseries
 - (a) Ross McIntyre Farm, Stevensville, Ravalli County
 - (b) Bill Lucier Farm, Missoula, Missoula County
 - (c) Art Mangles Farm, Polson, Lake County
5. Preliminary Evaluations of Hard Red Winter Wheat
 - (a) Kalispell

1982 RESULTS:

Western Regional Hard Red Winter Wheat Nursery - Kalispell

In 1982 the yields were considerably higher than in 1981. This is in part due to timeliness of rain, and a less foliar disease problem than we had in 1981. The highest yielding variety in the test was OR7921 (115.3 bu/a) which was significantly higher than the variety Crest used as a check. It was not statistically higher than Winridge, a newly released variety. The Oregon variety did have 1.12% smut factor which could be a little high for a light smut year, when compared to Karkof 5.5%. The variety has good straw strength and has an earlier heading date than Winridge, but somewhat later than Crest. There were 10 entries that exceeded 100 bu/a in this test, but only one of those showed fair smut resistance (OR 7930 - .62%). MT77066 yielded 100 bu/a, shows good smut resistance, but has a very weak straw. Weston, an Idaho variety, shows good smut resistance as does UT125327. These varieties yielded 98 plus bu/a.

The evaluation for smut resistance is just fair in this test. The smut level of Karkof, a very susceptible variety, was only 5.5% and a variety having 1% would be suspect as far as being smut susceptible under a heavy infestation. UT125327, ID0243, ID002616 and UT125512 had zero dwarf smut readings. Table 1

Test weights were somewhat below the standard 61 lbs/bu. Only ORCR8107 exceeded the standard weight.

Lodging was quite severe. There are a few varieties that have sufficient straw strength for this location. WA6816 and OR7921 had fair straw strength. Most of the Idaho and Montana lines are very susceptible to lodging.

Western Regional Hard Red Winter Wheat Nursery - Stillwater

Yields continue to increase each year in this location. The mean for this year was 83 bu/a with a range of 94.1 to 64.79 bu/a. UT125327 is the highest yielding entry in the nursery and has good smut resistance in this test. In the Kalispell location it showed no smut, whereas in the Stillwater location it showed .12% smut. Winridge, a new release yielded 92.5 bu/a which is not significantly higher than Crest, and shows a fair degree of smut resistance. ID0215 and ID0216 are the only two varieties that show no smut in this location.

Winridge had a test weight of 62.5 lbs/bu which is about the mean level of the entire experiment.

Dwarf smut at this location was light to moderate and Karkof, a very susceptible variety only had 2.25% whereas Wanser, probably equal in susceptibility, is 3.5%. MT 77002 was 5% which indicates to the author that this variety is even more susceptible than Karkof. With the snow cover at this location, we would have anticipated higher levels of dwarf smut than we found, however this is due in part because snow cover did not come early in the fall of 1981.

Six varieties showed a degree of lodging, from moderate to severe, in this study. This is in contrast to the Kalispell location where lodging was severe in most entries in the test. Table 2

Western Regional White Wheat Nursery - Kalispell

Luke was the high yielding entry in this nursery with 140.9 bu/a which is 23 bu/a greater than the mean. Lewjain, a newly released variety, was approximately 10 bu/a less in yield, however this difference was not statistically significant. There were 10 varieties or lines that exceeded 130 bu/a in this study. Yields ranged from 59.7 bu/a to 140.5 bu/a.

Test weight mean was 58.56 lbs/bu. The variety Daws had the highest test weight at 62.37 lbs/bu. Luke reached the standard of 60 lbs/bu and Lewjain was 59.4 lbs/bu.

Smut levels were moderate at this location. The susceptible variety Karkof had a reading of 5.25%. WA6696 was close behind (4.75%), Luke and Lewjain both had 1% plus dwarf smut levels. It should be noted that not a variety in this test was 100% smut free.

Lodging evaluation are significant. We have differential lodging in this experiment between varieties. Moro, Elgin and Karkof were severely lodged, Luke was lightly lodged, about 12%, whereas Lewjain showed no indication of lodging in this location. Table 3

Western Regional White Wheat Nursery - Stillwater

Yields at this location are quite high for the white wheats. Using Luke as the check (101.11 bu/a) we only find four varieties that are significantly higher in yield than Luke. The mean for the nursery was 91.73 bu/a. This illustrates a rather high productive level of these varieties in this test.

Test weights are lighter than we would have anticipated for this location.

Karkof had a smut level of 4.75% which is relatively light. It is interesting to note that Nugaines had approximately the same level of dwarf smut (4%) as we found in Karkof. Table 4

Off Station Nurseries

Four off station nurseries were planted in the fall of 1981. These were located in Missoula, Ravalli, Lake and Sanders Counties. Of the four planted only two were harvested in the fall of 1982.

Missoula County - In this location the nursery was seeded in a field that had been prepared for winter wheat. The operator then seeded the remaining part of the field and seeded through the nursery. In my 30 years of experience, I do not think this has ever occurred in my cooperative work.

Ravalli County - This was located on the Ross McIntyre Farm in Ravalli County. A grower we have worked with for many years. The nursery was located in a fallowed area with no crops seeded around it. Wild game found the seeding and selectively grazed varieties, thus destroying any possibility of obtaining data.

Sanders County - This nursery was located on the Joe Holland farm near Plains, MT. Luke was the high yielding variety in the nursery with 114.3 bu/a. Crest was the lowest with 58.62 bu/a. Winridge, a newly released hard red variety yielded 75.2 bu/a and was significantly lower in yield than the variety Luke.

No variety was entirely free of dwarf smut, however the level was not high, 4% reading. Lewjain and Winridge had the lowest smut readings in the test. Luke was somewhat higher than Lewjain with 1.8%.

Test weights varied from about 61 lbs/bu to 56 lbs/bu with a mean of 58.7 lbs/bu. Luke and Lewjain came close to meeting the 60 lbs/bu standard.

Lodging was quite high in the hard red winter varieties with no real severe problem in the soft whites except Luke had 24% lodging compared to Lewjain with 12%. Table 5

Lake County - This nursery was grown on the Art Mangles farm near Polson, MT. Yields were quite low, but understandably so in this rather light sandy soil. The mean was 43.46 bu/a. Luke was the high yielding variety in the test. Test weights were quite good in this location with a mean of 60.2 lbs/bu, with a range of 61.75 lbs/bu down to 57.8 lbs/bu. All the varieties were quite short. Table 6

Preliminary Yield Evaluation Nursery - Kalispell

This nursery contains preliminary lines developed by Dr. Allan Taylor, Montana State University winter wheat breeder. We evaluated these lines for yield and smut resistance primarily. The mean yield of this nursery was 67.6 bu/a. The test weights were quite good, with a mean of 61 lbs/bu. Lodging was light to moderate with some varieties lodging severely, particularly those with Yogo background.

Smut was light to moderate throughout the nursery and it should be noted there was not a variety that was free of dwarf smut in this study. Considering the parentage of the material in the test we would not have anticipated any degree of smut resistance. Table 7

TABLE 7

SMUT INCIDENCE AND SEVERITY IN DIFFERENT VARIETIES

Parentage of varieties
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Table 3. Agronomic data from the Western Regional White Winter Wheat Nursery on the Northwestern Agricultural Research Center, Kalispell, MT, in 1982. Random block design, four replications. Field No. E-2, harvested plot size: 32 sq. ft

Date seeded: September 22, 1981 Date harvested: August 24, 1982

Molecular
Micro

VARIETY	YIELD BU/A	TEST WT LB/BU	HEIGHT INCHES	% 2/ SMUT	LOD. ANGLE	LOD. %	HEADING DATE
CI 14586 LUKE 1/	140.49	60.17	33.66	1.00	2.00	12.50	173.50
ORCW8113 SPN//63189-66-71/BEZ	138.54	59.83	32.48	4.25a	.00	.00	169.50b
WA 6912 BUR/CI15923/NGS,VH074	137.14	59.95	33.07	2.87	2.00	7.50	172.75
OR 68007 YAMHILL/HYSLOP	133.34	59.47	36.02	2.37	.00	.00	172.50
WA 6696 DAWS/WA 5829, VH07914	132.60	61.63a	33.27	4.75a	.00	.00	173.00
ID745318 WA476511 BURT/PI 1783	132.22	58.83	33.66	2.12	.00	.00	170.25b
OR 7996 HYS/YAYLA//WA 4995/3/	131.07	58.37b	35.14	1.87	2.00	15.00	173.75
CI 13968 NUGAINES	130.85	61.25	32.68	2.75	.00	.00	171.25b
CI 17419 DAWS	130.76	62.37a	32.58	1.12	.00	.00	172.50
CI 17909 LEWJAIN	130.48	59.40	32.18	1.25	.00	.00	174.00
OR 794 YAYLA/YMH//RBS/YMH/3/	127.28	59.00	37.40a	4.75a	1.00	6.25	172.00b
WA 6914 SCT/101//3469/178383/	127.20	61.02	34.25	1.50	.00	.00	170.50b
ORCW8114 SPN//AURORA/YMH	126.31	56.00b	32.09	1.50	.00	.00	170.50b
OR 7956 DRC/68, QWW68109-IM6,R	125.41	56.45b	35.24	1.00	.00	.00	174.25
WA 6911 WA6240/NORCO,VJ080 12	124.87	59.20	33.66	.25	.00	.00	173.25
CI 17590 FARO	124.86	55.50b	34.25	2.87	2.00	12.50	169.50b
WA 6915 SPRAUGE/LUKE//498,B77	124.86	57.65b	32.09	2.00	3.50	40.00a	177.00
CI 17773 TYEE	124.15	56.90b	34.35	3.00	.00	.00	172.50b
WA 6698 SW92/6*0/3/TSP/CT L11	122.27	59.87	36.32a	3.25	.00	.00	173.00
OR 835 1523 DRC/RBS	119.51b	58.98	32.58	2.75	.00	.00	174.75
CI 17596 STEPHENS	119.01b	59.43	32.48	1.62	.00	.00	169.00b
WA 6910 MARIS HUNTMAN/VH74521	118.89b	57.98b	34.25	4.50a	.00	.00	172.75
CI 17951 CREW	118.20b	57.63b	34.35	1.62	1.00	6.25	172.50
OR CP04 1523 DRC/RBS	117.88b	58.22b	30.91b	3.00	.00	.00	175.75a
OR 7794 REW/LUKE SEL 305	112.02b	59.85	37.89a	1.25	4.75	42.50a	169.75b
WA 6813 LUKE/VH76375	108.48b	59.10	37.50a	4.75a	3.50	25.00	172.00b
OR 797 CI14482/MORO SEL E109	107.21b	58.62b	35.04	1.12	1.25	12.50	169.00b
ORCW8110 1523 DRC DWT/YMH	99.51b	56.30b	32.78	1.50	1.25	6.25	173.00
OR 7792 PAHA/OR6857 SEL 204	98.70b	56.50b	39.07a	.87	6.50a	90.75a	173.00
WA 6819 CJ CLUB/SPRAGUE	93.84b	58.58b	32.38	1.87	3.75	47.25a	171.50b
CI 13740 MORO	84.80b	54.70b	40.85a	.62	7.75a	92.00a	171.00b
CI 11755 ELGIN	63.22b	55.50b	38.39a	2.75	8.50a	90.75a	172.75
CI 1442 KHARKOF	59.69b	58.37b	49.21a	5.25a	8.50a	99.00a	172.00b

X	117.75	58.56	34.91	2.36	1.80	18.36	172.08
F 3/	7.82**	14.51**	14.15**	1.99**	6.96**	14.23**	9.98*
S.E.X.	6.96	.48	.89	.96	1.00	8.21	.53
L.S.D.(.05)	19.55	1.36	2.50	2.70	2.81	23.06	1.48
C.V.%	5.91	.83	2.55	40.75	55.68	44.73	.31

- 1/ Check variety
- 2/ % Smut = % TCK (Tilletia controversa Kuhn) smut per plot by ocular ratings
- 3/ 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 .01 level