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TITLE: Winter Wheat

PROJECT: Small Grains Investigations MS 756

YEAR: 1972

PERSONNEL: Leader - Vern R. Stewart
Cooperator - G. A. Taylor

LOCATION: Northwestern Agricultural Research Center and several off station locations throughout western Montana which will be identified in the manuscript.

DURATION: Indefinite

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 Northwest Montana designed to produce high yielding varieties with particular emphasis on the acceptable quality and resistance for dwarf bunt and stripe rust. Other agronomic characteristics such as straw strength, winter hardiness etc., will be evaluated in this program.

SIGNIFICANT FINDINGS:

1. There were no new entries in the intrastate nursery that provided any additional disease resistance or additional straw strength above that of Crest.
2. The variety Sundance did not perform in this test at an acceptable level.
3. CI 14565 and 14564 both Washington lines of white wheats, show promise for use in western Montana. They are superior in yield and straw strength to Luke and Nugaines. Further testing should be continued on these.

FUTURE PLANS: Plans for 1972-73 include the regular yield nurseries and assistance in the over all state breeding program. It is also possible that consideration will be given to reducing the winter wheat program in western Montana because of the declining acreage of winter wheat in the area.

MATERIALS AND METHODS:

Standard nursery procedures were used in all of the variety testing programs. A randomized block design was used having four to six replications. Data obtained were: Yield; plant height; test weight; disease and lodging. Nurseries grown were: Intrastate Winter Wheat Nursery at the Northwestern Agricultural Research Center in Field E-1; Western Regional Hard Red Winter Wheat Nursery grown on the L. B. Claridge farm, Northwest of Kalispell in a dwarf bunt area; Uniform White Wheat Nursery grown at the Northwestern Agricultural Research Center in Field E-1. The off station nurseries were planted in Missoula, Lake and Sanders Counties. Plots were harvested with a power harvester.

RESULTS AND DISCUSSIONS:Intrastate Hard Red Winter Wheat Nursery

The mean yield for the nursery was 71.73 bu/a. The mean test weight of 62.6% for all varieties was above average. Dwarf smut was present in the nursery but not a high level of infection as we have seen in previous years. Stripe rust infection rate was very high in the nursery. The mean for prevalence was 30.34% and the mean for type was 4.45 on a 0-9 coded scale. The highest yielding entry was Nugaines at 83.31 bu/a which was significantly higher than Crest, the variety used as a check. The yield of Crest was 70.87 bu/a. Crest does lodge severely. We did note some stripe rust on this entry in 1972. Again this variety is a little bit too tall for western Montana's conditions and we would prefer a variety in the area of 30 to 35 inches. Sundance was significantly lower in yield than Crest. It has limited resistance to dwarf smut and lodges severely. There is considerable evidence that this variety is not resistant to stripe rust. The bulk of the material included in the intrastate nursery does not show a great deal of promise for use in western Montana. In table 1, there are found the data from this nursery.

In table 2 is found a summary of selective winter wheat varieties grown at the Northwestern Agricultural Research Center, 1963 to 1972. Cheyenne is used as a check variety. In this summary there are 6 entries that are superior in yield to Cheyenne and this is only a range of from 1 to 15%. Wanser is 15% greater in yield than Cheyenne, however Wanser is very susceptible to dwarf smut. Crest, our resistant hard red is 4% better in yield than Cheyenne over the years. Centurk, a Nebraska line, is 8% better than Cheyenne. This variety is quite susceptible to stripe rust and also to dwarf smut. Comparing Sundance with Cheyenne we see that it is only 79% of Cheyenne.

Western Regional Hard Red Winter Nursery

Stands in this nursery were somewhat erratic. There was considerable variation between replications at this location. This seems to be a common problem in this area where this Western Regional Nursery is grown. However, because of the high incidence of dwarf smut found in this location we will continue to place our studies in this location.

The analysis of variance indicated that the yield data were non-significant, however the yield range was from 22.2 bu/a to 45 bu/a. The highest yielding entry in this nursery was ID 71040. Crest is used as the check variety. We did note some dwarf smut at a rate of 3%, however these could have been contaminants. ID 33 and ID 30 had the highest rate of dwarf smut with 15%. It is interesting to note that all of the Idaho entries had high levels of dwarf smut. One line WA 58336, from Washington also had 15% dwarf smut. Mean yield for the nursery was 31.85. Dwarf smut infection rate was lower than normal, with a mean of 6.77%, however this could be due in part to several resistant varieties being used. The mean for stand was 70% which is relatively high for this particular area.

Western Regional White Winter Wheat Nursery

Stands were excellent throughout this nursery, however no stand estimates were made. Dwarf smut and stripe rust data were obtained. The dwarf smut levels were not particularly high. The mean was 3%. The highest yielding entry was CI 14565 with 95.78 bu/a and this is contrasted with the nursery mean of 75.23 bu/a. Using Nugaines as the

Results and Discussions (con't)

check variety we found that CI 14565 was significantly higher in yield. Luke, a newly released variety, was not significantly higher in yield than the check, but did have good dwarf smut resistance and almost completely free of stripe rust. CI 14565 and CI 14564 show some promise for use in western Montana. Heading date is the same as Nugaines. Plant height is acceptable at 30 inches and they have relatively good stripe rust and dwarf smut resistance. Table 4.

In table 5 comparisons are made with Nugaines. Hyslop is 110% of Nugaines in this study or in the summary, but it does have some susceptibility to dwarf smut. This is one we should continue to evaluate. Luke is 106% of Nugaines and still continues to out yield it especially under some conditions. CI 14565 is 117% of Nugaines, it also shows some promise as a variety. Some of the newer entries show considerable yield advantage over Nugaines in 1972, however final decision will have to wait until further evaluation.

Off Station Nurseries

Three off station nurseries were seeded in Missoula, Lake and Sanders Counties. Of that number only the one at Sanders County was harvested. In Lake County at seeding time conditions were very dry resulting in poor emergence and stands were very erratic, therefore the nursery was abandoned. The nursery at Missoula County was abandoned because of poor emergence and high infestation of weeds.

Sanders County - Results from the nursery were outstanding. The average stand was 80%, better than what we would anticipate from this region. Highest yielding entry in this nursery was McCall (28.8 bu/a) whereas the average for the nursery was 22.34 bu/a. The high yielding white wheats do not yield well in this location. Crest is used as the check in the nursery and CI 14564 was the only entry significantly lower in yield. This line has preformed very well at the Northwestern Agricultural Research Center. Table 6.

The Elite Yellow Rust Nursery

This nursery is grown in cooperation with the main station in Bozeman. The primary purpose of the nursery is to evaluate new lines for stripe rust resistance and dwarf bunt resistance. Crest is used as the check variety because of its stripe rust and dwarf bunt resistance. MT 71103 is the highest yielding entry in the nursery, but does not have adequate stripe rust resistance. It appears to have relatively good straw strength. Lines that were superior to Crest in yield did not have adequate stripe rust resistance. The reader is referred to table 7 for details of this nursery.

Seed Treatment Study

To measure the effectiveness of various fungicides on the control of dwarf smut in winter wheat a study was established using the variety Cheyenne. The study consisted of 7 treatments. The fungicides used are found in table 8. The analysis of these data indicate no significant difference in yield due to the fungicide treatment and no significant difference in dwarf smut incidence to treatment. The smut rate was higher in the treated plots than in the non-treated plots, however as indicated these differences were not significant.

Table 1. Agronomic data from the intrastate winter wheat nursery grown at the Northwestern Agricultural Research Center, Kalispell, Montana in 1972. Experimental Design - Random Block - Six replications.

Planting Date: September 16, 1971 Harvest Date: August 10, 1972 Size of Plot: 16 sq. ft.

C.I. or State #	Variety	Yield Bu/A	Test Wt Lbs/Bu	Heading Date	Plant Height	Lodging		Dwarf Smut	Stripe Rust	
						Prev %	Sev.		Sev.	Type
CI 13968	Nugaines	83.31*	64.50	159.50a	32.00b	.00b	.00b	5.17a	9.17	3.17
CI 13844	Wanser	79.74	62.50	158.33a	43.67a	16.50b	.17b	5.33a	22.50	3.33
NB 66425	Centurk	78.59	62.50	155.67	41.33	33.00b	.33b	6.67a	15.17	3.33
DK 142		76.36	64.00	157.00a	39.50	33.00b	.83b	5.17a	54.17a	5.67a
CI 13880	Crest	70.87	63.00	155.50	40.00	99.00	2.83	1.67	5.67	3.00
CI 13190	Warrior	70.61	62.50	156.67a	44.17a	82.50	1.67	4.33	57.50a	6.67a
CI 13998	Trader	70.16	63.00	157.67a	45.00a	49.50b	.83b	9.33a	50.83a	5.67a
CI 13442	Delmar	68.97	63.00	158.67a	41.67	16.50b	.17b	1.67	16.67	3.67
CI 13842	McCall	68.46	63.00	159.83a	41.67	.00b	.00b	10.83a	27.50a	4.33
CI 13547	Lancer	68.11	63.00	155.67	43.83a	33.00b	.33b	10.83a	15.17	3.83a
CI 12933	Itana	67.86	63.00	159.17a	47.17a	16.50b	.00b	6.67a	99.00a	8.67a
CI 8885	Cheyenne	67.22	63.00	159.33a	45.83a	99.00	1.50b	6.83a	42.50a	6.50a
CI 13670	Winalta	66.62	63.50	158.00a	46.67a	82.50	1.00b	2.33	15.17	3.50
CI 14580	Bridger	66.27	64.00	158.83a	45.00a	41.33b	1.67	2.33	40.83a	4.33a
MT 6928	NB55-391-56-D8/WMT11-4-3	66.06	63.00	157.67a	33.50b	.00b	.00b	7.50a	11.00	3.67
MT 7015	NB55-391-64-D4/WMT2-1-1	65.86	64.00	160.17a	43.50a	33.00b	.17b	1.00	20.83	3.00
CI 14000	Winoka	62.42	64.00	158.17a	45.83 a	82.50	1.33b	3.17	5.33	3.00
MT 6535	Rego/CNN 3907-4	61.34	61.00	159.00a	48.00a	99.00	5.67a	1.00	11.83	3.00
MT 693	Winalta 41	61.22	63.00	158.17a	45.83a	82.50	1.17b	4.50	6.00	3.00
MT 7020	NB55391-56D8/WMT2-10-6-4	59.69	61.50	156.00	33.33b	.00b	.00b	10.00a	10.50	3.17
CI 6938	Kharkof MC22	59.52	61.00	160.50a	49.83 a	90.83	3.33	5.17a	43.33a	5.83a
CI 13872	Froid	59.44	62.00	159.33a	49.50a	99.00	4.33a	3.00	10.33	3.00
CI 13999	Trapper	58.35	62.00	157.83a	44.17a	49.50b	1.33b	7.67a	43.33a	5.67a
CI 8033	Yogo	58.35	62.50	159.50a	49.00a	99.00	5.17a	1.67	64.83a	7.67a
MT 6916	BWH1376-8/YTO-1171-3-2-1	58.05	62.00	159.83a	49.17a	99.00	3.17	2.33	44.17a	5.50
MT 6616	Sel Bulk 6-142-6	56.07	62.50	159.50a	46.00a	99.00	2.00	3.00	34.17a	5.67
CI 13181	Rego	54.27	60.50	158.33a	48.33a	99.00	7.33a	1.00	16.67	3.17
MT 6927	NB55-391-56-D8/WMT10-6-4	53.53	61.50	156.33a	33.00b	.00b	.00b	7.00a	7.83	3.33
CI 15327	Sundance	53.47	61.00	161.00a	46.33a	99.00	5.00	2.33	31.00a	4.33a
MT 7010	WHT/RY/A*E/3//WRR 14-2-1	53.27	61.50	156.83a	47.67a	99.00	3.00	.83	21.67	3.83a
MT 6918	BW 1376-8/YTO-1172-3-2-2	53.22	63.00	158.50a	46.33a	99.00	4.50	4.33	16.67	3.67

Table 1 (con't)

C.I. or State #	Variety	Yield Bu/A	Test Wt Lbs/Bu	Heading Date	Plant Height	Lodging		Dwarf Smut	Stripe Rust	
						Prev %	Sev.		Sev.	Type
MT 6715	3 Yogo/Cnn 2-3-13-6	53.08	63.00	159.67a	48.33a	99.00	5.83a	2.50	66.67a	5.33
MT 6919	BWH1867-5/Yto-1171-3-2-1	50.97	62.50	158.67a	47.83a	99.00	5.17a	2.33	26.67a	5.33
MT 7005	Polo/Turg//WRR 6-3-1	50.80	62.50	159.67a	46.67a	99.00	5.00a	1.00	.50	1.50
MT 6930	NB176/Y18181//YTO1174-3	50.08	63.00	159.17a	46.67a	82.50	1.00b	5.17a	26.00a	3.67
MT 6716	3Yogo/Cnn2-3-17-19	49.18	62.50	159.83a	47.33a	99.00	6.50a	3.00	60.83a	5.67
MT 6917	BWH1376-8/yTO-1171-3-2-2	49.10	62.50	159.67a	48.83a	99.00	3.00	3.67	45.83a	5.67
MT 6920	BWH1867-5/YTO-1171-3-4-1	45.31	62.50	159.83a	47.83a	99.00	4.83	2.33	55.00a	5.83

1/ Check Variety

* Variety yielding significantly more than the check.

a Values significantly more than the check

b Values significantly less than the check

\bar{x}	61.73	62.61	158.50	44.48	66.00	2.37	4.33	30.34	4.45
F-value for variety comparison	5.74**	.00	13.45**	23.87**	11.99**	21.69**	5.65**	12.53**	26.99**
S.E. \bar{x}	3.92	.00	.39	.98	11.15	.48	1.20	6.27	.29
L.S.D. (.05)	10.86	.00	1.09	2.70	30.90	1.32	3.34	17.38	.82
C.V. %	6.35	.00	.25	2.19	16.89	20.05	27.81	20.67	6.62

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Table 2. Summary of selected winter wheat varieties grown at the Northwestern Agricultural Research Center, Kalispell, Montana 1963-1972.

C.I. or State No.	Variety	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	\bar{x}	Station Years	% Cheyenne
CI 8885	Cheyenne	61.9	57.5	48.7	59.3	46.4	57.2	57.0	63.7	48.6	67.2	56.7	10	100.0
CI 13670	Winalta		54.4	31.4	67.4	44.9	55.8	45.7	57.9	55.9	66.6	53.3	9	94.9
CI 13181	Rego	60.2	49.9	42.5	62.4	43.6		51.3	58.7	56.3	54.3	53.2	9	93.9
CI 13442	Delmar	71.8	51.4	47.3	64.2	55.9	67.9	59.3			69.0	60.9	8	106.9
CI 13844	Wanser				73.9	51.7	76.5	56.0	65.5	59.6	79.7	66.1	7	115.9
CI 13880	Crest				73.4	53.5	51.6	43.8	69.0	54.1	70.9	59.5	7	104.2
CI 13842	McCall				56.4	51.9	76.8	40.5	63.3	58.5	68.5	59.4	7	104.1
CI 13190	Warrior		45.8	37.1	59.5	43.5			60.8	48.3	70.6	52.2	7	93.4
CI 13547	Lancer				57.0	41.7	44.0	38.3	58.4	42.6	68.1	50.0	7	87.7
CI 12933	Itana		46.8	38.3	58.2				61.1	53.3	67.9	54.3	6	94.4
MT 6535	Rego/Cnn 39-								59.0	47.4	61.3	55.9	3	93.4
CI 14000	Winoka								57.2	46.3	62.4	55.3	3	92.4
CI 13998	Trader								54.7	38.8	70.2	54.6	3	91.2
MT 693	Winalta 41								56.7	44.7	61.2	54.2	3	90.6
CI 13999	Trapper								56.6	44.6	58.4	53.2	3	88.9
CI 13872	Froid								55.5	43.8	59.4	52.9	3	88.4
MT 6616	Sel Bulk 6-1								58.3	40.7	56.1	51.7	3	86.4
NB 66425	Centurk									46.8	78.6	62.7	2	108.3
CI 14580	Bridger									51.0	66.3	58.7	2	101.3
CI 15327	Sundance										53.5	53.5	1	79.6

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