TITLE: Spring Wheat

PROJECT: Small Grains Investigations MS 756

YEAR: 1971

PERSONNEL: Leader - Vern R. Stewart
Cooperator - F. H. McNeal and M. A. Berg

LOCATION: Northwestern Agricultural Research Center - Field No. Y-1.
Off station locations as listed in the manuscript.

DURATION: Indefinite

OBJECTIVES:

1. To determine the adaptability of new introduced spring wheat varieties and selections by comparisons with recommended varieties.
2. Study the semi-dwarf strains of spring wheat for use under irrigated conditions.
3. To aid in basic genetics research in spring wheat and the overall breeding program.

SIGNIFICANT FINDINGS:

1. Semi-dwarf types are the higher yielding entries generally and have good to excellent straw strength.
2. ID 0044 and ID 0046, head 10 days earlier than Twin and were significantly higher in yield.
3. Fungicide treatments of seed did not affect yield of spring wheat.
4. Captam, Vatavax and Maneb reduced the severity of stripe rust significantly, however this needs further evaluation.

FUTURE PLANS: To continue to evaluate spring wheat varieties. To aid in the total breeding program in Montana. To study semi-dwarf strains of spring wheat for irrigated conditions.

MATERIALS AND METHODS:

Standard nursery procedures were used in a variety testing program. Nurseries were grown in four row plots, four replications. A randomized block design was used for all nurseries. All station nurseries this season were located in Field No. Y-1 at the Northwestern Agricultural Research Center. Yield nurseries grown were: Advanced Yield Nursery, containing 32 entries; and the Western Regional White Spring Wheat Nursery, containing 21 entries.

One off station yield nursery was grown in Lake County and contained 6 entries.

Two fungicide nurseries were planted in the spring of 1971. One was located on the research center, the other in Lake County. These nurseries contained three varieties, four chemicals for seed treatment and an untreated check. Plant counts

were made just following emergence by Dr. Mathre. Twelve feet of row from each plot was counted. Additional agronomic data secured from the studies, depending on location were; yield, bushel weight, heading date and disease readings. A factoral analysis of the various types of data was done by the computing laboratory at Bozeman.

All studies were harvested with a small power harvester and threshed with a nursery type thresher (Vogel).

Advanced Yield Nursery

Twelve entries in this years nursery were significantly higher in yield than Sheridan, the variety used as the check. Eleven of these were of the semi-dwarf type. Lodging resistance was excellent in most of the semi-dwarf's except Pitic 62 and Era which are quite susceptible to lodging. Cargills Bounty and World Seeds selections have earliness in their favor. Bounty's straw maybe somewhat weak, but not serious. I would suggest further evaluation of MT 7042, WO 1651, Bonanza, WO 1616, MT 6830, Bounty and FB 406, based on date of heading and other agronomic characteristics. The performance of Shortana was somewhat disappointing this season. Stripe rust was quite heavy in this entry and in our larger field plots this season. Table 1, gives complete data of this nursery.

Table 2, contains a ten year summary of spring wheat varieties grown in the Advanced Yield Nursery. Thatcher is the long time check (100%). Sheridan has been dropping below Thatcher in the last few years, because of a degree of susceptibility to stripe rust and a very weak straw under the rather high fertile conditions the nurseries are grown. Shortana is 114% of Thatcher, however in 1971 Thatcher was 2 bushels higher in yield. This can no doubt be attributed to the stripe rust that occurred on Shortana. Most of the new entries of the semi-dwarf lines are far superior in yield to Thatcher over a 1 to 3 year period.

Western Regional White Wheat Nursery

This nursery was changed considerably in 1971, when many of the long time checks were dropped as entries. The only long time check left in the nursery is Federation which is super susceptible to stripe rust and lodging.

Twin is used as a check in this nursery and only two entries were significantly higher in yield, namely ID 0044 and ID 0046. These two entries head ten days earlier than Twin which could be an advantage, however ID 0044 has a somewhat weak straw and somewhat susceptible to stripe rust. The following entries should have more evaluation because of potential use in Western Montana, ID 0046, Fremont, ID 0042, OR 6713 and ID 0035.

Test weights were low in this nursery because of a heavy rain prior to harvest. The material was harvested, bundled, but could have been dryer when it was threshed and weighed for yield. However, the variety Twin has always had a low test weight in our plots.

In Table 4, is found a ten year summary of varieties grown in the Western Regional Spring Wheat Nursery. Action by the Western Wheat Improvement group in February 1971 resulted in the removal of many of the historic checks, leaving only Federation as a long time check. Only Twin has been in four years, all other en-

tries are one to three years. It is difficult to make any judgements from this table, as to the preformance of any one variety in relationship to Twin.

Off Station

This nursery was grown under very good dryland conditions. Yields were above average for the area with a mean of 42.5 bu/a. Twin (soft white) was the highest yielding entry, followed by Era (hard red). These two entries were significantly higher in yield than Sheridan which was used as a check. Table 5.

FUNGICIDE STUDIES:

Research Center

Yield difference between varieties was found to be highly significant, but there were no significant difference in yield because of the fungicide used. It should be noted however, that a difference of 3.6 bu/a was recorded between the check and Ceresan. Vatavax reduced yields below the check, which has been noted in previous work. Thatcher is the highest yielding entry, and is probably due to the rather high level of stripe rust found in Shortana this season.

Bushel weights were not analyzed statistically. A tabulation of these data did not indicate significant difference in test weight as a result of fungicide or because of the variety.

Varieties were found to be significantly different in heading date. Thatcher being the earliest and little or no difference between Shortana and Sheridan. Fungicide treatments had no effect on heading date.

Plant counts made following emergence were found to be significantly different because of variety with Shortana having the most plants per 12 feet of row. This difference probably exsists because of the seed size of Shortana, which is smaller than either Sheridan or Thatcher.

Stripe rust readings were made on an arbitrary scale. Type,on a scale of 0-9 and severity based on the amount of the leaf covered by spores. Varieties were found to differ in type and severity. Sheridan had the highest reading for severity with a 5.25 reading for type, moderately resistant. Fungicide treatment did not significantly affect the type of stripe rust infection, there were significant differences in severity of infection (number of spores on leaf surface). Vatavax, Maneb and Captam treatments resulted in lower severity readings than the check and the Ceresan treatment which had the highest severity reading. Table 6.

Lake County

This location was in an area with light soil, but rain fall was fair which resulted in above average yields for spring wheat in this location.

Varieties were found to be significantly different statistically. Shortana is the high yielding entry and Thatcher the lowest. This is just the opposite of the study on the research center. Yields because of fungicide treatment were not significantly different, however the check (no treatment) did result in the highest yield.

Plant counts were found to be significantly different between varieties with Shortana having the highest number, which was also true at the research center location. The fungicide treatment did not result in statistical significance however, in plant counts the highest was obtained in the check (no treatment). This was also true in the study located at the research center.

In summary it can be said variety differences were significant as was expected. Some fungicide treatments resulted in a significant difference in the severity of stripe rust with Vatavax, Maneb and Captam reducing the severity. Not significant, but yield reductions were noted in the Vatavax treatment at the Kalispell location (research center)

Plant counts were highest in the check plots in both locations. Looking at these data one would question the value of seed treatment for spring wheat when these varieties are used, as it related to yield.

Table 3. Agronomic data from the Western Regional Spring Wheat nursery grown at the Northwestern Agricultural Research Center in 1971. Experimental design, random block, four replications.

Planting date: May 3, 1971 Harvest date: September 8, 1971 Size of plot: 16 sq. ft.

C. I or State #	Variety	Yield Bu/A	Test Wt Lbs/Bu	Heading Date[1/]	Plant Height	Stripe Rust Sev.	Stripe Rust Type	Lodging Prev.	Lodging Sev.
ID 0044	Aberdeen 6535S-128-6-1	106.01*	56.4	186.00b	40.00	5.50	7.00a	99.00	6.75
ID 0046	Yt54A*4//N10/B/3/A63166S	99.01*	55.5	185.25b	36.00b	2.00	3.00	44.75	3.50
MN 206248	Era SIB 1	89.50	57.6	193.00	38.75	6.50	3.00	99.00	6.00
ID 0045	Aberdeen 6535S-128-7-1	89.43	55.0	195.50	40.00	16.25a	6.00a	99.00	7.25
ID 0043	58/TC//TC/KF/3/FTN/3*TC	89.23	58.0	185.75b	35.00b	3.00b	3.00	49.50	2.25
WA 5652	Henry/Burt, Sel. 65-2	83.03	58.0	194.50	51.25a	36.25a	2.00	99.00	3.00
CA 6907	Opal[2/]	82.78	54.5	197.25	48.50a	1.00	2.00	49.50	.50b
CI 14588	Twin[2/]	82.63	56.0	195.25	38.50	2.00	2.75	57.25	4.75
CI 14056	Fremont - UT256006	80.63	59.0	187.75b	37.50	3.00	1.75	49.50	.50b
ID 5022	IDD/178383//3*LMH/3/Lm66	79.88	54.4	194.00	53.75a	11.25	7.50a	99.00	5.75
CI 14587	Tzpf/Sonora 64	79.80	56.0	188.00b	40.25	16.25a	3.25	99.00	2.50
OR 672	Idaed x Burt, 19-1	79.70	58.6	188.25b	42.00a	1.00	3.00	24.75	.25b
ID 0043	58/TC//TC/KF/3/FTN/3*TC	79.45	56.0	187.50b	36.50b	2.00	1.00	99.00	2.75
WA 5866	1750/TST//PI 187383	76.75	56.9	192.50	52.25a	.75	.75b	99.00	7.00
WA 5651	Marfed Mutant 6278	74.35	59.5	196.00	49.25a	28.75a	4.25	99.00	5.00
OR 6713	Idaed/Burt//Idaed 59	73.75	59.5	188.00b	44.75a	7.50	2.50	99.00	1.00
WA 5658	Marfed Mutant X6135-1	73.42	59.5	196.00	51.00a	35.00a	5.50a	99.00	6.00
MN 206264	Era Sib 2	72.17	54.9	192.75	36.50b	3.25	3.00	76.75	2.75
ID 0035	Tzpp/Sonora 64	70.90	58.9	188.25b	37.50	1.00	3.00	49.50	.75b
WA 5488	K337/AO//Koelz7941S66-9	65.77	56.5	191.75	51.50a	2.00	1.75	99.00	7.00
CI 4734	Federation	51.32	53.9	197.00	50.25a	99.00a	9.00a	99.00	4.75
$\bar{x}$		80.0	56.9	191.4	43.4	13.5	3.6	80.4	3.8
F value for variety comparison		9.23**	0.0	3.96**	101.21**	40.62**	37.74**	2.70**	6.22**
S.E. $\bar{x}$		3.77	0.0	2.05	.65	3.54	.36	15.66	.96
L.S.D. (.05)		10.66	0.0	5.19	1.83	10.01	1.01	44.28	2.73
C.V. %		4.71	0.0	1.07	1.49	26.24	10.08	19.47	25.25

1/ Days from January 1.
2/ Check variety
* Varieties yielding significantly more than the check (.05)
a/ Values significantly more than the check (.05)
b/ Values significantly less than the check (.05)

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Table 4. Summary of regional spring wheat variety yields grown at Northwestern Agricultural Research Center, Route 4, Kalispell, Montana 1961-71.

C.I. or State #	Variety	1961	1962	1963	1964	1966	1967	1968	1969	1970	1971	Sta. Yrs.	% of Twin
4734	Federation	24.9	44.1	27.2	29.5	36.6	43.7	54.1	55.2	18.4	51.3	10	57
14588	Twin							71.9	95.5	64.3	82.6	4	100
OR 672	Idaed x Burt 19-1								82.0	57.1	79.7	3	90
WA 5488	K337/AO/Koelz7941S66-9								69.0	29.6	65.8	3	60
14587	Peak									70.4	79.8	2	102
ID 0035	Tzpp/Sonora 64									67.9	70.9	2	94
OR 6713	Idaed/Burt//Idd 59									64.9	73.8	2	94
CA 6907	Opal									59.4	82.8	2	97
WA 5652	Henry/Burt, Sel. 65-2									56.7	83.0	2	95
WA 5651	Marfed Mutant 6278									38.2	74.4	2	77
WA 5658	Marfed Mutant x 6135-1									33.3	73.4	2	73
ID 0044	Aberdeen 6535S-128-6-1										106.0	1	128
ID 0046	Yt54A*4/Nrn10//Bvr/3/A63166S										99.0	1	120
MN 206248	Era SIB 1										89.5	1	108
ID 0045	Aberdeen 6535S-128-7-1										89.4	1	108
ID 0043	No58/Tc//Tc/KF/3/Ftn/3*Tc										89.2	1	108
14056	Fremont										80.6	1	98
ID 5022	Idd/178383//3*Lmh/3/Lmh66										79.9	1	97
ID 0042	No58/Tc//Tc/KF/3/Ftn/3*Tc										79.5	1	96
WA 5866	1750/Tst//PI 178383										76.8	1	93
MN 206264	Era Sib 2										72.2	1	87

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