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 1. Agronomic data from the advanced yield nursery grown at the Northwestern Agricultural Research Center Route 4, Kalispell, Montana in 1971. Experimental design - random block. Four replications.

Planting date: May 3, 1971 Harvest date: September 6, 1971 Size of plot: 16 sq. ft.

C.I. or State #	Variety	Yield Bu/A	Test Wt Lbs/Bu	Heading Date	Plant Height	Sheaf Wt Grams	Lodging Prev.	Lodging Sev.	Stripe Rust Prev %	Stripe Rust Type	Straw/Grn Ratio	Straw Weight
CI 13927	Pitic 62	91.66*	55.5	195.00a	39.75b	2684.00a	99.00	8.25a	20.00b	6.25	.52	1767.75
MT 7042	Si/3/Nrn10/Bvr14//5*Cnt	90.78*	59.5	190.50	37.75b	2324.75	24.75b	.25b	38.75	3.75b	.64a	1417.25
CI 13986	Era	90.00*	57.1	193.25a	37.75b	2239.50	80.50	5.75	13.75b	3.00b	.68a	1339.75b
WO 1651	World Seeds 1651	89.53*	59.0	185.75b	35.25b	2353.00	24.75b	1.75b	1.75b	1.00b	.61a	1458.00
CI 14077	Bonanza	86.08*	59.0	189.25b	35.25b	2211.50	31.00b	1.00b	.75b	.75b	.64a	1351.00b
WO 1616	World Seeds 1616	85.85*	60.4	185.25b	36.50b	2211.50	6.25b	2.00b	2.00b	2.00b	.63a	1353.25b
MT 6830	Si/3/Nrn10/Bvr14//5*Cnt	84.95*	57.2	189.75	38.50b	2154.50	49.50b	1.00b	15.25b	3.50b	.65a	1305.25b
CG 208	Cargill,S Bounty 208	84.23*	58.0	186.00b	38.25b	2183.25	43.50b	6.75	5.75b	1.25b	.63a	1341.25b
WO 1809	World Seeds 1809	83.78*	57.1	184.00b	33.00b	2069.50b	.00	.00b	13.25b	2.25b	.68a	1232.00b
MT 705	Swiss61Z69116/Cnt	83.58*	59.5	191.50	53.00	2438.00	99.00	2.75b	1.00b	2.00b	.52	1602.50
FB 406	Funk Brother,S W-406	83.00*	57.5	186.00b	31.00b	2041.00b	5.00b	1.25b	.75b	.75b	.68a	1211.25b
CI 14587	Peak - ID0018	82.93*	58.1	187.00b	39.50b	2239.50	96.75	.75b	22.50b	6.00	.59a	1410.50b
MT 6868	B52-91/3/N10/B14//4*Cnt	81.45	55.1	189.25	37.25b	2268.25	.00	.00b	5.25b	2.00b	.56a	1454.00b
CI 13985	Fletcher	80.50	53.2	193.75a	36.25b	2126.25	55.75b	2.00b	8.75b	3.25b	.62a	1321.50b
MT 6903	Si/3/Nrn10/Bvr14//5*Cnt	78.53	58.4	189.50	39.50b	2069.75b	24.75b	.25b	29.00	4.25b	.61a	1284.75b
MT 6839	Ftr/3/Nrn10/Bvr14//5*Cnt	78.35	53.8	194.00a	43.00b	2296.25	99.00	2.50b	30.00	5.50	.52	1513.00
DK 8	Dekalb,S SB8	78.03	59.9	187.00b	37.25b	2211.25	.00	.00b	4.00b	2.25b	.55a	1431.25
CI 13596	Fortuna	76.75	60.2	189.50	47.00b	2211.25	99.00	5.00	17.50b	3.25b	.53	1444.00
MT 6901	Ceres/3/N10/Bvr14//4*Cnt	76.70	51.0	191.50	40.75b	2126.00	74.25	2.75b	35.00	4.25b	.58a	1359.25b
WO 1812	World Seeds 1812	76.00	59.5	186.00b	32.50b	1871.00b	99.00	1.00b	2.00b	1.50b	.68a	1111.25b
FB 408	Funk Brother,S W-408	73.37	57.3	185.00b	31.00b	1927.75b	.00	.00b	5.25b	3.00b	.63a	1194.25b
CI 13586	Sheridan 1/	73.30	60.9	190.25	55.25	2324.75	96.75	5.75	40.00	6.75	.46	1592.00
CI 10003	Thatcher	72.55	57.0	189.25	48.75b	2126.25	99.00	4.75	6.50b	2.00b	.53	1401.00
ND 6579	Fta/61-107,S6579	71.80	58.0	187.75b	42.25b	2069.50b	99.00	1.00b	45.00	6.50	.53	1351.75b
CI 12974	Centana	71.12	59.0	194.25a	52.00b	2268.00	99.00	4.00	63.75a	6.75	.46	1557.00
CI 15233	Shortana	70.57	57.0	193.25a	38.50b	2182.75	74.25	.75b	57.50a	5.50	.48	1477.25
CI 13773	Polk	68.95	60.1	191.50	51.75b	2239.50	95.50	5.00	.75b	2.00b	.45	1550.25
CI 13775	Manitou, R.L. 4159	67.07	58.0	189.00	49.25b	2041.25b	86.75	2.00b	4.25b	2.25b	.49	1370.75b
CI 13333	Wells	66.77	59.0	192.00a	53.75	2126.25	86.75	5.50	50.00	6.25	.46	1458.75
CI 13958	Waldron	66.60	57.5	187.00b	45.25b	2183.00	.00	.00b	5.25b	2.00b	.44	1517.25
CI 13768	Leeds	61.37	60.6	190.00	52.75	2268.00	99.00	1.75b	30.00	6.50	.37b	1654.50
MT 6905	B59-3/Sheridan	55.64	54.1	189.75	42.25b	1899.25b	99.00	3.00b	80.00a	6.75	.41	1343.00b

1/ Check Variety

a/ Values significantly more than the check

* Varieties yielding significantly more than the check

b/ Values significantly less than the check

Table 1 . (Con't.)

	Yield Bu/A	Test Wt Lbs/Bu	Heading Date	Plant Height	Sheaf Wt Grams	Lodging Prev.	Lodging Sev.	Stripe Rust Prev.%	Stripe Rust Type	Straw/Grn Ratio	Straw Weight
$\bar{x}$	77.6	57.7	189.5	41.6	2187.1	60.8	2.5	20.5	3.6	.60	1411.8
F - Value for variety comparison	6.67**	0.0	34.96**	56.16**	3.09**	8.36**	8.05**	15.23**	11.21**	7.43**	3.84**
S.E. $\bar{x}$	3.42	0.0	.51	.95	89.48	13.93	.80	5.43	.61	.03	71.20
L.S.D. (.05)	9.59	0.0	1.43	2.67	250.81	39.05	2.25	15.23	1.71	.09	199.57
C. V. %	4.41	0.0	.27	2.29	4.09	22.90	32.77	26.54	16.97	5.80	5.04

Table 2. Summary of dryland, hard red spring wheat yields for the Advanced Yield Nursery grown at the Northwestern Agricultural Research Center, Route 4, Kalispell, Montana 1962-71.

C.I. or State #	Variety	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	Ave.	Sta. Yrs.	% of Thatcher
CI 10003	Thatcher	49.7	34.7	46.7	65.4	62.2	60.6	63.4	69.5	55.5	72.5	58.0	10	100.0
CI 13333	Wells	52.6	33.7	57.1	58.4	67.9	62.8	63.1	64.8	53.7	66.8	58.1	10	100.1
CI 13586	Sheridan	59.4	36.9	50.6	76.8	50.9	54.5	54.4	71.7	45.7	73.3	57.4	10	99.0
CI 12974	Centana	59.1	34.3	47.8	61.1	50.4	54.5	66.1	61.9	52.8	71.1	55.9	10	96.4
CI 13775	Manitou, R.L.			50.8	62.2	67.5	57.5	57.6	70.7	66.9	67.1	62.5	8	100.9
CI 13596	Fortuna			62.9		66.2	56.4	74.7	88.9	41.9	76.8	66.8	7	108.7
CI 13768	Leeds					55.8	58.1	58.2	49.4	64.0	61.4	57.8	6	90.4
CI 13773	Polk					51.4	52.3	57.2	64.3	50.2	68.9	57.4	6	89.7
CI 15233	Shortana							71.8	71.9	80.2	70.6	73.6	4	112.9
CI 13958	Waldron								62.0	67.1	66.6	65.2	3	99.1
ND 6579	Fta/61-107,S								90.9	71.3	71.8	78.0	3	118.5
MT 6839	Ftr/3/Nrn10/								80.9	80.3	78.4	79.9	3	121.3
MT 6830	Si/3/Nrn10/B								87.0	74.0	85.0	82.0	3	124.6
CI 13986	Era								93.1	82.2	90.0	88.4	3	134.3
CI 13927	Pitic 62								101.1	82.5	91.7	91.8	3	139.4
MT 6903	Si/3/Nrn10/B									87.7	78.5	83.1	2	129.8
MT 6868	B52-91/3/N10									84.1	81.5	82.8	2	129.4
CI 13985	Fletcher									78.0	80.5	79.3	2	123.8
MT 6901	Ceres/3/N10/									75.5	76.7	76.1	2	118.9
CI 14077	Bonanza									79.7	86.1	82.9	2	130.0
WO 1809	World Seeds									60.6	83.8	72.2	2	112.8
WO 1812	World Seeds									65.9	76.0	70.9	2	110.9
DK 8	Dekalb,S SB8									77.2	78.0	77.6	2	121.7
MT 6905	B59-3/Sherid									66.2	55.6	60.9	2	95.2
MT 7042	Si/3/Nrn10/B										90.8	90.8	1	125.2
WO 1651	World Seeds										89.5	89.5	1	123.4
WO 1616	World Seeds										85.9	85.9	1	118.5
CG 208	Cargill,S BO										84.2	84.2	1	116.1
MT 705	Swiss61z6911										83.6	83.6	1	115.3
FB 406	Funk Brother										83.0	83.0	1	114.5
CI 14587	Peak									85.7	82.9	80.3	2	131.7
FB 408	Funk Brother										73.4	73.4	1	101.2