

TITLE: Small Grain Investigations

PROJECT NUMBER: 5023

PERSONNEL: Leader - Vern R. Stewart

Coordinators -

1. Winter Wheat - E. R. Hehn
2. Spring Wheat - F. H. McNeal
3. Spring Barley - E. A. Hockett and R. F. Eslick
4. Winter Barley - R. F. Eslick
5. Oats - R. F. Eslick

FINDS: State - \$4415.00

LOCATION: Northwestern Montana Branch Station and off-station locations in several Northwestern Montana counties.

PROBABLE DURATION: Indefinite

EXPERIMENTAL DATA:

#### INTRODUCTION

The small grain investigations project includes winter wheat, spring wheat, winter barley, spring barley, and oats. The trials are conducted in cooperation with personnel at the Main Station in Bozeman. Plans for work on these projects are formulated and designed in a Planning Conference at the Main Station in Bozeman early in the spring.

Handling of line row and foundation seed is included in the project, however, it is not a research problem.

#### MATERIALS AND METHODS

Station nurseries are grown in four row plots, ten feet long in general, within a randomized or triple lattice design. Off-station plots were generally grown in a randomized block, single row plots, and four replications. All trials are analyzed using the variance analysis.

Planting was done with the Station's four row belt seeder mounted on a Farmall Cub tractor. Seeding depth depended on moisture and soil conditions, usually one to two inches.

Weeds were controlled when necessary. Cultivation was done with a garden tractor and 2,4-D was applied with a nursery type sprayer on a garden tractor. The irrigated nurseries were irrigated once during the growing season. Two inches of water were applied on June 26, 1961.

Plots were harvested by hand using a small hand scythe. Threshing was done in the field or at the plot immediately following harvest, except oats which were bound and allowed to dry. A portable Vogel threshing machine was used in threshing the plots.

All harvested samples are cleaned and weighed and yields of each plot are calculated from the weights. All weights per plots are given in grams except in larger plots (field size) where pounds per plot are used.

Foundations seeds were harvested with commercial machinery. Line row seed was harvested by hand, that is, in the same manner as the nursery material.

#### RESULTS AND DISCUSSION

The results and discussion of this project will be considered individually for each crop listed in the introduction.

##### Winter Wheat

Nurseries grown this year were (1) Western Regional Hard Red Winter, (2) Interstate Hard Red Winter, (3) Dwarf Bunt Lines, (4) Short Straw and (5) five off-station nurseries.

Tillage methods for the control of dwarf bunt, production of winter wheat on fallow versus winter wheat on corn land, Westmont versus Wasatch in adjacent plantings, and breeding material from various sources were evaluated and studied. Some 650 rows were planted for observation and study.

The Federal Smut Control Laboratory personnel continued their studies on dwarf bunt in Western Montana.

##### Western Regional Hard Red Winter

This nursery is grown at many Stations throughout the western region of the United States. The nursery this year was grown on the Lance Claridge farm in an area known to be infected with dwarf bunt (Race D-3). It contained sixteen entries which were grown in four row plots eighteen feet long in four replications. Thirty-two square feet were harvested for yield.

This nursery was seeded September 13, 1960. The soil was very dry at the time of seeding. Seeding depth was shallow to encourage bunt infection. Emergence of this nursery was slow and not until the first of November was there a stand of wheat. Snow cover was light through most of the season. There was no winter killing in the nursery that was evident.

Columbia and Westmont has light bunt infection rate. C.I. 13442 was the only entry found to be bunt free. For the first time in seven years, Westmont was significantly less in yield than other standard entries. This can be accounted for by the high rate of dwarf bunt in Westmont.

Table II gives the results of this study. In studying this table, it shows a high level of bunt in many entries. Yields are about normal for the area.

### Interstate Hard Red Winter

Material in this nursery is grown throughout the State of Montana in cooperation with other Agronomists in the Experiment Station system. Sixteen entries were grown in this nursery in 1961. Location of this nursery was in field E-4.

Table III (Part I) shows agronomic data for this nursery. Cheyenne was the most resistant to stripe rust, (*Puccinia glumarum*). Some entries were very susceptible to this disease. Columbia had a fairly high level of dwarf bunt, (*Tilletia contraversa*). In general, bunt was quite light in this nursery. Lodging was severe throughout this nursery. Yields were about normal for this rotation. No significant differences were found when analyzed with the variance analysis. Table III (Part II) gives yield data for this nursery.

### Dwarf Bunt Lines

This nursery is made up of lines in advance generations where enough seed is available for yield testing. This material was supplied by Dr. E. R. Hehn, winter wheat coordinator.

There were some stripe rust resistant lines in this material and not a high level of bunt, however, bunt was found in all but six lines. There is a wide range of lodging in this material. Westmont has the best straw strength in this nursery. There was no line which was significantly higher in yield than Westmont. See Table IV.

### Short Straw

The material for this nursery came from many sources and was given to the author by Dr. E. R. Hehn. All entries with the exception of the checks are semi-dwarfs. Yogo, Westmont, Itana, Burt, and Cheyenne are included as checks.

Dwarf bunt was found in most lines and all were, more or less, susceptible to stripe rust. Height variations were of considerable range from forty-eight inches for Cheyenne down to twenty-four inches for (N/E-17-4 x Y-16)-F6-1-2-6. Burt was the highest yielding line. None of the semi-dwarfs were significantly higher than any of the other checks in the nursery. See Table V.

Differences were found in total bundle weights between varieties, but little difference was found in grain straw ratios. Table VI shows bundle weights and other grain-straw comparative data.

### Off-station

These nurseries are grown in Western Montana counties and contain entries from the Station nurseries which have a yield potential or other factors which warrant testing off-station.

Table III. Agronomic data from the Interstate hard red winter wheat nursery at Creston, Montana in 1961. Four row plots, four replications. (Part I).  
Date Planted: September 21, 1960 Date Harvested: July 26, 1961 Size of Plot: 16 sq. ft.

Variety	G. I. Number	Head- ing Date	Ht. in In.	Stripe Rust 1 - 4	Stripe Rust %	Sep- toria 1 - 4	Dwarf Bunt %	Lodg- ing %
Cheyenne	8885	6-12	48	1	x	4	4.0	90.0
Karmont	6700	6-11	48	1	x	4	5.3	97.5
Rego	13181	6-10	46	1	x	4	0.0	95.0
Newturk	6935	6-11	46	1	x	4	5.3	95.0
Yogo	8033	6-12	53	3	30.0	4	1.3	90.0
Itana	12933	6-11	52	4	70.0	3	1.2	77.5
Westmont	12930	6- 7	46	4	70.0	4	5.7	87.5
Westmont (Short Straw)		6- 4	44	4	70.0	4	1.7	95.0
Tendoy (Cheyenne 57)	13426	6-11	47	1	x	3	5.0	77.5
Triplet	5408	6-10	48	3	5.0	2	5.7	45.0
Rodco		6- 5	52	3	10.0	4	8.0	35.0
Columbia	12928	6- 8	51	4	70.0	3	23.7	77.5
Omar	13072	6-15	54	4	60.0	4	1.3	15.0
Wasatch	11025	6- 9	51	3	10.0	4	1.7	30.0
Yogo x (Turkey x Oro-221)-117	13542	6-11	48	1	x	4	4.0	85.0
(Yogo x Wasatch-3) x Cheyenne 56-10-1	13633	6- 9	54	2	5.0	3	1.3	55.0

Table III. Agronomic data from the Interstate hard red winter wheat nursery at Creston, Montana in 1961. Four row plots, four replications. (Part II).

Variety	G. I. Number	Grams Per Plot				Total Grams	Yield in Bu./Acre	Bu. Wt.
		I	II	III	IV			
Cheyenne	8885	485	490	440	565	1980	49.5	61.3
Karmont	6700	300	490	355	630	1775	44.4	60.5
Rego	13181	475	405	515	471	1866	46.7	60.0
Newturk	6935	440	500	510	562	2012	50.3	59.5
Yogo	8033	300	470	410	335	1515	37.9	58.0
Itana	12933	360	545	505	510	1920	48.0	61.6
Westmont	12930	335	480	615	615	2045	51.1	60.6
Westmont (Short Straw)		390	500	488	464	1842	46.1	60.8
Tendoy (Cheyenne 57)	13426	430	490	555	435	1910	47.8	61.5
Triplet	5408	473	415	490	460	1838	46.0	61.7
Rodeo		460	515	555	529	2059	51.5	61.6
Columbia	12928	490	426	505	516	1937	48.4	61.6
Omar	13072	575	490	458	565	2088	52.2	58.5
Wasatch	11025	345	515	455	426	1741	43.5	62.0
Yogo x (Turkey x Oro-221)-117	13542	380	537	544	477	1938	48.5	62.3
(Yogo x Wasatch-3) x Cheyenne 56-10-1	13633	440	556	475	465	1936	48.4	61.4

Analysis of Variance

Source	D.F.	Mean Square	F
Replications	3	24,093.937	5.83
Varieties	15	5,044.963	1.22
Error	45	4,131.238	
Total	63		

Mean Yield.....	47.5
S.E.M. ....	3.2137
L.S.D. ....	NS
C.V. ....	6.76%