Introduction

This section of the annual report includes all work done on small grains as it pertains to testing and selecting for a new variety. The objectives of the small grain variety project is to (1) determine the adaptation of new and introduced varieties; (2) to evaluate new selections and crosses developed in the breeding program of the Montana Agricultural Experiment Station; and (3) to select for disease resistance. (Drawf bunt in winter wheat).

This work was done on both dryland and irrigated conditions on the station and in several locations in the seven western counties in Montana. Spring grain nurseries, which include wheat, oats and barley were located in the following counties: Sanders, Mineral, Missoula and Lincoln. The nursery in Mineral county was dryland where as the others were grown under irrigated conditions. Winter wheat nurseries were grown in all seven of the western counties served by the N. W. Montana Branch Station. Each of these nurseries will be discussed by crop later in this report.

All of this work is done in cooperation with the personnel in Montana State College, Extension Service, and the Agricultural Research Service, United States Department of Agriculture.

Spring Wheat

The spring wheat variety nurseries grown in 1957, were, advance yield, (dry and irrigated) durum, uniform western regional white wheat, four off-station nurseries, milling and baking plots, and barley streak mosaic on spring wheat varieties.

Advance Yield Nurseries

The advanced yield nursery was grown under both dryland and irrigated conditions. These nurseries consisted of 24 entries made up of recommended varieties and other promising selections. The dryland nursery was grown on Conrad Gilbertson farm northwest of Kalispell in a very low rain fall area. The irrigated nursery was grown on the station. Three replications were used for the dryland test and five for irrigation. Both nurseries were sprayed for weed control with 2, 4-D, and the dryland nursery was also cultivated. Seeding dates are included in the table of results of each nursery. Three inches of water were applied to the irrigated nursery, July 10, 1957.

Results and Discussion

In the dryland nursery, only one variety was found to be significantly lower in yield than Thatcher, which is used as a check, namely Rescue. Yields were low for this region of Flathead county, due to low rain fall during the growing season.

The mean for this nursery was 12.0 bushels per acre. Table I.

The mean yield of the irrigated nursery was 52.3 bushels per acre. C.I. 13242, a selection that is showing promise as a new variety, was significantly better in yield than Pilot. Leaf rust was severe in the nursery this year. Lodging, rust, and smut notes for this nursery can be seen in table II.

Durum Wheat

The government wheat programs have brought about an increased acreage of durum wheat in Montana. Some durum has been grown west of the continental divide. Because of this a testing program was undertaken on durum wheat. Studies have been conducted for two years.

Results and Discussions

In the past two years, the hard red spring wheat has out yielded the durum entries in the nursery. The data thus far gathered has been non-significant when analyzed statistically. In 1957 a C.V. of 24.41% was obtained. The author finds this difficult to explain. Stands were fair, however conditions were very dry, this could in part account for the high C.V. Data obtained to date does not encourage the growing of durm in some areas of Flathead county. Table III.

Off-Station Nurseries

The off-station nurseries will be discussed as a unit, a unit including wheat, oats and barley. This discussion will be only as to seeding methods, observations, weed control and other factors that pertain to all three crops. Specific results as to yield and other agronomic factors will be discussed in the division pertaining to that particular crop.

The off-station variety nurseries were seeded in single plots, rows eighteen feet long replicated four times. There were ten entries each of wheat, oats and barley. Seeding date and harvest dates for each are in the individual tables for each nursery.

Inspections of off-station plots were made twice during the growing season. Weed control methods were employed during the first observation. Following is information on observations, by county, location and date.

County	Name of farmer	Address	Date	Remarks
Sanders	Jim Hauser	Lonepine	6-12-57	Nursery in good shape. Cultivated but not sprayed.
			7-15-57	Good Shape, weed free
Mineral	Charles Fry	Tarkio	6-12-57	Cultivated and sprayed
			7-15-57	Centana outstanding in appearance, equal to Pilot.
Missoula	Don Roth	Clinton	6-11-57	Cultivated and sprayed, some quackgrass.
			7-11-57	Uniform irrigation apparent. Quackgrass throughout the plot.
Lincoln	Wilerd Johnson	Eureka	6-13-57	Cultivated and sprayed. Infestation of quackgrass and Canada thistle.
			7-2-57	Cattle had eaten off plot and was abandon because of this.

Results and Discussion

Only one of the irrigated spring wheat nurseries was harvested. Cattle distroyed the nursery in Lincoln county and birds the one in Sanders county. Results from the nursery at Roths in Missoula county was not found to be significant when analysed statistically. The high C.V. is due in part to the heavy growth of quackgrass in replications three and four of the nursery. Marfed x Merit-28, C.I. 13058 was the highest yielding variety. This entry is a white wheat. Of the hard red springs, Centana was the leading variety in the yield column. The mean for the nursery was 30.3 bushels per acre. Table V.

Uniform Western Regional White Wheat

One uniform nursery of this type is grown. The past year it was located on the station under non-irrigated conditions, however, where moisture conditions are usually quite favorable. (See weather data in this report). The nursery contained 16 entries. Three hard red spring varieties were included as checks. This nursery is grown in cooperation with ARS USDA.

Results and Discussion

Leaf rust was very prevalent this year and considerable was found on many of the varieties in this test. Stem rust was noted on eight varieties. It was most severe on the variety, Lemhi. There was not any statistical difference found in the nursery when analysed. The highest yielding variety was C.I. No. 13268. The mean for the test was 55.4 bushels per acre. See table VI for complete results.

Milling and Baking Plots

Each year several varieties for which milling and baking data are desired are grown in drill strips. These strips are seven feet wide and 90 to 100 feet long. They are harvested with a field combine. Weights are taken from a measured area to determine the yield. Quality data will be reported by Dr. McNeal in his annual report.

Results and Discussion

Centana was the highest yielding variety in these plots but C.I. 13304 had the highest test weight. See table VII.

Barley Stripe Mosaic Yield Nursery

This test was conducted to determine the effect of Barley strip mosaic on the yield of spring wheat. Paired varieties were used, one being infected the other disease free. The disease has a tendency to drawf some varieties, caused yellowing of the leaves and interfers with the plant growth process. It is a seed born disease. Material for the test was furnished by Dr. McNeal, ARS, USDA.

Results and Discussion

Yields were reduced considerably because of the infected seed that was planted. Thatcher, disease free, is used as a check in this nursery. Looking at the data it will be found that the difference between disease free and diseased Rescue is highly significant. Table VIII.

Table I. Agronomic data from dryland Advanced Yield Spring wheat nursery, grown on the Conrad Gilbertson farm in the Stillwater area, Kalispell, Montana 1957. Four row plots, three replications.

Planted. April 24, 1957 Harvested. August 13, 1957 Size of Plot. 16 Sq. Ft.

Variety or Cross	C.I. or N No.	Heading Date	Heading Height Inches	Grams Per Plot I	II	III	Total Grams	Average Bushel Per Acre
1898 x Lee[2]	B52-57	6-24	25	123	150	100	373	12.4
Thatcher	10003	6-22	24	115	150	100	365	12.2
1953 x Lee	B52-92	6-18	25	140	155	155	450	15.0
Pilot[2] x Regent(N2183)	13042	6-22	25	105	110	98	313	10.4
Lee x K.F.(R.L. 2937)	13221	6-19	25	120	117	90	327	10.9
Thatcher x Lee	B55-8	6-25	26	80	125	95	300	10.0
Rescue[2]	12435	6-26	25	75	98	76	249	8.3*
Conley	13157	6-26	28	109	85	121	315	10.5
Thatcher x Lee	B55-4	6-18	25	97	166	87	350	11.7
Russell[2]	12484	6-25	27	95	105	116	316	10.5
Rescue x 1831(B51-9)	13304	6-28	24	105	120	91	316	10.5
Ceres[2]	6900	6-26	27	120	125	104	349	11.6
Thatcher x Lee[2]	B55-2	6-25	25	143	135	100	378	12.6
Lee x 1831 (B52-119)	13243	6-18	26	145	158	136	439	14.6
1520 x 1752 (N2389)	13041	6-24	26	124	114	135	373	12.4
Centana	12974	6-26	26	120	151	114	385	12.8
Thatcher x Lee	B55-21	6-18	27	125	141[1]	119	385	12.8
Pilot	11945	6-23	29	135	140	135	410	13.7
Thatcher x Lee	B55-5	6-18	25	135	146	60	341	11.4
Selkirk	13100	6-23	27	132	135	115	382	12.7
1953 x Lee (B52-91)	13242	6-18	26	150	130	136	416	13.9
Lee[2]	12488	6-16	26	100	115	110	325	10.8
1953 x Lee	B52-90	6-18	27	113	170	126	409	13.6
1953 x Lee	B52-94	6-16	26	115	130	107[1]	352	11.7

Note: Thatcher is used as a check in this nursery.
*Varieties yielding significantly less than the check (5%).
[1]Calculated missing Plot.
[2]Loose Smut.

Mean Yield.....12.0
S. E. x.....1.0042
L.S.D.(5%).....2.9
C. V. 8.37%

Analysis of Variance

Source	D.F.	Mean Square	F
Replications	2	3, 177.4	10.50**
Varieties	23	750.230	2.48*
Error	44	302.573	
Total	69		

Leave off

Table II. Agronomic data from irrigated Advanced Yield Spring Wheat nursery, Creston, Montana 1957. Four row plots, five replications.

Start here.

Planted. April 30, 1957 Harvested. September 3, 1957 Size of Plot 16 square feet.

Variety or Cross	C.I. or N No.	Heading Date	Heading Height Inches	Lodging %	Leaf Rust %	Loose Smut L-M-H[1]	Grams Per Plot I	II	III	IV	V	Total Grams	Average Bushel Per Acre	Bushel Wt. in Pounds
1898 x Lee	B52-57	7-1	48	4	13	L	505	584	435	727	535	2786	55.7	61.9
Thatcher	10003	6-29	46	39	88	-	462	340	480	568	515	2365	47.3	60.5
1953 x Lee	B52-92	6-25	47	48	63	-	555	720	536	659	750	3220	64.4**	62.5
Pilot x Regent (N2183)	13042	6-28	47	28	63	-	400	383	584	676	500	2543	50.9	61.9
Lee[6] x K.F.(R.L. 2937)	13221	6-25	46	8	3	M	435	309	395	490	485	2114	42.3	61.4
Thatcher x Lee	B55-8	6-30	47	16	72	L	492	470	485	746	499	2692	53.8	60.9
Rescue	12435	7-1	48	56	68	-	485	471	435	442	315	2148	43.0	60.5
Conley	13157	6-30	49	28	63	-	435	479	660	682	492	2748	55.0	61.1
Thatcher x Lee	B55-4	6-27	45	56	62	-	515	780	460	731	790	3276	65.5**	61.4
Russell	12484	6-29	53	28	52	-	350	641	457	510	667	2625	52.5	61.2
Rescue x 1831 (B51-9)	13304	7-3	48	70	70	-	450	475	470	405	415	2215	44.3	61.5
Ceres	6900	7-1	50	51	68	-	485	370	420	540	490	2305	46.1	62.4
Thatcher x Lee	B55-2	7-1	49	33	68	-	470	425	550	690	593	2728	54.6	60.9
Lee x 1831 (B5a-119)	13243	6-27	51	28	3	-	426	500	501	473	615	2515	50.3	61.5
1520 x 1752 (N2389)	13041	6-28	48	4	75	-	390	542	425	640	494	2491	49.8	63.2
Centana	12974	7-3	49	26	87	-	410	486	431	580	564	2471	49.4	62.2
Thatcher x Lee	B55-21	6-26	48	19	3	-	372	460	415	745	505	2497	49.9	61.4
Pilot	11945	6-29	46	20	72	-	335	480	430	490	470	2205	44.1	61.5
Thatcher x Lee	B55-5	6-26	47	15	32	-	421	521	547	533	555	2577	51.5	61.8
Selkirk	13100	6-30	47	7	13	-	588	566	474	700	660	2988	59.8	61.2
1953 x Lee (B52-91)	13242	6-27	48	11	67	-	694	400	775	565	720	3154	63.1*	63.0
Lee	12488	6-25	48	41	17	L	675	485	468	454	730	2812	56.2	61.5
1953 x Lee	B52-90	6-27	47	53	67	-	655	555	447	665	535	2857	57.1	63.6
1953 x Lee	B52-94	6-25	47	45	3	-	625	400	456	376	660	2517	50.3	62.5

[1]L-light
M-Medium
H-Heavy

Leave off

Note: Thatcher is used as a check

*Varieties yielding significantly more than the check (5%).

**Varieties yielding significantly more than the check (1%).

Analysis of Variance

Source	D.F.	Mean Square	F
Reps	4	29,616.00	2.97*
Varieties	23	21,107.826	2.12**
Error	92	9,980.032	
Total	119		

Mean Yield.....52.3
S. E. $\bar{x}$.....4.4677
L.S.D.(5%).....12.6
L.S.D.(1%).....16.6
C. V. 8.54%