

TITLE: Winter Wheat  
PROJECT: Small Grains Investigations 756  
YEAR: 1974  
PERSONNEL: Leader - Vern R. Stewart  
 Cooperator - G. A. Taylor  
 Cooperating Agencies - Montana Agricultural Experiment Station  
 Montana Wheat Research and Marketing  
 Committee

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 Northwestern Montana designed to produce high yielding varieties with particular emphasis on quality, disease resistance - dwarf smut and stripe rust. Other agronomic characteristics such as straw strength, winter hardiness etc. will be evaluated in this program.

1974 EXPERIMENTS:

1. Western Regional Hard Red Winter Nursery
2. Off Station Nurseries
3. Elite Yellow Rust Nursery
4. Western Regional White Winter Nursery

SUMMARY OF 1974 RESULTS:

Kalispell - This is the first year this nursery has been grown in Field E where we have high yields. Most of the entries in this nursery have a long straw and are very susceptible to lodging. Because of severe lodging no dwarf smut readings were obtained. ID725055 and ID725056 were the two highest yielding entries and have good straw strength. Mean yield for the nursery was 55.47 bu/acre, test weight mean was 60.13. See Table 1 for complete detail.

Stillwater - Stand loss was less severe than in most years in this location, however many varieties had less than 80% stand. Dwarf smut levels were lower than some years, but of sufficient magnitude to give good differential reading. MT 6930 had the highest level of dwarf smut. Crest had the highest level we have seen in this variety, 7.5%. UT 819188 was the only variety with no smut recorded in this nursery. Several lines had less than 1%. Yields were about average for this location with a mean of 24.72 bu/acre. Two lines were found significantly higher in yield than Crest. Table 2.

Table 3 gives a summary of the data from the two locations. UT 819188 is the only line found to be free of dwarf smut. Yields are fair this season, test weight is excellent, the line has fair straw strength. Stands are equal to or better than Crest.

Off Station: Four off station nurseries were seeded in the fall of 1973. Two were harvested and reported below. The nursery in Sanders County was abandoned because of grain mixtured. It should be noted that this nursery was stubbled in, no tillage of any kind.

The nursery in Ravalli County was not harvested because of the very uneven growth of the nursery. This was due to soil conditions in the location where it was planted.

Missoula County - Stands were reduced at this location, which resulted in lower yields. Luke and Paha were significantly better in yield than Crest, the check variety. Luke and Paha are soft white varieties. There was little or no difference in yield between the hard red varieties. Table 4.

Off Station (con't) -

Lake County - Yield data obtained from this nursery were found to be non-significant. Nugaines is the highest yielding entry and Centurk the lowest yielding entry.

Elite Yellow Rust Nursery - In this nursery, lines from the breeding program are evaluated. Many lines were not harvested this year because of milling quality evaluation received, after seeding, indicated poor quality. Data from the lines harvested are found in Table 6. MT 71105 was high in yield with excellent straw strength. No evaluation of dwarf smut was made in the test because of the severe lodging.

Western Regional White Winter Wheat Nursery - Twenty-four entries were included in this nursery. Grain samples were sent to the Western Wheat Quality Laboratory, Pullman, Washington for quality evaluation.

Six entries were found to be significantly higher in yield than Nuagines, the variety used as the check. Five entries were significantly lower in yield than Nugaines. Paha and Hyslop continue to outyield Nugaines. Both varieties have some degree of dwarf smut, however the level was significantly less than Nugaines. Hyslop and Paha are somewhat later in heading date than the check. Both of these varieties have less straw strength than Nugaines.

There were four entries in which no dwarf smut was observed. They were: Moro, Luke, C.I. 14565 and OR 7146. Thirteen entries were found to have good resistance to stripe rust, including three of the top yielding entries. See Table 7.

The mean for test weight was 60.56 lbs/bu, with Nugaines having the highest test weight at 62.20 lbs/bu.

Using Nugaines as a check variety for several years, 15 varieties are superior in yield. Luke and C.I. 14565 exceed Nugaines in yield and have good dwarf smut resistance. All the other high yielding entries have some dwarf smut. Table 8.

Seeding Rate Study - The 90 pound seeding rate of Crest resulted in the highest yield in this location, lowest yields were obtained at the 30 pound seeding rate. Table 9.

## WINTER WHEAT VARIETIES

WINTER WHEAT VARIETIES RECOMMENDED FOR WESTERN MONTANAHard Red Varieties

1. Crest
2. Winalta
3. Cheyenne

Soft White Varieties

1. Nugaines
2. Luke

CHARACTERISTICS OF RECOMMENDED VARIETIES1. Crest

- a. Bearded variety, developed in Montana
- b. High yielding potential in dwarf smut and stripe rust areas
- c. Tall type
- d. Maturity - early to mid-season
- e. Good test weight
- f. Weak straw strength
- g. Moderate shattering resistance
- h. Resistant to stripe rust and dwarf smut
- i. Susceptible to stem rust and sawfly infestation
- j. Not extremely winter hardy
- k. Adequate baking and milling quality

2. Winalta

- a. Bearded variety
- b. Fair yielding
- c. Tall type
- d. Maturity - early to mid-season
- e. Good test weight
- f. Weak straw strength
- g. Good shattering resistance
- h. Susceptible to dwarf smut and sawfly infestations
- i. Resistant to stripe rust
- j. Moderate resistance to stem rust

3. Cheyenne

- a. Bearded variety
- b. Good yielding ability
- c. Tall type
- d. Maturity - early to mid-season
- e. Good test weight
- f. Weak straw strength
- g. Susceptible to shattering
- h. Moderate resistance to stripe rust
- i. Susceptible to dwarf smut, stem rust and sawfly infestation
- j. Good milling and baking qualities

Soft White Varieties1. Nugaines

- a. Bearded variety
- b. Good yielding ability
- c. Semi-dwarf type
- d. Maturity - mid-season
- e. Good test weight
- f. Very strong straw strength
- g. Resistant to shattering
- h. Resistant to stripe rust
- i. Susceptible to dwarf smut
- j. Good baking and milling quality for cake flours

2. Luke

- a. Bearded variety
- b. Good yielding ability
- c. Semi-dwarf type
- d. Maturity - mid-season
- e. Fair test weight
- f. Poor to fair straw strength
- g. Resistant to shattering
- h. Resistant to dwarf smut and stripe rust
- i. Foot rot tolerant
- j. Good baking and milling quality for cake flours

Table 7. Agronomic data from the western regional white winter wheat nursery grown at the Northwestern Agricultural Research Center, Kalispell, MT., Field No. E-4, 1974. Random block design, 4 replications.

Date seeded: September 24, 1973 Date harvested: August 12, 1974 Size of plot: 16 sq. ft.

| C.I or<br>State No. | Variety                 | Yield<br>Bu/A | Test Wt.<br>Lbs/Bu. | Heading<br>Date | Plant<br>Height | Lodging |        | Stripe Rust |         | Dwarf<br>Smut % |
|---------------------|-------------------------|---------------|---------------------|-----------------|-----------------|---------|--------|-------------|---------|-----------------|
|                     |                         |               |                     |                 |                 | % Prev. | Sev.   | % Prev.     | Sev.    |                 |
| OR 67205            | Cap.Desp./Sel.101//Drv  | 98.98a        | 60.10               | 165.00          | 32.50           | .00     | .00    | .00         | .00b    | .25b            |
| WA 5987             | WA4877//Sel. 66344      | 96.76a        | 61.90               | 169.25a         | 33.00           | .00     | .00    | .00         | .00b    | 1.50b           |
| CI 14564            | Hyslop                  | 96.31a        | 60.10               | 166.25          | 36.00           | 12.50   | 3.25   | .00         | .00b    | .50b            |
| ID 725057           | ID 5011/WA 4765, Sel. 2 | 95.06a        | 59.20               | 169.00a         | 38.25a          | 12.50   | 3.25   | 6.25a       | 5.25a   | .25b            |
| CI 14485            | Paha                    | 95.03a        | 61.50               | 168.00a         | 40.25a          | 5.00    | 2.75   | 1.25        | 1.00    | .25b            |
| WA 7000             | WA4877//Itana/CI13431   | 94.91a        | 61.10               | 169.00a         | 34.00           | .00     | .00    | .00         | .00b    | 1.25b           |
| WA 5986             | 4877/3/S3//178383/13431 | 91.96         | 61.10               | 169.00a         | 33.00           | .00     | .00    | .00         | .00b    | 1.75b           |
| WA 5826             | Om/1834-3//178383/13431 | 91.11         | 60.60               | 169.00a         | 35.00           | .00     | .00    | .00         | .00b    | .50b            |
| OR 6933             | Oregon Sel. 896         | 90.80         | 61.20               | 166.75          | 42.50a          | 31.25a  | 6.75a  | 7.50a       | 6.50a   | 2.50b           |
| WA 6099             | WA4877/Vb66336          | 88.98         | 61.50               | 164.75          | 33.25           | .00     | .00    | .00         | .00b    | .25b            |
| OR 7147             | C.I. 13748/Moro, 905    | 85.43         | 61.40               | 167.00a         | 35.25           | 2.50    | 1.25   | .00         | .00b    | .25b            |
| CI 14565            | Nord Desprez/2*Sel.101  | 84.73         | 60.00               | 165.25          | 33.25           | 18.75   | 3.50   | 2.50        | 1.50    | .00b            |
| WA 5988             | Gaines//178383/CI 13431 | 84.68         | 60.20               | 168.00a         | 34.25           | .00     | .00    | 1.25        | .75     | 3.25            |
| CI 14586            | Luke                    | 82.85         | 60.30               | 169.00a         | 34.00           | 37.25a  | 3.00   | .00         | .00b    | .00b            |
| CI 15376            | Sprague                 | 81.68         | 61.60               | 165.50          | 33.25           | 37.50a  | 5.75a  | 1.25        | 1.00    | 3.00            |
| OR 65116            | Nord Desprez/Sel. 101   | 81.23         | 59.80               | 163.50b         | 34.00           | .00     | .00    | .00         | .00b    | 1.25b           |
| CI 13968            | Nugaines <sup>1/</sup>  | 77.90         | 62.20               | 165.75          | 33.00           | .00     | .00    | 2.50        | 1.75    | 5.50            |
| OR 7146             | C.I. 13748/Moro, 826    | 73.20         | 60.50               | 167.50a         | 38.75a          | 49.75a  | 4.75a  | 6.25a       | 3.25a   | .00b            |
| ID 71041            | Gaines*2/Swedish Type   | 68.47         | 60.60               | 168.75a         | 39.50a          | 31.00a  | 1.50   | .00         | .00b    | 10.00a          |
| CI 13740            | Moro                    | 60.29b        | 59.40               | 167.25a         | 40.25a          | 99.00a  | 8.75a  | .00         | .00b    | .00b            |
| WA 6098             | 68R1590/A Line CI13438  | 59.42b        | 60.50               | 163.50b         | 35.25           | 15.00   | 4.75a  | .00         | .00b    | 1.50b           |
| CI 11755            | Elgin                   | 59.24b        | 61.00               | 168.00a         | 44.50a          | 93.00a  | 6.75a  | 17.50a      | 8.00a   | 11.25a          |
| WA 6097             | 68R2992/A Line WA4303   | 59.22b        | 59.00               | 165.75          | 34.00           | 2.50    | 2.25   | 5.00        | 3.50a   | 1.25b           |
| CI 1442             | Kharkof                 | 27.73b        | 58.70               | 165.00          | 43.50a          | 99.00a  | 8.50a  | 7.50a       | 4.00a   | 23.75a          |
|                     | $\bar{x}$               | 80.25         | 60.56               | 166.91          | 36.27           | 22.77   | 2.78   | 2.45        | 1.52    | 2.92            |
|                     | F <sub>2/</sub>         | 9.76**        | .00                 | 19.85**         | 10.10**         | 11.91** | 4.94** | 17.70**     | 20.61** | 35.53**         |
|                     | S.E. $\bar{x}$          | 5.47          | .00                 | .41             | 1.16            | 9.35    | 1.30   | .99         | .51     | .90             |
|                     | L.S.D.(.05)             | 15.43         | .00                 | 1.16            | 3.27            | 26.36   | 3.66   | 2.78        | 1.45    | 2.53            |
|                     | C.V. %                  | 6.82          | .00                 | .25             | 3.20            | 41.06   | 46.64  | 40.25       | 33.77   | 30.71           |

1/ Check variety

2/ Value for variety comparison

\* Indicates statistical significance .05 level

\*\* Indicates statistical significance .01 level

a/ Values significantly greater than the check .05 level

b/ Values significantly less than the check .05 level

Table 8. Summary of yields for western regional white winter wheat nursery grown at the Northwestern Agricultural Research Center, Kalispell, Montana, 1964-74

| C.I. or State No. | Variety                  | 1964 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971  | 1972 | 1973 | 1974  | Ave. | Sta. Yrs. | % Nugaines |
|-------------------|--------------------------|------|------|------|------|------|------|-------|------|------|-------|------|-----------|------------|
| 1442              | Kharkof                  | 49.2 | 52.1 | 47.4 | 58.5 | 58.9 | 56.4 | 62.1  | 59.7 | 45.3 | 27.7  | 51.7 | 10        | 68         |
| 11755             | Elgin                    | 57.3 | 52.3 | 49.6 | 80.5 | 51.2 | 74.1 | 73.0  | 70.8 | 50.9 | 59.2  | 61.9 | 10        | 82         |
| 13740             | Moro                     | 50.1 | 85.9 | 57.2 | 86.3 | 65.7 | 75.4 | 68.3  | 68.5 | 65.6 | 60.3  | 68.3 | 10        | 92         |
| 13968             | Nugaines                 |      | 79.7 | 58.7 | 85.8 | 63.2 | 77.6 | 102.8 | 73.0 | 68.5 | 77.9  | 76.4 | 9         | 100        |
| 14485             | Paha                     |      |      |      | 98.1 | 65.4 | 87.0 | 101.2 | 88.9 | 71.1 | 95.0  | 86.7 | 7         | 111        |
| 14564             | Hyslop                   |      |      |      | 90.1 | 62.7 | 87.3 | 113.1 | 90.1 | 63.1 | 96.3  | 86.1 | 7         | 110        |
| 14586             | Luke                     |      |      |      |      |      | 93.1 | 103.1 | 73.6 | 65.2 | 82.9  | 83.6 | 5         | 104        |
| 14565             | Nord Desprez/2*Sel.101   |      |      |      |      |      | 88.8 | 111.9 | 95.8 | 63.4 | 84.7  | 88.9 | 5         | 111        |
| WA 5826           | OM/1834-3//178383/13431  |      |      |      |      |      |      |       | 69.4 | 66.0 | 91.1  | 75.5 | 3         | 103        |
| ID 71041          | Gaines*2/Swedish type    |      |      |      |      |      |      |       | 82.3 | 64.4 | 68.5  | 71.7 | 3         | 98         |
| WA 5987           | WA4877//Sel. 66344       |      |      |      |      |      |      |       |      | 77.1 | 96.8  | 86.9 | 2         | 119        |
| WA 5988           | Gaines//178383/CI13431   |      |      |      |      |      |      |       |      | 69.3 | 84.7  | 77.0 | 2         | 105        |
| WA 5986           | 4877/3/S3//178383/13431  |      |      |      |      |      |      |       |      | 69.1 | 92.0  | 80.6 | 2         | 110        |
| ID 725057         | ID5011/Wa4765, Sel. 2    |      |      |      |      |      |      |       |      | 67.5 | 95.1  | 81.3 | 2         | 111        |
| OR 6933           | Oregon Sel. 896          |      |      |      |      |      |      |       |      | 65.8 | 90.8  | 78.3 | 2         | 107        |
| OR 67205          | Cap. Desp./Sel 101//Drv. |      |      |      |      |      |      |       |      | 63.3 | 100.0 | 81.7 | 2         | 112        |
| OR 65116          | Nord Desprez/Sel 101     |      |      |      |      |      |      |       |      | 61.6 | 81.2  | 71.4 | 2         | 98         |
| WA 7000           | WA4877//Itana/CI13431    |      |      |      |      |      |      |       |      |      | 94.9  | 94.9 | 1         | 122        |
| WA 6099           | WA4877/VB66336           |      |      |      |      |      |      |       |      |      | 89.0  | 89.0 | 1         | 114        |
| OR 7147           | CI13748/Moro, 905        |      |      |      |      |      |      |       |      |      | 85.4  | 85.4 | 1         | 110        |
| CI 15376          | Sprague                  |      |      |      |      |      |      |       |      |      | 81.7  | 81.7 | 1         | 105        |
| OR 7146           | CI13748/Moro, 826        |      |      |      |      |      |      |       |      |      | 73.2  | 73.2 | 1         | 94         |
| WA 6098           | 68R1590/A Line CI 13438  |      |      |      |      |      |      |       |      |      | 59.4  | 59.4 | 1         | 76         |
| WA 6097           | 68R2992/A Line WA 4303   |      |      |      |      |      |      |       |      |      | 59.2  | 59.2 | 1         | 76         |