TITLE: Off-station Winter Wheat variety investigations.

YEAR: 1990

LOCATION: Western Triangle Agricultural Research Center, Conrad, MT.

PERSONNEL:

Project Leader: Gregory D. Kushnak

Cooperators: Allan Taylor, MSU and Landowners (listed in footnotes).

Off-station winter wheat variety trials were grown at five locations in 1990: Dutton, Chester, the "Knees Area", Sun River, and Eden. (Tables 1-10). Three-year summaries are included. Soil moisture increased greatly in the fall after planting, and was very abundant by spring. This resulted in high yields in spite of the low amounts of rainfall during summer.

The Knees plot suffered heavy wheat streak mosiac virus infection, caused mainly by planting too early (Sept. 7). The cooperator's wheat surrounding the test-plot was planted six days later, had very few disease symptoms, and yielded 12 bu/acre higher (same variety comparison). The wheat streak was brought on by abundant fall moisture the previous year; which produced green growth from hail-shattered grain in the fall, on which the wheat curl-mite (virus vector) thrived. Curl-mite activity decreased by mid-September.

Sawfly emergence in the spring was late (June 16 near Conrad) relative to wheat development this year; and subsequently, stem cutting was only slight to moderate. Rocky and Centurk showed less sawfly cutting than the other hollow stemmed varieties, and may offer slight relief from damage in most years. The solid stemmed sawfly resistant lines (marked by an asterisk in the data tables) yielded poorly. These were remnant lines from a previous breeding program, and were tested in hopes that they would offer a satisfactory short-term solution for severely infested sawfly areas. However, their low yields do not warrant their use. Greater yield potential exists among several hundred sawfly resistant lines screened for resistance at Conrad this year for the first time. A percentage of these will be evaluated for yield in 1991.

None of the test plots had Russian Wheat Aphids; and winter survival was excellent. Low test weights at some of the locations were due to soil moisture depletion during grain filling.

Table 1. Winter wheat variety trial grown near Dutton, 1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Variety | Yield bu/a | Test wt. | Plant hgt. inches | Spring survival class 1/ | % Protein |
|---|---|---|---|---|---|
| Rocky | 68.1 | 62.6 | 36 | 2 | 9.5 |
| Neeley | 66.1 | 58.7 | 34 | 3 | 12.7 |
| Quantum 542 3/ | 66.0 | 57.2 | 37 | 3 | 10.3 |
| Judith | 62.4 | 59.9 | 36 | 3 | 9.8 |
| Redwin | 62.1 | 56.7 | 36 | 3 | 10.5 |
| Cree | 62.0 | 61.8 | 39 | 3 | 10.9 |
| Tiber | 61.9 | 59.3 | 37 | 3 | 9.5 |
| Centurk | 55.9 | 61.7 | 36 | 2 | 9.8 |
| Winridge | 54.0 | 58.9 | 37 | 2 | 9.4 |
| Bighorn | 53.9 | 60.7 | 32 | 2 | 9.3 |
| Cheyenne | 53.6 | 61.4 | 39 | 3 | 9.3 |
| Norstar | 53.5 | 59.4 | 43 | 5 | 11.5 |
| MT 7811 2/ | 51.4 | 59.7 | 36 | | 9.9 |
| Winalta | 49.7 | 62.3 | 40 | 4 | 10.0 |
| MT 88001* | 49.6 | 60.8 | 27 | | 10.5 |
| MT 88005* | 47.1 | 57.8 | 38 | | 10.9 |
| Norwin | 46.0 | 61.3 | 26 | 5 | 8.9 |
| MT 88006* | 44.8 | 58.4 | 38 | | 11.9 |

Cooperator & location : Darrell Goodmundson, 1 mile east of Dutton.
Fertilizer : 100# 11-51-0 with the seed + 80# AA-N.
Previous crop : Fallow
Date seeded : Septemner 12, 1989.
Date harvested : July 26, 1990.
Rainfall : April 26 to maturity 4.24".
Soil moisture probe at seeding : 42" +.
* Sawfly resistant varieties (MT 88001 partial).
1/ Spring survival class : 5=best; 1-very low; based on several location-years of observation.
2/ Hard white wheat
3/ Quantum 542 is a "hybrid", and needs new seed each year.
Error D.F. : 28
F. Test var. : 4.67
C.V. 1 : 9.32
LSD (0.05) : 9

Table 2. Three-year summary for winter wheat varieties grown east of Dutton, MT. 1988-1989-1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Varieties | Yield bu/a | Test wt. | Plant height | % Protein |
|---|---|---|---|---|
| Neeley | 57 | 61 | 31 | 12.3 |
| Judith | 56 | 60 | 31 | 11.8 |
| Rocky | 56 | 62 | 32 | 10.9 |
| Cree | 55 | 61 | 35 | 12.1 |
| Redwin | 55 | 60 | 33 | 12.1 |
| Tiber | 54 | 60 | 33 | 11.5 |
| Cheyenne | 51 | 61 | 35 | 12.0 |
| Norstar | 51 | 61 | 38 | 12.4 |
| Bighorn | 49 | 61 | 29 | 10.7 |
| Centurk | 48 | 61 | 32 | 11.2 |
| Winalta | 47 | 62 | 35 | 12.8 |
| Winridge | 47 | 59 | 33 | 10.9 |

Cooperator : Darrell Goodmundson
Location : Three miles east of Dutton, MT.

Table 3. Winter wheat variety trial grown near Chester, 1990. Mont. Agri Expt. Sta., Western Triangle Research Center, Conrad, MT

| Variety | Yield bu/a | Test wt. | Plant height inches | Spring survival class 1/ | % Protein |
|---|---|---|---|---|---|
| Quantum 542 3/ | 58.1 | 56.8 | 35 | 3 | 15.5 |
| Rocky | 55.1 | 59.4 | 33 | 2 | 16.1 |
| Tiber | 53.6 | 59.3 | 34 | 3 | 15.9 |
| Centurk | 53.5 | 59.1 | 33 | 2 | 16.8 |
| Cheyenne | 53.3 | 61.1 | 34 | 3 | 16.4 |
| Redwin | 51.9 | 60.5 | 32 | 3 | 16.9 |
| Judith | 51.2 | 55.0 | 33 | 3 | 16.7 |
| Neeley | 49.6 | 56.0 | 30 | 3 | 17.1 |
| Cree | 48.6 | 60.8 | 35 | 3 | 16.8 |
| Bighorn | 48.3 | 58.9 | 33 | 2 | 17.3 |
| Norwin | 46.4 | 58.3 | 26 | 5 | 15.3 |
| MT 7811 2/ | 46.1 | 57.9 | 33 | | 16.8 |
| Winalta | 45.9 | 61.0 | 34 | 4 | 15.9 |
| Winridge | 45.7 | 58.1 | 34 | 2 | 17.6 |
| MT 88005* | 42.5 | 59.5 | 36 | | 17.8 |
| MT 88006* | 41.6 | 59.4 | 36 | | 17.4 |
| Norstar | 40.6 | 62.2 | 36 | 5 | 16.9 |
| MT 88001* | 40.4 | 56.2 | 25 | | 17.2 |

Cooperator and location : Mike Violet, 10 miles south of Chester.
Fertilizer : 100# 11-51-0 with the seed.
Previous Crop : Fallow
Date seeded : September 7, 1989.
Date harvested : July 30, 1990.
Rainfall : April 30 to maturity 4.3".
Soil moisture probe at seeding : 2'.
* Sawfly resistant varieties (MT 88001 partial).
1/ Spring survival : 5=best; 1-very low; based on several location-years of observation.
2/ Hard white wheat.
3/ Quantum 542 is a "hybrid", and needs new seed each year.
Error D.F. : 28
F. Test var. : 6.42
C.V. 1 : 6.24
LSD (0.05) : 5.21

Table 4. Three-year summary for winter wheat varieties grown near Chester, MT. 1988-1989-1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Varieties | Yield bu/a | Test wt. | Plant height | % Protein |
|---|---|---|---|---|
| Cheyenne | 40 | 61 | 25 | 15.5 |
| Tiber | 39 | 57 | 25 | 15.3 |
| Neeley | 39 | 59 | 25 | 15.4 |
| Rocky | 39 | 57 | 23 | 14.5 |
| Centurk | 38 | 56 | 24 | 14.7 |
| Cree | 38 | 59 | 25 | 15.4 |
| Judith | 38 | 58 | 25 | 15.7 |
| Redwin | 38 | 58 | 24 | 15.9 |
| Bighorn | 36 | 58 | 23 | 15.8 |
| Norwin | 35 | 59 | 19 | 14.7 |
| Winalta | 35 | 61 | 25 | 15.5 |
| Winridge | 34 | 54 | 24 | 15.3 |
| Norstar | 33 | 59 | 25 | 15.7 |
| MT 88001 | 30 | 58 | 19 | 16.5 |
| MT 88005 | 30 | 59 | 25 | 16.7 |
| MT 88006 | 29 | 57 | 25 | 16.9 |

Cooperator : Mike Violet
Location : Ten miles south of Chester, MT.

Table 5. Winter wheat variety trial grown at the Knees east of Brady, 1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT

| Variety | Yield bu/a | Test wt. | Plant hgt. inches | Spring survival class 1/ | % Protein |
|---|---|---|---|---|---|
| Quantum 542 3/ | 47.4 | 57.1 | 37 | 3 | 15.1 |
| Rocky | 43.2 | 56.5 | 34 | 2 | 15.8 |
| Centurk | 42.4 | 57.4 | 33 | 2 | 15.9 |
| Bighorn | 40.9 | 57.6 | 32 | 2 | 15.9 |
| Cheyenne | 40.2 | 59.4 | 37 | 3 | 16.0 |
| Judith | 38.3 | 53.1 | 36 | 3 | 16.2 |
| Tiber | 38.1 | 58.2 | 35 | 3 | 16.0 |
| Neeley | 37.4 | 56.5 | 32 | 3 | 15.9 |
| MT 88005* | 36.8 | 55.7 | 36 | | 17.2 |
| Cree | 35.5 | 59.1 | 37 | 3 | 16.4 |
| MT 7811 2/ | 35.0 | 53.7 | 33 | | 16.2 |
| Redwin | 34.8 | 57.9 | 33 | 3 | 16.0 |
| MT 88006* | 34.6 | 55.9 | 36 | | 17.2 |
| Winridge | 33.6 | 55.9 | 35 | 2 | 16.0 |
| Norstar | 31.9 | 59.9 | 39 | 5 | 16.5 |
| MT 88001* | 31.5 | 51.7 | 26 | | 16.8 |
| Norwin | 30.9 | 55.8 | 28 | 5 | 15.8 |
| Winalta | 30.4 | 58.2 | 38 | 4 | 15.6 |

Cooperator & location : Dan Picard, 30 miles east of Brady.
Fertilizer : 100# 11-51-0 with the seed, + 65# AA-N.
Previous crop : Fallow.
Date seeded : September 7, 1989.
Date harvested : July 30, 1990.
Rainfall : May 10 to maturity 5.27".
Soil moisture probe at seeding : 2'8".
* Sawfly resistant varieties (MT 88001 partial).
1/ Spring survival class : 5=best; 1=very low; based on several location-years of observation.
2/ Hard white wheat.
3/ Quantum 542 is a "hybrid", and needs new seed each year.

Note: This test plot suffered heavy wheat streak mosaic virus infection. Stunting occurred in all varieties except Quantum 542, Rocky, Centurk, Tiber and Neeley. Planting too early allowed the disease to manifest itself. In contrast, the cooperator's wheat surrounding the test plot was planted 6 days later, had very few disease symptoms, and yielded 12 bu/acre higher (same variety comparison, 'Rocky').

Error D.F. : 28 ; F. Test var. : 14.36 ; C.V. 1 : 5.97 ;
LSD (0.05) : 3.73

Table 6. Three-year summary for winter wheat varieties grown near the Knees, 1987-1988-1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Varieties | Yield bu/a | Test wt. | Plant height | % Protein |
|---|---|---|---|---|
| Judith | 38 | 57 | 28 | 15.0 |
| Tiber | 36 | 60 | 28 | 15.2 |
| Centurk | 36 | 56 | 27 | 14.5 |
| Cheyenne | 36 | 61 | 30 | 15.3 |
| Cree | 36 | 61 | 29 | 15.6 |
| Rocky | 36 | 56 | 27 | 15.0 |
| MT 88005 | 35 | 58 | 30 | 16.3 |
| Neeley | 34 | 56 | 27 | 15.2 |
| Winridge | 34 | 58 | 28 | 14.8 |
| Redwin | 33 | 60 | 28 | 15.7 |
| Bighorn | 33 | 58 | 26 | 15.3 |
| MT 88006 | 32 | 58 | 28 | 16.5 |
| Norwin | 31 | 57 | 22 | 14.5 |
| Winalta | 30 | 58 | 31 | 15.0 |
| Norstar | 29 | 57 | 31 | 15.5 |
| MT 88001 | 28 | 54 | 21 | 16.5 |

Cooperator : Dan Picard
Location : One mile south of the Knees; west of Fort Benton, MT.

Table 7. Winter wheat variety trial grown near Sun River, 1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Variety | Yield bu/a | Test wt. | Plant hgt. inches | Spring survival class 1/ | % Protein |
|---|---|---|---|---|---|
| Quantum 542 3/ | 47.4 | 56.4 | 36 | 3 | 17.1 |
| Centurk | 41.4 | 58.2 | 36 | 2 | 17.8 |
| Archer | 40.3 | 54.6 | 32 | 2 | 17.4 |
| Judith | 40.0 | 53.7 | 36 | 3 | 17.8 |
| Tiber | 39.9 | 59.0 | 36 | 3 | 16.1 |
| Rocky | 39.3 | 58.4 | 36 | 2 | 17.0 |
| Cheyenne | 37.8 | 60.1 | 38 | 3 | 16.7 |
| Neeley | 36.5 | 55.2 | 33 | 3 | 18.1 |
| Bighorn | 36.3 | 57.5 | 32 | 2 | 18.2 |
| Redwin | 35.8 | 58.6 | 36 | 3 | 17.0 |
| Cree | 35.8 | 59.8 | 38 | 3 | 17.0 |
| Winridge | 34.4 | 55.6 | 34 | 2 | 17.9 |
| Winalta | 34.3 | 60.7 | 39 | 4 | 16.2 |
| MT 7811 2/ | 34.1 | 55.5 | 36 | | 17.9 |
| Norwin | 32.7 | 56.8 | 27 | 5 | 16.8 |
| MT 88001* | 29.8 | 54.1 | 29 | | 17.4 |
| Norstar | 29.7 | 59.8 | 40 | 5 | 16.6 |
| MT 88005* | 28.5 | 57.6 | 38 | | 18.0 |
| MT 88006* | 26.4 | 56.4 | 38 | | 17.8 |

Cooperator and location : Chuck Merja, 2 miles southeast of Sun River.
Fertilizer : 100# 11-51-0 with the seed + 50# AA-N.
Previous crop : Fallow
Date seeded : September 25, 1989.
Date harvested : July 26, 1990.
Rainfall : April 30 to maturity 4.25".
* Sawfly resistant varieties (MT 88001 partial).
1/ Spring survival class : 5=best; 1=very low; based on several location-years of observation.
2/ Hard white wheat.
3/ Quantum 542 is a "hybrid", and needs new seed each year.
Error D.F. : 28
F Test var. : 8.92
C.V. 1 : 6.61
LSD (0.05) : 4.09

Table 8. Three-year summary for winter wheat varieties grown near Sun River, MT. 1988-1989-1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Varieties | Yield bu/a | Test wt. | Plant height | % Protein |
|---|---|---|---|---|
| Archer | 37 | 57 | 26 | 16.8 |
| Centurk | 35 | 59 | 28 | 17.2 |
| Judith | 35 | 57 | 28 | 17.2 |
| Rocky | 35 | 60 | 28 | 16.5 |
| Tiber | 34 | 60 | 28 | 16.0 |
| Cree | 33 | 60 | 30 | 16.4 |
| Neeley | 33 | 57 | 26 | 17.3 |
| Redwin | 33 | 60 | 27 | 17.0 |
| Bighorn | 32 | 59 | 26 | 17.8 |
| Cheyenne | 32 | 60 | 30 | 16.1 |
| Winalta | 31 | 61 | 32 | 16.3 |
| Winridge | 31 | 57 | 27 | 16.5 |
| Norstar | 30 | 60 | 33 | 16.5 |
| Norwin | 30 | 59 | 21 | 16.4 |

Cooperator : Chuck Merja
Location : Two miles southeast of Sun River, MT.

Table 9. Winter wheat variety trial grown near Eden, 1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Variety | Yield bu/a | Test wt. | Plant hgt. inches | Spring survival class 1/ | % Protein |
|---|---|---|---|---|---|
| Winridge | 39.4 | 60.2 | 39 | 2 | 8.1 |
| Archer | 38.6 | 60.0 | 33 | 2 | 8.9 |
| Neeley | 38.4 | 62.9 | 36 | 3 | 10.0 |
| Judith | 33.5 | 59.8 | 36 | 3 | 8.4 |
| Rocky | 33.1 | 61.5 | 38 | 2 | 10.7 |
| Cree | 32.7 | 63.2 | 42 | 3 | 10.0 |
| Centurk | 32.7 | 60.9 | 38 | 2 | 9.9 |
| Norwin | 31.6 | 63.0 | 27 | 5 | 10.2 |
| Tiber | 31.0 | 61.0 | 38 | 3 | 10.3 |
| Norstar | 30.9 | 63.2 | 44 | 5 | 10.0 |
| Redwin | 29.7 | 60.9 | 37 | 3 | 11.2 |
| Cheyenne | 29.7 | 63.2 | 42 | 3 | 10.6 |
| Winalta | 26.1 | 62.3 | 41 | 4 | 10.6 |
| MT 7811 2/ | 26.1 | 60.1 | 35 | | 9.6 |

Cooperator and location : Tom Lorang, Eden.
Fertilizer : 100# 11-51-0 with the seed.
Previous crop : Fallow.
Date seeded : September 25, 1989.
Date harvested : August 7, 1990.
Rainfall : May 10 to maturity 6" +.
1/ Spring survival class : 5=best; 1=very low; based on several location-years of observation.
2/ Hard white wheat.

Table 10. Three-year summary for winter wheat varieties grown near Eden, MT. 1988-1989-1990. Mont. Agr. Expt. Sta., Western Triangle Research Center, Conrad, MT.

| Varieties | Yield bu/a | Test wt. | Plant height | % Protein |
|---|---|---|---|---|
| Winridge | 56 | 61 | 38 | 9.6 |
| Neeley | 55 | 62 | 35 | 10.1 |
| Archer | 53 | 60 | 33 | 9.5 |
| Judith | 51 | 60 | 33 | 10.0 |
| Tiber | 48 | 62 | 44 | 11.0 |
| Centurk | 47 | 62 | 35 | 10.1 |
| Cree | 47 | 63 | 39 | 10.9 |
| Norwin | 47 | 63 | 28 | 11.3 |
| Redwin | 46 | 62 | 36 | 10.7 |
| Cheyenne | 45 | 63 | 39 | 11.1 |
| Norstar | 45 | 62 | 44 | 10.9 |
| Rocky | 43 | 63 | 35 | 10.7 |

Cooperator : Tom Lorang
Location : East of Eden, MT.