

PROJECT TITLE: The effect of planting date on six hard red winter wheat varieties, yield and quality. SARC, Flycreek, Hardin. 1989.

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PROJECT PERSONNEL: Greytak Corporation

PROJECT LOCATION: MSU - Southern Agricultural Research Center, Huntley MT 59037

OBJECTIVES:

To evaluate hard red winter wheat varieties which have been selected based on winter hardiness ratings, and for yield and quality as affected by planting date. To determine if producers need to consider variety changes if they extend the fall planting season.

SUMMARY AND RESULTS:

In 1989, the trial consisted of two sites, one off-center location on Flycreek, Hardin MT, and one located at the Southern Agricultural Research Center. Tables 1-6 describe the SARC site data on yield, test weight, protein, heading date, plant height, and percent winter kill. The planting dates in 1989 ranged from 9/8 to 11/17. Yields decreased, heading was delayed, plant height decreased and percent winter kill increased when planting date was delayed. There appeared to be no effect on test weight or percent protein due to delayed planting. Generally, the more hardy varieties performed slightly better than the less hardy with respect to yield and test weight. Results observed for percent winter kill among the varieties within a particular planting date may be compounded by variation in snow cover within the plot area.

The data for the Flycreek site are given in Table 7-10. The data for yield and test weights are similar to the SARC site in that yield decreased, while test weight and protein were not affected by delayed planting. In contrast to the SARC site, plant height was not affected by planting date.

FUTURE PLANS:

This study is being continued for the 1989-1990 growing season. We consider that this will be the last year of study after which the data will be analyzed for publication.

TABLE 1. YIELD OF 7 WINTER WHEAT VARIETIES AT 7 PLANTING DATES AT SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT. 1988-89 GROWING SEASON.

| VARIETY | -----SEEDING DATE----- | | | | | | |
|---------|------------------------|---------|--------|--------|--------|--------|--------|
| | Sept. 8 | Sept.24 | Oct. 4 | Oct.14 | Oct.25 | Nov. 4 | Nov.17 |
| JUDITH | 37.85 | 30.98 | 39.91 | 24.09 | 38.10 | 28.15 | 26.13 |
| NEELEY | 32.62 | 27.82 | 31.19 | 24.97 | 27.47 | 27.82 | 26.59 |
| NORSTAR | 40.65 | 27.36 | 34.36 | 30.37 | 33.11 | 24.47 | 26.20 |
| REDLAND | 39.99 | 33.57 | 38.01 | 28.28 | 39.47 | 25.41 | 26.14 |
| ROCKY | 46.67 | 36.04 | 41.50 | 32.68 | 37.46 | 20.74 | 30.44 |
| ROSE | 43.01 | 27.98 | 37.83 | 29.31 | 35.34 | 33.54 | 29.43 |
| TIBER | 36.82 | 30.86 | 37.74 | 24.47 | 34.03 | 29.92 | 26.12 |
| MEAN = | 39.66 | 30.66 | 37.22 | 27.74 | 34.99 | 27.15 | 27.29 |

STATISTICS:

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0633 | .0006 | .0404 | .0204 | .0213 | .5003 | .8259 |
| CV (S/MEAN) = | 14.69 | 8.328 | 11.21 | 13.22 | 12.80 | 31.20 | 19.13 |
| CV (SE/MEAN) = | 7.344 | 4.164 | 5.603 | 6.610 | 6.398 | 15.60 | 9.566 |
| LSD(0.05 by t)= | 8.654 | 3.793 | 6.196 | 5.448 | 6.653 | NS | NS |

TABLE 2. TEST WT. OF 7 WINTER WHEAT VARIETIES AT 7 PLANTING DATES AT SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT. 1988-89 GROWING SEASON.

| VARIETY | -----SEEDING DATE----- | | | | | | |
|---------|------------------------|---------|--------|--------|--------|--------|--------|
| | Sept. 8 | Sept.24 | Oct. 4 | Oct.14 | Oct.25 | Nov. 4 | Nov.17 |
| JUDITH | 51.55 | 48.82 | 52.22 | 48.15 | 53.50 | 52.42 | 50.38 |
| NEELEY | 53.28 | 50.60 | 54.05 | 53.88 | 56.50 | 54.02 | 55.70 |
| NORSTAR | 57.30 | 54.10 | 57.78 | 57.18 | 57.40 | 56.22 | 56.38 |
| REDLAND | 52.67 | 49.95 | 53.65 | 51.90 | 55.70 | 55.05 | 54.03 |
| ROCKY | 57.20 | 53.33 | 54.88 | 54.45 | 56.75 | 56.43 | 54.15 |
| ROSE | 55.58 | 52.50 | 56.38 | 53.53 | 57.95 | 57.92 | 57.28 |
| TIBER | 55.48 | 54.13 | 56.30 | 53.77 | 57.52 | 55.55 | 56.00 |
| MEAN = | 54.72 | 51.92 | 55.04 | 53.26 | 56.48 | 55.38 | 54.84 |

STATISTICS:

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0000 | .0000 | .0002 | .0000 | .0938 | .1648 | .0008 |
| CV (S/MEAN) = | 2.123 | 1.649 | 2.464 | 1.886 | 3.667 | 4.886 | 3.341 |
| CV (SE/MEAN) = | 1.061 | .8244 | 1.232 | .9430 | 1.833 | 2.443 | 1.670 |
| LSD(0.05 by t)= | 1.726 | 1.272 | 2.014 | 1.492 | 3.076 | NS | 2.722 |

TABLE 3. PROTEIN OF 7 WINTER WHEAT VARIETIES AT 7 PLANTING DATES AT SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT. 1988-89 GROWING SEASON.

| VARIETY | -----SEEDING DATE----- | | | | | | |
|---------|------------------------|---------|--------|--------|--------|--------|--------|
| | Sept. 8 | Sept.24 | Oct. 4 | Oct.14 | Oct.25 | Nov. 4 | Nov.17 |
| JUDITH | 15.55 | 17.35 | 18.02 | 16.55 | 17.33 | 16.45 | 16.58 |
| NEELEY | 16.75 | 17.45 | 17.15 | 16.97 | 17.10 | 16.40 | 17.77 |
| NORSTAR | 17.67 | 16.63 | 16.85 | 17.60 | 16.83 | 16.63 | 16.70 |
| REDLAND | 16.98 | 17.22 | 17.38 | 16.40 | 17.60 | 16.50 | 18.40 |
| ROCKY | 15.52 | 16.38 | 17.65 | 16.30 | 16.38 | 16.35 | 18.03 |
| ROSE | 16.22 | 16.80 | 16.85 | 17.17 | 16.92 | 15.92 | 17.60 |
| TIBER | 17.00 | 17.88 | 16.58 | 16.32 | 17.15 | 17.15 | 17.75 |
| MEAN = | 16.53 | 17.10 | 17.21 | 16.76 | 17.04 | 16.49 | 17.55 |

STATISTICS:

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0142 | .6179 | .4730 | .7303 | .2655 | .7323 | .2395 |
| CV (S/MEAN) = | 5.138 | 6.963 | 5.958 | 7.553 | 3.869 | 5.630 | 6.322 |
| CV (SE/MEAN) = | 2.569 | 3.482 | 2.979 | 3.776 | 1.934 | 2.815 | 3.161 |
| LSD(0.05 by t)= | 1.262 | 1.769 | 1.523 | 1.881 | .9795 | 1.379 | 1.648 |

TABLE 4. HEADDATE OF 7 WINTER WHEAT VARIETIES AT 7 PLANTING DATES AT SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT. 1988-89 GROWING SEASON.

| VARIETY | -----SEEDING DATE----- | | | | | | |
|---------|------------------------|---------|--------|--------|--------|--------|--------|
| | Sept. 8 | Sept.24 | Oct. 4 | Oct.14 | Oct.25 | Nov. 4 | Nov.17 |
| JUDITH | 160.3 | 160.8 | 165.0 | 166.8 | 167.0 | 169.8 | 172.0 |
| NEELEY | 164.8 | 165.0 | 166.8 | 169.5 | 171.0 | 170.8 | 175.8 |
| NORSTAR | 167.3 | 167.3 | 169.5 | 172.0 | 173.5 | 178.0 | 178.3 |
| REDLAND | 160.3 | 162.0 | 165.0 | 167.5 | 167.3 | 169.5 | 171.5 |
| ROCKY | 160.0 | 161.3 | 163.0 | 165.0 | 165.8 | 167.5 | 169.0 |
| ROSE | 161.0 | 160.8 | 164.5 | 167.5 | 169.0 | 169.5 | 171.5 |
| TIBER | 162.8 | 164.3 | 166.8 | 169.3 | 170.3 | 172.8 | 174.0 |
| MEAN = | 162.3 | 163.0 | 165.8 | 168.2 | 169.1 | 171.1 | 173.1 |

STATISTICS:

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0000 | .0000 | .0000 | .0000 | .0000 | .0000 | .0000 |
| CV (S/MEAN) = | .5075 | .7442 | .6744 | .4810 | .9155 | .7687 | .9096 |
| CV (SE/MEAN) = | .2537 | .3721 | .3372 | .2405 | .4577 | .3844 | .4548 |
| LSD(0.05 by t)= | 1.224 | 1.803 | 1.661 | 1.202 | 2.300 | 1.954 | 2.340 |

TABLE 5. PLANT HT. OF 7 WINTER WHEAT VARIETIES AT 7 PLANTING DATES AT SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT. 1988-89 GROWING SEASON.

| VARIETY | -----SEEDING DATE----- | | | | | | |
|---------|------------------------|---------|--------|--------|--------|--------|--------|
| | Sept. 8 | Sept.24 | Oct. 4 | Oct.14 | Oct.25 | Nov. 4 | Nov.17 |
| JUDITH | 35.38 | 37.25 | 33.88 | 34.38 | 31.00 | 32.25 | 32.13 |
| NEELEY | 36.75 | 36.50 | 32.75 | 31.63 | 32.13 | 28.00 | 29.13 |
| NORSTAR | 44.25 | 42.13 | 40.13 | 38.00 | 40.38 | 33.13 | 33.50 |
| REDLAND | 35.50 | 34.75 | 31.38 | 32.88 | 32.00 | 28.88 | 25.88 |
| ROCKY | 37.00 | 39.75 | 37.13 | 33.25 | 33.88 | 28.75 | 31.38 |
| ROSE | 40.13 | 38.00 | 35.50 | 34.88 | 32.00 | 31.63 | 30.25 |
| TIBER | 40.25 | 38.75 | 37.50 | 34.13 | 31.25 | 30.25 | 31.13 |
| MEAN = | 38.46 | 38.16 | 35.46 | 34.16 | 33.23 | 30.41 | 30.48 |

STATISTICS:

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0000 | .0113 | .0001 | .0011 | .0000 | .0269 | .0004 |
| CV (S/MEAN) = | 4.949 | 6.438 | 5.727 | 4.848 | 6.087 | 7.411 | 6.121 |
| CV (SE/MEAN) = | 2.475 | 3.219 | 2.863 | 2.424 | 3.043 | 3.706 | 3.060 |
| LSD(0.05 by t)= | 2.828 | 3.650 | 3.017 | 2.460 | 3.005 | 3.348 | 2.772 |

TABLE 6. WINTER KILL PERCENT OF 7 WINTER WHEAT VARIETIES AT 7 PLANTING DATES AT SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT. 1988-89 GROWING SEASON.

| VARIETY | -----SEEDING DATE----- | | | | | | |
|---------|------------------------|---------|--------|--------|--------|--------|--------|
| | Sept. 8 | Sept.24 | Oct. 4 | Oct.14 | Oct.25 | Nov. 4 | Nov.17 |
| JUDITH | 18.75 | 12.50 | 11.25 | 2.500 | 7.500 | 50.00 | 30.00 |
| NEELEY | 26.25 | 3.750 | 13.75 | 28.75 | 45.00 | 65.00 | 38.75 |
| NORSTAR | 27.50 | .0000 | 3.750 | 7.500 | 28.75 | 59.50 | 66.25 |
| REDLAND | 16.25 | 10.00 | 6.250 | 40.00 | 12.50 | 57.50 | 51.25 |
| ROCKY | 23.75 | 2.500 | .0000 | 16.25 | 25.00 | 61.25 | 31.25 |
| ROSE | 13.75 | 1.250 | 7.500 | 6.250 | 27.50 | 40.00 | 48.75 |
| TIBER | 10.00 | .0000 | 3.750 | 5.000 | 42.50 | 40.00 | 11.25 |
| MEAN = | 19.46 | 4.286 | 6.607 | 15.18 | 26.96 | 53.32 | 39.64 |

STATISTICS:

| | | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .5691 | .4553 | .6617 | .0198 | .1909 | .2456 | .0206 |
| CV (S/MEAN) = | 74.10 | 231.6 | 169.0 | 103.0 | 80.90 | 31.65 | 49.73 |
| CV (SE/MEAN) = | 37.05 | 115.8 | 84.51 | 51.52 | 40.45 | 15.83 | 24.86 |
| LSD(0.05 by t)= | NS | NS | NS | 23.24 | NS | NS | 29.29 |

TABLE 7. YIELD OF 7 WINTER WHEAT VARIETIES AT 6 PLANTING DATES ON DRYLAND AT FLYCREEK FARMS, 1989 GROWING SEASON. SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT.

| VARIETY | -----SEEDING DATE----- | | | | | |
|---------|------------------------|--------|--------|--------|--------|--------|
| | Sept. 9 | Sept.2 | Oct. 6 | Oct.20 | Nov. 1 | Nov.10 |
| JUDITH | 33.40 | 30.77 | 30.30 | 24.10 | 21.25 | 19.65 |
| NEELEY | 30.80 | 25.30 | 24.00 | 19.30 | 18.70 | 19.08 |
| NORSTAR | 28.75 | 23.20 | 26.48 | 16.33 | 17.22 | 15.38 |
| REDLAND | 34.95 | 32.92 | 32.17 | 25.45 | 31.38 | 24.53 |
| ROCKY | 38.83 | 34.47 | 28.23 | 26.28 | 23.15 | 23.60 |
| ROSE | 31.42 | 29.90 | 23.25 | 20.23 | 20.45 | 20.80 |
| TIBER | 38.85 | 32.08 | 31.85 | 21.85 | 20.45 | 22.50 |
| MEAN = | 33.86 | 29.81 | 28.04 | 21.93 | 21.80 | 20.79 |

STATISTICS:

| | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0162 | .0000 | .2893 | .0000 | .0000 | .0004 |
| CV (S/MEAN) = | 12.49 | 7.967 | 22.29 | 9.451 | 13.02 | 11.33 |
| CV (SE/MEAN) = | 6.247 | 3.984 | 11.15 | 4.726 | 6.511 | 5.663 |
| LSD(0.05 by t)= | 6.284 | 3.528 | NS | 3.079 | 4.217 | 3.498 |

TABLE 8. TEST WEIGHT OF 7 WINTER WHEAT VARIETIES AT 6 PLANTING DATES ON DRYLAND AT FLYCREEK FARMS, 1988-89 GROWING SEASON. SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT.

| VARIETY | -----SEEDING DATE----- | | | | | |
|---------|------------------------|--------|--------|--------|--------|--------|
| | Sept. 9 | Sept.2 | Oct. 6 | Oct.20 | Nov. 1 | Nov.10 |
| JUDITH | 54.67 | 53.22 | 54.73 | 52.70 | 56.63 | 55.60 |
| NEELEY | 55.10 | 55.13 | 56.40 | 56.50 | 57.75 | 55.73 |
| NORSTAR | 57.10 | 57.50 | 59.77 | 59.10 | 60.45 | 59.15 |
| REDLAND | 57.28 | 56.55 | 55.83 | 55.30 | 56.40 | 55.92 |
| ROCKY | 59.02 | 57.57 | 57.65 | 54.78 | 58.52 | 55.67 |
| ROSE | 59.53 | 57.72 | 59.03 | 59.35 | 57.05 | 58.80 |
| TIBER | 58.23 | 57.65 | 59.25 | 60.10 | 60.58 | 58.05 |
| MEAN = | 57.28 | 56.48 | 57.52 | 56.83 | 58.20 | 56.99 |

STATISTICS:

| | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .0055 | .0197 | .0000 | .0000 | .0035 | .1510 |
| CV (S/MEAN) = | 3.095 | 3.345 | 1.350 | 1.569 | 2.727 | 4.210 |
| CV (SE/MEAN) = | 1.547 | 1.673 | .6752 | .7846 | 1.364 | 2.105 |
| LSD(0.05 by t)= | 2.633 | 2.807 | 1.154 | 1.325 | 2.358 | NS |

TABLE 9. PROTEIN OF 7 WINTER WHEAT VARIETIES AT 6 PLANTING DATES ON DRYLAND AT FLYCREEK FARMS, 1988-89 GROWING SEASON. SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT.

| VARIETY | -----SEEDING DATE----- | | | | | |
|---------|------------------------|--------|--------|--------|--------|--------|
| | Sept. 9 | Sept.2 | Oct. 6 | Oct.20 | Nov. 1 | Nov.10 |
| JUDITH | 16.90 | 16.63 | 16.65 | 17.30 | 16.38 | 17.48 |
| NEELEY | 17.42 | 15.90 | 18.23 | 17.50 | 17.30 | 18.55 |
| NORSTAR | 17.85 | 16.67 | 17.38 | 17.80 | 16.95 | 18.02 |
| REDLAND | 17.13 | 17.08 | 17.23 | 16.80 | 17.00 | 17.78 |
| ROCKY | 17.05 | 17.17 | 16.83 | 17.17 | 16.35 | 16.72 |
| ROSE | 18.10 | 17.63 | 17.60 | 17.40 | 17.35 | 16.22 |
| TIBER | 17.08 | 16.65 | 18.10 | 17.07 | 16.38 | 17.27 |
| MEAN = | 17.36 | 16.82 | 17.43 | 17.29 | 16.81 | 17.44 |

STATISTICS:

| | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .6619 | .3592 | .4037 | .9391 | .5049 | .0253 |
| CV (S/MEAN) = | 6.191 | 5.939 | 6.516 | 6.636 | 5.452 | 5.126 |
| CV (SE/MEAN) = | 3.095 | 2.969 | 3.258 | 3.318 | 2.726 | 2.563 |
| LSD(0.05 by t)= | NS | NS | NS | NS | NS | 1.328 |

TABLE 10. PLANT HT. OF 7 WINTER WHEAT VARIETIES AT 6 PLANTING DATES ON DRYLAND AT FLYCREEK FARMS, 1988-89 GROWING SEASON. SOUTHERN AG. RESEARCH CENTER, HUNTLEY, MT.

| VARIETY | -----SEEDING DATE----- | | | | | |
|---------|------------------------|--------|--------|--------|--------|--------|
| | Sept. 9 | Sept.2 | Oct. 6 | Oct.20 | Nov. 1 | Nov.10 |
| JUDITH | 29.13 | 29.25 | 29.75 | 26.63 | 28.00 | 27.13 |
| NEELEY | 27.25 | 26.75 | 28.00 | 24.75 | 26.50 | 26.75 |
| NORSTAR | 29.38 | 29.38 | 35.25 | 27.00 | 29.50 | 30.00 |
| REDLAND | 28.63 | 27.00 | 30.38 | 25.88 | 28.75 | 27.75 |
| ROCKY | 30.00 | 28.50 | 30.38 | 26.63 | 28.50 | 27.88 |
| ROSE | 28.63 | 26.88 | 27.13 | 26.00 | 28.75 | 29.63 |
| TIBER | 31.75 | 28.63 | 31.75 | 25.38 | 27.88 | 30.13 |
| MEAN = | 29.25 | 28.05 | 30.38 | 26.04 | 28.27 | 28.46 |

STATISTICS:

| | | | | | | |
|-----------------|-------|-------|-------|-------|-------|-------|
| P-VALUE TRTS = | .3926 | .1931 | .0001 | .0127 | .3902 | .0080 |
| CV (S/MEAN) = | 8.989 | 6.428 | 5.840 | 3.178 | 6.320 | 4.963 |
| CV (SE/MEAN) = | 4.494 | 3.214 | 2.920 | 1.589 | 3.160 | 2.482 |
| LSD(0.05 by t)= | NS | NS | 2.635 | 1.229 | NS | 2.099 |