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# WEST RIVER AGRICULTURAL RESEARCH AND EXTENSION CENTER
# CROPS AND SOILS RESEARCH

Rapid City, South Dakota

## INTRODUCTION

This is an annual progress report of the West River Crops and Soils Research Project, South Dakota Agricultural Experiment Station. The equipment storage and processing facilities are located approximately 1 mile west of the village of Box Elder. The office facilities are located on the Central States Fairgrounds at 801 San Francisco Street, Rapid City. Telephone 394-2236

The Research Project serves the western part of the state. It is unique in that all experimental plots are cooperatively located with farmers, ranchers, crop improvement associations, and county agents.

The research conducted is not restricted to a specific area, crop, or soil, but by necessity of workload investigates only those problems which are pertinent to general areas. This report contains results of selected research. It does not include results of incomplete work nor work conducted by projects headquartered from the campus at Brookings.

## FIELD PLOT COOPERATORS

| Name | Address | County |
|---|---|---|
| County Crop Impr. Ass'n | Martin 57551 | Bennett |
| David Winkler | Newell 57760 | Butte |
| Fred Beets | Spearfish 57783 | Lawrence |
| Lon Bachand | Sturgis 57785 | Meade |
| Charles Hawks | Plainview 57771 | Meade |
| Joe Komes | Sturgis 57785 | Meade |
| Lavon Shearer | Wall 57790 | Pennington |
| Joe Wunder | Bison 57620 | Perkins |
| Fred Menzel | Dupree 57623 | Ziebach |

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This is an annual report and results published herein are therefore neither complete nor conclusive. 1500 copies printed at an estimated cost of 51¢ each.

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## Acknowledgements

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The results reported in this pamphlet were funded under Plant Science projects 7110-971 and 7110-078. Research was conducted by H. A. Geise-Project Leader, C. E. Stymiest-Extension Agronomist, and G. A. Nelson-Assistant in Plant Science, and in conjunction with P. D. Carson, D. L. Reeves, P. B. Price, D. L. Keim, D. G. Wells, R. J. Pollman, J. B. Weber, J. J. Bonnemann, and W. E. Arnold of Brookings.

## Weather Summary

The weather summaries presented in tables 1 and 2 were obtained from the National Oceanic and Atmospheric Administration publication, Climatological Data-South Dakota.

Some of the information which is identified by footnotes, was obtained from The South Dakota Department of Natural Resources because data from the primary source was missing.

The effects of weather had a major influence on yields of small grain in 1979. The combination of a dry autumn in 1978, and a long extremely cold period durin the winter of 1978-79 resulted in winterkill of approximately 50% of the 870,000 acres seeded to winter wheat.

Moisture during the early spring was below normal resulting in poor growing conditions. Spring grains planted in late spring generally did better because of the above normal summer rains.

Table 1. Weather Data - Average Temperatures and Total Precipitation by Months, with Departures from Normals.

| Month & Year | | Average Temperature* | Departure from Normal** | Total Precipitation* | Departure from Normal** |
|---|---|---|---|---|---|
| Martin (Bennett County Reporting Station) | | | | | |
| Aug. | 1978 | 71.2 | -1.1 | 2.49 | 0.41 |
| Sept. | 1978 | 67.4 | 5.9 | 0.75 | -0.67 |
| Oct. | 1978 | 52.6 | 1.9 | 0.28 | -0.76 |
| Nov. | 1978 | 31.4 | -4.2 | 0.42 | 0.07 |
| Dec. | 1978 | 16.4 | -10.3 | 0.41 | 0.12 |
| Jan. | 1979 | 7.3 | -15.2 | 0.32 | 0.03 |
| Feb. | 1979 | 20.1 | -6.6 | 0.01 | -0.40 |
| Mar. | 1979 | 35.0 | 2.9 | 0.52 | -0.15 |
| April | 1979 | 45.7 | -0.1 | 0.89 | -0.76 |
| May | 1979 | 55.1 | -1.0 | 2.46 | -0.49 |
| June | 1979 | 66.1 | 0.9 | 5.65 | 1.77 |
| July | 1979 | 72.2 | -1.1 | 3.64 | 1.18 |
| Newell (Butte County Reporting Station) | | | | | |
| Aug. | 1978 | 69.4 | -1.6 | 1.49 | 0.24 |
| Sept. | 1978 | 64.0 | 4.8 | 0.27 | -0.99 |
| Oct. | 1978 | 48.9 | 0.8 | 0.15 | -0.63 |
| Nov. | 1978 | 27.5 | -5.1 | 0.83 | 0.26 |
| Dec. | 1978 | 16.7 | -6.0 | 0.11 | -0.18 |
| Jan. | 1979 | 4.0 | -13.5 | 0.35 | -0.05 |
| Feb. | 1979 | 9.8 | -12.1 | 0.79 | 0.42 |
| March | 1979 | 32.4 | 3.6 | 0.33 | -0.31 |
| April | 1979 | 42.8 | -1.1 | 1.09 | -0.54 |
| May | 1979 | 53.8 | -0.7 | 0.88 | -1.81 |
| June | 1979 | 65.0 | 1.6 | 3.69 | 0.17 |
| July | 1979 | 71.5 | -0.4 | 3.26 | 1.41 |
| Oelrichs (Fall River Reporting Station) | | | | | |
| Aug. | 1978 | 70.8 | -2.3 | 1.20 | -0.80 |
| Sept. | 1978 | 66.3 | 4.5 | 0.35 | -0.92 |
| Oct. | 1978 | 50.7 | 0.1 | 0.36 | -0.45 |
| Nov. | 1978 | 29.4 | -6.5 | 0.70 | 0.21 |
| Dec. | 1978 | 14.8 | -12.0 | 0.82 | 0.41 |
| Jan. | 1979 | 7.0 | -15.9 | 0.66 | 0.28 |
| Feb. | 1979 | 20.2 | -7.5 | 0.16 | -0.30 |
| Mar. | 1979 | 37.1 | 3.6 | 0.49 | -0.45 |
| April | 1979 | 46.9 | 0.5 | 0.84 | -1.01 |
| May | 1979 | 55.0 | -1.1 | 2.52 | -0.63 |
| June | 1979 | 66.1 | 0.7 | 2.43 | -0.82 |
| July | 1979 | 73.3 | -0.7 | 2.48 | 0.10 |
| Spearfish (Lawrence County Reporting Station) | | | | | |
| Aug. | 1978 | 69.0 | -1.3 | 2.12 | 0.52 |
| Sept. | 1978 | 64.9 | 5.3 | 0.17 | -1.74 |
| Oct. | 1978 | 49.4 | -0.6 | 0.63 | -0.58 |
| Nov. | 1978 | 29.5 | -6.5 | 1.36 | 0.04 |
| Dec. | 1978 | 20.4 | -8.5 | 0.55 | -0.22 |
| Jan. | 1979 | 9.3 | -15.2 | 0.79 | 0.06 |
| Feb. | 1979 | 18.7 | -9.1 | 1.02 | 0.25 |
| Mar. | 1979 | 35.0 | 3.2 | 0.81 | -0.65 |
| April | 1979 | 43.0 | -1.6 | 1.31 | -1.26 |
| May | 1979 | 52.8 | -1.6 | 1.89 | -1.75 |
| June | 1979 | 63.7 | 1.0 | 2.87 | -1.73 |
| July | 1979 | 70.5 | -0.5 | 2.85 | 1.16 |

Table 1 continued.

| Month & Year | | Average Temperature* | Departure from Normal** | Total Precipitation* | Departure from Normal** |
|---|---|---|---|---|---|
| **Bear Butte Valley** (Meade County Reporting Station) | | | | | |
| Aug. | 1978 | 70.3 | -- | 1.40# | -- |
| Sept. | 1978 | 65.9 | -- | 0.30# | -- |
| Oct. | 1978 | 51.1 | -- | -- | -- |
| Nov. | 1978 | 29.2 | -- | -- | -- |
| Dec. | 1978 | 20.1 | -- | -- | -- |
| Jan. | 1979 | 11.2 | -- | -- | -- |
| Feb. | 1979 | 18.4 | -- | -- | -- |
| Mar. | 1979 | 36.8 | -- | -- | -- |
| April | 1979 | 44.2 | -- | 0.66# | -- |
| May | 1979 | 54.3 | -- | 0.63# | -- |
| June | 1979 | 65.4 | -- | 3.11# | -- |
| July | 1979 | 71.3 | -- | 2.70# | |
| **Plainview#** (Meade County Reporting Station) | | | | | |
| Aug. | 1978 | 74.5 | -- | 2.49 | -- |
| Sept. | 1978 | 66.9 | -- | 0.32 | -- |
| Oct. | 1978 | 49.5 | -- | -- | -- |
| Nov. | 1978 | 24.8 | -- | -- | -- |
| Dec. | 1978 | 5.5 | -- | -- | -- |
| Jan. | 1979 | 3.2 | -- | -- | -- |
| Feb. | 1979 | 7.3 | -- | -- | -- |
| Mar. | 1979 | 32.8 | -- | -- | -- |
| April | 1979 | 43.7 | -- | -- | -- |
| May | 1979 | 54.6 | -- | 0.99 | -- |
| June | 1979 | 70.4 | -- | 3.92 | -- |
| July | 1979 | 73.9 | -- | 3.24 | -- |
| **Quinn#** (Pennington County Reporting Station) | | | | | |
| April | 1979 | -- | -- | 0.42 | -- |
| May | 1979 | 54.2 | -- | 1.03 | -- |
| June | 1979 | 65.1 | -- | 6.78 | -- |
| July | 1979 | 71.5 | -- | 4.35 | -- |
| **Bison** (Perkins County Reporting Station) | | | | | |
| Aug. | 1978 | 69.7 | -- | 0.63 | -1.18 |
| Sept. | 1978 | -- | -- | 1.05 | -0.25 |
| Oct. | 1978 | 48.9 | -- | 0.00 | -0.83 |
| Nov. | 1978 | 26.3 | -- | 1.08 | 0.54 |
| Dec. | 1978 | 12.5 | -- | 0.01 | -0.26 |
| Jan. | 1979 | 1.6 | -- | 0.60 | 0.14 |
| Feb. | 1979 | 8.0 | -- | 1.54 | 1.13 |
| Mar. | 1979 | 28.9 | -- | 0.34 | -0.39 |
| April | 1979 | 40.7 | -- | 1.07 | -0.53 |
| May | 1979 | 51.0 | -- | 1.08 | -1.45 |
| June | 1979 | 65.3 | -- | 2.06 | -1.89 |
| July | 1979 | 69.9 | -- | 3.02 | 0.97 |

| Month & Year | Average Temperature* | Departure from Normal** | Total Precipitation* | Departure from Normal** |
|---|---|---|---|---|
| Dupree (Ziebach County Reporting Station) | | | | |
| Aug. 1978 | 71.1 | -1.5 | 3.03 | 1.45 |
| Sept. 1978 | 66.7 | 5.9 | 0.11 | -1.05 |
| Oct. 1978 | 50.7 | 1.1 | 0.10 | -0.77 |
| Nov. 1978 | 26.4 | -6.5 | 0.95 | 0.49 |
| Dec. 1978 | 13.3 | -8.2 | 0.15 | -0.18 |
| Jan. 1979 | 3.2 | -12.5 | 0.33 | -0.11 |
| Feb. 1979 | 7.1 | -13.3 | 0.57 | 0.11 |
| March 1979 | 31.3 | 2.4 | 0.42 | -0.31 |
| April 1979 | 42.6 | -2.5 | 1.14 | -0.60 |
| May 1979 | 53.9 | -2.2 | 1.02 | -1.56 |
| June 1979 | 66.8 | 1.7 | 2.80 | -0.73 |
| July 1979 | 71.3 | -2.2 | 4.83 | 3.00 |

* Average temperatures and total precipitation obtained from NOAA climatological data from reporting station nearest the experimental sites.
**Departures from normal are based on records for the period 1941-1970.
# Data obtained from source other than NOAA.
NOTE: Temperatures are reported in degrees Fahrenheit and precipitation in inches.

Table 2. Weather Data - Date of Critical Temperatures and Total Usable Precipitation in Counties with Experimental Plots, 1978-79.

| Location | Date of Temperature* Fall-First | Spring-Last | Total Usable Moisture** Aug 78-July 79 | April 79-July 79 |
|---|---|---|---|---|
| Bennett County (Martin) | Oct 6 | May 11 | 13.91 | 10.93 |
| Butte County (Newell) | Oct 6 | May 11 | 10.20 | 8.32 |
| Fall River Co. (Oelrichs) | Oct 6 | May 11 | 8.53 | 6.46 |
| Lawrence County (Spearfish) | Oct 6 | May 10 | 12.21 | 7.71 |
| Meade County (Plainview) | -- | -- | -- | 7.44# |
| (Bear Butte Valley) | Oct 6 | May 11 | -- | 6.53# |
| Pennington Co. (Quinn) | -- | -- | -- | 12.16# |
| Perkins County (Bison) | Oct 7 | May 11 | 8.73 | 6.10 |
| Ziebach County (Dupree) | Oct 6 | May 11 | 13.33 | 9.15 |

* First 28° temperature in Fall or last 28° in Spring.
** Sum of all precipitation where amounts were greater than 0.25 inch or totaled 0.25 in two contiguous days.
# Data obtained from source other than NOAA.

## SMALL GRAIN VARIETY TRIALS

Objective: To observe and compare standard small grain varieties and experimental varieties for winterhardiness, grain yield, grain quality, disease resistance, insect resistance, and other characteristics for area adaptability.

### Hard Red Winter Wheat

Plots were located in Bennett, Haakon, Lawrence, Meade - (2 locations), Pennington, Perkins, and Ziebach counties. All trials were seeded in non-fertilized fallow with a deep furrow drill. The seeding rate averaged 60 pounds per acre.

Of the eight locations, three winterkilled due to lack of moisture and an extremely cold winter, and one was lost because of a combination of winterkill and weeds. The four surviving locations suffered from moisture stress during early spring, while precipitation in June, July, and August was generally above average.

The plots were harvested with a Massey-Ferguson Model 35 self-propelled combine. Machine harvested plots contained a minimum of 75 square feet but generally contained 300 square feet per sample.

DISCUSSION:

### Bennett County

The winter wheat variety trials in Bennett county in 1978-79 (table 3) had good survival for nearly all entries. Survival was not uniform in all replications as indicated by the value of the Coefficient of Variability. Those varieties which had an average yield of less than 17.0 bushels per acre also experienced low survival in the 1977-78 crop year.

Grain quality in 1979 was reduced as indicated by lower test weights and protein content. Precipitation was below normal or much reduced during the fall and spring. However, in June and July moisture was good, but not sufficient to make up for the earlier shortage. The lowered yields of 1979 are the result of both lower plant populations and reduced tillering. Plant height was also reduced due to the early moisture shortage.

### Lawrence County

Hard red winter wheat plots in Lawrence county (table 4) had the best winter survival of all locations. Those varieties with known low hardiness had fair to poor survival. Much of the stand loss could be attributed to the subnormal precipitation from September on. The trial had been grazed by cattle in the fall while the soil was wet. The result was stand damage by trampling. The grazing did not appear to affect the grain yield but because there was not an ungrazed area, an accurate measurement could not be made.

Table 3. Hard Red Winter Wheat Variety Performance Trial - Bennett County (Martin Airport), 1978-79.

| Variety | Height (Inches) | Percent* Protein | Test Wt (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|---|
| YTO-117 | 37 | 12.9 | 59.3 | 34.9 | 30.9 |
| Roughrider | 30 | 13.5 | 59.2 | 28.2 | 26.7 |
| Bronze | 31 | 15.9 | 59.5 | 27.8 | 21.2 |
| Agate | 29 | 14.3 | 59.0 | 26.6 | 27.8 |
| Winoka | 31 | 15.9 | 59.8 | 26.3 | 27.7 |
| Scoutland | 27 | 14.2 | 58.2 | 25.4 | 19.5 |
| Buckskin | 30 | 14.1 | 57.7 | 23.9 | 26.5 |
| Parker 76 | 26 | 14.5 | 60.2 | 23.2 | -- |
| Lancer | 29 | 10.9 | 58.7 | 22.9 | 25.1 |
| Larned | 25 | 14.5 | 58.7 | 22.3 | 23.8 |
| Kirwin | 27 | 14.1 | 58.2 | 22.1 | 21.3 |
| Gent | 26 | 12.4 | 58.0 | 21.6 | 19.5 |
| Centurk | 27 | 13.9 | 57.5 | 21.6 | 21.9 |
| Scout 66 | 27 | 13.6 | 57.3 | 21.6 | 22.3 |
| Baca | 26 | 14.9 | 57.8 | 21.5 | 17.5 |
| Gage | 28 | 11.1 | 58.5 | 20.8 | 19.4 |
| Crest | 25 | 14.5 | 56.0 | 20.7 | 19.9 |
| Rall | 25 | 14.6 | 57.8 | 20.2 | 22.3 |
| Cloud | 27 | 13.7 | 58.2 | 19.0 | 19.5 |
| Sage | 28 | 13.9 | 56.7 | 18.4 | 17.7 |
| Sentinel | 25 | 12.6 | 57.2 | 17.4 | 22.0 |
| Eagle | 24 | 11.9 | 58.8 | 17.2 | 19.4 |
| Centurk 78 | 25 | 13.4 | 56.7 | 15.9 | -- |
| Lancota | 28 | 12.5 | 55.7 | 15.8 | 17.7 |
| Vona | 20 | 14.4 | 57.2 | 15.5 | 13.4 |
| Trison | 26 | 14.7 | 58.7 | 15.4 | 12.5 |
| Bennett | 23 | 15.1 | 56.8 | 15.2 | -- |
| Lindon | 24 | 15.7 | 58.8 | 14.6 | 16.7 |
| TAM 101 | 22 | 15.4 | 56.5 | 13.3 | 9.2 |
| Hiplains | 28 | 12.4 | 56.8 | 13.2 | 16.1 |
| Homestead | 23 | 12.4 | 56.3 | 12.5 | 17.7 |
| Newton | 22 | 15.7 | 56.5 | 10.6 | -- |
| LSD(05) - 9.7 Bu/A | | C.V. - 29.5% | | Mean - 20.2 | |

Note: Yield data presented within the table are averages of three replications. Plot size was 6' x 50' with 12 inch spaced rows. Seeded on September 26, 1978 and harvested on July 30, 1979. Seeding rate was 60 pounds per acre. Fallowed soil was moist and friable at seeding time.

*Protein content was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.

Table 4. Hard Red Winter Wheat Variety Performance Trial - Lawrence County (Spearfish), 1978-79.

| Variety | Height (Inches) | Percent* Survival | Percent** Protein | Test Wt (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|---|---|
| Roughrider | 32 | 95 | 13.7 | 59.3 | 39.2 | 45.4 |
| Centurk 78 | 29 | 92 | 13.2 | 58.7 | 38.6 | -- |
| Winoka | 34 | 90 | 14.4 | 61.0 | 36.7 | 41.3 |
| Buckskin | 31 | 85 | 14.8 | 60.2 | 35.6 | 43.7 |
| Centurk | 28 | 80 | 14.1 | 57.3 | 35.5 | 45.3 |
| Parker 76 | 26 | 85 | 17.2 | 59.3 | 33.2 | -- |
| Agate | 30 | 80 | 14.8 | 57.7 | 33.0 | 41.9 |
| Sage | 30 | 90 | 14.6 | 61.5 | 32.9 | 40.6 |
| Scout 66 | 32 | 87 | 14.6 | 59.0 | 32.4 | -- |
| Gent | 31 | 95 | 14.3 | 59.2 | 31.9 | 40.2 |
| Rall | 29 | 90 | 12.9 | 61.2 | 31.5 | 45.5 |
| Bronze | 32 | 90 | 15.6 | 59.8 | 31.0 | -- |
| Lancota | 31 | 75 | 14.8 | 58.7 | 30.5 | 38.5 |
| Bennett | 26 | 85 | 16.2 | 59.7 | 29.6 | -- |
| Larned | 28 | 60 | 15.0 | 58.6 | 28.9 | 42.4 |
| Newton | 26 | 70 | 15.0 | 59.5 | 27.1 | -- |
| Eagle | 28 | 75 | 15.9 | 59.7 | 25.4 | 32.2 |
| Vona | 23 | 35 | 14.3 | 57.8 | 21.0 | 39.4 |
| Lindon | 24 | 30 | 15.2 | 57.0 | 18.0 | 32.4 |
| | | | | Mean - | 31.2 | |

Note: Yield data presented within the table are averages of 3 replications. Plot size was 5' x 50' with 10 inch spaced rows. Seeded on September 22, 1978 and harvested on July 27, 1979. Seeding rate was 60 pounds per acre. Soil moisture was adequate for germination and emergence. Plots were grazed in the fall after emergence.

* Percent survival was estimated on May 5, 1979.
**Protein content was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.

Table 5. Hard Red Winter Wheat Trials - Meade County(Bear Butte Valley),1979.

| Variety | Rust Reaction* Leaf | | Wheat Streak Mosaic* | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|---|---|---|
| YTO-117 | -- | -- | -- | 58.5 | 14.1 |
| Winoka | S | R | S | 55.0 | 3.9 |
| Roughrider | S | R | S | 55.7 | 2.7 |

Note: Plots were seeded on September 19, 1978 using a deep furrow drill with a 12 inch row space. Soil moisture was adequate for germination and emergence. Lack of fall rain left the seedlings under moisture stress during winter.
* Letter indicates reaction to disease: S-susceptible, MS-moderately susceptible, MR-moderately resistant, R-resistant, Tol-tolerant.

Table 6. Hard Red Winter Wheat Variety Performance Trial - Pennington County (Quinn), 1979.

| Variety | Height (Inches) | Percent* Survival | Percent** Protein | Test Wt (Lbs/Bu) | Grain Yield Bu/Acre |
|---|---|---|---|---|---|
| Gage | 22 | 95 | 15.9 | 57.7 | 34.5 |
| Crest | 23 | 95 | 16.2 | 57.0 | 34.3 |
| Winoka | 24 | 95 | 15.9 | 58.3 | 33.5 |
| Hiplains | 22 | 95 | 15.7 | 54.7 | 32.9 |
| Agate | 24 | 95 | 15.5 | 57.8 | 32.4 |
| Roughrider | 22 | 95 | 16.4 | 58.7 | 32.3 |
| YTO-117 | 28 | 95 | 13.6 | 59.2 | 30.8 |
| Centurk 78 | 20 | 95 | 14.8 | 57.5 | 30.6 |
| Buckskin | 23 | 90 | 15.0 | 57.0 | 30.4 |
| Cloud | 22 | 95 | 15.3 | 57.8 | 29.3 |
| Centurk | 24 | 90 | 14.7 | 57.3 | 29.2 |
| Lancer | 22 | 95 | 14.8 | 57.2 | 29.0 |
| Rall | 22 | 85 | 15.9 | 57.0 | 28.5 |
| Lancota | 22 | 95 | 14.7 | 56.5 | 28.5 |
| Bronze | 24 | 90 | 16.3 | 55.3 | 28.0 |
| TAM 101 | 21 | 75 | 14.8 | 57.0 | 27.9 |
| Bennett | 22 | 80 | 15.8 | 56.5 | 27.2 |
| Homestead | 20 | 95 | 16.3 | 55.3 | 26.4 |
| Baca | 25 | 90 | 16.5 | 56.0 | 26.3 |
| Sage | 25 | 90 | 16.7 | 57.5 | 25.5 |
| Gent | 26 | 95 | 17.2 | 57.0 | 24.9 |
| Kirwin | 24 | 95 | 16.0 | 58.3 | 24.6 |
| Larned | 22 | 95 | 14.7 | 57.3 | 24.6 |
| Scout 66 | 24 | 90 | 17.7 | 57.0 | 24.1 |
| Parker 76 | 23 | 95 | 15.7 | 59.5 | 23.8 |
| Vona | 25 | 50 | 12.8 | 57.0 | 23.3 |
| Scoutland | 27 | 90 | 16.8 | 57.3 | 23.1 |
| Eagle | 21 | 95 | 16.5 | 58.3 | 23.0 |
| Newton | 23 | 95 | 15.6 | 57.7 | 22.7 |
| Lindon | 21 | 85 | 15.9 | 57.3 | 22.3 |
| Sentinel | 20 | 75 | 15.8 | 55.7 | 22.3 |
| Trison | 22 | 50 | 15.6 | 57.0 | 21.3 |

LSD(05) - 7.5 Bu/A C.V. - 16.7% Mean - 27.4

Note: Yield data presented within the table are averages of three replications. Plot size was 6' x 50' with 12 inch spaced rows. Seeded on September 28, 1978 and harvested on August 16, 1979. Seeding rate was 60 pounds per acre. Fallowed soil had adequate moisture for germination and emergence.

* Percent survival is an average of visual estimates made on April 17, 1979.
**Protein content was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.

Table 7. Hard Red Winter Wheat Variety Performance Trial - Perkins County (Bison), 1979.

| Variety | Height (Inches) | Percent* Survival | Percent** Protein | Test Wt (Lbs/Bu) | Grain Yield Bu/Acre |
|---|---|---|---|---|---|
| Roughrider | 22 | 88 | 15.6 | 56.8 | 39.0 |
| Agate | 22 | 96 | 15.8 | 54.8 | 36.7 |
| Winoka | 24 | 97 | 15.3 | 58.9 | 36.5 |
| Centurk | 20 | 92 | 14.1 | 57.3 | 35.7 |
| Buckskin | 23 | 92 | 16.1 | 56.9 | 34.4 |
| Vona | 19 | 91 | 13.5 | 55.4 | 34.2 |
| Bennett | 21 | 91 | 15.2 | 54.6 | 34.2 |
| Lindon | 20 | 90 | 13.9 | 56.0 | 34.0 |
| Lancer | 23 | 94 | 12.9 | 57.8 | 33.7 |
| Rall | 22 | 92 | 15.3 | 55.4 | 33.3 |
| Scout 66 | 21 | 94 | 14.8 | 55.5 | 32.6 |
| Nebred | 24 | 85 | 13.8 | 56.9 | 32.5 |
| Centurk 78 | 21 | 89 | 15.1 | 57.4 | 31.1 |
| Sage | 22 | 97 | 16.8 | 55.5 | 29.8 |
| Gent | 23 | 96 | 15.2 | 55.3 | 28.6 |
| Lancota | 22 | 89 | 15.5 | 54.6 | 28.2 |
| Larned | 20 | 91 | 14.8 | 54.5 | 26.4 |
| Eagle | 21 | 93 | 17.3 | 55.8 | 25.9 |
| Parker 76 | 21 | 95 | 17.9 | 57.7 | 17.8 |

LSD(05) - 8.0 Bu/A  C.V. - 20%  Mean - 31.8

Note: Yield data presented within the table are averages of 6 replications. Plot size was 5' x 14' with 10 inch spaced rows. Seeded on September 11, 1978 and harvested on August 6, 1979. Seeding rate was 60 pounds per acre. Soil moisture was adequate for germination and emergence.
* Percent survival is based on desired stand and is a visual estimate.
**Protein content was calculated from Kjeldahl nitrogen analysis and is reported on an oven-dry basis.

DISCUSSION: (Continued)

Meade County

There were two winter wheat variety trials established in Meade county in 1978. They each contained 38 entries. The stands of wheat in the fall were excellent and produced a fair amount of top growth. In early spring the area experienced a period of warm weather followed by several days of very cold weather. During that period all varieties which had broken dormancy were killed. Investigation of many fields in the area during early March indicated healthy crowns and development of seminal roots. This would indicate plants were alive up to that date. Later investigation showed green leaf tissue but brown watery crown tissue. Plant populations steadily decreased during March and eventually the Plainview site was abandoned, while the Bear Butte Valley site (table 5) was retained.

## Pennington County

The trial was seeded in late September into essentially dry soil. Only a small number of seedlings emerged. Precipitation was negligible during the winter with only a short period of shallow snow cover. Subnormal precipitation was experienced during spring and early summer. The stands that devel oped germinated and emerged after the cold weather in late winter and were not subjected to the extreme cold. The yields (table 6) that were obtained were exceptional considering the adverse conditions. Weeds which germinated after mid-June made harvesting extremely difficult and influenced grain quality. Protein content was higher than usual because maturity was delayed due to the spring germination. Weight per bushel was reduced because of the effect of the green weed seed which required drying of the samples before they could be weighed.

## Perkins County

This trial was seeded on September 11, 1978. Precipitation during late summer and fall was well below normal. Stands were good but seedlings were under moisture stress. Winter survival could be described as normal, however, there was variation between plots of the same variety in different replications. Plant height was reduced due to drought stress. The weight per bushel was also reduced but it was due to a rainy period at harvest. Yield results are shown in table 7.

## Hard Red and Durum Spring Wheat

Plots were seeded at seven locations in 1979. All trials were seeded on fallow with the exception of Butte county. The Butte county site had been in small grain the previous year. All sites were seeded with a plot seeder having an 8 inch row spacing.

Seeding rate was controlled by prepackaging all seed. Fertilizer requirements were predetermined by soil test and only phosphorus was applied with the seed. Nitrogen was surface broadcast on the irrigated trial.

Harvesting was accomplished with a self-propelled plot combine. Grain yields and other agronomic data are reported on tables 8 through 24.

Table 8. Hard Red Spring Wheat Variety Trial - Bennett County (Martin), 1979.

| Variety | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|
| Semidwarfs | | |
| Bounty 309 | 52.7 | 28.1 |
| Prodax | 50.2 | 27.8 |
| Bounty 208 | 54.7 | 26.4 |
| James | 54.3 | 25.9 |
| Len | 53.5 | 25.6 |
| Olaf | 53.0 | 25.4 |
| Protor | 52.5 | 25.2 |
| Profit 75 | 52.7 | 24.4 |
| Era | 52.7 | 23.5 |
| WS 25 | 51.3 | 23.2 |
| Solar | 51.7 | 22.7 |
| Angus | 55.7 | 22.5 |
| WS 1809 | 53.0 | 22.0 |
| Kitt | 50.2 | 21.8 |
| Funk's W444 | 52.5 | 21.5 |
| Standard Height | | |
| Nowesta | 52.3 | 28.6 |
| Waldron | 51.8 | 24.9 |
| Butte | 55.5 | 24.2 |
| Ellar | 54.2 | 24.2 |
| Fortuna | 54.0 | 24.2 |
| Coteau | 52.3 | 21.5 |
| Eureka | 52.2 | 20.1 |
| | C.V. - 14.2 | Mean - 24.3 |

Note: Plots were seeded on April 19 at 60 pounds per acre, and harvested on August 14. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

Table 9. Durum Spring Wheat Variety Trial - Bennett County (Martin), 1979.

| Variety | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|
| Semidwarfs | | |
| Calvin | 54.5 | 31.0 |
| Cando | 58.2 | 23.7 |
| Standard Height | | |
| Ward | 56.2 | 34.8 |
| Rolette | 56.3 | 32.9 |
| Edmore | 53.2 | 29.3 |
| Botno | 54.3 | 28.6 |
| Rugby | 52.7 | 26.9 |
| Crosby | 53.7 | 26.1 |
| LSD(05) - 5.1 Bu/A | C.V. - 10.1% | Mean - 29.2 |

Note: Plots were seeded on April 19 at 60 pounds per acre, and harvested on August 14. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

Table 10. Hard Red Spring Wheat Variety Trial - Butte County (Newell), 1978-1979.

| Variety | Height (Inches) | Date of Heading | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|---|
| Semidwarfs | | | | | |
| Prodax | 36 | June 21 | 57.5 | 97.8 | 78.7 |
| Protor | 33 | 20 | 58.2 | 87.1 | 73.7 |
| Solar | 37 | 23 | 58.0 | 83.2 | 74.7 |
| WS 25 | 34 | 21 | 58.3 | 82.3 | 76.5 |
| Profit 75 | 35 | 21 | 58.5 | 80.6 | 73.8 |
| James | 37 | June 17 | 56.3 | 80.3 | 76.4 |
| Len | 34 | 23 | 57.5 | 79.9 | -- |
| Bounty 309 | 34 | 20 | 57.5 | 79.4 | -- |
| Kitt | 37 | 23 | 57.2 | 78.9 | 68.3 |
| Era | 36 | 23 | 58.8 | 78.2 | 68.5 |
| WS 1809 | 32 | June 18 | 57.3 | 77.4 | 71.5 |
| Olaf | 36 | 22 | 57.5 | 76.7 | 71.0 |
| Bounty 208 | 31 | 19 | 58.5 | 74.3 | 67.1 |
| Funk's W444 | 31 | 18 | 56.3 | 67.8 | 65.0 |
| Angus | 37 | 23 | 59.0 | 67.0 | 65.2 |
| Standard Height | | | | | |
| Fortuna | 41 | June 21 | 57.8 | 78.9 | 64.4 |
| Butte | 40 | 18 | 59.2 | 77.4 | 71.6 |
| Waldron | 40 | 20 | 56.5 | 71.1 | 65.9 |
| Nowesta | 41 | 21 | 57.5 | 69.2 | 63.7 |
| Eureka | 42 | 22 | 57.0 | 68.7 | 65.1 |
| Coteau | 42 | 23 | 58.7 | 65.3 | 60.9 |
| Ellar | 41 | 19 | 57.8 | 63.9 | 59.8 |

LSD(05) - 6.6 Bu/A C.V. - 5.2% Mean - 76.8

Note: Plots were seeded on April 10 at 120 pounds per acre, and harvested on August 23. Row spacing was 8 inches. They were flood irrigated twice during the season. Phosphorus pentoxide was applied with the seed at 66 pounds per acre, while nitrogen was surface broadcast at the rate of 150 pounds per acre.

Table 11. Durum Wheat Variety Trial - Butte County (Newell), 1978-79.

| Variety | Height (Inches) | Date of Heading | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|---|
| Semidwarfs | | | | | |
| Cando | 29 | June 20 | 57.7 | 97.3 | 93.2 |
| Calvin | 31 | 21 | 58.7 | 92.9 | 87.6 |
| Standard Height | | | | | |
| Vic | 46 | June 21 | 60.0 | 93.6 | -- |
| Ward | 43 | 19 | 59.0 | 91.0 | 86.1 |
| Crosby | 43 | 19 | 59.7 | 88.3 | 78.9 |
| Rugby | 43 | 19 | 59.0 | 85.9 | 78.1 |
| Edmore | 42 | 21 | 59.3 | 83.2 | 80.5 |
| Botno | 41 | 18 | 58.0 | 83.2 | 74.2 |
| Rolette | 38 | 18 | 59.7 | 77.2 | 72.1 |

LSD(05) - 8.7 Bu/A C.V. - 5.7% Mean - 88.1

Note: Plots were seeded on April 10 at 120 pounds per acre, and harvested on August 23. Row spacing was 8 inches. They were flood irrigated twice during the season. Phosphorus pentoxide was applied with the seed at 66 pounds per acre, while nitrogen was surface broadcast at the rate of 150 pounds per acre.

Table 12. Hard Red Spring Wheat Variety Trail - Meade County (Bear Butte Valley), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr. ave.) |
|---|---|---|---|---|
| Semidwarfs | | | | |
| Prodax | 25 | 57.8 | 34.6 | 31.4 |
| Kitt | 26 | 56.7 | 32.9 | 29.2 |
| Era | 25 | 59.2 | 31.9 | 27.0 |
| Protor | 22 | 59.0 | 31.2 | 30.7 |
| Angus | 28 | 59.7 | 30.5 | -- |
| WS 25 | 22 | 59.5 | 30.0 | 28.6 |
| Solar | 26 | 57.2 | 30.0 | 27.0 |
| Olaf | 26 | 59.2 | 27.8 | 28.0 |
| James (SD2273) | 29 | 58.8 | 27.8 | 27.7 |
| WS 1809 | 25 | 59.0 | 27.1 | 28.3 |
| Profit 75 | 24 | 58.0 | 26.6 | 27.0 |
| Bounty 208 | 21 | 59.8 | 25.6 | 26.6 |
| Len | 26 | 57.0 | 22.0 | -- |
| Funk's W444 | 21 | 56.2 | 19.8 | 25.9 |
| Standard Height | | | | |
| Ellar | 30 | 57.3 | 29.8 | 29.9 |
| Coteau | 29 | 58.2 | 28.8 | 26.6 |
| Nowesta | 27 | 59.5 | 28.6 | 27.6 |
| Waldron | 30 | 58.3 | 27.6 | 28.2 |
| Eureka | 31 | 56.7 | 27.6 | 29.0 |
| Butte | 27 | 59.8 | 25.6 | 31.1 |
| Fortuna | 29 | 58.2 | 24.9 | 25.1 |

LSD(05) - 5.3 Bu/A C.V. - 11.5% Mean - 28.1

Note: Plots were seeded on April 16 at 60 pounds per acre, and harvested on August 3. Drill row apace was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 13. Durum Wheat Variety Trial - Meade County (Bear Butte Valley), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr. ave.) |
|---|---|---|---|---|
| Semidwarfs | | | | |
| Cando | 26 | 57.2 | 29.0 | 25.9 |
| Calvin | 25 | 56.2 | 28.0 | 25.2 |
| Standard Height | | | | |
| Ward | 31 | 58.8 | 35.6 | 31.1 |
| Vic | 30 | 57.2 | 31.9 | -- |
| Rugby | 32 | 57.5 | 29.8 | 28.5 |
| Crosby | 31 | 57.0 | 27.2 | 27.1 |
| Edmore | 31 | 56.5 | 26.9 | 28.2 |
| Botno | 30 | 56.7 | 24.0 | 26.3 |
| Rolette | 28 | 56.7 | 22.9 | 26.0 |

LSD(10) - 6.0 Bu/A C.V. - 11.4% Mean - 28.4

Note: Plots were seeded on April 16 at 60 pounds per acre, and harvested on August 3. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 14. Hard Red Spring Wheat Variety Trail - Meade County (Plainview), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr. ave.) |
|---|---|---|---|---|
| **Semidwarfs** | | | | |
| Era | 27 | 55.2 | 25.0 | 24.8 |
| Bounty 309 | 25 | 53.8 | 22.9 | -- |
| Angus | 27 | 54.7 | 19.6 | 19.4 |
| Protor | 26 | 57.5 | 18.5 | 21.8 |
| Profit 75 | 25 | 52.8 | 17.1 | 21.0 |
| Bounty 208 | 22 | 56.0 | 16.0 | 20.2 |
| Prodax | 29 | 50.0 | 14.9 | 19.3 |
| Olaf | 29 | 49.0 | 14.2 | 18.6 |
| Solar | 30 | 50.2 | 12.7 | 16.7 |
| Kitt | 26 | 51.5 | 12.3 | 17.6 |
| WS 1809 | 22 | 52.7 | 11.3 | 16.2 |
| WS 25 | 26 | 52.0 | 11.3 | -- |
| James (SD2273) | 28 | 49.8 | 10.9 | 18.7 |
| Funk's W444 | 23 | 55.2 | 8.3 | 13.6 |
| **Standard Height** | | | | |
| Nowesta | 30 | 55.0 | 26.1 | 23.4 |
| Ellar | 31 | 53.5 | 24.0 | -- |
| Waldron | 30 | 52.2 | 19.6 | 21.4 |
| Eureka | 28 | 52.5 | 15.6 | -- |
| Fortuna | 29 | 55.3 | 15.2 | 16.0 |
| Coteau | 29 | 51.0 | 13.1 | 16.1 |
| Butte | 29 | 49.5 | 7.3 | 17.4 |

C.V. - 54.9% Mean - 16.0

Note: Plots were seeded on April 18 at 60 pounds per acre, and harvested on August 2. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 15. Durum Wheat Variety Trail - Meade County (Plainview), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr. ave.) |
|---|---|---|---|---|
| **Semidwarfs** | | | | |
| Calvin | 26 | 56.0 | 20.3 | 20.6 |
| Cando | 24 | 53.3 | 16.0 | 20.2 |
| **Standard Height** | | | | |
| Crosby | 29 | 56.0 | 22.7 | 22.1 |
| Ward | 27 | 56.0 | 21.1 | 22.3 |
| Rugby | 29 | 55.5 | 20.8 | 22.8 |
| Edmore | 30 | 54.8 | 19.4 | 19.7 |
| Botno | 28 | 56.7 | 16.5 | 19.7 |
| Rolette | 30 | 57.7 | 13.3 | 17.6 |

C.V. - 22.3% Mean - 18.8

Note: Plots were seeded on April 18 at 60 pounds per acre, and harvested on Auguts 2. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 16. Hard Red Spring Wheat Variety Trial - Pennington County (Quinn), 1979.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|---|
| Semidwarfs | | | |
| Era | 21 | 57.3 | 45.0 |
| Prodax | 24 | 54.5 | 45.0 |
| Solar | 25 | 56.0 | 44.0 |
| Kitt | 24 | 55.0 | 43.1 |
| Bounty 309 | 24 | 54.5 | 42.4 |
| Angus | 23 | 57.3 | 42.1 |
| Len | 21 | 57.5 | 41.6 |
| Protor | 18 | 55.3 | 39.0 |
| Olaf | 25 | 53.2 | 38.5 |
| WS 25 | 20 | 54.5 | 33.9 |
| Profit 75 | 20 | 55.7 | 33.6 |
| James (SD2273) | 24 | 55.3 | 33.4 |
| WS 1809 | 20 | 52.8 | 31.0 |
| Bounty 208 | 15 | 56.7 | 29.8 |
| Funk's W444 | 19 | 53.5 | 25.2 |
| Standard Height | | | |
| Coteau | 27 | 56.8 | 45.7 |
| Ellar | 25 | 56.5 | 38.5 |
| Nowesta | 26 | 55.5 | 37.8 |
| Eureka | 28 | 55.5 | 35.8 |
| Waldron | 26 | 54.0 | 35.1 |
| Butte | 22 | 57.7 | 31.5 |
| Fortuna | 25 | 54.0 | 29.5 |

LSD(05) - 6.6 Bu/A C.V. - 10.7% Mean - 37.3

Note: Plots were seeded on April 17 at 60 pounds per acre, and harvested on August 15. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 17. Durum Wheat Variety Trial - Pennington County (Quinn), 1979.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|---|
| Semidwarfs | | | |
| Calvin | 22 | 58.2 | 47.2 |
| Cando | 24 | 55.2 | 47.2 |
| Standard Height | | | |
| Rugby | 29 | 58.2 | 51.2 |
| Ward | 29 | 57.5 | 49.7 |
| Vic | 29 | 58.8 | 49.0 |
| Edmore | 29 | 57.5 | 49.0 |
| Crosby | 28 | 57.5 | 43.2 |
| Botno | 26 | 57.8 | 42.1 |
| Rolette | 26 | 57.2 | 40.6 |

C.V. - 9.8% Mean - 46.0

Note: Plots were seeded on April 17 at 60 pounds per acre, and harvested on August 15. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 18. Hard Red Spring Wheat Variety Trial - Perkins County (Bison), 1977-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (3 yr av) |
|---|---|---|---|---|
| Semidwarfs | | | | |
| Solar | 23 | 60 | 23.9 | -- |
| Era | 22 | 59 | 23.9 | 29.9 |
| Len | 23 | 59 | 23.9 | -- |
| Wared | 22 | 59 | 23.9 | -- |
| Angus | 23 | 59 | 23.0 | 28.4 |
| Prodax | 23 | 58 | 22.7 | 28.0 |
| Kitt | 23 | 57 | 21.6 | 24.4 |
| Olaf | 24 | 58 | 21.3 | 27.1 |
| Bounty 309 | 24 | 61 | 20.9 | 29.3 |
| Sexauer Aim | 21 | 60 | 20.7 | -- |
| Funk's W444 | 20 | 59 | 20.4 | 23.0 |
| Profit 75 | 21 | 60 | 19.7 | 25.9 |
| James | 23 | 60 | 19.5 | 26.6 |
| Protor | 20 | 60 | 19.5 | 25.0 |
| WS 25 | 23 | 60 | 19.0 | 24.7 |
| Sexauer 906R | 22 | 59 | 18.2 | -- |
| WS 1809 | 21 | 59 | 17.8 | 20.8 |
| Standard Height | | | | |
| Chris | 28 | 58 | 22.1 | 23.9 |
| Waldron | 27 | 57 | 22.1 | 27.6 |
| Eureka | 26 | 58 | 22.0 | 29.8 |
| Coteau | 25 | 58 | 20.9 | 25.0 |
| Butte | 25 | 61 | 20.1 | 25.7 |
| Fortuna | 27 | 60 | 19.4 | 25.8 |

LSD(05) - 3.7 Bu/A C.V. - 12.3% Mean - 21.2

Note: Plots were seeded on April 24 at 60 pounds per acre, and harvested on August 8. Drill row space was 12 inches. A starter fertilizer was applied with a drill attachment at seeding time.

Table 19. Durum Wheat Variety Trial - Perkins County (Bison), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Semidwarfs | | | | |
| Cando | 22 | 59.0 | 20.2 | 19.7 |
| Calvin | 21 | 61.0 | 20.1 | 19.5 |
| Standard Height | | | | |
| Rugby | 27 | 60.4 | 24.3 | 20.8 |
| Ward | 26 | 60.0 | 23.4 | 18.7 |
| Edmore | 26 | 59.4 | 21.8 | 18.5 |
| Vic | 25 | 60.8 | 20.9 | -- |
| Crosby | 24 | 60.4 | 19.4 | 18.2 |
| Botno | 24 | 60.0 | 18.2 | 17.6 |
| Rolette | 25 | 60.2 | 16.6 | 16.1 |

LSD(05) - 4.1 Bu/A C.V. - 13.6% Mean - 20.5

Note: Plots were seeded on April 24 at 60 pounds per acre, and harvested on August 8. Drill row space was 12 inches. A starter fertilizer was applied with a drill attachment at seeding time.

Table 20. Hard Red Spring Wheat Variety Trial - Ziebach County (Dupree), 1978-79.

| Variety | Height (inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr. ave.) |
|---|---|---|---|---|
| Semidwarfs | | | | |
| Solar | 23 | 57.7 | 36.5 | 33.3 |
| Prodax | 24 | 55.2 | 36.5 | 31.9 |
| Kitt | 24 | 55.5 | 34.8 | 30.5 |
| Bounty 309 | 21 | 57.0 | 34.1 | -- |
| Protor | 22 | 55.8 | 31.7 | 28.9 |
| Olaf | 24 | 55.7 | 31.7 | 29.1 |
| Len | 22 | 57.2 | 30.5 | -- |
| Angus | 23 | 57.2 | 30.2 | 27.1 |
| WS 25 | 24 | 56.0 | 30.2 | 28.6 |
| James (SD2273) | 28 | 54.8 | 29.5 | 27.5 |
| WS 1809 | 22 | 56.0 | 29.0 | 27.6 |
| Profit 75 | 24 | 53.7 | 26.9 | 27.5 |
| Bounty 208 | 20 | 57.8 | 26.6 | 22.6 |
| Era | 24 | 56.8 | 26.6 | 26.9 |
| Funk's W444 | 20 | 54.5 | 25.4 | 21.4 |
| Standard Height | | | | |
| Eureka | 29 | 55.7 | 33.4 | 27.9 |
| Butte | 28 | 56.7 | 32.2 | 31.1 |
| Coteau | 27 | 56.5 | 31.5 | 28.7 |
| Nowesta | 26 | 55.8 | 30.0 | 27.1 |
| Ellar | 28 | 55.8 | 28.5 | 27.9 |
| Waldron | 28 | 55.5 | 27.6 | 26.7 |
| Fortuna | 27 | 54.0 | 25.2 | 22.8 |

C.V. - 14.8% Mean - 30.5

Note: Plots were seeded on April 24 at 60 pounds per acre, and harvested on August 25. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

Table 21. Durum Wheat Variety Trial - Ziebach County (Dupree), 1978-79.

| Variety | Height (inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr. ave.) |
|---|---|---|---|---|
| Semidwarfs | | | | |
| Calvin | 21 | 56.7 | 40.4 | 36.1 |
| Cando | 21 | 54.8 | 38.5 | 33.7 |
| Standard Height | | | | |
| Ward | 27 | 56.7 | 39.9 | 35.1 |
| Crosby | 31 | 55.7 | 37.8 | 30.8 |
| Vic | 28 | 56.5 | 37.7 | -- |
| Botno | 28 | 54.8 | 37.5 | 33.9 |
| Rugby | 29 | 54.7 | 37.5 | 33.9 |
| Edmore | 30 | 55.5 | 36.5 | 31.7 |
| Rolette | 27 | 57.7 | 34.4 | 28.5 |

C.V. - 8.6% Mean - 37.8

Note: Plots were seeded on April 24 at 60 pounds per acre, and harvested on August 25. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100# per acre.

DISCUSSION:

Spring wheat variety trials were seeded at seven locations in 1979. The shortage of soil moisture due to the lack of fall rain and winter snow, coupled with subnormal rain in March through May resulted in thin stands and stunted plants. During June and July rainfall was abundant. This stimulated weed seed germination. As a result the plots and neighboring fields became overgrown with weeds which could not be controlled with herbicides. The green weeds complicated the harvest because of the difficulty in cutting the grain as well as processing the seed samples.

Bennett County

The trials in Bennett county (tables 8 and 9) averaged eight bushels above the mean yield of 1975-77. Cool temperatures during the spring offset the moisture shortage so that plants were able to tiller. The rains in May, June, and July were timely and provided the moisture necessary to develop the kernels and fill heads. Test weights were lower than usual because the grain contained green weed seed at the time it was processed.

Butte County

The irrigated trials in Butte county at Newell (tables 10 and 11) had high yields in 1979. Cool temperatures after seeding provided conditions favorable to tillering. The fertility level was adjusted so that excessive nutrients were not available thus lodging did not occur. The trials received two applications of water during the growing season.

Meade County

Spring wheat trials in Meade county were seeded in mid-April. The soil was damp but moisture was limited. Temperatures during March and April were below normal and growth was slow. Droughty conditions existed until June when above normal rainfall favored weed growth. Overall, the mean grain yield in Bear Butte Valley (tables 12 and 13) werecomparable to those of 1978, slightly above 1977, and much below 1976. At Plainview (tables 14 and 15) the same pattern existed with the yields in 1979 being about 80% of those in the previous two years.

Pennington County

The trials in Pennington county (tables 16 and 17) were initiated at the present site in 1979. For that reason there is no yield record to compare with or average against. Soil moisture content was low because of the winter wheat crop in the previous year. Rainfall was limited during the spring, but during June and July there were heavy showers. The wheat was able to produce good yields despite the earlier problems.

Perkins County

Spring wheat trials in Perkins county in 1979 had better moisture conditions than the other sites. Heavy snow in February provided the wheat seedlings with sufficient moisture for vigorous germination and emergence. However, limited rainfall through June resulted in yields (table 18) below the three year average for hard red wheat. The yield of durum wheat (table 19) was above the yields of 1978 as shown by the 2 year average.

## Ziebach County

Rainfall patterns in Ziebach county during late 1978 and early 1979 were similar to the other sites. Subnormal precipitation during the late summer 1978 and spring 1979 resulted in drought stress during most of the growing season. In July there were above normal showers which resulted in good grain yields and weed problems. Grain yields in 1979 for both types of spring wheat (tables 20 and 21) were several bushels above the two year average.

## Oat Variety Trials

Oat variety trials were conducted on a cooperative basis at seven locations in 1979. Seeding dates ranged from April 10 to April 24. Soil moisture was adequate for germination and emergence in all sites but was limited for further growth. All trials received phosphorus fertilizer with a drill attachment at seeding.

Table 22. Oat Variety Trial - Bennett County (Martin), 1977-79.

| Variety | Seed Color | Test Weight (lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (3 yr av) |
|---|---|---|---|---|
| Early Maturing | | | | |
| Otee | Ivory | 37.3 | 109.8 | 54.4 |
| Lang | Yellow | 32.0 | 88.9 | 49.2 |
| Bates | Dark | 36.2 | 87.1 | 46.3 |
| Multiline E-77 | Yellow | 34.1 | 83.9 | 45.0 |
| Nodaway 70 | White | 34.8 | 81.2 | 42.1 |
| Stout | Ivory | 34.3 | 76.2 | 46.1 |
| Medium Maturing | | | | |
| Noble | Yellow | 35.7 | 101.6 | 54.3 |
| Lancer | White | 35.5 | 96.6 | -- |
| Burnett | Ivory | 36.0 | 94.8 | 47.0 |
| Diana | Ivory | 31.5 | 91.7 | 44.1 |
| Spear | White | 33.2 | 87.1 | 49.6 |
| Garland | Yellow | 36.8 | 84.4 | -- |
| Chief | Yellow | 33.7 | 83.9 | 43.9 |
| Multiline M-73 | Yellow | 34.3 | 77.1 | 42.9 |
| Late Maturing | | | | |
| Moore | White | 35.8 | 108.0 | -- |
| Astro | White | 35.2 | 107.1 | 55.5 |
| Lyon | White | 34.3 | 96.2 | 49.5 |
| Marathon | White | 34.8 | 91.2 | -- |
| Benson | White | 36.2 | 90.8 | -- |
| Dal | Ivory | 34.1 | 85.8 | 43.0 |
| Otana | White | 34.0 | 82.6 | -- |
| Wright | Ivory | 36.7 | 79.9 | 49.3 |
| Froker | Yellow | 35.3 | 72.1 | 41.2 |

LSD(05) - 21.8 Bu/A C.V. - 14.8% Mean - 89.5

Note: Plots were seeded on April 19 at 64 pounds per acre, and harvested on August 14. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was appplied with the seed at the rate of 100 pounds per acre.

DISCUSSION:

Bennett County

Oat yields in 1979 (table 22) were excellent. Snow in late winter provided soil moisture during the cool spring. Consequently, the plants were able to tiller and produce high grain yields of good quality. The combination of cool weather and above normal rainfall in June and July favored the medium and late maturing varieties.

Table 23.Oat Variety Trial - Butte County (Newell), 1978-79.

| Variety | Height (Inches) | Percent Lodging | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|---|
| Early Maturing | | | | | |
| Bates | 36 | 10 | 39.7 | 129.8 | 120.3 |
| Lang | 36 | 10 | 38.0 | 126.1 | 120.0 |
| Nodaway 70 | 39 | 10 | 38.0 | 113.4 | 110.5 |
| Stout | 35 | 10 | 36.3 | 111.6 | 117.3 |
| Otee | 36 | 10 | 40.7 | 87.1 | 98.7 |
| Multiline E-77 | 38 | 10 | 37.5 | 77.6 | 96.5 |
| Medium Maturing | | | | | |
| Lancer | 40 | 10 | 37.2 | 118.9 | 115.1 |
| Noble | 37 | 10 | 36.2 | 116.6 | 116.9 |
| Burnett | 42 | 10 | 40.3 | 101.6 | 104.1 |
| Garland | 39 | 10 | 37.7 | 95.7 | -- |
| Spear | 39 | 10 | 36.3 | 93.5 | 95.8 |
| Diana | 37 | 10 | 38.5 | 90.8 | 95.1 |
| Chief | 43 | 10 | 35.0 | 85.3 | 91.5 |
| Multiline M-73 | 40 | 10 | 36.3 | 82.1 | -- |
| Late Maturing | | | | | |
| Astro | 38 | 10 | 34.3 | 144.3 | 140.2 |
| Otana | 47 | 10 | 38.5 | 137.5 | -- |
| Wright | 42 | 10 | 38.5 | 124.3 | 117.1 |
| Marathon | 52 | 10 | 37.0 | 115.7 | 107.6 |
| Froker | 44 | 35 | 37.2 | 110.7 | 112.1 |
| Dal | 44 | 50 | 37.0 | 107.5 | 109.1 |
| Benson | 44 | 25 | 37.3 | 106.6 | 104.6 |
| Moore | 47 | 50 | 37.7 | 105.7 | 113.5 |
| Lyon | 47 | 85 | 36.3 | 105.3 | 114.4 |

LSD(05) - 32.6 Bu/A C.V. - 18.3% Mean - 108.2

Note: Plots were seeded on April 10 and harvested on August 23. Drill row spacing was 8 inches with a seeding rate of 80 pounds per acre. They were flood irrigated twice during the season. Phosphorus pentoxide was applied with the seed at 66 pounds per acre, while nitrogen was surface broadcast at the rate of 80 pounds per acre. Previous crop was small grain.

DISCUSSION:

Butte County

The irrigated oat trial in Butte county (table 23) produced high yields of high quality grain. The weights per bushel were nearly all above thirty five pounds. Kernels were plump and bright. The height of the plants were excessive but normal under irrigation. Lodging was not serious in 1979 because the nitrogen fertilizer level was adjusted so that an excessive amount was not added.

Table 24. Oat Variety Trial - Meade County (Bear Butte Valley), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | Grain Yield-Bu/Acre (2 yr av) |
|---|---|---|---|---|
| Early Maturing | | | | |
| Bates | 25 | 32.3 | 55.8 | 72.6 |
| Nodaway 70 | 31 | 31.7 | 54.4 | 65.3 |
| Otee | 30 | 33.8 | 53.5 | 66.0 |
| Lang | 27 | 32.0 | 53.1 | 70.8 |
| Multiline E-77 | 27 | 33.0 | 44.9 | 63.3 |
| Stout | 26 | 31.8 | 39.5 | 54.5 |
| Medium Maturing | | | | |
| Burnett | 33 | 33.3 | 63.1 | 72.9 |
| Noble | 28 | 31.5 | 57.2 | 69.0 |
| Diana | 30 | 31.5 | 56.3 | 63.3 |
| Spear | 29 | 33.7 | 53.5 | 66.9 |
| Garland | 30 | 33.2 | 50.8 | 62.2 |
| Chief | 31 | 33.5 | 50.4 | 65.6 |
| Lancer | 28 | 33.5 | 49.0 | 68.3 |
| Multiline M-73 | 29 | 32.5 | 47.6 | 59.9 |
| Late Maturing | | | | |
| Otana | 32 | 34.7 | 69.0 | 74.2 |
| Moore | 32 | 33.2 | 65.3 | 75.1 |
| Lyon | 34 | 32.8 | 63.5 | 73.1 |
| Marathon | 36 | 33.3 | 63.1 | 69.2 |
| Froker | 31 | 33.3 | 58.5 | 68.5 |
| Dal | 31 | 32.5 | 58.1 | 64.2 |
| Wright | 32 | 32.3 | 56.3 | 64.7 |
| Astro | 25 | 29.7 | 53.5 | 64.7 |
| Benson | 31 | 33.3 | 53.1 | 64.9 |
| | C.V. - 18.8% | | Mean - 55.2 | |

Note: Plots were seeded on April 16 at 60 pounds per acre, and harvested on August 3. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

DISCUSSION:

Meade County - Bear Butte Valley

The oat variety trial in Bear Butte Valley (table 24) in Meade county was seeded into soil with limited moisture. Rainfall from that date was below normal although sufficient to support plant growth. With cool temperatures during the spring, tillering occurred and when rain came in June the plants produced numerous short heads. Yields were well below those of 1978. Grain quality was down with test weights being only average.

Table 25. Oat Variety Trial - Meade County (Plainview), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | Grain Yield-Bu/Acre (2 yr av) |
|---|---|---|---|---|
| Early Maturing | | | | |
| Stout | 26 | 33.7 | 53.5 | 50.5 |
| Lang | 27 | 34.3 | 49.5 | 51.1 |
| Otee | 30 | 36.5 | 48.1 | 43.1 |
| Nodaway 70 | 30 | 37.7 | 47.6 | 43.9 |
| Bates | 23 | 34.8 | 47.6 | 48.7 |
| Multiline E-77 | 31 | 35.5 | 44.5 | 40.7 |
| Medium Maturing | | | | |
| Noble | 29 | 37.0 | 61.3 | 54.0 |
| Spear | 30 | 34.3 | 57.2 | 47.7 |
| Burnett | 33 | 36.8 | 55.8 | 45.6 |
| Lancer | 29 | 35.0 | 53.1 | 48.5 |
| Multiline M-73 | 30 | 35.7 | 49.9 | 39.4 |
| Garland | 30 | 34.0 | 49.5 | -- |
| Diana | 28 | 33.0 | 49.5 | 40.8 |
| Chief | 31 | 35.5 | 48.6 | 40.7 |
| Late Maturing | | | | |
| Marathon | 37 | 32.7 | 76.7 | 61.9 |
| Wright | 33 | 37.5 | 75.8 | 59.4 |
| Dal | 32 | 35.2 | 73.5 | 58.0 |
| Lyon | 36 | 34.2 | 70.8 | 57.3 |
| Otana | 35 | 35.8 | 66.7 | -- |
| Moore | 34 | 35.8 | 64.4 | 50.6 |
| Benson | 33 | 35.8 | 58.1 | 51.2 |
| Froker | 32 | 37.7 | 56.3 | 48.7 |
| Astro | 26 | 30.7 | 53.5 | 52.0 |

LSD(05) - 15.8 Bu/A C.V. - 16.9% Mean - 57.0

Note: Plots were seeded on April 18 at 60 pounds per acre, and harvested on August 2. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

DISCUSSION:

Meade County - Plainview

The trial at Plainview in eastern Meade county (table 25) was under moisture stress during most of the growing season. Adequate rainfall was not received until late May and June. Plants were stunted and had few tillers. Weights per bushel were good and grain yields were comparable to those of 1978.

Table 26. Oat Variety Trial - Pennington County (Quinn), 1979.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|---|
| Early Maturing | | | |
| Bates | 25 | 37.3 | 86.2 |
| Lang | 24 | 35.0 | 77.6 |
| Otee | 26 | 36.8 | 74.4 |
| Nodaway 70 | 28 | 39.0 | 72.1 |
| Stout | 23 | 38.0 | 62.2 |
| Multiline E-77 | 24 | 37.8 | 54.9 |
| Medium Maturing | | | |
| Noble | 26 | 37.8 | 86.2 |
| Spear | 28 | 35.8 | 86.2 |
| Garland | 26 | 36.7 | 85.3 |
| Lancer | 27 | 36.2 | 85.3 |
| Burnett | 32 | 38.5 | 84.8 |
| Chief | 25 | 36.3 | 79.0 |
| Diana | 25 | 37.0 | 73.5 |
| Multiline M-73 | 25 | 36.5 | 63.5 |
| Late Maturing | | | |
| Lyon | 33 | 37.3 | 104.8 |
| Otana | 33 | 37.5 | 103.9 |
| Moore | 30 | 38.2 | 102.5 |
| Wright | 31 | 38.5 | 91.6 |
| Marathon | 33 | 36.8 | 89.4 |
| Dal | 30 | 37.2 | 86.7 |
| Astro | 23 | 36.2 | 85.8 |
| Benson | 28 | 36.3 | 85.3 |
| Froker | 30 | 38.8 | 82.6 |

LSD(05) - 3.9 Bu/A C.V. - 2.9% Mean - 82.6

Note: Plots were seeded on April 17 at 60 pounds per acre, and harvested on August 15. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

DISCUSSION:

Pennington County

This trial (table 26) was seeded in land which had been in winter wheat the previous year, but had been tilled immediately after harvest. Although moisture was limiting during the early part of the season, there was also cool temperatures. The combination resulted in delaying maturity so that the rain in late June and July could be utilized. Plants were short but test weights were good. Grain yields were higher for the later maturing than for the early maturing varieties.

Table 27.Oat Variety Trial - Perkins County (Bison), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Early Maturing | | | | |
| Lang | 24 | 37.1 | 32.8 | 31.2 |
| Bates | 22 | 36.4 | 32.8 | 32.9 |
| Stout | 22 | 38.4 | 27.7 | 26.8 |
| Otee | 24 | 37.8 | 25.2 | 26.6 |
| Nodaway 70 | 23 | 38.9 | 24.3 | 22.0 |
| Medium Maturing | | | | |
| Lancer | 23 | 37.3 | 36.2 | 30.8 |
| Holden | 24 | 38.1 | 35.6 | -- |
| Burnett | 23 | 39.5 | 34.6 | 29.6 |
| Chief | 25 | 36.0 | 31.9 | 27.8 |
| Spear | 23 | 36.3 | 29.8 | 30.0 |
| Noble | 22 | 38.4 | 23.7 | 25.2 |
| Late Maturing | | | | |
| Otana | 28 | 40.6 | 57.7 | -- |
| Moore | 27 | 39.5 | 51.7 | 42.4 |
| Lyon | 29 | 37.6 | 49.8 | 36.6 |
| Marathon | 30 | 38.3 | 44.4 | 37.7 |
| Benson | 25 | 37.5 | 39.5 | 34.8 |
| Froker | 26 | 39.1 | 39.2 | 32.4 |
| Wright | 26 | 39.9 | 35.2 | 33.1 |
| Dal | 25 | 37.6 | 34.3 | 29.6 |

LSD(05) - 11.2 Bu/A C.V. - 21.8% Mean - 36.1

Note: Plots were seeded on April 24 at 64 pounds per acre, and harvested on August 8. Drill row space was 12 inches. A starter fertilizer was applied with a drill attachment at seeding time.

DISCUSSION:

Perkins County

The Perkins county trial (table 27) was seeded in late April. Although moisture was below normal in early spring, more rain was received in late-April and early-May than at other sites. Rain which came in July helped to produce better quality grain. Grain yields were higher for the later-maturing than for the early-maturing varieties. All varieties were short in height.

Table 28. Oat Variety Trial - Ziebach County (Dupree), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/Acre 1979 | (2 yr av) |
|---|---|---|---|---|
| Early Maturing | | | | |
| Lang | 25 | 34.0 | 71.7 | 50.6 |
| Stout | 24 | 33.5 | 63.5 | 53.6 |
| Otee | 27 | 34.3 | 59.0 | 45.9 |
| Bates | 23 | 32.7 | 55.4 | 48.8 |
| Multiline E-77 | 26 | 34.3 | 52.5 | 34.9 |
| Nodaway 70 | 26 | 35.3 | 42.2 | 35.6 |
| Medium Maturing | | | | |
| Lancer | 27 | 34.0 | 66.2 | 56.5 |
| Spear | 27 | 34.5 | 58.1 | 43.1 |
| Noble | 25 | 34.0 | 54.4 | 44.9 |
| Garland | 27 | 34.3 | 53.1 | 49.9 |
| Burnett | 28 | 32.5 | 51.7 | 43.1 |
| Chief | 28 | 35.0 | 43.1 | 38.1 |
| Diana | 28 | 33.2 | 39.0 | 34.0 |
| Multiline M-73 | 27 | 32.0 | 36.3 | 32.5 |
| Late Maturing | | | | |
| Lyon | 35 | 34.8 | 81.2 | 66.9 |
| Marathon | 34 | 32.8 | 77.1 | 68.5 |
| Otana | 30 | 38.5 | 74.9 | 78.8 |
| Moore | 30 | 34.3 | 74.9 | 69.5 |
| Dal | 27 | 36.0 | 69.9 | 56.1 |
| Astro | 23 | 32.5 | 69.9 | 58.8 |
| Froker | 27 | 34.3 | 66.2 | 54.0 |
| Wright | 31 | 3610 | 54.0 | 51.3 |
| Benson | 29 | 34.2 | 52.6 | 55.4 |

LSD(05) - 11.5 Bu/A C.V. - 11.7% Mean - 59.4

Note: Plots were seeded on April 24 at 60 pounds per acre, and harvested on August 25. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

DISCUSSION:

Ziebach County

The Ziebach county plots (table 28) were seeded on fallow in late April. As with the other trials soil moisture was limiting. Heights varied between the varieties but most were short. The weather again favored later maturing varieties which had high test weights and grain yields. Some of the early maturing varieties produced higher yields, but due to rains and wet fields could not be harvested and the grain shattered.

Spring Barley

Spring barley varieties were compared at seven locations in 1979. All plots were seeded in April. Two sites were recrop area, one of which was winter wheat, and the other, and irrigated study, was in spring grains. Rainfall was limited during the early part of the season, but because of cool temperatures maturity was delayed. For that reason rain in June and July increased yields and improved grain quality.

Table 29.Spring Barley Variety Trial - Bennett County (Martin), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Hector | 27 | 45.5 | 77.1 | -- |
| Prilar | 28 | 42.7 | 67.8 | 47.4 |
| Park | 28 | 42.2 | 67.2 | 47.1 |
| Steptoe | 24 | 38.3 | 62.9 | -- |
| Larker | 27 | 43.5 | 62.0 | 47.1 |
| 71672 | 26 | 46.5 | 60.8 | -- |
| Manker | 27 | 44.2 | 60.5 | 40.9 |
| Morex | 28 | 42.5 | 60.2 | 40.0 |
| Primus II | 28 | 42.3 | 58.1 | 36.8 |
| Glenn | 27 | 41.3 | 56.6 | 41.3 |
| Unitan | 23 | 41.0 | 52.0 | -- |
| Beacon | 29 | 40.8 | 51.4 | 37.6 |

LSD(05) - 10.9 Bu/A C.V. - 10.5% Mean - 61.4

Note: Plots were seeded on April 19 at 72 pounds per acre, and harvested on August 1. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

Table 30.Spring Barley Variety Trial - Butte County (Newell), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Steptoe | 36 | 42.5 | 122.2 | -- |
| Glenn | 39 | 46.5 | 110.4 | 106.0 |
| Hector | 38 | 47.7 | 98.6 | -- |
| Morex | 39 | 46.7 | 96.5 | 82.6 |
| Park | 38 | 46.8 | 92.6 | 96.2 |
| Larker | 38 | 46.2 | 92.6 | 88.7 |
| Unitan | 37 | 42.2 | 91.4 | -- |
| Beacon | 39 | 42.3 | 90.4 | 96.0 |
| Prilar | 40 | 46.7 | 87.7 | 78.7 |
| Manker | 36 | 46.5 | 87.1 | 98.3 |
| 71672 | 37 | 45.5 | 84.1 | -- |
| Primus II | 38 | 45.0 | 81.1 | 88.1 |

LSD(05) - 8.7 Bu/A C.V.-5.4% Mean - 94.6

Note: Plots were seeded on April 10 and harvested on August 23. Drill row spacing was 8 inches with a seeding rate of 72 pounds per acre. They were flood irrigated twice during the season. Phosphorus pentoxide was applied with the seed at 66 pounds per acre, while nitrogen was surface broadcast at the rate of 80 pounds per acre. Previous crop was small grain.

Table 31. Spring Barley Variety Trial - Meade County (Bear Butte Valley), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Steptoe | 22 | 42.0 | 65.3 | -- |
| Hector | 28 | 45.5 | 53.1 | -- |
| Glenn | 25 | 43.0 | 49.0 | 53.3 |
| 71672 | 28 | 47.0 | 48.6 | -- |
| Morex | 29 | 43.7 | 47.2 | 53.0 |
| Unitan | 27 | 40.7 | 45.4 | -- |
| Park | 29 | 41.7 | 44.5 | 51.0 |
| Prilar | 28 | 45.0 | 41.7 | 48.6 |
| Larker | 28 | 42.7 | 39.9 | 49.6 |
| Manker | 26 | 45.2 | 39.0 | 43.3 |
| Beacon | 30 | 40.2 | 37.7 | 46.1 |
| Primus II | 26 | 41.0 | 33.1 | 48.5 |

LSD(05) - 8.9 Bu/A C.V. - 8.9% Mean - 45.5

Note: Plots were seeded on April 16 at 72 pounds per acre, and harvested on August 3. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

Table 32. Spring Barley Variety Trial - Meade County (Plainview), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Hector | 26 | 50.5 | 37.9 | -- |
| Steptoe | 19 | 47.3 | 35.4 | -- |
| 71672 | 22 | 50.3 | 34.2 | -- |
| Morex | 24 | 48.7 | 31.5 | 31.7 |
| Unitan | 21 | 46.8 | 30.6 | -- |
| Larker | 27 | 47.7 | 29.6 | 31.4 |
| Prilar | 27 | 48.0 | 28.4 | 31.2 |
| Park | 24 | 45.2 | 28.4 | 31.8 |
| Beacon | 21 | 46.5 | 26.6 | 28.5 |
| Glenn | 24 | 47.2 | 26.3 | 31.6 |
| Manker | 23 | 48.5 | 23.9 | 27.4 |
| Primus II | 22 | 44.7 | 17.8 | 23.2 |

LSD(05) - 7.9 Bu/A C.V. - 16.1% Mean - 29.2

Note: Plots were seeded on April 18 at 72 pounds per acre, and harvested on August 2. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

Table 33. Spring Barley Variety Trial - Pennington County Quinn), 1979.

| Variety | Height (Inches) | Test Weight (lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|---|
| Hector | 27 | 50.0 | 104.4 |
| Glenn | 25 | 45.8 | 92.2 |
| Park | 27 | 46.0 | 91.0 |
| Steptoe | 23 | 42.3 | 89.2 |
| Morex | 28 | 46.5 | 86.8 |
| Prilar | 29 | 46.0 | 85.9 |
| Larker | 26 | 46.5 | 83.2 |
| Primus II | 29 | 47.0 | 78.6 |
| Unitan | 23 | 42.5 | 77.7 |
| Manker | 25 | 49.0 | 77.4 |
| Beacon | 26 | 45.2 | 76.2 |
| 71672 | 26 | 51.2 | 71.4 |

LSD(05) - 9.6 Bu/A C.V. - 6.7% Mean - 84.6

Note: Plots were seeded on April 17 at 72 pounds per acre and harvested on August 15. Drill row space was 8 inches. Phosphorus pentoxide (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

Table 34. Spring Barley Variety Trial - Perkins County (Bison), 1977-79.

| Variety | Height (Inches) | Test Weight (lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (3 yr av) |
|---|---|---|---|---|
| Firlbeck's III | 21 | 49 | 48.9 | 47.6 |
| Glenn | 19 | 45 | 40.8 | -- |
| Larker | 20 | 48 | 40.2 | 34.8 |
| Liberty | 20 | 48 | 40.2 | 34.1 |
| Morex | 21 | 47 | 39.5 | -- |
| Bonanza | 24 | 46 | 37.5 | 38.5 |
| Beacon | 21 | 48 | 37.3 | 35.2 |
| Park | 21 | 48 | 37.2 | -- |
| Prilar | 21 | 47 | 36.2 | 36.4 |
| Menuet | 18 | 49 | 34.3 | -- |
| Primus II | 19 | 46 | 26.4 | 34.4 |
| VDH 118-74 | 18 | 50 | 43.6 | -- |
| VDH 257-73G | 18 | 49 | 39.7 | -- |
| SD 77-137 | 21 | 47 | 39.5 | -- |
| VDH 274-75 | 19 | 49 | 35.2 | -- |
| SD 71-672 | 20 | 50 | 34.7 | 36.5 |
| SD 77-104 | 21 | 49 | 31.4 | -- |
| SD 77-163 | 20 | 47 | 30.5 | -- |
| SD 77-119 | 21 | 48 | 27.8 | -- |

LSD(05) - 5.8 Bu/A C.V. - 11.2% Mean - 36.9

Note: Plots were seeded on April 24 at 72 pounds per acre, and harvested on August 8. Drill row space was 12 inches. A starter fertilizer was applied with a drill attachment at seeding time.

Table 35. Spring Barley Variety Trial - Ziebach County (Dupree), 1978-79.

| Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Hector | 22 | 49.6 | 63.8 | -- |
| Morex | 23 | 45.7 | 60.5 | 57.0 |
| Prilar | 23 | 45.2 | 60.2 | 55.1 |
| Glenn | 23 | 43.2 | 60.2 | 56.7 |
| Larker | 23 | 45.8 | 59.9 | 56.1 |
| Park | 24 | 45.7 | 59.6 | 53.7 |
| Primus II | 22 | 43.0 | 54.4 | 51.7 |
| Unitan | 22 | 41.7 | 53.8 | -- |
| Manker | 23 | 45.3 | 53.5 | 49.9 |
| Steptoe | 20 | 41.7 | 52.6 | 52.5 |
| Beacon | 22 | 42.8 | 50.5 | 49.6 |
| 71672 | 22 | 46.5 | 45.7 | -- |

LSD (05) - 9.7 Bu/Acre C.V. - 10.0% Mean - 56.2

Note: Plots were seeded on April 24 at 72 pounds per acre, and harvested on August 25. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

DISCUSSION:

Barley Yields By Location

Spring barley trials in Bennett county (table 29) produced good yields of fair quality grain. Grain yields averaged 61.4 bushels per acre with the highest yield being 77.1 Bu/A. Test weights were low because the grain was still immature at harvest. It was necessary to harvest the grain prior to normal maturity because of weeds which were growing in the plots.

The irrigated trial at Newell in Butte county (table 30) had only fair test weights but excellent yields. The average for the trial was 94.6 bushels per acre. Plant heights averaged 38 inches and stood very well. Lodging was not of consequence in this trial.

The trials in Meade county (tables 31 and 32) suffered from moisture stress during most of the growing season but were able to recover due to rains in late June. Test weights at Bear Butte Valley were low but those at Plainview were above normal. Grain yields were good in the valley which had cooler temperatures but less moisture while those at Plainview had lower yields but were of better quality.

In Pennington county (table 33) both yields and test weights were excellent. Moisture was in short supply until late in June but because of cool temperatures maturity was delayed and the plants were able to take advantage of it.

In Perkins county (table 34) moisture supply was better throughtout the season and although moisture stress was present, as indicated by the short plants, the grain yields and test weights were normal.

In Ziebach county (table 35) conditions were similar to Perkins county, and similarly, plants were short. Test weights averaged normal with yields above those obtained in 1978.

## Flax

Only one flax trial was seeded in 1979. It was located in Ziebach county. Soil moisture at seeding time was adequate to germinate seed. Precipitation was limiting during May but more favorable in June and July. Grain yields were low because of lack of boll development which resulted from moisture stress. Seed quality was also poor with test weights several pounds below the standard weight. Yield data are shown in table 36.

Table 36. Flax Variety Trial - Ziebach County (Dupree), 1979.

| Variety | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|
| Windom | 54.7 | 14.1 |
| Dufferin | 55.5 | 11.5 |
| Culbert 79 | 55.2 | 8.7 |
| Culbert | 52.0 | 8.7 |
| Linott | 55.2 | 7.9 |
| | | Mean - 10.2 |

Note: Plots were seeded on April 24 at 56 pounds per acre and harvested on August 25. Drill row space was 8 inches. Phosphorus fertilizer (0-44-0) was applied with the seed at the rate of 100 pounds per acre.

## SORGHUM VARIETY TESTING

### Grain Sorghum

Objective: To compare the performance of grain sorghum hybrids and varieties for yield and other agronomic characteristics.

Grain sorghum variety trials were seeded in Meade (table 37) and Pennington (table 38) counties in 1979. Included were a number of commercial varieties which varied in maturity from short season, or very early, to medium.

The stands varied from excellent to very poor, and had only a small amount of lodging. Moisture shortage was evident in both trials by the number of varieties that failed to produce normal heads, or produced heads but did not pollinate and produce seed.

Grain quality in Meade county was poor with weights per bushel ranging from 53.3 to 47.5 pounds. The grain quality in Pennington county was similar with the weights per bushel ranging from 55.5 to 45.5 pounds.

Grain yields in Meade county were nearly double those of Pennington county. The range in Meade county was from 43.8 to 0.6 bushels per acre, while in Pennington county the range was from 30.5 bushels to 2.7 bushels per acre.

Table 37. Grain Sorghum Variety Trial - Meade County (Bear Butte), 1978-79.

| Brand & Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield-Bu/A 1979 | Grain Yield-Bu/A (2 yr av) |
|---|---|---|---|---|
| Western WS 201 | 48 | 50.0 | 43.8 | 60.0 |
| RS 506 | 40 | 50.4 | 43.7 | 65.8 |
| DeKalb A28+ | 41 | 51.1 | 42.7 | 52.0 |
| DeKalb Ex19 | 42 | 50.6 | 40.9 | -- |
| GSA E110 | 41 | 52.3 | 40.5 | 64.9 |
| Funk's G251 | 38 | 53.3 | 39.9 | -- |
| NK 121A | 37 | 50.4 | 39.1 | 51.6 |
| Pioneer 894 | 43 | 52.4 | 37.8 | 63.9 |
| Western WS103 | 40 | 51.1 | 34.9 | 57.3 |
| Funk's 1771 | 40 | 54.5 | 34.3 | -- |
| DeKalb A25a+ | 39 | 49.8 | 34.1 | -- |
| Frontier 385A | 39 | 51.5 | 33.7 | 51.4 |
| Western WS203 | 40 | 51.6 | 33.5 | -- |
| Disco 182 | 42 | 50.8 | 33.4 | -- |
| Disco 184 | 44 | 51.3 | 32.6 | -- |
| Pride P500A | 40 | 51.6 | 32.1 | 54.6 |
| Sokota 110 | 41 | 53.3 | 32.0 | -- |
| ACCO R920 | 38 | 51.9 | 31.7 | 47.9 |
| Frontier 389 | 42 | 51.3 | 31.4 | 48.4 |
| Asgorw Dorado E | 40 | 51.4 | 30.7 | -- |
| NK MM52 | 38 | 49.1 | 30.1 | 52.2 |
| Frontier 399 | 40 | 51.9 | 29.5 | -- |
| Cenex 322 | 41 | 50.8 | 28.2 | 41.6 |
| Funk's G393 | 42 | 50.0 | 28.2 | -- |
| Disco 186R | 40 | 49.3 | 26.4 | -- |
| SD 104 | 38 | 51.4 | 25.4 | 46.2 |
| NK 180 | 41 | 51.3 | 23.1 | -- |
| SD 106 | 39 | 48.8 | 22.8 | 40.2 |
| Cenex 333 | 39 | 51.3 | 21.7 | 34.6 |
| Cenex 300T | 39 | 50.2 | 19.9 | 21.0 |
| GSA 1060 | 41 | 50.3 | 19.3 | 40.0 |
| Sokota 100 | 43 | 52.3 | 19.0 | -- |
| GSA 1210A | 40 | 48.5 | 13.1 | -- |
| Asgor Corral | 44 | 51.0 | 10.1 | -- |
| GSA 1100 | 42 | 47.5 | 10.0 | -- |
| GSA 1236 | 38 | -- | 1.7 | -- |
| GSA 1212 | 38 | -- | 0.6 | -- |

LSD(05) - 11.5 Bu/A  Mean - 28.5

Note: Plots were seeded on June 5 and harvested on October 2. Plots were a single row 3 ft x 30 ft with a harvested size of 3 ft x 10 ft. Ramrod 20G was applied at seeding time at the rate of 2 pounds per acre. The soil condition was dry and cloddy.

Table 38. Grain Sorghum Variety Trial - Pennington County (Quinn), 1979.

| Brand & Variety | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield Bu/Acre |
|---|---|---|---|
| DeKalb Ex19 | 34 | 51.0 | 30.5 |
| ACCO R920 | 33 | 53.8 | 30.3 |
| Pioneer 894 | 32 | 52.5 | 29.0 |
| Funk's G251 | 34 | 55.3 | 25.1 |
| Sokota 110 | 34 | 53.3 | 25.0 |
| DeKalb A25a+ | 33 | 54.0 | 24.1 |
| Western WS201 | 35 | 51.5 | 22.3 |
| Western WS203 | 33 | 51.5 | 21.6 |
| Disco 184 | 35 | 51.3 | 21.4 |
| GSA 1210A | 34 | 51.3 | 20.9 |
| Asgrow Dorado E | 34 | 47.8 | 20.6 |
| Western WS103 | 32 | 50.2 | 20.2 |
| NK 180 | 31 | 53.2 | 19.9 |
| Disco 186R | 31 | 49.2 | 19.9 |
| Funk's G393 | 37 | 52.0 | 18.8 |
| Pride P500A | 33 | 52.3 | 18.7 |
| DeKalb A28+ | 34 | 55.5 | 17.1 |
| RS506 | 33 | 52.8 | 16.9 |
| Cenex 322 | 33 | 53.3 | 16.6 |
| GSA 1060 | 33 | 49.5 | 15.7 |
| Frontier 385A | 32 | 50.0 | 15.2 |
| SD 106 | 36 | 46.0 | 14.1 |
| Frontier 389 | 31 | 52.5 | 14.0 |
| Frontier 399 | 29 | 54.5 | 13.2 |
| Funk's 1771 | 36 | 51.0 | 13.2 |
| Cenex 300T | 32 | 50.3 | 12.0 |
| Asgrow Corral | 34 | 54.0 | 11.6 |
| Disco 182 | 34 | 52.5 | 11.6 |
| Cenex 333 | 32 | 52.0 | 11.3 |
| NK 121A | 33 | 45.5 | 11.3 |
| GSA E110 | 34 | 48.5 | 8.4 |
| NK MM52 | 35 | 50.0 | 7.5 |
| SD 104 | 35 | 49.0 | 7.4 |
| GSA 1100 | 33 | 51.0 | 6.8 |
| Sokota 100 | 36 | -- | 5.9 |
| GSA 1236 | 33 | -- | 2.9 |
| GSA 1212 | 31 | -- | 2.7 |

Mean - 16.3

Note: Plots were seeded on June 6 and harvested on October 9. They consisted of a single row 3' x 30'but only 10' of row was harvested. Ramrod 20G was applied at seeding at the rate of 2 pounds per acre. The seedbed was in an excellent condition.

## Sorghum Forage Trials

Objective: To compare the various forage sorghums, sorghum-sudangrass crosses, and sudangrasses as to their adaptability, their forage production, and their forage quality.

Replicated single row plots of forage sorghum, sorghum-sudangrass, and sudangrasses were seeded in Meade and Pennington counties. The trial in Meade county was seeded into soil which had been fallowed while the trial in Pennington county had been in winter wheat the previous cropping season. The seedbeds were excellent, but soil moisture was limited. Forage yields are reported in tables 37 through 44.

Table 39. Forage Sorghum Variety Yield Trial - Meade County(Bear Butte), 1978-79.

| Brand & Variety | Height (Inches) | Percent Dry Matter | Forage Yield-Tons/A* 1979 | (2 yr av) |
|---|---|---|---|---|
| NK 367 | 61 | 83.3 | 12.9 | 8.7 |
| Sokota 320F | 57 | 86.4 | 12.7 | 8.6 |
| Disco Kane | 66 | 79.3 | 12.7 | --- |
| Sokota 330F | 65 | 86.1 | 11.8 | --- |
| Pioneer 931 | 72 | 72.4 | 11.0 | 7.6 |
| Western WS60 | 58 | 73.1 | 9.6 | 6.2 |
| GSA 30F | 49 | 77.3 | 9.4 | 6.8 |
| DeKalb FS4 | 65 | 64.5 | 9.3 | 6.4 |
| Disco 213R | 60 | 65.3 | 8.8 | --- |
| DeKalb FS25a+ | 51 | 80.3 | 8.7 | 6.4 |
| Waconia | 57 | 79.3 | 8.3 | 5.6 |
| Frontier S214 | 50 | 60.6 | 8.1 | 6.0 |
| Warner W561 | 37 | 85.9 | 7.0 | 5.2 |
| Warner W55 | 38 | 81.2 | 6.8 | 5.2 |
| Rancher | 66 | 80.6 | 6.7 | 5.0 |
| GSA 1586F | 54 | 80.5 | 6.4 | --- |
| Warner W600 | 39 | 89.2 | 5.9 | 5.4 |
| NK Silomilo II | 49 | 47.5 | 5.4 | --- |
| Funk's G766W | 35 | 45.9 | 3.8 | --- |

LSD(05) - 2.6 Tons/Acre C.V. - 15.8% Mean - 8.7

*Reported as 12% Dry Matter

Note: Plots were seeded on June 5 and harvested on October 2. Plots were a single row 3 ft x 30 ft with a harvested size of 3 ft x 10 ft. Ramrod 20G was applied at seeding time at the rate of 2 pounds per acre. The soil condition was dry and cloddy.

Table 40. Forage Sorghum Variety Yield Trial - Pennington County (Quinn), 1979.

| Brand & Variety | Height (Inches) | Percent Dry Matter | Forage Yield-Tons/A @ 12% moisture |
|---|---|---|---|
| Disco 213 R | 44 | 65.1 | 8.4 |
| Frontier S214 | 53 | 74.9 | 7.6 |
| DeKalb FS25a+ | 48 | 65.2 | 6.8 |
| NK 367 | 58 | 58.3 | 6.6 |
| Disco Kane | 55 | 67.4 | 6.4 |
| Funk's G766W | 36 | 62.9 | 5.5 |
| Western WS60 | 53 | 62.5 | 5.3 |
| DeKalb FS 4 | 67 | 69.2 | 4.9 |
| GSA 30F | 43 | 65.6 | 4.6 |
| Pioneer 931 | 68 | 56.5 | 4.3 |
| Sokota 320F | 53 | 52.3 | 4.0 |
| Sokota 330F | 58 | 68.1 | 4.0 |
| GSA 1586F | 47 | 67.2 | 3.9 |
| Rancher | 60 | 60.5 | 3.9 |
| Waconia | 48 | 53.5 | 3.8 |
| Warner W561 | 33 | 71.9 | 3.5 |
| Warner W600 | 42 | 63.3 | 3.0 |
| Warner W55 | 34 | 65.5 | 2.8 |
| NK Silomilo II | 49 | 37.8 | 1.8 |

LSD(05) - 3.3 Tons/A  Mean - 4.8

Note: Plots were seeded on June 6, 1979 and harvested on October 9, 1979. Row space was 36 inches. Ramrod 20G at 2 lbs per acre was applied at time of seeding. Seedbed preparation was excellent and no fertilizer was used.

DISCUSSION:

Meade County

Forage sorghum trials in Meade county produced a much higher forage yield (table 39) than in 1978. Although moisture was limited during early spring, the rain in June and July came at the right time for the sorghum. The plants in some varieties failed to head because of moisture shortage in August, but had already completed the vegetative part of their growth prior to the drought.

Pennington County

The Pennington county trial suffered from lack of moisture at seeding time and had thin stands. Moisture which came in June and July permitted the plants to continue growth but many of the forages did not produce heads. The plants were much shorter than normal and yields were less than anticipated. The yields are reported in Table 40.

Table 41. Sorghum-Sudangrass Variety Yield Trial - Meade County(Bear Butte), 1979.

| Brand & Variety | Height (Inches) | Percent Dry Matter | Forage Yield-Tons/A @ 12% moisture |
|---|---|---|---|
| Funk's G83F | 63 | 85.7 | 9.4 |
| Disco 235 | 63 | 81.2 | 7.8 |
| Sokota 310 | 67 | 83.1 | 7.4 |
| GSA 11 | 69 | 65.4 | 7.3 |
| Western WS20 | 69 | 82.7 | 6.9 |
| DeKalb X-996 | 62 | 68.4 | 6.7 |
| Funk's G88F | 68 | 76.3 | 6.4 |
| Western WS15 | 67 | 56.2 | 6.2 |
| GSA 1757S | 57 | 66.9 | 6.2 |
| Frontier Hidan 37R | 65 | 72.7 | 6.0 |
| Pioneer 977 | 59 | 63.7 | 5.8 |
| Sokota 300F | 61 | 42.1 | 4.6 |
| Frontier Hidan 35 | 65 | 47.9 | 3.8 |

LSD(05) - 2.0 Tons/A C.V. - 15.6% Mean - 6.7

* Reported as 12% Dry Matter

Note: Plots were seeded on June 5 and harvested on October 2. Plots were a single row 3 ft x 30 ft with a harvested size of 3 ft x 10 ft. Ramrod 20G was applied at seeding time at the rate of 2 pounds per acre. The soil condition was dry and cloddy.

Table 42. Sorghum-Sudangrass Variety Yield Trial - Pennington County(Quinn), 1979.

| Brand & Variety | Height (Inches) | Percent Dry Matter | Forage Yield-Tons/A* @ 12% Moisture |
|---|---|---|---|
| DeKalb X996 | 69 | 68.9 | 5.3 |
| GSA 1757S | 65 | 69.1 | 5.3 |
| Western WS 20 | 75 | 75.7 | 4.7 |
| Pioneer 977 | 68 | 64.0 | 4.2 |
| Western WS 15 | 66 | 56.4 | 3.9 |
| Frontier Hidan 37R | 69 | 68.0 | 3.7 |
| Sokota 300F | 68 | 51.9 | 3.6 |
| Frontier Hidan 35 | 68 | 55.1 | 3.3 |
| Funk's G83F | 69 | 50.8 | 3.2 |
| GSA 11 | 66 | 54.2 | 3.0 |
| Funk's G88F | 78 | 40.0 | 2.6 |
| Sokota 310 | 76 | 59.3 | 2.5 |
| Disco 235 | 60 | 55.5 | 2.0 |

LSD(05) - 2.3 Tons/A Mean - 3.6

Note: Plots were seeded on June 6 and harvested on October 9, 1979. Row space was 36 inches. Ramrod 20G at 2 pounds per acre was applied at time of seeding. Seedbed preperation was excellent and no fertilizer was used.

Table 43. Sudangrass Variety Yield Trial - Meade County (Bear Butte), 1979.

| Brand & Variety | Height (Inches) | Percent Dry Matter | Forage Yield-Tons/A* @ 12% moisture |
|---|---|---|---|
| NK Trudan 6 | 68 | 93.0 | 8.1 |
| ACCO HS-33 | 70 | 86.7 | 8.0 |
| Disco 3030 | 73 | 43.0 | 6.3 |
| GSA FFR74A | 67 | 78.5 | 5.8 |
| Piper | 71 | 71.2 | 4.3 |
| LSD(05) - 2.6 Tons/A | | | Mean - 6.5 |

*Reported as 12% Dry Matter

Note: Plots were seededon June 5 and harvested on October 2. Plots were a single row 3 ft x 30 ft with a harvested size of 3 ft x 10 ft. Ramrod 20G was applied at seeding time at the rate of 2 pounds per acre. The soil condition was dry and cloddy.

Table 44. Sudangrass Variety Yield Trial - Pennington County (Quinn), 1979.

| Brand & Variety | Height (Inches) | Percent Dry Matter | Forage Yield-Tons/A @ 12% Moisture |
|---|---|---|---|
| Disco 3030 | 61 | 51.5 | 4.6 |
| NK Trudan 6 | 61 | 52.5 | 1.9 |
| GSA FFR74A | 63 | 55.1 | 1.6 |
| ACCO HS-33 | 60 | 36.0 | 1.3 |
| Piper | 62 | 46.3 | 1.0 |
| LSD(05) - 1.2 Tons/A | | | Mean - 2.1 |

Note: Plots were seeded on June 6 and harvested on October 9, 1979. Row space was 36 inches. Ramrod 20G at 2 pounds per acre was applied at time of seeding. Seedbed preparation was excellent and no fertilizer was used.

DISCUSSION:

Meade County

Sorghum-sudangrass crosses and sudangrasses grown in Meade county in 1979 (see tables 41 and 43) experienced the same problems as did the forage sorghums. Limited moisture at seeding and immediately after resulted in thin stands. However, with good rain in late June and July the plants were able to tiller and produce good yields. The thin stands were a benefit because the plants were able to continue growth and did not go dormant. Although some varieties did not produce heads the yields were much higher than in previous years.

Pennington County

The sorghum-sudangrass crosses and sudangrasses tested in Pennington county were short of moisture during the early season, but received moisture in late June and July. Although some varieties had thin stands, they were able to tiller and utilize the additional moisture. The yields reported in table 42 and 44 were much lower than those of Meade county where moisture stress was not so evident.

## SUNFLOWER VARIETY TESTING

Objective: To compare the various brands and hybrids or varieties as to adaptability based on seed yield, seed quality, insect and disease resistance, and other agronomic characteristics.

Table 45. National Sunflower Variety Trial - Bennett County (Martin), 1979

| Brand & Hybrid | Height (Inches) | Percent Oil | Test Weight (Lbs/Bu) | Seed Yield (Lbs/Acre) |
|---|---|---|---|---|
| Pacific Oilseeds Sun Hi S304 | 50 | 33.7 | 28.5 | 1626 |
| Kraig Sheyenne 893 | 57 | 33.3 | 28.5 | 1612 |
| RBA 400D | 52 | 34.9 | 28.5 | 1568 |
| Golden Harvest 20 | 55 | 33.8 | 29.0 | 1539 |
| Cenex 897 | 53 | 34.6 | 30.5 | 1496 |
| Cenex 907 | 54 | 32.6 | 28.3 | 1452 |
| Master Farmer 700 | 53 | 34.4 | 28.8 | 1437 |
| 4 Winds 900 | 56 | -- | 27.8 | 1423 |
| USDA Hyb. 903 | 55 | 34.9 | 31.3 | 1408 |
| Sigco 894A | 53 | 34.3 | 28.8 | 1379 |
| Interstate Seeds 7775 | 56 | 33.0 | 28.3 | 1365 |
| Cargill 205 | 52 | 35.6 | 30.5 | 1336 |
| NK Sunbred 265 | 53 | 34.8 | 29.8 | 1336 |
| Cargill 204 | 51 | 32.9 | 28.0 | 1321 |
| MN Farm Bur Hysun 101 | 54 | 34.0 | 27.8 | 1321 |
| Pacific Oilseeds Sun Hi S301A | 57 | -- | 30.5 | 1307 |
| RBA 300G | 56 | 35.4 | 27.8 | 1307 |
| Jacques 501 | 51 | 33.7 | 29.0 | 1292 |
| Golden Harvest 10 | 53 | 33.9 | 28.5 | 1278 |
| Kraig Sheyenne 898 | 50 | -- | 30.0 | 1263 |
| Master Farmer 800 | 54 | 33.9 | 29.8 | 1220 |
| Dahlgren DO 704 | 50 | 33.6 | 26.5 | 1205 |
| Sigco 241A | 55 | 36.0 | 29.0 | 1191 |
| Dahlgren DO 844 | 55 | 32.2 | 28.3 | 1191 |
| NK Sunbred 254 | 53 | 34.0 | 29.5 | 1176 |
| Cal/West 034 | 55 | -- | 29.3 | 1162 |
| Interstate Seeds 3107 | 53 | 37.5 | 31.3 | 1118 |
| Jacques 701 | 56 | 33.5 | 31.0 | 1104 |
| 4 Winds 1100C | 50 | 34.9 | 31.0 | 973 |
| USDA Hyb. 894 | 52 | 33.7 | 29.0 | 973 |

Mean - 1313

Note: Plots were seeded on May 30 and harvested on October 11. Row space was 36 inches with 11 inches between plants for a population of 15,800 plants per acre. Final stands were estimated at 13,400 plants per acre. Plots were treated with a granular herbicide at seeding time. Insects were not a serious problem in 1979.

Table 46. National Sunflower Variety Trial - Pennington County (Quinn), 1979.

| Brand & Hybrid | Height (Inches) | Days to 50% Flower | Percent Oil | Test Weight (Lbs/Bu) | Seed Yield (Lbs/A) |
|---|---|---|---|---|---|
| Sigco 894A | 54 | 73 | 36.8 | 30.8 | 1439 |
| Master Farmer 700 | 61 | 71 | 35.4 | 30.0 | 1406 |
| Cargill 205 | 55 | 71 | 37.7 | 32.5 | 1335 |
| RBA 300G | 61 | 74 | 35.7 | 30.3 | 1324 |
| 4 Winds 900 | 60 | 71 | 36.2 | 29.7 | 1298 |
| Master Farmer 800 | 58 | 72 | 34.9 | 29.0 | 1239 |
| USDA Hyb. 903 | 61 | 74 | 35.6 | 30.8 | 1222 |
| NK Sunbred 265 | 56 | 72 | 37.4 | 30.5 | 1220 |
| Interstate Seeds 7775 | 60 | 72 | 34.7 | 30.3 | 1199 |
| Pacific Oil Seeds Sun Hi S304 | 60 | 74 | 35.6 | 30.3 | 1186 |
| Golden Harvest 20 | 57 | 72 | 36.1 | 30.7 | 1183 |
| Cargill 204 | 61 | 71 | 35.7 | 30.2 | 1157 |
| RBA 400D | 55 | 73 | 36.2 | 31.3 | 1131 |
| Jacques 501 | 57 | 73 | 36.7 | 31.2 | 1126 |
| Kraig Sheyenne 893 | 59 | 74 | 34.3 | 29.8 | 1101 |
| Cenex 907 | 61 | 71 | 35.2 | 29.0 | 1099 |
| Cenex 897 | 56 | 72 | 36.1 | 29.0 | 1094 |
| USDA Hyb. 894 | 53 | 73 | 36.7 | 29.5 | 1078 |
| Interstate Seeds 3107 | 59 | 71 | 38.4 | 31.5 | 1077 |
| Kraig Sheyenne 898 | 56 | 75 | 37.5 | 31.3 | 1039 |
| 4 Winds 1100C | 59 | 73 | 38.2 | 32.2 | 1015 |
| Golden Harvest 10 | 56 | 74 | 34.7 | 30.0 | 1005 |
| Cal/West 034 | 63 | 74 | 37.1 | 31.5 | 999 |
| Dahlgren DO 844 | 53 | 70 | 36.6 | 31.0 | 999 |
| NK Sunbred 254 | 57 | 75 | 35.4 | 31.5 | 964 |
| Dahlgren DO 704 | 53 | 72 | 36.8 | 31.2 | 900 |
| Pacific Oil Seeds Sun Hi S301A | 57 | 74 | 36.3 | 31.8 | 884 |
| MN Farm Bur Hysun 101 | 57 | 74 | 35.3 | 30.8 | 883 |
| Sigco 241A | 51 | 73 | 37.9 | 33.7 | 858 |
| Jacques 701 | 54 | 75 | 39.3 | 33.0 | 563 |

LSD(05) - 310 lbs/A C.V. - 17.2% Mean - 1102

Note: Plots were seeded on May 31 and harvested on October 9. Row space was 36 inches with 11 inches between plants for a population of 15,800 plants per acre. Final stands were estimated at 13,400 plants per acre. Plots were treated with a granular herbicide at seeding time. Insects were not a serious problem in 1979.

## MANAGEMENT, TILLAGE, AND CULTURAL PRACTICES

### Date of Planting of Sunflowers

Objectives: To observe and compare sunflowers planted at different calendar dates as to adaptability, insect infestations, disease resistance, and various agronomic characteristics.

Table 47. Sunflower Date of Seeding - Bennett County (Martin), 1979.

| Date of Seeding | Height (Inches) | Percent Oil | Test Weight (Lbs/Bu) | Seed Yield (Lbs/Acre) |
|---|---|---|---|---|
| May 31 | 47 | 34.2 | 30.4 | 2169 |
| June 7 | 48 | 33.6 | 29.3 | 1869 |
| June 15 | 44 | 34.7 | 29.5 | 1546 |

LSD(05) - 300 Lbs/Acre C.V. - 12.5% Mean - 1861

Note: Replicated plots contained 6 rows each with a 36 inch row spacing. Final populations were approximately 13,400 plants per acre. Two rows from each plot were harvested for yield. Harvesting was completed on October 11.

Table 48. Sunflower Date of Seeding - Pennington County (Quinn), 1979.

| Date of Seeding | Date of Flowering | Height (Inches) | Test Weight (Lbs/Bu) | Seed Yield (Lbs/Acre) |
|---|---|---|---|---|
| May 31 | July 30 | 59 | 31.5 | 1232 |
| June 6 | August 7 | 60 | 27.5 | 1009 |
| June 14 | * | 56 | 28.0 | 722 |

LSD(05) - 239 Lbs/Acre C.V. - 18.7% Mean - 988

* Only buds were showing on August 7.

Note: Replicated plots contained 6 rows with 36 inches between rows. Final population was approximately 13,400 plants per acre. Two rows from each plot were harvested for yield. Harvesting was completed on October 9.

DISCUSSION:

Sunflower hybrid 894 was seeded at two locations on three different dates. All procedures used were the same at both sites. Insect and disease damage was negligible.

Both studies produced the same results, with the early seeding producing the mid-height, highest test weight, and highest yield. The second date of seeding produced the tallest plants, but had the lowest test weight, oil content, and medium yield. The late planting had the shortest plants and smallest yields.

## Methods of Fallow

Objective: To observe and compare various tillage systems and their effects on soil tilth, soil fertility, and soil moisture.

This is the first year results of a research trial conducted near Quinn, (Pennington county), that was started in the fall of 1978. Three different tillage systems used in fallow are being evaluated. Nitrate ($NO_3$-N) readings were taken after one complete year of fallow and prior to winter wheat seeding. The three tillage systems used were:

Blade - subsurface tillage (Noble blade)
Black - surface tillage (disc)
Chemical - any chemical or combination of chemicals (no tillage)

Tillage was performed under each system as much as necessary to insure control of weeds. The first year results show a significant reduction in $NO_3$-N release under chemical fallow as compared to subsurface or surface fallowing methods.

Table 49. Nitrate Levels of Soil with Three Different Tillage Systems.

| Tillage System | $NO_3$-N Level* | Soil Type |
|---|---|---|
| Blade | 87.50 lbs/a | si-clay |
| Black | 82.25 lbs/a | clay |
| Chemical | 41.25 lbs/a | clay |

LSD(05) - 31.31 lbs/a C.V. - 25.7%
* Soil was sampled in fall of 1979.

## Fertilizer Studies on Spring Wheat

Objective: To study the effects of various rates of nitrogen fertilizer on yield of hard red spring wheat when irrigated.

Table 50. Effect of Rates of Nitrogen on Spring Wheat Under Irrigation Butte County (Newell), 1979.

| Rate of Nitrogen Application - Lbs per acre | | | Test Weight | Grain Yield |
|---|---|---|---|---|
| (Lbs of $NO_3$-N) | (Lbs of Applied N) | (Total N/Acre) | (Lbs/Bu) | (Bu/Acre) |
| 88 | 0 | 88 | 54.9 | 72.2 |
| 88 | 30 | 118 | 54.9 | 82.3 |
| 88 | 60 | 148 | 56.8 | 90.8 |
| 88 | 90 | 178 | 56.1 | 93.1 |
| 88 | 120 | 208 | 55.9 | 94.2 |

LSD(05) - 5.3 Bu/A C.V. - 4.1%
Note: Olaf hard red spring wheat was seeded in mid-April at the rate of 110 pounds per acre. Plot size was 7' x 30' with 7 inch row spacing. Yield data is an average of 4 replications. Nitrogen fertilizer was applied as ammonium nitrate, topdressed when the wheat was 4 to 5 inches tall. Ten inches of water was applied two days after fertilization. Four inches of water was applied just prior to the heading stage of growth. The plots were harvested August 22, 1979. Soil Test Information: 4/23/79 - 88 pounds $NO_3$-N, 110 pounds of Phosphorus, 999+ pounds Potassium, soil pH 6.9, Soluble salts - 0.7, clay texture.

## Effects of Azotobacter as a Seed Treatment

Objective: To study the use of a biological agent, the Azotobacter, a non-symbiotic, aerobic nitrogen fixing organism as a replacement for commercial nitrogen fertilizer.

Five varieties of oats and barley, two varieties of hard red spring wheat, and four varieties of durum wheat were used to study the beneficial effects of an Azotobacter as a source of nitrogen fixation.

Half of each lot of seed was treated with the bacteria culture. The seed was then packaged for individual plots. All of the untreated plots were seeded before the treated material to prevent contamination. The plots were harvested on August 24, 1979.

The results of the study are presented in table 52. An inspection of the data indicates varieties react differently to the presence of the organism. Differences whether positive or negative are small. However, the yield advantage in oats is greater than for other crops. Barley had more varieties that reacted positively but the increase was smaller. Overall more research needs to be done to determine if the differences are real or are due to chance.

## Alternate Cropping Sequences

Objective: To compare a series of six crop rotations and determine the relative operational costs and economic returns, as well as monitor changes in weed populations, pathogens, and soil moisture.

The series of rotations used in this study are shown in table 51, and includes a continuous cropping, an alternating crop-fallow system, as well as monoculture, biculture, and triculture systems.

Table 51. Rotation Study - Pennington County (Quinn), 1979.

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|
| Rot 1 | HRW* | HRW | HRW | HRW | HRW | HRW |
| Rot 2 | Barley | HRW | Safflower | Barley | HRW | Safflower |
| Rot 3 | HRS** | HRW | Fallow | HRS | HRW | Fallow |
| Rot 4 | Fallow | HRW | Fallow | HRW | Fallow | HRW |
| Rot 5 | HRS | HRW | Proso | HRS | HRW | Proso |
| Rot 6 | HRW | HRW | Fallow | HRW | HRW | Fallow |

* Hard Red Winter Wheat
**Hard Red Spring Wheat

The results of the initial year are shown in table 53, and have been grouped together because there is no previous cropping year effects. The table is misleading because of the loss of the winter wheat by winterkill. Spring grain yields were higher than normal because of the cool spring. Soil moisture was very short but since growth was slow the rains in late June and July were of advantage to the late maturing spring grains.

Table 52. The Influence of Azotobacter on Yield, Test Weight, and Height of Small Grains. Pennington County (Quinn), 1979.

| Variety | Seed Treatment | Lbs/A of Soil $NO_3^-$-N | Height (Inches) | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) |
|---|---|---|---|---|---|
| **Oats** | | | | | |
| Burnett | Check | 46 | 28 | 39.7 | 93.0 |
| | Treated | 27 | 28 | 39.3 | 91.2 |
| Froker | Check | 39 | 28 | 42.5 | 85.3 |
| | Treated | 72 | 29 | 40.7 | 82.1 |
| Lang | Check | 55 | 23 | 37.0 | 87.6 |
| | Treated | 63 | 26 | 36.8 | 95.7 |
| Stout | Check | -- | 23 | 39.0 | 78.5 |
| | Treated | -- | 22 | 39.7 | 81.2 |
| Spear | Check | -- | 27 | 38.8 | 84.8 |
| | Treated | -- | 27 | 38.2 | 81.7 |
| **Barley** | | | | | |
| Larker | Check | 36 | 25 | 51.0 | 71.1 |
| | Treated | 47 | 25 | 50.8 | 65.6 |
| Morex | Check | 50 | 25 | 50.5 | 70.2 |
| | Treated | 34 | 27 | 49.5 | 71.4 |
| Prilar | Check | -- | 28 | 51.7 | 69.0 |
| | Treated | -- | 26 | 50.8 | 65.6 |
| Primus II | Check | 43 | 26 | 51.2 | 62.6 |
| | Treated | 37 | 25 | 50.7 | 63.5 |
| Park | Check | -- | 24 | 50.2 | 76.8 |
| | Treated | -- | 23 | 50.5 | 80.2 |
| **Hard Red Spring Wheat** | | | | | |
| Butte | Check | -- | 26 | 60.0 | 37.8 |
| | Treated | -- | 23 | 59.0 | 36.3 |
| Prodax | Check | -- | 26 | 53.0 | 32.7 |
| | Treated | -- | 25 | 56.0 | 34.8 |
| **Durum Wheat** | | | | | |
| Botno | Check | -- | 27 | 58.7 | 36.3 |
| | Treated | -- | 28 | 58.2 | 35.3 |
| Rolette | Check | -- | 25 | 59.5 | 32.9 |
| | Treated | -- | 24 | 59.6 | 31.9 |
| Ward | Check | -- | 28 | 58.5 | 39.2 |
| | Treated | -- | 29 | 58.7 | 39.9 |
| Vic | Check | -- | 28 | 60.7 | 42.6 |
| | Treated | -- | 27 | 59.8 | 38.5 |

Mean Grain Yields

| | | |
|---|---|---|
| Oats | Check | 85.8 |
| | Treated | 86.4 |
| Barley | Check | 69.9 |
| | Treated | 69.3 |
| HRS Wheat | Check | 35.3 |
| | Treated | 35.6 |
| Durum Wheat | Check | 37.8 |
| | Treated | 36.4 |

Table 53. Initial Yields of Rotation Study - Pennington County (Quinn), 1979.

| Crop | Rotation | Year | Test Weight (Lbs/Bu) | Grain Yield (Bu/Acre) | Gross Return in Dollars** |
|---|---|---|---|---|---|
| Barley | 2 | 1 | 47.5 | 41.7 | $80.06 |
| Barley | 2 | 4 | 47.0 | 40.2 | 77.18 |
| HRS Wheat | 3 | 1 | 52.4 | 16.8 | 57.96 |
| HRS Wheat | 3 | 4 | 52.6 | 19.4 | 66.93 |
| HRS Wheat | 5 | 1 | 54.1 | 21.6 | 74.52 |
| HRS Wheat | 5 | 4 | 51.9 | 14.2 | 48.99 |
| HRW Wheat | 2 | 2 | 49.4* | 7.1* | 24.50 |
| HRW Wheat | 4 | 2 | 49.4* | 7.1* | 24.50 |
| HRW Wheat | 6 | 1 | 48.4* | 7.1* | 24.50 |
| HRW Wheat | 1 | 1 | 49.4* | 7.1* | 24.50 |
| Safflower | 2 | 3 | 35.9 | 1118 lbs | 84.74 |

* Severe winterkill resulted in only selected plots being harvested, therefor, a mean test weight and yield was calculated.

** Gross return is calculated as market price on January 1: Winter wheat-$3.45; Spring wheat-$3.45; Barley-$1.92; Safflower- 8¢ per pound less discount.

## Pesticide Research

Table 54. Weed Control in Winter Wheat - Bennett County (Martin), 1979.

| Rate | Grain Yield-Bushels/Acre | | | | | |
|---|---|---|---|---|---|---|
| Pounds of | Dates of Application | | | | | |
| Sencor/Acre | Oct 6 | Oct 20 | Nov 1 | April 1 | April 30 | *Mean |
| 0 | | | | | | 24.75A |
| 1/4 | 30.15 | 25.60 | 28.40 | 30.20 | 29.35 | 28.98A |
| 3/8 | 25.60 | 28.05 | 29.75 | 29.40 | 28.05 | 28.17A |
| 1/2 | 25.60 | 28.30 | 23.50 | 30.30 | 26.50 | 26.80A |
| 3/4 | 27.40 | 15.90 | 18.50 | 18.40 | 22.30 | 20.28B |
| | | | | | | Mean - 21.44 |

*Duncan's Multiple Range Test - Means with the same letter are not significantly different.

Spraying Information:

Oct 6, 1978 - Sage wheat was in 3 leaf and one tiller stage of growth and the soil was dry with very little cheatgrass or broadleaf weeds present.

Oct 20, 1978 - Sage wheat was fully tillered and green with a little frost damage to leaf tips. Very few weeds were present and growing conditions were generally dry.

April 1, 1979 - Sage wheat was green at growing point, no weeds at this time.

April 30, 1979 - Sage wheat was developing leafy growth but few weeds were present at this time.

Discussion of Results:

The yield differences in the table are not due completely to cheatgrass control but better kochia control. The plots were over sprayed with 2,4-D but because of the dry season it did not control all broadleaf weeds and the kochia was heavy in the control plots. The plots receiving higher rates of Sencor were weed free. It is apparent the higher rates of Sencor, or early fall applications can reduce yields.