Plant Science Pamphlet #74 December 1983

ANNUAL PROGRESS REPORT

# NORTHEAST RESEARCH STATION
Watertown, South Dakota

## BRIEF HISTORY

The Northeast Research Station Advisory Group met in Watertown, February 3rd, 1983 to discuss research being conducted on the Northeast Research Station. At this meeting, Sherman Hustel was elected President and Joe E. Schuch of Roberts County, Secretary for 1983.

Weather conditions in April slowed planting of spring crops. Farm operations were in full swing in May and continued this way until mid-May. At this time, small showers of rain hindered plantings and tillage operations. The heavy rain July 17th caused some erosion and severe crusting of the soil. A potato and forage experiment was ruined at this time due to washing and crusting. Temperatures and fair amounts of rainfall in June were conducive to rapid small grain growth. Over the complete crop season of April through October, rainfall was 1.19 inches above normal. The subsoil moisture is in good condition for 1984.

There were 2 crop tours on the station this year. One on July 14th in the evening to view the small grain varieties, dry beans, millets, sunflowers and other crops in season at that time. The second tour was conducted September 8th and was set up to observe row crops, such as soybeans, sunflowers, artichokes, forage sorghums, sunflower insect study and weed control practices. Coffee and cookies were served by the Crop Improvement Association. Turn-outs for both tours were very good.

New Research Station advisors for the period 1983-1986 are Doug Toben, Deuel County and Sherman Hustel from Roberts County.

I wish to acknowledge the companies that provided seed for the various experiments. Their names are by the entries used for each study. Other grain was purchased from South Dakota Foundation Seed Stocks.

NOTE: This is a progress report and therefore the results presented are not necessarily complete nor conclusive. Any interpretation given is strictly tentative because additional data from continuation of these experiments may produce conclusions different than those of any one year. These data reflect the 1983 growing season.

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Northeast Research Station, 1982
Watertown, South Dakota

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| Loyal Evjen | South Shore | Ag. Technician | |
| Quentin Kingsley | SDSU | Station Manager | |

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1983 Crop Season

Total rainfall for growing season by months with this Department from long-term average on Northeast Research Station, S.D.

| Rainfall | Inches | Normal | Departure* | Greatest Day | Date |
|---|---|---|---|---|---|
| April | 0.70 | 2.06 | -1.36 | 0.26 | 13 |
| May | 1.64 | 2.97 | -1.33 | 1.02 | 7 |
| June | 3.43 | 3.70 | -0.27 | 1.22 | 26 |
| July | 5.45 | 2.67 | +2.78 | 4.60 | 17 |
| August | 3.00 | 2.78 | +0.22 | 1.30 | 29 |
| September | 2.86 | 1.85 | +1.01 | 1.06 | 4 |
| October | 1.30 | 1.16 | +0.14 | 0.77 | 19 |
| Total | 18.38 | | +1.19 | | |

Long-Time Average 17.19 inches April through October.

Number of days during month of 90° of above: June 4, July 15, August 15, and September 4.

Last frost - Spring (May 4).
First frost - Fall (September 21) Frost free period - 140 days.

# SOYBEAN VARIETY AND ROW SPACE STUDY
Northeast Research Station, 1983
Q. Kingsley and L. Evjen

## OBJECTIVES:

To observe several varieties of soybeans for oil percent, test weight, yielding ability and row spacings in this environment.

## DISCUSSION:

The soybeans were planted May 26 and harvested September 26. Row spacings were 7, 14, 21, 28 and 35 inches. The planting rate was 185,000 seeds per acre. Plants per foot of row were for 7 inch row, 3.5, 14 inch 6.7, 21 inch 8.7, 28 inch 9.2, and for 35 inch 10.3. This planting rate is about 60 pounds of soybeans per acre, which varies with seed size.

Chemical weed control on this study was accomplished using 3 quarts of Lasso broadcast preemergent.

There was very little lodging and any that did occur was in the 28 and 35 inch row spacings. This lodging was apparent after the first frost on September 21. Rainfall during the crop season was 14.0 inches.

Lakota soybeans replaced Corsoy 79 and two early varieites, Ozzie and Dawson were added to the study in 1983.

Dawson appears to be a few days earlier than Evans. The other soybeans mature in about the same order as they appear in Table 1. This year the higher yields of soybeans were produced in the wider row spacings. In 1982, the higher yields were in the 7, 14, and 21 inch row spacings.

RESULTS:

Table 1. Soybean Vareity and Row Spacings, Northeast Research Station, Watertown, S.D. 1983.

| Entry | Row Space inches | Maturity Group* | 100 Seed Wt. grams | Percent Oil | Test Wt. | Yield Bu/A | All Entry Average Yield Bu/A |
|---|---|---|---|---|---|---|---|
| Ozzie | 7 | 0 | 14.2 | 20.0 | 56.8 | 15.7 | |
| Evans | | 0 | 13.5 | 20.8 | 57.5 | 12.7 | |
| Dawson | | 0 | 14.0 | 20.5 | 56.5 | 12.4 | |
| Swift | | 0 | 15.2 | 21.5 | 56.5 | 18.7 | |
| Simpson | | 0 | 15.6 | 21.3 | 54.8 | 18.7 | |
| Hodgson 78 | | 1 | 14.6 | 21.2 | 56.5 | 20.1 | |
| Lakota | | 1 | 15.6 | 19.8 | 56.3 | 17.0 | |
| Weber | | 1 | 13.4 | 21.6 | 55.8 | 21.1 | 17.1 |
| Ozzie | 14 | 0 | 14.0 | 20.5 | 55.0 | 25.4 | |
| Evans | | 0 | 13.2 | 21.5 | 57.5 | 28.3 | |
| Dawson | | 0 | 13.2 | 21.3 | 56.3 | 25.6 | |
| Swift | | 0 | 15.4 | 21.2 | 56.3 | 22.4 | |
| Simpson | | 0 | 13.0 | 21.4 | 55.0 | 27.4 | |
| Hodgson 78 | | 1 | 14.1 | 21.3 | 55.5 | 26.0 | |
| Lakota | | 1 | 14.8 | 20.1 | 56.0 | 26.6 | |
| Weber | | 1 | 13.3 | 21.7 | 56.5 | 29.3 | 26.4 |
| Ozzie | 21 | 0 | 14.1 | 20.1 | 56.3 | 32.7 | |
| Evans | | 0 | 13.3 | 21.2 | 57.0 | 33.8 | |
| Dawson | | 0 | 13.6 | 20.8 | 56.5 | 30.8 | |
| Swift | | 0 | 14.7 | 21.7 | 55.5 | 32.1 | |
| Simpson | | 0 | 13.8 | 21.8 | 54.5 | 33.6 | |
| Hodgson 78 | | 1 | 14.7 | 21.0 | 56.0 | 30.4 | |
| Lakota | | 1 | 15.0 | 20.5 | 56.0 | 36.4 | |
| Weber | | 1 | 12.8 | 21.3 | 55.5 | 33.1 | 32.9 |
| Ozzie | 28 | 0 | 14.2 | 20.5 | 55.0 | 31.3 | |
| Evans | | 0 | 13.6 | 21.3 | 56.5 | 33.0 | |
| Dawson | | 0 | 12.8 | 21.0 | 56.5 | 28.3 | |
| Swift | | 0 | 15.3 | 21.2 | 57.0 | 32.1 | |
| Simpson | | 0 | 13.8 | 21.5 | 55.0 | 41.0 | |
| Hodgson 78 | | 1 | 14.1 | 20.9 | 56.3 | 32.8 | |
| Lakota | | 1 | 14.9 | 19.8 | 56.5 | 31.8 | |
| Weber | | 1 | 13.3 | 21.2 | 56.3 | 34.0 | 33.0 |
| Ozzie | 35 | 0 | 13.4 | 20.0 | 55.8 | 35.6 | |
| Evans | | 0 | 13.8 | 22.4 | 55.5 | 42.0 | |
| Dawson | | 0 | 13.5 | 21.3 | 56.5 | 44.5 | |
| Swift | | 0 | 15.2 | 22.1 | 56.0 | 43.3 | |
| Simpson | | 0 | 13.4 | 22.2 | 56.0 | 47.1 | |
| Hodgson 78 | | 1 | 14.4 | 21.4 | 56.5 | 49.4 | |
| Lakota | | 1 | 14.6 | 20.7 | 54.5 | 49.0 | |
| Weber | | 1 | 12.4 | 21.6 | 54.5 | 42.3 | 44.2 |

* Maturity Group from USDA Classification: 0 = early, 1 = early to mid-season, Crop was planted May 26 and harvested September 26.

# DRY BEAN VARIETY TRIALS
Northeast Research Station, 1983
Q. Kingsley and L. Evjen

## OBJECTIVE:

To observe several varieties of dry beans for adaptability, maintenance and yielding ability.

## DISCUSSION:

The beans were planted June 16th with a two row planter at a rate of a bean every 2½-4 inches or about 100,000 per acre. Normally the beans would be planted in mid-May after any danger of that last frost in the spring. A population of near 80,000 plants per acre were harvested September 12th to October 5th and the results are shown in Table 2.

All varieties of beans would be adaptable to the area. California light red kidney HIR 604 were about 10 days earlier than the navys harvested September 12. The latest were pink vivas harvested October 5th. The Great Northern and pintos matured between these dates.

Maintenance of the beans is difficult for the vining and prostrate types because they spread out and are driven over when cultivating. Harvesting also presents a problem because the plant must be sheared off below the soil surface. Special equipment is needed for this operation. The bush types may be taken by straight combining them. When combining dry beans, the cylinder speed is down to about 300 RPM and the concave is fairly wide open. There is a high discount on cracked beans. Navy beans were the easiest to combine, with less cracking and dirt in the grain tank.

The price on dry beans at harvest time was 28 cents a pound for navy, 22 cents for pinto beans. Current price is 23 cents for navy and 19 cents for pinto. Light red kidney beans are now priced at 42 cents a pound and Great Northerns are 17 to 20 cents a pound.

Dry bean seed cost for planting in 1984 for navy beans will be about 55 to 60 cents per pound and for pinto beans about 60 cents a pound or under.

In 1984, four varieties of pinto beans are to be added to those in Table 2. One variety is a pink bean and the other three, Ela, Agate and Pindak are short season 85 day beans. Also, chick peas, commonly known as Garbanzo beans, will be included in this study.

Seed for these trials was provided by Garden State Bean Company and Sacramento Valley Milling Co.

RESULTS:

Table 2. Dry Bean Production, Northeast Research Station, 1983.

| Entry | Type | Plant Type | 200 Seed Count Grams | Test Wt. | Yield Lbs/A |
|---|---|---|---|---|---|
| Fleetwood TVS 82NS | Navy | Bush | 39.3 | 64.5 | 727.8 |
| Fleetwood STVS82 N13 | Navy | Bush | 41.6 | 63.5 | 806.0 |
| Seafarer, pea bean | Navy | Bush | 39.1 | 63.1 | 1287.0 |
| Black turtle T-39 | Black bean | Bush | 40.5 | 61.0 | 1517.3 |
| Small white G-211 | Small white | Vining | 29.1 | 61.6 | 1415.9 |
| California Light Red Kidney HIR 604 | L.R. Kidney* | Bush | 84.6 | 56.0 | 2036.8 |
| Sacramento Light Red Kidney HIE 209 | L.R. Kidney | Bush | 96.1 | 54.6 | 1431.0 |
| California Regular Light Red Kidney | L.R. Kidney | Bush | 83.8 | 52.0 | 1866.8 |
| Sacramento Light Red Regular kidney | L.R. Kidney | Bush | 90.1 | 54.3 | 1451.5 |
| UI 111 | Pinto | Vining | 77.7 | 56.5 | 1202.1 |
| UI 114 | Pinto | Vining | 78.7 | 55.5 | 808.7 |
| Wyoming 166 | Pinto | Vining | 65.3 | 56.5 | 1258.3 |
| GN Star | Gr. North** | Prostrate vine | 69.0 | 58.3 | 1444.7 |
| GN Valley | Gr. North | Prostrate vine | 65.3 | 56.3 | 1983.3 |
| GN 59S | Gr. North | Prostrate vine | 61.6 | 56.2 | 1587.2 |
| Pink Viva | Pinto | Vining | 65.9 | 60.4 | 1288.4 |

* Light Red Kidney

** Great Northern

# DATE PLANTING OF VARIOUS CROPS
Northeast Research Station, 1983
Q. Kingsley and L. Evjen

TITLE: Date planting of small grain and oil crops.

OBJECTIVES:

1. Do dates of planting have any effect on yielding ability, percent protein and test weight?

2. Do weeds become a problem?

DISCUSSION:

The Date Planting study was started April 27 in 1983. This is about 7 days earlier than in 1982. Soil conditions and the weather were not right to initiate this study sooner.

Weed control of late emerging grassy weeds was the biggest problem in 1983.

The first plantings of small grain April 27, Table 3, emerged about the same time as the third planting May 11th. Yield differences in 1983, except durum and flax, favored mid May plantings, when compared to all dates. From this time on through the June 16th planting, the yields decreased as did test weights.

Tillage was performed prior to each planting date, but grassy weeds would take over some crops. Three plantings of flax, four of durum and four of spring wheat were lost to the weed problem. There were 10 plantings made but the late ones were lost to weeds.

Sunflowers, Table 4, were definitely affected by the weather and soil temperatures. Emergence was irregular, which had a bearing on yielding ability at seasons end. Much breakage of stems occurred at ground level and resulted in total loss from these plants. An attempt was made to try to pick these up with the machine. The final result of this attempt was constant plugging of the snoots. Only the plants that were standing or lodged but retrievable were harvested October 17th.

Percent oil, percent protein, percent moisture, test weight and yield varied with planting date and row spacing. Percent moisture increased with later plantings in both sunflower varieties.

The corn, Table 4, reached a peak yield at the May 18 and 24th plantings and then dropped with each planting through June 30th. Corn was harvested October 19th.

RESULTS:

Table 3. Date Planting of Spring Crops, Yield in Bushels per Acre. Northeast Research Station, 1983.

| Variety | Date Planted | % Protein | Test Weight | Yield Bu/A |
|---|---|---|---|---|
| Robust Barley | 4/27 | 12.9 | 47.0 | 62.9 |
| | 5/4 | 11.4 | 49.0 | 58.5 |
| | 5/11 | 14.1 | 48.0 | 64.6 |
| | 5/18 | 12.2 | 49.0 | 59.7 |
| | 5/24 | 13.0 | 45.0 | 49.2 |
| | 6/1 | 13.7 | 40.0 | 27.0 |
| | 6/8 | 11.1 | 38.0 | 10.9 |
| | 6/16 | 16.4 | 37.0 | 8.2 |
| Lancer Oats | 4/27 | 16.4 | 40.0 | 71.8 |
| | 5/4 | 16.0 | 39.0 | 75.0 |
| | 5/11 | 15.6 | 39.0 | 79.2 |
| | 5/18 | 13.8 | 40.0 | 79.4 |
| | 5/24 | 15.3 | 36.0 | 51.3 |
| | 6/1 | 16.1 | 32.0 | 25.9 |
| | 6/8 | 14.3 | 27.0 | 13.9 |
| | 6/16 | 10.8 | 25.0 | 8.4 |
| Len Wheat | 4/27 | 18.0 | 59.0 | 37.1 |
| | 5/4 | 16.7 | 60.0 | 34.1 |
| | 5/11 | 15.6 | 60.0 | 35.6 |
| | 5/18 | 15.7 | 58.0 | 39.9 |
| | 5/24 | 15.1 | 57.0 | 26.6 |
| | 6/1 | 15.8 | 51.0 | 20.8 |
| Vic Durum | 4/27 | 14.7 | 58.0 | 45.4 |
| | 5/4 | 14.4 | 62.0 | 38.1 |
| | 5/11 | 15.5 | 60.0 | 39.8 |
| | 5/18 | 14.4 | 56.0 | 34.1 |
| | 5/24 | 16.2 | 57.0 | 26.1 |
| | 6/1 | 14.3 | 56.5 | 15.9 |
| Clark Flax | 4/27 | -- | 53.0 | 10.7 |
| | 5/4 | -- | 54.0 | 8.1 |
| | 5/11 | -- | 52.0 | 10.6 |
| | 5/18 | -- | 53.5 | 10.4 |
| | 5/24 | -- | 54.0 | 7.1 |
| | 6/1 | -- | 53.0 | 4.0 |
| | 6/8 | -- | 48.0 | 0.6 |
| | 6/16 | -- | 49.0 | 1.5 |

RESULTS:

Table 4. Date Planting and Row Spacing of Sunflowers for Grain Yield, Oil Percent and Other Observations.

| Entry | Planting Date | % Oil 10% Moisture | % Moisture | Test Wt. lbs/bu | Yield lbs/A |
|---|---|---|---|---|---|
| Sunflowers | | | | | |
| PAG 102 | 4/27 | 36.7 | 14 | 30.0 | 1224.8 |
| | 5/4 | 35.1 | 11 | 30.0 | 1141.5 |
| | 5/11 | 34.6 | 11 | 30.0 | 954.2 |
| | 5/18 | 33.9 | 12 | 29.0 | 860.1 |
| | 5/24 | 31.0 | 15 | 25.5 | 1395.7 |
| | 6/1 | 30.0 | 15 | 25.0 | 1129.8 |
| | 6/8 | 32.0 | 19 | 26.0 | 870.5 |
| | 6/16 | 33.9 | 23 | 25.0 | 1099.1 |
| | 6/22 | 28.8 | 27 | 23.0 | 684.7 |
| | 6/30 | 25.1 | 40 | 23.5 | 348.5 |
| Sigco Dwarf | 4/27 | 33.5 | 12 | 28.5 | 693.1 |
| | 5/4 | 33.4 | 13 | 28.0 | 597.6 |
| | 5/11 | 31.3 | 13 | 27.0 | 714.3 |
| | 5/18 | 34.5 | 12 | 28.0 | 860.1 |
| | 5/24 | 34.2 | 13 | 28.0 | 1072.6 |
| | 6/1 | 31.9 | 16 | 25.5 | 799.6 |
| | 6/8 | 32.5 | 21 | 26.5 | 789.7 |
| | 6/16 | 34.3 | 19 | 25.3 | 1061.6 |
| | 6/22 | 32.2 | 26 | 23.0 | 434.0 |
| Corn | | % Protein | | | Yield #2 Corn bu/A |
| Sokota 222 | 4/27 | 10.1 | 14 | 53.8 | 47.7 |
| | 5/4 | 9.6 | 11 | 56.8 | 56.0 |
| | 5/11 | 9.6 | 12 | 57.0 | 53.4 |
| | 5/18 | 9.8 | 12 | 56.5 | 57.1 |
| | 5/24 | 9.9 | 15 | 54.3 | 57.0 |
| | 6/1 | 9.8 | 16 | 51.5 | 51.2 |
| | 6/8 | 9.6 | 20 | 50.5 | 51.0 |
| | 6/16 | 9.5 | 22 | 48.0 | 44.2 |
| | 6/22 | 9.4 | 31 | 44.8 | 38.8 |
| | 6/30 | 10.8 | 46 | 45.0 | 27.1 |

# HAY, HAYLAGE AND SILAGE PRODUCTION
## Northeast Research Station 1983

Q. Kingsley and L. Evjen

TITLE: Dry Matter Production for Small Grains, Millet, and Forage Sorghum.

OBJECTIVES OF EXPERIMENT:

1. Compare various crops for dry matter production.
2. Obtain regrowth data after first harvest for green chop or haylage when possible.

RESULTS:

Table 5. Small Grain Haylage, Tons of Dry Matter* (DM) Per Acre at Stages of Maturity. First Planting April 26, 1983.

| Variety and Maturity | Yield in tons per acre | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Milk | % Protein | Dough | % Protein | Late Dough | % Protein | Yield Bu/A | % Protein |
| Nodaway 70 | 7/5** | | 7/12 | | 7/19 | | 7/25 | |
| Early | 3.03 | 12.8 | 3.03 | 12.8 | 3.45 | 10.4 | 60.8 | 16.4 |
| Burnett | 7/5 | | 7/12 | | 7/20 | | 7/25 | |
| Medium | 2.60 | 12.7 | 3.03 | 11.8 | 3.45 | 11.2 | 74.8 | 15.3 |
| Lancer | 7/5 | | 7/15 | | 7/20 | | 7/25 | |
| Medium | 2.60 | 11.0 | 3.33 | 10.9 | 3.45 | 10.6 | 69.8 | 14.9 |
| Benson | 7/5 | | 7/15 | | 7/20 | | 7/25 | |
| Medium L. | 2.78 | 11.7 | 3.45 | 11.1 | 3.61 | 11.3 | 77.7 | 16.4 |
| Triticales | 7/5 | | 7/15 | | 7/20 | | 8/8 | |
| | 2.66 | 10.8 | 2.96 | 10.8 | 3.45 | 10.6 | 60.4 | 15.3 |
| Average | 2.73 | | 3.16 | | 3.48 | | 68.7 | |

Hay (88% DM); Haylage (50% DM); Silage (33% DM).

*To determine yields of hay, haylage, or silage: Divide tons of DM by percent DM in hay, haylage, or silage. Example: (DM average for dough of 1.88 if divided by 0.88 equals 2.13 tons of 12% moisture hay, etc.).

**Harvest date: Listed above under column heading.

RESULTS:

Table 6. Small Grain Haylage, Tons of Dry Matter* (DM) Per Acre at Stages of Maturity. Second Planting May 23, 1983.

| Variety and Maturity | Yield in tons per acre | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Milk | % Protein | Dough | % Protein | Late Dough | % Protein | Yield Bu/A | % Protein |
| Nodaway 70 | 7/15** | | 7/22 | | 7/28 | | 8/8 | |
| Early | 3.39 | 12.1 | 1.94 | 11.6 | 2.12 | 13.1 | 65.1 | 13.6 |
| Burnett | 7/15 | | 7/22 | | 7/29 | | 8/8 | |
| Medium | 3.27 | 12.6 | 1.82 | 12.2 | 2.18 | 14.1 | 50.0 | 13.6 |
| Lancer | 7/20 | | 7/25 | | 7/29 | | 8/8 | |
| Medium | 3.03 | 11.4 | 2.12 | 11.3 | 2.24 | 11.3 | 62.1 | 16.6 |
| Benson | 7/20 | | 7/25 | | 8/1 | | 8/8 | |
| Medium L. | 3.54 | 12.6 | 2.06 | 12.7 | 2.18 | 12.8 | 56.4 | 14.9 |
| Triticales | 7/20 | | 7/25 | | 8/1 | | 8/19 | |
| | 3.03 | 11.2 | 1.63 | 11.1 | 1.57 | 11.3 | 44.7 | 17.3 |
| Average | 3.25 | | 1.91 | | 2.06 | | 55.7 | |

* Refer to Table 5 to determine yield at various stages.

**Harvest date: Listed above under column heading.

DISCUSSION:

Four oats varieties of various degrees of maturity wre used for this study. Triticales was added in 1982 to study the time to harvest the crop for forage yield. When the plant is in the dough or late dough stage, most of the leaves have dropped off leaving but stems and a few leaves plus the head to harvest. It is the opinion of this observer that the crop be harvested when the plant is covered with leaves. The stage of seed maturity is not the proper criteria for triticales.

Haylage production and percent protein for the four oat varieties varied with maturity as may be noted in Tables 5 and 6. There were two dates of planting, April 26 and May 23.

The forage study, Table 7, was planted June 7th but the July 17th rain washed out most of it. The study was replanted July 27th to see what production would occur. Corn was not replanted because the stand was adequate. For the sorghum and sudans, the growing period was 58 days. These crops were harvested September 23rd and rainfall during this period was 5.2 inches with good subsoil moisture.

Table 7. Forage Study, Cut for Silage 1983, Northeast Research Station, Watertown, SD.

| Entry | Type* | Dry Yield Ton/A | Waller Grouping ** | | | Percent Protein | Plant Height Inches |
|---|---|---|---|---|---|---|---|
| NK XS 191 | Corn | 7.89 | | | A | 9.6 | 67 |
| Sigco 4300 | Corn | 7.82 | | | A | 10.4 | 73 |
| NK XS7902 | Corn | 6.94 | | | A | 8.6 | 72 |
| Pioneer 988 | GxS | 2.17 | | | B | 13.1 | 59 |
| Sokota 320F | F | 1.95 | | C | B | 11.7 | 50 |
| Sigco Sooner Sue | FxS | 1.89 | | C | B D | 10.9 | 56 |
| DeKalb ST-6+ | GxS | 1.78 | | C | B D | 10.7 | 63 |
| Sigco Super Sile 20 | SoxSo | 1.76 | | C | B D | 14.1 | 52 |
| Sigco Super Sweet 10 | SxSo | 1.75 | | C | B D | 10.0 | 65 |
| Pioneer XSG | GxS | 1.74 | | C | B D | 13.5 | 61 |
| NK 367 | FL | 1.74 | | C | B D | 9.3 | 54 |
| Sigco Bet-R-Sile | GxF | 1.54 | | C | B D | 8.8 | 55 |
| DeKalb FS-4 | F | 1.53 | | C | B D | 12.8 | 47 |
| NK Sordan 79 | GxS | 1.48 | | C | B D | 15.3 | 57 |
| Rose Atlas | FL | 1.43 | | C | B D | 15.5 | 48 |
| NK Sucro Sorgo 301 | SoxSo | 1.37 | | C | B D | 13.6 | 59 |
| Cenex Hiland Green | GxS | 1.31 | | C | B D | 10.8 | 62 |
| Sigco Sooner Sweet | GxS | 1.19 | | C | B D | 13.7 | 60 |
| Cargill 250S | F | 1.15 | | C | B D | 13.8 | 51 |
| Cenex Sweet Suso | SoxSo | 1.15 | | C | B D | 14.5 | 54 |
| DeKalb FS-1A+ | DP | 1.14 | | C | B D | 13.8 | 45 |
| NK Silo Milo 2 | FL | 1.13 | | C | B D | 14.5 | 49 |
| Rose Hegri | GxF | 1.08 | | C | B D | 13.0 | 41 |
| Rose Sweet N Red | F | 1.08 | | C | B D | 15.3 | 49 |
| Cenex Hiland Sweet | SxSo | 1.07 | | C | B D | 14.4 | 66 |
| Cargill SS100 | GxS | 1.06 | | C | B D | 14.8 | 62 |
| Pioneer 931 | FL | 1.05 | | C | B D | 13.8 | 61 |
| NK X8262F | S | 1.03 | | C | B D | 10.8 | 69 |
| NK X8264F | GxS | 1.03 | | C | B D | 11.4 | 63 |
| Pioneer 956 | GxF | 1.02 | | C | B D | 11.6 | 55 |
| Rose Leoti | FL | 1.02 | | C | B D | 15.0 | 47 |
| DeKalb FS-5 | F | 1.01 | | C | B D | 9.4 | 48 |
| Pioneer 947 | GxF | 1.01 | | C | B D | 14.6 | 53 |
| NK 300 | DP | 0.98 | | C | B D | 14.5 | 50 |
| DeKalb FS-25A+ | F | 0.97 | | C | B D | 15.0 | 47 |
| Pipersudan | S | 0.94 | | C | D | 11.5 | 60 |
| NK Trudan 8 | S | 0.94 | | C | D | 15.6 | 62 |
| Rancher | F | 0.92 | | C | D | 14.0 | 51 |
| NK X8261F | S | 0.86 | | C | D | 12.6 | 72 |
| NK Sucro Sorgo 405 | SoxSo | 0.82 | | C | D | 13.4 | 59 |
| Cargill 200F | F | 0.78 | | C | D | 15.1 | 49 |
| Cenex 70DT | GxF | 0.75 | | C | D | 15.0 | 53 |
| NK 326 | F | 0.71 | | | D | 12.6 | 50 |

* Type: S - Sudan; DP - Dual Purpose; FL - Forage Leafy; F - Forage; FxS - Forage x Sudan; GxF - Grain x Forage; GxS - Grain x Sudan; SoxSo - Sorgo x Sorgo; SxSo - Sudan x Sorgo.

** Means with the same letter are not significantly different.

To determine tons of hay, haylage, or silage, use the formula from Table 5.

# MISCELLANEOUS CROPS
Northeast Research Station 1983
Q. Kingsley and L. Evjen

## FORAGE RAPE - TYFON - KOCHIA

A planting of Dwarf Essex rape was planted May 3rd at a rate of 4 pounds per acre in 7 inch rows for observation and forage production. The rape grew to a height of 30 inches and was harvested July 20th yielding 2.01 tons of dry matter per acre. Volunteer growth from this crop would have been adequate for pasturing.

Tyfon is a broad leafed crop and is a cross between Chinese cabbage and turnip. The stalks are more succulent than rape and would make a better haylage or silage mix than a dry crop. It was planted at the same rate as rape and harvested the same day. Regrowth was similar to rape. At harvest it was 28 inches tall and produced 1.52 tons per acre dry matter. Both rape and tyfon were subject to feeding by flea beetles and leaf hoppers.

Kochia was planted May 3rd at 3 pounds per acre broadcast on the surface. This crop may be planted in the fall or very early spring with very little soil cover. The best time to cut it is at 18-24 inch height. Protein in the plant is about 23% at this time. The kochia on July 20th was 41 inches high and yielded 3.15 tons of dry matter per acre.

## RAPE FOR GRAIN

There were 45 entries of grain rape in this study, of which 43 numbered selections came from Europe and the other 2 from Pacific Seed Producers of Albany, Oregon. Pacific Seed was the source of seed which had been provided to them for distribution and testing.

The rape crop is fairly easy to grow. Seed depth of about one quarter inch is satisfactory at 4 pounds per acre. A soil insecticide is necessary for control of flea beetles and leaf hoppers. Windrowing should begin when the pods start to turn tan. Windrows that are too high may blow in the wind. The crop threshes easily but the wind on the sieves must be watched closely to reduce blow-over.

Yields varied from a high of 2219.9 pound down to 1143.3 pounds per acre. The average yield was 1612.4 pounds per acre. Plant heights vary from 36 to 42 inches and the days from planting to harvest is about 94 to 97 days. The rape was planted May 2nd and harvested between August 4th to the 7th. Rainfall during this period was 10.54 inches. The 4.6 inch rain of July 17th did quite a bit of damage to the rape.

# SAFFLOWER TRIALS

Q. Kingsley and L. Evjen

TITLE: Safflower Trials and Row Spacings

OBJECTIVES:

1. What entry performs most satisfactorily in this area of South Dakota?
2. Will various row spacings affect the yield and physical condition of the crop?

DISCUSSION:

Two row spacings, 7 and 14 inch, were used to plant safflower this year. The planting rate was 20 pounds per acre. This seemed to be adequate for the type of a season which occurred. The crop was planted April 27 and harvested August 26. There was 12.3 inches of moisture received during this period.

Safflower should be planted about the same time as wheat. The plant will produce some top growth and then seem to go dormant. It is during this dormant period that roots are growing and when a certain stage is reached the top will elongate. Late plantings set the plant back and roots are not as extensive in the soil. The results of this study are shown in Table 8. None of the varieties exceeded the 40 pound test weight. No insects, disease, or lodging were observed in these plantings. Excess rain in July hampered productivity of the crop.

RESULTS:

Table 8. Safflower Variety Row Space and Yield Study. Northeast Research Station, 1983.

| | Row Spacing in Inches | | | | | |
|---|---|---|---|---|---|---|
| | 7 inch | | | 14 inch | | |
| Entry | test wt. | % oil | yield lb/A | test wt. | % oil | yield lb/A |
| S-541 | 35.9 | 37.4 | 1410.5 | 39.0 | 39.7 | 1389.4 |
| S-208 | 35.9 | 36.4 | 1095.2 | 35.3 | 36.8 | 1221.0 |
| Rehbein | 37.0 | 36.2 | 1012.3 | 36.3 | 35.6 | 1086.2 |
| Hartman | 36.8 | 37.9 | 1178.2 | 36.6 | 36.1 | 1237.8 |
| Lesaf 34 COO | 35.1 | 33.6 | 954.2 | 34.3 | 33.6 | 1086.2 |
| Lesaf 34 AY 000 | 33.6 | 32.0 | 1012.3 | 32.5 | 32.7 | 1128.3 |
| 2793-2 | 34.1 | 36.3 | 1053.8 | 32.9 | 35.5 | 1170.4 |
| Average yield | | | 1102.4 | | | 1188.5 |

Note: All differences are nonsignificant.

## OAT BREEDING & TESTING

D. L. Reeves

The Watertown location is one of our main testing sites for oats. Since it is such a good testing location for oats, we usually have about 1100 different plots at this location each year. The material tested here includes new crosses which we are just beginning to look at all the way through the final evaluation when we decide which ones to release as varieties. One regional test is also grown here.

This is the main testing station in determining the best grain quality a selection is capable of producing. Many of our selection decisions are made based upon information that we obtain from this location.

## SPRING WHEAT BREEDING PROGRAM

F. A. Cholick, K. M. Sellers, and G. W. Buchenau

The yield, maturity, plant height, and percent protein results for the spring wheat advanced yield trial are presented in Table 9. This trial is conducted to compare the best experimental lines from the breeding program with selected check varieties. It is extremely difficult to obtain an adequate evaluation at one site or in one year; therefore, this nursery is grown at 9 locations throughout the spring wheat production area each year. The mean grain yield was 30.1 bu/A, which was approximately 13 bu/A less than the past five years. Protein contents were 1.5-2.0% higher than in previous years. This is a reflection of the lower yields and due to the fact the plots were fertilized for a 50 bu/A yield goal.

A seed treatment study with two varieties, Olaf and Centa, and treatment of Benlate T, Vitavax200, and an untreated control was conducted to evaluate the effects of seed treatments on yield. Sound seed samples with little or no scab or loose smut were used to determine the effects of seed treatment in the absence of these diseases. The seed treatments produced no effects on grain yield (control 30.5, Benlate T 30.6, and Vitavax200 30.5 bu/A). Seed treatments also produced no effects at the other four sites where this experiment was grown.

The plots were planted on April 26, 1983 at a seeding rate of 75 lbs/A with adequate moisture at planting. There were little or no problems with weeds or diseases at this site in 1983. Harvest was completed on August 1, 1983.

Table 9. 1983 Watertown Advanced Yield Trial

| Variety | Pedigree | Yield 1983 | Yield 1982 | Planting to Heading | Height | Protein |
|---|---|---|---|---|---|---|
| | | bu/A | | days | inches | % |
| Butte | | 31.9 | 47.3 | 59 | 28 | 17.4 |
| Centa | | 29.3 | 44.2 | 58 | 28 | 16.8 |
| James | | 29.7 | 43.5 | 58 | 29 | 17.3 |
| Oslo | | 32.1 | 44.2 | 59 | 25 | 16.4 |
| Olaf | | 29.0 | 36.8 | 61 | 26 | 17.6 |
| Len | | 26.9 | 42.2 | 61 | 27 | 18.4 |
| Guard | | 29.9 | 45.2 | 59 | 23 | 17.1 |
| Era | | 30.5 | 38.5 | 62 | 27 | 17.2 |
| Marshall | | 29.9 | 40.3 | 62 | 25 | 17.5 |
| Wheaton | | 28.2 | 41.6 | 62 | 24 | 17.3 |
| Angus | | 30.5 | -- | 62 | 27 | 18.1 |
| Eureka | | 26.3 | 38.5 | 61 | 28 | 18.7 |
| Alex | | 28.2 | 46.2 | 62 | 30 | 18.9 |
| ND 582 | ND 527/Coteau S//Era | 28.8 | -- | 62 | 27 | 18.6 |
| SD 2854 | James/SD 2049 | 30.1 | 46.2 | 60 | 28 | 18.2 |
| SD 2861 | EE/Prodax | 31.5 | 44.6 | 57 | 23 | 17.0 |
| SD 2881 | PRT/RL6010 | 30.8 | 43.9 | 61 | 26 | 17.5 |
| SD 2912 | PRT/RL6010//Marshall | 30.2 | 48.5 | 59 | 26 | 17.4 |
| SD 2925 | Butte/James | 30.9 | 46.0 | 61 | 27 | 17.5 |
| SD 2942 | Butte/EE (SD 2835-6) | 32.8 | 48.8 | 60 | 28 | 17.6 |
| SD 2943 | Butte/EE (SD 2837-2) | 30.9 | 46.7 | 60 | 28 | 17.0 |
| SD 2946 | Butte/SD 2271//MN 70181 | 29.8 | 44.7 | 59 | 27 | 17.3 |
| SD 2948 | PRT/RL 6010//James | 34.4 | 44.8 | 62 | 29 | 18.1 |
| PRO 711 | | 27.6 | 39.9 | 61 | 26 | 17.6 |
| SD 2952 | PRT/RL 6010//Marshall | 27.3 | 43.9 | 61 | 24 | 18.2 |
| SD 2955 | 2167/MN 70181//SD 2853 | 26.9 | 45.2 | 61 | 26 | 17.3 |
| SD 2956 | Butte/CO 53427//WS 1809 | 30.2 | 47.2 | 61 | 25 | 17.4 |
| SD 2960 | MN 7378/SD 2845 | 30.4 | | 60 | 27 | 16.4 |
| SD 2961 | Butte/SD 2700 | 33.6 | | 60 | 28 | 17.3 |
| SD 2962 | SO 2827/5/BGS .../4/CNO | 31.2 | | 59 | 27 | 16.9 |
| SD 2963 | Era/Olaf//PRT | 27.6 | | 61 | 29 | 17.9 |
| SD 2964 | E/JM/2049/3/M7083/74219I | 27.1 | | 60 | 25 | 17.8 |
| SD 2965 | Alex/MN 7125 | 29.4 | | 61 | 26 | 16.7 |
| SD 2966 | Alex/MN 7125 | 28.9 | | 61 | 26 | 16.3 |
| SD 2967 | Len/Junco S | 27.5 | | 62 | 27 | 17.7 |
| SD 2968 | SD 2256/Wheaton | 32.9 | | 61 | 26 | 17.1 |
| SD 2969 | SD 2700/SD 2818 | 31.7 | | 60 | 27 | 16.9 |
| SD 2970 | 2167/MN 70181//SD 2853 | 28.9 | | 59 | 28 | 16.5 |
| SD 2971 | AGT/3/.../4/Butte/5/Len | 29.9 | | 60 | 25 | 17.4 |
| SD 2972 | SD 2838/MN 7460//PRT | 29.4 | | 60 | 24 | 17.7 |
| SD 2973 | SD 2847/CGT700//8utte | 29.1 | | 60 | 23 | 17.7 |
| SD 2974 | SD 2869/SD 74115//Centa | 30.8 | | 61 | 30 | 17.0 |
| SD 2975 | NK5511/SD 2827//Butte | 30.3 | | 61 | 27 | 16.6 |
| SD 2976 | Coteau/Dawn//2902 | 29.8 | | 61 | 32 | 16.8 |
| SD 8026 | Coteau/Dawn | 34.7 | | 59 | 26 | 17.0 |
| SD 8035 | Butte 2*/65 49-8-101-16 | 31.7 | | 59 | 27 | 17.2 |
| SD 8036 | Butte 2*/Arthur 71 | 31.9 | | 59 | 26 | 16.9 |
| SD 8048 | Coteau/Dawn (8026R) | 34.1 | | 58 | 26 | 16.6 |
| SD 8049 | Guard/SD 2892 | 29.8 | | 61 | 28 | 17.5 |

## Standard Variety Small Grain Trials

J. J. Bonnemann

The 1983 small grain trials were seeded at the NE Research Station on April 25. Harvest was during late July and early August as the entries matured. Yield and quality of most crops was good for the drier conditions that prevailed in the area. Data presented are 1983 and 3-year yield, available 3-year averages for test weight, lodging percent, height, and percent protein. The oat readings are for groat protein which averaged 3.5-4 percent higher than for normal oats with the hull. Additional information is found in Plant Science Pamphlet #75, 1983 Small Grain Variety Trials.

Table 10. Small Grain Trials, Northeast Farm, Watertown, SD.

| Brand | Variety | Bu/A | | Three-year averages | | | |
|---|---|---|---|---|---|---|---|
| | | 1983 | 3-yr | Test weight | Percent protein | Percent lodging | Height inches |
| BARLEY | | | | | | | |
| | Firlbecks III | 41 | 42 | 46.8 | 17 | | 28 |
| | Larker | 51 | 50 | 47.5 | 15 | 3 | 29 |
| | Primus II | 63 | 49 | 48.4 | 14 | 3 | 28 |
| | Glenn | 52 | 47 | 45.9 | 15 | | 27 |
| | Morex | 56 | 50 | 46.4 | 15 | 5 | 30 |
| | Clark | 45 | | | | | |
| | Azure | 58 | | | | | |
| | Robust | 61 | | | | | |
| NAPB | Bumper | 53 | 52 | 45.2 | 15 | | 29 |
| OATS | | | | | | | |
| Arrowhead | EX400 | 75 | | | | | |
| Arrowhead | 135E Blend | 66 | | | | | |
| Arrowhead | 335M Blend | 70 | | | | | |
| Arrowhead | Exp 300 | 78 | | | | | |
| | Burnett | 74 | 73 | 35.1 | 16 | 13 | 34 |
| | Nodaway 70 | 58 | 63 | 35.7 | 17 | 10 | 32 |
| | Chief | 63 | 65 | 33.0 | 18 | 8 | 32 |
| | Otee | 67 | 60 | 34.5 | 20 | | 29 |
| | Dal | 68 | 66 | 34.7 | 18 | 10 | 32 |
| | Noble | 71 | 65 | 34.1 | 18 | | 30 |
| | Lyon | 72 | | | | | |
| | Bates | 69 | 66 | 34.2 | 16 | | 30 |
| | Wright | 76 | 70 | 36.5 | 17 | | 34 |
| | Lancer | 73 | 74 | 34.6 | 18 | | 31 |
| | Lang | 73 | 73 | 32.8 | 17 | | 29 |
| | Benson | 70 | 70 | 33.9 | 17 | 10 | 33 |
| | Moore | 85 | 76 | 33.9 | 17 | | 33 |
| | Marathon | 77 | | | | | |
| | Larry | 83 | 74 | 33.7 | 16 | | 27 |
| | Ogle | 93 | 79 | 32.2 | 15 | | 29 |

Table 10 Cont.

| Brand | Variety | Bu/A 1983 | Bu/A 3-yr | Three-year averages: Test weight | Percent protein | Percent lodging | Height inches |
|---|---|---|---|---|---|---|---|
| OATS Cont. | | | | | | | |
| | Porter | 87 | | | | | |
| | Preston | 66 | 63 | 35.0 | 20 | 2 | 31 |
| | Pierce | 78 | | | | | |
| | Centennial | | | | | | |
| SPRING WHEAT | | | | | | | |
| Arrowhead | AHEx200 | 41 | | | | | |
| | Chris | 33 | 32 | 59.0 | 17 | 4 | 36 |
| | Era | 40 | 37 | 58.1 | 15 | | 30 |
| | Olaf | 35 | 34 | 57.9 | 16 | | 31 |
| Nor-King | Protor | 34 | | | | | |
| | Lew | 31 | 33 | 58.3 | 16 | 7 | 34 |
| | Butte | 35 | 36 | 60.7 | 15 | 5 | 32 |
| | Eureka | 31 | 33 | 56.5 | 17 | | 35 |
| | Angus | 38 | 38 | 60.3 | 16 | 10 | 29 |
| | Coteau | 36 | 32 | 58.7 | 17 | | 34 |
| | Len | 33 | 35 | 58.2 | 17 | | 31 |
| | James | 32 | 33 | 58.1 | 16 | | 32 |
| | Pondera | 33 | 35 | 59.4 | 15 | | 30 |
| NAPB | Oslo | 36 | 36 | 56.0 | 15 | | 29 |
| | Alex | 34 | 35 | 59.4 | 17 | | 34 |
| | Marshall | 38 | 35 | 56.6 | 16 | | 27 |
| | Guard | 36 | | | | | |
| | Centa | 35 | 36 | 60.2 | 15 | 2 | 33 |
| Dak. Oats | MPV-2 | 32 | | | | | |
| Dak. Oats | MPV-3 | 32 | | | | | |
| Cuasmex | A99ar | 37 | | | | | |
| NAPB | Erik | 39 | | | | | |
| Agsco | Walera | 40 | 37 | 56.7 | 15 | | 29 |
| Agsco | Solar | 39 | 37 | 57.6 | 15 | | 29 |
| Nor-King | Probrand 711 | 33 | 31 | 58.4 | 16 | 5 | 29 |
| | Wheaton | 37 | | | | | |
| Pioneer | PR 2360 | 34 | | | | | |
| Pioneer | PR 2369 | 33 | | | | | |
| Westbred | Challenger | 33 | | | | | |
| Westbred | Aim | 21 | 30 | 54.8 | 15 | | 28 |
| Westbred | 9906R | 32 | 33 | 57.8 | 15 | | 27 |
| DURUM | | | | | | | |
| | Ward | 36 | 35 | 60.7 | | | 34 |
| | Crosby | 36 | 34 | 60.5 | | | 34 |
| | Rugby | 36 | 34 | 60.4 | | | 34 |
| | Cando | 35 | 35 | 58.7 | | | 26 |
| | Edmore | 35 | 34 | 60.7 | | | 35 |
| | Vic | 33 | 35 | 60.5 | | | 35 |
| | Lloyd | 37 | | | | | |

## Nematicide/Insecticide Field Trials and Related Information

James D. Smolik

Both stem insect and nematode populations in sunflower were reduced by Furadan and Temik applications at the NE Experiment Farm north of Watertown (Table 11). Application of Furadan 4F four and six weeks after planting also reduced stem insect populations, however the 1 pt. rate appeared to be less effective than the 2 and 4 pt. rates. Yield data was not obtained at this location because of a severe head clipper infestation resulting in 30-60% damage across the various plots.

Table 11. Effect of insecticide/nematicide treatments on stem insect and nematode populations in sunflower, NE Research Station, 1983.

| Treatment | Time of Application | Insects/stalk Aug. 15 Long Horn Stem Bore | Stem weevils | No. of plant feeding nematodes/100 cc soil Pre-treat | Aug. 15 |
|---|---|---|---|---|---|
| | Planting | | | | |
| Check | | 1.3[a] | 6.4 | 10 | 313 |
| 2 lbs Furadan | | 0.6 | 1.3 | | 18 |
| 16 oz Temik | | 0.6 | 1.0 | | 0 |
| | 4 wks post plant | | | | |
| Check | | 1.2 | 5.6 | | |
| 2 pt Furadan 4F | | 0.6 | 1.4 | | |
| 4 pt Furadan 4F | | 0.6 | 0.6 | | |
| | 6 wks post plant | | | | |
| Check | | 0.8 | 5.0 | | |
| 1 pt Furadan 4F | | 0.8 | 2.4 | | |
| 2 pt Furadan 4F | | 0.4 | 1.4 | | |

[a]Average of 4 reps.

Table 12. Soil test results - 1983 field studies.

| Location | Organic matter % | pH | Salts | Texture | % Sand | % Silt | % Clay |
|---|---|---|---|---|---|---|---|
| NE Farm | 3.1 | 7.2 | 0.7 | Clay-Loam | 29.1 | 39.0 | 31.9 |

## Sunflower Seed Weevil Date of Planting Study

J. Gednalske - D. Walgenbach

Four sunflower hybrids were planted on three dates in 1983. Sunflowers were planted in 4 row plots with 36 inch spacings 100 ft long and replicated 6 times. Plots were hand harvested for yield on 10/28/83. Seed weevil damage was determined by removing 100 seed samples from harvested seed removed in each plot in 6 reps, and counting seeds infested.

Table 13. Seed weevil damage and yield data.

| Planting Date | Hybrid | Mean % Seed Damaged | | | | | Yield Lbs/A |
|---|---|---|---|---|---|---|---|
| June 1 | Sigco 432 | 35.3 | A | | | | 910 |
| June 1 | Sigco 894 | 30.2 | A | B | | | 1007 |
| June 1 | Sokota 2057 | 28.1 | | B | | | 1001 |
| June 1 | Interstate 7101 | 26.8 | | B | | | 1182 |
| May 16 | Sigco 894 | 15.2 | | | C | | 1049 |
| May 1 | Sigco 894 | 12.8 | | | C | D | 1383 |
| May 16 | Interstate 7101 | 12.5 | | | C | D | 1003 |
| May 16 | Sigco 432 | 9.9 | | | C | D E | 1089 |
| May 16 | Sokota 2057 | 9.6 | | | C | D E | 938 |
| May 1 | Interstate 7101 | 7.2 | | | | D E | 1260 |
| May 1 | Sigco 432 | 6.6 | | | | D E | 1111 |
| May 1 | Sokota 2057 | 5.5 | | | | E | 1234 |

The early planting of sunflower in 1983 again showed a dramatic reduction in seed weevil damage compared to later planting dates. The key aspect of this sunflower seed weevil relationship is that the flowers that bloom prior to or around August 1 escape peak egg laying period of the weevils. The cool wet spring delayed development of the earliest planting date and tended to group the damage of the first two dates more than in 1982.

Yields were not significantly different at Watertown in 1983. Although trends did show a slight advantage to the earlier dates; however, this was not the case at our Redfield location. Therefore we have much to learn about fertility and hybrid interactions at the early dates before recommendations of early planting can be made.

## Chlorsulfuron Recropping Study

M. A. Peterson and W. E. Arnold

Chlorsulfuron (Tradename: Glean) is a very effective herbicide which is currently labeled for use in wheat and barley. In order to investigate possible carryover problems, split plot experiments were established at the Northeast Research Station near Watertown, and the James Valley Research Farm near Redfield.

In the spring of 1981, four rates of chlorsulfuron (0.0, 0.015, 0.03, and 0.06 lb active ingredient per acre) were applied postemergence to oats at the Watertown location and spring wheat at the Redfield location. Flax, sunflowers, corn, soybeans, and grain sorghum were planted into the treated areas in the spring of 1982 and crop injury was evaluated by means of visual ratings and crop dry weight samples. Also in 1982, experiments were established at both locations on spring wheat to duplicate those established in 1981. Test crops were planted in all experiments again in 1983. Tables 14 and 15 show visual crop injury ratings for 1982 and 1983.

Crop injury was substantially greater at the Redfield location in both 1982 and 1983. Differences in climate and soil texture between the two locations were small, but differences in soil pH and organic matter appeared to be large enough to explain the higher crop injury at Redfield (pH 7.5, organic matter 3.0%) than at Watertown (pH 6.4, organic matter 4.0%).

A large variation in crop injury at a given herbicide rate was observed within one of the Watertown experiments. In one instance, corn injury from the 0.06 lb/A rate ranged from 10% to 95%. Soil samples were taken from these areas of varying crop injury and tests of pH and organic matter made. Multiple regression analysis showed a strong correlation between crop injury the year following chlorsulfuron application and soil pH and organic matter. Soil pH appeared to exert an especially strong influence, with crop injury increasing rapidly as pH rises from 6.0 to 7.0.

Table 14. Crop Injuries for Experiments Established 1981.

| Crop | Rate (1981) | Watertown 1982 | Watertown 1983 | Redfield 1982 | Redfield 1983 |
|---|---|---|---|---|---|
| Flax | 0.015 | 0 | 0 | 38 | - |
| | 0.03 | 0 | 0 | 54 | - |
| | 0.06 | 5 | 0 | 72 | - |
| Sunflowers | 0.015 | 0 | 0 | 21 | 13 |
| | 0.03 | 0 | 0 | 38 | 39 |
| | 0.06 | 8 | 0 | 77 | 34 |
| Corn | 0.015 | 0 | 0 | 34 | 9 |
| | 0.03 | 5 | 0 | 59 | 16 |
| | 0.06 | 8 | 0 | 77 | 39 |
| Soybeans | 0.015 | 0 | 0 | 37 | 23 |
| | 0.03 | 0 | 0 | 62 | 28 |
| | 0.06 | 0 | 0 | 89 | 49 |
| Sorghum | 0.015 | 0 | 0 | 44 | 4 |
| | 0.03 | 0 | 0 | 78 | 12 |
| | 0.06 | 5 | 0 | 93 | 14 |

*Flax stand in this experiment was poor and injury was not evaluated.

Table 15. Crop Injuries for Experiments Established 1982.

| Crop | Rate (1982) | % Crop Injury 1983 Watertown | % Crop Injury 1983 Redfield |
|---|---|---|---|
| Flax | 0.015 | 4 | 33 |
| | 0.03 | 10 | 55 |
| | 0.06 | 20 | 84 |
| Sunflowers | 0.015 | 3 | 43 |
| | 0.03 | 8 | 74 |
| | 0.06 | 28 | 92 |
| Corn | 0.015 | 25 | 60 |
| | 0.03 | 29 | 72 |
| | 0.06 | 44 | 88 |
| Soybeans | 0.015 | 5 | 58 |
| | 0.03 | 13 | 76 |
| | 0.06 | 30 | 89 |
| Sorghum | 0.015 | 18 | 65 |
| | 0.03 | 26 | 81 |
| | 0.06 | 51 | 91 |

Stubble Weed Control Demo
L. Wrage and P. Johnson

Table 16.

| Treatment | Carrier (gpa) | lb/A prod. | Seed Reduction | Foxtail Kill |
|---|---|---|---|---|
| | | | % | |
| Roundup + X-77 | 5 | 4 fl oz | 78 | 87 |
| Roundup + X-77 | 5 | 16 fl oz | 74 | 93 |
| Roundup + X-77 | 5 | 8 fl oz | 82 | 89 |
| Roundup + X-77 | 20 | 8 fl oz | 32 | 55 |
| Roundup + X-77 | 20 | 8 fl oz (hard) | 28 | 38 |
| Roundup + X-77 | 20 | 8 fl oz (AS) | 48 | 60 |
| Paraquat + X-77 | 20 | 2 pt | 97 | 92 |
| Paraquat + X-77 | 20 | 1 pt | 83 | 81 |
| Paraquat + X-77 | 10 | 1 pt | 35 | 42 |
| Paraquat + X-77 | 20 | 1/2 pt | 52 | 22 |

Applied: 8/26/83
Evaluated: 9/8/83

## 1983 South Dakota Hybrid Sunflower Trial

Charles Lay and Kathleen Grady

Seed yield and oil content were generally lower in 1983 than in 1982 due to the high temperatures and somewhat lower rainfall during the growing season. However, moisture at seeding was good resulting in good stands for most hybrids.

Plots were 33 feet long and consisted of 4 rows spaced 30 inches apart. The experimental design was a randomized complete block with 3 replications. Approximately 100 $ft^2$ from the 2 center rows of each plot were harvested for yield at all locations except yield. Final plant population and percent lodging were estimated from this same area at harvest. All seed yields are expressed at moisture levels below 10%. Plant height was determined at harvest by measuring from ground level to center of the head. Oil content was determined using a Newport NMR on oven-dry samples and converted to 10% moisture. Oil yield was calculated from seed yield and oil content at 10% moisture data for each plot. Gross income was calculated based on a market price of $13.00 per hundredweight plus a factor for oil. The oil factor was 2% of the market price for each percentage point of oil (graduated in 0.1% oil) above or below 40.0%.

Table 17. Results of the 1983 Hybrid Sunflower Trial at South Shore, SD.

| Identification | | Seed Yield | | Oil Content | | Oil Yield | | Gross Income | Plant Height | Lodging |
|---|---|---|---|---|---|---|---|---|---|---|
| Company | Hybrid | 1983 (lbs/A) | 1982 (lbs/A) | 1983 (%) | 1982 (%) | 1983 (lbs/A) | 1982 (lbs/A) | (dollar) | (inches) | (%) |
| PAG | SF 101 | 1708 | 1739 | 39.0 | 40.3 | 666 | 701 | 218 | 53 | 3 |
| Cargill | C 207 | 1604 | 2277 | 32.6 | 36.6 | 528 | 833 | 179 | 69 | 8 |
| Stauffer | S-1300 | 1563 | | 35.4 | | 554 | | 185 | 59 | 3 |
| Seedtec | ST 316 | 1510 | 1517 | 36.8 | 37.7 | 556 | 572 | 184 | 61 | 7 |
| Sokota | SK 82-2200 | 1476 | | 34.9 | | 512 | | 172 | 65 | 5 |
| PAG | SF 102 | 1474 | 2264 | 36.8 | 38.1 | 543 | 863 | 180 | 64 | 20 |
| Northrup King | NK 265 | 1472 | 1676 | 37.6 | 40.1 | 554 | 672 | 182 | 59 | 4 |
| Seedtec | ST 315 | 1416 | 1970 | 35.0 | 36.8 | 495 | 725 | 166 | 70 | 8 |
| Arrowhead | 707-8 | 1412 | | 35.5 | | 504 | | 168 | 64 | 7 |
| Sokota | SK 2057 | 1382 | 1640 | 36.1 | 37.3 | 499 | 612 | 166 | 70 | 11 |
| Data | 82102 | 1338 | | 35.5 | | 475 | | 158 | 64 | 19 |
| Stauffer | S-1888 | 1306 | 1791 | 36.8 | 38.4 | 482 | 688 | 159 | 61 | 10 |
| Sunflo | X 10083 | 1295 | | 40.9 | | 529 | | 171 | 65 | 16 |
| Gro Agri | GA 378 | 1291 | 1747 | 40.0 | 41.0 | 517 | 716 | 168 | 61 | 7 |
| Sokota | SK 4000 | 1285 | 2006 | 36.4 | 39.1 | 467 | 784 | 155 | 58 | 8 |
| O's Gold | OG 614 | 1265 | 1805 | 36.2 | 38.0 | 460 | 686 | 153 | 63 | 4 |
| Sexauer | S811 | 1260 | 1718 | 37.6 | 38.5 | 474 | 661 | 156 | 62 | 9 |
| Jacques | J 311 | 1255 | 1840 | 36.2 | 36.8 | 455 | 677 | 151 | 63 | 3 |
| Check | Hybrid 894 | 1255 | 1832 | 37.2 | 38.1 | 459 | 698 | 154 | 60 | 10 |
| Sigco | Sigco 455 | 1238 | | 33.4 | | 412 | | 139 | 68 | 9 |
| Kaltgen | KO 66 | 1232 | | 35.9 | | 442 | | 147 | 65 | 12 |
| Interstate | IS 7111 | 1232 | | 38.4 | | 474 | | 155 | 62 | 10 |
| Dahlgren | DO 705 | 1225 | 1835 | 36.4 | 39.0 | 445 | 716 | 148 | 68 | 14 |
| Northrup King | NK 254 | 1213 | 2062 | 36.8 | 38.6 | 448 | 796 | 148 | 61 | 15 |
| O's Gold | Exp 8152 | 1199 | | 35.5 | | 426 | | 142 | 65 | 8 |
| Cargill | C206 | 1170 | 1913 | 33.7 | 38.8 | 392 | 742 | 132 | 59 | 17 |
| Gro Agri | GA 382 | 1162 | 1991 | 38.7 | 40.2 | 450 | 800 | 147 | 60 | 7 |
| Jacques | J 503 | 1162 | 1648 | 36.1 | 37.3 | 419 | 615 | 139 | 66 | 15 |
| Sigco | Sigco 470 | 1162 | | 40.3 | | 468 | | 152 | 66 | 11 |
| DeKalb | DK 3412 | 1158 | | 35.9 | | 417 | | 138 | 59 | 5 |
| Gro Agri | GA 380-A | 1155 | 1779 | 40.7 | 41.7 | 470 | 742 | 152 | 65 | 11 |
| Sexauer | S 305A | 1148 | 1761 | 36.9 | 38.6 | 424 | 680 | 140 | 63 | 3 |
| Keltgen | DO 704XL | 1145 | 1703 | 35.0 | 37.9 | 401 | 645 | 134 | 69 | 22 |

Table 17 Cont.

| Identification | | Seed Yield | | Oil Content | | Oil Yield | | Gross Income | Plant Height | Lodging |
|---|---|---|---|---|---|---|---|---|---|---|
| Company | Hybrid | 1983 (lbs/A) | 1982 (lbs/A) | 1983 (%) | 1982 (%) | 1983 (lbs/A) | 1982 (lbs/A) | (dollar) | (inches) | (%) |
| Sexauer | X 30083 | 1143 | | 33.2 | | 379 | | 128 | 62 | 4 |
| Arrowhead | Bonus | 1137 | | 37.6 | | 427 | | 141 | 62 | 10 |
| DeKalb | DK 3334 | 1135 | | 34.3 | | 390 | | 131 | 64 | 15 |
| Check | Hybrid 903 | 1134 | 1848 | 34.8 | 36.3 | 395 | 671 | 132 | 64 | 4 |
| Data | 82101 | 1133 | | 34.9 | | 394 | | 132 | 63 | 13 |
| Stauffer | S-1830 | 1126 | | 37.3 | | 420 | | 139 | 63 | 14 |
| DeKalb | DKS-37 | 1080 | 1833 | 35.3 | 38.1 | 382 | 698 | 127 | 59 | 15 |
| Arrowhead | 747 | 1064 | 2050 | 40.0 | 40.8 | 426 | 836 | 138 | 57 | 15 |
| Check | 400x299 | 1014 | | 39.3 | | 399 | | 130 | 62 | 32 |
| Test average | | 1265 | | 36.5 | | 463 | | 153 | 63 | 11 |
| $LSD_{.10}$ | | 213 | | 1.9 | | 85 | | 27 | 4 | 13 |
| Coefficient of variation | | 13 | | 4 | | 14 | | 13 | 5 | 85 |
| Correlation with yield | | 1.00 | | 0.08 | | 0.94 | | 0.96 | -0.07 | -0.50 |

Planting date: June 7
Harvest date: Oct. 11
Population at harvest: 17260 plants/A