

ANNUAL PROGRESS REPORT

NORTHEAST RESEARCH STATION  
Watertown, South Dakota

Introduction

The State Legislature appropriated money in 1955 for new research in crops, soils and crop diseases in northeastern South Dakota. A 20-acre site was originally selected. It is located on the Otto Korth farm, 15 miles north of Watertown at the junction of Highways 81 and 20. A second site was added in 1965 at Garden City. It was located on the Everett Fletcher farm, 2 miles north and a half mile west of the Garden City junction on Highway 25. There were 45 acres in this farm for crop and soil management and 15 acres for weed control studies.

In 1969, a third research unit was added to the Northeast Research Farms. It was located one mile east and one and one half miles north of Twin Brooks, on the Max Goerke farm. This farm was established through the combined efforts of the farmers and businessmen in Grant and Roberts counties. These people solicited contributions for use in paying the land rental and use of a building on the Goerke building site. The new unit was known as the Whetstone Valley Research Farm. There were 20 acres in this farm for crop and soil management and weed control studies.

These farms provided research facilities to obtain solutions for local problems in crop production and soil management. Soil and crop management experiments include tillage methods and the use of fertilizers and the soil fertility. Crop oriented experiments were conducted on disease control, weed control, and the testing of potentially adaptable varieties.

Evaluation of plant materials by plant breeders in the Plant Science Department was carried on at these farms. Local weather conditions aid in the selection of plants adapted to the area.

There will be an evening Crop Tour at the Watertown Station July 9, 1981 at 6:30 PM. Tours may be scheduled by the County Extension Agents at this site.

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 1980 growing season.

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# Brief History

ion was put into operation in 1955 and experimen-  
 personnel on the station were Quentin Kingsley,  
 Hubert as an advisor. Many experiments were in-  
 maintained through 1964. The plant breeding grow-  
 grains continued and is still in operation. During  
 been set up for weed control studies in row and  
 studies are now conducted on the station along  
 ng year. In 1980, soybeans were planted on the  
 allowed and a variety-population study was set up.  
 and sudangrass and grain sorghum was also started

e was started north of Garden City, which was laid  
 there were Polinsett silty clay, a waterlain soil  
 onnel on this station were Quentin Kingsley and  
 ty. This station was operated through 1973 and

ed in the Whetstone Valley and put into operation  
 was Peever, which is a heavy soil and time of  
 This farm was run through 1973 and closed down.  
 Quentin Kingsley and Harry C. Nelson from

## ch Station Board of Directors

### County

### Address

Codington  
 Codington  
 Clark  
 Day  
 Deuel  
 Grant  
 Hamlin  
 Marshall  
 Roberts  
 SDSU  
 SDSU

Plant Science Dept., SDSU  
 South Shore

## 1980 CROP SEASON

Rainfall	Inches	Departure
April	0.43	-1.63
May	3.09	+0.12
June	4.97	+1.27
July	1.96	-0.71
August	3.82	+1.04
September	0.72	-1.13
October	0.68	-0.48
Total	15.67	-1.52 April through October

NOTE: The Northeast Research Station Board of Directors  
 names will be completed after the March 6, 1981  
 planning meeting in Waterford.

Quentin S. Kingsley

Director

Member

Robert  
 Mayr

General  
 Quentin  
 Loyal

CROP HISTORY FOR SUNFLOWERS

James Valley Research Station: Redfield, SD, 6 miles east.

Dryland: Planted: May 23 Harvested: October 21  
Population: (1) 16,000/A in Variety Test, 36" rows  
: (2) 16,000/A in Insect Studies  
: Variety IS3100, #3 seed used in (2)  
Herbicide: Tolban, 1 qt/A or 1/2#/A disked in  
Insecticide: None  
Replications: Four (4)  
Soil Preparation: Chisel and Disk  
Cultivations: Two (2)  
Soil Type: Beotia-Great Bend-Harmony  
Rainfall: 15.0 Inches, May 23 - October 21  
First Killing Frost in Fall: October 3

Northeast Research Station, Watertown, SD, 15 miles north.

Dryland: Planted: May 28 Harvested: October 13  
Population: (1) 15,800/A in Variety Test, 36" rows  
: (2) 9,500; 15,800 & 24,000 Population Study  
: (3) 16,000/A Insect Studies  
: Variety IS3100, #3 seed used in (2) & (3)  
Herbicide: Tolban, 1 qt/A or 1/2#/A disked in  
Insecticide: Supracide, 1 qt/A  
Replications: Four (4)  
Soil Preparation: Chisel and Disk  
Cultivations: Two (2)  
Soil Type: Kranzburg Silty Clay Loam  
Rainfall: 14.25 Inches May 28 to October 13  
First Killing Frost in Fall: October 3



SUNFLOWER VARIETY TRIALS  
Q. S. Kingsley

OBJECTIVE: To test various sunflower varieties grown in the state for yield percent oil, diseases and general plant characteristics.

CROP YEAR HISTORY: Note Sunflower Crop Year Histories, Page 3.

DISCUSSION: With the continued improvement in hybrid sunflowers and the experience gained from past years, the crop should fit in well with present crop rotations. There are many varieties that react differently to irrigation than dryland plantings. The one major change is the increased plant height that occurs when irrigated, in most years.

Areas east of Highway 281, on dryland, produced higher yields per acre due mainly to increased rainfall. Sunflower seed production west of Highway 281, under dryland conditions, were sporadic. The rainfall patterns were so varied that any variation in soil type was evident in the field. The yields produced in 1979 were the best over the years. The state average last year was about 1,250 pounds per acre and 612,000 acres were planted. In 1980, there were 519,000 acres planted and about 467,000 acres harvested.

The dryland sunflowers were a failure on the Onida satellite in 1980 where rainfall amounted to 5.65 inches for the growing season.

Irrigated sunflowers under any population produced yields that offset the cost of water applied. An increase of 35 pounds of seed per acre in 1980 offset the cost of irrigation at \$3.00 per acre application cost. The dryland yields in Sully County, where the irrigated studies were conducted, amounted to about 800 pounds per acre. Yields on irrigated fields run from 1,500 to 2,000 pounds per acre or better.

There were numerous variety trials in 1980 with the same varieties used in each case. The Sunflower Association of America provided the seed for these plantings. Yields for each location may be found in Tables 1 and 2. The Crop Histories are on Page 3.

Table 1. NE Research Station - Watertown  
Sunflower Varieties - 1980  
Dryland

Identification	Yield #/A	% Oil	Test Wt.
1. PAG SF 101	2019.2	42.5	30.0
2. Interstate Seed IS 3100	1989.0	44.1	29.0
3. Master Farmer MF 707	1936.0	35.1	30.5
4. Sunbred (NK) NK 254	1928.5	40.4	30.5
5. Agra-Sun Prod. GH 10	1905.8	40.6	29.5
6. Sokota Hybrid SKA 4000	1883.1	40.3	30.0
7. TNT Sales TNT 444	1762.1	41.4	29.5
8. Jacques Seed J 501	1724.3	41.1	29.0
9. RBA RBA 300G	1724.3	38.6	28.5
10. Cargill CAR 205	1694.1	42.2	31.0
11. Growers Seed GS 378	1671.4	42.8	31.0
12. Texas Triumph TRI 490	1641.1	42.8	31.0
13. Barzen Rancher 994	1595.7	40.1	28.5
14. Payco Seed Sungold 85	1580.6	40.1	30.0
15. Sheyenne Seed Sundance	1573.0	39.5	28.5
16. Pacific Oil POI S315	1505.0	40.0	28.0
17. 4 Winds Sales 4W 900	1489.9	39.7	28.5
18. Peterson Bloddick, Funks G 6625	1459.6	40.8	29.0
19. Minn. Farm Bur. Hy 101	1459.5	40.5	29.0
20. Dahlgren Co. DO 704XL	1452.1	39.5	28.0
21. Arrowhead, Inc. AR 8907	1436.9	40.7	29.0
22. Pfizer P 620	1406.7	39.6	29.5
23. Silco Research SGO 449	1384.0	38.6	28.5
24. Cal/West Seed C/W 8904	1353.7	40.4	29.5
25. Hybrid Hyb 894	1338.6	40.5	29.5
26. Cenex CX 907	1300.8	38.5	27.5
27. Hybrid Hyb 903	1225.2	42.3	29.5
28. Keltgen Seed DO 844	1217.6	38.5	27.5
Average	1594.9		
Sputnik	945.4		
Peredovik	1149.1		
Confection: Dahlgren D716	1671.2	27.7	26.0

LSD at .05%: 8.34, 230#/A CV%: 10.21 Rainfall: 14.25 inches

Planted: May 28 Harvested: October 13 Population: 15,800

Table 2. James Valley Research Station - Redfield  
Sunflower Varieties - 1980  
Dryland

Identification	Yield #/A	% Oil	Test Wt.
1. PAG SF 101	2179.2	40.6	35.0
2. Texas Triumph TRI 490	2150.8	39.3	35.2
3. Agra-Sun Products GH 10	2144.0	38.1	35.1
4. Peterson Biddick, Funks G 6625	2130.4	39.0	35.0
5. TNT Sales TNT 444	2065.5	39.9	35.1
6. 4 Winds Sales 4W 900	2057.1	38.8	35.1
7. Sokota Hybrid SKA 4000	2047.5	39.7	35.2
8. Sunbred (NK) NK 254	2030.7	38.1	35.1
9. Pfizer P 620	1998.1	38.6	35.0
10. Cargill CAR205	1974.0	40.4	35.3
11. CalWest Seed CW 8904	1955.3	39.3	35.0
12. Jacques Seed J 501	1948.9	40.2	35.2
13. Pacific Oil POI 5315	1912.6	39.0	35.2
14. RBA RDA 300G	1895.4	38.4	35.0
15. Payco Seed Sungold 85	1845.9	37.8	35.2
16. Interstate Seed IS 3100	1839.8	38.6	35.0
17. Growers Seed GS 378	1823.7	38.9	35.3
18. Cenex CX 907	1775.2	39.1	35.1
19. Minn. Farm Bur. Hy 101	1774.9	40.4	35.0
20. Sigco Research SGO 449	1699.5	37.1	33.0
21. Master Farmer MF 707	1655.8	37.5	30.4
22. Barzen Rancher 994	1604.2	38.1	35.0
23. Keltgen Seed DO 844	1602.0	35.5	30.4
24. Hybrid Hy 903	1597.7	39.8	35.0
25. Dahlgren Co. DO 704XL	1590.2	38.6	35.2
26. Sheyenne Seed Sundance	1552.1	37.4	35.1
27. Hybrid Hy 894	1551.1	39.8	35.0
28. Arrowhead, Inc. AR 8907	1548.9	39.0	35.0
Average	1854.9		
Sputnik	1626.4	42.3	35.0
Peredovik	1578.0	38.8	30.5

LSD at .05: 2.12, 407#/A CV: 15.5 Rainfall: 15.01 inches

Planted: May 23 Harvested: October 21 Population: 16,000

SUNFLOWER POPULATION STUDY  
Q. Kingsley

OBJECTIVE: Which population is most satisfactory for high yields and standability.

EXPERIMENTAL DESIGN: 12,000; 16,000; 20,000 plants per acre dryland  
16,000; 20,000; 24,000 plants per acre Irrigated  
Variety, Interstate 3100, #3 seed

DISCUSSION:

The dryland sunflowers were a failure on the Central Research Station Satellite west of Onida, in 1980, where rainfall amounted to 5.65 inches for the growing season.

Sunflower populations did not come out exactly as planned but were thinned back to the lowest population in each planting site. Some germination problems were experienced and the late emerging were cut off to maintain the existing population.

Plant height and head size corresponded closely to population. As population increased, plant height increased and head size decreased. The yielding ability varied with the amount of moisture available during the crop season as may be noted in Table 3.

Table 3. Northeast Research Station - Watertown  
\*Sunflower Population Study - 1980  
Dryland

<u>Population</u>	<u>Yield</u> <u>Lbs/A</u>	<u>%</u> <u>Oil</u>	<u>Test</u> <u>Wt.</u>	<u>Plant</u> <u>Height</u> --- inches ---	<u>Head</u> <u>Size</u>
9,500	1724.3	43.4	29.6	56	8.0
15,800	1762.1	44.0	29.6	54	6.7
24,000	1646.1	44.9	29.0	58	5.5

Date Planted: May 28

Harvested: October 13

Row Space: 36 inches

Weed Control: 1 qt.  
tolban/A

Replications: 4

Rainfall: 14.25 inches



Hay, Haylage and Silage Production  
Q. Kingsley and L. Evjen  
Northeast Research Station, Watertown, SD

OBJECTIVE: 1. To study the effect on oats haylage crop following sunflowers from previous year.

2. Compare various crops for forage production or grain yields.

EXPERIMENTAL PLAN: 1. Three (3) varieties of oats which are of the haylage type were used with and without sunflowers in the field.

2. A grain and foxtail millet compared to a sudangrass.

3. A grain sorghum for grain yield.

4. Four (4) replications.

RESULTS:

Table 4. Oats Haylage Following Sunflowers and Without Sunflowers in Field.

Variety	Yield in Tons per Acre		*Stage of Maturity	Plant Height Inches
	Following Sunflowers	Without Sunflowers		
Benson	5.2		LD to ripe	34
Benson		7.1	LD to ripe	38
Lancer	7.0		Ripe	28
Lancer		8.5	LD to ripe	35
Moore	4.7		LD to ripe	34
Moore		8.1	LD	40

\*LD

Late dough stage  
Planted: May 1, 1980

Harvested: July 22, 1980

DISCUSSION:

The above oats, Table 4, with sunflowers mixed in did not show much effect from the use of chemical weed control for sunflowers in 1979.

Benson oats plus sunflowers was in the late dough to ripe stage and the straw had some green and dry straw in it. The Benson oats was in the same state without sunflowers in the field.

Lancer oats plus sunflowers had ripe heads but some green remained in the straw, whereas without sunflowers, the seed was in a late dough to ripe and the straw was half green yet.

Moore oats plus sunflowers was in a late dough to ripe and the straw was fairly green. Where no sunflowers were in the field, the straw was green to light green. The sunflowers were sprayed with 2,4-D at  $\frac{1}{2}$  pound per acre in the fields where oats was the only plant harvested.

The sunflowers were sprayed with 2,4-D at  $\frac{1}{2}$  pound per acre in the fields where oats was the only plant harvested.

A forage study was initiated on the Northeast Research Station that consisted of millets and one piper sudangrass. An interest was expressed for this type of a study. No forage millets were used. The Forage Production table is set up where hay, haylage and silage yields are shown at various percentages of moisture.

The grain sorghum was added as a double crop. The first cut would be for grain and the second cut for silage. Grain yields from this study were satisfactory. Silage yields were not taken this year.

Table 5. Forage Production

Variety	Plant Height, inches	Tons per Acre at % Moisture		
		Hay 12%	Haylage 50%	Silage 67%
Foxtail millet	44	5.0	8.8	13.4
Proso millet	44	4.3	7.6	11.6
Piper sudangrass	70	2.5	4.4	6.6

Planted: June 9, 1980

Harvested: August 18

Planting Rate: Millets 20#/A, grain drill, 7" space  
Sudangrass 15#/A, grain drill, 7" space

Rainfall: June 9 to August 18, 7.0 inches

Table 6. Grain Sorghum Production

Variety	Plant Ht. Inches	Maturity	Yield		Test Wt.
			Lbs/A	Bu/A	
IS 203	46	Ripe	4547.2	82.4	56.5

Planted: June 9, 1980

Harvested: October 8

Planting Rate: 10#/A in 36-inch rows

Rainfall: June 9 to October 8, 8.46 inches

Soybean Variety and Population Study  
Northeast Research Station, 1980  
Q. Kingsley and L. Evjen

**OBJECTIVES:** To observe several varieties of soybeans for maturity, yielding ability and populations in this environment.

**DISCUSSION:** The soybeans were planted at 3 settings on the corn planter. Population was not a factor because the machine was an air planter and the drop was the same. Seed size did not seem to be a factor. On the large fields, speed reduced the population per acre.

For this area north of Watertown, Evans, Hodgson 78 and Corsoy 79 would mature most years. With Corsoy 79 being judged average or zero (0), Evans is 13 days earlier and Hodgson 78 is 4 days earlier. The others range from 3 to 10 days later than Corsoy 79.

Each variety responded differently to plant spacing within the row.

**RESULTS:**

Table 7. Soybean Variety and Population Study, 1980.

Variety	Maturity	Plant Space Inches	Population per Acre*	Test Weight	Bushels per Acre
Evans (Ripe)	VE	2	87,120	57.5	23.8
	-13	3 1/4	53,724	57.5	29.1
		4 3/4	36,300	58.0	26.6
Hodgson 78 (Ripe)	E	2	"	57.5	29.6
	- 4	3 1/4	"	57.5	29.0
		4 3/4	"	57.5	29.3
Corsoy 79 (Some green seed)	M	2	"	58.0	26.8
	Zero	3 1/4	"	58.0	25.2
	(0)	4 3/4	"	58.0	28.2
Harcor (30% green seed)	ML	2	"	58.5	26.1
	+ 3	3 1/4	"	58.5	28.2
		4 3/4	"	58.5	29.2
Wells (50% green seed)	L	2	"	57.0	23.5
	+ 6	3 1/4	"	57.0	27.8
		4 3/4	"	56.5	24.3
Sloan (80% green seed)	VL	2	"	56.5	22.5
	+10	3 1/4	"	56.5	25.1
		4 3/4	"	56.0	23.6

\*Plant population and spacing in the row is the same for each variety as shown for Evans.

Planted: June 9

Harvested: October 8

Cultivations: Two(2)

Row Space: 36"

Rainfall: 8.46"

Weed Control: Tolban, 1 qt/A

