Plant Science Pamphlet #58 December, 1980

ANNUAL PROGRESS REPORT

CENTRAL CROPS AND SOILS
RESEARCH STATION

HIGHMORE, SOUTH DAKOTA

BRIEF HISTORY

The 1980 crop season started out to be a good year for crop production. The soil moisture and temperature were adequate for rapid germination of planted crops. As the season progressed, rainfall was below normal for all months of the small grain season. High temperatures and windy conditions affected all crops on the research station. Millet, which is more tolerant to heat and drought, did not produce a good seed or forage crop this year.

Fall plantings of winter grain emerged well on summer fallow ground but not on recrop areas cropped in 1980. These plantings had seed laying in dry soil till the rains in October occurred, at which time germination and emergence took place. Usually by October 16 the soil would be frozen and plant activity would be in a dormant state till the following spring.

A twilight tour of the station, June 24, covered the garden, diseases affecting small grain, weed control in small grain, small grain varieties and the Ram Testing unit, which is now in its 4th year of testing. An after tour lunch was served by the ladies associated with the station or extension service.

The Board of Directors met in Highmore December 18, 1980, and the yearly station results were discussed, and election of officers for 1981.

In 1981, the twilight tour will be conducted Wednesday, July 1 at 6:30 PM, with refreshments to be served after the tour.

The annual meeting of the Central Research Advisors has been set for December 18, 1981 in the Hyde County Extension building at 9:30 AM, Highmore, SD.

A planning meeting for 1981 has been tentatively set for 3:30 PM, March 3 at the Crop and Pest Conference at the King's Inn in Pierre, SD.

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.

750 copies printed at an estimated cost of 42¢ per copy.

TABLE OF CONTENTS

AGRICULTURAL ADVISORY GROUP

Central Research Station, 1980

Highmore

Roger Hainy, Chairman '80	Wessington Spring	Jerauld County
Doug Meyer	Huron	Beadle County
Larry Lindhorst	Cresbard	Faulk County
Jay Pugh	Miller	Hand County
Jerry Hawkins	Pierre	Hughes County
Dennis Ruzicka	Highmore	Hyde County
Victor Beringer	Gettysburg	Potter County
Doug Marsh	Onida	Sully County

THE COOPERATIVE EXTENSION SERVICE

Hollis D. Hall, Director

County Extension Agents of the Central Research Station Area

Lawrence Carson, Sec. '80	Wessington Springs	Jerauld County
Dick Fadgen	Huron	Beadle County
Ray Larsen	Faulkton	Faulk County
Wayne Nesby	Miller	Hand County
Robert Edwards	Pierre	Hughes County
Becci Fonck, Acting	Highmore	Hyde County
Lawrence Madsen	Gettysburg	Potter County
Nanette Weber, Acting	Onida	Sully County

1980 Crop Season

Total Rainfall for Growing Season by months with their Departure from Long-time average on Central Research Station, Highmore, S.D.

Rainfall	Inches	Departure*	Greatest Day	Date
April	1.25	-0.62	1.10	7th
May	0.95	-1.60	0.40	10
June	3.77	-0.20	1.20	28
July	2.25	-0.29	0.55	4
August	2.90	+0.55	1.95	16
September	0.43	-1.18	0.20	1
October	3.30	+2.05	2.25	16

Number of days during month with temperature 90° or above: April 2; May 7; June 10; July 20; August 13; September 7; October 2.

Last frost - Spring (May 15)
First frost - Fall (October 11) Frost free period - 149 days

*Departure from longtime rainfall average April through October: -1.29 inches on the Central Research Station. Total hail occurred June 12, July 10 and 15.

CROP ROTATION - SOIL MOISTURE USAGE RELATIONSHIP

Q. Kingsley and M. Volek

OBJECTIVE OF EXPERIMENT:

1. To compare various crops with different maturities for soil moisture usage and yielding ability under similar soil and climatic conditions.

DISCUSSION:

Crops chosen for this experiment are of different maturities. Barley, oats and wheat are about 20-25 days earlier maturing than safflower while corn and sunflowers are long season crops. Planting and harvest dates are the same as * Inches used period.

The safflowers and sunflowers had Tolban applied at 1 pound per acre preplant for weed control.

In 1981, a grain sorghum will replace the safflower in the rotation, but it will be grown in another area to study moisture usage and yielding ability.

This is a replicated study and will be continued on a rotation basis where a short season crop may precede or follow a long season crop.

RESULTS: Central Research Station, Highmore, S.D. 1980

Table 1

Crop	Yield in Bu or lb/A	Moisture loss from profile plus precip. inches used*	Bu/or Lbs. per Inch of Water Used**	Test Weight	Protein or Oil
Barley					
Primus II	12.2	9.13	1.34	48.8	15.7
Oats					
Nodaway 70	14.6	9.85	1.48	34.6	15.1
Wheat					
WS1809	9.3	9.30	1.00	58.3	18.2
Corn					
Pioneer	55.7	11.47	4.86		9.9
Safflower					
S-208	469.9	12.56	37.41	40.0	
Sunflower					
IS 3100	578.4	12.15	47.60	28.0	43.7

* Inches used: Includes 6.42 inches of rain from April 17 to July 16 for barley, oats and wheat.
Safflower - April 17 to August 6, 6.97 inches
Corn - May 19 to September 17, 9.62 inches
Sunflowers - May 19 to October 8, 9.75 inches

**Calculated by: $\frac{\text{Bu. of grain produced}}{\text{Loss + precipitation}}$ = bushels of grain produced per inch of water used.

HAY, HAYLAGE AND SILAGE PRODUCTION
Central Research Station, 1980
Q. Kingsley and M. Volek

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.

DISCUSSION:

Four oat varieties of various degrees of maturity were used for this study. The dried samples from the milk stage cutting wer lost when the drying oven caught fire. The tonnage there is reported on a wet weight basis. Yields taken from the late dough to ripe were hailed on but an attempt was made to salvage some of the crop.

RESULTS:

Table 2. Small Grain Haylage, Tons of Dry Matter* (DM) per acre.

Variety	Milk (wet wt) 6/26	Tons per acre Dough 7/1	Late dough to Ripe (Hail---7/10) 7/14
Burnett	3.82	1.23	0.36
Lancer	3.16	0.92	0.45
Nodaway 70	3.32	1.01	0.42
Benson	4.25	1.48	0.51
Average:	3.64		

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 1.16 if divided by 0.88 equals 1.32 tons of 12% moisture hay, etc.)

Planted: 4/16/80

Harvested: Listed above under column heading.

DISCUSSION:

Dryness after the millet, Table 3, was at the heading stage reduced yield plus the constant activity of grasshoppers. This study will be continued in 1981.

RESULTS:

Table 3. Millet Haylage 1980, Tons of Dry Matter* (DM). Per acres and grain yield, Central Research Station.

Variety	Tons DM per acre	Lbs Grain per acre
Foxtail	1.09	158.9
White (proso)	1.21	99.4
Minsum (proso)	----	196.1
DM Average 0.65		

DM average	0.65	Haylage (50% DM)	1.30
Hay (88% DM)	0.74	Silage (33% DM)	1.97

*Formula same as Small Grain Haylage, Table 2.

Planted: June 13 Harvested: August 5

Planting rate: Foxtail 6#/A
Proso 20#/A

FORAGE SORGHUM

DISCUSSION:

The tonnage produced from these different sorghum plant types reflect the environmental conditions during 1980. Regrowth from the first cutting August 15 was not dried and yields had to be given on a wet weight basis. In 1981, this study will be cut back to 3 entries per plant type with complete chemical analysis performed on each entry.

RESULTS:

Table 4. Forage Sorghum Tons of Dry Matter*(DM) per Acre, Central Research Station, 1980. Planted June 11.

Plant Type and Variety	First Cut Plant Height	First Cut 8/15 tons/A DM	Regrowth 9/13 tons/A wet	First Cut 9/13 tons/A DM	Plant Height
Sudan					
Acco HS 33	36	1.62	1.10	5.71	51
Cal/West Piper	44	2.03	1.35	4.44	68
Forage					
Asgrow Merit	31	1.18	1.01	3.89	43
DeKalb FS 25A	46	2.63	1.21	7.11	61
Sigco Bet-R-Sile	32	1.43	0.96	3.64	45
Sorgo x Sorgo					
NK X4224	32	1.46	0.96	4.35	49
Forage x Sudan					
Acco Sweet Sioux IV	34	1.91	1.05	5.71	55
Cal/West Forage x Sudan	37	2.38	1.09	5.66	64
Cal/West Sorgo x Sudan	41	2.56	1.16	6.56	63
DeKalb ST6	49	2.46	1.10	5.08	66
Paymaster S99	32	1.88	1.06	3.82	40
Sigco Sorghum Sudan	31	1.20	1.03	4.07	52
Grain x Sudan					
Asgrow Grazer N2	31	1.37	1.06	3.65	44
Asgrow Titan E	31	1.33	1.10	4.14	52
Grain x Forage					
Pioneer 911	28	2.48	1.04	3.07	45
Pioneer 923	32	1.52	1.05	5.95	47
Pioneer 931	33	1.52	1.07	4.29	49
Forage, Leafy					
NK 367	36	1.42	1.09	5.03	53
Paymaster 401R	31	1.35	1.04	5.51	48
Paymaster FS531	32	1.23	1.05	7.00	48
Pioneer 989	33	1.60	1.08	4.33	47
Dual Purpose					
Acco D2912	34	1.54	1.02	4.77	47
DeKalb FS4	47	2.90	1.10	6.37	70
NK Silo-Milo	34	1.47	0.99	4.09	48
NK 300	30	1.34	0.93	5.96	46
Pioneer 956	29	1.42	0.96	3.26	49
DeKalb FS1A	50	2.58	1.14	7.56	59
Corn (18,000/A)					
NK PX 37	35	1.59	1.07	3.44	48

*Formula same as Small Grain Haylage, Table 2.

1980 Standard Variety Small Grain Trials

J. J. Bonnemann

The drouth and high temperatures during the 1980 small grain growing season at Highmore greatly limited production. Yields and quality of all grains were affected adversely. The winter wheat trial was lost to winterkill. Seeding was on April 16 but lack of moisture, even early in the crop year, retarded growth and the plants suffered throughout the season.

The results are reported in Tables 5, 6, and 7. Results of the remaining Standard Variety Small Grain Trials conducted by this project are published in Plant Science Pamphlet #56, November 1980.

Table 5. 1980 Standard Variety Spring Wheat Trials.

Variety	Bushels per acre 1978	1979	1980	3 yr	Test Weight 1980	3 yr
Standard/mid-tall						
Fortuna	23.9	27.6	16.9	22.8	57	57
Chris	18.9	21.4	20.0	20.1	57	57
Waldron	17.8	26.2	17.1	20.3	54	54
Lew			18.0		56	
Butte	22.5	31.6	13.6	22.5	56	57
Eureka	19.2	26.5	14.7	20.1	55	55
Coteau	17.2	24.7	21.0	20.9	57	57
James	20.0	30.8	17.2	22.6	56	57
Pondera			22.4		57	
Marberg			20.7		56	
Semi-dwarfs						
Era	16.6	26.3	19.8	20.9	55	56
WS 1809	22.9	29.6	16.4	22.9	58	57
Wared	23.4	24.3	22.5	23.4	54	56
Olaf	17.7	33.8	19.3	23.6	56	56
Prodax	18.6	28.5	23.7	23.6	55	54
Protor	16.7	27.7	15.2	19.8	58	58
Angus	20.0	30.7	23.9	24.8	58	58
Len	25.7	31.9	22.8	26.8	56	56
Solar	15.2	30.0	22.9	22.7	56	56
711			18.1		58	
Oslo			14.1		56	
Aim		33.2	15.9		57	
906-R		30.9	18.3		58	
Means			18.9		57	
LSD .05			4.5			
CV - %			16.9			

Table 6. 1980 Standard Variety Oat Trials.

Variety	Bushels per acre				Test Weight	
	1978	1979	1980	3 yr	1980	3 yr
Burnett	37.6	47.0	35.4	40.0	32	31
Nodaway 70	30.0	48.2	33.8	37.3	36	33
Froker	31.5	49.6	34.5	38.5	35	32
Chief	31.7	49.4	34.8	38.6	34	32
Otee	26.6	42.6	32.5	33.9	35	32
Dal	43.2	52.1	34.0	43.1	34	33
Noble	29.9	42.4	28.6	33.6	34	32
Stout	19.9	51.4	40.0	37.1	34	30
Spear	30.2	54.9	32.8	39.3	34	29
Lyon	37.5	53.9	41.7	44.4	34	32
Bates	35.0	44.4	49.0	42.8	34	31
Wright	41.7	51.7	34.8	42.7	37	33
Otana		64.1	49.0		34	
Lancer	33.2	64.3	42.1	46.5	35	31
Lang	21.3	53.6	41.5	38.8	31	27
Benson	33.5	57.6	32.8	41.3	33	31
Moore	48.5	55.7	50.8	51.7	36	33
Marathon	37.3	56.6	44.1	46.0	31	30
Larry		62.2	37.6		34	
Ogle		65.1	53.4		30	
Means			37.9		34	
LSD .05			4.8			
CV - %			8.9			

Table 7. 1980 Standard Variety Barley Trials.

Variety	Bushels per acre				Test Weight	
	1978	1979	1980	3 yr	1980	3 yr
Firlbecks III	17.2	48.7	27.4	31.1	44	46
Larker	15.2	38.3	27.6	27.0	44	46
Primus II	15.8	30.8	18.7	21.8	46	46
Park	20.1	45.3	20.3	28.6	42	45
Glenn	21.2	39.4	22.4	27.7	39	43
Morex	22.3	45.5	22.5	30.1	42	46
Menuet		50.4	19.9		43	
Klages			18.5		39	
SD 71-672	25.2	35.0	26.5	28.9	48	48
Means			22.9		43	
LSD .05			4.6			
CV - %			14.0			

Spring Wheat Breeding

D. L. Keim, G. W. Buchenau,
K. M. Sellers and G. K. Hess

The Advanced Yield Trial was planted on April 15, 1980 on summer fallow. Stand establishment was good and moisture stress hit the crop fairly early in development. A hail storm hit on July 10 causing from three to 17 percent damage depending on variety.

SD 2860 (SD 2167/James 'sib') was the top yielding line in the 1980 average as well as the two-year average. At 14 test sites through 1979 and 1980, SD 2860 outyielded all check varieties with the exception of Butte. This line has yielded better than Butte under more stressed environments. Further testing will be conducted on SD 2860 and other promising lines.

Table 8.

1980 SPRING WHEAT BREEDING
HIGHMORE ADVANCED YIELD TRIAL

VARIETY	PEDIGREE	ENTRY	YIELD	TEST WEIGHT	HEADING DATE	PLANT HEIGHT	HAIL DAMAGE	1979-80 YIELD	
			BU/A	LB/BU	JUNE	INCHES	0/0		BU/A
SD 2860	SD 2167/SD 2271	15	21.8	55.6	10	25	3		27.2
SD 2856	JAMES/2049	13	21.3	53.7	10	26	7		
ERA		3	20.9	53.9	13	24	7	24.8	25.4
SD 2256	ERA/ND 496	7	20.3	55.6	11	30	10	24.6	
HUAC*5*	HUACAMAYO *5*	47	19.6	55.5	13	25	5		
MPV-3		49	19.6	55.2	13	29	18		
SD 2901	SD 2528/MN 7083	43	19.0	55.3	10	27	13		
SD 2881	PROTOR/RL 6010	23	18.6	57.8	10	27	12		
CGT 700		46	18.6	56.4	6	24	3		
SD 2899	3001/RL 6010	41	18.3	54.7	7	26	3		
SD 2880	PROTOR/RL 6010	22	18.2	56.4	10	26	13		
OLAF		2	18.1	55.1	12	24	7	26.1	26.1
EUREKA		6	18.1	51.3	11	28	15	22.0	23.8
SD 2891	OLAF/MN 6792	33	18.0	56.6	9	25	7		
SD 2882	JAMES/SD 2049	24	17.9	57.1	8	26	10		
SD 2870	69103/2*1809//ON/TOB/	21	17.8	55.1	9	26	13	22.8	
SD 2886	OLAF/MN 6792	28	17.4	57.1	9	24	7		
SD 2887	OLAF/MN 6792	29	17.3	56.4	10	25	7		
SD 2895	3001/RL 6002	37	17.1	57.4	9	26	15		
SD 2853	JAMES/2049	12	17.0	57.1	7	26	7		
SD 2868	BUTTE/JAMES *5*	20	16.7	59.0	6	26	12	24.3	
CGT 705		48	16.7	55.1	11	23	7		
SD 2888	OLAF/MN 6792	30	16.6	56.8	10	26	13		
SD 2890	OLAF/MN 6792	32	16.6	56.0	9	25	8		
SD 2898	3001/RL 6010	40	16.6	56.1	9	26	17		
SD 2855	JAMES/2049	14	16.5	56.6	9	25	12		24.1
SD 2899	OLAF/MN 6792	31	16.3	57.5	8	24	7		
SD 2700	OLAF/MN 6792	8	16.0	58.5	8	24	8	24.6	
SD 2865	SD 2201/PROTOR	18	16.0	56.4	12	27	15		21.8
SD 2866	BUTTE/ERA	19	16.0	56.8	7	26	8		23.2
BUTTE		5	15.7	57.3	9	26	7	23.2	21.0
SD 2851	PROTOR/RL 6010	11	15.7	58.0	8	26	13		
SD 2902	BUTTE/2271//MN 70181	44	15.7	56.4	7	25	10		
SD 2837	BUTTE/EUREKA	10	15.5	59.5	7	26	5	22.6	
SD 2835	BUTTE/EUREKA	9	15.4	53.2	9	25	12	22.4	
SD 2884	SD 2201/PROTOR	26	15.4	54.4	13	26	10		
SD 2861	EUREKA/PROJAX	16	15.3	55.8	6	25	3		22.3
SD 2883	SD 2201/PROTOR	25	15.2	53.2	13	26	15		
SD 2864	SD 2201/PROTOR	17	15.0	55.2	13	25	8		22.4
SD 2892	BUTTE/EUREKA	34	15.0	56.6	10	28	17		
SD 2894	3001/RL 6002	36	15.0	58.8	9	24	12		
SD 2896	MN 7083/SD 74219	38	15.0	55.1	12	25	7		
SD 2885	BUTTE/ERA	27	14.9	53.6	9	26	8		
WALDRON		1	14.7	50.2	12	26	12	23.4	23.7
SD 2903	SXW COMPOSITE	45	14.2	57.9	8	25	10		
SD 2897	SD 2307//BUTTE/ND 517	39	14.0	55.1	9	26	13		
PROTOR		4	13.5	56.4	10	22	3	18.4	20.8
SD 2843	BUTTE/ND 517//JAMES	35	12.5	57.3	10	24	10		
SD 2901	SD 2528/SD 2003	42	10.9	58.0	7	21	8		
Location Mean			16.7	55.9	10	25	9		
Coefficient of Variation			7.4						
Bayes LSD			2.04						

Highmore Forage Experiments

James G. Ross and Arvid Boe

Because of the drought, forage production from the grass and alfalfa trials was so low that harvests were not possible. A spaced plant nursery of grazing-type alfalfa was established for selection of drought resistant, high seed yielding genotypes. An experiment to evaluate the best varieties of switchgrass, big bluestem and Indiangrass was planted for stand establishment and forage yield June 10.

WINTER WHEAT BREEDING

CENTRAL RESEARCH STATION

D. G. Wells

The tests were seeded on fallowed land on September 7. The top soil was moist and the subsoil contained a good supply of water. Fall stands were good.

Winter precipitation was inadequate. Spring weather was hot and dry. Late rains produced good growth and a wet field at harvest time.

Winter injury was extensive and so severe that some tests were not harvestable. Some others that were harvested were of little value.

The tests were very weedy.

The tests were harvested with a Hege combine July 14.

Northern Regional Performance Nursery, Highmore, 1980

Table 9.

Line or Variety	Pedigree	Entry	Survival	Yield	Test Wt.
ND 7412	YTO-17/Trader	267	60	32.6	57.6
SD 73177	Scout sel./NE 66403	271	53	31.2	59.6
ND 7481	Froid/Lancer	268	57	29.8	57.8
NE 77663	Mironovskaja 808/2*Ctk78	265	43	29.4	58.7
SD 76125	CI 15322//3*Ag/4*Sut	275	37	27.0	59.3
SD 7279	SS/D8//Wmt/3/Hume/NE 63265	269	40	26.6	57.7
SD 75284	Ag/4*Sut*2//Hand	277	30	26.0	58.6
SD 75393	Ctk*4/NapHal	274	40	25.8	57.9
SD 75269	Agent/4*Sut//Hand	272	43	25.3	58.9
SD 73165	Ctk/NE 66490	279	43	24.5	58.4
NE 75414	NE 68723/NE 68719//Gage sel.	264	37	24.2	57.5
Karkof, Check		261	50	23.5	57.5
SD 75314	Sage/Hand	278	40	23.3	58.8
NK 76W239	Winoka/Sturdy	280	30	22.1	57.4
Roughrider, Check		263	33	21.3	56.7
Warrior, Check		262	40	21.2	57.4
MT 7801	Yogo*3/Cnn	283	33	21.0	57.9
MT 7244	Lancer/Winalta	281	33	20.9	58.0
NE 76706	Bezostaia1/2*Ctk sel.	266	17	19.1	56.5
SD 75375	Ctk*3/Hand//Ctk*4/NapHal	273	23	18.2	57.0
MT 7431	Rego/Cnn//Winalta	282	27	17.1	57.0
SD 74221	Ctk*2/Hand	276	28	13.6	59.0
SD 73160		270	13	12.6	56.0

High Protein Lines, 1980 - Highmore

Line or variety	Pedigree	Entry	Survival	Yield	Test Wt.
		n	%	bu.	lbs.
SD 75269	AG/4*Sut*2//Hand	503	62	30.4	59.6
Centurk, Check		502	45	28.7	59.4
SD 75284	Ag/4*Sut//Hand	505	57	27.7	59.3
SD 74221	Ctk*2/Hand	506	48	24.9	60.1
SD 75375	Ctk*3/Hand//Ctk*4NapHal	504	43	23.5	57.3
SD 75314	Sage/Hand	507	52	22.2	58.8
Gent, Check		501	33	20.9	58.4

Garden 1980
Central Research Station
M. Volek and Q. Kingsley

Table 10. Yields of Garden Edibles in pounds produced by row or plants and on acre basis.

Variety	Row Length or Number Plants	Yield Lbs.	Yield#/A
Radish			
New Champion	1 row 15'	2.1	1,987.3
Sparkles	" "	1.0	671.0
White Icicle	" "	2.6	2,530.4
Beet			
Early Wonder	2 row 15'	19.0	9,215.9
Ruby Queen	" "	11.0	5,360.7
Cardenal 190	1 " "	9.9	9,602.0
Lettuce			
Black Seeded Simpson	1 row 15'	6.3	6,113.1
~~Royal~~ Oakleaf	" "	6.0	5,783.0
Peas			
Alaska	2 row 15'	1.0	362.7
Wando	" "	5.6	2,736.0
Early Perfection	" "	2.3	1,095.7
Little Marvel	" "	2.8	1,342.9
Kohl Rabi			
Early White Vienna	2 row 15'	25.4	12,337.1
Cabbage			
Golden Acre	12 plants	37.6	36,371.9
Hercules Hybrid	" "	109.8	106,131.5
Beans			
Busy Daisy	4 rows 15'	35.5	8,691.8
Spartan Arrow	1 row 15'	21.1	20,448.0
Green Isle	" "	24.1	23,306.5
Green Improved Tender	2 row 15'	22.9	11,145.1
Kentucky Wonder	" "	27.4	13,298.0
Slim Green	" "	24.8	12,039.6
Wax Pencil Pod Black	" "	18.6	9,037.2
Peppers			
No. 3	4 plants	4.5	8,084.0
No. 5	8 "	3.1	2,782.0
No. 7 Petite Sirah	4 plants	1.0	1,276.0
No. 9	" "	5.0	9,040.0
No. 15	" "	4.7	8,532.0
Big Bertha 046	" "	1.0	1,464.0
No. 69	" "	3.7	6,692.0

Table 10 Continued

Variety	Row Length or Number Plants	Yield Lbs.	Yield#/A
Peppers (Cont'd)			
" 86	4 plants	3.8	6,808.0
" 91	" "	1.2	2,196.0
" 98	" "	1.8	3,164.0
" 107	" "	2.6	4,776.0
" 111	" "	5.3	10,048.0
" 118	8 plants	5.8	5,278.0
" 121	4 plants	2.3	4,180.0
" 128	" "	8.1	14,712.0
" 131	" "	3.9	7,072.0
" 137	" "	1.3	2,356.0
" 142	" "	3.8	6,868.0
" 144	" "	3.5	6,364.0
" 148	" "	2.8	5,016.0
" 151	" "	1.8	3,184.0
" 153	" "	1.4	2,568.0
" 173	" "	6.1	11,088.0
" 182	" "	2.4	4,364.0
Tomatoes			
Tiny Tim	16 plants	20.2	9,159.0
Sweetie-872	" "	10.5	4,770.0
No. 9	8 plants	7.6	6,940.0
" 10	" "	29.5	26,742.0
" 11	" "	12.3	11,144.0
" 12	" "	11.4	10,384.0
" 13	" "	65.5	59,470.0
" 20	4 plants	12.0	21,852.0
" 98	" "	0.3	408.0
" 99	" "	18.1	32,860.0
" 103	" "	25.4	46,072.0
" 107	" "	14.9	27,084.0
" 108	" "	10.4	18,964.0
" 110	" "	15.0	27,232.0
Carrots			
Scarlet Nantes	2 row 15'	15.6	7,592.7
Red Core Chantenary	" "	12.2	5,939.6
Danvers Half Long	" "	19.6	9,508.0
Egg Plant			
Unknown Variety	8 plants	10.8	9,844.0
Broccoli			
Hybrid Green Comet	16 plants	51.1	23,210.0
Cauliflower			
Self Blanche	16 plants	36.6	16,598.0

Table 10 Continued

Variety	Row Length or Number Plants	Yield Lbs.	Yield#/A
Onions			
Jumbo Yellow	2 row 15'	16.5	8,025.0
Squash			
Z hini	3 Hills	17.6	3,993.4
Early Prolific, Straight Neck	" "	62.7	14,226.6
Yellow Summer	" "	122.9	27,886.0
Hybrid PSX475	" "	30.3	6,875.1
Butternut	" "	40.3	9,144.1
Buttercup, Bush	" "	140.0	31,766.0
Hybrid Gold Shush?	" "	392.2	88,990.2
Acorn Squash	" "	142.7	32,378.6
Buttercup	" "	234.1	53,117.3
Pumpkin			
Big Moon	3 Hills	420.0	95,298.0
Jack-O-Lantern	2 Hills	420.0	142,926.0
Cantaloupe			
Alaska	1 Hill	12.8	37,171.2
Raspberries			
Fall Red	3' x 54'	9.7	2,596.6
Strawberries			
Ogallalla	8' x 20'	19.0	5,188.2
June Bearing	3' x 60'	3.5	845.5
Grapes			
7333 White		0.6	
73512 Purple		4.0	

GARDEN DISCUSSION:

The transplants for the garden were provided by the SDSU Horticulture and Plant Science Departments. Seed for flowers and many of the vegetables were provided by Peto Seed of Saticoy, California.

Weights were recorded at each harvest and reported on total yield from number of rows, plants or hills of each variety. These yields were then calculated on an acreage basis for comparisons.

The garden was watered to reduce any moisture stress, but was damaged by hail on 3 occasions.

Sunflower Research
Quentin Kingsley

Plant Populations: Central Satellite, Onida, Ken Sutton Ranch, 22 miles west of Onida.

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

Areas east of Highway 281, on dryland, produced higher yields at 16,000 plants per acre due mainly to increased rainfall. Sunflower seed production west of Highway 281, under dryland conditions, were sporatic. The rainfall patterns are so varied that any variation in soil type is 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.

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 were producing 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. Yields at 12,000, 18,000 and 22,000 plants per acre were 1793.9, 2014.7 and 2172.0 pounds per acre, respectively on the Onida farm.

Sunflower Varieties Study:

Objective: To evaluate plant materials from various sources for yield, diseases and general plant characteristics.

The results of this experiment are published yearly with no remarks about individual entries. Yields, plant heights, disease reactions and seed oil content are reported to the USDA at Fargo, North Dakota.

Table 11. Central Research Station - Onida Farm
Sunflower Varieties - 1980
Irrigated

Identification		Yield #/A	% Oil	Test Wt.
1.	Barzen Rancher 994	2403.1	40.2	34.0
2.	Cargill CAR 205	2214.3	43.8	37.0
3.	Pacific Oil POI S315	2134.4	40.3	32.5
4.	NK Sunbred NK 254	2040.1	40.8	35.0
5.	Growers Seed GS 378	1996.5	42.7	36.5
6.	4 Winds Sales 4W 900	1945.7	41.3	33.5
7.	Jacques Seed J 501	1938.5	41.8	34.5
8.	Keltgen Seed DO 844	1938.4	39.2	35.5
9.	Master Farmer MF 707	1931.2	34.1	34.5
10.	Interstate Seed IS 3100	1916.7	44.0	34.5
11.	Agra Sun Products GH 10	1916.7	43.5	35.0
12.	TNT Sales TNT 444	1909.4	41.2	35.5
13.	Dahlgren Co. OO 704XL	1887.6	41.2	34.0
14.	Cenex CX 907	1815.0	40.4	33.5
15.	Texas Triumph TRI 490	1807.7	42.9	36.5
16.	Minn. Farm Bur. Hy 101	1807.7	41.7	34.0
17.	Pfizer P 620	1800.5	39.7	35.5
18.	Payco Seed Sungold 85	1749.7	40.5	33.5
19.	Peterson-Biddick, Funks G 6625	1713.4	42.4	34.5
20.	Sigco Research SGO 449	1713.4	39.0	34.5
21.	RBA RBA 300G	1698.9	40.8	34.5
22.	Sokota Hybrid SKA 4000	1698.9	40.6	35.0
23.	Hybrid Hyb 894	1662.5	40.7	35.5
24.	Sheyenne Seed Sundance	1633.5	41.2	34.5
25.	PAG SF 101	1626.2	43.3	36.0
26.	Cal/West Seed C/W 8904	1619.0	41.2	35.0
27.	Arrowhead, Inc. AR 8907	1597.2	41.0	34.5
28.	Hybrid Hyb 903	1531.8	40.6	34.5
	Average	1844.5		
	Sputnik	1343.1		
	Peredovik	1894.9		

LSD at .05%: 3.49, 302#/A CV%: 11.46

Rainfall: 6 inches Planted: May 22

Harvested: October 8 Population: 22,000 Irrigation: 12 inches

Table 12. Central Research Station, Onida Carm
Fodder Beets - 1980

Variety and Color	Yield Tons/A Root Wet	Top Oven Dry	Top Wet %
Monoblanc (white)	31.2	4.34	79
Monorosa (red)	31.6	4.38	76
Monoboma (red)	35.2	4.49	76
Trivert (white)	31.9	3.57	76

	Percent Protein	Percent Dry Matter	Percent Sugar
Tops	18.1	23	--
Root	12.7	15	16

Date Planted: May 22 Harvested: October 7

Rainfall: 6.0 inches Irrigation: 12.0 inches

DISCUSSION:

Fertility: 150# H; 80# phosphate; 150# potash High potash will increase sugar.

Optimum Planting Date: Early as possible in the spring. Mid-March - Mid-April.

Plant Spacing: 36" row-7"; 22" row-10". (28,000 survival) 3-6 lbs/A depending on seed size. Depth 3/4 to 1 inch and pack after planting.

This crop was planted too late in 1980 to attain a maximum yield. Yields may reach 50 ton per acre if conditions are suitable. Fodder beets must be topped before digging, but unlike sugar beets, some of the leaf stems are left on to prevent bleeding. The harvesting can be performed with a modified potato digger.

Onida Soybean Trials
L. Fine and Q. Kingsley

Table 13. Inoculation Treatments

Treatment	Bu/A
None	24.6
Slurry	25.8
Dry	24.9

Variety Hodgson 78

Table 14. Irrigated Varieties

Variety	Bu/A
Evans	14.9
Hodgson 78	19.1
Corsory	16.3
Wells	24.3
Harcor	19.3
Sloan	19.6

Table 15. Row Space Plant Populations

Variety	Row Space Inches	Plant Space Inches	Bu/A
Hodgson 78	18	1	22.3
	18	2	25.1
	36	1	23.7
	36	2	18.3
Wells	18	1	26.2
	18	2	25.3
	36	1	20.4
	36	2	19.8

Planted: May 21, 1980
Harvested: October 7, 1980
Rainfall: 5.65 inches
Irrigation: 12 inches of water

Performance of Herbicides in Irrigated Soybeans

W. E. Arnold and L. J. Wrage

Herbicide demonstration plots provide side-by-side comparison of herbicide treatments. Treatments include herbicides presently labeled and those which may be approved in the near future. Demonstration plots are the final step in the herbicide evaluation program. Rates and application methods for each are based on results obtained in previous years' screening tests.

Methods

Preplant and preemergence treatments were applied in the soybean plots on May 21. A plot sprayer delivering 20 gpa water and 32 psi pressure was used. Preplant treatments were incorporated immediately with two tandem diskings set to cut 5-6 inches deep (except Lasso and Dual preplant treatments incorporated 3-4 inches deep with one disking). Plots were planted in 36-inch rows the same day. Precipitation totaled 0.0 inches and 0.84 inches for the first and second week after planting, respectively. Post-emergence treatments were applied June 24 with precipitation totalling 0.44 inches and 1.05 inches for the first and second week following application, respectively.

Weed pressure was moderate to light. Annual grass species included green and yellow foxtail. Major broadleaved species were redroot pigweed, lambsquarter, and kochia with kochia becoming more apparent in late season. The plots were not cultivated.

Results

The performance of the soybean herbicide treatments is presented in the following table. Evaluations are based on an average of two visual estimates for each weed listed. Weed control differences in 1980 were apparent. The strengths and weaknesses of each treatment can be assessed. Over 90% control of both grasses and broadleaved weeds was achieved with several combination treatments.

Table 16. 1980 Irrigated Soybean Herbicide Demonstration, Sully County.

Treatment	lb/A a.i.	Percent Weed Control 7/30/80 Gr	Bdlf	Cost/A[1/]
PREPLANT INCORPORATED				
Check	--	0	0	--
Lasso	3½	91	65	$14.35
Dual	2½	88	45	14.70
Treflan	3/4	92	76	6.80
Tolban	1	83	78	8.75
Prowl	1¼	90	81	8.75
Vernam	2½	82	57	8.05
Treflan + Amiben	3/4 + 2	91	84	20.26
Treflan + Sencor/Lexone	3/4 + 3/8	90	91	14.38
Treflan + Sencor/Lexone	3/4 + ½	93	92	16.90
PREPLANT INCORPORATED AND PRE				
Treflan & Sencore/Lexone	3/4 & ½	98	97	16.90
Treflan & Sencore/Lexone	3/4 & 3/8	96	97	14.38
Check	--	0	0	--
PREEMERGENCE				
Amiben	3	91	76	20.18
Lasso	3	95	82	12.54
Dual	2½	94	46	14.70
Lasso + Lorox	2 + 1	92	67	18.75
Lasso + Modown	2 + 1½	91	89	17.08
Lasso + Sencor/Lexone	2 + 3/8	96	95	15.93
Lasso + Sencor/Lexone	2 + ½	97	97	18.45
PREEMERGENCE AND POST				
Lasso & Basagran	2 & 1	92	59	25.35
Lasso & Blazer	2 & ½	95	72	--
PREEMERGENCE				
*Lasso + Lorox + Sencor/Lexone	2 + 1 + ¼	93	93	23.80
PREPLANT INCORPORATED				
*Treflan + Amiben +Sencor/Lexone	3/4 + 1½ + ¼	92	89	21.95
Check	--	0	0	--

* Experimental

1/ Suggested retail

Gr: Green and yellow foxtail

Bdlf: Kochia, redroot pigweed & lambsquarters

SHEEP
RAM TESTING

J. M. THOMPSON AND D. L. WHITTINGTON

Data for the Fall 1979 and Spring 1980 ram tests conducted at the Central Research Station in Highmore is presented in the following tables. The fall tests are primarily for wool breeds and the spring tests for meat type breeds.

The following formula was used to index the rams in the fall test period: I = 60 x (ADG) + 4.0 x (staple length) + 4 x (clean wool) - 3 x (face cover score) - 4 x (skin fold score).

The following formula was used to index the rams in the spring test period: I = 60 x (ADG) + 30 x (weight per day of age) + 5 x (muscle score) - 5 x (fat score) - 5 x (soundness score).

In the 1979 fall test 24 producers entered 109 rams and 18 producers entered 56 rams in the spring 1980 test. For the fall 1980 test period, 86 rams were started on test for completion in March 1981. Results of this test and others will be presented in future Central Research Station reports.

Table 17. Results of Spring 1980 Test

Breed	No.	Total Gain (lb)	ADG (lb)	Fat Score	Muscle Score	Soundness Score	Index
Suffolk	18	92.4	1.11	2.1	7.3	1.6	116.79
Hampshire	12	79.5	.96	2.75	7.7	1.4	105.55
Columbia	5	73.4	.89	1.8	5.6	1.0	92.6
Rambouillet	17	65.8	.80	1.9	5.4	1.1	83.2
Targhee	4	68.5	.84	2.0	5.2	1.0	85.8

Table 18. Results of the 1979 Fall Test

	No.	Total Gain (lb)	ADG (lb)	Adj. 365 day Grease Fl. Wt. (lb)	Adj. 365 day Clean Fl. Wt. (lb)	Adj. 365 day Staple Length (in)	Face Score	Wrinkle Score	Index
Rambouillet	72	113.7	.76	25.05	11.66	4.53	2.4	1.96	93.51
Columbia	8	115.4	.77	28.40	13.49	5.28	1.7	1.38	110.42
Targhee	19	125.2	.83	26.87	12.49	4.86	1.8	1.50	108.14
Hampshire	2	111.5	.74	15.06	8.06	3.493	2.0	1.0	80.43
Corriedale	3	80.66	.54	23.65	11.35	5.467	2.5	1.33	86.53
Suffolk	5	91.2	.61	12.05	6.32	4.13	1.0	1.0	71.15