1990

EC90-107 Nebraska Proso, Sunflower and Amaranth Variety Tests 1990

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University of Nebraska Cooperative Extension
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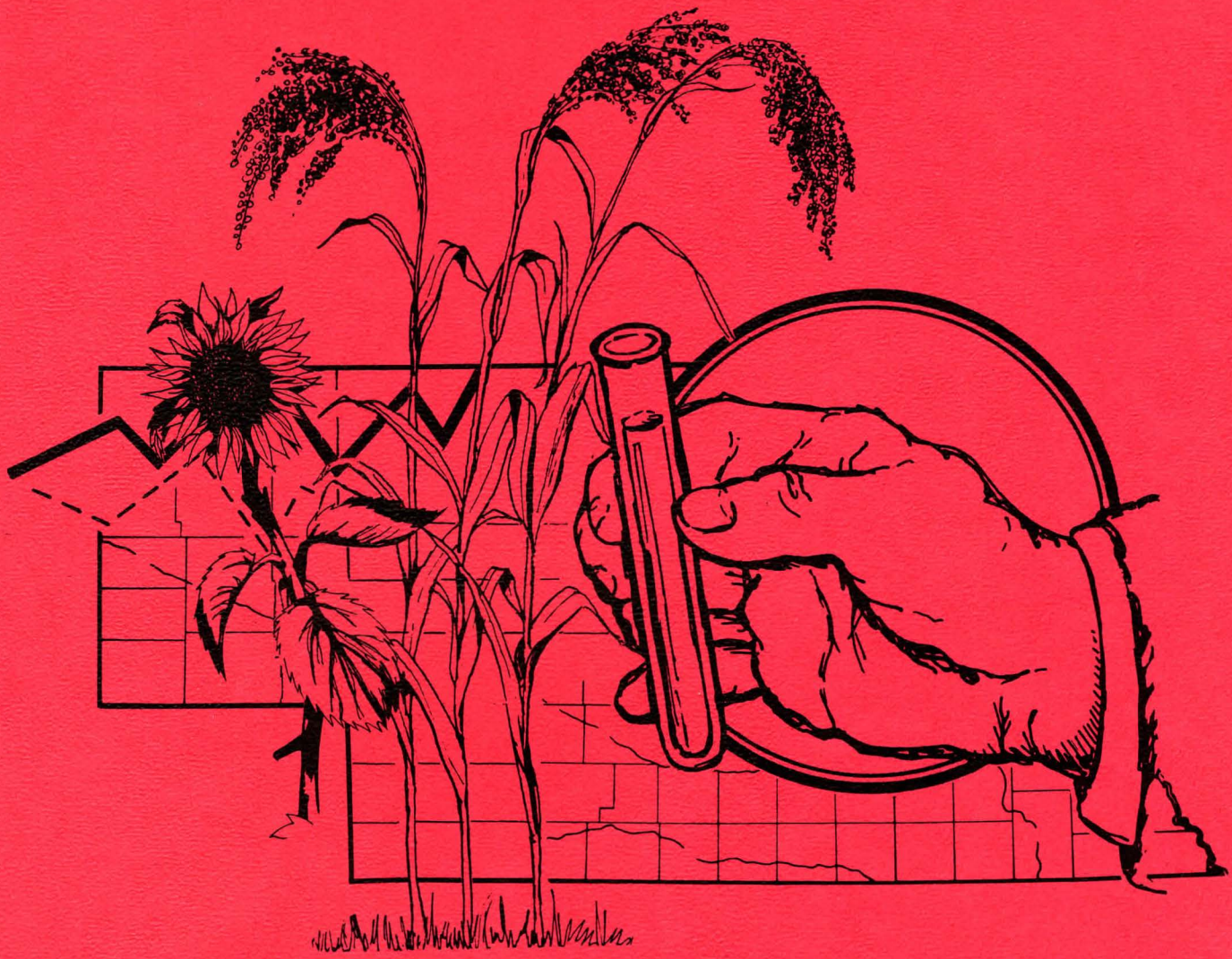

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This circular is a progress report of proso, sunflower, and amaranth variety trials conducted by the Panhandle Research and Extension Center, and the High Plains Agricultural Laboratory. Conduct of the experiments and publication of results is a joint effort of the Agricultural Research Division and the Cooperative Extension Service.

A large responsibility for these tests fell on Glen Frickel. Thanks to Glen and David Davis for their efforts in trial maintencence and data analysis. Thanks to Jim Robb for his assistance on price and acreage history. Special thanks to Shari Bordeaux for layout and design of this publication.

METRIC EQUIVALENTS

1 centimeter = 0.394 inches	cm = inches x 2.541
1 hectare = 2.471 acres	ha = acres x 0.405
1 kilogram = 2.205 pounds	kg = pounds x 0.454
1 hectoliter = 2.838 bushels	hl = bushels x 0.352

Kilogram/hectoliter = lb/bu x 1.287
Kilograms/hectare = bu/a x 62.78 (56# bu)

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PROSO

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PROSO PRODUCTION IN NEBRASKA

Proso production in Nebraska varies from year to year because a portion is grown on land where winter wheat has been destroyed due to adverse weather. Proso acreage reflects proso prices in relation to wheat prices or expected prices. The following table shows fluctuations in proso acreage since 1973.

Year	Yield lb/a	Area acres
1973	1,500	29,000
1974	1,300	42,000
1975	1,300	40,000
1976	1,250	34,000
1977	1,470	37,000
1978	1,200	50,000
1979	1,360	63,000
1980	1,350	27,000
1981	1,950	33,000
1982	1,700	44,000
1983	1,500	43,000
1984	1,650	64,500
12 year average	**1,460**	**42,166**

As evidenced by this table, yields in 1984 were only average. Because of the larger acreage grown, there was a greater production of proso in 1984 than in any of the previous years. The larger acreage is primarily a reflection of the government program. The statistics for 1985 through the current year are not available due to cutbacks in the Federal Crop and Livestock Reporting Service. Partially due to the large set aside since 1984 the acreage of proso has increased. In spite of the increase in acreage the market has grown and prices for proso increased to above $10.00 per cwt during 1989.

Estimated value of proso production, using the twelve year average for yield adjusted to a 10% increase due to the use of the new variety 'Rise' and 50,000 acres of production is shown in the table below. A 15% increase in Nebraska yields based on improved varieties or cultural practices developed from research could return as much as a million dollars per year to Nebraska.

Year	Est. Price -$/cwt-	Value* --$--
1986	3.40	2,380,000
1987	3.95	2,765,000
1988	6.90	4,830,000
1989	6.50	4,550,000
1990	4.75	3,325,000

* Based on production estimate of 700,000 cwt.

PROSO VARIETY TRIALS

1990

The 1990 proso test contained 27 white seeded entries of which seven were named varieties used as check varieties. The other 20 entries were selections and crosses from the proso breeding program at the Panhandle Research and Extension Center. All these selections and crosses involve the variety Dawn and the primary purpose of this trial is to identify a taller better yielding, larger 'Dawn type' variety. Sunup is a new release from the crosses and has demonstrated improved height and yield over other varieties and is larger seeded than Rise.

DESCRIPTION OF CHECK VARIETIES

SUNUP

Sunup is a 1989 release from Nebraska. It is a white seeded variety with excellent yield potential. Its height is greater than Rise but is not as tall as Panhandle. Sunup is as lodging resistant as Dawn and Rise in spite of its taller height.

RISE

Rise is a 1983 Nebraska release. It is the result of a Dawn X Minn 402 cross made in 1975. It is later and taller than Dawn with many of the same characteristics in head type and lodging resistance. It is anticipated that Sunup will replace Rise.

COPE

Cope is 1978 Colorado release. It is much later maturing than other varieties. It has yielded well in Nebraska, especially when planted early.

MINCO

Minco is a joint Colorado-Minnesota release. It is taller and later than Panhandle. It has white seed and produces good yields.

DAWN

Dawn is a 1976 Nebraska release. It is shatter resistant and ripens uniformly to make it suitable for direct combining if wind is not a problem. It has a large seed with good white color and has been well accepted in the bird seed trade. Its early maturity and short stature have made it less suitable under enviormental stress conditions. It has not performed well under ecofallow in University of Nebraska tests. Its yield potential is good when fertilizer and moisture are favorable.

ABARR

Abarr is a 1974 release from Colorado. It is a white seeded variety with good yield potential and is similar to Panhandle with improved seed type.

PANHANDLE

Panhandle is a 1968 Nebraska release. It is the first variety selected from the common white proso grown in western Nebraska. It has a good yield but is lower yielding than newer varieties. It is white seeded.

DESCRIPTION OF PLOT TECHNIQUES

Five proso variety trials were conducted in 1990. All were located at the High Plains Agricultural Laboratory near Sidney, Nebraska except for one which was located at the Panhandle Research and Extension Center in Scottsbluff, Nebraska.

These five trials included a black fallow site, a early continous cropping site, a late continuous cropping site, a notill site, and a irrigated site. Table 1 shows the conditions of each of those sites.

Plots were seeded with a 6-row double disc drill. Each plot was 22 feet long and six feet wide. The center four rows were harvested from each plot with a self-propelled combine when the variety was mature. Four replications of each variety in each location were planted and harvested. The plots were treated with a pre-emergence herbicide, atrazine, for weed control except the irrigated trial at Scottsbluff.

Table 1. List of 1990 plot conditions.

Location	Designation	Planting date	Stand	Weed control	Av. yld cwt/a	Previous crop
HPAL	Fallow	June 18	Uniform	good	24.8	fallow
HPAL	EarlyCont.	June 11	Uniform	good	21.1	sunflower
HPAL	Late Cont.	June 28	Uniform	good	8.0	sunflower
HPAL	Notill	June 11	Uniform	good	11.6	proso
PREC	Irrigated	July 2	Uniform	good	23.3	fallow

Table 2. Seven year yield summary of varities included in test.

Variety	7 year Average	1990	1989	1988	1987	1986	1985	1984
				cwt/a				
Sunup	**20**	21	23	21	23	15	19	17
Rise	**18**	19	19	22	19	20	15	18
Minco	**17**	16	17	18	19	16	18	18
Cope	**16**	14	18	17	18	14	15	14
Panhandle	**14**	16	17	16	16	12	12	10
Dawn	**11**	15	12	10	12	6	12	13
Average	**16**	17	18	17	18	13	16	16

Table 3. Proso yields for 1990 variety trials.

Variety	Average Yield	Early cont.	Late cont.	Notill cont.	Fallow	Irrigated
			cwt\a			
SUNUP	**20.6**	27.8	8.5	12.8	25.2	28.6
86005-3	**20.4**	23.0	9.6	15.1	28.5	26.0
86020-1	**20.1**	27.0	8.1	10.3	30.2	25.2
76010-3	**19.8**	25.5	6.7	14.2	27.7	25.1
86020-3	**19.8**	21.8	9.9	12.0	30.0	25.2
RISE	**19.3**	21.0	8.5	11.1	29.7	26.3
86019-2	**19.1**	20.9	10.4	13.6	28.9	21.6
86021-4	**19.1**	21.1	9.1	15.7	26.3	23.3
83014-6	**18.6**	19.6	8.4	12.1	27.5	25.2
RISE-SL	**18.5**	18.1	11.0	9.1	28.5	25.9
85004-3	**18.4**	22.3	6.4	11.8	28.1	23.2
86019-1	**18.3**	21.2	11.3	14.1	21.7	23.4
85007-1	**18.2**	23.4	5.6	14.7	23.8	23.4
79017-4	**18.2**	18.1	8.7	12.0	28.4	23.7
83011-4	**17.8**	21.5	6.4	10.2	24.3	26.9
85011-2	**17.8**	26.5	6.2	13.5	23.5	20.0
76010-1	**17.5**	23.8	9.1	10.6	23.3	21.6
87002-6	**17.0**	19.3	11.2	14.9	20.4	19.1
83014-1	**16.9**	20.2	8.5	10.7	21.7	23.6
86015-2	**16.5**	18.5	6.2	11.9	23.9	21.9
83014-4	**16.1**	20.6	6.2	10.1	21.2	22.7
83012-6	**15.9**	24.7	6.8	11.6	12.5	24.0
PANHANDLE	**15.6**	20.2	6.4	8.3	21.5	21.7
MINCO	**15.4**	15.9	5.4	10.0	25.9	20.0
SNOWBIRD	**14.6**	14.8	7.5	7.7	23.1	20.0
DAWN	**14.6**	15.9	8.1	3.1	22.7	23.2
COPE	**13.9**	16.4	5.9	9.9	21.2	15.9
Average	**17.7**	21.1	8.0	11.6	24.8	23.3
LSD 0.05	**2.8**	7.1	4.4	4.7	9.0	5.5

Table 4. Agronomic characteristics of lines and varieites in 1990 trials.

Variety	Heading August	Seeds /5g	Weight lb/bu	Height Inches	Lodging %
SUNUP	5.7	736	56.0	32.4	28.0
86005-3	8.1	711	54.9	27.1	23.2
86020-1	9.8	766	55.0	29.4	21.0
76010-3	3.5	704	54.3	30.7	34.0
86020-3	8.0	782	55.1	26.4	21.5
RISE	3.5	750	55.1	29.5	24.0
86019-2	7.4	721	56.3	30.5	21.2
86021-4	10.2	727	56.0	29.6	23.2
83014-6	9.9	721	56.3	30.2	26.2
RISE-SL	5.4	733	55.2	29.9	26.0
85004-3	11.3	742	55.3	31.1	23.5
86019-1	6.3	736	55.8	30.7	33.2
85007-1	6.7	751	55.8	31.1	30.7
79017-4	7.9	747	55.5	29.0	23.5
83011-4	9.6	747	55.0	29.8	34.2
85011-2	8.9	713	54.9	31.5	25.0
76010-1	7.1	721	54.6	28.9	31.7
87002-6	5.6	782	52.6	29.8	39.5
83014-1	11.3	731	55.7	30.2	27.7
86015-2	9.2	754	55.0	32.0	32.2
83014-4	11.1	745	55.9	30.1	24.7
83012-6	10.8	753	56.0	35.1	23.0
PANHANDLE	2.4	738	55.7	33.9	42.7
MINCO	5.3	760	55.7	33.7	46.7
SNOWBIRD	2.1	736	55.0	30.7	40.2
DAWN	0.3	721	55.2	24.9	50.5
COPE	9.4	717	56.1	36.7	30.7
MEAN	7.3	739	55.4	30.6	30.0
LSD 0.05	1.5	17	0.5	2.3	4.3

Proso Millet—Unsuitable As A Host For Russian Wheat Aphid

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Five commonly grown varieties of proso millet were tested in a greenhouse study for their suitability as a host for Russian wheat aphid. In addition, a resistant check (Ogle oats) and 2 susceptible checks (Hazen barley and Guard wheat) were included. All plants were planted at the same time. Five adult or late-instar Russian wheat aphids were placed on each of three plants in each pot about 3 weeks after planting. Each variety was replicated 6 times. After 2 weeks, all the aphids were counted on each plant to determine the aphids reproductive capability on the variety. Very few aphids were found on any of the millet varieties, therefore these plants were placed in berlese funnels to determine if any aphids were missed during the counting process. Almost no aphids were found on any of the millet varieties after 2 weeks. Those aphids that did remain were probably lone survivors of the initial infestation. It is clear from this test that these proso millet varieties are **not suitable** hosts for the Russian wheat aphid. This study is supported by the lack of field observations of the presence of Russian wheat aphids on proso millet.

Variety	RWA/Plant	Growth Stage at Evaluation
Checks		
Hazen (barley)	150.6	late tillering
Guard (wheat)	223.7	tillering
Ogle (oat)	20.3	late tillering
Proso		
Cerise	0.1	late boot
Dawn	0.1	early heading
Rise	0.1	early heading
Sunup	0.0	boot
Panhandle	0.0	early heading

SUNFLOWER TEST - 1990

The 1990 sunflower test was conducted under dryland conditions in Cheyenne County. It was planted in a 10 acre sunflower field at the High Plains Agricultural Lab near Sidney, Nebraska. Two trials were conducted involving a fallow trial and a continuous trial. Continuous refers to continuous cropping. In this trial the continuous plot followed a wheat crop the previous year. The trials were planted on June 14. Each plot consisted of 4, 30 inch rows and each hybrid was replicated 4 times. Plots were planted 30 feet long of which 25 feet were harvested. Four rows were planted and the center two of each were harvested with a small plot combine. Seeding rate was 18,000 seeds per acre. Six companies entered 19 hybrids in the fallow test and 15 hybrids in the continuous test. One hybrid was of confectionary type in each test. The herbicide used on each test was Prowl at a rate of 1 1/2 pints/a. The plots were harvested on October 14.

Sunflower yields were approximately 30% below average in both the fallow trials and the continuous trial.

Oil percentage is based on 10% moisture. Analysis was provided by Dr. J. F. Miller, USDA-ARS in Fargo, North Dakota. Samples were cleaned of all foreign material prior to analysis. Thanks to Dr. Miller and all his assistants for their contributions to these test. We would like to thank Glen Frickel for the extra effort he gave these plots in order to make it a success. Without his help these tests could not have been conducted in 1990. Thanks to David Davis and Shari Bordeaux for there efforts in preparing this book. Companies entering the 1990 Sunflower Test.

Companies entering the 1990 Sunflower Test.

Cargill Hybrid Seeds,	Minneapolis, MN 55440
Jacques Seed Co.,	Prescot, WI 54021-1499
Triumph Seed Co.,	Ralls, TX 79357
Garst Seed Co.,	Kindred, ND 58501
Genitic Resources Inc.,	Philo, Ill 61864

Sunflowers Grown at the HPAL, Sidney, NE, 1990

Table 5. Fallow Cropping Sunflower.

ENTRY	YIELD lbs/a	FLOWER August	HEIGHT Inches	TSTWT lbs/bu	H2O %	STD #Plts	OIL %
GRI 8806	1075	16.2	59.2	26.0	5.7	35	39.3
GRI 8803	1019	16.7	59.5	27.1	5.7	35	39.1
GRI 89102	992	17.7	66.7	26.4	5.6	33	39.9
GRI 881	982	15.5	58.5	26.2	5.5	36	39.9
CARGILL SF187A	974	16.0	47.7	23.7	5.9	34	35.0
TRIUMPH 565	973	15.7	60.2	27.1	5.4	35	39.9
TRIUMPH TRX 92	967	15.2	57.0	23.3	5.6	34	37.0
JACQUES COMMANDO	913	15.0	57.2	25.1	5.8	33	36.7
CARGILL C207A	908	16.5	64.7	24.5	5.8	37	34.6
TRIUMPH 560A	897	16.0	59.7	25.3	5.3	36	40.2
CARGILL SF100A	872	16.2	52.0	24.5	5.9	32	33.7
GRI 89101	864	20.2	64.0	27.2	5.5	38	*
TRIUMPH 548A	860	18.5	60.2	26.1	5.6	35	39.5
JACQUES EX8812	854	14.2	54.0	23.4	5.6	35	37.9
GARST HYSUN 354	838	16.0	56.7	24.4	5.6	38	39.8
GRI 8807	824	19.7	65.2	27.1	5.5	36	40.3
GARST HYSUN 33	820	21.2	70.5	30.4	5.6	34	40.6
GARST HYSUN 350	819	13.2	63.5	25.1	5.7	32	37.4
GARST HYSUN 44	701	19.7	62.0	28.4	5.7	36	40.3
Average	**903**	**16.8**	**59.9**	**25.9**	**5.7**	**35**	**38.4**
LSD 0.05	**165**	**2.0**	**4.7**	**1.1**	**0.2**	**5.2**	**1.4**

* Confectionary

Table 6. Four year summary of yield and percent oil data of sunflower entries in fallow trials from western Nebraska. 1987 - 1990.

Company	Hybrid	1990		1989		1988		1987		Four Year Average	
		Yield lbs/a	Oil %	Yield lbs/a	Oil %	Yield lbs/a	Oil %	Yield lbs/a	Oil %	Yield lbs/a	Oil %
Triumph	565	973	39.9	2250	42.3	1250	44.9	1760	48.1	1558	43.8
Triumph	548A	860	39.5	2540	43.3	1070	43.4	1960	41.9	1607	42.0

Table 7. Continuous Cropping Sunflower.

ENTRY	YIELD lbs/a	FLOWER August	HEIGHT Inches	TSTWT lbs/bu	H2O %	STD #pts	OIL %	BRKN #plnts
GARST HYSUN 354	576	16.0	36.2	24.8	5.5	33	41.7	0.25
TRIUMPH 560A	519	15.5	35.2	26.8	5.2	26	43.3	0.25
TRIUMPH 565	486	16.7	36.7	27.2	5.3	18	42.9	0.25
JACQUES COMMANDO	474	14.0	37.0	25.0	5.6	26	38.4	0.50
TRIUMPH 548A	468	17.2	34.2	26.0	5.3	25	42.4	0.00
GARST HYSUN 350	464	16.0	38.7	25.9	5.5	18	40.2	0.00
TRIUMPH TRX 92	458	12.7	31.2	24.6	5.4	29	39.4	0.25
GRI 89101	438	20.2	37.0	26.0	5.3	28	*	0.00
GRI 8803	426	16.5	35.2	27.6	5.6	26	40.4	0.00
GRI 8806	419	16.5	36.5	25.9	5.3	22	42.4	0.00
GARST HYSUN 44	415	20.7	41.5	25.9	5.7	24	40.1	0.00
GARST HYSUN 33	388	21.0	46.0	25.9	5.7	23	40.0	0.2
GRI 8807	355	20.0	36.2	25.2	5.2	30	40.4	0.25
GRI 89102	351	18.2	39.7	25.3	5.4	12	41.1	0.00
GRI 881	349	15.7	36.7	27.0	5.4	11	40.7	0.00
Average	439	17.1	37.2	25.9	5.5	24	40.9	0.13
LSD 0.05	170	1.3	5.1	1.2	0.2	7	1.3	0.47

* Confectionary

Table 8. Two year summary of yield and percent oil data of sunflower entries in fallow trials from western Nebraska. 1989 - 1990.

Company	Hybrid	1990 Yield lbs/a	1990 Oil %	1989 Yield lbs/a	1989 Oil %	Two Year Average Yield lbs/a	Two Year Average Oil %
GarstHysun	354	838	39.8	2386	42.0	1612	40.9
Cargill	SF 187A	974	35.0	2167	41.0	1570	38.0
Cargill	SF 207A	908	34.6	2481	38.5	1694	36.5
GarstHysun	33	820	40.6	2215	39.2	1517	39.9
Jacques	Commando	910	36.7	2120	39.7	1515	38.2
Triumph	565	973	29.9	2250	42.3	1611	41.1
Triumph	548A	860	39.5	2540	43.3	1700	41.1

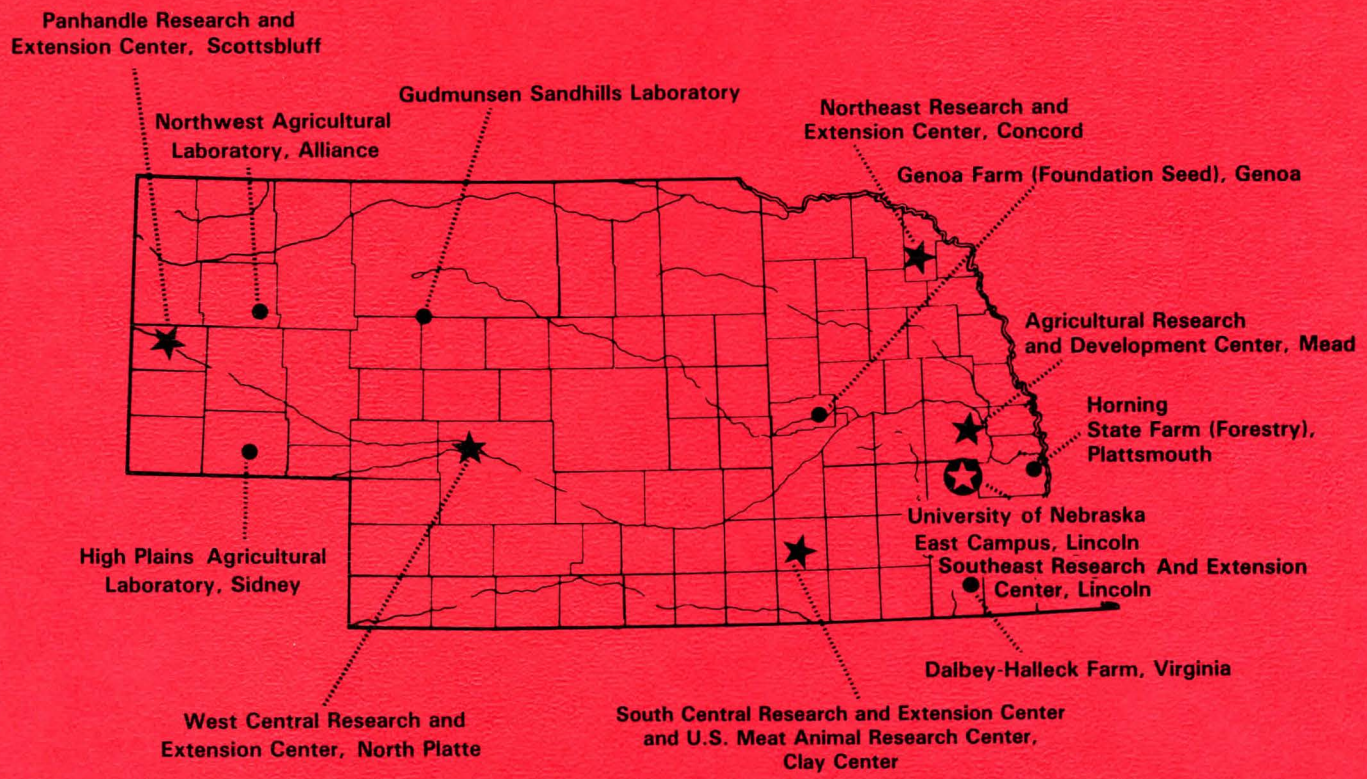
DESCRIPTION OF AMARANTH PLOT TECHNIQUES

The 1990 Amaranth trial was conducted at the High Plains Agriculture Laboratory near Sidney, Nebraska. These plots were planted June 8 with a 4 row double disc drill. Each plot was 30 feet long and 4 rows wide. Due to extremely low moisture very low numbers of plants emerged until rainfall at the beginning of July. These plots were then harvested on October 20. One of the center rows was hand harvested due to extreme lodging from early snow and a large wind front after the snow. Four replications of each variety were planted and harvested from this trial.

AMARANTH 1990

VARIETY	YIELD LBS/a	FLRDT AUGUST	LODG %	HEIGHT inches	STD %	VARIETY	YIELD LBS/a	FLRDT AUGUST	LODG %	HEIGHT inches	STD %
K583	1151	31.7	100	56.7	70.0	A5198	402	32.0	100	69.2	72.5
D141	1015	33.0	100	62.7	65.0	K710	400	37.2	70	45.7	72.5
K591	1007	30.5	100	56.5	72.5	A5186	395	32.2	100	65.7	70.0
K686	967	30.2	100	54.5	72.5	D129	393	29.7	100	54.0	57.5
K549	868	29.5	100	50.0	70.0	A5196	376	31.2	100	64.7	72.5
K433-B	859	30.7	100	40.7	77.5	A5194	375	32.5	100	66.7	67.5
D115	850	29.0	100	55.7	57.5	K725	370	29.7	75	56.2	77.5
Plainsman	**816**	**29.7**	**100**	**53.5**	**77.5**	A5187	361	32.0	100	63.2	62.5
K676	784	31.0	100	56.7	75.0	K283-B	360	31.2	95	58.7	70.0
D126	711	29.2	100	52.2	65.0	K622	357	33.5	100	62.0	57.5
A5200	710	31.7	100	65.7	55.0	A5188	353	31.5	100	65.7	70.0
K593C	710	30.7	100	55.0	67.5	D70-1	350	36.2	82	52.2	70.0
D107	697	32.0	100	48.7	67.5	A5172	346	31.5	100	62.0	72.5
A5199	685	31.0	100	62.2	75.0	D139	341	37.7	95	44.0	77.5
K551	674	30.0	100	54.2	72.5	A5195	338	31.7	100	64.2	75.0
D34-1-1	642	28.5	100	61.7	45.0	K571	333	30.5	100	64.0	57.5
K578	596	29.2	100	50.7	77.5	K436-B	331	31.5	100	54.7	75.0
D74	589	31.0	100	54.5	62.5	D145	262	32.5	82	52.5	77.5
D108	584	28.2	100	58.0	75.0	A5189	256	32.7	100	67.0	67.5
D56A	576	32.2	100	55.5	70.0	A5483	251	35.5	100	67.7	55.0
K432-B	569	29.2	100	40.2	70.0	A5183	249	32.0	100	68.0	67.5
D113	541	31.0	100	58.0	65.0	K540	235	34.7	100	61.2	62.5
D87	540	32.2	100	48.7	60.0	3451F2	222	29.0	100	51.0	70.0
D43B	519	29.2	100	54.0	72.5	A5173	221	31.5	100	69.7	82.5
K665	517	34.5	100	55.7	67.5	K559	180	39.5	100	66.2	82.5
AMONT	513	32.5	100	63.7	62.5	K575	161	40.7	90	51.2	77.5
A5192	510	29.7	100	62.2	80.0	K633	114	35.5	80	69.5	57.5
D106	506	30.5	100	52.5	75.0	K636	104	37.5	85	71.0	67.5
K683	488	30.5	100	54.5	47.5	D104	96	35.0	100	61.0	72.5
D110	464	31.2	100	59.7	55.0	D97	84	39.7	40	51.5	85.0
D85-2	458	32.2	100	54.7	67.5	D136-1	48	42.5	55	51.5	80.0
K266	435	30.5	100	56.7	55.0						
K709	431	35.5	100	54.5	35.0	MEAN	481	32.4	96	57.8	68.2
D85-1	416	31.0	100	58.2	70.0	LSD 0.05	293.4	1.6	14.7	5.2	20.2

AGRICULTURAL RESEARCH AND EXTENSION FOR ALL OF NEBRASKA



The Agricultural Research Division of the Institute of Agriculture and Natural Resources is responsible for studies to broaden our basis of knowledge for agricultural production. Research centers and field laboratories provide applied information for development of Nebraska's largest industry — agriculture.

The Cooperative Extension Service transmits data and provides interpretation to users through Extension Agents and Specialists. Extension Agents may be contacted through 85 local Extension offices for additional information and more specific recommendations.

Nebraska is a large state and has great variation due to topography and the continental type of climate. The elevation ranges from 1,000 feet to near a mile high in the northwest portion of the state, rainfall varies from less than 15 to more than 35 inches per year, and the soil types vary from sands to heavy clays. The research and extension programs thus are broad in subject matter and geography, resulting in the need for various centers, satellite locations, and local offices.