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FEBRUARY 1979

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Institute of Agriculture
and Natural Resources

PROSO VARIETY TESTS
1978

L. A. NELSON

Extension work in "Agriculture,
Home Economics and subjects relating
thereto," The Cooperative Extension Service,
Institute of Agriculture and Natural Resources,
University of Nebraska–Lincoln, Cooperating with
the Counties and the U.S. Department of Agriculture
Leo E. Lucas, Director

The Agricultural Experiment Station
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
H. W. Ottoson, Director

EXTENSION CIRCULAR 78-107

February 1979

FOREWORD

This circular is a progress report of proso variety trials conducted by the Panhandle Station and High Plains Agricultural Laboratory. These Extension Circulars replace the Outstate Testing Series. Conduct of experiments and publication of results is a joint effort of the Agricultural Experiment Station and the Cooperative Extension Service. Special acknowedgment is made to Ted McIrwin and Les Griffeth for furnishing land for irrigated and nonirrigated trials in Kimball County, respectively.

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PROSO VARIETY TESTS

1978

L. A. NELSON 1/

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 the last six years:

Year	Yield	Area
	lb/A (kg/ha)	acres (hectares)
1973	1,500 (1680)	29,000 (11 700)
1974	1,300 (1456)	42,000 (17 000)
1975	1,300 (1456)	40,000 (16 200)
1976	1,250 (1400)	34,000 (13 800)
1977	1,470 (1646)	49,000 (19 850)
1978	1,200 (1344)	50,000 (20 250)

The largest acreage of proso for grain is White Proso (a type rather than a variety), which accounts for 62%. Abarr accounts for 15% of the acreage, Panhandle 11% and Dawn 6%. Table 1 lists the characteristics of proso varieties. Proso sold for $3.90 per hundred weight in 1978 compared to $3.40 in 1977.

Yield tests were planted about May 20 for early plantings and June 15 for late plantings. Twenty varieties were planted at the rate of 15 seeds per foot of row in four replications. Half of each replicate was fertilized with 40 pounds of nitrogen. Each test was analyzed as a randomized complete block and fertilizer sub-plots as a split block. Three error terms were calculated, one for varieties, one for fertilizer and one for the interaction of variety and fertilizer. Differences required for significance at the 5% level are given in individual tables. Differences this large may be expected through chance alone in 1 to 20 trials. Unless varietal differences exceed this amount, little confidence can be placed in the superiority of one over the other in that in that particular test.

Seed counts were made on a 5 gram composite sample from all replications of each experiment. The larger the number of seeds, the smaller the seed size.

Strains with RB, IPM, Akron, Minn., prefixes or numbers beginning with 7 are experimental and seed is not available for commercial plantings. Cerise and Dawn are recent releases of the Nebraska Experiment Station and are being recommended wherever millet if grown in the state.

1/ Associate Professor of Agronomy, Panhandle Station, Scottsbluff, Nebraska.

Dawn is an early maturing, short statured proso which ripens uniformly and is quite shatter resistant. It's yield is nearly as high as Panhandle in many locations but it responds to higher moistue and fertility levels. Dawn had excellent yields at some locations in 1976 since its earliness helped to escape the drought. It continues to show good potential for direct combining.

Cerise is a red seeded proso with an open panicle type. It is similar in height to both Turghai and Panhandle. It heads about one day earlier than Turghai and one and one half days earlier than Panhandle. The color of the seedcoat is red and is very similar to Turghai. The yield of Cerise is about 100 pounds per acre higher than Turghai. The grain protein is slightly higher than Turghai and 1-2% higher than Panhandle. Cerise produces a higher tonnage and more leafy forage than Panhandle.

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

Minco is a recent release from the Minnesota Experiment Station. It has white seed. It has performed similar to Panhandle in the Nebraska tests.

Cope was released by Colorado in 1978. It is later in maturity than common white proso but has performed quite well.

Table 2 lists the 5-year grain yields of several of the lines and varieties. Many of them have not been in the test for 5 years, so are listed for only the years they were tested.

Five trials were planted in 1978 and all were harvested. One was on irrigated land, one on ecofallow, and the other three were on fallow planted at different times. All plots were treated with atrazine at the rate of one pound per acre at planting time for weed control.

The irrigated test was located near Dix. It had good fertility and water throughout the season. It was planted on June 21. The early trial at the High Plains Agricultural Laboratory near Sidney was planted on May 25 on fallowed land. It had good fertility and moisture was good through most of the season. The ecofallow was located at the High Plains Agricultural Laboratory on land where wheat was harvested in 1977. Water was limited on this test. It was planted on June 1. The late planted test at the High Plains Laboratory was planted on June 19. Soil moisture was good at planting but limited during the later part of the growing season. The Kimball County plot was North of Kimball. Soil moisture was fair at planting but limited during the season. It was planted on June 16.

The yields of the early planted test was as high as the irrigated test. The irrigated test responded better to nitrogen fertilizer. Minn. 55, Minco, and Minn. 402 all yielded well in 1978. Dawn and its look-alike, 73038 were poorly adapted to ecofallow. Dawn generally is unsatisfactory under severe stress conditions.

Protein percent generally increases as yields decline while the amount of protein per acre rises with higher yields. Minn. 55 had highest protein production per unit area with Dawn second high.

Table 1. Characteristics of lines and varieties tested in 1978.

Variety or line	Seed Color	Maturity	Relative straw strength	Height
Panhandle	White	Medium	Weak	Medium
Cerise	Lt. Red	Early	Fair -	Medium
Dawn	White +	V. Early	Good	Short
Akron 29	White +	Medium	Fair	Tall
Cope	White	Late	Fair +	Tall
Minco	White	Medium	Fair	Medium
Minn. 402	White	M. Late	Fair	Medium
Akron 58	White	Medium	Fair +	Medium
71009	Tan	Medium	Fair +	Medium
73037	White	Medium	Fair	Medium
73115-1	White	Late	Fair	Tall
73038	White	Early	Good	Short
74002	White	Medium	Fair +	Med. Short
Minn. 55	White	Medium	Fair	Med. Short
72004	Lt. Red	Late	Fair	Medium
72005	Red	Medium	Fair	Tall
74003	White	V. Late	Weak	Tall
74103	Lt. Red	Late	Fair +	Med. Tall
RB 170603 D. R.	Red	Medium	Weak	Medium
Abarr	White	Late	Fair	Medium Tall
White Proso	White	Medium	Weak	Medium

THE METRIC SYSTEM

Data in this circular are given in commonly used U. S. units followed by metric units in parentheses ( ). Some equivalents and conversions used were as folows:

1 centimeter (cm) = 0.394 inches	cm = inches x 2.54
1 hectare (ha) - 2.471 acres	ha = acres x 0.405
1 kilogram (kg) - 2.205 pounds	kg = pounds x 0.454
1 kilogram/hectare (kg/ha) = 0.892 pounds per acre	kg/ha = lb/A x 1.121
1 kilogram/hectare (kg/ha) = 0.892 pounds per acre	kg/ha = cwt/A x 112.1

Table 2. Proso yield results. 1974-1978.

Variety or line	1978 (5 tests) cwt/A (kg/ha)	1977 (4 tests) cwt/A (kg/ha)	1976 (4 tests) cwt/A (kg/ha)	1975 (5 tests) cwt/A (kg/ha)	1974 (3 tests) cwt/A (kg/ha)
Panhandle	14.7 (1646)	15.6 (1747)	10.6 (1190)	15.2 (1700)	18.8 (2110)
Cerise	12.5 (1400)	21.8 (2442)	8.8 (990)	14.6 (1640)	16.0 (1790)
Dawn	14.9 (1669)	14.3 (1602)	17.4 (1950)	13.0 (1460)	10.7 (1200)
Akron 29	15.1 (1691)	18.7 (2094)	14.0 (1570)	14.0 (1570)	15.7 (1760)
Cope	13.5 (1517)	19.9 (2223)	9.7 (1080)	16.0 (1786)	---- ----
Abarr	13.5 (1512)	---- ----	7.8 (870)	15.8 (1770)	18.1 (2030)
Minco	15.9 (1781)	16.6 (1859)	9.0 (1010)	15.0 (1680)	---- ----
Minn. 402	15.9 (1781)	15.7 (1758)	10.0 (1120)	15.7 (1760)	---- ----
Akron 58	14.8 (1658)	18.1 (2027)	12.6 (1410)	16.7 (1870)	---- ----
71009	16.5 (1848)	13.7 (1534)	10.9 (1220)	---- ----	---- ----
73038	14.0 (1568)	14.3 (1602)	---- ----	---- ----	---- ----
74002	14.6 (1635)	17.3 (1938)	---- ----	---- ----	---- ----
Minn. 55	17.3 (1938)	---- ----	---- ----	---- ----	---- ----
72004	13.1 (1467)	---- ----	---- ----	---- ----	---- ----
72005	11.2 (1254)	---- ----	---- ----	---- ----	---- ----
74003	11.1 (1243)	---- ----	---- ----	---- ----	---- ----
74103	15.0 (1680)	---- ----	---- ----	---- ----	---- ----
RB 170603 DR	12.2 (1366)	---- ----	---- ----	---- ----	---- ----
L.S.D. .05	2.1 (235)	2.7 (302)	---- ----	---- ----	---- ----

Table 3. Proso yields at 5 locations in 1978

Variety	Irrigated Yield cwt/A	(kg/ha)	Early HPAL Yield cwt/A	(kg/ha)	Ecofallow Yield cwt/A	(kg/ha)	Late HPAL Yield cwt/A	(kg/ha)	Kimball county Yield cwt/A	(kg/ha)	Average 5 tests Yield cwt/A	(kg/ha)
Minn 55	22.0	(2464)	24.0	(2688)	15.2	(1702)	17.9	(2005)	7.2	(806)	17.3	(1938)
Dawn	20.4	(2285)	17.3	(1938)	6.8	(771)	19.1	(2139)	11.0	(1232)	14.9	(1669)
Minco	23.4	(2621)	20.0	(2240)	14.8	(1658)	15.8	(1770)	5.6	(627)	15.9	(1781)
71009	20.1	(2251)	21.3	(2386)	13.8	(1546)	15.4	(1725)	11.8	(1322)	16.5	(1848)
Minn 402	22.3	(2498)	19.6	(2195)	13.7	(1534)	15.1	(1691)	8.7	(974)	15.9	(1781)
Akron 58	20.6	(2307)	20.2	(2262)	10.7	(1198)	13.4	(1501)	9.2	(1030)	14.8	(1658)
Cope	15.3	(1714)	12.3	(1378)	13.0	(1456)	15.7	(1758)	8.3	(930)	12.9	(1445)
Cerise	18.1	(2027)	17.8	(1994)	13.0	(1456)	9.3	(1042)	4.5	(504)	12.5	(1400)
Akron 29	19.8	(2218)	21.1	(2363)	13.6	(1523)	12.8	(1434)	8.5	(952)	15.1	(1691)
Panhandle	19.6	(2195)	19.2	(2150)	13.7	(1534)	14.1	(1579)	6.8	(762)	14.7	(1646)
73115-1 & 73037*	14.8	(1658)	18.9	(2117)	11.7	(1310)	11.1	(1243)	8.1	(907)		
73038	16.2	(1814)	17.6	(1971)	4.5	(504)	19.4	(2173)	12.3	(1378)	14.0	(1568)
74002	17.7	(1982)	19.2	(2150)	11.0	(1232)	14.8	(1658)	10.1	(1131)	14.6	(1635)
Akron 73-21-3	16.8	(1882)	15.5	(1736)	14.9	(1669)	15.4	(1725)	8.6	(963)	14.2	(1590)
Abarr	20.4	(2285)	17.9	(2005)	12.1	(1355)	11.4	(1277)	5.7	(638)	13.5	(1512)
740030	10.7	(1198)	11.7	(1310)	12.2	(1366)	15.1	(1691)	5.7	(638)	11.1	(1243)
170603 D. R.	18.6	(2083)	17.8	(1993)	12.7	(1422)	8.1	(907)	3.9	(437)	12.2	(1366)
72005-3	17.6	(1971)	16.6	(1859)	9.8	(1098)	7.4	(829)	4.8	(538)	11.2	(1254)
72004	15.8	(1770)	20.6	(2307)	12.6	(1411)	10.0	(1120)	6.5	(728)	13.1	(1467)
74103	18.4	(2061)	20.5	(2296)	13.4	(1501)	15.6	(1747)	7.2	(806)	15.0	(1680)
L.S.D. .05	3.9	(437)	3.0	(336)	3.0	(336)	2.4	(269)	3.6	(403)	2.1	(235)
No. Fert.	18.0	(2016)	18.5	(2072)	12.0	(1344)	14.0	(1568)	7.9	(885)	14.0	(1568)
Fert.	19.0	(2128)	18.4	(2061)	13.0	(1456)	13.7	(1334)	7.5	(840)	14.3	(1602)
L.S.D. .05	0.6	(67)	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

* 73115-1-irrigated 73037 - dryland

Table 4. Protein data on 1978 yield trials.

Variety	Irrigated % protein	Irrigated lbs/protein per acre	Irrigated (kg/ha)	Early HPAL % protein	Early HPAL lbs/protein per acre	Early HPAL (kg/ha)	Ecofallow % protein	Ecofallow lbs/protein per acre	Ecofallow (kg/ha)	Late HPAL % protein	Late HPAL lbs/protein per acre	Late HPAL (kg/ha)
Minn 55	14.1	309	(346)	14.2	341	(382)	13.1	200	(244)	14.7	264	(296)
Dawn	15.1	308	(345)	16.1	278	(311)	15.8	106	(119)	15.9	304	(340)
Minco	13.8	321	(360)	13.3	266	(298)	12.4	181	(203)	13.9	220	(246)
71009	13.4	268	(300)	13.9	295	(330)	12.4	174	(195)	14.1	217	(243)
Minn 402	13.7	306	(343)	13.2	258	(289)	11.9	160	(179)	14.1	212	(237)
Akron 58	13.3	274	(307)	13.1	267	(299)	12.6	131	(147)	13.8	184	(206)
Cope	14.1	214	(240)	13.5	167	(187)	12.3	157	(176)	14.5	226	(253)
Cerise	14.6	263	(295)	15.4	275	(308)	12.9	170	(190)	15.6	145	(162)
Akron 29	13.4	264	(296)	13.4	282	(316)	12.3	168	(188)	13.8	176	(197)
Panhandle	13.7	269	(301)	13.4	259	(290)	12.5	172	(193)	14.2	200	(224)
73037 & 73115-1*	13.6	201	(225)	16.0	302	(338)	13.6	161	(180)	15.8	176	(197)
73038	15.2	246	(276)	15.8	278	(311)	16.0	71	(80)	15.8	306	(343)
74002	13.2	233	(261)	13.6	262	(293)	12.3	137	(153)	13.9	204	(228)
Akron 73-21-3	13.9	231	(259)	13.4	208	(233)	12.6	186	(208)	14.4	221	(248)
Abarr	14.0	285	(319)	14.1	250	(280)	12.6	155	(174)	14.7	168	(188)
74003	13.0	139	(156)	13.5	158	(177)	11.5	137	(153)	13.8	208	(233)
170603 D. R.	14.5	267	(299)	15.2	271	(304)	13.0	162	(181)	15.6	125	(140)
72005-3	14.5	254	(284)	14.7	244	(274)	13.4	128	(143)	15.1	111	(124)
72004	15.2	239	(268)	15.8	325	(364)	13.7	170	(190)	16.1	162	(181)
74103	14.6	269	(301)	14.7	302	(338)	13.8	185	(207)	15.4	241	(270)
L.S.D. .05	0.5	53	(59)	0.5	44	(49)	1.1	37	(41)	0.3	33	(37)
No. Fert.	13.9	248	(278)	14.1	262	(293)	11.7	132	(148)	14.6	203	(227)
Fert.	14.1	268	(300)	14.5	267	(299)	14.4	179	(200)	14.9	204	(228)
L.S.D. .05	0.1	9	(10)	0.2	N.S.	N.S.	2.3	43	(48)	0.2	N.S.	N.S.

*73115-1 irrigated 73037 - dryland

Table 5. Protein, heading, and lodging data

Variety	Kimball % protein	Kimball lbs/protein per acre	Kimball (kg/ha)	5 locations % protein	5 locations lbs/protein per acre	5 locations (kg/ha)	Heading date Early	Heading date Ecofallow	Heading date Late	Average 3 tests	Lodging Irrigated	Lodging Kimball
Minn 55	14.3	101	(113)	14.1	243	(272)	15	27	30	24	24	49
Dawn	13.9	152	(170)	15.4	230	(258)	10	17	26	18	0	0
Minco	13.4	74	(83)	13.3	212	(237)	18	28	32	26	10	33
71009	12.9	151	(169)	13.3	221	(248)	16	22	30	23	8	8
Minn. 402	12.9	110	(123)	13.2	209	(234)	18	28	31	26	15	33
Akron 58	13.0	119	(133)	13.2	195	(218)	15	27	30	24	9	15
Cope	13.6	112	(125)	13.6	175	(196)	21	30	35	29	21	8
Cerise	15.2	68	(76)	14.7	184	(206)	14	24	30	23	28	30
Akron 29	12.9	108	(121)	13.2	200	(224)	15	25	31	24	8	28
Panhandle	13.7	91	(102)	13.5	198	(222)	17	27	30	25	25	23
73037 & 73115-1*	14.2	113	(127)				13	23	30	22	29*	16
73038	14.5	178	(199)	15.4	216	(242)	10	19	26	18	0	0
74002	13.5	134	(150)	13.3	194	(217)	15	24	29	23	10	10
Akron 73-21-3	13.0	112	(125)	13.4	191	(214)	19	28	33	27	14	13
Abarr	13.9	77	(86)	13.9	187	(209)	18	27	33	26	26	36
7400301	13.4	74	(83)	13.1	143	(160)	28	34	36	33	64	3
170603 D. R.	15.0	57	(64)	14.6	176	(197)	18	28	31	26	41	31
72005-3	12.2	57	(64)	14.0	159	(178)	17	27	31	25	18	20
72004	14.7	95	(106)	15.1	198	(222)	18	27	33	26	24	8
74103	14.3	102	(114)	14.6	220	(246)	19	27	33	26	14	15
L.S.D. .05	1.5	45.2	(50.6)	0.4	18	(20)	1.6	2.1	1.9		19	13.7
No Fert.	13.2	103	(115)	13.5	190	(213)					18	18
Fert.	14.3	106	(119)	14.4	205	(230)					20	20
L.S.D. .05	0.7	N.S.	N.S.	0.3	12	13					N.S.	N.S.

*73115-1 on irrigated test, 73037 - dryland

**Days after July 1

Table 6. Plant height and seed size of Proso variety at five locations

Variety	Plant height						Number of seeds/5 grams					
	Irrigated in (cm)	Early in (cm)	Eco in (cm)	Late in (cm)	Kimball in (cm)	Five Locations in (cm)	Irrigated	Early	Eco.	Late	Kimball	Five Locations
Minn 55	31 (79)	35 (89)	31 (79)	36 (79)	26 (66)	32 (81)	806	758	778	791	812	789
Dawn	28 (71)	23 (58)	19 (48)	28 (71)	23 (58)	24 (61)	794	789	839	811	844	815
Minco	38 (96)	36 (91)	29 (74)	37 (94)	24 (61)	33 (84)	840	803	860	834	820	832
71009	37 (94)	33 (84)	26 (66)	38 (96)	28 (71)	32 (81)	919	871	881	900	921	898
Minn 402	37 (94)	36 (91)	29 (74)	37 (94)	29 (74)	33 (84)	850	815	853	841	881	848
Akron 58	35 (89)	37 (94)	30 (76)	37 (94)	29 (74)	33 (84)	811	772	808	799	822	802
Cope	42(107)	41(104)	31 (79)	42(107)	30 (76)	37 (94)	826	791	848	817	809	818
Cerise	37 (94)	35 (89)	32 (81)	40(102)	29 (74)	34 (86)	945	881	894	948	913	916
Akron 29	35 (89)	33 (84)	31 (79)	37 (94)	28 (71)	33 (84)	820	784	798	811	836	810
Panhandle	36 (91)	39 (99)	33 (84)	39 (99)	27 (69)	35 (89)	836	801	814	827	856	827
73115-1 & 73037*	38 (96)	31 (79)	29 (74)	37 (94)	27 (69)		846	819	847	872	881	
73038	27 (69)	23 (58)	17 (43)	27 (69)	22 (56)	23 (58)	793	776	859	813	844	817
74002	32 (81)	34 (86)	32 (81)	37 (94)	31 (79)	33 (84)	856	799	805	825	855	828
Akron 73-31-3	40(102)	41(104)	35 (89)	41(104)	30 (76)	37 (94)	812	770	818	798	781	796
Abarr	36 (91)	38 (96)	32 (81)	41(104)	27 (69)	35 (89)	809	775	792	805	854	807
74003	39 (99)	36 (91)	30 (76)	39 (99)	26 (66)	34 (86)	895	819	894	861	848	863
170603 D. R.	36 (91)	36 (91)	30 (70)	40(102)	27 (69)	34 (86)	941	869	905	940	907	913
72005-3	42(107)	37 (94)	32 (81)	43(109)	32 (81)	37 (94)	861	817	833	861	881	851
72004	36 (91)	32 (81)	28 (71)	39 (99)	26 (66)	32 (81)	910	866	870	893	879	884
74103	37 (94)	37 (94)	29 (74)	37 (94)	28 (71)	34 (86)	852	805	835	838	849	836
L.S.D. .05	3.3 (8.4)	2.5 (6.4)	3.3 (8.4)	2.3(5.8)	5.1 (13.0)	1.5(3.8)	28	22	32	16	75	18
No. Fert.	36 (91)	35 (89)	29 (74)	38 (96)	28 (71)	33 (84)	848	796	829	842	852	833
Fert.	36 (91)	35 (89)	29 (74)	37 (94)	27 (69)	33 (84)	855	822	854	846	857	847
L.S.D. .05	N.S.	N.S.	N.S.	0.3(0.8)	0.4(1.0)	N.S.	N.S.	N.S.	18	N.S.	N.S.	10

*73115-1 irrigated, 73037 - dryland

Agricultural Research for All of Nebraska

The agricultural research division of the Institute of Agriculture and Natural Resources is the Nebraska Agricultural Experiment Station. The Experiment Station relies on its research centers and field laboratories to provide applied knowledge for development of Nebraska's largest industry—agriculture. In addition, many Nebraska farmers cooperate by furnishing land and other facilities for research projects. This provides information from areas not well represented by stations.

The Cooperative Extension Service transmits data to users through District and County Extension Offices. Area and County Extension Agents are available to provide additional interpretation 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 14 to 40 inches per year, and the soil types vary from sands to heavy clays. The research program thus is broad in subject matter and geography, resulting in the need for various stations and satellite locations.

The Cooperative Extension Service provides information and educational programs to all people without regard to race, color or national origin.