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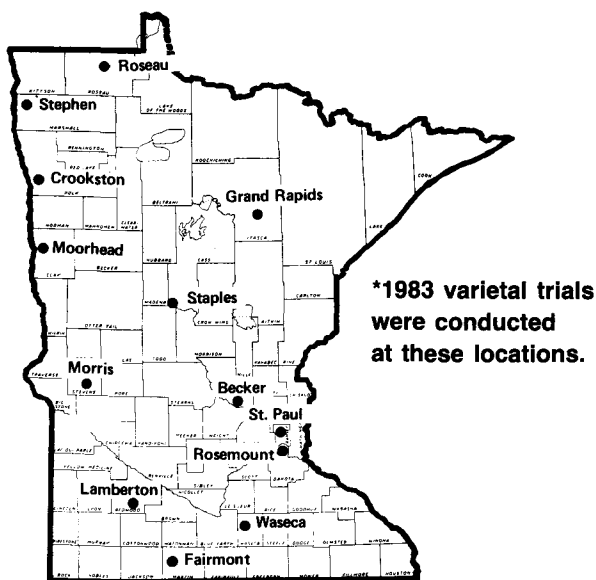
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VARIETALS OF FARM CROPS

AGRICULTURAL EXPERIMENT STATION UNIVERSITY OF MINNESOTA
ST. PAUL, MINN. (FORMERLY MINNESOTA REPORT 24)

VARIETAL TRIALS OF FARM CROPS



Successful crop production depends to a considerable extent on selecting the best varieties for a particular farm. For that reason, varieties are compared in trial plots on Minnesota Agricultural Experiment Station fields at St. Paul, Rosemount, Waseca, Lambertson, Morris, Crookston, Grand Rapids, and Becker, and on farmers' fields. Important old varieties and new varieties are grown in replicated plots at each location. These plots are handled so that the factors affecting yield and other characteristics are as nearly the same for all varieties at each location as is possible.

Varieties of many of the crops are classed into three groups: "recommended varieties," "varieties not adequately tested," and "other varieties." For these crops, the varietal descriptions are arranged in alphabetical order within the groups. The classifications of varieties as "recommended varieties" and "other varieties" are determined each year by the Minnesota Agricultural Experiment Station Crop Variety Review Committee. A variety is not usually eligible for the "recommended varieties" group unless it has been better than other varieties in important characteristics in 3 years of testing. New varieties from other public experiment stations and private plant breeders but not sufficiently evaluated here are listed as "varieties not adequately tested." Information now available regarding these varieties is presented but no conclusions are drawn regarding their suitability under Minnesota conditions. Varieties listed in the "other varieties" category are usually inferior in one or more characteristics, as demonstrated in comparative tests.

Varieties of all three groups may be eligible for certification, and the use of certified seed is suggested. However, certification does not imply recommendation. Registered and certified seed of

most varieties described in this report can be purchased from seed dealers or from growers listed in the Minnesota Registered and Certified Seed Directory for 1984 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, 1900 Hendon Avenue, St. Paul, Minnesota 55108, or from county extension agents' offices.

The LSD (Least Significant Difference) figures listed under the yield columns in the tables are statistical measures of variability within the trials. This statistic is used to determine whether the difference between two yields is due to genetic difference in the varieties or to other causes such as soil variability. If the yield difference between two varieties equals or exceeds the LSD, one can conclude that the higher yielding variety was superior in yield. If the difference is less than the LSD, the yield difference was probably due to environmental rather than varietal differences. The 5 percent significance level used in this report is based on odds of 19 to 1 that yields differing by the amount of the LSD were truly different.

Data for varieties not included in all trials averaged within a table have been adjusted so that averages of varieties tested for different numbers of years can be compared directly. But use of the LSD for these comparisons is not valid.

These trials are not designed for crop (species) comparisons, because the various crops are grown on different fields or with different management. The data should only be used to compare varieties within a table.

Relative maturities of varieties are indicated in the tables as date mature, heading, or blooming; days to mature, heading, or blooming; or moisture percentage at harvest.

Yields of some forage crops are given in pounds or tons of dry matter per acre. To convert to hay yield at 15 percent moisture (85 percent dry matter), divide the figure given by 0.85. To convert to haylage yield at 55 percent moisture (45 percent dry matter), divide by 0.45.

Authors of the crop sections are: R.G. Robinson (adzuki, annual canarygrass, buckwheat, fieldbean, fieldpea, grain sorghum, lentil, millet, sunflower, and rye); D.K. Barnes and N.P. Martin (alfalfa, birdsfoot trefoil, bromegrass, orchardgrass, red clover, reed canarygrass, tall fescue, and timothy); D.C. Rasmussen (barley); J.L. Geadelmann and R.H. Peterson (corn); V.E. Comstock (flax); D.D. Stuthman (oat); J.H. Orf and L.L. Hardman (soybean); R.H. Busch (wheat—durum, hard red spring, and winter); R.E. Stucker (wild rice).

Information on the reaction of varieties to specific pathogens was largely obtained by the following members of the Department of Plant Pathology: F.I. Froshaiser (alfalfa); A.P. Roelfs (wheat); R.D. Wilcoxson (barley and oat); J.S. Baumer (wheat); P.G. Rothman (oat); B.W. Kennedy (soybean); D.V. McVey and J.H. Schafer (wheat).

Field work of the varietal trials at Waseca, Lambertson, Morris, Crookston-Stephen, and Grand Rapids was supervised by W.E. Lueschen, J.H. Ford, D.D. Warnes, J.V. Wiersma, and D.L. Rabas, respectively.

ADZUKI

Adzuki is combine-harvested as mature, dry seed. Consumption in the United States is small, but the potential export market is large. A processed mixture of adzuki, sugar, and water is used for many confections in Japan.

All varieties in trials since 1980 were severely damaged by a bacterial disease for which no control has been developed. The uncertainty of where or when severe losses will occur has delayed rapid expansion of adzuki production.

Takara occupied most of the 2,800 acres of adzuki grown in 1983. Research plot yields of Takara and Minoka have ranged from

0 to 3,000 pounds and averaged about 1,000 pounds per acre. The plants mature in about 110 days and are about 22 inches tall.

Minoka—Medium yield. Medium-late maturity. Medium height. Large, red seed. Selected by the Minnesota Agricultural Experiment Station from an introduction from Taiwan. Released in 1980.

Takara—Medium yield. Early. Medium height. Medium size, red seed. Imported from Japan by the Red River Edible Bean Growers Association in 1977-78.

ALFALFA

Many alfalfa varieties are available from both private and public plant breeders. Certified seed should be used because it provides the best assurance of varietal purity and performance. For this reason only varieties that are eligible for certification or approved for Plant Variety Protection, and that will be sold in Minnesota in 1984, are listed in this report.

WINTERHARDINESS AND YIELD—Severe Minnesota winters make winterhardiness a primary consideration in variety selection. Greater winterhardiness is usually needed in southern and western Minnesota and in the Red River Valley than in other parts of the state.

The varieties listed in tables 1 and 2 are ranked according to winterhardiness index which is an indication of rate of growth and degree of winterhardiness. *Very winterhardy varieties* are slow to recover after cutting. These varieties will survive nearly all winters. They usually are not high yielding because they recover slowly for the second crop and produce only a small third crop because of early dormancy. *Winterhardy varieties* are adapted to all areas of the state. Forage yields vary among varieties in this group, primarily because of disease and insect resistance. Three or four years of production can be expected from most winterhardy varieties, but a few can be productive for 5 or more years. *Moderately winterhardy varieties* usually reach 1/10 bloom several days earlier than more winterhardy varieties. They are also characterized by rapid recovery after harvest.

Nonwinterhardy varieties should not be grown in Minnesota except for plowdown in the seedling year. Varieties in this group are not listed in the tables but include Amador, Ardiente, AS-13R, AS-49R, Caliente, Caliverde 65, CUF 101, Florida 77, Granada, Hayden, Joaquin II, Lew, Maxidor, Mesa Sirsa, Mesilla, Moapa 69, Pierce, Sonora 70, 183, WL 504, WL 508, WL 514, WL 515, WL 600, UC Cibola, UC Salton, Validor, 572, and 581.

BACTERIAL WILT RESISTANCE—This disease is prevalent in most areas of the state. Wilt-susceptible varieties are poor risks and should not be grown, because they generally show losses in stand by the end of the second year after seeding. In some cases where infection is severe, stand losses are often observed by the end of the first year after seeding. Stand reductions after winter often are due to a combination of wilt damage and winter injury.

PHYTOPHTHORA ROOT ROT—This fungus disease is important on poorly drained soils. It can cause stand losses of seedlings and can contribute to lower productivity in older stands if the soil remains wet for a week or more.



Agronomist C. C. Sheaffer has researched the response of alfalfa varieties to dates and number of harvests per year. Winterhardy varieties are less affected by cutting management than are moderately winterhardy varieties.

FUSARIUM WILT—The fungus that causes Fusarium wilt is present in most soils. In Minnesota it is usually not a serious problem by itself, but it contributes to stand decline in combination with other disease organisms. Resistance to Fusarium wilt in addition to resistance to bacterial wilt and Phytophthora root rot contribute to longer lived stands.

ANTHRACNOSE—This fungus disease was first found in Minnesota in 1978 and has become more prevalent each year. It infects stems and crowns and will kill susceptible plants. The disease is favored by hot, moist conditions; therefore, it will be most frequently observed in SE Minnesota.

VERTICILLIUM WILT— This is a new, potentially destructive fungus disease that was first found in several Minnesota fields in 1981. Very few additional infested fields were found in 1982 and 1983. It has usually been found in 2- or 3-year-old fields. If the disease has been identified in the immediate vicinity, consider planting a resistant variety. The only varieties listed in tables 1 and 2 having at least moderate levels of resistance are Apollo II, Decathlon, DK 135, Trumpetor, and WL 316.

Table 1. Average yields of alfalfa varieties expressed as percentage of Vernal for all tests in Minnesota, 1959-83

Variety	Number tests	Yield (percent of Vernal)						
		Year after seeding					Average over years	
		1st	2nd	3rd	4th	5th-9th	1-2	3-9
VERY WINTERHARDY								
Norseman	12	96	93	91	86	90	95	90
Prowler	4	98	92	—	—	—	95	—
Ladak	3	87	88	78	89	—	88	82
Spredor II	1	100	93	—	—	—	97	—
Teton	3	89	93	86	93	—	91	90
Travois	3	88	88	88	87	—	88	88
Maverick	3	95	—	—	—	—	95	—
WINTERHARDY								
<i>Vernal, tons/acre, 15% M</i>								
Baker	11	98	97	106	106	112	98	108
Dawson	4	100	104	104	100	98	102	101
526	3	105	—	—	—	—	105	—
Vancor	3	104	98	—	—	—	101	—
G2818	1	100	102	—	—	—	101	—
Agate	29	98	99	101	98	100	99	100
Algonquin	5	100	104	104	102	100	102	102
Iroquois	14	106	106	105	111	103	106	106
Ladak 65	5	100	101	98	99	100	101	99
130	5	102	98	106	114	100	100	109
520	13	104	105	109	111	109	104	109
524	9	106	101	106	105	96	104	105
Blazer	10	105	104	111	114	99	104	111
545	8	100	102	105	108	—	101	106
Thunder	4	102	103	106	—	—	102	106
Phytor	9	102	104	108	116	—	103	110
Valor	9	100	103	103	107	111	101	106
120	8	110	110	117	118	—	110	117
A-54	4	103	106	113	89	—	104	102
Anchor	11	103	107	111	110	116	105	111
Ranger	26	97	98	97	99	93	97	97
532	5	111	109	101	—	—	110	101
Pacer	9	102	104	108	107	105	103	107
Polar II	4	100	88	—	—	—	96	—

Table 1 (continued). Average yields of alfalfa varieties expressed as percentage of Vernal for all tests in Minnesota, 1959-83

Variety	Number tests	Yield (percent of Vernal)						
		Year after seeding					Average over years	
		1st	2nd	3rd	4th	5th-9th	1-2	3-9
MODERATELY WINTERHARDY								
Arc	4	102	101	98	—	—	102	98
Marathon	6	104	104	100	98	93	104	99
Oneida	4	102	102	101	—	—	102	101
Apollo	11	101	100	103	107	108	101	105
A-59	11	101	101	107	109	96	101	102
Classic	8	100	101	105	114	—	101	107
G7730	5	101	100	110	128	—	101	116
Magnum	6	106	100	116	132	—	104	121
Advantage	3	100	107	101	—	—	104	101
Answer	7	105	102	107	102	—	103	106
Honeye	6	103	103	103	107	113	103	107
Primal	7	106	106	101	105	—	106	103
Saranac AR	15	104	100	102	104	106	102	103
WL 318	6	100	96	101	97	89	98	96
Apollo II	3	104	99	—	—	—	103	—
Duke	4	100	103	106	—	—	101	106
DK 135	2	103	—	—	—	—	103	—
Peak	9	106	106	113	124	108	106	116
Saranac	39	104	103	101	102	98	103	100
Thor	10	103	103	100	102	105	103	102
Trident	8	103	104	103	115	—	103	106
Spectrum	2	101	—	—	—	—	101	—
SX-418	7	101	102	101	102	—	101	102
G-2815	1	94	105	109	102	—	100	105
A-57	7	99	99	94	105	—	99	97
Trumpetor	4	104	100	—	—	—	102	—
Aquarius	5	97	103	101	114	—	100	107
Decathlon	1	106	—	—	—	—	106	—
WL 312	6	102	103	101	—	—	103	101
Armor	4	105	102	106	—	—	104	106
A-24	1	109	101	—	—	—	105	—
Hi-Phy	8	102	107	113	125	—	104	117
Epic	5	101	109	115	151	—	104	124
WL 316	4	100	104	97	—	—	101	97
Cimarron	1	103	103	87	—	—	103	84

Table 2. Winterhardiness index and disease resistance of alfalfa varieties eligible for certification

Variety	Developer or owner ¹	Winter hardiness (index) ²	RESISTANT PLANTS ³			Anthracnose (rating) ⁴
			Bacterial wilt (percent)	Phytophthora root rot (percent)	Fusarium wilt (percent)	
VERY WINTERHARDY						
Norseman	Barzen of Minneapolis	7.9	30	3	27	S
Prowler	Pride Seed Co. ^f	7.9	72	2	18	S
Ladak	USDA (foreign introduction) ^{achu}	7.5	8	2	29	S
Spredor II	Northrup King Co. ^l	7.5	58	5	24	S
Teton	S. Dakota Agr. Exp. Sta. ^{acu}	7.4	15	7	26	S
Travois	S. Dakota Agr. Exp. Sta. ^{cju}	7.4	37	1	15	S
Maverick	North American Plant Breeders ^f	7.3	42	17	36	S

Table 2 (continued). Winterhardness index and disease resistance of alfalfa varieties eligible for certification

Variety	Developer or owner ¹	Winter hardness (index) ²	RESISTANT PLANTS ³			Anthracnose (rating) ⁴
			Bacterial wilt (percent)	Phytophthora root rot (percent)	Fusarium wilt (percent)	
WINTERHARDY						
Vernal	Wisconsin Agr. Exp. Sta. & USDA ^{acfhijnqqtuw}	6.5	42	5	32	S
Baker	USDA & Nebraska Agr. Exp. Sta. ^{ajuw}	6.5	50	2	37	LR
Dawson	USDA & Nebraska Agr. Exp. Sta. ^{aj}	6.5	15	1	35	S
526	Pioneer Hi-Bred International Inc. ^p	6.5	57	8	15	LR
Vancor	Northrup King Co. ^l	6.2	56	22	38	R
G2818	Funk Seeds Int. ^g	6.1	58	24	44	LR
Agate	USDA & Minnesota Agr. Exp. Sta. ^{ahioqwu}	6.0	65	43	54	MR
Algonquin	Agriculture Canada ^w	6.0	51	3	40	—
Iroquois	Cornell University ^{ilqtw}	6.0	61	1	22	S
Ladak 65	Montana Agr. Exp. Sta. ^j	6.0	36	2	15	S
130	DeKalb-Pfizer Genetics ^e	6.0	66	29	73	MR
520	Pioneer Hi-Bred International Inc. ^p	5.9	40	4	29	LR
524	Pioneer Hi-Bred International Inc. ^p	5.9	24	8	44	LR
Blazer	Land O'Lakes ^l	5.9	49	24	26	LR
545	Pioneer Hi-Bred International Inc. ^p	5.8	35	30	30	LR
Thunder	North American Plant Breeders ^x	5.7	43	49	55	MR
Phytor	Northrup King Co. ^l	5.5	34	30	39	S
Valor	Land O'Lakes ^l	5.5	36	2	30	LR
120	DeKalb-Pfizer Genetics ^e	5.5	57	39	20	LR
A-54	Ramey Seed Co. ^t	5.4	26	11	25	—
Anchor	Rudy Patrick Co. ^f	5.4	36	5	17	LR
Ranger	USDA & Nebraska Agr. Exp. Sta. ^{achjnoqu}	5.4	18	4	25	S
532	Pioneer Hi-Bred International Inc. ^p	5.4	63	7	37	MR
Pacer	Land O'Lakes ^l	5.3	33	8	20	LR
Polar II	Pride Seed Co. ^r	5.3	57	60	34	S
MODERATELY WINTERHARDY						
Arc	USDA & N. Carolina Agr. Exp. Sta. ^j	5.2	7	3	34	HR
Marathon	Cargill Inc. ^b	5.2	36	2	13	S
Oneida	Cornell University ^{qt}	5.1	62	52	—	S
Apollo	North American Plant Breeders ^x	5.1	36	36	40	S
A-59	E. F. Mangelsdorf & Bros. Inc. ^t	5.0	16	4	34	LR
Classic	Farmers Forage Res. Coop. ^c	5.0	39	7	11	—
G7730	Funk Seed Int. ^g	4.7	55	62	62	LR
Magnum	Dairyland Seed Co. Inc. ^d	4.7	51	5	32	MR
Advantage	DeKalb-Pfizer Genetics ^e	4.6	42	44	23	MR
Answer	Midland Cooperatives, Inc. ^{ci}	4.6	50	66	58	LR
Honeye	Cornell University ^q	4.6	16	1	—	S
Primal	Pride Seed Co. ^r	4.6	62	9	33	S
Saranac AR	Cornell University ^q	4.6	35	14	44	HR
WL 318	W.L. Research Inc. ⁱ	4.6	32	21	52	MR
Apollo II	North American Plant Breeders ^f	4.5	43	54	47	MR
Duke	North American Plant Breeders ^x	4.5	43	55	43	MR
DK 135	DeKalb-Pfizer Genetics ^e	4.5	26	20	—	MR
Peak	Research Seeds, Inc. ^q	4.5	52	16	28	LR
Saranac	Cornell University ^{qw}	4.5	49	3	34	S
Thor	Northrup King Co. ^l	4.5	69	1	30	S
Trident	PAG Seeds ^m	4.5	37	71	55	MR
Spectrum	W.L. Research Inc. ^c	4.5	56	29	33	MR
SX-418	Sexauer Co. ^u	4.5	33	5	20	LR
G 2815	Funk Seed Int. ^g	4.4	51	16	56	MR
A-57	Embro Seed Co. Inc. ^t	4.4	12	7	38	—
Trumpetor	Northrup King Co. ^l	4.4	28	8	51	R
Aquarius	Lincoln Seed & Feed Co. ^j	4.3	75	2	47	HR

Table 2 (continued). Winterhardiness index and disease resistance of alfalfa varieties eligible for certification

Variety	Developer or owner ¹	Winter hardiness (index) ²	RESISTANT PLANTS ³			Anthracnose (rating) ⁴
			Bacterial wilt (percent)	Phytophthora root rot (percent)	Fusarium wilt (percent)	
Decathlon	Cargill, Inc. ^b	4.3	66	21	43	MR
WL 312	W.L. Research Inc. ^o	4.3	38	25	54	MR
Armor	North American Plant Breeders ^x	4.2	39	43	44	MR
A-24	Ramy Seed Co. ^t	4.2	5	2	—	S
Hi-Phy	Farmers Forage Res. Coop. ^c	4.1	64	27	57	—
Epic	Larry Peterson, Ltd. ^{sv}	3.9	58	34	45	S
WL 316	W.L. Research Inc. ⁱ	3.6	19	9	53	HR
Cimarron	Great Plains Research ^y	3.4	47	13	44	R

¹1984 seed suppliers: a. Arrowhead, Inc.; b. Cargill Seeds; c. Genex; d. Dairyland Seed Co., Inc.; e. DeKalb-Pfizer Genetics; f. Field Seed Farms; g. Funk Seeds International, Inc.; h. Interstate Seed and Grain Co.; i. Land O'Lakes, Inc.; j. Lincoln Seed and Feed Co.; k. Migro Seeds; l. Northrup King Co.; m. PAG Seeds; n. Payco Seeds; o. Peterson-Biddick Co.; p. Pioneer Hi-Bred International, Inc.; q. Premium Seed Co.; r. Pride Seed Co., Inc.; s. ProfiSeed Co.; t. Ramy Seed Co.; u. The Sexauer Co.; v. Stamer Seed Co.; w. Werner Farm Seeds; x. Ziller Seed Farms; y. Great Plains Research. ²Based on fall growth after cutting 1st week of September: 1 = tallest (least winterhardy), 9 = shortest. ³Plants with little or no injury are classified as resistant. ⁴Resistance rating (percent resistant plants): HR = high resistance (51+), R = resistant (31-50), MR = moderate resistance (16-30), LR = low resistance (6-15), and S = susceptible (0-5).

ANNUAL CANARYGRASS



Agronomist J. V. Wiersma and an annual canarygrass variety trial in mid-July.

Annual canarygrass is grown as a cash grain crop and used for feeding caged and wild birds. Kittson County is the North American production and processing center for the crop.

RECOMMENDED VARIETIES

Alden—Medium yield, medium maturity and height. Poor lodging resistance. Medium size seed of medium test weight. May outyield Keet in favorable environments for canarygrass. Developed cooperatively by Minnesota Agricultural Experiment Station and Minn-Dak Growers Association. Released in 1973.

Elias—High yield, medium maturity and height. Fair lodging resistance. Medium size seed of very high test weight. Released by Minnesota Agricultural Experiment Station in 1983.

Keet—High yield, early, medium height. Fair lodging resistance. Medium size seed of high test weight. Released by Minnesota Agricultural Experiment Station in 1979.

Table 3. Yields of annual canarygrass varieties in pounds per acre

Variety	Stephen 1979-83	Crookston 1979-83	Rosemount 1979-83	Becker ¹ 1982-83	Average 17 trials
Alden	1093	1340	953	800	1090
Elias	1494	1718	1078	816	1358
Keet	1274	1585	950	792	1213
LSD 5%	145	163	106	92	33

¹Irrigated.

Table 4. Characteristics of annual canarygrass varieties

Variety	Planting to heading (days)	Planting to maturity (days)	Lodging (score) ¹	Height (inches)	Seeds/pound (number)	Test weight/bushel (pounds)
Alden	64	104	3.1	35	61,300	47.5
Elias	64	104	2.0	35	58,200	51.1
Keet	62	101	2.0	35	61,300	48.6

¹1 = erect, 9 = flat.

BARLEY

RECOMMENDED VARIETIES

Glenn—High yield. Early. Good lodging resistance. Six-row, rough-awn, long rachilla hairs, colorless aleurone. Classified as a malting variety by Malting Barley Improvement Association (MBIA). Resistant to stem rust and spot blotch. Developed by North Dakota Agricultural Experiment Station from crosses involving Br 5755-3, ND B138, and Trophy. Released in 1977.

Morex—High yield. Early. Medium lodging resistance. Kernel plumpness intermediate to high. Six-row, semi-smooth awn, short rachilla hairs, colorless aleurone. Awns may drop off as crop approaches maturity. Threshes easily. Classified as a malting variety by MBIA. Resistant to stem rust and moderately resistant to spot blotch. Developed by Minnesota Agricultural Experiment Station from cross of Cree and Bonanza. Released in 1978.

Robust—Very high yield. Later maturing than Morex. Superior to Morex in lodging resistance and kernel plumpness. Six-row, semi-smooth awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by AMBA. Resistant to stem rust and spot blotch. Susceptible to loose smut. Developed by Minnesota Agricultural Experiment Station from cross of Morex and Manker. Released in 1983.

OTHER VARIETIES

Azure—High yield, medium maturity. Six-row, semi-smooth awn, long rachilla hairs, blue aleurone. Classified as a malting variety by MBIA. Resistant to stem rust and spot blotch. Not recommended because of limited demand for a blue aleurone malting variety and the associated marketing problem. Developed by North Dakota Agricultural Experiment Station from a cross involving Bonanza, Nordic, and NDB130. Released in 1982.

Beacon—Low yield, early, good lodging resistance. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by MBIA. Resistant to stem rust and spot blotch. Developed by North Dakota Agricultural Experiment Station from a cross between Conquest and Dickson. Released in 1973.

Bonanza—Medium yield. Later maturing than other recommended varieties. Six-row, semi-smooth awn, long rachilla hairs, blue aleurone. Classified as a malting variety by MBIA. Resistant to stem rust. Susceptible to spot blotch. Developed by Agriculture Canada, Brandon, from a cross involving Vantage, Jet, Vantmore, Parkland, and Conquest. Licensed in 1970.

Bumper—High yield. Later maturing than Morex. Medium lodging resistance. Six-row, rough-awn, long rachilla hairs, colorless aleurone. Malting quality status undetermined. Lower extract percent than Morex. Resistant to stem rust and spot blotch. Developed by North American Plant Breeders. Selected from a bulk population which involved Larker as a parent. Released in 1980.

Cree—High yield. Medium maturity and lodging. Kernel plumpness low. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a nonmalting variety by MBIA. Resistant to stem rust, moderately resistant to leaf spot diseases. Developed at Minnesota Agricultural Experiment Station from crosses involving Traill, Br. 5750-2 and Dickson. Released in 1972.

Larker—Low yield. Early. Six-row, semi-smooth awn, long rachilla hairs, colorless aleurone. Good kernel plumpness. Classified as a malting variety by MBIA. Susceptible to loose smut and spot blotch. Yield loss from spot blotch may reach 25 bushels per acre. Developed by North Dakota Agricultural Experiment Station from a cross of Traill and a selection from UM 570. Released in 1961.

Manker—High yield. Medium maturity, good lodging resistance. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by MBIA. Resistant to stem rust and spot blotch; susceptible to loose smut. Developed by Minnesota Agricultural Experiment Station from cross involving Cree, M2, Vantage, Kindred, and Jotun. Released in 1974.

Nordic—Medium-high yield. Medium maturity. Medium lodging resistance. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a nonmalting variety by MBIA. Resistant to spot blotch and Septoria leaf blotch. Developed by North Dakota Agricultural Experiment Station from crosses of Dickson, CI 4738, Traill, and UM 570. Released in 1971.

Table 5. Yield of barley varieties in bushels per acre, 1979-83

	Crookston 7 ¹	Morris 8	Stephen 4	St. Paul 4	Lamberton 3	Roseau 1	Average 27
Glenn	74	71	76	74	78	77	74
Morex	69	75	86	70	71	80	74
Robust	76	80	88	76	73	81	79
Bumper	69	73	86	71	64	73	73
Larker	58	73	78	61	65	70	67
LSD 5%	10	7	14	13	12	13	6

¹Number of trials.

Table 6. Characteristics of barley varieties

	Heading (June)	Height (inches)	Lodging (percent)	Plump kernels (percent)	Protein (percent) ¹	Malt extract (percent) ¹	Reaction to disease ²		
							stem rust	loose smut	spot blotch
Glenn	16	33	27	72	12.7	77.0	R	S	R
Morex	17	35	36	67	12.9	78.7	R	S	MR
Robust	19	35	28	80	12.8	79.1	R	S	R
Bumper	21	34	37	74	12.8	76.0	R	S	R
Larker	18	34	50	72	13.5	76.6	R	S	S

¹Regional data (19 trials). Protein based on dry matter.

²R = resistant, MR = moderately resistant, and S = susceptible.

BIRDSFOOT TREFOIL

Birdsfoot trefoil is primarily a pasture legume but also can be harvested for hay. It is suitable on sandy soils of medium to low fertility, but is tolerant to a wide range in soil fertility, acidity, and drainage. It is persistent when grown with bluegrass, but is also suitable with timothy. This highly palatable forage will not cause bloat.

Varieties have been evaluated for about 14 years in pure stands. Average hay yield for the variety Empire was 3.7, 3.2, and 3.0 tons/acre for the first, second, and third years after seeding, respectively. The relative 3-year yield of varieties sold in

Minnesota (% of Empire) and sources of seed¹ are: Leo-112¹, Carroll-109², Dawn-108³, Norcen-105⁴, Empire-100^{acdefghij}, and Macanaw (no data available)¹.

Norcen was released in 1983 by the agricultural experiment stations of Minnesota and six other states. It has performed well in grazing trials.

¹1984 seed sources: a. Cenex; b. Field Seed Farms; c. Interstate Seed and Grain; d. Land O'Lakes, Inc.; e. Lincoln Seed and Feed Co.; f. Peterson-Biddick Co.; g. Premium Seed Co.; h. Ramy Seed Co.; i. The Sexauer Co.; j. Werner Farm Seeds.

BROMEGRASS

Bromegrass is generally grown for hay in mixture with alfalfa or is used as pasture in mixture with other grasses and legumes. Varieties can be classed as southern, intermediate, and northern types. Varieties of the southern type may not be higher yielding, but they are generally less susceptible to leaf diseases and earlier in maturity than northern types. Varieties presently being sold in Minnesota are of the southern type except for Manchar which is a northern type. All varieties are winterhardy. Some stand losses may occur when bromegrass is managed under three- and four-cut alfalfa harvest systems.

Varieties have been evaluated in pure stands for about 15 years at most Minnesota experiment stations. Average hay yields were

about 4.7 tons/acre at Grand Rapids, 3.9 tons/acre at Rosemount, and about 3.5 tons/acre at the other locations. Average hay yield for Fox bromegrass has been about 4.0 tons/acre. The relative yield of varieties sold in Minnesota (% of Fox) and sources of seed¹ are: Barton-105^e, Rebound 102^{afm}, Baylor 101^{cho}, Lincoln-95^{abcdehijklmn}, and Manchar (no data available)^b.

¹1984 seed sources: a. Arrowhead Inc., b. Cenex, c. Field Seed Farms, d. Interstate Seed and Grain, e. Land O'Lakes, Inc., f. Lincoln Seed and Feed Co., g. Northrup King Co., h. PAG Seeds, i. Payco Seeds, j. Peterson-Biddick Co., k. Premium Seed Co., l. Ramy Seed Co., m. The Sexauer Co., n. Werner Farm Seeds, and o. Ziller Seed Farms, Inc.

BUCKWHEAT



A buckwheat variety trial in mid-July and agronomist D. L. Rabas. The two rows of winter rye planted between the buckwheat plots help prevent mixtures at harvest.

RECOMMENDED VARIETIES

Mancan—High yield. Large seed. Low test weight but good market acceptability. Released by Agriculture Canada, Morden. Licensed in 1974.

Manor—High yield. Large seed. Low test weight but good market acceptability. Released by Agriculture Canada, Morden. Licensed in 1980. Production of certified seed limited to Canada.

VARIETIES NOT ADEQUATELY TESTED

Royal—High yield. Large seed. Low test weight but good market acceptability. Released by Winsor Grain Co., Grain Exchange, Minneapolis, MN 55415 in 1982. Variety protection pending.

OTHER VARIETIES

Common—Seed lots tested under this name ranged from low to high yield. Small or medium seed of high test weight.

Giant American—High yield. Large seed. Very low test weight.

Pennquad—Low yield. Very large seed. Low test weight. Good lodging resistance. Tetraploid so fields should probably be isolated from other varieties. Released by Pennsylvania Agricultural Experiment Station in 1966.

Tokyo—High yield. Small to medium seed. High test weight. Originated by Agriculture Canada, Ottawa in 1955.

Table 7. Yields of buckwheat varieties in pounds per acre

Variety	Becker 1981-83	Grand Rapids 1981-83	Crookston 1981, 83	Lamberton 1982-83	Rosemount 1981-82	Waseca 1983	Morris 1983	Average 14 trials
Mancan	778	322	618	887	1106	1020	2074	830
Manor	754	318	695	1107	1162	893	2049	863
Royal ¹	897	311	675	1147	1136	1038	1686	876
Tokyo	709	274	794	911	1104	736	1760	790
LSD 5%	135	37	204	385	126	482	291	105

¹Not grown in 1981.

Table 8. Characteristics of buckwheat varieties

Variety	Planting to bloom (days)	Lodging (score) ¹	Height (inches)	Weight/ 100 seeds (grams)	Seeds/ pound (number)	Test weight/ bushel (pounds)
Mancan	32	4.3	41	2.9	15,600	43.0
Manor	32	4.3	40	2.8	16,200	43.6
Royal	32	3.7	39	2.9	15,600	43.1
Tokyo	29	4.9	38	2.1	21,600	46.1

¹1 = erect, 9 = flat.

CORN

Many corn hybrids are produced by private companies. A total of 1,373 hybrids were registered for sale in Minnesota in 1983. Information on the performance of these closed-pedigree or private hybrids is usually available from the companies selling them.

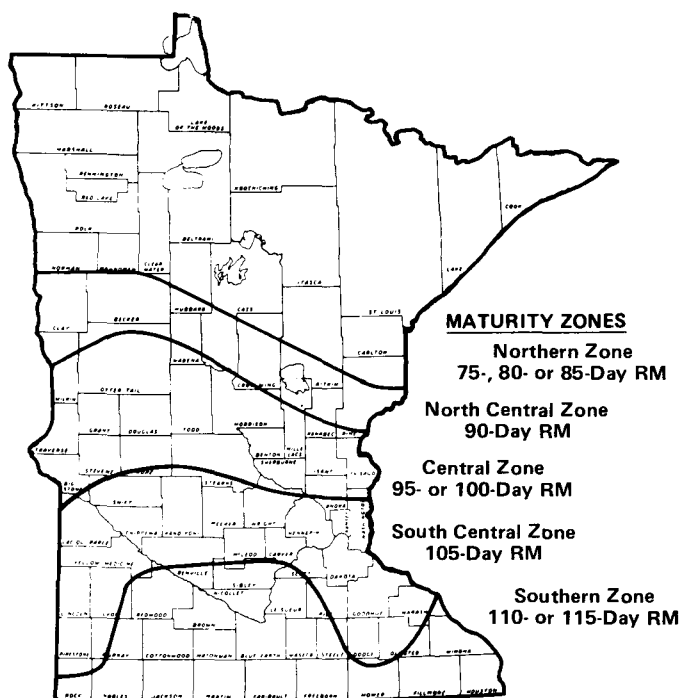
The Minnesota Agricultural Experiment Station conducts research in corn breeding, including the development of inbred lines which are used as parents of hybrids. These Minnesota inbreds, designated by the letter "A", are released to private companies through the Minnesota Crop Improvement Association. Private companies may use these inbreds to produce hybrid seed corn for farmers. Inbreds developed by the Minnesota Agricultural Experiment Station accounted for 16 percent of the total United States' hybrid seed production in 1979, the most recent year for which accurate survey data are available. Information on the performance of these inbreds is available from the Corn Breeding Project, 303 Agronomy, University of Minnesota, 1509 Gortner Avenue, St. Paul, MN 55108.

Open-pedigree or public hybrids developed by the Minnesota Agricultural Experiment Station are called Minhybrids. Some

recent Minhybrids, their pedigrees, and their Minnesota relative maturity (RM) ratings are listed in table 9. The zones of adaptation on the accompanying map show the areas for which hybrids of a particular RM rating are considered to be full-season maturity.

Table 9. Description of some recent Minhybrids

Minhybrid	Pedigree	Relative maturity
8201	A641 × W182B	80
8301	(A639 × A641) × W182B	80
7301	(A638 × A639) × W182B	90
6301	(B9A × A239) × A635	95
6305	(A658 × A659) × A665	95
5202	A665 × Mo17	105
5303	(A658 × A659) × A632	105
4201	A619 × A632	110
4202	A634 × Mo17	110
4303	(A665 × A634) × Mo17	110



FIELD BEAN

Fieldbean is combine-harvested as mature, dry seed. It is used for human food and reaches the grocer's shelf in either canned or dry form.

There are more than 15 market classes of dry, edible bean, but only eight have been grown commercially in Minnesota. Minnesota's 1982 production amounted to 58 percent navy, 31 percent pinto, 9 percent red kidney, and 1 percent other classes. Varietal recommendations are confined to varieties within the navy, small white, pinto, dark red kidney, pink, black turtle soup, great northern, and small red classes. Other classes are grown successfully, but important differences among varieties within their classes have not yet been identified in our trials.

RECOMMENDED VARIETIES

Aurora small white—High yield. Late. Erect vine. Very small, white seed. Released by New York Agricultural Experiment Station in 1973.

Ebony black turtle soup—High yield. Medium late. Erect vine. Wilbur-Ellis Co., Spokane, WA 99206. Seed sale regulated by U.S. Variety Protection Act.

Emerson great northern—High yield. Medium late. Large, prostrate vine. Large, white seed. Released by Nebraska Agricultural Experiment Station in 1971.

Fiesta pinto—High yield. Early. Large, prostrate vine. Large, pinto seed. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Seed sale regulated by U.S. Variety Protection Act.

Fleetwood navy—High yield. Late. Medium-size bush. Small, white seed. Released by Agriculture Canada, Harrow. Licensed in 1977.

Gala pinto—High yield. Medium maturity. Large, prostrate vine. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Montcalm dark red kidney—Medium yield. Late. Large, erect bush. Very large, dark red seed. Released by Michigan Agricultural Experiment Station in 1974.

Pindak pinto—High yield. Medium maturity. Large, prostrate vine. Small, pinto seed. Released by USDA and North Dakota Agricultural Experiment Station in 1981.

Seafarer navy—Medium yield. Early. Erect bush. Small white seed. Released by Michigan Agricultural Experiment Station in 1967.

Snow-Bunting navy—Medium yield. Early. Medium-size bush. Small, white seed. Released by Clarence Muehlfeld, Bridgeport, MI 48722 in 1974.

T39 black turtle soup—High yield. Medium late. Erect vine. Small, black seed. Released by California Agricultural Experiment Station.

UI-37 small red—Low yield. Very early. Short, usually erect vine. Large, dark red seed. Released by Idaho Agricultural Experiment Station in 1964. *Recommended only as a very early maturing fieldbean; other small red varieties yield more in a normal growing season.*

UI-114 pinto—High yield. Late. Large, prostrate vine. Tan and brown mottled seed. Released by Idaho Agricultural Experiment Station in 1965.

Up-Land navy—Medium yield. Medium maturity. Medium size bush. Small, white seed. Released by Clarence Muehlfeld, Bridgeport, MI 48722 in 1974.

Viva pink—High yield. Late. Large, prostrate vine. Pink seed resistant to splitting. Released by Washington Agricultural Experiment Station and USDA in 1974.

VARIETIES NOT ADEQUATELY TESTED

Black Magic black turtle soup—High yield. Late. Erect vine. Released by Michigan Agricultural Experiment Station in 1981.

Bunsi navy—High yield. Late. Medium size bush. Small, white seed. Tolerant of ozone pollution. Similar to Ex Rico 23. Released by Colombian Agriculture Institute. Rereleased by Michigan Agricultural Experiment Station in 1983.

C-20 navy—High yield. Late. Medium size bush. Small, white seed. Tolerant of ozone pollution. Developed by Campbell Soup Co. Released by Michigan Agricultural Experiment Station in 1982. Variety protection pending.

Domino black turtle soup—High yield. Late. Erect vine. Released by Michigan Agricultural Experiment Station in 1981.

Ex Rico 23 navy—High yield. Late. Medium size bush. Small, white seed. Tolerant of ozone pollution. Released by University of Guelph, Ontario, Canada. Licensed in 1980.

Harofleet navy—High yield. Late. Medium size bush. Small, white seed. Developed by Agriculture Canada, Harrow and University of Guelph. Licensed in 1983.

Harold pink—High yield. Very late. Large vine. Released by Washington Agricultural Experiment Station and USDA in 1984.

Isabella light red kidney—Medium yield. Early. Large, erect bush. Released by Michigan Agricultural Experiment Station in 1983.

Midnight black turtle soup—Medium yield. Late. Erect bush of excellent type for combine-harvest. Released by Cornell University Agricultural Experiment Station in 1980. Seed sale regulated by U.S. Variety Protection Act.

Neptune navy—Medium yield. Very late. Erect vine. Released by Michigan Agricultural Experiment Station in 1981.

OAC Seaforth navy—Medium yield. Early. Erect bush. Small, white seed. Developed by Agriculture Canada, Harrow and University of Guelph. Licensed in 1983.

Red Kloud light red kidney—Medium yield. Early. Large, erect bush. Released by Cornell University Agricultural Experiment Station in 1973.

Ruddy light red kidney—Medium yield. Early. Large, erect bush. Released by Cornell University Agricultural Experiment Station in 1982.

Swan Valley navy—High yield. Very late. Large bush. Released by Michigan Agricultural Experiment Station in 1981.

Victor pink—Medium yield. Very late. Large, prostrate vine. Released by Washington Agricultural Experiment Station and USDA in 1984.

OTHER VARIETIES

Admiral navy—Medium yield. Late. Bush. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Agate pinto—Medium yield. Early. Bush. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982. Variety protection pending.

Amber pinto—Medium yield. Medium maturity. Bush. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982. Variety protection pending.

Black Beauty black turtle soup—High yield. Late. Vine. Wilbur-Ellis Co., Spokane, WA 99206.

Bos'n navy—Medium yield. Late. Bush. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Captain navy—Low yield. Late. Bush. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Garnet small red—Medium yield. Medium maturity. Large, prostrate vine. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982. Variety protection pending.

Harris great northern—High yield. Very late. Large, prostrate vine. Seed quality frequently poor. Released by Nebraska

Agricultural Experiment Station in 1980. Seed sale regulated by U.S. Variety Protection Act.

Holberg pinto—High yield. Very late. Large, prostrate vine. Small, pinto seed. Released by North Dakota Agricultural Experiment Station and USDA in 1983.

Loop black turtle soup—High yield. Late. Erect vine. Released by Saskatchewan Wheat Pool, Watrous, Saskatchewan SOK 4T0 in 1982.

NW 395 navy—Medium yield. Medium maturity. Short vine. Large, navy seed. Released by Washington Agricultural Experiment Station and USDA in 1979.

NW 410 pinto—Lower yield than UI-114. Late. Large, prostrate vine. Small, pinto seed. Released by USDA and Washington Agricultural Experiment Station in 1980.

Olathe pinto—Medium yield. Late. Small, pinto seed. Large, prostrate vine. Lower yield than UI-114 but is tolerant of rust. Released by Colorado Agricultural Experiment Station in 1979. Seed sale regulated by U.S. Variety Protection Act.

Opal navy—Medium yield. Late. Vine. Released by Rogers

Brothers Seed Co., Idaho Falls, ID 83401 in 1982. Variety protection pending.

Sanilac navy—Medium yield. Medium late. Bush. Released by Michigan Agricultural Experiment Station in 1956.

Tall Bun-Yan navy—Medium yield. Late. Large bush. Released by Clarence Muehlfeld, Bridgeport, MI 48722 in 1981.

Tuscola navy—Medium yield. Late. More resistance to splitting than most navy varieties. Released by Michigan Agricultural Experiment Station in 1977. Seed sale regulated by U.S. Variety Protection Act.

UI-36 small red—Medium yield. Medium maturity. Large, prostrate vine. Seed quality frequently poor. Released by Idaho Agricultural Experiment Station in 1964.

UI-111 pinto—Medium yield. Late. Large, prostrate vine. Released by Idaho Agricultural Experiment Station in 1945.

Wyo 166 pinto—High yield. Late. Large, prostrate vine. Released by Wyoming Agricultural Experiment Station in 1965.

Zircon small white—High yield. Very late. Small seed. Vine. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982. Seed sale regulated by U.S. Variety Protection Act.

Table 10. Characteristics of fieldbean varieties, 1981-83

Class and variety	Seed yield/acre (pounds)				Yield/acre (pounds)	Average—4 locations		
	Becker	Lamberton	Morris	Crookston		Seeds/pound (number)	Planting to maturity (days)	Growth (habit) ¹
Pinto								
Fiesta	2264	1468	1993	2017	1935	1110	100	V
Gala	2340	1386	2176	1954	1964	1180	101	V
Pindak	2163	1383	1869	1693	1777	1450	100	V
UI-114	2095	1530	2045	1862	1883	1240	108	V
Agate	1695	1113	1478	1545	1458	1250	98	B
Amber	1533	974	1468	1468	1361	1340	102	B
Holberg	2077	1839	2088	1980	1996	1440	111	V
Navy								
Fleetwood	2194	1672	1767	1784	1854	2470	108	B
Seafarer	1492	1139	1396	1263	1322	2470	95	B
Snow-Bunting	1735	983	1759	1572	1512	2390	96	B
Up-Land	1847	1136	1788	1344	1529	2470	99	B
Admiral	1786	1227	1577	1099	1422	2770	108	B
Bos'n	1586	883	1499	1258	1306	2750	106	B
Captain	1480	996	1330	849	1164	2890	108	B
C-20	2117 ²	1191 ²	2040 ²	1595 ²	1736	2390	110	EV
Ex Rico 23	2242 ²	1169 ²	2058 ²	1607 ²	1769	2370	103	EV
Harofleet	2215 ²	1420 ²	1699 ²	1863 ²	1799	2410	108	B
Neptune	2193 ²	1485 ²	2020 ²	1014 ⁵	1678	2580	111	EV
NW 395	1562 ³	1150 ³	1973 ³	—	—	2010	108	V
OAC Seaforth	1582 ²	1206 ²	1377 ²	1006 ²	1293	2470	97	B
Opal	1584	1058	1598	1184	1356	2520	103	V
Swan Valley	2206 ²	1406 ²	1805 ²	1634 ²	1763	2590	111	EV
Tall Bun-Yan	1804	1292	1575	1116	1447	2190	107	B
Small White								
Aurora	2145	1389	2170	1889	1898	3000	109	EV
Zircon	2196	1457	1973	1557	1796	2700	111	V
Great Northern								
Emerson	2385	1645	2069	2211	2077	990	103	V
Harris	2037 ⁴	1773	1836 ⁶	1872	1879	1350	111	V
Small Red								
UI-37	1470	622	1102	1029	1056	1520	92	EV
Garnet	2009 ⁴	1034	1799	1612	1613	1600	98	V
Pink								
Viva	1830	1501	1883	1670	1721	1710	109	V
Harold	—	—	—	1812 ³	—	1370	115	V
Victor	—	—	—	1617 ³	—	1440	—	V

Table 10 (continued). Characteristics of fieldbean varieties, 1981-83

Class and variety	Seed yield/acre (pounds)				Yield/acre (pounds)	Average—4 locations		
	Becker	Lamberton	Morris	Crookston		Seeds/pound (number)	Planting to maturity (days)	Growth (habit) ¹
<u>Dark Red Kidney</u>								
Montcalm	2016	1019	1647	1211	1473	980	109	B
<u>Light Red Kidney</u>								
Isabella	1591 ³	869 ³	1316 ³	641 ³	1104	1210	96	B
Red Kloud	2037 ²	644 ²	1450 ²	858 ²	1247	1020	97	B
Ruddy	1554 ²	585 ⁵	1167 ²	873 ²	1045	1220	95	B
<u>Black Turtle Soup</u>								
Ebony	2291	1180	2244	1961	1919	2280	102	EV
T 39	2112	1249	2197	1699	1814	2210	102	EV
Black Beauty	2324	1162	2305	1640	1858	2280	104	V
Black Magic	2180 ²	1477 ²	2065 ²	1717 ²	1860	2260	104	EV
Domino	2316 ²	1246 ²	2167 ²	1873 ²	1900	2260	105	EV
Loop	2144 ²	1358 ²	2052 ²	1759 ²	1828	2290	104	V
Midnight	1825	1067	1952	1453	1574	2450	105	B
LSD 5%	259	227	263	295	131			

¹V=vine, B=bush, EV=erect vine. ²1982-83. ³1983. ⁴1981-82. ⁵1982. ⁶1981, 83.

Table 11. Reaction of fieldbean varieties to some important pathogens¹

Class and variety	Rust ²	Blight ²		Mosaic ²		Anthracnose ³	Fusarium root rot ²	White mold ²
		Common	Halo	Type	15			
<u>Pinto</u>								
Fiesta	S	S	T	T	T	—	S	S
Gala	S	S	T	T	T	B	S	S
Pindak	T	S	T	T	T	—	T	S
UI-114	S	S	T	T	T	S	T	S
Agate	T	S	S	T	T	S	T	S
Amber	S	S	S	T	T	—	—	S
Holberg	S	S	—	T	T	S	T	S
Olathe	T	S	T	T	T	BG	S	S
UI-111	S	S	T	T	S	S	S	S
Wyo 166	S	S	T	T	S	—	S	S
<u>Navy</u>								
Fleetwood	T	S	T	T	T	ABG	S	S
Seafarer	S	S	T	T	T	ABG	S	S
Snow-Bunting	S	S	T	T	S	AB	S	S
Up-Land	T	S	T	T	S	A	S	S
Admiral	T	S	T	T	T	—	S	S
Bos'n	T	S	T	T	T	—	S	S
Bunsi	T	S	T	T	T	G	—	T
Captain	T	S	T	T	T	—	S	S
C-20	T	S	—	T	T	BGD	T	T
Ex Rico 23	T	S	T	T	T	G	—	T
Harofleet	T	S	T	T	T	ABGD	S	S
Neptune	T	—	T	T	T	S	T	T
NW 395	—	S	T	T	T	—	T	T
OAC Seaforth	S	S	T	T	T	ABGD	S	S
Opal	T	—	T	T	T	AG	—	—
Sanilac	S	S	T	T	S	ABG	S	S
Swan Valley	T	S	T	T	T	BGD	T	T
Tall Bun-Yan	—	S	—	—	—	—	—	—
<u>Small White</u>								
Aurora	T	S	T	T	T	BG	T	T
Zircon	T	S	T	T	T	—	T	—
<u>Great Northern</u>								
Emerson ⁴	S	T	T	T	T	—	—	—
Harris	S	T	T	T	T	—	—	—

Table 11 (continued). Reaction of fieldbean varieties to some important pathogens¹

Class and variety	Rust ²	Blight ²		Mosaic ²		Anthracnose ³	Fusarium root rot ²	White mold ²
		Common	Halo	Type	15			
Small Red								
UI-37	S	S	—	T	T	—	S	S
Garnet	S	S	—	T	T	—	—	—
UI-36	S	S	—	T	T	BG	S	S
Pink								
Viva	S	S	T	T	T	—	T	S
Harold	S	S	T	T	T	—	T	S
Victor	S	S	T	T	T	—	T	S
Dark Red Kidney								
Montcalm	T	S	T	T	T	A	S	T
Light Red Kidney								
Isabella	T	S	T	T	T	—	—	—
Red Kloud	T	S	T	T	T	G	S	T
Ruddy	—	S	T	T	T	S	—	—
Black Turtle Soup								
Ebony	T	S	T	T	T	—	T	S
T 39	T	S	T	T	T	G	T	T
Black Beauty	T	S	T	T	T	G	T	T
Black Magic								
Domino	T	S	T	T	—	BGD	T	T
Loop	—	S	—	—	—	—	—	—
Midnight ⁵	T	S	S	T	T	BGD	T	T

¹Many of these reactions are adapted from North Central Regional Extension Publication 198. ²T = tolerant or resistant, S = susceptible. ³Resistant to A = alpha, B = beta, G = gamma, and D = delta races of anthracnose. ⁴Resistant to bacterial wilt. ⁵Resistant to pythium root rot.

FIELDPEA

Fieldpea is usually combine-harvested as mature, dry seed. The seed is sold for use in soup and pigeon feed or fed on the farm to sheep, hogs, or cattle. When used for a forage or feed grain crop, fieldpea usually is sown in a mixture with oat.

Varieties with cream-colored seed are most commonly grown. Buyers in Minnesota have not encouraged production of green varieties because of bleaching at harvest time.

RECOMMENDED VARIETIES

Century—Medium yield and maturity. Long vined. Large, cream-colored seed. Good cooking quality. Released by Agriculture Canada, Ottawa. Licensed in 1960.

Lenca—High yield. Medium maturity. Medium size, cream-colored seed. Good cooking quality. Susceptible to powdery mildew. Released by Agriculture Canada, Morden, in 1979. Production of certified seed limited to Canada.

Miranda—Very high yield. Very early. Very short. Very large, cream-colored seed. Released by Cebeco-Handelsraad of The Netherlands. Seed distributed by Wilbur-Ellis Co., Spokane, WA 99206. Seed sale regulated by U.S. Variety Protection Act.

Paloma—Very high yield. Early. Very short. Large, cream-colored seed. Released by Cebeco-Handelsraad of The Netherlands.

VARIETIES NOT ADEQUATELY TESTED

Marrowfat CEB 207—Very high yield. Early. Short. Very large, flat, dimpled, green seed. Released by Cebeco-Handelsraad of The Netherlands.

OTHER VARIETIES

Maple—Medium to low yield. Late. Long vined. Large, olive-colored seed with brown mottle and indistinct hilum. An excellent variety for pigeon feed use. Grown under contract when buyers offer a higher price than for recommended varieties.

Tara—High yield. Medium maturity. Long-vined. Medium size, cream-colored seed. Satisfactory cooking quality, but irregular seed shape undesirable. Resistant to powdery mildew. Released by Agriculture Canada, Morden. Licensed in 1978. Production of certified seed limited to Canada.

Trapper—High yield. Medium maturity. Medium vine length. Small, cream-colored seed. Good cooking quality. Released by Agriculture Canada, Morden. Licensed in 1970.

Table 12. Characteristics of fieldpea varieties

Variety	Seed yield/acre (pounds)			Seeds/pound (number)	Seed protein ² (percent)	Planting to		Vine length (inches)
	Becker ¹ 1981-83	Grand Rapids 1981-83	Crookston 1981			bloom (days)	maturity (days)	
Century	1504	1904	2580	2290	26.3	62	100	62
Lenca	2222	2336	2988	2590	25.5	62	98	53
Miranda	3536	2714	3630	1460	23.7	56	95	22
Paloma	3243	2475	2990	1690	25.2	58	97	22
Marrowfat CEB 207	3376	2448 ³	—	1400	23.7	56	96	26
Trapper	1749	1846	2590	3600	27.1	60	100	58
LSD 5%	280	266	694					

¹Irrigated. ²Oven-dry. ³1982-83.

FLAX

RECOMMENDED VARIETIES

Culbert—Very high yield. Early, brown seed, blue flowers. High oil percent and very high iodine value. Resistant to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in 1975 by Minnesota Agricultural Experiment Station from a cross of Windom and Bison 70.

Dufferin—High yield when sown early, *not recommended for late sowing*. Very late, brown seed, blue flowers, variable plant height. High oil percent. Resistant to rust and wilt. Licensed in 1975 by Agriculture Canada, Ottawa from a cross of Redwood 65 and FP 441.

Flor—High yield. Medium-maturity, brown seed, blue flowers. High oil percent and medium iodine value. Resistant to rust, moderately susceptible to wilt and pasmo. Avoid sowing on soil that grew flax during any of 3 previous years. Released in 1981 by North Dakota Agricultural Experiment Station from backcrossing Linott to Bison M³ and Bison P³.

Linott—High yield. Early, brown seed, blue flowers. High oil percent and iodine value. Resistant to rust (has a trace of susceptible plants), moderately susceptible to wilt and pasmo. Licensed in 1967 by Agriculture Canada, Ottawa, from crosses involving 770B, Argentine C, Arrow, and CI 974.

OTHER VARIETIES

Clark—High yield. Early, brown seed, blue flowers. Medium oil percent and iodine value. Resistant to rust, moderately resistant to wilt and pasmo. Released in 1983 by South Dakota Agricultural Experiment Station from a cross of Linott and CI.2783.

Culbert 79—High yield. Early, brown seed, blue flowers. High oil percent and high iodine value. Resistant to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in

1979 by South Dakota Agricultural Experiment Station as a selection of Culbert.

McGregor—High yield when sown early. Very late, brown seed, blue flowers. Very resistant to lodging. Medium in oil percent. Resistant to rust, moderately resistant to wilt, and susceptible to pasmo. Licensed in 1981 by Agriculture Canada, Ottawa from a cross of Redwood 65 and FP 539. Production of certified seed limited to Canada.

Nored—High yield, especially when sown early. Late, brown seed, blue flowers, resistant to lodging. More tolerant of herbicides MCPA and Dalapon than other commercial varieties. High oil percent, medium iodine value. Moderately susceptible to rust (exhibits some field tolerance to current races), resistant to wilt and pasmo. Released in 1968 by Minnesota Agricultural Experiment Station from an irradiated population of a cross of B-5128 and Redson.

Norlin—High yield. Medium maturity, brown seed, blue flowers. Medium oil percent and iodine value. Resistant to rust, moderately susceptible to wilt. Licensed in 1982 by Agriculture Canada, Ottawa from crosses involving Linott, Rocket, and Raja. Production of certified seed limited to Canada.

Norstar—High yield. Medium-late, resistant to lodging, brown seed, blue flowers. High oil percent, medium to low iodine value. Moderately susceptible to rust (exhibits some field tolerance to current races), resistant to wilt, moderately resistant to pasmo. Released in 1969 by Minnesota Agricultural Experiment Station from a cross of Redwood and Crystal.

Wishek—High yield. Early, brown seed, blue flowers. High oil percent and iodine value. Resistant to rust, moderately susceptible to wilt and pasmo. Released in 1979 by North Dakota Agricultural Experiment Station from a cross of Koto and CI.1220B sel.

Table 13. Yields of flax varieties in bushels per acre, 1981-83

Variety	Early-sown							Late-sown		
	Lamberton 1981-83	Morris 1982-83	Crookston 1981-83	Stephen 1981-83	Grand Rapids 1981-83	Roseau Co. 1981-83	Average 1981-83	Lamberton 1981-83	Morris 1982-83	Average 1981-83
Culbert	24	24	12	12	21	17	18	17	18	18
Dufferin	27	34	15	14	21	18	22	14	16	15
Flor	24	33	14	13	23	19	21	17	16	17
Linott	23	32	13	12	21	20	20	16	19	17
Clark	23	33	14	12	—	—	20	16	19	18
Norstar	25	30	14	13	19	17	20	14	16	15
LSD 5%	3	3	3	3	5	3	3	4	3	3

Table 14. Characteristics of flax varieties, 1981-83

Variety	Days from sowing to		Height (inches)	Lodging (score) ¹	Pasmo (score) ¹	Wilt (score) ¹	Rust ²	Oil (percent) ³
	first bloom	full bloom						
Culbert	50	55	22	3.1	2.5	2.5	R	43.1
Dufferin	56	59	24	3.3	4.0	1.2	R	43.6
Flor	54	58	22	4.3	3.3	4.1	R	42.6
Linott	50	54	22	4.0	3.5	4.0	R	42.3
Clark	51	54	22	4.2	3.0	3.2	R	42.4
Norstar	53	58	24	4.2	3.3	1.2	MS	42.4

¹1 = best, 9 = poorest.

²R = resistant, MS = moderately susceptible.

³Oven-dry basis.

GRAIN SORGHUM

Many hybrids are available. Most are too late for Minnesota. Even the earliest hybrids generally require drying after combine-harvest. The hybrids shown in the table may be of acceptable maturity for southern Minnesota, and the earliest hybrids usually are satisfactory for some parts of central Minnesota. Late hybrids usually yield less than early hybrids in years with low temperatures in August or early September.

Trials were planted between May 21 and June 4 at the rate of 150,000 seeds per acre in rows 30 inches apart. Sorghum was harvested when it was dry enough to combine but not dry enough to store without artificial drying. Consequently, these trials do not measure lodging that might occur during natural drying in the field. All hybrids were harvested the same day for relative moisture comparisons. Hybrids in the table are ranked from earliest to latest based on head moisture at harvest.

Companies enter hybrids in these trials voluntarily, and adapted hybrids are usually tested for 3 years. Data reported for hybrids not included in all trials are adjusted to be comparable with average data of all hybrids tested.

Companies with hybrids in these trials include: Cargill Seed Division, Box 9300, Minneapolis, MN 55440; DeKalb-Pfizer Genetics, Box 225, Glenvil, NE 68941; Jacques Seed Co., Prescott, WI 54021; Northrup King Co., 1500 NE Jackson, Minneapolis, MN 55413; PAG Seeds, Box 9480, Minneapolis, MN 55440; Paymaster Seeds, Box 9493, Minneapolis, MN 55440; Pioneer Hi-Bred International Inc., 7000 Pioneer Parkway, Johnston, IA 50131; Pride Company, Glen Haven, WI 53810. Company reports indicate hybrids in the table that are resistant to greenbug biotype C (not E) include NK 1210, Cargill 22, J-150, P151GB, P508GB, PAG 2250, DK-18, DK-28, and DK-38.

Table 15. Characteristics of grain sorghum hybrids at Lamberton

Hybrid and company	Grain yield/acre (pounds) ¹		Head moisture (percent)		Test weight/ bushel (pounds) ⁴	Seeds/ pound (number) ⁴	Planting to heading (days) ⁴	Height (inches) ⁵
	1983	1978-79, 81-83	September 17 ²	October 7 ³				
M1, Minnesota AES	5063	4363	30.0	24.4	57.8	18,100	59	57
NK 1040, Northrup King ⁶	5453	4719	32.4	24.9	57.7	19,700	60	43
RS 455, Minnesota AES	6190	5360	35.8	26.1	57.6	16,800	64	58
DK-18, DeKalb ⁶	6537	6189	37.2	28.1	59.7	18,100	64	47
Pioneer 8855, Pioneer ⁷	5772	—	34.4	—	60.2	21,600	68	—
Pioneer 894, Pioneer ³	—	5576	39.0	28.5	58.4	21,600	69	43
NK 1210, Northrup King ⁹	6085	5565	38.0	29.4	57.6	23,900	69	44
P151GB, Pride ⁹	5968	5518	38.5	29.7	57.7	22,700	70	44
Pioneer 8790, Pioneer ⁹	5714	5220	41.4	30.2	59.2	22,700	71	45
R-920, Paymaster ³	—	5450	40.1	30.5	57.9	20,600	69	50
NK 121A, Northrup King ¹⁰	—	6367	42.4	30.9	57.5	19,700	72	46
NK 1580, Northrup King ³	—	5756	43.5	30.9	58.8	19,700	74	49
DK-28, DeKalb ⁶	6000	5560	42.7	31.8	60.0	20,600	69	45
PAG 2250, PAG ⁹	5117	4851	41.8	32.1	57.1	22,700	72	45
P508GB, Pride ³	—	5621	42.1	32.1	58.0	20,600	73	48
DK-38, DeKalb ⁹	5972	5304	42.9	33.4	57.2	26,700	74	57
J-150, Jacques ⁹	5792	5237	42.9	33.5	58.8	26,700	72	47
NK 180, Northrup King ¹⁰	—	5907	46.6	33.5	58.4	21,600	76	51
Cargill 22, Cargill ⁶	5412	4860	42.6	34.6	59.5	26,700	71	47
R-930, Paymaster ¹¹	—	5556	44.2	36.9	59.7	22,700	72	45
J-108, Jacques ⁷	5724	—	47.9	—	59.4	20,600	72	—
LSD 5%	702	351	3.4	1.3	—	—	—	—

¹Oven-dry. ²1978, 81-83. ³1978-79, 81-82. ⁴1978-79, 81-83. ⁵1978-79, 82. ⁶1982-83. ⁷1983. ⁸1978, 81-82. ⁹1981-83. ¹⁰1978-79, 81. ¹¹1982.

LENTIL

Lentil is a pulse crop, and the seed is used in soup. The crop is sown with a grain drill and harvested with a windrower and combine.

Eston—High yield. Medium maturity. Short. Very small seed. Released by University of Saskatchewan. Licensed in 1981. Production of certified seed limited to Canada.

Laird—Low yield. Late maturity. Medium height. Large seed. Released by University of Saskatchewan. Licensed in 1978. Production of certified seed limited to Canada.

Brewer—Medium yield, maturity, and height. Medium size

seed. Released by Washington Agricultural Experiment Station and USDA in 1982.

Chilean 78—Medium yield, maturity, and height. Medium size seed. Chilean, introduced to the U.S. about 1920, is the principal variety grown. Chilean 78 was distributed to growers in 1981.

Red Chief—Medium yield, maturity, and height. Medium size seed. Cotyledon color in the seed is brick red in contrast to the yellow of other varieties. Released by Washington Agricultural Experiment Station and USDA in 1980.

Table 16. Characteristics of lentil varieties

	Seed yield/acre (pounds)			Seeds/ pound (number)	Seed protein (percent) ¹	Height (inches)	Lodging (score) ²	Planting to	
	Becker 1981-83	Grand Rapids 1981-83	Crookston 1981					bloom (days)	maturity (days)
Eston	1778	979	1631	15,640	24.6	18	3.0	61	103
Laird	708	492	1242	8,400	23.1	21	4.5	66	106
Brewer ³	1335	895	—	9,650	27.5	18	4.5	57	100
Chilean 78 ³	1112	732	—	10,310	26.4	20	5.0	58	100
Red Chief ³	1674	854	—	9,860	26.1	19	4.2	58	100
LSD 5%	209	186	694						

¹Oven-dry. ²1 = erect, 9 = flat. ³1982-83.

MILLET

Three types of millet are adapted in Minnesota: proso, foxtail, and barnyard (Japanese). Proso varieties are grown for grain for bird or livestock feed. Foxtail varieties and Japanese are grown for silage or hay.

RECOMMENDED VARIETIES

FORAGE

Empire—Foxtail. Very late. Very tall. Poor lodging resistance. Very small, plump yellow seed of low test weight. Released by Agriculture Canada.

GRAIN

Cerise—Red proso. Very early. Medium height. Fair lodging resistance. Small, orange seed of high test weight. Released by Nebraska Agricultural Experiment Station in 1974.

Dawn—White proso. Very early. Short. Fair lodging resistance. Medium size, white seed of medium test weight. Released by Nebraska Agricultural Experiment Station in 1976.

Minco—White proso. Late. Medium height. Fair lodging resistance. Medium size, white seed of high test weight. Released by Minnesota Agricultural Experiment Station in 1976.

Minsum—White proso. Early. Medium height. Poor lodging resistance. Large, white seed of medium test weight. Open heads with long, spreading branches contrast with more compact heads of other white proso varieties. Released by Minnesota Agricultural Experiment Station in 1980.

VARIETIES NOT ADEQUATELY TESTED

Rise—White proso. Medium maturity. Short. Fair lodging resistance. Medium size, white seed of medium test weight. Released by Nebraska Agricultural Experiment Station in 1983.

OTHER VARIETIES

Barnyard or Japanese—Forage. Late. Very tall. Very good lodging resistance. Medium size, gray seed of low test weight. High yielding forage millet but very coarse.

Cope—White proso. Late. Very tall. Fair lodging resistance. Large, white seed of medium test weight. Released by Colorado Agricultural Experiment Station in 1978.

German, German R, and German No. 8—Foxtail. Very late. Very tall. Good lodging resistance. Very small, yellow seed of low test weight. High forage yield but too late for good seed production.

Panhandle—White proso. Early. Medium height. Poor lodging resistance. Large, white seed of medium test weight. Lower yield than Minsum. Released by Nebraska Agricultural Experiment Station in 1967.

Red Leonard—Red proso. Very late. Tall. Fair lodging resistance. Medium size, orange seed of high test weight. Lower grain yield than Cerise in 1982 trials. Released by Colorado Agricultural Experiment Station in 1983.

Sno-Fox—Foxtail. Late. Medium height. Poor lodging resistance. Small, white seed of medium test weight. Released by Nebraska Agricultural Experiment Station in 1980.

Table 17. Yields of millet varieties in pounds per acre, 1980-83

Type and variety	Grain ¹			Forage ²		
	Rosemount	Becker	Average	Rosemount	Becker	Average
Foxtail						
Empire	2128	1212	1670	9621	6759	8190
Proso						
Dawn	2554	1078	1816	5768	3305	4536
Minco	3152	1179	2166	7934	3964	5949
Minsum	2747	1387	2067	6830	4340	5585
Rise ³	3120	1145	2132	7481	3863	5672
Cerise	2924	1300	2112	7177	4332	5754
LSD 5%	247	168	149	403	431	295

¹10 percent moisture basis. ²Oven-dry including grain. ³1983.

Table 18. Characteristics of millet varieties, two location average

Type and variety	Planting to heading (days)	Planting to maturity (days)	Lodging (score) ¹	Height (inches)	Seeds/pound (number)	Test weight/ bushel (pounds)
Foxtail						
Empire	62	98	3.2	48	238,700	47.0
Proso						
Dawn	43	73	3.5	28	68,730	51.7
Minco	47	87	3.6	40	68,730	54.2
Minsum	44	80	5.2	38	63,000	51.7
Rise ²	45	84	4.3	34	73,200	51.5
Cerise	42	73	3.5	39	79,600	56.3

¹1 = erect, 9 = flat. ²1983.

OAT

The losses from oat smut in susceptible varieties increased greatly in recent years. Since the disease is primarily seed carried, seed of susceptible varieties should be treated with a chemical to control oat smut.

RECOMMENDED VARIETIES

Benson—Medium maturity, high yield, medium height, fair lodging resistance, medium test weight, medium groat percent, medium protein percent, cream colored seed. Some resistance to crown rust, resistant to smut, some tolerance to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Portage and Burnett. Released in 1979. Seed sale regulated by U.S. Variety Protection Act.

Lyon—Medium-late maturity, high yield, tall, fair lodging resistance, medium test weight and groat percent, medium protein percent, white seed. Some resistance to crown rust, resistant to smut, susceptible to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Lodi and Portage. Released in 1977.

Moore—Late, very high yield, tall, fair lodging resistance, high test weight and groat percent, low protein percent, white seed. Some resistance to crown rust and smut, some tolerance to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Lodi and Mn 65B1286, a crown rust resistant selection. Released in 1979.

Noble—Early-medium maturity, medium yield, medium height, good lodging resistance, medium test weight, groat percent and protein percent, yellow seed. Susceptible to crown rust, resistant to smut, some tolerance to red leaf. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

Ogle—Medium maturity, very high yield, medium height, good lodging resistance, medium test weight and groat percent, low protein percent, yellow seed. Susceptible to crown rust and smut, tolerant to red leaf. Selected at Illinois Agricultural Experiment Station from a cross of Brave, Tyler and Egdolon. Released in 1981.

Preston—Early maturity, medium yield and height, good lodging resistance, high test weight, medium groat percent, high protein percent, ivory seed. Moderately resistant to crown rust, resistant to smut, some tolerance to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Dal and Otee. Released in 1982.

VARIETIES NOT ADEQUATELY TESTED

Centennial—Late, high yield, medium height, fair lodging resistance, medium test weight, high groat percent, low protein percent, yellow seed. Resistant to crown rust and smut, some tolerance to red leaf. Selected at Wisconsin Agricultural Experiment Station from a cross involving Holden, Garland, and Froker. Released in 1983. Seed sale regulated by U.S. Variety Protection Act.

Pierce—Late, very high yielding, tall, fair lodging resistance, high test weight, medium groat percent and protein percent, white seed. Resistant to crown rust and smut. Selected at North Dakota Agricultural Experiment Station from a cross between Hudson and Dal. Released in 1983.

OTHER VARIETIES

Chief—Early-medium maturity, medium yield and height, fair lodging resistance, high test weight and groat percent, medium protein percent, yellow seed. Susceptible to crown rust, smut, and



The lodged oat variety in front of agronomist D. D. Stuthman contrasts with the erect oat variety behind him. Oat breeding during the last 40 years has increased yields and also improved the crop in lodging resistance, disease resistance, test weight, groat percentage, and protein percentage.

red leaf. Selected at South Dakota Agricultural Experiment Station from a cross between Clintland 64 and Garland. Released in 1972.

Dal—Late, medium yield and height, fair lodging resistance, high test weight, medium groat percent, high protein percent, ivory seed. Resistant to crown rust and smut, susceptible to red leaf. Selected at Wisconsin Agricultural Experiment Station from a cross involving Trispermia, Belar and Beedee. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

Iowa Early Multiline Blend (E73, E74, E76, and E77)—Early, low yield, medium height, good lodging resistance, high test weight and groat percent, medium protein percent, yellow seed. Heterogeneous crown rust reaction, susceptible to smut. The recurrent parent is CI 7970. Developed at Iowa Agricultural Experiment Station and originally released in 1968.

Lancer—Early-medium maturity, high yield, medium height, good lodging resistance, high test weight, groat percent and protein percent, white seed. Susceptible to crown rust, smut, and red leaf. Selected at South Dakota Agricultural Experiment Station from a cross between Neal and Clintland 64. Released in 1979.

Lang—Early, high yield, short, good lodging resistance, medium test weight and groat percent, low protein percent, yellow seed. Susceptible to crown rust and smut. Tolerant to red leaf. Selected at Illinois Agricultural Experiment Station from a cross of Tyler and Orbit. Released in 1976.

Lodi—Late, medium yield, tall, fair lodging resistance, medium test weight, groat percent, and protein percent, white seed. Susceptible to crown rust, smut, and red leaf. Selected at Wisconsin Agricultural Experiment Station from a cross involving several lines. Released in 1963.

Porter—Late, very high yield, medium height, poor lodging resistance, medium test weight, groat percent and protein percent, ivory seed. Resistant to crown rust and smut, tolerant to red leaf. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1981. Seed sale regulated by U.S. Variety Protection Act.

Rodney—Late, medium yield, tall, poor lodging resistance, medium test weight, white seed. Some resistance to crown rust, susceptible to smut. Selected by Agriculture Canada, Winnipeg, from a cross involving several lines. Licensed in 1952.

Stout—Early-medium maturity, medium yield, short, good

lodging resistance, high test weight and groat percent, medium protein percent, white seed. Some resistance to crown rust. Susceptible to smut and red leaf. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

Table 19. Yield of oat varieties in bushels per acre, 1981-83

Variety	Rosemount	Waseca	Lamberton ¹	Morris	Crookston	Grand Rapids	Stephen	Average 7 locations
Preston	82	79	83	97	110	58	77 ¹	86
Noble	80	76	79	100	122	55	95	87
Ogle	92	100	94	112	133	71	105	101
Benson	87	92	80	103	118	61	97	92
Lyon	80	87	86	102	122	52	89	89
Centennial ²	90	75	79	111	128	52	—	91
Moore	91	92	88	117	132	63	106	99
Porter	83	91	82	114	128	73	120 ¹	97
Pierce ²	92	90	103	116	135	63	114	101
LSD 5%	7	8	10	9	10	7	8	3

¹1982-83. ²1983.

Table 20. Characteristics of oat varieties, 1981-83¹

Variety	Heading (date)	Height (inches)	Lodging (score) ²	Seeds/pound (number)	Test weight/bushel (pounds)	Groat (percent)	Protein percent ³		Protein/acre (pounds)	Reactions to disease ⁴	
							groat	seed		crown rust	smut
Preston	June 25	37	2.1	17,300	39	75	19.4	14.5	396	MR	R
Noble	June 26	36	1.8	16,600	37	73	16.3	11.9	324	S	HR
Ogle	June 28	36	1.9	15,500	37	75	14.6	11.1	351	S	S
Benson	June 28	40	2.6	14,900	37	75	16.7	12.6	362	MS	HR
Lyon	June 28	41	2.2	14,200	37	76	17.2	13.1	367	MS	HR
Centennial ⁵	June 29	37	2.6	15,400	38	77	15.8	12.2	336	R	R
Moore	June 30	40	2.1	15,900	39	77	15.8	12.1	378	MR	MR
Porter	July 2	37	2.7	15,500	38	74	16.4	12.2	367	MS	HR
Pierce ⁵	July 2	39	2.1	14,600	40	75	17.0	12.8	406	MR	HR

¹Does not include Stephen. ²1 = erect, 5 = flat. ³10 percent moisture. ⁴HR = highly resistant, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. ⁵1983.

ORCHARDGRASS

Orchardgrass is used with other grasses and legumes because it establishes rapidly and recovers quickly after grazing or harvest. Its chief limitation is lack of winterhardiness, but in areas with reliable snow cover it may persist and remain productive. Varieties have been evaluated in pure stands at Rosemount and Grand Rapids over a period of 10 years. Average annual hay yield for the variety Hallmark was 3.4 tons/acre at Grand Rapids and 3.9 tons/acre at Rosemount, Minnesota. The relative yield of varieties sold in Minnesota (% of Hallmark) and the sources of seed¹ are: Dart-

102^c, Hallmark-100^a, Sterling-100^{dl}, Napier-100^{bf}, Comet-98^{eg}, Orion-98^e, Able-92^a, Frode-92^e, Hawk Hybrid-91^{bm}, Potomac-87^{acdhijkl}, Prime-84ⁱ, and Crown (no data available)^e.

¹1984 seed sources: a. Cenex, b. Field Seed Farms, c. Land O'Lakes, d. Lincoln Seed and Feed Co., e. Northrup King Co., f. PAG Seeds, g. Payco Seeds, h. Peterson-Biddick Co., i. Premium Seed Co., j. Ramy Seed Co., k. The Sexauer Co., l. Werner Farm Seeds, and m. Ziller Seed Farms, Inc.

RED CLOVER

Red clover can be seeded in pure stands or with timothy for hay or silage. It is more easily established in pasture renovation than either alfalfa or trefoil. Historically, winterhardy varieties have not persisted beyond two crop years because of susceptibility to crown rot. Most of the varieties presently sold in Minnesota can persist for 3 years with good winter snow cover. Varieties have been evaluated at Rosemount, Grand Rapids, Lamberton, Morris, and Waseca, Minnesota, for about 13 years. Average hay yield for the variety Lakeland was 3.6, 3.5, and 2.2 tons/acre for the first, second, and third years after seeding, respectively. The relative two-year yield

of varieties sold in Minnesota (% of Lakeland) and sources of seed¹ are: Florex-116^g, Arlington-113^{aefhiklm}, Prosper I-111^j, Lakeland-100^{aedfiln}, Redman-99^a, Redland II^{2cn}, and Ruby^{2b}.

¹1984 seed sources: a. Cenex, b. Dairyland Seed Co., Inc., c. Field Seed Farms, d. Interstate Seed and Grain, e. Land O'Lakes, Inc., f. Lincoln Seed and Feed Co., g. Northrup King Co., h. Peterson-Biddick Co., i. Premium Seed Co., j. Pride Co., k. Ramy Seed Co., l. The Sexauer Co., m. Werner Farm Seeds, and n. Ziller Seed Farms, Inc.

²Not tested in Minnesota, but similar to Lakeland in University of Wisconsin tests.

REED CANARYGRASS

Reed canarygrass is adapted throughout Minnesota for use as hay, pasture, or silage. It is one of the best grass species for use on poorly drained soil, in swampy areas, and in areas subject to spring flooding. The species is also well adapted to upland soils. The seedling vigor is not as good as that of other commonly used forage grasses. Reed canarygrass is less palatable than most species seeded for hay and pasture, but cattle will produce well on the grass if it is used before it becomes mature. Satisfactory pasture utilization occurs if the grass is grazed when it is between 6 and 24 inches tall. Harvesting hay between heading and early bloom is preferred, because the quality declines with advanced maturity. Available varieties are winterhardy and persistent.

Varieties have been evaluated in pure stands at Grand Rapids,

Lamberton, Morris, and Rosemount for 10 years. Average annual hay yields for all varieties were about 3.0 tons/acre at Lamberton and Morris and 4.4 tons/acre at Grand Rapids and Rosemount.

The latest development in reed canarygrass breeding has been the development of varieties with low concentrations of indole alkaloids. In grazing trials, lambs and steers gained more weight and sheep had less diarrhea on low alkaloid varieties than on the common reed canarygrass varieties. Two low alkaloid varieties, Palaton^b and Venture^{cd}, and two common reed canarygrass varieties, Flare^b and Rise^a, are available¹.

¹1984 seed sources: a. Interstate Seed and Grain, b. Land O'Lakes Inc., c. Premium Seed Co., d. The Sexauer Co.

SOYBEAN

Many different soybean varieties are available in Minnesota. These varieties have been developed by public and/or private organizations. The important characteristics of these soybean varieties are presented in the following tables. Tables 21 to 25 deal with those varieties that were developed by publicly supported institutions and are being considered for recommendation by Minnesota Agricultural Experiment Station. Tables 26 to 28 show performance characteristics of privately developed varieties as well as several public varieties. Recommendations are not made for these private varieties because they are voluntarily submitted by the owners and long term performance data (3 years or more) are not available on many of them.

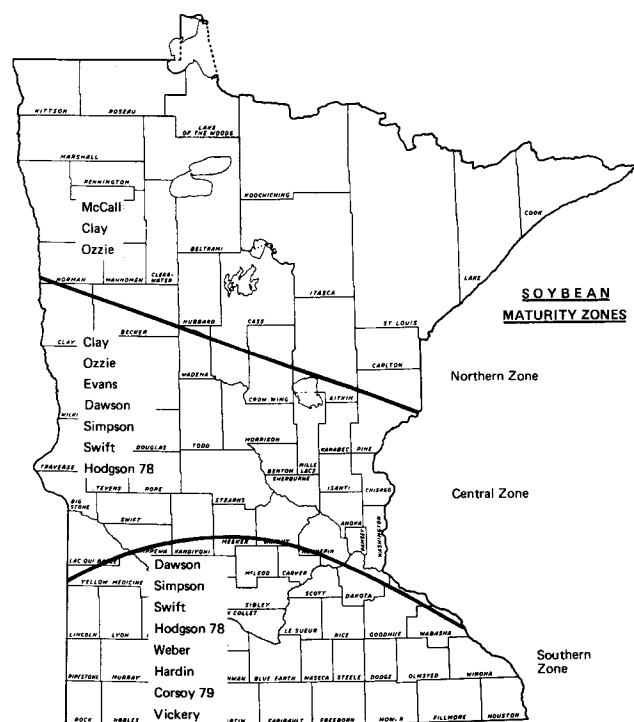
Many factors need to be considered in selecting varieties. The major ones are listed below.

MATURITY—Soybeans are sensitive to day length, so the date of maturity is affected by production zone latitude. Because of this, each soybean variety has a narrow range of adaptation. Varieties that mature before the fall killing frost should be selected to obtain high yield and quality. A soybean variety is considered mature when 95 percent of the pods have reached their mature color. Harvesting would normally be done 1 to 2 weeks after this stage is reached, depending on drying conditions. The accompanying map relates production zones to the recommended varieties discussed in the text and tables.

YIELD—Varieties in the tables are arranged in order of increasing maturity. Normally, later maturing varieties are expected to have a higher yield potential than earlier maturing varieties. When comparing yields, it is best to look within a maturity range of about 5 days. Yield comparisons are more reliable if data are available for several years. Data from different tables should not be compared. All yield data reported in these tables were obtained from replicated tests harvested with a plot combine.

PLANT HEIGHT AND LODGING—These measurements give an indication of the stem strength and standability of a variety and relate somewhat to ease of combining. The actual height and lodging score is influenced by environmental conditions, so values may vary from year to year. A good way to use these values is to compare scores of newer varieties to scores of a familiar variety.

PHYTOPHTHORA—Phytophthora root rot can cause significant yield losses in susceptible varieties exposed to wet weather and poorly drained fields. Since there are numerous races of this



fungus, it is important to know which are present in a particular situation. The phytophthora reactions listed in the tables were determined on greenhouse-grown plants by the University of Minnesota's Department of Plant Pathology. *These reactions are only to phytophthora races 1 and 2.*

CHLOROSIS—The chlorosis score listed for each variety is a measure of how much leaf yellowing occurred in tests conducted on a high lime (high pH) soil near Lamberton. This score indicates how well a variety will perform on high lime soils.

Performance data for public and private soybean varieties are presented in northern, central and southern zone tables. The test locations for each zone are indicated in each table. Becker was the only irrigated test location. All tests were planted between May 5 and May 25 unless otherwise indicated.

RECOMMENDED VARIETIES

Clay—Northern and central zones. Has given good yields and is outstanding for oil and protein in its maturity class. Highly susceptible to phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1968.

Corsoy 79—Southern zone. Very similar to Corsoy, which has been the leading variety in Minnesota for several years, except that it is resistant to races 1, 2, 3, 6, 7, 8 and 9 of phytophthora. Has poor chlorosis ratings and is somewhat lodging susceptible. Developed by Illinois Agricultural Experiment Station. Released in 1979.

Dawson—Central and southern zones. Very good tolerance to iron chlorosis on high lime soils and higher yielding than Swift. Good lodging resistance. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1983. Seed sale regulated by U.S. Variety Protection Act.

Evans—Central zone. Resistant to races 1 and 2 of phytophthora. A good variety for late season plantings in the southern zone. Developed by Minnesota Agricultural Experiment Station. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

Hardin—Southern zone. Earlier than Corsoy, good yield performance. Resistant to races 1 and 2 of phytophthora. Developed by Iowa Agricultural Experiment Station. Released in 1980. Seed sale regulated by U.S. Variety Protection Act.

Hodgson 78—Central and southern zones. Similar to Hodgson, except resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1978. Seed sale regulated by U.S. Variety Protection Act.

McCall—Northern zone. High yield, tall and good lodging resistance in its maturity class. Susceptible to phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1978.

Ozzie—Northern and central zones. High yield and good lodging resistance for its maturity. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1983. Seed sale regulated by U.S. Variety Protection Act.

Simpson—Central and southern zones. High yield with good lodging resistance. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1982. Seed sale regulated by U.S. Variety Protection Act.

Swift—Central and southern zones. Very good tolerance to iron chlorosis on high-lime soils. Susceptible to phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1972.

Vickery—Southern zone. Similar to Corsoy except that it is resistant to races 1, 2, 3, 6, 7, 8 and 9 of phytophthora. Developed jointly by the Iowa and Ohio Agricultural Experiment Stations. Released in 1978. Seed sale regulated by U.S. Variety Protection Act.

Weber—Southern zone. Similar to Corsoy 79 in yield and lodging. Good tolerance to high lime soils. Susceptible to phytophthora rot. Developed by Iowa Agricultural Experiment Station. Released in 1979. Seed sale regulated by U.S. Variety Protection Act.

VARIETIES NOT ADEQUATELY TESTED

BSR 201—Similar in maturity to Corsoy 79. Good resistance to brown stem rot and high yield potential. Resistant to race 1 and 2 of phytophthora. Suggested for fields where 75 percent or more of the plants had brown stem rot in previous years' soybean crops. Developed by Iowa Agricultural Experiment Station. Released in 1982. Seed sale regulated by U.S. Variety Protection Act.

Elgin—Matures several days later than Corsoy 79. Not tolerant to iron chlorosis on high lime soils. Not resistant to any races of phytophthora. Fair lodging resistance. Developed by Iowa Agricultural Experiment Station. Released in 1983. Seed sale regulated by U.S. Variety Protection Act.

Maple Amber—Matures 6 days earlier than McCall. High percentage of oil and protein for its maturity. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Ottawa. Licensed in 1982.

OTHER VARIETIES

Chico—A small-seeded variety for specialty markets. Matures slightly earlier than Clay. Seed weight is about 5 grams per 100 seeds less than Clay. Yields less than Clay. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station. Released in 1983.

Corsoy—A leading variety in Minnesota for many years. Now largely superseded by phytophthora-resistant backcross derivatives. Developed by Iowa Agricultural Experiment Station. Released in 1967.

Harcor—Similar to Corsoy in yield but later and lodges more. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Harrow. Licensed in 1975.

Hodgson—A leading variety in central Minnesota for several years. Now largely superseded by phytophthora-resistant Hodgson 78. Developed by Minnesota Agricultural Experiment Station. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

Lakota—Similar in maturity to Hodgson 78. Taller and lodges more than Hodgson 78. Tolerant to chlorosis on high lime soils. Resistant to races 1 and 2 of phytophthora. Developed at Iowa Agricultural Experiment Station. Released in 1982. Seed sale regulated by U.S. Variety Protection Act.

Maple Arrow—Matures about 6 days later than McCall. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Ottawa. Licensed in 1976.

Maple Presto—Matures 12 days earlier than McCall. May be too early for high yields in Minnesota. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Ottawa. Licensed in 1979. Production of certified seed limited to Canada.

Wells II—Similar to Wells except that it is resistant to races 1, 2, 3, 5, 6, 7, 8 and 9 of phytophthora. Developed by Indiana Agricultural Experiment Station. Released in 1978. Seed sale regulated by U.S. Variety Protection Act.

PRIVATELY DEVELOPED VARIETIES

The private companies entering varieties in the 1983 Minnesota tests and the brand names of the varieties are: Arrowhead Inc., West Hwy 212, Watertown, SD 57201 (Arrowhead); Asgrow Seed Company, 7000 Portage Road, Kalamazoo, MI 49001 (Asgrow); Cenex, P.O. Box 43089, St. Paul, MN 55164 (Cenex); Dairyland Seed Company, Inc., P.O. Box 958, 3570 Hwy H, West Bend, WI 53095 (Dairyland); DeKalb-Pfizer Genetics, 3100 Sycamore Road, DeKalb, IL 60115 (DeKalb); Farmacy Seed Company, Route 2 Box 123, Dodge Center, MN 55927 (Farmacy); FFR Cooperative, 4112 E State Road 225, West Lafayette, IN 47906 (FFR); Funk Seeds International, 1300 West Washington St., Bloomington, IL 61701 (Funk); Green Field Seed, P.O. Box 56, Comfrey, MN 56019 (Green Field Seed); Hoffman Seed Farms, Inc., Route 1, Iowa Falls, IA 50126 (Hoffman); Hy-Vigor Seeds, Inc., Paullina, IA 51046 (Hy-Vigor Seeds); Interstate Seed Company, P.O. Box 470, Fargo, ND 58107 (Interstate); Jacques Seed Company, 720 St. Croix St., Prescott, WI 54021 (Jacques); Kaltenberg Seed Farms, 5506 Hwy 19, Waunakee, WI 53597 (Kaltenberg Seeds); Kruger Seed Company, Hwy. 57 West, P.O. Box 807, Cedar Falls, IA 50613 (Kruger, DeSoy); Latham Brothers Farms, Alexander, IA 50420 (Latham); Latham Seed Company, Route 1, Alexander, IA 50420 (Latham); Lynnville Seed Company, Lynnville, IA 50153 (Riverside); Midwest Oilseeds, Inc., Route 3, Box 204, Adel, IA 50003 (Midwest Oilseeds); Mogensen Seed Farm, Route 1, P.O. Box 330, Trimont, MN 56176 (MSF); Agripro—Division of North American Plant Breeders, Route 2, Hwy 30 East, Ames, IA 50010 (Agripro); Northrup King Company, 4124 Quebec Ave. North, New Hope, MN 55427 (Northrup King); Payco Seeds, P.O. Box 70, Dassel, MN 55325

(Payco Select); Paymaster Seeds, P.O. Box 307, Belmond, IA 50421 (Paymaster, Paymaster Bounty Brand); PGF Seeds, Inc., Route 2 Box 74, Marcus, IA 51035 (Pine Grove Farm); Pioneer Hi-Bred International, Inc., Central Division, 1202 23rd Street South, Fargo, ND 58103 (Pioneer Brand); Pride Company, Inc., Route 1, Box 58, Glen Haven, WI 53810 (Pride); ProfiSeed Inc., Route 2, Hampton, IA 50441 (ProfiSeed); Sand Seed Service, Inc., P.O.

Box 648, Marcus, IA 50135 (Sands); Schettler Seed, Inc., 626 North Court, Carroll, IA 51401 (Diamond Brand); Soybean Research Foundation, Inc., 115 North Perry, Mason City, IL 62664 (SRF); Stine Seed Farm, Inc., Route 3, Box 2040, Adel, IA 50003 (Stine); Thompson Farms Seeds, Leland, IA 50453 (Thompson Farms); Willette Seed Farm, Inc., Delavan, MN 56023 (Wilsoy); Ziller Seed Company, Route 1, P.O. Box 122, Bird Island, MN 55310 (Ziller).

Table 21. Yields of publicly developed soybean varieties in northern zone in bushels per acre

Variety	Crookston 1981-83	Grand Rapids 1981-83	Moorhead 1981-83	Morris 1981-83	Roseau 1981-83
Maple Presto	26	27	—	—	21
Maple Amber	28	33	30	29	27
Portage	—	33	—	—	31
McCall	34	39	32	31	40
Chico	26	27	34	27	—
Clay	34	33	38	30	34
Maple Arrow	31	37	32	29	32
Ozzie	29 ¹	—	39	35	—
Evans	31 ¹	—	39	35	—
Simpson	—	—	38	38	—
Dawson	—	—	40	37	—
LSD 5%	5	5	3	2	5

¹1983.

Table 22. Yields of publicly developed soybean varieties in 10-inch and 30-inch spacings in central zone in bushels per acre

Variety	Rosemount and Morris 1983		Rosemount 30 inch 1981-83	Morris 30 inch 1981-83	Becker 30 inch 1981-83	Average 30 inch 9 trials
	10 inch	30 inch				
Chico ¹	36	30	25	34	41	33
Clay	38	36	36	30	46	37
Ozzie	43	41	42	35	50	42
Evans	42	37	40	35	48	41
Simpson	48	41	43	38	51	44
Dawson	44	42	41	37	49	43
Swift	46	40	39	37	48	41
Hodgson 78	48	42	42	37	53	44
LSD 5%	4	4	3	2	3	1

¹1982-83.

Table 23. Yields of publicly developed soybean varieties in 10-inch and 30-inch row spacings in southern zone in bushels per acre

Variety	Waseca and Lambertson			Fairmont mid-May planting 1982-83	Waseca mid-May planting 1981-83	Lamberton mid-May planting 1981-83	Average mid-May planting 30-inch 8 trials
	late-April planting 1982-83	mid-May planting 1982-83					
		10 inch	30 inch				
McCall	—	—	—	33	—	—	—
Clay	—	—	—	30	—	—	—
Ozzie	—	—	37	34 ¹	44	31 ²	43 ²
Evans	—	—	38	35	43	40	38
Simpson	—	—	39	35 ¹	49	40	41
Dawson	—	—	41	37 ¹	45	42	42
Swift	—	—	40	—	45	41	42
Hodgson 78	37	42	39	37	52	45	44
Lakota	38	38	38	—	48	43	40
Weber	39	43	40	37	51	45	42
Hardin	40	49	45	35 ¹	58	48	47
Corsoy 79	40	45	43	37	51	44	47
Vickery	41	45	44	—	52	46	47
BSR 201	—	45	41	—	54	39 ²	42 ²
Elgin	—	44	42	—	49	40 ²	44 ²
Gnome	—	35	35	—	44	32 ²	38 ²
LSD 5%	3	3	3	3	5	3	2

¹1983. ²1982-83.

Table 24. Field characteristics of publicly developed soybean varieties

Variety	Mature		Lodging (score) ¹	Height (inches)	Phytophthora (reaction) ²	Chlorosis (score) ¹
	mid-May planting (days after August 31)	mid-June planting				
Northern Zone						
Maple Presto	-8	—	1.0	25	R	3.6
Maple Amber	0	—	1.3	26	R	4.2
Portage	3	—	1.0	32	S	2.6
McCall	5	—	1.4	29	S	2.8
Chico	7	—	1.4	32	R	2.4
Clay	9	—	1.6	28	S	2.4
Maple Arrow	12	—	1.7	26	R	3.8
Ozzie	17	—	1.5	35	R	2.6
Evans	19	—	1.5	35	R	2.8
Simpson	22	—	2.0	36	R	2.8
Dawson	22	—	2.3	37	R	1.6
Central Zone						
Chico	1	—	1.4	26	R	2.4
Clay	5	—	1.3	27	S	2.4
Ozzie	9	—	1.0	31	R	2.6
Evans	11	—	1.6	33	R	2.8
Simpson	16	—	1.4	32	R	2.8
Dawson	16	—	2.1	34	R	1.6
Swift	17	—	3.0	37	S	1.6
Hodgson 78	23	—	2.5	37	R	2.4
Lakota	24	—	2.3	37	R	1.6
Weber	29	—	2.6	34	S	2.2
Hardin	30	—	2.9	35	R	3.8
Corsoy 79	32	—	2.9	37	R	4.4
Vickery	32	—	2.9	37	R	4.4
Southern Zone						
McCall	—	17	1.0	28	S	2.8
Clay	—	19	1.0	24	S	2.4
Ozzie	6	22	1.0	25	R	2.6
Evans	7	22	1.0	27	R	2.8
Simpson	14	24	1.0	25	R	2.8
Dawson	14	24	1.8	26	R	1.6
Swift	16	—	2.1	30	S	1.6
Hodgson 78	18	26	1.4	30	R	2.4
Lakota	18	—	2.9	37	R	1.6
Weber	21	27	2.6	34	S	2.2
Hardin	22	29	2.9	35	R	3.8
Corsoy 79	23	31	2.9	37	R	4.4
Vickery	23	—	2.9	37	R	4.4
BSR 201	25	—	1.9	31	R	4.8
Elgin	27	—	2.0	31	S	2.2
Gnome	31	—	1.0	24	S	3.6

¹1 = excellent, 5 = very poor. ²R = resistant, S = susceptible to races 1 and 2.

Table 25. Plant characteristics of publicly developed soybean varieties

Variety	Color			Seeds/ pound (number)	Seed quality (score)	Protein (percent) ⁴	Oil (percent) ⁴
	flower ¹	pubes- cence ²	hilum ³				
Northern Zone							
Maple Presto	P	T	G	2730	2.7	40.6	18.1
Maple Amber	P	T	Br	2670	2.7	43.5	19.4
Portage	P	G	Y	2110	3.3	40.8	16.9
McCall	P	G	Y	2640	2.3	41.3	18.3
Chico	W	G	Bf	3830	3.0	42.7	20.5
Clay	P	G	Y	2470	2.5	42.3	20.4
Maple Arrow	P	T	Br	2650	3.0	41.9	18.7
Ozzie	P	G	Y	2610	2.0	43.4	19.1

Table 25 (continued). Plant characteristics of publicly developed soybean varieties

Variety	Color			Seeds/ pound (number)	Seed quality (score)	Protein (percent) ⁴	Oil (percent) ⁴
	flower ¹	pubes- cence ²	hilum ³				
Evans	W	G	Y	2700	1.8	41.9	19.3
Simpson	P	G	Bf	2590	2.2	42.3	17.9
Dawson	P	G	Y	2840	2.2	41.8	19.7
Central Zone							
Chico	W	G	Bf	3840	3.0	42.7	20.5
Clay	P	G	Y	2470	2.5	42.3	20.4
Ozzie	P	G	Y	2610	2.0	43.4	19.1
Evans	W	G	Y	2700	1.8	41.9	19.3
Simpson	P	G	Bf	2590	2.2	42.3	17.9
Dawson	P	G	Y	2840	2.2	41.8	19.7
Swift	W	T	Bl	2590	2.5	40.7	18.1
Hodgson 78	P	G	Bf	2620	2.0	41.6	19.4
Lakota	P	T	Bl	2650	2.0	41.2	19.2
Weber	W	T	Bl	3200	2.0	39.9	19.9
Hardin	P	G	Y	2730	2.0	39.7	19.6
Corsoy 79	P	G	Y	2700	2.3	40.3	19.5
Vickery	P	G	Y	2750	2.7	40.6	18.7
Southern Zone							
McCall	P	G	Y	3040	2.5	41.2	18.1
Clay	P	G	Y	2950	2.8	41.0	19.3
Ozzie	P	G	Y	2870	2.7	41.3	19.2
Evans	W	G	Y	2980	2.7	39.7	20.7
Simpson	P	G	Bf	2670	2.3	39.3	19.6
Dawson	P	G	Y	2840	2.3	39.1	21.0
Swift	W	T	Bl	2710	3.3	38.8	19.4
Hodgson 78	P	G	Bf	2690	2.3	39.2	20.8
Lakota	P	T	Bl	2750	2.0	41.2	19.2
Weber	W	T	Bl	3610	2.0	39.9	19.9
Hardin	P	G	Y	2720	2.0	39.7	19.6
Corsoy 79	P	G	Y	2770	2.3	40.3	19.5
Vickery	P	G	Y	2790	2.7	40.6	18.7
BSR 201	W	G	Bf	2650	2.3	39.8	19.8
Elgin	P	T	Bl	2770	2.7	39.9	19.4
Gnome	P	T	Bl	3540	2.3	42.2	17.5

¹P = purple W = white. ²T = tawny G = gray. ³Y = yellow G = gray Br = brown Bl = black Bf = buff. ⁴Oven-dry.

Table 26. Yields and characteristics of private soybean varieties, northern zone, 1983 (Crookston, Moorhead, Morris)

Brand	Variety	Mature (days after August 31)	Yield/acre (bushels)	Lodging (score) ²	Height (inches)	Phytophthora (reactions) ³	Chlorosis (score) ²
Arrowhead	Maple Amber	1	36	1.4	32	R	4.2
	McCall	5	34	1.4	29	S	2.8
	4222 ¹	7	35	1.4	27	S	2.2
Interstate	Chico	7	33	1.7	26	R	2.4
	Clay	9	37	1.6	28	S	2.4
	IS 505	12	35	1.9	30	S	1.6
Arrowhead	9010	13	35	2.3	31	S	2.8
Jacques	E8272	15	37	1.9	33	S	3.8
	Maple Arrow	15	36	1.4	32	R	3.8
Interstate	IS 515	18	39	1.8	30	R	2.2
	Evans	18	39	1.6	33	R	2.8
Pioneer	0877	19	43	2.4	36	R	4.2
Interstate	IS 545	19	39	2.3	32	S	2.2
LSD (5%)			4				

¹Blend. ²1 = excellent, 5 = very poor. ³R = resistant, S = susceptible to races 1 and 2.

Table 27. Yields and characteristics of private soybean varieties, central zone, 1981-83 (Morris, Becker, Rosemount)

Brand	Variety	Mature (days after August 31)	Yield/acre (bushels)			Lodging (score) ²	Height (inches)	Phytophthora (reaction) ³	Chlorosis (score) ²
			1983	1982-83	1981-83				
	Ozzie	6	37	—	—	1.3	32	R	2.6
	Evans	7	39	39	40	1.6	35	R	2.8
Midwest Oilseeds	0450	10	41	—	—	2.0	39	R	2.2
Agripro	AP120	11	42	41	—	1.8	37	S	2.6
DeKalb	CX282	11	39	37	38	2.3	39	S	1.6
Arrowhead	9144	11	39	37	38	2.3	34	S	3.6
Payco Select	PS 0011	12	42	—	—	2.1	36	R	3.8
Asgrow	A1179	12	37	38	39	1.8	39	R	3.0
	Simpson	13	43	43	—	1.4	33	R	2.8
MSF	220	13	42	41	—	2.1	37	R	2.8
Jacques	E8282	15	45	—	—	2.8	40	S	3.0
Hy-Vigor Seeds	Hardy	15	44	—	—	1.8	35	R	3.8
	Swift	15	43	41	41	3.0	37	S	1.6
Pine Grove Farm	P-1400	15	43	—	—	2.4	39	R	2.8
SRF	101	15	43	43	—	1.8	37	S	4.6
Dairyland	DSR 120	16	45	44	44	2.1	35	S	4.6
Pride	PEX 96	16	44	—	—	2.6	40	M	2.8
Stine	1100	17	41	40	42	2.7	40	R	4.2
Midwest Oilseeds	1400	18	45	—	—	2.1	35	R	3.6
Kaltenberg Seeds	EXP 114	18	44	—	—	1.8	36	M	4.0
	Hodgson 78	18	43	43	44	2.4	39	R	2.4
Sands	EXP SOI 131	19	47	—	—	2.1	35	R	4.2
Funk	12231	19	45	—	—	2.4	35	S	4.0
Northrup King	S 09-90	19	45	43	44	2.6	39	R	3.2
FFR	12002	19	40	—	—	3.1	39	S	4.6
Pride	B152	20	45	45	—	1.9	34	R	3.8
Northrup King	S 14-60	20	45	—	—	2.0	34	S	2.2
Stine	1350	20	45	—	—	2.0	33	S	4.4
Agripro	AP10	20	41	40	43	2.8	39	R	2.0
Kruger	K-10078	20	41	—	—	1.7	34	S	3.6
Cenex	8300	20	41	—	—	2.7	36	R	1.4
Pine Grove Farm	P-1470	21	46	—	—	1.8	34	S	3.6
DeKalb	EX 2004	21	42	—	—	2.6	38	S	1.6
Paymaster									
Bounty Brand	183	22	43	—	—	2.8	38	S	4.0
Cenex	7430 ¹	22	42	—	—	2.7	40	R	3.6
Farmacy	Enterprise II	23	44	—	—	3.0	38	R	4.0
LSD (5%)			3	2	2				

¹Blend. ²1 = excellent, 5 = very poor. ³R = resistant, S = susceptible, M = mixture of R and S to races 1 and 2.

Table 28. Yields and characteristics of private soybean varieties, southern zone, 1981-83 (Lamberton, Waseca, Fairmont)

Brand	Variety	Mature (days after August 31)	Yield/acre (bushels)			Lodging (score) ²	Height (inches)	Phytophthora (reaction) ³	Chlorosis (score) ²
			1983	1982-83	1981-83				
Diamond Brand	TC137	16	44	46	48	1.8	33	R	3.6
	Hodgson 78	16	42	44	46	1.7	32	R	2.4
MSF	350	16	42	45	—	1.7	33	R	2.4
Agripro	AP10	16	38	43	46	1.3	32	R	2.0
Latham	300 ¹	17	46	48	49	1.9	35	M	2.6
MSF	440	17	46	47	—	1.4	35	R	3.2
Asgrow	A1564	17	45	45	47	1.8	38	R	3.8
Cenex	8212	17	43	—	—	1.8	33	M	1.6
Payco Select	PS 0019 ¹	17	42	—	—	1.7	33	R	3.0
Ziller	EXP 177	17	42	—	—	1.6	33	S	3.0
Asgrow	A 1937	18	48	50	51	2.0	33	M	3.8
Latham	Ex-300A ¹	18	47	—	—	2.1	34	S	2.6

Table 28 (continued). Yields and characteristics of private soybean varieties, southern zone, 1981-83 (Lamberton, Waseca, Fairmont)

Brand	Variety	Mature (days after August 31)	Yield/acre (bushels)			Lodging (score) ²	Height (inches)	Phytophthora (reaction) ³	Chlorosis (score) ²
			1983	1982-83	1981-83				
Sands	SOI 220	18	46	—	—	2.0	34	R	4.4
Ziller	EXP 20	18	46	—	—	2.4	36	R	3.0
FFR	12003	18	45	—	—	1.6	36	S	4.2
Arrowhead	8155	18	45	47	48	2.0	35	R	3.0
Stine	1800 ¹	18	44	42	44	2.1	35	M	3.0
Jacques	E8389	18	44	—	—	2.6	33	S	2.8
Dairyland	DSR-141	18	43	44	46	1.7	40	S	2.8
SRF	76-24486	18	43	—	—	1.7	34	R	4.6
Kaltenberg Seeds	KB 212	18	42	44	—	1.8	34	R	3.0
Sands	SOI 125	18	41	—	—	1.8	35	R	4.0
Northrup King	S 14-60	19	50	—	—	1.9	34	S	2.2
Thompson Farms	1250 ¹	19	47	—	—	2.6	35	M	3.6
Midwest Oilseeds	1480	19	46	—	—	1.3	29	S	3.0
Thompson Farms	1020 ¹	19	45	—	—	2.9	37	R	4.4
Dairyland	DSR-171	19	43	44	47	2.4	38	S	4.4
Green Field Seed	GFS-213	19	43	—	—	1.8	32	S	2.2
Hy-Vigor Seeds	Rowtunda	19	43	45	48	2.6	38	R	2.2
Paymaster	251	19	43	45	47	1.9	35	R	1.6
FFR	Weber	19	42	46	49	2.2	36	S	2.2
	2895	19	40	—	—	1.3	33	S	4.2
Agripro	AP 200	20	47	49	51	1.8	39	R	3.6
Midwest Oilseeds	2200 ¹	20	45	—	—	1.9	36	R	3.8
Wilsoy	Wilsoy 82 ¹	20	45	47	50	2.9	40	R	4.4
Hoffman	8401 ¹	20	44	—	—	2.6	37	R	4.2
ProfiSeed	1138	20	44	47	—	2.4	38	M	4.2
Paymaster	201 ¹	20	43	45	49	2.6	40	S	4.8
Riverside	4041	20	42	—	—	1.4	35	R	2.2
Northrup King	S 18-84	21	47	48	—	2.4	35	R	3.8
Cenex	8017	21	45	—	—	2.3	37	R	4.2
Farmacy	Eve	21	45	—	—	1.8	38	R	4.4
Latham	500	21	45	46	49	2.0	37	R	2.6
	Corsoy 79	21	44	46	—	2.7	38	R	4.4
Funk	12215	21	44	45	—	1.9	32	R	4.0
Funk	12245 ¹	21	44	—	—	2.2	36	R	3.6
Farmacy	Abel	21	43	47	49	2.3	37	S	5.0
Pride	B203	22	49	48	50	2.9	36	R	4.8
DeKalb	CX 155	22	47	47	50	2.9	40	S	2.0
DeSoy	302B ¹	22	47	—	—	2.3	37	R	4.2
Kruger	K-2000	22	46	—	—	2.0	39	R	2.8
Payco Select	PS 0021 ¹	22	46	—	—	2.8	38	R	3.8
DeKalb	EX35	22	45	—	—	2.1	33	M	2.8
Stine	2220 ¹	22	45	48	—	2.7	35	M	2.2
Arrowhead	2244	22	44	—	—	2.2	36	M	2.2
Hoffman	8001A ¹	22	43	—	—	2.4	38	R	4.0
Hy-Vigor Seeds	901 ¹	22	42	—	—	2.7	40	R	4.0
Diamond Brand	D195B	23	48	—	—	2.4	38	S	3.0
Green Field Seed	GFS-423	23	47	—	—	2.6	37	R	2.0
Northrup King	X735028	23	47	—	—	2.6	38	S	3.0
Sands	SOI 226	23	47	—	—	2.3	34	S	2.2
Pine Grove Farm	P 2240	23	46	—	—	2.8	36	S	2.8
Pine Grove Farm	B-221 ¹	23	46	—	—	2.4	36	M	3.2
ProfiSeed	1152	23	46	—	—	2.8	35	S	2.2
Jacques	J-103	23	45	48	51	2.6	38	S	3.0
Asgrow	A2575	23	43	44	47	1.7	40	R	1.4

Table 28 (continued). Yields and characteristics of private soybean varieties, southern zone, 1981-83 (Lamberton, Waseca, Fairmont)

Brand	Variety	Mature (days after August 31)	Yield/acre (bushels)			Lodging (score) ²	Height (inches)	Phytophthora (reaction) ³	Chlorosis (score) ²
			1983	1982-83	1981-83				
SRF	205	23	43	46	—	2.3	41	R	4.8
Riverside	4042 ¹	23	41	44	—	2.6	40	R	4.0
Latham	650	24	49	—	—	2.8	36	S	3.4
Kaltenberg Seeds	KB 231	24	48	50	—	2.8	36	M	2.8
Dairyland	DSR-207	24	44	44	48	2.1	36	S	3.6
Pride	B216	25	48	50	51	3.0	40	S	5.0
LSD (5%)			5	4	3				

¹Blend. ²1 = excellent, 5 = very poor. ³R = resistant, S = susceptible, M = mixture of R and S to races 1 and 2.

SUNFLOWER

The oilseed varieties of sunflower are used for oil and protein-feed extraction. The nonoilseed varieties are used for nutmeats, salted whole seed, or birdfeed.

Row spacings in these trials were 30 inches, and plant populations averaged 20,000 for oilseed and 15,000 for nonoilseed varieties.

The head moisture and seed moisture columns in the tables show comparative moisture percentages among the hybrids at harvest time. Hybrids of low moisture percentages dried faster than those of high moisture percentages. However, damage from diseases and insects affect drying rate. Consequently, yield and other characteristics should be considered when making moisture comparisons among hybrids.

A major advantage of some hybrids over the old varieties is their ability to produce a normal yield despite a shortage of insect pollinators. However, this is artifact, not true, autogamy because the hybrids increase seed size and weight to compensate for fewer seeds per head. Hybrids of 70 percent artifact autogamy suffered a 30 percent yield reduction when bees were excluded by bags; no yield reduction occurred with hybrids of 100 percent artifact autogamy (tables 30 and 31, last column). The larger seeds resulting from a shortage of bees are usually lower in oil percentage

than normal-size seeds.

Companies enter hybrids in these trials voluntarily, and hybrids are usually tested for 3 years. Data reported for hybrids not included in all trials are adjusted to be comparable with average data of all hybrids tested.

Companies with hybrids in these trials are: Agway Inc., Grandin, ND 58038; Arrowhead Inc., Watertown, SD 57201; Cargill Seed Division, Box 9300, Minneapolis, MN 55440; Dahlgren and Company, 1220 Sunflower St., Crookston, MN 56716; DeKalb-Pfizer Genetics, Box 8AA, Glyndon, MN 56547; Interstate Seed Company, Box 470, Fargo, ND 58107; Jacques Seed Co., Prescott, WI 54021; Keltgen Seed Company, Box 143, Olivia, MN 56277; Northrup King Co., 1500 NE Jackson St., Minneapolis, MN 55413; PAG Seeds, Box 9480, Minneapolis, MN 55440; Peterson-Biddick Co., Box 190, Wadena, MN 56482; Red River Commodities, Inc., Box 3022, Fargo, ND 58102; SeedTec International Inc., Box 5522, Fargo, ND 58105; Sheyenne Foundation Seeds, Inc., Sheldon, ND 58068; Sigco Research, Inc., Box 289, Breckenridge, MN 56520; Sokota Hybrid Producers, Brookings, SD 57006; Stauffer Seeds, Box 59, Danvers, MN 56231; TNT/SUN-FLO, Box 5637, Fargo, ND 58105.

Table 29. Yields of sunflower varieties in pounds per acre

Variety and company	Crookston	Morris	Lamberton	Rosemount	Average	Crookston	Morris	Lamberton	Rosemount	Average
	1983	1983	1983	1983	1983	1980-83	1979-81, 83	1980-83	1979, 81-83	4 locations
Oilseed varieties										
894, USDA	1025	1733	1683	1840	1570	939	1997	2005	2138	1770
Arrowhead 747, Arrowhead Inc.	1052	2018	1803	1922	1699	1063	—	1832	2093	1828 ¹
205, Cargill	—	—	—	—	—	1099	2057	2039	2334	1882 ²
206, Cargill	1178	1758	1916	2012	1716	1299	2189	2017	2479	1996 ³
207, Cargill	1545	1748	1988	2386	1917	1313	—	2201	2851	2105 ¹
DO 164, Dahlgren	—	—	—	—	—	802	1836	2086	2506	1807 ²
DO 167, Dahlgren	—	—	—	—	—	1040	—	2317	2639	1999 ⁵
DO 704XL, Dahlgren	1111	1734	1979	2396	1805	1044	1944	2080	2674	1935
DO 705, Dahlgren	1050	1426	2331	2240	1762	1156	1826	2263	2423	1917 ⁴
DO 844, Dahlgren	—	—	—	—	—	822	1697	2097	2246	1715 ²
DO 855, Dahlgren	1315	1918	2284	2197	1928	—	—	—	—	—
DKS-37, DeKalb	866	1781	1831	1692	1542	951	2066	1990	1954	1740 ⁴
Cenex 7101, Interstate	—	—	—	—	—	822	1938	1828	2330	1729 ²
IS 3001, Interstate	1119	1794	1964	1922	1700	1074	—	2244	2311	1933 ¹
IS 3104, Interstate	1263	1838	1886	1918	1726	—	—	—	—	—
IS 3106, Interstate	807	1821	1943	2130	1675	—	—	—	—	—
IS 7111, Interstate	1036	1702	1891	2201	1707	1027	—	2057	2286	1845 ¹
IS 7120, Interstate	802	2153	1917	2068	1735	—	—	—	—	—
IS 7775 Select, Interstate	—	—	—	—	—	1033	2077	1953	2459	1880 ²
IS 7781, Interstate	1357	1871	1974	1923	1781	—	—	—	—	—

Table 29 (continued). Yields of sunflower varieties in pounds per acre

Variety and company	Crookston 1983	Morris 1983	Lamberton 1983	Rosemount 1983	Average 1983	Crookston 1980-83	Morris 1979-81, 83	Lamberton 1980-83	Rosemount 1979, 81-83	Average 4 locations
J-311 Brand, Jacques	1056	2188	1998	1740	1745	1037	—	2111	2130	1943 ¹
J-503 Brand, Jacques	1146	2069	1806	2198	1805	968	2261	2046	2558	1958 ⁴
KO-66, Keltgen	1451	1747	2292	2207	1924	1240	—	2378	2421	2023 ¹
Sunbred 254, Northrup King	—	—	—	—	—	1030	2163	1889	2237	1830 ²
Sunbred 265, Northrup King	—	—	—	—	—	887	2366	1840	2112	1801 ²
Sunbred 275, Northrup King	1236	2121	1703	1921	1745	1101	2191	1863	2080	1809 ⁴
PAG SF 101, PAG Seeds	1108	1868	1990	1729	1674	1092	2133	1935	1976	1784
PAG SF 102, PAG Seeds	—	—	—	—	—	1249	1941	2026	2366	1895 ¹⁰
Funk's G-6625, Peterson Biddick	—	—	—	—	—	947	2063	1973	2298	1820 ⁶
Funk's G-6627, Peterson Biddick	951	1871	1946	2081	1712	1001	—	2098	2545	1956 ¹
Imperial 673, Red River Commodities	—	—	—	—	—	1072	2112	1796	2163	1786 ⁸
EX SD-1, Red River Commodities	982	1749	1944	1526	1550	1002	—	1837	1665	1640 ¹
SeedTec 307, SeedTec International	861	1825	1941	1661	1572	953	—	1923	1979	1747 ¹
SeedTec 315, SeedTec International	—	—	—	—	—	1216	2409	1928	2336	1972 ¹⁰
SeedTec 316, SeedTec International	1432	2053	2134	2135	1938	1297	—	2181	2307	2036 ¹
SeedTec 317, SeedTec International	1423	2328	1934	1969	1913	—	—	—	—	—
SeedTec 327, SeedTec International	—	—	—	—	—	754	2037	1980	2291	1765 ¹⁰
SeedTec 349, SeedTec International	1689	2158	1810	1871	1882	1520	2479	2031	2489	2130 ⁴
Dakota Gold, Sheyenne Seed	884	1667	2081	1876	1627	1025	1966	1927	2183	1775 ⁹
Golden Glo, Sheyenne Seed	—	—	—	—	—	866	1949	2080	2350	1811 ⁸
SIGCO 448, Sigco Research	—	—	—	—	—	820	2062	2025	2483	1847 ²
SIGCO 449, Sigco Research	—	—	—	—	—	937	1868	2082	2366	1813 ²
SIGCO 454, Sigco Research	—	—	—	—	—	892	1886	2156	2594	1882 ¹⁰
SIGCO 455, Sigco Research	1144	2099	2083	1966	1823	—	—	—	—	—
SIGCO 470, Sigco Research	892	1752	1529	1493	1416	—	—	—	—	—
SIGCO 472, Sigco Research	—	—	—	—	—	883	2049	2130	2107	1792 ¹⁰
SIGCO 488, Sigco Research	646	1826	1722	1744	1484	1270	—	1916	2205	1881 ¹
Sokota 2057, Sokota Hybrid	943	1820	2088	2197	1762	980	—	2228	2364	1925 ¹
Sokota 4000, Sokota Hybrid	—	—	—	—	—	1083	2033	1956	2320	1848 ¹⁰
Sokota 5000, Sokota Hybrid	990	1921	1859	1805	1644	981	2117	1806	2054	1739 ⁴
Sokota 6000, Sokota Hybrid	1185	1795	1800	2172	1738	924	1933	1979	2206	1760 ⁴
S-1283, Stauffer Seeds	1190	1583	1798	1992	1641	—	—	—	—	—
S-1300, Stauffer Seeds	1198	1315	1997	1826	1584	—	—	—	—	—
S-1830, Stauffer Seeds	1026	1465	2118	1845	1613	—	—	—	—	—
S-1888, Stauffer Seeds	1148	1738	1948	2111	1736	1092	—	1896	2321	1839 ¹
S-3101, Stauffer Seeds	1502	1642	2282	1903	1832	1006	1895	2166	1935	1750 ⁴
GH 10, TNT/SUN-FLO	—	—	—	—	—	1034	2082	1814	2156	1771 ²
GH 20, TNT/SUN-FLO	—	—	—	—	—	1198	1986	1667	2458	1827 ⁷
L10, TNT/SUN-FLO	446	1211	1798	1492	1237	—	—	—	—	—
XR 28, TNT/SUN-FLO	1239	2198	1863	1773	1768	1217	2319	2072	2008	1904 ¹¹
534B, TNT/SUN-FLO	—	—	—	—	—	1112	—	1997	1973	1694 ⁵
634B, TNT/SUN-FLO	—	—	—	—	—	1080	—	1733	2006	1606 ⁵
Peredovik	—	—	—	1532	—	—	—	—	2058	—
Sputnik	—	—	—	2286	—	—	—	—	2371	—
LSD 5%	376	439	329	423	392	202	223	236	240	225
Nonoilseed varieties										
924, USDA	1105	1351	1699	2561	1679	1041	1842	1944	2537	1841
Royal Hybrid 621, Agway	1531	2512	2240	2200	2121	1274	—	2297	2635	2256 ¹
Royal Hybrid 2121, Agway	—	—	—	—	—	935	1810	2100	2615	1865 ¹⁰
Royal Hybrid 2141, Agway	1807	2458	2093	2779	2284	1217	2381	2511	2891	2250 ⁴
D131, Dahlgren	1615	2372	2004	2518	2127	1369	2626	2214	2764	2243 ⁴
D135, Dahlgren	—	—	—	—	—	905	1985	2115	2398	1851 ¹⁰
IS 8001, Interstate	1461	2264	1870	2162	1939	1254	—	2036	2358	2055 ¹
Sheyenne 043, Sheyenne Seed	1298	2102	2198	1925	1881	1158	—	2316	2493	2094 ¹
SIGCO 934, Sigco Research	1343	1969	1788	2054	1788	1066	2180	1852	2089	1797 ⁴
SIGCO 944, Sigco Research	—	—	—	—	—	1041	—	1895	2617	1851 ⁵
SIGCO 954, Sigco Research	1449	2778	2291	2977	2374	1269	2569	2142	2668	2162 ⁴
SIGCO 964, Sigco Research	1772	2154	1998	2654	2144	1437	—	2172	2809	2220 ¹
LSD 5%	326	505	224	485	201	195	319	291	247	134

¹1982-83. ²1979-82. ³1980-83. ⁴1981-83. ⁵1982. ⁶1979-80, 82. ⁷1979-80. ⁸1981-82. ⁹1981, 83. ¹⁰1980-82. ¹¹1980, 83.

Table 30. Characteristics of oilseed sunflower varieties, four location average

Variety and company	Oil (percent) ¹	Seeds/ pound (number) ²	Planting to		Lodging (percent) ⁵	Height (inches) ⁶	Head moisture (percent) ⁷	Seed moisture (percent) ⁸	Midge damage (percent) ⁹	Artifact autogamy (percent) ¹⁰
			bloom (days) ³	maturity (days) ⁴						
894, USDA	46	11,100	72	117	15	66	47	14	76	100
Arrowhead 747, Arrowhead Inc.	50	10,800	74	117	24	67	52	14	69	100
205, Cargill	48	9,300	72	—	28	62	38	17	76	96
206, Cargill	47	9,300	73	117	23	67	45	16	58	89
207, Cargill	43	8,700	73	116	27	70	35	16	35	100
DO 164, Dahlgren	44	8,700	69	—	22	67	49	18	78	65
DO 167, Dahlgren	45	8,200	68	—	9	65	34	—	74	72
DO 704XL, Dahlgren	45	8,600	71	116	26	67	50	16	70	72
DO 705, Dahlgren	46	8,900	70	115	26	67	45	17	54	91
DO 844, Dahlgren	44	9,700	71	—	12	67	42	16	85	100
DO 855, Dahlgren	47	9,100	69	115	16	63	37	14	—	81
DKS-37, DeKalb	47	10,500	73	118	23	66	54	21	61	84
Cenex 7101, Interstate	46	10,100	70	—	41	67	44	10	79	62
IS 3001, Interstate	49	8,900	72	119	7	63	42	13	33	63
IS 3104, Interstate	47	7,400	75	120	27	76	50	17	—	100
IS 3106, Interstate	45	8,700	74	118	29	74	50	20	—	100
IS 7111, Interstate	48	8,400	70	117	17	64	39	14	58	61
IS 7120, Interstate	47	8,600	73	119	34	73	50	17	—	100
IS 7775 Select, Interstate	45	9,900	72	—	23	70	55	18	76	100
IS 7781, Interstate	46	7,300	75	121	24	79	53	18	—	100
J-311 Brand, Jacques	45	10,300	72	116	16	68	46	16	76	92
J-503 Brand, Jacques	44	9,900	73	118	22	69	55	16	70	92
KO-66, Keltgen	44	8,600	71	118	26	67	54	16	72	83
Sunbred 254, Northrup King	46	11,300	74	—	17	68	50	24	62	100
Sunbred 265, Northrup King	47	8,700	71	—	31	59	47	18	70	97
Sunbred 275, Northrup King	44	10,300	74	120	19	72	59	21	72	100
PAG SF 101, PAG Seeds	47	10,800	73	117	17	62	43	14	67	100
PAG SF 102, PAG Seeds	47	9,900	73	—	27	66	42	19	68	87
Funk's G-6625, Peterson Biddick	46	10,500	70	—	31	67	48	15	70	97
Funk's G-6627, Peterson Biddick	44	9,400	73	119	21	69	54	18	71	87
Imperial 673, Red River Commodities	49	8,400	73	—	21	65	61	19	61	59
EX SD-1, Red River Commodities	49	10,100	73	117	15	62	51	14	69	78
SeedTec 307, SeedTec International	45	10,300	73	118	20	67	49	18	66	100
SeedTec 315, SeedTec International	44	8,200	75	—	19	72	61	20	32	100
SeedTec 316, SeedTec International	46	8,400	73	118	27	68	49	15	12	100
SeedTec 317, SeedTec International	48	8,400	72	120	27	69	56	16	—	88
SeedTec 327, SeedTec International	45	10,100	73	—	18	69	53	16	77	87
SeedTec 349, SeedTec International	44	7,300	76	121	21	76	66	24	43	100
Dakota Gold, Sheyenne Seed	50	9,400	72	119	21	64	36	13	—	55
Golden Glo, Sheyenne Seed	44	10,100	73	—	25	69	55	24	72	91
SIGCO 448, Sigco Research	50	9,900	73	—	33	66	49	21	69	75
SIGCO 449, Sigco Research	44	9,900	71	—	20	70	46	15	81	86
SIGCO 454, Sigco Research	44	9,300	74	—	24	69	57	17	70	88
SIGCO 455, Sigco Research	44	8,900	72	118	32	69	55	16	—	100
SIGCO 470, Sigco Research	49	9,700	73	118	29	73	56	18	—	100
SIGCO 472, Sigco Research	45	10,800	73	—	18	69	55	15	78	100
SIGCO 488, Sigco Research	45	6,800	78	121	38	81	63	17	11	100
Sokota 2057, Sokota Hybrid	45	9,300	70	116	14	66	35	15	77	74
Sokota 4000, Sokota Hybrid	45	11,300	73	—	16	66	45	18	63	93
Sokota 5000, Sokota Hybrid	45	10,800	73	117	19	66	47	13	63	80
Sokota 6000, Sokota Hybrid	47	8,700	73	120	20	68	59	24	77	74
S-1283, Stauffer Seeds	47	8,700	69	116	20	64	24	14	—	58
S-1300, Stauffer Seeds	44	11,100	70	113	18	59	17	15	—	87
S-1830, Stauffer Seeds	48	8,700	69	114	27	64	35	14	—	100
S-1888, Stauffer Seeds	46	10,100	72	118	16	65	47	14	67	69
S-3101, Stauffer Seeds	38	13,000	70	115	15	60	32	13	70	96
GH10, TNT/SUN-FLO	45	10,300	73	—	20	65	47	13	61	89
GH20, TNT/SUN-FLO	46	—	73	—	16	—	55	17	—	100
L10, TNT/SUN-FLO	46	11,100	71	115	38	65	38	15	—	100
XR28, TNT/SUN-FLO	47	7,600	72	121	25	73	62	17	—	100

Table 30 (continued). Characteristics of oilseed sunflower varieties, four location average

Variety and company	Oil (percent) ¹	Seeds/ pound (number) ²	Planting to		Lodging (percent) ⁵	Height (inches) ⁶	Head moisture (percent) ⁷	Seed moisture (percent) ⁸	Midge damage (percent) ⁹	Artifact autogamy (percent) ¹⁰
			bloom (days) ³	maturity (days) ⁴						
534B, TNT/SUN-FLO	45	9,700	72	—	26	66	52	—	73	98
634B, TNT/SUN-FLO	46	10,500	73	—	9	65	48	—	74	87
Peredovik	45	6,800	74	123	27	75	60	—	—	25
Sputnik	48	7,000	72	118	25	73	56	—	—	23
LSD 5%							4	5		12

¹Oven-dry. Crookston and Morris 1979-81, 83; Lamberton 1980-83; Rosemount 1979, 81-83. ²Rosemount 1981-83. ³Crookston 1980, 83; Morris 1980-81, 83; Lamberton 1980, 82-83; Rosemount 1982. ⁴Crookston and Rosemount 1983. ⁵Down or broken stalks in trials severely lodged. Crookston and Morris, 1981, 83; Lamberton 1982; Rosemount 1980, 83. ⁶Crookston and Morris 1980, 81-83; Lamberton and Rosemount 1982-83. ⁷Crookston 1979, 81, 83; Lamberton 1982; Rosemount 1979, 81-83. ⁸Lamberton 1980-81, 83. ⁹Damaged ray flowers and cupped heads. Crookston 1981-82; Morris 1981. ¹⁰100 times yield of self-pollinated plants (covered with bags) divided by yield of cross-pollinated plants (no bags). Rosemount 1978-83.

Table 31. Characteristics of nonoilseed sunflower varieties, four location average

Variety and company	Large seed (percent) ¹	Test weight/ bushel (pounds) ²	Seeds/ pound (number) ²	Planting to		Lodging (percent) ⁵	Height (inches) ⁶	Head moisture (percent) ⁷	Seed moisture (percent) ⁸	Midge damage (percent) ⁹	Artifact autogamy (percent) ¹⁰
				bloom (days) ³	maturity (days) ⁴						
924, USDA	69	25.0	3690	72	118	28	65	56	23	79	95
Royal Hybrid 621, Agway	29	27.7	4160	71	120	18	66	60	22	78	84
Royal Hybrid 2121, Agway	33	27.0	3980	70	—	30	64	60	18	80	81
Royal Hybrid 2141, Agway	30	28.0	4050	71	119	12	67	61	18	83	70
D131, Dahlgren	27	26.5	4240	71	119	15	63	61	17	57	75
D135, Dahlgren	13	26.2	4400	71	—	31	63	60	26	66	68
IS 8001, Interstate	49	25.8	3780	72	119	18	66	62	21	79	78
Sheyenne 043, Sheyenne Seed	25	26.0	4540	72	117	4	61	57	19	69	82
SIGCO 934, Sigco Research	35	25.8	3980	71	118	20	64	58	27	80	86
SIGCO 944, Sigco Research	12	26.1	4360	71	—	24	60	53	—	70	66
SIGCO 954, Sigco Research	45	25.0	3410	70	117	18	62	58	20	68	67
SIGCO 964, Sigco Research	38	25.9	3940	69	117	13	59	48	18	53	56
LSD 5%								4	7		13

¹Held on a 20/64 round-hole sieve. Crookston and Morris 1981, 83; Lamberton and Rosemount 1981-83. ²Crookston and Morris 1981, 83; Lamberton and Rosemount 1981-83. ³Crookston 1980, 83; Morris 1980-81, 83; Lamberton 1980, 82-83; Rosemount 1982. ⁴Crookston and Rosemount 1983. ⁵Down or broken stalks in trials severely lodged. Crookston and Morris 1981, 83; Lamberton 1982; Rosemount 1980, 83. ⁶Crookston and Morris 1980, 81-83; Lamberton and Rosemount 1982-83. ⁷Crookston 1979, 81, 83; Lamberton 1982; Rosemount 1979, 81-83. ⁸Lamberton 1980-81, 83. ⁹Damaged ray flowers and cupped heads. Crookston 1981-82; Morris 1981. ¹⁰100 times yield of self-pollinated plants (covered with bags) divided by yield of cross-pollinated plants (no bags). Rosemount 1978-83.

TALL FESCUE

Tall fescue is a relatively new forage grass in Minnesota. It may be tried in mixtures with other grasses and legumes. It establishes rapidly, withstands trampling, tolerates summer drought, and produces fall season pasture when other grasses become dormant. This bunchgrass is subject to winter injury, but may persist and remain productive in areas with reliable snow cover.

Varieties have been evaluated for about 8 years at Grand Rapids and Rosemount, Minnesota. Average annual hay yields were about 4.2 tons/acre at both locations for the variety Kentucky-31. The

relative yield of varieties sold in Minnesota (% of Kentucky-31) and sources of seed¹ are: Kenhy-102ⁱ, Kentucky-31 100^{bcdefghi}, Forager-92^a, Fawn-78^{adh}, Johnstone (no data available)^f and Olympic (no data available)^a.

¹1984 seed sources: a. Cenex, b. Field Seed Farms, c. Land O'Lakes, Inc., d. Lincoln Seed and Feed Co., e. Northrup King Co., f. Premium Seed Co., g. Ramy Seed Co., h. The Sexauer Co., and i. Werner Farm Seeds.

TIMOTHY

Timothy is adapted throughout Minnesota for use in hay and pasture mixtures. When timothy is the major component in hay, its stage of maturity affects yield and quality. Harvesting at early bloom stage is preferred to later harvesting. Because timothy varieties differ in maturity, care should be taken in choosing varieties that will fit the management of the crop. Only very early varieties are adapted to a three-cut system with alfalfa. Varieties presently available in Minnesota are of medium and medium-late maturity and should not be harvested more than twice during the growing season. Therefore, timothy and red clover are compatible in mixtures for hay production.

Varieties have been evaluated in pure stands for about 13 years

in Minnesota. Average annual hay yields were about 3.6 tons/acre for the variety Itasca. The relative yield of varieties sold in Minnesota (% of Itasca) and source of seed¹ are: Timfor-100^g, Toro-98^{co}, Pronto-97^k, Climax-95^{abcdefhijlmn}, Verdant-94^j and Mohawk (no data available)^b.

¹1984 seed sources: a. Arrowhead, Inc., b. Cenex, c. Field Seed Farms, d. Interstate Seed and Grain, e. Land O'Lakes, f. Lincoln Seed and Feed Co., g. Northrup King Co., h. Payco Seeds, i. Peterson-Biddick Co., j. Premium Seed Co., k. Pride Co., Inc., l. Ramy Seed Co., m. The Sexauer Co., n. Werner Farm Seeds, and o. Ziller Seed Farms, Inc.

DURUM WHEAT

RECOMMENDED VARIETIES

Cando—Awned, midseason to late, semidwarf and good lodging resistance. Resistant to stem rust and susceptible to leaf rust. Medium yield and test weight with low seed weight. Satisfactory quality. Better adapted to Northern Minnesota. Released by North Dakota Agricultural Experiment Station in 1975.

Crosby—Awned, midseason, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield and test weight with high seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1973.

Rugby—Awned, midseason, medium height and fair lodging resistance. Resistant to stem and moderately susceptible to leaf rust. High yield, and medium test weight and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1973.

Vic—Awned, midseason, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield, test weight, and seed weight. Satisfactory quality. Superior quality for export market. Released by North Dakota Agricultural Experiment Station in 1979.

Ward—Awned, midseason, medium height, and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield and test weight with medium seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1972.

VARIETIES NOT ADEQUATELY TESTED

Lloyd—Awned, midseason to late, semidwarf and good lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. Medium yield and low test weight with low seed weight.

Satisfactory quality. Superior quality for export market. Released by North Dakota Agricultural Experiment Station in 1983.

OTHER VARIETIES

Botno—Awned, early, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield, test weight, and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1973.

Calvin—Awned, midseason to late, semidwarf with good lodging resistance. Resistant to stem rust and susceptible to leaf rust. Low yield, medium test weight and low seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1978.

Edmore—Awned, midseason, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. Medium yield and low test weight and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1978.

Mindum—Awned, late, tall, and poor lodging resistance. Susceptible to leaf rust, stem rust, and lodging. Low yield and high test weight with medium seed weight. Satisfactory quality. A durum type selected from a bread wheat field. Released by Minnesota Agricultural Experiment Station in 1917.

Rolette—Awned, early, medium height and fair lodging resistance. Resistant to stem rust and susceptible to leaf rust. Medium yield with high test weight and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1971.

Table 32. Characteristics of durum wheat varieties, 1981-83

Variety	Heading (June)	Height (inches)	Lodging (score) ¹	Rust reaction ²		Seeds/pound (number)	Test weight/bushel (pounds)	Yield/acre (bushels)			
				leaf	stem			Morris	Crookston	Stephen	Average
Cando	33	29	1.4	S	R	12,300	59.3	41	44	54	46
Crosby	30	37	2.0	MS	R	11,400	59.7	48	50	55	51
Rugby	31	38	1.7	MS	R	11,600	59.5	48	50	55	51
Vic	32	38	2.1	MS	R	11,400	60.5	47	49	53	49
Ward	31	38	1.8	MS	R	11,600	60.0	48	47	52	49
Botno	29	37	1.8	MS	R	11,100	60.2	49	51	51	50
Calvin	33	27	1.1	S	R	11,900	59.3	40	42	48	43
Edmore	32	39	1.7	MS	R	11,900	58.3	42	44	50	45
Lloyd	33	29	1.2	MS	R	12,300	58.2	41 ³	41 ³	—	—
Mindum	35	45	5.2	S	S	11,600	60.5	47	37	42	42
Rolette	28	38	2.2	S	R	11,100	61.3	47	47	51	48
LSD 5%									8		4

¹1 = erect, 9 = flat. mean.

²Reaction to prevalent races: R = resistant, MS = moderately susceptible, S = susceptible.

³2 year data adjusted to 3 year

HARD RED SPRING WHEAT

RECOMMENDED VARIETIES

Butte—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1977. Awned, early to midseason, medium height. Resistant to stem rust. Tolerant of loose smut and ergot. High yield and test weight with medium protein percent. Satisfactory milling and baking characteristics. Because of early heading, may be suitable for later seeding. Disadvantages—Susceptible to leaf rust and to black chaff. Moderately

susceptible to tan spot and lodging. Very tough threshing and may be erratic in yield.

Era—Released by Minnesota Agricultural Experiment Station in 1970. Awned, late to midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Tolerant of loose smut and ergot. Medium lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption. Because of later maturity, less suitable for late seeding in southern Minnesota.



Agronomy student R. J. Burke and Wheaton wheat. Wheaton, named for Wheaton, Minnesota, and released in 1983, is the highest yielding variety of hard red spring wheat in Minnesota Agricultural Experiment Station trials.

Len—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1979. Awned, midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately tolerant of loose smut and ergot. Good lodging resistance. Medium yield and test weight. High protein percent. Satisfactory milling and baking. Disadvantages—Moderately susceptible to shattering.

Marshall—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1982. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Resistant to stem and leaf rust. Tolerant of loose smut and moderately tolerant of ergot. Good lodging resistance. Very high yield and high test weight. Satisfactory milling. Disadvantages—Low to medium protein percent. Low bake absorption.

Solar—Released by Northrup King Co. in 1977. Seed sale regulated by U.S. Variety Protection Act. Awned, late to midseason, semidwarf, similar to Era. Resistant to stem rust and moderately resistant to leaf rust. Tolerant of loose smut and ergot. Medium lodging resistance. Very high yield and medium test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption. Because of later maturity, less suitable for late seeding in southern Minnesota.

Wheaton—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1983. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Resistant to stem and leaf rust. Moderately tolerant of loose smut and ergot. Medium lodging resistance. Very high yield. Satisfactory milling. Disadvantages—Low protein percent and test weight.

VARIETIES NOT ADEQUATELY TESTED

Centa—Released by South Dakota Agricultural Experiment Station in 1982. Awned, very early, medium height. Resistant to stem rust. Medium yield and high test weight. Medium protein. Satisfactory milling and baking characteristics. Disadvantages—Susceptible to lodging and moderately susceptible to leaf rust and loose smut.

Erik—Released by North American Plant Breeders in 1983. Seed sale regulated by U.S. Variety Protection Act. Awned, late to midseason, semidwarf. Moderately resistant to stem and leaf rust. Good lodging resistance. High yield. Low to medium protein percent. Disadvantages—Moderately susceptible to loose smut and mildew. Low test weight.

Oslo—Released by North American Plant Breeders in 1981. Seed sale regulated by U.S. Variety Protection Act. Awned, early, semidwarf. Moderately resistant to stem rust and moderately tolerant of ergot. Good lodging resistance. Very high yield. Satisfactory milling. Disadvantages—Low protein percent and bake absorption. Moderately susceptible to leaf rust and loose smut. Low percent vitreous kernels and test weight.

PR2360—Released by Pioneer Hi-Bred in 1981. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Medium lodging resistance. Very high yield and test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption.

2369—Released by Pioneer Hi-Bred in 1983. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Moderately resistant to stem rust and tolerant to loose smut. High yield and test weight. Low to medium protein percent. Disadvantages—Susceptible to leaf rust. Moderately susceptible to lodging.

Victory 283—Sold exclusively by Dakota Oat Processors in 1983. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason to early, medium height. Medium yield and high test weight. Medium protein percent. Disadvantages—Susceptible to leaf rust and moderately susceptible to stem rust, loose smut, and lodging. Low flour yield.

OTHER VARIETIES

Alex—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1981. Awnless, midseason, medium height. Resistant to leaf rust. Medium yield and high test weight. High protein percent. Satisfactory milling and baking. Disadvantages—Moderately susceptible to lodging, ergot, stem rust, and loose smut.

Angus—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1978. Awned, bronze chaff, midseason, semidwarf. Resistant to stem and leaf rust. Tolerant of ergot, tan spot, and moderately tolerant of loose smut. Good lodging resistance. Medium yield and high test weight. Medium protein percent. Satisfactory milling and baking. Disadvantages—Susceptible to bacterial leaf blight and moderately susceptible to shattering and black chaff.

Chris—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1965. Awnless, midseason, medium height. Resistant to stem rust but ranges from resistant to moderately susceptible to leaf rust. Tolerant of ergot and moderately tolerant of loose smut. Medium test weight and high protein percent. Satisfactory milling and baking. Disadvantages—Susceptible to lodging. Low yield.

Coteau—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1978. Awned, midseason to late, medium height. Resistant to stem and leaf rust. High test weight. Very high protein percent. Satisfactory milling and baking. Disadvantages—Moderately susceptible to ergot, loose smut, and lodging. Low yield.

Kitt—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1975. Awned, midseason to late, semidwarf. Resistant to stem and leaf rust. Tolerant of tan spot and ergot. High yield and medium protein percent. Satisfactory milling and baking. Disadvantages—Low test weight, moderately susceptible to loose smut, shattering, and lodging.

Olaf—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1973. Awned, midseason, semidwarf. Resistant to stem rust. Moderately tolerant of ergot. Good lodging resistance. Medium yield and low test weight. Medium protein percent. Satisfactory milling. Disadvantages—Susceptible to tan spot. Moderately susceptible to loose smut, leaf rust, and shattering. Tendency to have long and strong dough mixing requirements.

Wared—Released by Washington Agricultural Experiment Station and USDA-ARS in 1974. Selected at the Minnesota Agricultural Experiment Station. Awned, midseason to late, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Tolerant of loose smut and ergot. Good lodging resistance. Medium yield and test weight. Satisfactory milling. Disadvantages—Low protein percent. Low bake absorption. Because of later maturity, less suitable for late seeding in southern Minnesota.

World Seeds 1809—Released by World Seeds, Inc. in 1970. Seed sale regulated by U.S. Variety Protection Act. Awnless, very

early, semidwarf. Resistant to stem rust and tolerant of ergot. Good lodging resistance. Medium test weight and protein percent. Satisfactory milling and baking. Disadvantages—Susceptible to loose smut and tan spot. Moderately susceptible to leaf rust. Low yield.

Walera—Released by Northrup King Co. in 1980. Seed sale regulated by U.S. Variety Protection Act. Awned, late to midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Moderately resistant to loose smut and ergot. Good

lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption.

711—Released by Northrup King Co. in 1980. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Resistant to stem rust. Moderately tolerant to loose smut. Good lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Moderately susceptible to leaf rust, ergot, and tan spot. Low protein percent and bake absorption.

Table 33. Yield of hard red spring wheat varieties in bushels per acre, 1981-83

Variety	Crookston	Stephen	Roseau ¹	Northern average	St. Paul ¹	Morris ²	Lamberton ³	Waseca ¹	Southern average	State average
Butte	48	51	40	47	46	48	44	49	47	47
Era	53	52	37	49	45	51	33	41	44	46
Len	48	50	38	46	41	44	40	41	42	44
Marshall	55	56	46	53	48	50	40	45	46	50
Solar	55	53	41	51	45	51	35	46	45	48
Wheaton	58	59	43	55	46	52	41	47	47	51
Alex	50	51	37	47	38	47	41	45	43	45
Angus	54	42	41	46	46	47	38	39	43	45
Centa	45	48 ⁴	36	44	38	43	39	44	41	43
Chris	34	35	39	36	31	42	28	35	35	35
Coteau	42	48	42	44	36	42	32	40	39	41
Erik	55	55 ⁴	37	51 ⁴	35	49	37	51	44	47 ⁴
Kitt	50	51	42	48	43	46	37	42	43	46
Olaf	45	49	37	44	41	47	36	40	42	43
Oslo	55	52	41	50	45	49	42	42	45	48
PR2360	51	57 ⁴	43	51 ⁴	43	47	38	47	44	48 ⁴
Victory 283	44 ⁴	49 ⁴	36	44	38	—	41	43	—	—
Walera	53	53	41	50	46	49	34	45	45	47
Wared	50	49	39	47	42	48	33	40	42	45
World Seeds 1809	46	40	35	41	40	44	35	38	40	41
2369	54 ⁴	55 ⁴	45	52	50	—	39	47	—	—
711	52	52	43	50	49	50	32	42	45	47
LSD 5%	7	9		5	9	6	7		4	3

¹1982-83. ²1981, 1983. ³1982. ⁴1982-83 data adjusted to 3-year average.

Table 34. Characteristics of hard red spring wheat varieties, 1981-83

Variety	Heading (June)	Height (inches)	Lodging (score) ¹	Rust reaction ²		Seeds/pound (number)	Test weight/bushel (pounds)	Wheat protein (percent) ³	Milling and baking quality
				leaf	stem				
Butte	28	36	3.7	S	R	13,400	61.3	14.6	med.-high
Era	34	31	2.3	MR	R	15,700	60.2	13.2	low-med.
Len	31	32	1.6	MR	R	13,400	59.7	15.0	high-med.
Marshall	33	30	1.5	R	R	14,600	60.8	13.5	med.-low
Solar	35	31	2.1	MR	R	14,600	59.8	13.1	low
Wheaton	31	30	2.0	R	R	13,000	58.5	13.2	low-med.
Alex	31	37	3.3	R	MS	13,200	60.7	15.0	high-med.
Angus	32	32	1.9	R	R	13,200	60.2	14.9	med.
Centa	27	35	4.5	MS	R	15,100	61.0	14.4	high-med.
Chris	32	38	4.8	MR	MR-R	15,700	59.7	15.8	v. high
Coteau	33	37	3.0	R	R	14,600	60.2	16.1	high
Erik	34	32	1.9	R-MR	MR-MS	15,100	58.7	13.7	low-med.
Kitt	34	31	2.3	R	R	13,200	57.9	14.9	med.
Olaf	32	32	1.9	MS	R	13,000	58.9	14.8	med.-low
Oslo	29	31	1.8	MS	MR	14,200	58.6	13.4	low-med.
PR2360	32	32	2.2	MR	R	14,600	60.0	13.4	low-med.
Victory 283	30	37	3.4	S	MS	14,200	61.0	14.3	low-med.
Walera	35	31	1.9	MR	R	14,600	59.5	13.0	low
Wared	35	32	1.9	MR	R	15,700	59.9	13.7	med.-low
World Seeds 1809	27	28	1.8	MS	R	15,100	59.6	14.8	med.
2369	31	31	2.8	S	MR-MS	13,000	60.8	13.8	low-med.
711	31	32	1.7	MS	R	14,200	60.0	13.5	med.-low

¹1 = erect, 9 = flat. ²Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. ³14% moisture basis.

WINTER WHEAT

Cultural practices have an effect on winter survival of all winter wheats. Planting into a firm seedbed with some stubble remaining to retain snow cover can reduce winterkill.

RECOMMENDED VARIETIES

Rose—Awned, medium height, winterhardy, medium maturity and good lodging resistance. Moderately susceptible to leaf rust and resistant to stem rust. High yield and test weight. Satisfactory quality. Released by South Dakota Agricultural Experiment Station in 1981.

Roughrider—Awned, tall, winterhardy, medium maturity and fair lodging resistance. Susceptible to leaf rust but resistant to stem rust. High yield and test weight. Released by the North Dakota Agricultural Experiment Station in 1975.

OTHER VARIETIES

Brule—Awned, early, semidwarf with good lodging resistance. Winterhardiness is not satisfactory. Moderately susceptible to leaf rust and moderately resistant to stem rust. High yield and low test weight. Satisfactory quality. Released by Nebraska Agricultural Experiment Station and USDA-ARS in 1982. Seed sale regulated by U.S. Variety Protection Act.

Eklund—Awnless, tall, late and poor lodging resistance. Susceptible to leaf and stem rust. Medium yield and test weight. Satisfactory quality. Seed was available in 1976. Seed sale regulated by U.S. Variety Protection Act.

Froid—Awned, tall, winterhardy, medium maturity, and poor lodging resistance. Moderately resistant to stem rust and susceptible to leaf rust. High yield and medium test weight. Satisfactory

milling and baking characteristics. Released by Montana Agricultural Experiment Station in 1968.

Gent—Awned, early, medium height and fair lodging resistance. Winterhardiness lower than Minter and Winoka. Moderately resistant to leaf rust and resistant to stem rust. Low yield and medium test weight. Satisfactory quality. Developed at Hays, Kansas, but tested and released by South Dakota Agricultural Experiment Station in 1974.

Minter—Awned, tall, winterhardy, and poor lodging resistance. Moderately susceptible to leaf and moderately resistant to stem rust. Medium yield and high test weight. Satisfactory quality. Released by the Minnesota Agricultural Experiment Station and USDA-ARS in 1949.

Nell—Awned, early, medium height, and good lodging resistance. Medium winterhardiness. Susceptible to leaf rust and resistant to stem rust. Medium yield and high test weight. Released by South Dakota Agricultural Experiment Station in 1981.

Norstar—Awned, tall, winterhardy and fair lodging resistance. Susceptible to leaf and stem rust. High yield and test weight. Satisfactory quality. Licensed by Agriculture Canada in 1978.

Sundance—Awned, tall, winterhardy, and fair lodging resistance. Susceptible to leaf and stem rust. Medium yield and low test weight. Satisfactory quality. Licensed by Agriculture Canada in 1971.

Winoka—Awned, tall, winterhardy, medium maturity and fair lodging resistance. Susceptible to leaf rust and moderately resistant to stem rust. Severe leaf necrosis in certain years. Medium yield and high test weight. Satisfactory quality. Reselection from Winalta by South Dakota Agricultural Experiment Station in 1968.

Table 35. Characteristics of winter wheat varieties, 1981-83

Variety	Heading (June)	Height (inches)	Winter survival (percent)	Lodging (score) ¹	Rust reaction ²		Test weight/ bushel (pounds)	Yield/acre (bushels)				Average
					leaf	stem		Rosemount ³	Morris	Crookston	Roseau ⁴	
Rose	14	36	80	1.2	S-MS	R	62.0	38	49	47	34	44
Roughrider	16	40	90	1.6	S	R	61.6	38	49	43	35	43
Brule	14	35	56	1.2	MS-S	MR	58.9	41	51	48	35	46
Eklund	19	45	88	2.5	S	S	59.0	29	47	40	32	39
Froid	18	43	93	2.7	S	MR	60.7	34	51	40	38	42
Gent	10	36	61	1.5	MR	R	60.5	41	39	38	30	37
Minter	18	44	87	2.8	MS	MR	62.1	34	46	37	40	41
Nell	12	37	73	1.2	S	R	61.1	34	40 ⁵	39	34	38
Norstar	19	44	90	1.9	S	S	60.3	33	51	44	36	43
Sundance	19	43	81	2.7	S	S	57.0	31	50	43	31	41
Winoka	16	41	65	1.8	S	MR	61.7	37	43	41	33	39
LSD 5%								8		5		

¹1 = erect, 9 = flat. ²Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.
³1982. ⁴1981 and 1983. ⁵1982 and 1983 data adjusted to a 3-year average.

WILD RICE

Cultivated wild rice is grown on 18,000 acres in Minnesota. Most wild rice is produced from varieties with nonshattering tendency, but some fields are still producing shattering types. No recommendations regarding specific varieties are made. Because of the likelihood of preharvest losses due to high winds, storms, blackbird damage, and killing frost before varietal maturity,

growers should favor early to medium maturing varieties. All varieties shatter to some extent and are lodging and disease susceptible.

VARIETIES

Johnson—Tall, late maturity, and low to medium yield if the variety matures before frost. Seed made available by Algot Johnson in 1969.

K2—Medium height, early to medium maturity, and medium to high yield. Developed by Kosbau Bros. in 1972.

M3—Medium height, medium to late maturity, and high yield. Diverse in plant and panicle type. Developed by Manomin Development Co. in 1974.

Netum—Medium height, early maturity, and low to medium

yield. Because of its earlier maturity, it frequently will produce higher yields than M3 and Johnson. Developed by Minnesota Agricultural Experiment Station and released in 1978.

Voyager—Short to medium height, early maturity, and medium to high yield. Should equal or exceed K2 in yield and mature a few days earlier. Developed by Minnesota Agricultural Experiment Station and released in 1983.

Table 36. Characteristics of wild rice varieties

	Yield/acre (pounds) ¹		1981-1982			Seeds per pound ³
	1982 ²	1981-83	Heading (July)	Harvest (August)	Height (inches)	
Johnson	1020	1244	19	27	78	—
K2	1357	1509	17	21	71	7300
M3	1440	1607	19	25	73	—
Netum	1478	1525	11	18	68	8300
Voyager	1623	1697	9	16	65	8600
LSD 5%	126	127	2	—	5	

¹Adjusted green weight of grain at 40% moisture. ²1983 data from fall plantings at Grand Rapids and Waskish, and spring plantings at Grand Rapids and Excelsior. ³Seeds per pound based on wet, stored seed.

WINTER RYE

Spring rye varieties are not recommended because they yield much less than recommended winter ryes.

RECOMMENDED VARIETIES

Hancock—High yield, fair winterhardiness, medium late, medium height, and good lodging resistance. Large seed of predominantly tan color and high test weight. Originated by Wisconsin Agricultural Experiment Station from crosses involving Von Lochow and Wisconsin synthetics of tan seed color. Released in 1979.

Musketeer—High yield, good winterhardiness, medium late, medium height, and poor lodging resistance. Large seed of green color and medium test weight. Originated by Agriculture Canada, Swift Current, from crosses of Harrach, Petkus, and Dakold. Licensed in 1980. Production of certified seed limited to Canada.

Rymin—High yield, fair winterhardiness, medium late, medium height. Good lodging resistance. Large seed of predominantly greenish-gray color and high test weight. Originated by Minnesota Agricultural Experiment Station from a cross of Von Lochow and WR5. Released in 1973.

OTHER VARIETIES

Animo—Medium yield, poor winterhardiness, late, medium height, and good lodging resistance. Large seed of green color and

low test weight. Released by Cebeco-Handelsraad of the Netherlands. Licensed in Canada in 1979. Seed obtained from Minas Seed Co-operative Limited, Canning, N.S.

Aroostook—Low yield, good winterhardiness, very early, tall, and poor lodging resistance. Small seed of brown and tan color and low test weight. Selected from Balbo by USDA Soil Conservation Service in New York. Released by USDA, Cornell University, and Maine Department of Agriculture in 1981.

Cougar—Medium yield, winterhardy (only fair hardiness in eastern Minnesota trials), late, medium height. Fair lodging resistance. Small seed of green and tan color, and medium test weight. Originated by University of Manitoba from an open-pollinated selection in a composite cross of European and Canadian varieties. Licensed in 1967.

Puma—Medium yield, good winterhardiness, medium late, medium height. Poor lodging resistance. Small seed of predominantly green color and medium test weight. Winterhardy selection from Dominant by University of Manitoba. Licensed in 1972.

Von Lochow—Medium yield, fair to poor winterhardiness, medium late, medium height. Good lodging resistance. Large seed of predominantly green color and high test weight. Obtained from F. Von Lochow-Petkus Ltd. of Germany in 1958. Released by Minnesota Agricultural Experiment Station in 1964.

Table 37. Yields of winter rye varieties in bushels per acre

Variety	Rosemount 1981-83	Becker 1982-83	Morris 1982-83	Crookston 1982-83	Grand Rapids 1982-83	Average 11 trials
Hancock	60	39	58	60	47	53
Musketeer	58	41	60	68	46	55
Rymin	59	45	60	67	49	56
Animo	53 ¹	40	55	49	35	47
Aroostook	42 ¹	37	43	35	33	38
Puma	49	39	55	61	47	50
LSD 5%	3	8	5	7	6	3

¹1982-83.

Table 38. Characteristics of winter rye varieties, average 5 locations

Variety	Winterkill (percent)	Heading (date)	Mature (July)	Lodging (score) ¹	Height (inches)	Seeds/pound (number)	Test weight/ bushel (pounds)
Hancock	3	5-31	21	2.5	55	15,600	55.7
Musketeer	2	5-30	20	3.2	53	16,200	55.6
Rymin	2	5-31	20	2.9	52	16,200	56.2
Animo	18	6-4	23	2.1	52	15,600	54.8
Aroostook	2	5-24	16	4.4	56	19,700	54.7
Puma	2	5-30	21	3.8	56	18,100	55.6

¹1 = erect, 9 = flat.



Musketeer, the newest and most winterhardy of the recommended rye varieties, and plot coordinators G. O. Titrud and W. G. Connolly at the Sand Plain Research Farm.

PLANTING RATE AND DATE

Rates are based on normal seedbeds and on normal size, good quality seed. Rates used will vary greatly depending on seed cost, desired stand, expected mortality, emerging ability, seed weight, seed germination, seedbed condition, depth of planting, and planting equipment.

Crop	Bushel weight (pounds) ¹	Seeds/pound (number)	Rate/acre (pounds)	Rate (seeds)	Date
Barley	48	14,300	85	28/square foot	Early spring
Corn	56	1,400	17	24,000/acre	Late April or early May
Fieldbean Black turtle soup	60	2,300	35	78,000/acre	May 20 to June 15
Great northern		1,000	75	78,000/acre	
Kidney		900	90	80,000/acre	
Navy		2,500	30	78,000/acre	
Navy 6- to 14-inch rows			60	155,000/acre	
Pink		1,700	45	78,000/acre	
Pinto		1,300	60	78,000/acre	
Small Red		1,400	55	78,000/acre	
Small White		3,000	25	78,000/acre	
Flax	56	88,000	42	85/square foot	April 15 to May 15
Forage Grasses (perennial)	If mixed with legume, sow at time indicated for the legume.				
Bromegrass alone	14	136,000	16	50/square foot	Early spring or summer
in mixtures			10	31/square foot	
Orchardgrass in mixtures	14	653,000	2	30/square foot	Early spring or summer
Reed canarygrass alone	46	526,000	7	85/square foot	Early spring or summer
in mixtures			5	60/square foot	
Tall fescue in mixtures	25	229,000	4	21/square foot	Early spring or summer
Timothy in mixtures	45	1,234,000	3	85/square foot	Early spring or summer
Forage Legumes (perennial)					
Alfalfa alone	60	199,000	11	50/square foot	Early spring to August 10
with grass			7	32/square foot	
Alsike clover in mixtures	60	653,000	2	30/square foot	Early spring to August 10
Birdsfoot trefoil alone	60	372,000	7	60/square foot	Early spring or summer
with grass			4	34/square foot	
Ladino clover in mixtures	60	784,000	1	18/square foot	Early spring to August 10
Red clover alone	60	252,000	9	50/square foot	Early spring to August 10
with grass			5	30/square foot	
Oat	32	15,200	80	28/square foot	Early spring
Rye	56	18,200	60	25/square foot	September
Sorghum 18- to 40-inch rows	56	15,000	10	150,000/acre	May 20 to June 5 for grain
6- to 14-inch rows			15	5/square foot	
Soybean 6- to 8-inch rows	60	2,800	80	3/foot of row	May 5 to May 25
20-inch rows			65	7/foot of row	
30-inch rows			55	9/foot of row	
40-inch rows			50	11/foot of row	
Sunflower Nonoilseed	24	4,300	4	17,000/acre	May 1 to June 15
Oilseed	27	7,700	3	23,000/acre	
Wheat Durum	60	12,100	90	25/square foot	Early spring
Hard red spring		15,200	80	28/square foot	Early spring
Winter		14,500	75	25/square foot	August 20 to September 20
Other Crops					
Adzuki	60	3,500	25	78,000/acre	May 20 to June 10
Annual canarygrass	50	58,000	30	40/square foot	Early spring
Buckwheat	48	14,900	50	17/square foot	June 15 to July 20
Fieldpea	60	2,300	180	9/square foot	Early spring
With 1½ to 2 bushels of oat			70	4/square foot	
Fababean-medium size	60	1,300	180	5/square foot	Early spring
With 2 bushels of oat			60	2/square foot	
Lentil-small	60	15,600	55	20/square foot	Early spring
Lupine 6- to 8-inch rows	60	1,500	170	6/square foot	Early spring
30-inch rows			70	6/foot of row	
Millet Foxtail	48	218,000	15	75/square foot	June 15 to July 15
Proso	56	65,000	20	30/square foot	June 15 to July 15
Mustard	56	84,000	13	25/square foot	May
Rape Forage	50	145,000	6	20/square foot	Early spring with oat
Oilseed	50	136,000	8	25/square foot	May
Sudangrass 18- to 40-inch rows	40	44,000	10	25/foot of row	May 20 to June 10
6- to 14-inch rows			20	20/square foot	
Sweetclover	60	240,000	10	55/square foot	Early spring
Wild rice (wet)	25	7,900	33	6/square foot	Late fall

¹U.S. legal if established. If not established, weight given is that most widely accepted in the United States.

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