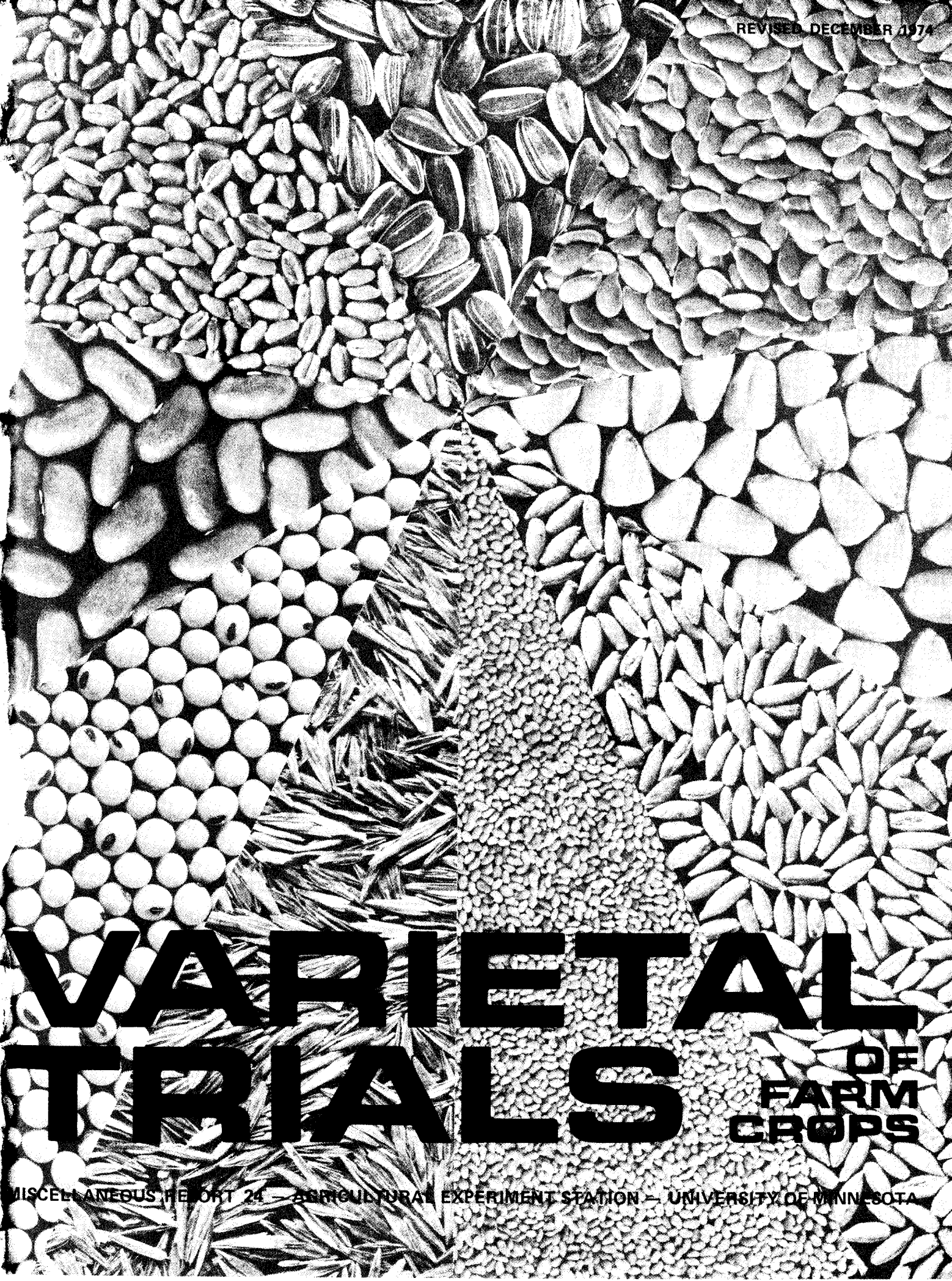

REVISED DECEMBER 1974

VARIETAL TRIALS OF FARM CROPS

MISCELLANEOUS REPORT 24 — AGRICULTURAL EXPERIMENT STATION — UNIVERSITY OF MINNESOTA

VARIETAL TRIALS OF FARM CROPS

Successful crop production depends to a considerable extent on selecting the best varieties for a particular farm.

To provide a basis for the selection of varieties, the Minnesota Agricultural Experiment Station compares varieties in trial plots. These trials are conducted on the Agricultural Experiment Stations at St. Paul, Rosemount, Waseca, Lamberton, Morris, Crookston, Grand Rapids, and Elk River, and on farmers' fields.

Recommended varieties, 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.

On the basis of these comparative trials, the list of varieties recommended for use in Minnesota is revised each year by the Experiment Station Crop Variety Review Committee.

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.

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.

For crops where recommendations are made, varietal descriptions are arranged in order of "recommended varieties," "varieties not adequately tested," and "other varieties," and in alphabetical order within each group.

Recommended varieties have performed better than other varieties in important characteristics in comparative tests. A variety usually is not eligible for recommendation until it has been tested in Minnesota for at least 3 years. New varieties from other public experiment stations and private plant breeders but not sufficiently evaluated here are listed as "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.

These trials are designed for variety and not crop (species) comparisons, because the various crops were 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 birdsfoot trefoil, red clover, bromegrass, orchardgrass, timothy, and reed canarygrass reported in the following sections are given in 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 (or multiply by 1.2). To convert to haylage yield at 55 percent moisture (45 percent dry matter), divide by 0.45 (or multiply by 2.2).

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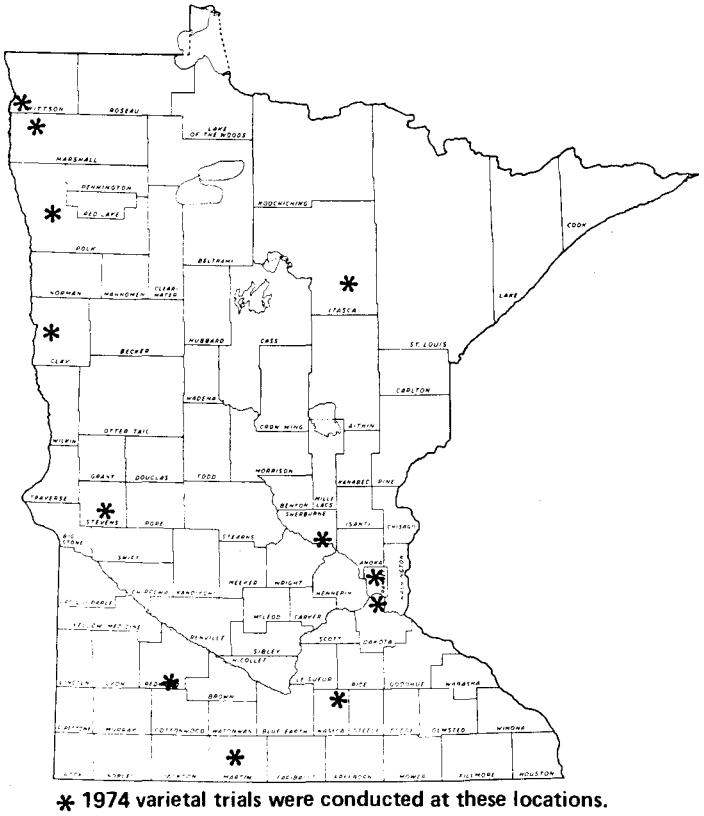


* 1974 varietal trials were conducted at these locations.

The use of certified seed of recommended varieties is suggested. Varieties eligible for certification by the Minnesota Crop Improvement Association include varieties recommended by the Minnesota Agricultural Experiment Station, certain new varieties not adequately tested in Minnesota, and certain nonrecommended varieties. 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 1975 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul, Minnesota 55101, or from county extension agents' offices.

Authors of the following sections are: barley, D.C. Rasmusson; oats, D.D. Stuthman and L.W. Briggle; hard red spring, durum, and winter wheat, R.E. Heiner; rye, millet, annual canarygrass, grain sorghum, buckwheat, field peas, field beans, and sunflowers, R.G. Robinson; corn, J.L. Geadelmann and R.H. Peterson; flax, V.E. Comstock; soybeans, J.W. Lambert; alfalfa, birdsfoot trefoil, and red clover, D.K. Barnes and F.I. Frosheiser; and bromegrass, orchardgrass, reed canarygrass, and timothy, A. Hovin. Extension agronomists H.J. Otto and R.L. Thompson also participated in preparing this publication.

Information on the reaction of varieties to specific pathogens was largely obtained by the following members of the Department of Plant Pathology: F.I. Frosheiser, alfalfa; B.W. Kennedy, soybeans; D.V. McVey, wheat; A.P. Roelfs, barley, oats, and wheat; P.G. Rothman, oats; R.D. Wilcoxson, barley, wheat, and oats.

Field work of the variety trials at Waseca, Lamberton, Morris, Crookston, and Grand Rapids was supervised by W.E. Lueschen, J.H. Ford, D.D. Warnes, L.J. Smith, and D.L. Rabas, respectively.

BARLEY

RECOMMENDED VARIETIES

Beacon – Outstanding in yield at Morris and Crookston in 1972, but leaf rust was severe in the nurseries. In 1973 and 1974 it ranked below other recommended varieties in yield. Resistant to prevalent leaf spotting diseases, stem rust, and loose smut. Early, with good resistance to lodging. Classified as a malting variety by Malting Barley Improvement Association (MBIA). Six-row, rough-awn, short rachilla hairs, and a colorless aleurone. Developed by North Dakota Agricultural Experiment Station from a cross between Conquest and Dickson.

Bonanza – Slightly higher yield than Conquest, but later maturing. Resistant to loose smut. Classified as a malting variety by MBIA. Six-row, semi-smooth awn, long rachilla hairs, blue aleurone. Developed by Agriculture Canada, Brandon, from a cross involving Vantage, Jet, Vantmore, Parkland, and Conquest. Licensed in 1970.

Conquest – Medium yield, good lodging resistance. Resistant to loose smut. Classified as a malting variety by MBIA. Six-row, smooth-awn, long rachilla hairs, blue aleurone. Developed by Agriculture Canada, Brandon, from crosses involving Vantage, Jet, Vantmore, Br. 4635-4456, UM 570, and Parkland. Released in 1965.

Cree – High yield. Similar to Larker in maturity and lodging reaction. Resistant to loose smut, and moderately resistant to spot blotch. Kernel plumpness similar to Dickson. Classified as a nonmalting variety by MBIA. Recommended for feed purposes only. Six-row, rough-awn, colorless aleurone. Short rachilla hairs. Developed at the Minnesota Agricultural Experiment Station from crosses involving Traill, Br. 5750-2 and Dickson. Released in 1972.

Larker – Medium yield. Susceptible to loose smut and leaf spotting diseases. Excellent kernel plumpness. Classified as a malting variety by MBIA. Six-row, semi-smooth awn, long rachilla hairs, colorless aleurone. Developed by North Dakota Agricultural Experiment Station from a cross of Traill and a selection from UM 570. Released in 1961.

Manker – Higher yield than recommended malting varieties. Slightly earlier and more resistant to lodging than Larker. Kernel plumpness intermediate to Beacon and Larker. Leaf spotting resistance equal to Beacon. Susceptible to loose smut. Malting quality status undetermined. Six-rowed, rough awned, colorless aleurone. Short rachilla hairs. Resulted from cross involving Cree, M2, Vantage, Kindred, and Jotun. Released by the Minnesota Agricultural Experiment Station in 1974.

Nordic – High yield. Taller than Larker, but similar in lodging resistance. Resistant to leaf spotting diseases, including Septoria leaf blotch. Classified as a nonmalting variety by MBIA. Recommended for feed purposes only. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Developed by North Dakota Agricultural Experiment Station from crosses of Dickson, CI 4738, Traill, and UM 570. Released in 1971.

OTHER VARIETIES

Burk – Medium yield. Similar to Larker in maturity, height, lodging reaction, and plump kernels. Ranges between Larker and Dickson in resistance to leaf spotting diseases. Not classified as a malting variety by MBIA. Six-row, smooth-awn, long rachilla hairs, colorless aleurone. Developed by Wisconsin Agricultural Experiment Station from a cross of WISC X691-1 and Swan. Released in 1971.

Dickson – Yields similar to Larker except when leaf diseases are present. Resistant to prevalent leaf diseases. Kernel plumpness inferior to Larker. Susceptible to loose smut. Classified as a malting variety by MBIA. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Developed by North Dakota Agricultural Experiment Station from crosses involving Traill, Kindred, and CI 7117-77. Released in 1964.

Manker barley, released in 1974 by the Minnesota Agricultural Experiment Station, is examined by visitors at the crops field day at Crookston.

Prilar – Lower yield than Cree. Height, maturity, lodging reaction, and disease resistance similar to Larker. Malting quality status undetermined. Six-row, smooth-awn, long rachilla hairs, colorless aleurone. Developed at South Dakota Agricultural Experiment Station from a cross of Primus and Larker. Released in 1971.

Primus II – Moderately high yield. Early. Susceptible to prevalent diseases, except stem rust. Good kernel plumpness. Not classified as a malting variety by MBIA. Six-row, smooth-awn, long rachilla hairs, colorless aleurone. Developed by South Dakota Agricultural Experiment Station from crosses of Brandon 3902, Liberty, and Swan. Released in 1966.

Table 1. Yield of barley varieties in bushels per acre, 1971-74

Variety	Morris 6[1]	Crookston 6	Stephen 2	St. Paul 2	Lamberton 2	Average (18 Trials)
Beacon	56	72	38	65	74	62
Larker	54	75	39	66	80	63
Manker	60	73	40	72	76	65
Cree	57	76	46	73	81	67
Nordic	61	72	44	67	68	65
Conquest	57	72	46	59	66	62
Bonanza	56	75	41	67	69	63
LSD 5%	6	5	4	7	9	3

[1] Number of trials.

Table 2. Characteristics of barley varieties[1]

Variety	Heading (June)	Height (inches)	Lodging (percent)	Plump kernels (percent)	Reactions to disease[2] Stem rust	Loose smut	Leaf spotting
Beacon	18	32	28	58	R	R	R
Larker	20	32	34	74	R	S	S
Manker	19	31	23	58	R	S	R
Cree	19	30	38	46	R	R	MR
Nordic	20	32	36	66	R	S	R
Conquest	20	34	26	62	R	R	S
Bonanza	22	34	26	55	R	R	S

[1] Ten trials, except eight for height and three for lodging.
[2] R = resistant, MR = moderately resistant, S = susceptible.

OATS

RECOMMENDED VARIETIES

Chief – Medium maturity, high yield, medium height, good lodging resistance, medium test weight, high groat percentage, yellow seed. Heterogeneous crown rust reaction, resistant to smut. Selected at the South Dakota Agricultural Experiment Station from a cross between Clintland 64 and Garland. Released in 1972.

Dal – Late, high yield, medium height, fair lodging resistance, medium test weight and groat percentage, ivory seed. Resistant to crown rust and smut. Selected at the Wisconsin Agricultural Experiment Station from crosses involving Trispernia, Belar, and Beedee. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

Diana – Early, medium yield, short, good lodging resistance, medium test weight and groat percentage, yellow seed. Susceptible to crown rust. Selected at the Purdue Agricultural Experiment Station from a cross involving several lines. Released in 1970.

Froker – Late, high yield, medium height, good lodging resistance, high test weight and groat percentage, yellow seed. Susceptible to crown rust. Selected at the Wisconsin Agricultural Experiment Station from a cross involving sister lines of Beedee and Garland, and a foreign introduction. Released in 1970.

Lodi – Late, high yield, tall, fair lodging resistance, medium test weight and groat percentage, white seed. Susceptible to crown rust. Selected at the Wisconsin Agricultural Experiment Station from crosses involving Richland, Bond, Hawkeye, Garry, and Victoria. Released in 1963.

Otee – Early-medium maturity, short, good lodging resistance, medium test weight and groat percentage, white seed. Susceptible to crown rust, tolerant to red leaf. Selected from a cross of several lines at the Illinois Agricultural Experiment Station. Released in 1973.

VARIETIES NOT ADEQUATELY TESTED

Goodland – Late, low yield, good lodging resistance, medium test weight and groat percentage, yellow seed. Resistant to crown rust and smut. Selected at the Wisconsin Agricultural Experiment Station from a cross involving several lines, including Garland. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

Korwood – Late, high yield, poor lodging resistance, high test weight and groat percentage, white seed. Moderately susceptible to crown rust and smut. Selected at the Michigan Agricultural Experiment Station from a cross of several lines. Released in 1974.

Noble – Early-medium maturity, medium yield, short, good lodging resistance, medium test weight and groat percentage, yellow seed. Susceptible to crown rust. Selected at the Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

Spear – Medium maturity, high yield, good lodging resistance, high test weight, medium groat percentage, white seed. Susceptible to crown rust and moderately resistant to smut. Selected at the South Dakota Agricultural Experiment Station from a cross between Neal and Clintland 64. Released in 1974.

Stout – Early-medium maturity, medium yield, short, good lodging resistance, medium test weight, high groat percentage, white seed. Some resistance to crown rust. Selected at the Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

OTHER VARIETIES

Astro – Medium maturity, high yield, short, medium lodging resistance, low test weight and groat percentage, white seed. Susceptible to crown rust. Selected from Orbit at the Cornell Agricultural Experiment Station. Released in 1973.

Cayuse – Late, high yield, short, fair lodging resistance, low test weight and groat percentage, white seed. Susceptible to crown rust. Selected at the New York Agricultural Experiment Station but released from the Washington Agricultural Experiment Station from the cross Craig x Alamo. Released in 1966.

Garland – Medium maturity and yield, short, fair lodging resistance, high test weight and groat percentage, yellow seed.

Susceptible to crown rust. Selected at the Wisconsin Agricultural Experiment Station from crosses involving Clintland, Garry, Hawkeye, and Victoria. Released in 1962.

Grundy – Early, medium yield, short, poor lodging resistance, high test weight and groat percentage, yellow seed. Susceptible to crown rust. Selected at the Iowa Agricultural Experiment Station from the cross Clintland x Garry-5. Released in 1971. Seed sale regulated by U.S. Variety Protection Act.

Harmon – Late, medium yield, tall, poor lodging resistance, low test weight and groat percentage, white seed. Susceptible to crown rust. Selected in Canada from crosses involving several lines. Licensed in 1965.

Holden – Medium maturity, high yield, medium height, good lodging resistance, high test weight and medium groat percentage, yellow seed. Susceptible to crown rust. Selected at the Wisconsin Agricultural Experiment Station from the same cross as Garland. Released in 1966.

Table 3. Yield of oat varieties in bushels per acre, 1972-74

Variety	Rosemount	Waseca	Lamberton	Morris	Crookston	Grand Rapids	Average
E72, 73 or 74	75	85	82	73	77	64	76
Diana	82	84	94	66	85	72	81
M72 and 73	90	87	76	76	79	72	80
Otee	82	93	82	70	81	74	80
Garland	82	89	79	67	87	86	82
Noble[1]	86	102	94	79	95	78	89
Chief	93	102	89	75	88	75	87
Otter	92	98	73	75	91	82	85
Spear[2]	95	94	92	70	82	68	83
Stout[1]	94	102	90	74	92	70	87
Portal	88	94	87	72	86	76	84
Goodland[2]	92	82	73	65	65	60	73
Korwood[2]	85	105	80	72	97	81	87
Astro[1]	86	103	82	77	91	76	86
Lodi	86	92	79	71	104	80	85
Froker	92	98	89	77	93	75	87
Mariner[3]	80	100	90	74	95	82	87
Dal[3]	84	99	82	75	88	81	85
LSD 5%	7	8	8	8	6	9	3

[1] 1973-74 only. [2] 1974 only. [3] Grand Rapids and Crookston only in 1972.

Table 4. Characteristics of oat varieties, 1972-74

Variety	Heading (date)	Height (inches)	Lodging (score)[1]	Test weight/bushel (pounds)	Groat (percent)	Groat protein[2] (percent)	Protein/acre (pounds)[2]	Reactions to disease[3]	
								Crown rust	Smut (percent)
E72, 73 or 74	6-22	35	2.0	39	73	18.7	339	R,MS	30
Diana	6-24	35	2.2	36	71	20.3	410	S	25
M72 and 73	6-25	37	2.5	37	74	19.6	376	S,HR	30
Otee	6-25	35	2.2	36	71	20.9	412	S	15
Garland	6-25	33	2.6	36	73	19.2	386	S	2
Noble[2]	6-26	34	2.0	36	70	19.1	398	S	2
Chief	6-26	36	2.2	36	74	19.2	406	S	20
Otter	6-26	35	2.1	35	73	17.0	346	MS	0
Spear[4]	6-26	36	1.7	36	71	20.3	401	S	20
Stout[2]	6-26	31	1.7	36	73	18.8	396	MS-S	10
Portal	6-27	37	2.6	36	73	17.9	360	S	30
Goodland[4]	6-29	35	2.3	36	72	21.4	373	MR	0
Korwood[4]	6-29	37	3.1	37	73	18.3	358	MS	40
Astro[2]	6-30	33	2.3	33	68	18.7	357	S	0
Lodi	6-30	42	2.5	35	70	18.6	377	S	6
Froker	6-30	38	2.3	37	73	18.7	384	S	50
Mariner	6-30	36	2.8	37	71	18.8	385	S	6
Dal	7-1	37	2.7	36	72	20.3	400	HR	0

[1] One erect, five flat. [2] 1973-74 only.
[3] 1974 only. For crown rust, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible; letters separated by commas indicate both kinds of plants in the variety. For smut, numbers indicate percentage susceptible plants in smut nursery.
[4] 1974 only.

Iowa Early Multiline Blend (E72, E73, E74) – Early, medium yield, short, good lodging resistance, high test weight and groat percentage, yellow seed. Heterogeneous crown rust reaction, susceptible to some races of smut. The recurrent parent is CI 7970. Developed at the Iowa Agricultural Experiment Station and originally released in 1968.

Iowa Midseason Multiline Blend (M72, M73) – Medium maturity, high yield, medium height, fair lodging resistance, high test weight and groat percentage, yellow seed. Heterogeneous reaction to crown rust, susceptible to some races of smut. The recurrent parent is CI 7555, a Clintland type. Developed at the Iowa Agricultural Experiment Station and originally released in 1968.

Mariner – Late, high yield, medium height and lodging resistance, high test weight, medium groat percentage, tan seed. Susceptible to crown rust, resistant to smut. Selected by the Michigan Agricultural Experiment Station from a cross between Garry and a Michigan selection. Released in 1972.

Otter – Medium maturity, high yield, short, good lodging resistance, medium test weight and high groat percentage, white seed. Some resistance to crown rust. Selected at the Minnesota Agricultural Experiment Station from crosses involving several lines. Released in 1970.

Portal – Medium-late maturity, high yield, medium height, fair lodging resistance, high test weight and groat percentage, yellow seed. Some resistance to crown rust. Selected at the Wisconsin Agricultural Experiment Station from the cross PI 174544 x Garland. Released in 1966.

Random – Late, medium yield and height, fair lodging resistance, low test weight and groat percentage. Susceptible to crown rust and smut. Selected in Canada from a cross between Glen and Pendek. Licensed in 1971.

Rodney – Late, medium yield, tall, poor lodging resistance, medium test weight, white seed. Some resistance to crown rust. Selected in Canada from crosses involving Victoria, Hajira, Banner, Victory, and Roxton. Licensed in 1952.

Sioux – Late, high yield, medium height, poor lodging resistance, low test weight and groat percentage, white seed. Susceptible to crown rust. Selected in Canada from the cross Garry x Rex. Licensed in 1966.

WINTER RYE

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

RECOMMENDED VARIETIES

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 the University of Manitoba from an open-pollinated selection in a composite cross of European and Canadian varieties. Licensed in 1967.

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

Von Lochow – High yield, fair to poor winterhardiness, 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 the Minnesota Agricultural Experiment Station in 1964.

VARIETIES NOT ADEQUATELY TESTED

Kustro – High yield, fair to poor winterhardiness, late, short. Excellent lodging resistance. Large seed of predominantly greenish-gray color and high test weight. Developed in Germany and named about 1970. Licensed in Canada in 1971.

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

OTHER VARIETIES

Coloma – Medium yield, winterhardy, medium maturity, tall. Good lodging resistance. Medium size seed of tan color ("white") and low test weight. Originated by the Wisconsin Agricultural Experiment Station from five selfed plants from crosses of inbred lines of Adams. Released in 1970.

Frontier – Medium yield, very winterhardy, medium maturity, tall. Poor lodging resistance. Small seed of predominantly blue-gray color and high test weight. Developed by Agriculture Canada, Swift Current, from a cross of Dakold 23 and Petkus. Licensed in 1965. *If winterhardiness is of primary concern, grow Frontier instead of the recommended varieties.*

Kodiak – Medium yield, winterhardy, medium maturity, tall. Poor lodging resistance. Medium size seed of light tan color and low test weight. Selected from Sangaste by the University of Alberta. Licensed in 1971.

Table 5. Yields of winter rye varieties in bushels per acre

Variety	Rosemount 1970-74	Morris 1970-74	Grand Rapids 1970-74	Average of 3 locations
Cougar	45	52	43	47
Rymin	57	52	52	54
Von Lochow	58	46	47	50
LSD 5%	3	4	4	2
Coloma[1]	48	42	43	44
Puma[2]	44	47	49	47
Kustro[3]	59	57	34	50

[1] 1971-74. [2] 1973-74. [3] 1974.

Rymin rye at Grand Rapids is shoulder-high to agronomist D.L. Rabas.

Table 6. Characteristics of winter rye varieties, 1970-74

Variety	Winterkill (percent)	Heading (June)	Mature (July)	Lodging (score)[1]	Height (inches)	Weight/100 seeds (grams)	Test weight/bushel (pounds)
Cougar	9	5	24	3.7	49	2.4	54.1
Rymin	6	2	23	2.8	51	2.9	55.6
Von Lochow	11	3	24	3.1	51	2.9	55.6
Coloma	4	1	22	3.0	55	2.6	53.3
Puma	7	3	24	3.7	52	2.4	54.8
Kustro	13	4	25	1.5	48	2.8	56.0

[1] One erect, nine flat.

HARD RED SPRING WHEAT

RECOMMENDED VARIETIES

Era – Awned, midseason to late semidwarf with high lodging resistance. Resistant to stem and leaf rust. Tolerant of Septoria, bunt, and ergot. Very high yield and medium test weight. Milling characteristics are satisfactory. Protein content and bake absorption are low. Selected from crosses involving Frontana, Thatcher, Mida, Kenya 117A, Kenya 58, Lee, Newthatch, Pembina, and Polk "sib." Released by the Minnesota Agricultural Experiment Station in 1970.

Olaf – Awned, semidwarf, medium maturity with high lodging resistance. Resistant to stem and leaf rust. High yield and medium test weight. Protein content and bake absorption are lower than Chris, but better than Era. Tendency to have long dough mixing requirements. Selected from crosses involving Conley, Justin and Waldron. Released by the North Dakota Agricultural Experiment Station in 1973.

World Seeds 1809 – Awnless, early semidwarf with high lodging resistance. Resistant to stem and leaf rust but susceptible to loose smut. High yield and medium test weight. Milling characteristics are satisfactory. Protein content and bake absorption are lower than Chris, but better than Era. Released by World Seeds Inc. in 1970. Seed sale regulated by U.S. Variety Protection Act.

VARIETIES NOT ADEQUATELY TESTED

Bounty 309 – Awned, medium to early maturing semidwarf with high lodging resistance. Moderately susceptible to leaf rust. Moderately resistant to stem rust if planted early; moderately susceptible to stem rust if planted late. Preliminary data show high yield and medium test weight. Insufficient data on milling and baking characteristics. Developed by Cargill, Inc., and approved for certification in 1972. Seed sale regulated by U.S. Variety Protection Act.

Glenlea – Awnless, medium height and maturity with high lodging resistance. Resistant to stem rust, but moderately susceptible to leaf rust. Preliminary data show high yield and medium test weight with very large kernels. Insufficient data on milling and baking characteristics. Developed by the University of Manitoba. Licensed in 1972.

Nowesta – Awned, medium height, maturity, and lodging resistance. Moderately susceptible to leaf rust and moderately resistant to stem rust. Medium to high yield and medium test weight. Insufficient data on milling and baking characteristics. Selected as an individual plant from the variety Waldron. Originated in Drayton, North Dakota.

Prodax – Awned, semidwarf, medium maturity with high lodging resistance. Susceptible to leaf rust, but resistant to stem rust. Preliminary data show high yield and medium to low test weight. Insufficient data on milling and baking characteristics. Developed by Northrup, King & Co. and approved for certification in 1974.

Profit 75 – Awned, early semidwarf with high lodging resistance. Resistant to stem and leaf rust. Preliminary data show high yield and medium test weight. Insufficient data on milling and baking characteristics. Released by World Seeds Inc., Oceanside, California, in 1974. Seed sale regulated by U.S. Variety Protection Act.

Semidwarf Olaf and Era wheat varieties at Crookston are knee-high to agronomists R.E. Heiner and L.J. Smith.

WS 1877 – Awned, early with high lodging resistance. Resistant to moderately susceptible to leaf rust; resistant to stem rust. Medium yield and high test weight. Insufficient data on milling and baking characteristics. Released by World Seeds Inc., Oceanside, California, in 1973.

OTHER VARIETIES

Bonanza – Awned, early maturing semidwarf with high lodging resistance. Resistant to stem and leaf rust. High incidence of necrotic lesions on leaves. High yield and medium test weight. Satisfactory milling characteristics. Protein content and bake absorption are low. Released by DeKalb Agricultural Research in 1970. Seed sale regulated by U.S. Variety Protection Act.

Bounty 208 – Awned, early semidwarf with high lodging resistance. Moderately resistant to leaf and stem rust. Medium yield and low test weight. High incidence of necrotic lesions on leaves. Quality data indicate low in protein and bake absorption. Released by Cargill, Inc. in 1970.

Chris – Awnless, medium height and maturity. Fair resistance to lodging. Resistant to stem rust but ranges from resistant to moderately susceptible to leaf rust. Medium yield and test weight. Milling and baking characteristics are satisfactory. Selected from crosses involving Frontana, Kenya 58, Newthatch, and Thatcher. Released by the Minnesota Agricultural Experiment Station in 1965.

Ellar – Awnless, early, medium height and lodging resistance. Resistant to stem rust and moderately resistant to leaf rust. Medium yield and test weight. Flour yield and wheat

Table 7. Characteristics of spring wheat varieties, 1972-74

Variety	Heading (June)	Plant height (inches)	Lodging (score)[1]	Rust reaction[2] Leaf	Rust reaction[2] Stem	Test weight per bushel (pounds)	Yield, bushels/acre St. Paul	Morris	Crookston	Stephen[3]	Ave.[5]	Milling, baking quality
Hard red spring												
Era	26	28	2.3	R-MR	R	61.7	49	49	58	60	52	Low-med.
Olaf	24	30	2.2	R	R	60.8	47	49	50	58	49	Low-med.
World Seeds 1809	20	27	1.6	R-MR	R	61.2	50	49	42	—	47	Medium
Bonanza	21	27	2.0	R	R	61.7	44	44	46	52	45	Med-low
Bounty 208	22	27	2.2	MR	MR	59.0	42	43	33	42	39	Med-low
Bounty 309[3]	21	29	2.5	MS	MR	60.5	41	43	57	—	47	—
Chris	25	37	4.0	R-MS	R	61.5	37	40	44	49	41	V. high
Ellar	24	33	2.5	MR	R	61.1	40	48	50	—	46	Medium
Fletcher	27	28	2.2	MS	R	60.8	42	40	50	51	44	Medium
Glenlea[4]	25	36	3.3	MS	R	60.5	43	43	54	—	47	Medium
Lark	22	28	2.3	MR	R	60.9	45	43	44	54	44	Low-med.
Nordak	24	37	4.3	R-MS	R	62.0	37	43	49	45	43	Med.-high
Nowesta[3]	23	26	3.5	MS-S	MR	60.2	44	46	58	—	49	—
Polk	25	37	3.8	R-MS	R	63.0	37	38	47	52	41	V. high
Prodax[3]	23	28	2.3	S	R	58.7	43	38	57	—	46	—
Profit 75[4]	22	27	2.3	R	R	61.0	45	42	47	—	45	—
Protor	22	27	2.2	MS	R	61.8	51	50	51	55	51	Low
Red River 68	21	28	1.8	MR	R	62.0	47	44	49	50	47	Low
Waldron	23	35	2.4	R	R	60.5	43	46	50	42	46	High
WS 6	22	27	2.3	R	R	59.5	44	42	44	—	43	Low
WS 1877[3]	21	27	2.3	R-MS	R	62.7	44	43	52	—	46	—
LSD 5%							4	6	4	4	2	
Red durum (Feed wheat)												
WS 3[4]	22	26	2.8	R-MS	MR	59.5	49	46	39	—	45	—
Durum[4]												
Crosby	27	38	2.1	R	R	61.5	—	39	44	—	42	—
Rugby	28	38	1.8	R	R	62.1	—	41	44	—	43	—
Ward	27	37	1.8	MS	R	61.6	—	38	44	—	41	—
Botno	26	36	1.7	MS	R	62.0	—	44	43	—	44	—
Hercules	26	36	2.8	MS	R	60.7	—	38	37	—	38	—
Lakota	27	39	2.1	MS	R	59.3	—	40	44	—	42	—
Leeds	27	38	2.8	MR	R	62.0	—	40	38	—	39	—
Macoun	29	37	2.4	MS	R	59.9	—	34	36	—	35	—
Mindum	29	45	4.5	R	S	63.5	—	36	42	—	39	—
Rolette	25	35	2.7	MS	R	62.8	—	39	42	—	41	—
Wakooma	28	39	2.8	MS	R	60.4	—	35	40	—	38	—
Wells	28	38	3.6	MR	R	61.6	—	37	40	—	39	—
Wascana	28	39	3.5	MR	R	60.2	—	35	42	—	39	—
LSD 5%								6	5		4	

[1] One erect, nine flat. [2] Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.
[3] One year's data. [4] Two years' data. [5] Stephen not included.

protein are lower than Chris but better than Era. Milling and baking characteristics are satisfactory. Selected from crosses involving Waldron, Kenya Farmer, Lee, Mida, and Cadet. Released by the North Dakota Agricultural Experiment Station in 1974.

Fletcher – Awned, midseason to late semidwarf with high lodging resistance. Resistant to stem but moderately susceptible to leaf rust. Tolerant of Septoria, bunt, and ergot. High yield and medium test weight. Milling characteristics are satisfactory. Protein content and bake absorption are lower than Chris, but better than Era. Selected from crosses involving Frontana, Thatcher, Mida, Kenya 117A, Kenya 58, Lee, Newthatch, Pembina, and Polk "sib." Released by the Minnesota Agricultural Experiment Station in 1970.

Lark – Awned, early semidwarf with high lodging resistance. Resistant to stem and leaf rust. Moderately susceptible to black chaff. High yield and medium test weight. Quality data show lower protein and bake adsorption than Chris. Released by World Seeds Inc. in 1971.

Nordak – Awned, medium height and maturity. Fair resistance to lodging. Resistant to stem rust and resistant to moderately susceptible to leaf rust; susceptible to loose smut. Medium yield and test weight. Satisfactory milling and baking quality. Selected as a single plant in a field of durum wheat by A.H. Berg, Barney, North Dakota. Released to farmers in 1971.

Polk – Awned, bronze chaff, medium height and maturity. Medium resistance to lodging. Resistant to stem rust but ranges from resistant to moderately susceptible to leaf rust. Medium yield and high test weight. Satisfactory milling and baking characteristics. Selected from crosses involving

Thatcher, Supreza, Frontana, Kenya 58, and Newthatch. Released by the Minnesota Agricultural Experiment Station in 1968.

Protor – Awned, early semidwarf with high lodging resistance. Resistant to stem and moderately susceptible to leaf rust; susceptible to ergot. High yield and medium test weight. Low milling and baking quality. Selected from the cross of Tobari by Ciano. Released by Northrup, King & Co. in 1972.

Red River 68 – Awned, early, semidwarf with high lodging resistance. Resistant to stem and leaf rust. High yield and test weight. Unsatisfactory milling and baking characteristics. Released by World Seeds Inc. in 1967.

Waldron – Awnless, yellow chaff, early, and medium height. Very lodging resistant. Resistant to stem and leaf rust. Very susceptible to ergot. Susceptible to Septoria. High yield and medium test weight. Satisfactory milling and baking characteristics. Selected from crosses involving Lee, Mida, K338AA, and Justin. Released by the North Dakota Agricultural Experiment Station in 1969.

WS 6 – Awned, early semidwarf with high lodging resistance. Resistant to stem and leaf rust. Medium yield and test weight. Unsatisfactory milling and baking characteristics. Released by World Seeds Inc. in 1973. Seed sale regulated by U.S. Variety Protection Act.

DURUM WHEAT

RECOMMENDED VARIETIES

Crosby – Awned, early, medium height and lodging resistant. Resistant to leaf and stem rust. High yield and medium test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Langdon, ST 464, and Leeds. Released by the North Dakota Agricultural Experiment Station in 1973.

Rugby – Awned, early, medium height with high lodging resistance. Resistant to stem and leaf rust. High yield and medium test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Heiti, Stewart, Carleton, Mindum, and Nugget. Released by the North Dakota Agricultural Experiment Station in 1973.

Ward – Awned, early, medium height and lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield, test, and 1,000 kernel weight. Satisfactory quality for semolina products. Selected from crosses involving Langdon, Leeds, and Wells. Released by the North Dakota Agricultural Experiment Station in 1972.

VARIETIES NOT ADEQUATELY TESTED

Botno – Awned, early, medium height, and high lodging resistance. Resistant to stem rust, but moderately susceptible to leaf rust. High yield and medium test weight with large kernels. Satisfactory quality for semolina products. Selected for crosses involving Heiti, Stewart, Carleton, Mindum, and Nugget. Released by the North Dakota Agricultural Experiment Station in 1973.

WS 3 – Red durum feed wheat. Not suitable for semolina products. Awned, early semidwarf with high lodging resistance. Moderately resistant to stem and leaf rust. Medium yield and medium-low test weight. Released by World Seeds Inc. in 1973. Seed sale regulated by U.S. Variety Protection Act.

OTHER VARIETIES

Hercules – Awned, early, medium height, and high lodging resistance. Resistant to stem rust, susceptible to leaf rust and Septoria. Medium yield and test weight. Satisfactory quality for semolina products. Released by Agriculture Canada, Winnipeg in 1969.

Lakota – Awned, early, medium height and lodging resistance. Resistant to stem rust, bunt, and loose smut. Moderately susceptible to leaf rust. High yield and fair test weight. Satisfactory quality for semolina products. Selected from crosses involving Sentry, Ld. 379, and Ld. 357. Released by the North Dakota Agricultural Experiment Station in 1960.

Leeds – Awned, early, medium height and lodging resistance. Moderately resistant to leaf rust, resistant to stem rust and loose smut. Medium yield and very high test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Br. 180 and Wells. Released by the North Dakota Agricultural Experiment Station in 1966.

Macoun – Awned, medium maturity and height with high lodging resistance. Resistant to stem rust; moderately susceptible to leaf rust. Medium yield and test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving RL3607/DT182. Licensed by Agriculture Canada, Swift Current, in 1973.

Mindum – Awned and amber-kerneled. Resistant to bunt, leaf rust, and loose smut; susceptible to scab and stem rust. Susceptible to lodging. Medium yield and high test weight. Excellent for semolina products. Resulted from a durum type selected from a common bread wheat field at the Minnesota Agricultural Experiment Station in 1917.

Rolette – Awned, early, medium height, and high lodging resistance. Resistant to stem rust, moderately susceptible to leaf rust. High yield and high test weight. Satisfactory quality for semolina products. Selected from crosses involving Ld. 393, Langdon, Ld. 398, Ld. 357, and St. 464. Released by the North Dakota Agricultural Experiment Station in 1971.

Wakooma – Awned, early, medium height and high lodging resistance. Resistant to stem and moderately susceptible to leaf rust. Medium yield and low test weight. Satisfactory quality for semolina products. Selected from crosses involving Lakota and Pelissier. Licensed by Agriculture Canada, Swift Current, in 1973.

Wascana – Awned, early, medium height and lodging resistance. Resistant to stem rust and moderately resistant to leaf rust. Medium yield and low test weight. Satisfactory quality for semolina products. Selected from crosses involving Lakota and Pelissier. Licensed by Agriculture Canada, Swift Current, in 1971.

Wells – Awned, early, medium height and lodging resistance. Moderately resistant to leaf rust; resistant to stem rust, bunt, and loose smut. High yield, medium test weight and small kernel size. Satisfactory quality for semolina products. Selected from crosses involving Sentry, Ld. 379, and Ld. 357. Released by the North Dakota Agricultural Experiment Station in 1960.

WINTER WHEAT

RECOMMENDED VARIETIES

Gent – Awned, early, medium height and lodging resistance. Winterhardiness lower than Minter but better than Centurk. Moderately resistant to leaf and stem rust. High yield and test weight. Satisfactory quality. Made by compositing nine selections from crosses of Agent and Scout. Developed at

Hays, Kansas, but tested and released by the South Dakota Agricultural Experiment Station in 1974.

Minter Awned, tall, winterhardy, and medium lodging resistance. Moderately susceptible to leaf and stem rust. Medium yield and test weight. Satisfactory quality characteristics. Selected from a backcross of Hope and Minturki. Released by the Minnesota Agricultural Experiment Station in 1949.

Winoka Awned, winterhardy, medium height, maturity, and lodging resistance. Susceptible to leaf and moderately resistant to stem rust. Severe leaf necrosis in certain years. Satisfactory milling and baking characteristics. Reselection from Winalta by the South Dakota Agricultural Experiment Station in 1968.

VARIETIES NOT ADEQUATELY TESTED

Bronze – Awned, early, medium height and lodging resistance. Moderately winterhardy. Susceptible to leaf rust, but resistant to stem rust. High yield and medium test weight. Milling and baking characteristics satisfactory. Selected from Cycle II, Series I of a recurrent selection scheme. Released by the South Dakota Agricultural Experiment Station in 1972.

OTHER VARIETIES

Centurk – Awned, early, medium height and lodging resistance. Winterhardiness is not satisfactory. Susceptible to leaf rust and moderately resistant to stem rust. Satisfactory quality. Selected from crosses involving Kenya 58, Newthatch, Hope, Turkey, Cheyenne, and Parker. Released by the Nebraska Agricultural Experiment Station in 1971.

Froid – Awned, winterhardy, medium height, maturity, and lodging resistance. Moderately resistant to stem rust, susceptible to leaf rust. High yield, but lower than average test weight. Satisfactory milling and baking characteristics. Selected from a population of unknown origin at the Montana Agricultural Experiment Station in 1968.

Sundance – Awned, tall, winterhardy, medium lodging resistance. Susceptible to leaf and stem rust. Low yield and medium test weight. Satisfactory quality characteristics. Selected from a cross involving Cheyenne and Kharkof. Licensed by Agriculture Canada, Winnipeg, in 1971.

Warrior – Awned, early, medium height and lodging resistance. Winterhardiness is not satisfactory. Susceptible to leaf and stem rust. Medium yield and test weight. Satisfactory quality. Selected from a cross of Pawnee and Cheyenne at the Nebraska Agricultural Experiment Station.

Table 8. Characteristics of winter wheat varieties, 1972-74

Variety	Heading (date)	Plant height (inches)	Winter survival (percent)	Lodging (score)[1]	Rust reaction[2]		Test weight per bushel (pounds)	Yield, bushels/acre		
					Leaf	Stem		St. Paul[3]	Waseca[4]	Average
Gent	6-4	40	70	3	MR	MR	63.0	54	51	53
Minter	6-8	45	85	5	MS	MS	62.6	35	44	40
Winoka	6-6	42	80	5	S	MR	63.0	42	–	–
Bronze	6-5	39	65	4	S	R	60.5	45	43	44
Centurk	6-4	39	50	3	S	MR-S	61.0	59	49	54
Froid	6-5	44	80	5	S	MR-S	61.0	36	–	–
Sundance	6-8	43	85	4	S	S	59.0	37	29	33
Warrior	6-5	41	55	4	S	S	60.4	43	40	42
LSD 5%								6	6	4

[1] One erect, nine flat.
[2] Reaction to prevalent races: R = resistant, S = susceptible, MR = moderately resistant.
[3] 1972 and 1974 data.
[4] 1972 and 1973 data.

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

Snobird – Proso. Early. Poor lodging resistance. Large white seed. Higher yielding and more uniform than common white proso and Panhandle in Minnesota trials. Selected from white proso by the Minnesota Agricultural Experiment Station. Released in 1973.

Turghai – Proso. Very early. Fair lodging resistance. Large orange seed. Introduced from Russia by the U.S. Department of Agriculture in 1903.

Empire Foxtail. Medium maturity. Poor lodging resistance. Very small, plump yellow seed. Originated by Agriculture Canada.

White Wonder – Foxtail. Late. Fair lodging resistance. Small white or yellow seed. Often too late for good seed production.

VARIETIES NOT ADEQUATELY TESTED

Abarr Proso. Medium maturity. Poor lodging resistance. Large white seed. Selected from white proso by the Colorado Agricultural Experiment Station. Released in 1975.

Cerise – Proso. Very early. Poor lodging resistance. Large orange seed. A red-seeded composite selection from P.I. 170603 by the Nebraska Agricultural Experiment Station. Released in 1974.

Butte – Foxtail. Late. Fair lodging resistance. Medium size yellow seed. A head or spray millet for birdfeeding. A bulk selection made by the Colorado Agricultural Experiment Station from the Russian variety Harkovakaja. Released in 1975.

OTHER VARIETIES

Akron – Proso. Late. Poor lodging resistance. Medium size, dark orange seed. Originated by purifying seed of P.I. 222811 from Iran. Named in 1968 and released by the Colorado Agricultural Experiment Station.

Barnyard or Japanese – High yielding forage millet but very coarse. Good seed producer. Very good lodging resistance. Medium-size gray seed of low test weight.

Crown – Proso. Excellent variety but its gray-colored seed usually is not marketable. Originated by Agriculture Canada.

Table 9. Characteristics of proso millet varieties

Variety	Grain yield/acre (pounds) Rosemount 1970-74	Elk River 1973-74	Average	Averages, Rosemount and Elk River Test weight/bushel (pounds)	Weight/100 seeds (grams)	Heading (date)	Lodging (score)[1]	Height (inches)
Snobird	2856	1550	2203	51.7	.69	7-28	3.2	39
Turghai	2643	1762	2202	55.1	.58	7-26	2.5	39
LSD 5%	148	204	126					
Abarr[2]	2651	1606	2128	46.9	.68	8-6	3.5	41
Cerise[2]	2583	1657	2120	55.0	.58	7-27	3.3	38

[1] One erect, nine flat. [2] 1974.

Table 10. Characteristics of foxtail millet varieties

Variety	Yield/acre (pounds) Rosemount 1968-70,74 Seed	Rosemount 1973-74 Forage[1]	Elk River 1971-73 Forage[1]	Averages, Rosemount and Elk River Forage protein (percent)	Heading (August)	Lodging (score)[2]	Height (inches)	Test weight/bushel (pounds)[3]	Weight/100 seeds (grams)[3]
Empire	1496	9763	6799	9.0	19	2.6	43	49.0	.20
White Wonder	609	10416	6468	8.5	25	1.7	45	46.5	.23
Butte	955	8977	—	9.7	23	1.7	42	—	.32
LSD 5%	180	782	531						

[1] Oven-dry moisture basis. [2] One erect, nine flat. [3] Rosemount.

German, German R, and German No. 8 – Foxtail. Very late. Good lodging resistance. Very small yellow seed. Poor seedling vigor. High forage yield but too late for good seed production.

Golden German – Foxtail. Medium maturity. Poor lodging resistance. Small yellow seed. Much earlier than German and very uniform. Selected from German foxtail millet by Mr. Deschamps of Wray, Colorado. Named Golden German by the Colorado Agricultural Experiment Station in 1968.

Leonard Proso. Late. Fair lodging resistance. Medium size tan seed. Originally P.I. 223794 from Afghanistan. Named in 1968 and released by the Colorado Agricultural Experiment Station.

Manta - Foxtail. Early. Short. Poor lodging resistance. Small orange seed. Low yield. A selection of Manchurian released by South Dakota Agricultural Experiment Station in 1958.

Panhandle Proso. Early. Poor lodging resistance. Large white seed. Lower yield than Snobird in Minnesota trials. Selected from white proso by the Nebraska Agricultural Experiment Station and released in 1967.

Red Proso – (A type, not a variety). Usually Turghai or Early Fortune. Seedlots of Early Fortune tested did not differ from Turghai.

White Proso – (A type, not a variety). Snobird is a variety of white proso.

ANNUAL CANARYGRASS

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.

Few named varieties exist but 89 collections from commercial lots, other states, and other countries have been tested at Rosemount and Robbin in Kittson County. Performance of Alden and the best commercial lot is shown in table 11.

RECOMMENDED VARIETIES

Alden – High yield, late and tall. Fair to poor lodging resistance. Large heads with good shattering resistance. Developed cooperatively by the Minnesota Agricultural Experiment Station and Minn-Dak Growers Association from P.I. 251390 from Iran. Released in 1973.

Table 11. Characteristics of annual canarygrass

Variety	Grain yield/acre (pounds) Rosemount 1969-73	Robbin 1969-71,73	Average	Averages – Rosemount and Robbin Test weight/bushel (pounds)	Weight/100 seeds (grams)	Heading (July)	Lodging (score)[1]	Height (inches)
Alden	1083	1512	1298	47.0	.71	9	4.0	36
common	1004	1324	1164	47.5	.73	5	4.6	35
LSD 5%	83	130	77					

[1] One erect, nine flat.

CORN

Many corn hybrids are produced by private plant breeders. Information on the performance of these closed-pedigree or private hybrids is usually available from the individuals or companies selling them. The Minnesota Agricultural Experiment Station does not conduct performance trials of most private hybrids, but does develop and test open-pedigree or public hybrids. Those public hybrids developed by the Minnesota Agricultural Experiment Station are called Minhybrids. Minhybrids are produced and offered for sale by private growers.

The relative maturity ratings (RM) listed in table 12 correspond to zones of adaptation shown in the accompanying map. Yield and stalk breakage data reported in the table are from replicated, hand-harvested, single row plots. The plant population was approximately 21,000 plants per acre.

The high yielding and widely grown single cross Minhybrid 4201 is shown flanked by its two inbred parents.

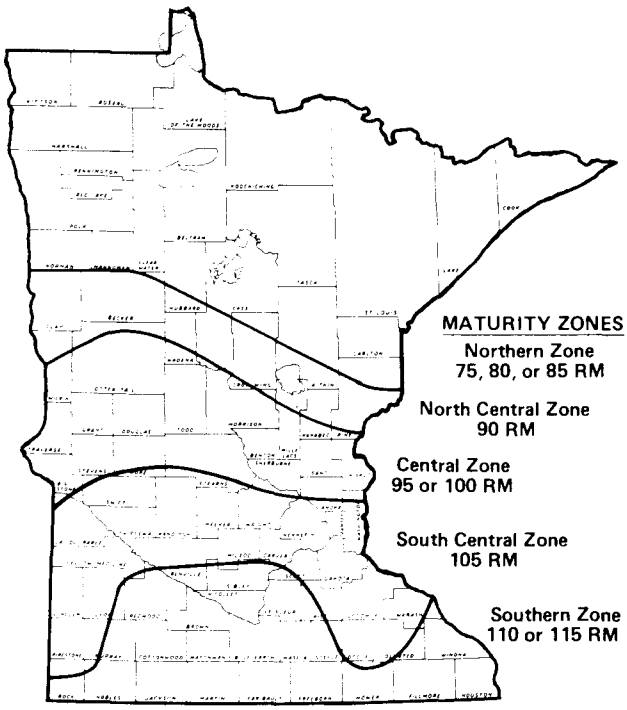


Table 12. Performance of corn hybrids

Hybrid	Type of cross	Relative maturity	Yield per acre[1] (bushels) Crookston 1974	Morris 1972-74	Waseca 1972-74	Broken stalks[2] (percent) Crookston 1974	Morris 1972-74	Waseca 1972-74
Minhybrid 8301	3-way	80	114	105		2	8	
Minhybrid 8201	single	80	114	113[4]		11	8[4]	
Minhybrid 806	double	85	110			11		
Minhybrid 7301	3-way	90		120	115[3]		6	5[3]
Minhybrid 6304	3-way	95		101[3]			0[3]	
Minhybrid 6301	3-way	95		118	125		5	8
Minhybrid 612	double	95		106[3]			8[3]	
Minhybrid 611	double	95		120[3]			23[3]	
Minhybrid 5302	3-way	105			131[4]			8[4]
Minhybrid 5301	3-way	105			127			11
Minhybrid 5201	single	105			144			16
Minhybrid 4201	single	110			147			7
Minhybrid 417	double	110			134[3]			5[3]
LSD 5%			8	7	9	3	6	8

[1] 15.5% moisture basis. [2] Below ear. [3] 1974 only. [4] 1973-74 average only.

GRAIN SORGHUM

Many hybrids are available. Most are too late for Minnesota. Even the earliest hybrids generally require drying after combine-harvest. The medium- and early-maturing hybrids shown in the table are 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 22 and June 3 at the rate of 150,000 seeds per acre in rows 30 inches apart. Hybrids in the table are ranked from earliest to latest, based on head moisture at harvest. Data for varieties not tested for 4 years are adjusted to be comparable with 1971-74 data.

Table 13. Characteristics of grain sorghum varieties at Lamberton

Variety[1] and originator	Years of trial	Grain yield/acre (pounds)[2,3]	Head moisture (percent)[3]	Test weight/ bushel (pounds)	Weight/ 100 seeds (grams)	Heading (date)	Height (inches)	Lodging (score)[4]
1, Minnesota	1971-74	5198	23.1	56.7	2.2	7-23	59	2.0
52, Northrup, King	1973-74	5131	25.4	55.8	1.3	7-23	41	2.3
104, South Dakota	1974	–	–	58.1	2.0	7-24	41	7.3
894, Pioneer	1971-73	5491	26.4	56.9	1.7	7-27	41	–
121, Northrup, King	1971-74	5296	26.5	56.6	1.7	7-28	47	2.3
R-1010, Acco	1971-73	5552	26.5	58.2	2.0	7-30	58	–

(continued on page 13)

Table 13 (continued). Characteristics of grain sorghum varieties at Lamberton

Variety[1] and originator	Years of trial	Grain yield/acre (pounds)[2,3]	Head moisture (percent)[4]	Test weight/ bushel (pounds)	Weight/ 100 seeds (grams)	Heading (date)	Height (inches)	Lodging (score)[4]
R-920, Acco	1971-72	5739	26.7	56.4	–	7-26	49	–
8901, Pioneer	1972-74	4862	26.9	51.7	1.6	7-28	43	2.0
180A, Northrup, King	1974	–	27.3	54.6	1.7	7-30	46	2.0
505, Nebraska	1971-72	4810	27.8	57.4	–	7-30	52	–
350, Frontier	1973-74	5501	28.2	57.4	1.5	7-31	49	2.0
106, South Dakota	1974	–	–	56.0	1.9	7-26	42	3.0
125, Northrup, King	1971	5140	28.2	54.0	–	7-30	50	–
129, Northrup, King	1973-74	6979	29.7	59.2	2.4	7-31	50	1.7
A-25, DeKalb	1971-73	5272	30.6	53.9	1.8	7-27	46	–
180, Northrup, King	1971-74	5828	31.3	56.3	1.6	8-3	51	1.7
LSD 5%		527	1.8					

[1] All are hybrids except South Dakota 104 and 106. [2] Oven-dry moisture basis. [3] 1974 data not used because bird-feeding loss affected varietal comparisons. [4] 1974; one erect, nine flat.

BUCKWHEAT

Buckwheat is cross-pollinated and very little certified seed is available. Consequently, variety designations may not be valid except for the few available certified seedlots. Since 1972, only Pennquad, Tempest, and Tokyo have been certified in the United States.

Trials at Rosemount from 1960 to 1969 failed to show consistent superiority of named varieties over good common buckwheat. Therefore, variety recommendations have not been made.

Mancan – Large seed. Diploid. Selected by Agriculture Canada, Morden, from common buckwheat. Licensed in 1974.

Pennquad – Very large seed. Most lodging resistant variety. Tetraploid. Should probably be isolated from diploid varieties. Released by the Pennsylvania Agricultural Experiment Station in 1966.

Tempest – Small seed. Diploid. Selected by Agriculture Canada from a Russian seedlot. Licensed in 1971.

Tokyo – Small seed. Diploid. Yielded about the same as good common buckwheat at Rosemount in 1961, 1963-64. Originated by Agriculture Canada from a Japanese introduction.

Table 14. Characteristics of buckwheat varieties at Elk River

Variety	Years of trial	Seed yield/acre (pounds)	Weight/100 seeds (grams)	Height (inches)
Common	1972-74	851	2.4	33
Tempest	1972-74	643	2.2	39
LSD 5%		94		2
Pennquad	1973-74	545	3.5	35
Giant American	1973-74	749	3.3	37
Tokyo	1974	741	2.4	36
Mancan	1974	746	3.0	36

FLAX

RECOMMENDED VARIETIES

Linott – Very 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.

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.

OTHER VARIETIES

Arny – Medium to low yield. Late, brown seed, blue flowers, resistant to lodging. Medium oil percent, high iodine value. Susceptible to rust, resistant to wilt, moderately resistant to pasmo. Released in 1958 by Minnesota Agricultural Experiment Station from a cross of Crystal and Redson.

Bison – Medium yield. Medium-late, brown seed, blue flowers, susceptible to lodging. Medium oil percent, low iodine value. Released in 1927 by North Dakota Agricultural Experiment Station by mass selection.

Bolley – Medium yield. Early, brown seed, blue flowers. More susceptible to chlorosis than recommended varieties. Very high oil percent and iodine value. Susceptible to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in 1957 by North Dakota Agricultural Experiment Station from a cross of Birio and C.I. 1134.

B-5128 – Medium yield but low in yield when sown late. Late, brown seed, blue flowers. Medium oil percent, low iodine value. Susceptible to rust, moderately susceptible to both wilt and pasmo. Contains a mixture of types including a small percentage of yellow-seeded plants and rust-susceptible plants. Released in 1943 by North Dakota Agricultural Experiment Station from a cross of Golden and Rio.

Foster – Low yield, especially when sown late. Medium-late, yellow seed, dark blue flowers. Very high oil percent, medium iodine value. Immune to rust, moderately resistant to wilt and pasmo. Released in 1969 by North Dakota Agricultural Experiment Station from a cross of C.I. 1665 and Minerva.

Marine 62 – Low yield but better than most varieties when sown late. Early, brown seed, blue flowers. Medium to low oil percent, high iodine value. Susceptible to rust, moderately resistant to wilt and pasmo. Released in 1962 by Minnesota Agricultural Experiment Station from a selection of Marine.

Noralta – High yield. Medium-late, brown seed, blue flowers. Very low oil percent, high iodine value. Susceptible to rust, moderately susceptible to wilt and pasmo. Released in 1964 at Ft. Vermilion, Canada, from a cross of Rocket and Redwing.

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.

Norland Low yield, especially when sown late. Late maturity, brown seed, white flowers with blue anthers. Medium oil percent and iodine value. Susceptible to rust, moderately susceptible to wilt, susceptible to pasmo. Released in 1955 by North Dakota Agricultural Experiment Station from a selection of Victory.

Raja Low yield. Very early maturity, brown seed, blue flowers. Height and appearance changes from early to late sowing. Very low oil percent and iodine value. Resistant to rust, moderately susceptible to wilt, susceptible to pasmo. Released in 1954 by Agriculture Canada, Ottawa from crosses involving Arg. M.S., F.G. 1025, and JWS 15339.

Redwood High yield when sown early. Medium-late, brown seed, blue flowers. Medium oil percent and iodine value. Susceptible to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in 1951 by Minnesota Agricultural Experiment Station from a cross of B-5128 and Redson.

Redwood 65 – Superior to Redwood in yield and oil percent. Similar to Redwood in maturity and appearance. Susceptible to rust, more susceptible to pasmo than Redwood. Released in 1965 by University of Saskatchewan from irradiated Redwood.

Linott flax at Lamberton is examined by agronomist R.L. Thompson.

Summit – Very high yield. Early, brown seed, blue flowers. Medium to low oil percent, high iodine value. Susceptible to rust, resistant to wilt, and moderately susceptible to pasmo. Released in 1964 by South Dakota Agricultural Experiment Station from a cross of B-5128 and Zenith.

Windom – Very high yield whether sown early or late. Early, brown seed, blue flowers. Medium oil percent, high iodine value. Susceptible to rust, resistant to wilt, and moderately susceptible to pasmo. Released in 1962 by Minnesota Agricultural Experiment Station from crosses involving Renew, Bison, Koto, Redwing, and Redwood.

Table 15. Yields of flax varieties in pounds per acre, 1967-74

Variety	Early-sown					Late-sown				Early-late average
	St. Paul	Lamberton	Morris	Crookston		Lamberton	Morris	Crookston		
No. trials	8	5	8	7	Average	7	8	7	Average	
Linott	1494	1663	1472	1097	1419	1168	1162	1008	1115	1285
Norstar	1452	1704	1467	1055	1402	1134	1144	934	1074	1258
Nored	1473	1640	1449	1114	1406	987	1151	829	996	1226
LSD 5%	77	85	67	73	38	86	63	126	55	32

Table 16. Characteristics of flax varieties, 1967-74

Variety	Days from sowing to First bloom	Days from sowing to Full bloom	Plant height (inches)	Wt./1000 seeds (grams)	Lodging[1] (score)	Pasmo[1] (score)	Wilt[1] (score)	Major rust genes	Oil[2] (percent)	Iodine (no.)
No. trials	50	49	50	23	14	13	14		52	45
Linott	49	53	22	5.2	3.9	4.3	5.9	L[6][3]	40.7	182
Norstar	52	56	24	5.6	3.2	4.1	2.9	LN[1]	40.2	180
Nored	54	58	25	5.9	2.9	4.6	2.7	N[1]	40.4	185

[1] 1 = best, 9 = poorest; data from trials in north central U. S. and Canada.
[2] Data from trials in north central U. S. and Canada; oven-dry basis.
[3] Immune to all known races of rust in North America.

SOYBEANS

Information on soybeans is presented in two sections. The first section deals with varieties that have been developed and released by publicly supported institutions and that are considered for recommendation by the Minnesota Agricultural Experiment Station. The second section deals primarily with privately developed varieties, although several public varieties are included for comparison. These private varieties are not considered for recommendation because only those submitted

Table 17. Yields of publicly developed soybean varieties in bushels per acre

Variety	Crookston 1971-74	Grand Rapids 1972-74	Moorhead 1972-74	Morris 1972-74	Elk River 1972-74	St. Paul 1972-74	Lamberton Early planting date 1972-74	Lamberton Normal planting date 1972-74	Lamberton Very late planting date 1972-73	Waseca Early planting date 1972-74	Waseca Normal planting date 1972-74	Waseca Very late planting date 1972-74	Fairmont 1972-74
Early-maturing group													
Norman	21	32	28	29					23			27	
Ada	21	30	27	29					22			27	
Altona	19	32	27	27					21			27	
Wilkin	25	29	30	31					19			28	
Clay	25	29	33	34					22			29	
LSD 5%	2	3	2	2					3			1	
Medium-maturing group													
Wilkin					46								
Clay			34	34	45	39							
Merit			32	31	50	39		30			39		46
Evans			35	38	54	46		32			44		50
Swift			32	36	43	45		32			44		49
Chippewa 64				31	40	41		30			40		42
Hodgson				37	53	46		35			45		52
Anoka				36	43	41		31			39		45
Steele				35	45	42		31			43		48
LSD 5%			2	2	4	3		2			2		4
Late-maturing group													
Hodgson								34			45		52
Rampage							33	30		41	39		48
Hark							35	33		43	41		50
Corsoy							36	35		45	43		55
Wells							35	32		43	40		49
Amsoy 71							31	30		41	36		49
LSD 5%							2	3		2	2		4

voluntarily by their owners were tested, and the experiment station does not have adequate long-time (3 years or more) data on most of them.

PUBLICLY DEVELOPED VARIETIES

Yield data are reported in table 17 and in most cases are averages for 3 years. The data for Crookston, Moorhead, Morris, St. Paul, Lamberton, and Waseca are from replicated combine-harvested plots. Data from Grand Rapids, Elk River, and Fairmont are from replicated multiple-row nursery plots. The row spacing was 24 inches at Grand Rapids; 28 in 1972 and 1973 and 22 in 1974 at Crookston; and 22 in 1972 and 1974, and 28 in 1973 at Moorhead. At all other locations the spacing was 30 inches. At all locations, seeding rate was about 10 viable seeds per foot of row. The majority of the tests were planted from May 15 to June 1. However, the early planting dates at Waseca and Lamberton ranged from April 27 to May 10. The very late planting dates at Waseca and Lamberton ranged from June 27 to July 6.

Varieties are grouped in three maturity categories. Certain transitional varieties appear in more than one maturity grouping. Comparisons should be made only within a grouping, because varying numbers of years or plot locations may be involved between groupings.

Data on maturity, lodging resistance, plant height, seed size, and seed quality in table 18 are from locations suited to particular maturity groups. Phytophthora reactions were determined by the University of Minnesota's Department of Plant Pathology and by the U.S. Regional Soybean Laboratory, Urbana, Illinois. Chlorosis scores were obtained from plantings at Crookston and on a high-lime soil near Lamberton. Protein and oil determinations were made at the regional laboratory.

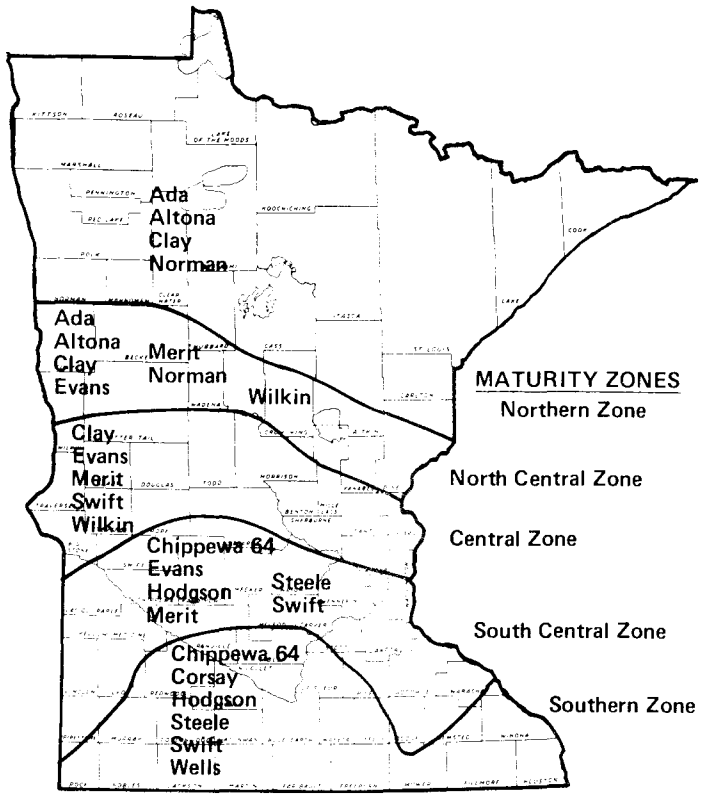


Table 18. Characteristics of publicly developed soybean varieties

Variety	Mature (date)	Lodging resistance (score)[1]	Plant height (inches)	Weight of 100 seeds (grams)	Seed quality (score)[1]	Protein (percent)[2]	Oil (percent)[2]	Phytoph-thora (reaction)[3]	Chlor-osis (score)[1]	Flower (color)[4]	Pubes-cence (color)[4]	Hilum (color)[4]
Early-maturing group (average, Crookston and Moorhead, 1972-74)												
Norman	9-11	2.1	26	18.4	2.6	40.0	21.4	S	2.0	P	G	Y
Ada	9-12	1.7	28	18.4	2.8	39.5	20.5	R	1.3	W	G	Y
Altona	9-12	1.7	25	19.0	3.0	40.1	21.2	R	3.0	P	T	Bl
Wilkin	9-18	1.1	26	15.9	2.4	38.4	22.3	R	1.6	W	G	Y
Clay	9-18	1.7	26	17.0	2.1	38.8	22.7	S	1.8	P	G	Y
Medium-maturing group (average, Morris and St. Paul, 1972-74)												
Clay	9-11	1.8	26	17.9	2.6	40.1	22.5	S	1.8	P	G	Y
Merit	9-17	2.5	33	15.4	2.2	39.1	20.4	R	2.1	W	G	Bf
Evans	9-18	2.4	34	16.7	2.0	39.9	21.3	R	1.8	W	G	Y
Swift	9-22	3.3	37	16.7	2.1	38.1	21.6	S	1.5	W	T	Bl
Chippewa 64	9-22	2.6	37	15.0	2.2	40.5	20.5	R	2.6	P	T	Bl
Hodgson	9-24	2.8	35	16.0	2.4	38.5	21.4	S	1.7	P	G	Bf
Anoka	9-24	3.0	33	19.4	1.9	40.0	22.1	S	4.0	P	T	Bl
Steele	9-26	2.9	38	16.8	2.2	39.6	20.3	R	2.6	P	G	Y
Late-maturing group (average, Lamberton and Waseca)												
Hodgson	9-16	1.6	33	16.9	2.4	39.1	23.1	S	1.6	P	G	Bf
Rampage	9-21	1.5	33	15.9	2.2	40.4	21.5	S	2.1	P	T	Bl
Hark	9-24	1.4	36	15.8	1.7	41.4	21.6	S	4.2	P	G	Y
Corsoy	9-24	2.0	37	15.4	2.0	40.1	21.7	S	2.8	P	G	Y
Wells	9-25	1.3	40	15.2	2.7	40.4	21.4	R	1.9	P	G	Ib
Amsoy 71	9-28	1.9	43	16.9	2.0	38.7	22.0	R	2.1	P	G	Y

[1] 1 = excellent, 5 = very poor.
[2] Moisture-free basis; average 1972-73.
[3] R = resistant, S = susceptible.
[4] Flower color: P = purple, W = white; pubescence color: G = gray, T = tawny; hilum color: Bl = black, Bf = buff, Ib = imperfect black, Y = yellow.

From the standpoint of maturity, soybean varieties have a fairly narrow range of adaptation. The accompanying map relates Minnesota production areas to varietal recommendations in the text.

Table 19. Yields of private soybean varieties in bushels per acre, early group, 1974

Brand	Variety	Morris	Rosemount	Average, two locations
	Anoka	31	28	30
	Chippewa 64	28	28	28
	Evans[1]	34	39	36
	Hodgson[1]	33	33	33
	Merit	34	29	32
	Steele	29	32	31
	Swift	32	35	33
Agripro	Osage	30	29	30
	1120	26	29	27
	1235	29	28	29
Jacques	J94	30	30	30
	J98	27	23	25
L.O.L.-Felco	Pike	30	29	30
	Go45	29	30	29
Midwest Res. Assoc.	WM70	21	17	19
Northrup, King	9414	30	30	30
Peterson	85[1]	29	37	33
SRF	100[1]	32	33	32
Teweles	XK121	32	30	31
LSD 5%		6	5	4

[1] Seed sale regulated by U. S. Variety Protection Act.

RECOMMENDED VARIETIES

Ada – Recommended for the northern and north central zones. Excellent seedling vigor. Resistant to phytophthora root rot. Good tolerance to high-lime soils. Developed at the Minnesota Agricultural Experiment Station from a cross of Merit and Norman. Released in 1972.

Altona – Recommended for northern and north central zones. Resistant to phytophthora root rot. Developed at the University of Manitoba from a cross of P.I. 194654 and Flambeau. Released in 1966.

Chippewa 64 – Recommended for south central and southern zones and southern one-half of the central zone. Similar in all respects, except phytophthora resistance, to Chippewa which was selected from crosses involving Lincoln and Richland at the U.S. Regional Soybean Laboratory. Blackhawk was the phytophthora-resistant, nonrecurrent backcross parent in the development of Chippewa 64. Released in 1964.

Clay – Recommended for the north central, central, and northern zones. Outstanding in yield and oil content in its maturity class. Rather highly susceptible to phytophthora root rot. Developed at the Minnesota Agricultural Experiment Station from a cross of Renville and Capital. Released in 1968.

Corsoy – Recommended for the southern zone only. Outstanding in yield among the later-maturing varieties. Has only medium resistance to lodging. Occupied a large part of the soybean acreage in southern Minnesota in 1974. Developed at the Iowa Agricultural Experiment Station from a cross of Harosoy and Capital. Released in 1967.

Evans – Recommended for the three central maturity zones. Has performed well in southern zone also. Resistant to phytophthora rot. Developed at the Minnesota Agricultural

Experiment Station from a cross of Merit and Harosoy. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

Hodgson – Recommended for south central and southern maturity zones. Outstanding in yield in its maturity class. Good resistance to lodging. Tolerant to high-lime soils. High oil content. Susceptible to phytophthora rot. Developed at the Minnesota Agricultural Experiment Station from crosses involving Corsoy, Lincoln, Richland, and PI 180501. Seed sale regulated by U.S. Variety Protection Act.

Merit – Recommended for the three central zones. Adapted to a rather wide range of conditions. Resistant to phytophthora root rot. Developed by Agriculture Canada, Ottawa, from a cross of Blackhawk and Capital. Released in 1959.

Norman – Recommended for the northern and north central zones. Has good seedling vigor, is tall for its maturity, and has good tolerance to high-lime soils, but is susceptible to phytophthora root rot. Developed at the Minnesota Agricultural Experiment Station from a cross of Acme and Hardome. Released in 1969.

Steele – Recommended for south central and southern maturity zones. Yields more than Chippewa 64. Resistant to phytophthora root rot. Developed at the Minnesota Agricultural Experiment Station from a cross of Blackhawk and Harosoy. Released in 1972.

Table 20. Yields of private soybean varieties in bushels per acre, late group, 1974

Brand	Variety	Fairmont	Lamberton	Waseca	Average three locations
	Chippewa 64	39	32	37	36
	Corsoy	45	31	35	37
	Hark	46	29	35	37
	Hodgson[1]	48	34	40	41
	Steele	46	31	42	40
	Wells[1]	40	29	36	35
Agripro	Osage	41	30	35	35
	14	44	29	39	37
	1120	42	26	41	36
	1235	48	29	41	39
Asgrow	2002	48	31	31	37
	2203	49	30	33	37
	2204	53	30	31	38
	2205	45	26	31	34
D-Mora-Soy	55	51	31	33	38
Empire Seed	B.R.S.64	28	17	16	20
	B.R.S.88	39	27	34	33
	B.R.S.108	39	27	34	33
FFR	111	45	29	28	34
	2010	38	20	22	27
Jacques	J98	49	31	32	37
	J104	51	31	31	38
Kruger	Desoy 333N	48	32	31	37
	Desoy 727	46	30	33	36
L.O.L -Felco	Pike	46	32	42	40
	Go44	50	30	33	38
	Go45	44	32	36	37
Mid America	Exp 103	42	31	38	37
	Exp 202	44	32	40	39
Midwest Res.	WM70	37	27	32	32
Northrup, King	1422	46	29	32	36
	S1474[1]	42	28	26	32
	9414	49	33	38	40
	9447	48	29	34	37
Peterson	85[1]	48	31	38	39
	105R	47	29	25	34
	105P	48	28	31	36
	3100	49	32	33	38
	3105	42	28	28	33
S.R.F.	100[1]	42	31	35	36
	150[1]	44	30	36	37
	200[1]	45	27	27	33
	174 AT[1]	42	29	30	34
	Exp. 70-554	46	29	35	37
Teweles	XR 50	41	28	30	33
	XK 121	47	32	40	40
	XK 125	43	30	36	36
	XK 505[1]	41	25	31	32
LSD 5%		8	3	6	4

[1] Seed sale regulated by U. S. Variety Protection Act.

Table 21. Yields of private soybean varieties in bushels per acre, late group, 1971-74, 1972-74, and 1973-74

		Fairmont			Lamberton			Waseca			Average three locations		
Brand	Variety	71-74	72-74	73-74	71-74	72-74	73-74	71-74	72-74	73-74	71-74	72-74	73-74
	Chippewa 64	42	43	42	39	40	37	36	37	42	39	40	40
	Corsoy	51	52	51	43	43	37	43	43	45	46	46	44
	Hodgson			53			42			48			48
	Steele		50	50		41	38		42	46		44	45
Agripro	Osage	49	49	47	40	40	36	39	40	44	43	43	42
	14			51			35			47			44
	1120		50	48		40	37		43	46		44	44
	1235			54			38			49			47
Kruger	Desoy 333N			53			41			42			45
	Desoy 727			52			37			46			45
L.O.L.-Felco	Pike			52			37			48			46
	Go44			53			36			44			44
	Go45			48			36			42			42
Northrup, King	S1474			47			34			39			40
	9447			52			37			45			45
Peterson	85	48	53	54	43	44	40	40	43	45	44	47	46
	3100			56			42			45			48
	3105			52			34			42			43
S.R.F.	100	44	45	44	37	38	36	36	37	41	39	40	40
	150	49	50	48	39	40	35	42	43	43	43	44	42
	200		48	49		36	33		36	39		40	40
Teweles	XK121			49			38			46			44
	XK125	48	49	48	40	41	38	40	42	47	43	44	44
	XK505	46	46	46	36	38	31	38	39	41	40	41	39
LSD 5%		3	3	5	3	3	5	3	3	4	2	2	3

Table 22. Characteristics of private soybean varieties; average Morris and Rosemount

Brand	Variety	Mature (date)	Lodging resistance (score)[1]	Plant height (inches)	Weight of 100 seeds (grams)	Seed quality (score)[1]	Phytoph-thora (reaction)[2]	Chlorosis (score)[1]	Flower (color)[3]	Pubescence (color)[3]	Hilum (color)[3]
	Anoka	9-18	2.4	30	14.7	1.5	S	4.0	P	T	Bl
	Chippewa 64	9-17	1.9	32	12.0	1.4	R	2.2	P	T	Bl
	Evans	9-10	1.2	27	14.2	1.4	R	2.0	W	G	Y
	Hodgson	9-20	2.1	32	12.4	1.6	S	1.7	P	G	Bf
	Merit	9-14	1.9	28	13.0	2.4	R	1.7	W	G	Bf
	Steele	9-20	2.4	35	13.4	1.5	R	2.7	P	G	Y
	Swift	9-15	2.6	32	13.2	1.2	S	1.0	W	T	Bl
Agripro	Osage	9-21	1.8	30	14.6	1.8	S	1.7	P	T	Y
	1120	9-21	1.8	29	12.6	2.0	S	2.5	P	G	Y
	1235	9-20	1.7	30	12.4	1.8	H	3.0	P	G	Y
Jacques	J94	9-18	2.2	32	12.2	1.9	S	2.2	M	M	M
	J98	9-24	2.6	38	10.6	2.6	S	2.5	P	G	Y
L.O.L.-Felco	Pike	9-20	1.5	26	12.4	2.0	S	1.0	P	G	Y
	Go45	9-20	2.0	32	13.6	2.0	H	2.0	P	T	M
Midwest Res. Assoc.	WM 70	9-25	2.0	37	10.7	3.5	S	4.0	P	G	Bf
Northrup, King	9414	9-22	2.5	34	12.5	2.5	S	3.5	P	T	Bl
Peterson	85	9-18	2.0	28	13.7	1.5	S	3.5	P	G	Bf
S.R.F.	100	9-16	2.0	32	11.7	1.0	R	2.0	P	T	Bl
Teweles	XK121	9-20	2.4	33	12.0	2.1	H	2.5	P	M	M

[1] 1 = excellent, 5 = very poor. [2] R = resistant, S = susceptible, H = heterogeneous.
[3] Flower color: M = mixed, P = purple, W = white; pubescence color: G = gray, M = mixed, T = tawny; hilum color: Bl = black, Bf = buff, M = mixed, Y = yellow.

Table 23. Characteristics of private soybean varieties; average Fairmont, Lamberton, and Waseca

Brand	Variety	Mature (date)	Lodging resistance (score)[1]	Plant height (inches)	Weight of 100 seeds (grams)	Seed quality (score)[1]	Phytophthora (reaction)[2]	Chlorosis (score)[1]	Flower (color)[3]	Pubescence (color)[3]	Hilum (color)[3]
	Chippewa 64	9-18	2.2	35	14.3	2.0	R	2.2	P	T	Bl
	Corsoy	9-27	3.3	39	13.3	2.4	S	3.0	P	G	Y
	Hark	9-26	2.5	38	13.7	2.3	S	4.0	P	G	Y
	Hodgson	9-20	1.9	33	15.4	2.0	S	1.7	P	G	Bf
	Steele	9-20	2.3	36	16.9	1.9	R	2.7	P	G	Y
	Wells	9-27	2.1	39	13.7	2.7	R	3.0	P	G	Ib
Agripro	Osage	9-24	2.6	32	17.7	2.3	S	1.5	P	T	Y
	14	9-25	2.6	38	14.7	2.8	S	4.0	M	M	M
	1120	9-24	2.6	32	15.1	2.3	S	2.5	P	G	Y
	1235	9-21	2.3	33	15.5	2.0	H	3.0	P	G	Y
Asgrow	2002	9-26	3.4	40	13.2	2.0	S	2.5	P	G	Y
	2203	9-28	3.3	39	13.4	2.4	H	2.5	P	G	M
	2204	9-28	3.7	40	13.1	1.9	S	2.7	P	G	Y
	2205	9-30	3.2	42	13.3	2.8	S	1.5	P	G	Y
D-Mora-Soy	55	9-28	3.3	41	13.2	2.3	S	2.5	P	G	Y
Empire Seed	BRS64	10-3	3.3	41	11.8	3.5	S	3.5	M	G	Bf
	BRS88	9-24	3.5	32	15.8	2.4	R	2.5	P	G	Y
	BRS108	9-26	2.6	37	16.6	2.4	H	3.0	P	M	M
FFR	111	9-27	3.3	41	14.3	2.4	H	2.8	P	G	Y
	2010	10-2	3.4	41	12.3	3.1	H	4.0	P	M	M
Jacques	J98	9-27	3.2	39	13.8	2.0	S	3.0	P	G	Y
	J104	9-28	3.3	39	13.7	2.4	H	3.5	P	G	Y
Kruger	Desoy 333N	9-28	3.2	39	12.9	2.3	S	3.5	P	G	Y
	Desoy 727	9-28	3.4	39	13.4	2.4	S	4.0	P	G	Y
L.O.L.-Felco	Pike	9-20	2.3	29	15.0	2.1	S	1.0	P	G	Y
	Go44	9-27	3.2	39	13.7	2.3	S	2.2	P	G	Y
	Go45	9-22	2.3	34	16.6	2.6	H	3.0	P	T	M
Mid America	Exp 103	9-23	2.3	33	17.6	2.2	H	3.0	P	M	Y
	Exp 202	9-21	1.9	35	15.6	2.0	S	2.7	P	G	Y
Midwest Res.	WM70	9-28	2.6	39	12.8	2.8	S	4.0	P	G	Bf
Northrup, King	1422	9-27	2.9	36	14.0	2.1	H	3.5	P	G	Y
	S1474	10-2	3.8	39	12.9	3.0	S	4.0	P	T	Br
	9414	9-22	2.6	36	16.1	2.3	S	3.5	P	T	Bl
	9447	9-30	3.0	38	12.8	2.6	H	4.5	W	G	M
Peterson	85	9-18	2.3	29	15.9	2.2	S	3.5	P	G	Bf
	105R	9-27	3.0	40	13.4	2.6	H	3.0	P	G	Y
	105P	9-28	2.9	41	13.9	2.6	H	3.5	P	G	Y
	3100	9-28	2.8	39	13.6	2.7	H	2.5	P	G	M
	3105	10-1	3.3	41	13.0	2.7	S	3.0	P	G	Y
S.R.F.	100	9-16	2.4	34	14.3	2.0	R	2.0	P	T	Bl
	150	9-25	2.7	37	13.2	2.3	S	4.0	P	G	Y
	200	9-29	2.8	40	12.4	2.6	R	3.0	P	G	Y
	174AT	9-24	3.3	38	14.2	1.8	R	3.0	P	G	Y
	Exp. 70-554	9-25	2.4	36	15.2	2.3	S	3.5	P	M	Y
Teweles	XR50	9-29	2.5	41	13.4	2.8	R	4.0	P	M	M
	XK121	9-20	2.7	35	15.0	2.5	H	2.5	M	M	M
	XK125	9-27	3.0	39	13.2	2.6	H	3.5	M	G	M
	XK505	9-29	2.7	41	13.3	2.8	R	2.8	P	T	Bl

[1] 1 = excellent, 5 = very poor.
[2] R = resistant, S = susceptible, H = heterogeneous.
[3] Flower color: M = mixed, P = purple, W = white; pubescence color: G = gray, M = mixed, T = tawny; hilum color: Bl = black, Bf = buff, Br = brown, Ib = imperfect black, M = mixed, Y = yellow.

Swift – Recommended for the south central, central, and southern maturity zones. High yield and oil content. Very good tolerance to high-lime soils. Only fair resistance to lodging. Susceptible to phytophthora root rot. Developed at the Minnesota Agricultural Experiment Station from crosses involving Lincoln, Richland, Capital, and Korean. Released in 1972.

Wells – Recommended for the southern zone only. Similar in maturity to Corsoy. Yields less than Corsoy, but has greater resistance to lodging and has resistance to phytophthora root rot. Developed at the Indiana Agricultural Experiment Station from crosses involving Harosoy, Lincoln, Ogden, and Blackhawk. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

Wilkin – Recommended for the central and north central maturity zones. Excellent resistance to lodging. Resistant to phytophthora root rot. Good tolerance to high-lime soils. Developed at the Minnesota Agricultural Experiment Station from a cross of Merit x Harosoy. Released in 1972.

OTHER VARIETIES

Amsoy Several days later than Corsoy and has yielded less. Susceptible to phytophthora rot. Selected at the Iowa

Agricultural Experiment Station from a cross of Adams and Harosoy. Released in 1965.

Amsoy 71 – Similar to Amsoy, but resistant to phytophthora. Developed by backcrossing at the Indiana Agricultural Experiment Station. Released in 1971. Seed sale regulated by U.S. Variety Protection Act.

Anoka – Similar to Chippewa 64 in maturity. Yields more but lodges more than Chippewa 64. High oil content. Large seed. Susceptible to phytophthora rot and very susceptible to chlorosis on high-lime soils. Developed at the Minnesota Agricultural Experiment Station from crosses involving Lincoln, Richland, and Korean. Released in 1970.

Beeson – Similar in maturity and yield to Amsoy. Resistant to phytophthora root rot. Developed at the Indiana Agricultural Experiment Station from crosses involving Blackhawk, Harosoy, and Kent. Released in 1968.

Chippewa – Similar in all respects to Chippewa 64 except in its susceptibility to phytophthora root rot. Released in 1955.

Dunn – Similar in maturity and yielding ability to Anoka, but lower in oil content. Susceptible to phytophthora root rot. Developed at the Wisconsin Agricultural Experiment Station from a cross of Chippewa and Grant. Released in 1970.

Hark – Similar to Corsoy in maturity and is more resistant to lodging. Yields less than Corsoy. Susceptible to phytophthora rot and very susceptible to chlorosis on high-lime soils. Developed at Iowa Agricultural Experiment Station from a cross of Hawkeye and Harosoy. Released in 1966.

Morsoy – Between Altona and Clay in maturity. Similar in yield to Altona. Lodges considerably. Poor seed quality. Susceptible to phytophthora root rot. Developed by Agriculture Canada, Morden, from a cross involving Acme, Seneca, and Richland. Released in 1970.

Ottawa Mandarin – Similar to Swift in maturity, but yields less. Highly resistant to lodging. Susceptible to phytophthora and chlorosis on high-lime soils. Selected by Agriculture Canada, Ottawa, from the variety Mandarin. Released in 1945.

Portage – Earlier than Norman. Good resistance to lodging. Susceptible to shattering, to chlorosis on high-lime soils, and to phytophthora root rot. Developed at the University of Manitoba from a cross of Acme and Comet. Released in 1964.

Rampage – Slightly earlier than Hark and Corsoy and has better lodging resistance; yields less, however. Developed at Iowa Agricultural Experiment Station from a cross of Chippewa and Clark. Released in 1969.

Traverse – Similar to Chippewa 64 in yield but several days earlier. Susceptible to chlorosis on high-lime soils. Highly susceptible to phytophthora root rot. Developed at the Minnesota Agricultural Experiment Station from a cross of Lincoln and Ottawa Mandarin. Released in 1965.

Wirth – Similar in maturity to Chippewa 64. Excellent resistance to lodging, but has yielded only slightly better than Chippewa 64 and is susceptible to phytophthora root rot. Selected at the Iowa Agricultural Experiment Station from a cross of Chippewa and Clark. Released in 1969.

PRIVATELY DEVELOPED VARIETIES

A group of varieties considered "early" by the companies submitting them was tested at Morris and Rosemount in 1974. A "later" group of varieties was tested at Fairmont, Lamberton, and Waseca. Some of these later varieties had been tested at the three locations in previous years, also. All tests in all years were planted in four-row plots, 12 feet long with 30-inch spacings between rows. There were four replications at each location. Eight feet of each of the two interior rows were harvested for yield. Planting dates varied in the several years involved. In 1974 planting was done at Morris on May 8, Rosemount on May 22, Fairmont and Lamberton on May 24, and Waseca on May 6. Seeding rate was about 10 viable seeds per foot of row.

Yields for 1974 are given in tables 19 and 20 for the early and late groups, respectively. The varieties are arranged in two groups with the publicly developed checks first and the privately developed varieties second. Varieties in each group are arranged alphabetically. Yields for 2-, 3-, and 4-year periods are given in table 21.

Other characteristics for 1974 are given in tables 22 and 23 for the early and late groups, respectively. For several of the characteristics, an average is shown for all locations within a group. However, maturity in the late group is an average of Fairmont and Waseca; chlorosis scores in both groups are from special nurseries at Crookston and Lamberton. Phytophthora reactions are from laboratory tests made by the Department of Plant Pathology.

Companies entering varieties in these tests were Agripro Inc., Ames, Iowa; Asgrow Seed Co., Ames, Iowa; D-Mora-Soy, Jewell, Iowa; Empire Seed Co., Storm Lake, Iowa; Farmers Forage Research Cooperative, West Lafayette, Indiana; Jacques Seed Co., Prescott, Wisconsin; Kruger Seed Co., Cedar Falls, Iowa; Land O' Lakes-Felco Inc., Fort Dodge, Iowa; Mid America Seeds, Willmar, Minnesota; Midwest Research Associates, Dassel, Minnesota; Northrup, King & Co., Washington, Iowa; Peterson Seed Division, Pioneer Hi-bred International Inc., Waterloo, Iowa; Soybean Research Foundation, Mason City, Illinois; and Teweles Seed Co., Clinton, Wisconsin.

SUNFLOWERS

Nonoilseed varieties and hybrids are grown for use as nutmeats, salted whole seed, or birdfeed. Oilseed varieties and hybrids are grown for oil and protein extraction. Varieties are still more commonly grown than hybrids, but the proportion of sunflower acreage planted to hybrids is increasing.

The available hybrids are produced by the cytoplasmic male-sterility and genetic fertility-restoration method. Names for open-pedigree hybrids in this report are based on the last digits of the parents' names. Single crosses are named from the last two digits of the female's name and the last digit of the male's name; for example, cms HA 89 X RHA 266 is called 896. For a three-way cross, the last digit of the second parent's name is also shown; for example, (cms HA 89 X HA 234) X RHA 266 is called 8946.

Seed labeling regulations of the United States Department of Agriculture require that seed labeled hybrid must be at least 75 percent hybrid. Furthermore, if the seedlot is less than 95 percent hybrid, the tag must give the exact percentage of hybrid or a range between 75 and 95 percent hybrid seeds. Unless the word hybrid appears on the tag, there is no assurance of receiving hybrid seed. The hybrid data in this report are based on seedlots that produced over 90 percent hybrid plants.

Table 24. Characteristics of sunflower varieties, 1972-74

Variety and originator	Seed yield/acre (pounds) Crookston	Morris	Average	Averages Crookston and Morris: Large seed (percent)[1]	Oil (percent)[2]	Weight/100 seeds (grams)	Test weight/ bushel (pounds)	Flowering (date)	Lodging (score)[3]	Height (inches)	Disease ratings[4]: Rust	Downy mildew	Leaf mottle *Verticillium*
Nonoilseed varieties													
Arrowhead, Minn.	1718	1614	1666	0	31.1	7.5	30.0	7-27	1.9	63	S	S	S
D-694, Dahlgren	1572	1541	1556	24	29.2	10.0	25.0	8-2	2.5	66	S	S	S
Mingren, Minn.	1542	1559	1550	46	28.1	10.5	24.3	7-31	2.7	66	S	S	S
Sundak[5], USDA	1836	1681	1758	19	30.7	9.7	26.8	8-4	2.7	72	R	S	S
Nonoilseed hybrids													
852[5], USDA	2049	2067	2058	2	34.2	8.9	29.3	8-3	2.8	71	R	S	S
850[6], USDA	1812	2177	1994	22	29.5	10.8	27.7	8-1	2.5	69	R	S	S
860[6], USDA	2218	3043	2630	56	27.3	13.2	26.2	8-2	3.1	68	R	S	S
862[6], USDA	2216	1632	1924	6	33.2	9.9	27.3	7-31	1.7	63	R	S	S
872[6], USDA	2502	1978	2240	0	30.1	10.1	29.0	7-28	1.7	64	R	S	S
882[6], USDA	2020	1936	1978	2	33.2	10.0	26.9	7-30	1.7	61	R	S	S
D-747[6], Dahlgren	1812	1549	1680	38	32.7	10.1	24.7	8-3	3.1	64	R,S	S	S
Oilseed varieties													
Peredovik 66, U.S.S.R.	1685	1655	1670	0	46.9	5.6	28.9	8-4	2.3	73	MS	S	MS
Sputnik 71, U.S.S.R.	1744	1894	1819	0	48.4	6.1	30.3	8-3	1.6	71	MS	S	–
Oilseed hybrids													
896, USDA	1612	1865	1738	0	48.0	4.3	30.5	8-6	1.2	71	R	S	R
345, USDA	1848	2238	2043	0	47.3	4.8	32.1	8-3	2.2	78	R	S	S
101, Cargill	1537	1749	1643	0	46.8	4.3	30.2	8-6	1.7	72	R	S	R
102, Cargill	1421	1903	1662	0	46.9	4.4	30.4	8-9	1.7	76	R	S	R
891[5], USDA	1659	1941	1800	0	48.1	4.2	32.3	8-6	1.7	67	R	R	R
8941[5], USDA	1633	2268	1950	0	48.4	4.9	34.3	8-4	1.2	74	R	R	R,S
8946[5], USDA	1518	1665	1591	0	45.4	5.0	31.1	8-4	2.1	76	R	S	R,S
DO-731[5], Dahlgren	1943	1879	1911	0	46.1	5.3	30.4	8-7	3.1	74	R	S	S
201[6], Cargill	1723	2253	1988	0	47.2	4.4	31.5	8-5	1.7	68	R	R	R
344[6], USDA	2112	2202	2157	0	44.0	5.1	34.7	7-30	1.7	72	R	R	S
893[6], USDA	2231	2093	2162	0	49.4	4.0	32.7	8-3	1.1	66	R	R	R
894[6], USDA	1957	2227	2092	0	47.6	3.6	32.1	8-4	1.7	68	R	R	R
8944[6], USDA	1984	2278	2131	0	46.5	4.3	34.0	8-1	1.7	72	R	R	R,S
DO-411[6], Dahlgren	1606	–	–	0	45.7	4.2	28.8	8-9	–	79	R	S	S
DO-413[6], Dahlgren	1586	1792	1689	0	48.6	5.2	28.2	8-8	4.1	80	R	R	S
Sun-Hi 304[6], P. O. I.	2221	2056	2138	0	46.6	4.2	32.0	8-5	1.7	68	R	R	R
LSD 5%	221	296	185										

[1] Held on a 20/64 round-hole screen. [2] Oven-dry basis. [3] Morris; one erect, nine flat.
[4] Ratings based on known parentage and plot observations but not on controlled tests with the fungi. R = resistant; S = susceptible; MS = moderately susceptible; R,S = about half of plants resistant. All varieties and hybrids are susceptible to stem and head rots caused by *Sclerotinia*.
[5] Not tested in 1972. [6] Not tested in 1972-73.

Sunflower varieties differ in pollen and nectar production. Agronomy student G.P. Waibel measures plants in these agronomy-entomology research plots where varieties are compared with and without bees.

DRY EDIBLE PEAS AND FIELD PEAS

Dry edible peas are sold to processors 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 they usually are sown in a mixture with oats.

Varieties of green seed color have not been recommended because they yielded less than recommended yellow varieties, and buyers in Minnesota have not encouraged production of green varieties because of bleaching at harvest time.

RECOMMENDED VARIETIES

Century – High yield. Medium to early. Long vined. Large, cream-colored seed. Good cooking quality. Originated by Agriculture Canada, Ottawa, from crosses involving Chancellor, Early Raymond, and Stirling. Licensed in 1960.

VARIETIES NOT ADEQUATELY TESTED

Latah – High yield. Early. Long vined. Medium size, cream-colored seed. Originated by Washington Agricultural Experiment Station. Released about 1972.

Triumph – Medium yield. Late. Medium vine length. Very large green seed. Good cooking quality. Selected from P.I. 206852 by Agriculture Canada, Morden. Licensed in 1973.

OTHER VARIETIES

Maple – Medium to high 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.

Trapper – Medium to high yield. Medium to early. Medium vine length. Small, cream-colored seed. Good cooking quality. Originated by Agriculture Canada, Morden, from a cross of Chancellor x Weibull's 700. Licensed in 1970.

Table 25. Characteristics of pea varieties at Elk River

Variety	Seed yield/acre (pounds)	Weight/100 seeds (grams)	Seed protein (percent)	First bloom (June)	Mature (July)	Vine length (inches)
Century	1572	22.6	26.4	18	18	50
Latah	1655	18.7	27.5	9	16	52
Triumph	1222	27.4	27.2	21	–	36
LSD 5%	284					

DRY EDIBLE BEANS OR FIELD BEANS

Field beans are combine-harvested as mature dry beans. They are used for human food and reach the grocer's shelf in either canned or dry form. Minnesota farmers usually raise beans under contract and buy seed from the contractor.

There are more than 15 market classes of dry, edible beans, but only eight have been grown commercially in Minnesota. Minnesota's 1973 production amounted to 43 percent pinto, 41 percent navy, 12 percent pink, 4 percent red kidney, and 0.3 percent great northern. Navy had the highest production in 1974.

Variety recommendations are confined to navy and pinto because they occupy the largest acreage, and to dark red kidney because there is a market and variety choice available.

RECOMMENDED VARIETIES

Montcalm dark red kidney – Medium to high yield. Late. Large, erect bush. Very large dark red seed. Resistant to mosaic and tolerant to halo blight. Susceptible to white mold, anthracnose, and common and fuscous blights. Named and released by the Michigan Agricultural Experiment Station in 1974.

Sanilac navy – Medium yield. Medium-late maturity. Erect bush. Small white seed. Resistant to anthracnose and mosaic V-1. Tolerant of halo blight. Much less injury from rust than pinto in 1972. Susceptible to white mold and common and fuscous blights. Developed by the Michigan Agricultural Experiment Station from crosses involving a bush mutant (X-ray induced) of Michelite and an anthracnose-resistant line. Released in 1956.

Seafarer navy – Medium yield. Early. Erect bush. Small white seed. Resistant to anthracnose and mosaic V-1, V-1A, V-15. Tolerant of halo blight. Much less injury from rust than pinto in 1972. Susceptible to white mold and common and fuscous blights. Developed by the Michigan Agricultural Experiment Station from crosses involving X-ray bush mutants, Emerson 847, Michelite, Trag 279-1, and Florida Belle. Released in 1967.

UI-114 pinto – High yield. Medium-late maturity. Large prostrate vine. Tan and brown mottled seed. Resistant to mosaic V-1, V-1A. Tolerant of halo blight. Susceptible to white mold, rust, and common and fuscous blights. Developed by the Idaho Agricultural Experiment Station from a cross of UI-111 pinto and J378 great northern. Released in 1965.

VARIETIES NOT ADEQUATELY TESTED

Charity navy – Medium to high yield. Medium maturity. Medium-size bush. Medium-size white seed. Reported resistant to common mosaic and fuscous blight. Susceptible to white mold, root rot, and common blight. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from a cross of experimental navy strains. Released in 1974.

Snow-Bunting navy – Medium to high yield. Early. Medium-size bush. Small white seed. Reported resistant to common mosaic and root rot. Susceptible to white mold and common and fuscous blights. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from crosses involving Gratiot, Sanilac, Snow-Flake, and experimental navy strains. Released in 1974.

Snow-Flake navy – Medium yield. Very early. Small erect bush. Small white seed. Reported resistant to common mosaic and fuscous blight. Susceptible to white mold and common blight. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from crosses involving red kidney, Michelite, and experimental navy strains. Released in 1974.

Up-Land navy – Medium to high yield. Medium maturity.

Table 26. Characteristics of field bean varieties

Class and variety	Seed yield/acre (pounds)			Averages, Rosemount and Lamberton		
	Rosemount 1972-74	Lamberton 1973-74	Morris 1974	Weight/100 seeds (grams)	Mature (date)	Growth (form)
Pinto						
UI-114	2393	2173	1763	40.0	8-29	vine
UI-111	1994[1]	1987	1749	39.9	8-26	vine
Navy						
Sanilac	1750	1650	599	18.4	8-30	bush
Seafarer	1781	1785	1207	20.2	8-22	bush
Gratiot	1888[1]	1752	675	20.1	8-28	bush
Small White						
Atlas	1992[1]	1820	999	16.8	9-12	vine
Aurora	1861[1]	1873	1144	15.8	8-25	viny bush
Bailiff[3]	1683	1826	1008	13.7	9-16	vine
Bonus	1868	1877	1021	17.4	9-10	vine
Chief	2093	1709	939	16.5	9-13	vine
Great Northern						
Emerson	2452	2152	1955	47.3	8-28	vine
Valley[2]	2341	1742	1741	32.9	9-11	vine
UI-59	2389	2070	1621	35.1	8-30	vine
Pink						
Gloria[2]	2344	2556	1186	32.8	8-30	vine
Roza	2139[1]	1952	1040	35.3	9-2	vine
Sutter	2109	2112	778	31.0	9-2	vine
Viva	2168	1976	1465	26.6	9-1	vine
Dark Red Kidney						
Montcalm	2208	1676	1294	53.3	9-5	bush
Charlevoix	1756	1212	547	50.6	9-5	bush
Light Red Kidney						
Manitou	1283	894	192	45.2	9-12	bush
Mecosta	2260	1571	1176	55.9	9-8	bush
Redkote	1589[1]	1282	364	54.0	9-14	bush
Redkloud[2]	1674	1572	865	54.5	8-27	bush
Cranberry						
Mich. Improved[2]	2190	1831	1127	48.3	9-3	vine
LSD (5%)	249	245	458			

[1] Not tested in 1972. [2] Not tested in 1972-73. [3] Not tested in 1973.

Medium-size bush. Small white seed. Reported resistant to common mosaic and root rot. Susceptible to white mold and common and fuscous blights. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from a cross of Snow-Flake and a navy bean mutation. Released in 1974.

OTHER VARIETIES

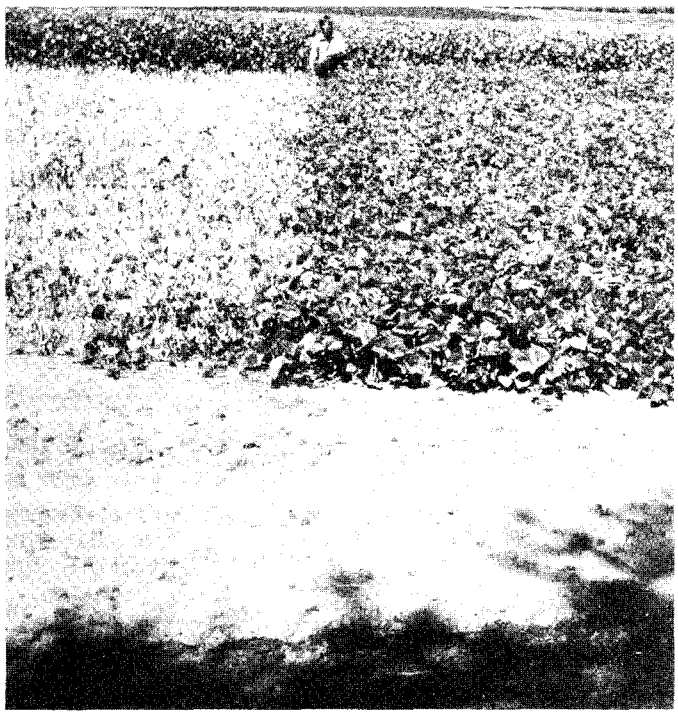
Charlevoix dark red kidney – Lower yield than Montcalm and susceptible to halo blight. Developed by the Michigan Agricultural Experiment Station.

Gratiot navy – Medium yield. Between Sanilac and Seafarer in maturity. Released by the Michigan Agricultural Experiment Station in 1963.

Ouray pinto – Lower yield than UI-111 pinto. Same maturity as UI-111. Semi-erect bush. Very susceptible to blight. Developed by the Colorado Agricultural Experiment Station from crosses involving Sanilac, UI-111, and many other varieties and classes. Named in 1972.

UI-111 pinto – Lower yield than UI-114 but earlier maturing. Less resistant to mosaic and root rot than UI-114. Developed by the Idaho Agricultural Experiment Station from a cross of UI-34 small red and pinto. Released in 1945.

Wyo-166 pinto – Yielded significantly less than UI-114 and significantly more than UI-111 pinto in 1965-68 trials at Rosemount. Between UI-111 and UI-114 in maturity. Vigorous, prostrate vine. Developed by the Wyoming Agricultural Experiment Station from an interspecies cross of Golden Pinto and White Runner (*P. coccineus*) ornamental garden bean. Released in 1965.



Seafarer navy beans at the left are much earlier than the UI-114 pinto beans at the right.

Table 27. Characteristics of field bean varieties in 1974 at six locations

Class and variety	Seed yield/acre (pounds)						Average of six locations		
	Rosemount	Waseca	Lamberton	Morris	Crookston	Grand Rapids	Yield/acre (pounds)	Weight/100 seeds (grams)	Mature (date)
Navy									
Sanilac	1732	1166	1571	599	777	2303	1358	17.8	9-12
Seafarer	1778	991	1617	1207	1484	2439	1586	19.8	8-24
Charity	1895	896	1930	1126	1743	2509	1683	22.0	8-27
Snow-Bunting	2005	949	1801	1172	1814	2418	1693	19.6	8-24
Snow-Flake	1809	688	1547	972	1587	2429	1505	19.7	8-22
Up-Land	1824	1007	1784	1480	1849	2252	1699	19.1	8-27
Pinto									
UI-114	2412	1446	1710	1763	1755	1867	1826	37.5	9-14
LSD 5%	392	325	334	458	312	306	146		

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 for which certified seed is available 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 28 and 29 are ranked according to fall growth score, 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, but 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. 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 African, Bonanza, Caliente, Caliverde, Caliverde 65, Delta, El-Unico, Florida 66, Hairy Peruvian, Hayden, Joaquin II, Mesa Sirsa, Mesilla, Moapa, Moapa 69, Salton, Sonora, Sonora 70, 183, WL 504, WL 508, WL 600, and Unico.

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 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. The first Phytophthora resistant variety, Agate, was released in 1973 by the Minnesota Agricultural Experiment Station and the USDA.

FOLIAR DISEASE – Common leafspot, blackstem and Lepto leafspot are the most important foliar diseases throughout Minnesota. Losses from these diseases usually result in leaf losses which reduce both total yield and forage quality.

INSECT RESISTANCE – Losses caused by insects are usually less than those caused by diseases. Potato leafhopper can cause injury in July and August if harvest is delayed past 1/10 bloom. Potato leafhoppers are most serious in southern Minnesota.

Table 28. Average yields expressed as percentage of Vernal for all tests in Minnesota, 1959-1974

Variety	Yield (percent of Vernal)					
	Seeding year	Year after seeding				
		1st	2nd	3rd	4th	5th-7th
VERY WINTERHARDY						
Norseman	–	97	93	89	–	–
Ladak	90	87	88	78	89	–
Beaver	–	99	97	93	–	–
Teton	94	89	93	86	93	–
Travois	–	88	88	88	87	–
Ramsey	93	101	102	104	115	110
SX-10	108	101	99	103	–	–
WINTERHARDY						
Dawson	99	101	106	105	100	98
Vernal, tons hay/acre	2.0	4.8	4.3	4.5	4.2	4.2
Titan	104	102	101	103	106	106
123	102	102	105	102	102	–
Victoria	99	99	100	100	88	–
WL 215	91	101	108	109	–	–
Agate	112	100	102	106	–	–
ATRA 55	102	110	108	106	112	–
Iroquois	94	109	105	106	110	108
Ladak 65	–	99	104	101	99	–
WL 202	–	101	101	104	106	100
Narragansett	89	100	101	95	92	81
Scout	104	101	100	100	99	90
153	97	97	103	85	–	–
525	–	101	98	101	105	100
520	108	110	112	109	117	–
Weevlchek	101	109	110	111	103	–
Anchor	99	107	110	111	115	–
Gladiator	–	–	–	–	–	–
Progress	–	99	101	103	105	99
Ranger	88	97	98	97	99	93
Team	102	102	103	100	90	–
MODERATELY WINTERHARDY						
WL 308	–	–	–	–	–	–
522	–	97	101	100	103	97
Arc	107	104	–	–	–	–
WL 216	109	107	108	108	–	–
WL 307	108	104	107	109	–	–
Tempo	92	100	107	102	107	–

(continued on page 25)

Table 28 (continued). Average yields expressed as percentage of Vernal for all tests in Minnesota, 1959-1974

Variety	Yield (percent of Vernal)					
	Seeding year	Year after seeding 1st	2nd	3rd	4th	5th-7th
WL 306	96	108	116	106	109	—
A59	—	102	103	109	110	100
530	104	99	103	—	—	—
Bonus	100	98	101	103	99	—
WL 305	—	97	100	108	—	—
WL 309	108	107	112	114	—	—
Apex	91	101	109	102	105	62
Chimo	107	103	—	—	—	—
G777	103	100	—	—	—	—

Table 28 (continued). Average yields expressed as percentage of Vernal for all tests in Minnesota, 1959-1974

Variety	Yield (percent of Vernal)					
	Seeding year	Year after seeding 1st	2nd	3rd	4th	5th-7th
Saranac	102	105	105	105	106	101
Thor	104	104	106	108	—	—
A57	115	96	102	—	—	—
Glacier	104	101	105	84	85	31
Warrior	101	97	103	99	101	82
WL 303	94	99	106	105	109	83
A24	—	109	101	—	—	—
Europa	111	98	100	81	89	32
Stride	90	94	102	99	85	31

Table 29. Winterhardiness index and disease and insect resistance of certified alfalfa varieties under Minnesota conditions

Variety	Certification applicant[1]	Winter hardiness (index)[2]	RESISTANT PLANTS					
			Bacterial wilt (percent)[3]	Phytophthora root rot (percent)[3]	Common leaf spot (percent)[3]	Lepto leaf spot (percent)[3]	Spring blackstem (percent)[3]	Leafhopper yellowing (percent)[3]
VERY WINTERHARDY		highest values best						
Norseman	Barzen of Minneapolis	7.9	34	5	34	10	27	36
Ladak	USDA (foreign introduction)[a]	7.5	9	2	22	7	23	43
Beaver	Agriculture Canada[a]	7.4	28	3	26	8	36	38
Teton	S. Dakota Agr. Exp. Sta.[b]	7.4	17	9	51	6	30	61
Travois	S. Dakota Agr. Exp. Sta.[b]	7.4	42	1	42	7	44	72
Ramsey	Minnesota Agr. Exp. Sta. & USDA[a]	6.7	42	12	94	23	64	48
SX-10	Sexauer Co.	6.7	6	4	—	—	—	—
WINTERHARDY								
Dawson	Nebraska Agr. Exp. Sta. & USDA[b]	6.5	16	1	32	13	22	18
Vernal	Wisconsin Agr. Exp. Sta. & USDA[b]	6.5	47	3	23	14	41	29
Titan	Rudy-Patrick Co.	6.4	68	3	31	16	60	47
123	DeKalb AgResearch Inc.	6.3	46	4	8	22	39	51
Victoria	Arkansas Agr. Exp. Sta.[a]	6.3	5	14	47	9	43	46
WL 215	Waterman-Loomis Co.[c]	6.3	40	5	23	15	38	23
Agate	Minnesota Agr. Exp. Sta. & USDA[b]	6.0	73	55	66	16	10	19
ATRA 55	Arnold-Thomas Seed Service[d]	6.0	27	1	44	33	22	30
Iroquois	Cornell University[b]	6.0	69	1	44	10	40	26
Ladak 65	Montana Agr. Exp. Sta.[b]	6.0	40	2	16	4	29	23
WL 202	Waterman-Loomis Co.[c]	6.0	39	2	7	12	39	29
Narragansett	Rhode Island Agr. Exp. Sta.[a]	5.9	<1	2	44	11	44	24
Scout	Farmers Forage Res. Coop.[e]	5.8	13	2	30	9	19	32
153	DeKalb AgResearch Inc.	5.7	2	10	7	5	19	27
525	Arnold-Thomas Seed Service[d]	5.7	43	1	29	24	52	21
520	Arnold-Thomas Seed Service[d]	5.6	45	1	25	17	42	42
Weevlchek	Farmers Forage Res. Coop.[e]	5.5	64	2	47	22	38	74
Anchor	Rudy-Patrick Co.	5.4	40	4	58	13	18	13
Gladiator	Northrup, King & Co.	5.4	64	2	—	—	—	—
Progress	Cal/West Seeds[f]	5.4	29	2	18	9	18	39
Ranger	Nebraska Agr. Exp. Sta. & USDA[b]	5.4	16	2	11	1	7	16
Team	USDA[b]	5.4	<1	1	51	10	38	59
MODERATELY WINTERHARDY								
WL 308	Waterman-Loomis Co.[c]	5.3	24	1	29	17	28	41
522	Arnold-Thomas Seed Service[d]	5.3	45	4	15	10	40	30
Arc	USDA[a]	5.2	8	4	—	—	—	—
WL 216	Waterman-Loomis Co.[c]	5.2	28	2	11	8	27	44
WL 307	Waterman-Loomis Co.[c]	5.2	29	<1	—	—	—	—
Tempo	Farmers Forage Res. Coop.[e]	5.1	29	3	42	11	19	31
WL 306	Waterman-Loomis Co.[c]	5.1	25	1	16	8	40	28
A59	E.F. Mangelsdorf & Bros. Inc.[g]	5.0	18	5	21	12	42	18
530	Arnold-Thomas Seed Service[d]	5.0	43	2	68	6	46	20
Bonus	Cal/West Seeds[f]	4.7	13	1	17	18	40	45
WL 305	Waterman-Loomis Co.[c]	4.7	25	6	13	9	47	36
WL 309	Waterman-Loomis Co.[c]	4.7	28	4	—	—	—	—

Table 29 (continued). Winterhardiness index and disease and insect resistance of certified alfalfa varieties under Minnesota conditions

Variety	Certification applicant[1]	Winter hardiness (index)[2]	RESISTANT PLANTS					
			Bacterial wilt (percent)[3]	Phytophthora root rot (percent)[3]	Common leaf spot (percent)[3]	Lepto leaf spot (percent)[3]	Spring blackstem (percent)[3]	Leafhopper yellowing (percent)[3]
Apex	Rudy-Patrick Co.	4.6	<1	2	48	10	20	28
Chimo	L. Teweles Seed Co.	4.6	22	1	–	–	–	–
G 777	Funk Bros. Seed Co.	4.5	28	5	–	–	–	–
Saranac	Cornell University[b]	4.5	55	2	49	18	37	20
Thor	Northrup, King & Co.	4.5	78	1	–	–	–	–
A-57	Embro Seed Co. Inc.[g]	4.4	14	8	–	–	–	–
Glacier	Northrup, King & Co.	4.4	<1	1	56	16	42	24
Warrior	Northrup, King & Co.	4.3	22	<1	55	12	26	16
WL 303	Waterman-Loomis Co.[c]	4.3	12	1	22	20	32	37
A24	Embro Seed Co. Inc.[g]	4.2	5	2	64	3	28	25
Europa	H.W. Walcott & Co.	3.3	<1	<1	81	12	21	20
Stride	Cal/West Seeds[f]	3.0	2	<1	58	7	17	31

[1] Sold in Minnesota by: a. Seed not available or very limited, b. Seed available from several sources, c. Cenex Seed Co. and Midland Cooperatives, Inc., d. Pioneer Hi-Bred International, Inc., e. Land O'Lakes-Felco, f. Peterson Seed Co., and g. Ramy Seed Co.

[2] Based on fall growth after cutting in 1st week of September: 1= tallest, 9 = shortest.

[3] Plants with little or no injury are classed as resistant.

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.

RECOMMENDED VARIETIES

Empire – Winterhardy, prostrate growth habit. Released by New York Agricultural Experiment Station.

Carrol – Winterhardy, prostrate, persistent pasture type. Slightly earlier in maturity, better seedling vigor and larger seed than Empire. Released in 1970 by Iowa Agricultural Experiment Station. Seed sale regulated by U.S. Variety Protection Act.

Leo – Winterhardy, higher yielding, less prostrate growth habit, and better seedling vigor than Empire. Released in 1963 by MacDonald College, Quebec, Canada.

OTHER VARIETIES

Viking – Less winterhardy than Empire, upright. Released by New York Agricultural Experiment Station.

Table 30. Dry matter yields of birdsfoot trefoil varieties in tons per acre

Variety	Crookston	Grand Rapids	Lamberton	Rosemount
No. trial years	2	2	2	3
Carrol	3.60	2.10	2.65	3.30
Empire	2.97	1.96	2.02	2.89
Leo	3.02	2.58	2.89	3.27
Viking	2.60	2.27	2.60	2.43
LSD 5%	.38	.38	.47	.43

RED CLOVER

Red clover is grown in association with timothy for hay or silage. Winterhardy varieties will generally not persist beyond two crop years because of susceptibility to crown rot and other diseases. Red clover should not be seeded with alfalfa because red clover seedlings are more aggressive than alfalfa seedlings and may prevent alfalfa from becoming established. Where alfalfa can be grown successfully, it will yield more than red clover.

RECOMMENDED VARIETIES

Dollard – Persistent with good forage yield in second crop year. Resistant to northern anthracnose but susceptible to powdery mildew. Released in 1937 by MacDonald College, Quebec, Canada, and distributed by Maple Leaf Mills Ltd., Toronto, Canada.

Lakeland – Fairly persistent with good forage yield in second crop year. Highly resistant to powdery mildew and resistant to northern anthracnose and virus. Released in 1959 by Wisconsin Agricultural Experiment Station in cooperation with U.S. Department of Agriculture.

VARIETIES NOT ADEQUATELY TESTED

Arlington – Developed by Wisconsin Agricultural Experiment Station and U.S. Department of Agriculture. Seed not yet available.

Emerson – Local strain from Marion County, Iowa, and

Table 31. Dry matter yields of red clover varieties in tons per acre

Variety	Grand Rapids	Rose-mount[1]	Waseca	Grand Rapids percent stand[2]
No. trial years	3	1	1	
Dollard	3.45	2.48	2.46	73
Kenland	3.40	2.47	2.83	16
Lakeland	3.55	2.42	2.48	78
Pennscott	3.26	2.41	2.56	15
LSD 5%	.20	.21	.60	

[1] One harvest. [2] Reflects winter survival.

released by Iowa Agricultural Experiment Station. Distributed by Peterson Seed Co.

Kenstar – Developed by Kentucky Agricultural Experiment Station and U.S. Department of Agriculture. Selected from Kenland for greater persistence under Kentucky conditions.

Redman – Developed by Farmers Forage Research Cooperative and distributed by Land O'Lakes-Felco.

OTHER VARIETIES

Kenland – Very susceptible to northern anthracnose and virus. Released by Kentucky Agricultural Experiment Station in cooperation with U.S. Department of Agriculture.

Pennscott – Very susceptible to northern anthracnose and virus. Released by Pennsylvania Agricultural Experiment Station.

This forage chopper, driven by M.R. Gehring at Waseca, is used to harvest variety trials of forage crops. These oats are being harvested for silage.

BROMEGRASS

Bromegrass is generally grown for hay in mixture with alfalfa or is used as pasture in mixture with other grasses and legumes. Present 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. All of the recommended varieties are of the southern type and are satisfactory in winterhardiness under Minnesota conditions.

RECOMMENDED VARIETIES

Baylor – Leafy, good seedling vigor. Developed and distributed by Rudy-Patrick Co.

Fox – Spreading, good seedling vigor, good tolerance to leaf diseases. Maturity similar to Lincoln. Released in 1968 by Minnesota Agricultural Experiment Station.

Lincoln – Spreading, good seedling vigor. Released in 1942 by Nebraska Agricultural Experiment Station in cooperation with U.S. Department of Agriculture.

Sac – Leafy, moderately coarse, good tolerance to leaf diseases. Released in 1962 by Wisconsin Agricultural Experiment Station in cooperation with U.S. Department of Agriculture.

Saratoga – Leafy, good aftermath production. Released in 1955 by New York Agricultural Experiment Station.

Table 32. Dry matter yields of bromegrass varieties in tons per acre

Variety	Crookston	Grand Rapids	Lamberton	Morris	Rosemount
No. trial years	2	4	3	3	4
Baylor	2.77	3.73	3.20	3.19	3.53
Fox	2.62	4.05	3.08	3.21	3.48
Lincoln	2.55	3.64	3.00	3.16	3.39
Sac	2.67	3.70	3.03	3.22	3.65
Saratoga	2.69	4.18	3.23	3.44	3.53
LSD 5%	.43	.43	.36	.25	.31

ORCHARDGRASS

Orchardgrass is used with other grasses in mixtures with 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. Orchardgrass should be grown in mixtures with adapted grasses having similar heading characteristics. Heading differences were greater among varieties grown at Rosemount than at Grand Rapids. Early heading varieties and common types tested are generally less satisfactory than those with medium to late heading in mixtures.

Table 33. Characteristics of orchardgrass varieties in Minnesota and adjacent states

Variety	Developed by	Heading	Winter injury Rosemount (percent)	Dry matter yield, tons/acre Fargo N.D.	Arlington Wis.	Spooner Wis.	Grand Rapids	Morris	Rose-mount	Leaf rust reaction[1] Rose-mount	Arlington Wis.
No. trial years			1	1	2	5	2	3	3	1	1
Boone	Kentucky Agr. Exp. Sta.	Early	40	–	2.96	–	2.97	–	2.76	4.8	3.5
Chinook	Agriculture Canada	Early	10	–	–	–	2.97	2.44	2.53	4.5	–
Dayton	Rudy-Patrick Company	Medium	–	–	2.56	2.53	–	–	–	–	3.9
Hallmark	Farmers Forage Res. Coop.	Medium	30	–	–	–	3.29	–	2.88	4.8	4.1
Ina	Ontario Agr. College, Guelph	Medium	17	–	–	–	3.15	–	2.73	3.3	–
Napier	Rudy-Patrick Company	Medium	32	–	2.69	–	3.23	–	2.85	3.8	4.0
Orbit	Northrup, King & Company	Medium	7	–	–	–	3.04	–	2.79	2.3	–
Pennmead	Pennsylvania Agr. Exp. Sta.	Medium	–	2.39	–	–	–	–	–	–	–
Potomac	USDA & Maryland Agr. Exp. Sta.	Medium	–	2.66	2.86	2.46	–	–	–	–	3.7
Sterling	Iowa Agr. Exp. Sta.	Medium	–	3.10	2.80	2.59	–	3.09	–	–	4.1
Nordstern	Northrup, King & Company	Late	10	3.69	2.54	2.32	3.31	2.78	2.81	3.0	4.1
Pennlate	Pennsylvania Agr. Exp. Sta.	Late	–	3.19	–	–	–	–	–	–	–
Rideau	Agriculture Canada	Late	–	2.39	2.50	2.33	–	–	–	–	4.3
LSD 5%				.59			.30	.25	.26		

[1] 1 = resistant, 5 = most susceptible.

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. The recommended varieties in Minnesota tests are similar in yield. All appear winterhardy and persistent.

RECOMMENDED VARIETIES

Frontier – Slightly later in maturity and leafier than Ioreed. Licensed in 1959 by Agriculture Canada, Ottawa.

Ioreed – Moderately productive in first year's stand, mid-early in maturity. Appears similar to common types from older stands in Minnesota. Released in 1946 by Iowa Agricultural Experiment Station.

Rise Stand establishment better and slightly later in maturity than Ioreed. Developed and distributed by Rudy-Patrick Co.

VARIETIES NOT ADEQUATELY TESTED

Castor – Higher seed retention but similar to Frontier in maturity and forage yield. Developed by Agriculture Canada, Alberta, and licensed in 1972.

Grove – About 7-10 days later in maturity than Frontier, equal to Frontier in forage yield and slightly more palatable to cattle in Canadian trials. Developed by Agriculture Canada, Ottawa, and licensed in 1970.

Vantage – Slightly earlier than Rise. Higher seed yield and less shattering than Rise in Minnesota trials. Developed by Iowa Agricultural Experiment Station and released in 1972.

Table 34. Dry matter yields of reed canarygrass varieties in tons per acre.

Variety	Arlington Wis.	Lancaster Wis.	Grand Rapids	Lamberton	Morris	Rosemount	Waseca
No. trial yrs.	1	1	2	3	1	2	1
Castor	–	–	–	1.77[1]	2.64	–	–
Frontier	3.33	6.54	4.61	2.35	2.78	4.90	3.22
Grove	3.10	5.93	4.12	–	2.26	4.60	–
Ioreed	–	–	4.62	2.04[1]	–	–	3.15
Rise	3.27	6.24	4.65	2.48	2.77	5.04	3.15
Vantage	3.22	6.27	4.92	2.05[1]	2.67	4.99	–
LSD 5%	ns	ns	.44	.25	.32	.28	.40

[1] Data from 1 trial year.

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.

RECOMMENDED VARIETIES

Clair – Vigorous, and very early. Adapted to a three-cut system with alfalfa. Released in 1958 by Kentucky Agricultural Experiment Station.

Climax – Tall, fine-stemmed, leafy, medium-late maturity. Developed by Agriculture Canada, Ottawa, and licensed in 1947.

Itasca – Less leafy than Climax, medium maturity. Well adapted throughout Minnesota. Released by Minnesota Agricultural Experiment Station.

Lorain – Medium-late maturity. Released in 1939 by Ohio Agricultural Experiment Station in cooperation with U.S. Department of Agriculture.

VARIETIES NOT ADEQUATELY TESTED

Champ – Leafy with good aftermath in Canadian trials. Five to seven days earlier in maturity than Climax. Developed by Agriculture Canada, Ottawa, and licensed in 1967.

Timfor – Medium-early, very leafy variety relatively free of leaf diseases. Named in 1971 by Northrup, King & Co.

OTHER VARIETIES

Drummond – Relatively tolerant to rust, medium-late maturity. Released by MacDonald College, Quebec, Canada.

Essex – Forage relatively disease-free, leafy, and very late maturity. Released in 1955 by New York Agricultural Experiment Station.

Verdant – Leafy, relatively disease free, but low yielding, late maturity. Released in 1968 by Wisconsin Agricultural Experiment Station in cooperation with U.S. Department of Agriculture.

Table 35. Dry matter yields of timothy varieties in tons per acre

Variety	Arlington Wis.	Ashland Wis.	Crookston	Grand Rapids	Morris	Rosemount
No. trial years	3	2	2	6	3	2
Champ	3.05	2.15	–	3.41	–	–
Clair	2.82[1]	–	3.66	3.82[2]	3.74	3.78
Climax	2.88[1]	2.11	3.62	3.62[2]	3.73	3.44
Drummond	2.90	–	3.54	3.38[2]	–	–
Essex	2.48	–	3.19	3.46[2]	–	–
Itasca	–	–	3.79	3.52	3.72	3.55
Lorain	2.95	2.16	–	2.98[2]	3.39	–
Timfor	–	–	–	–	–	3.54
Verdant	2.62	2.15	–	3.37	–	–
LSD 5%	ns	ns	.71	.18	.34	.47

[1] Data from 2 trial years.

[2] Data from 3 trial years.

RATE AND DATE OF SOWING

Rates are based on average seedbed and on use of good quality seed of high germination. Use high rate for large-seeded and low rate for small-seeded recommended varieties. Increase rate for seed of low germination.

Crop	Bushel weight* in pounds	Rate/acre in pounds	Date
Barley	48	72-96	Early spring
Corn	56	10-20	Late April or early May
Flax	56	42-56	April 15 to May 15
Forage Grass (perennial) If mixed with legumes, sow at time indicated for the legume.			
Bromegrass in mixtures	14	5-8	Early spring or late summer
Orchardgrass in mixtures	14	2-6	Early spring or late summer
Reed canarygrass	44-48		Early spring or late
Alone		6-8	summer
In mixtures		4-6	
Timothy in mixtures	45	2-6	Early spring or late summer
Forage Legumes (biennial or perennial)			
Alfalfa	60		Early spring to
Alone		8-12	August 10
With grasses		5-8	
Birdsfoot trefoil (with grasses)	60	5-6	Early spring
Clover	60		Early spring
Alsike (in mixture)		2-4	
Ladino (in mixture)		½-1	
Red (in mixture)		4-8	
Sweet Clover	60		Early spring
Alone		10-12	
In mixture		2-4	
Oats	32	64-80	Early spring
Rye	56	56-70	September
Sorghum	50 (sweet), 56 (grain)		May 20 to June 5
18- to 40-inch rows		5-10	for grain
6- to 14-inch rows		7-15	
Sudangrass	40		May 20 to June 10
18- to 40-inch rows		10-20	
6- to 14-inch rows		25-30	
With 1½ bushels of soybeans		10	
Soybeans	60		
6- to 7-inch rows		120 (4 seeds/ft.)	
20-inch rows		75 (8 seeds/ft.)	May 5-25
30-inch rows		60 (10 seeds/ft.)	
40-inch rows		50 (11 seeds/ft.)	
Wheat	60		
Hard Red Spring		75-90	Early spring
Durum		90	Early spring
Winter		75-90	Aug. 20 to Sept. 20
Miscellaneous Crops			
Annual canarygrass	50	40-50	Early spring
Buckwheat	48-50	40-48	June 15 to July 15
Field peas	60	120-225	Early spring
With 1½ to 2 bushels of oats		45-90	
Fababeans – medium size	60	180	Early spring
With 2 bushels of oats		60	
Millet	48-56	20-40	June 15 to July 15
Mustard and oilseed rape	50-58	10	May 1 – June 15
Navy beans	60	40	May 20 to June 15
Pinto beans	60	60-80	May 20 to June 15
Kidney beans	60	75-100	May 20 to June 15
Rape for forage	50	4-6	Early spring with oats
Sunflowers	24	3-8	May 1-25

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