

1964 varietal trials were conducted at these locations.

VARIETAL TRIALS OF FARM CROPS

UNIVERSITY OF MINNESOTA

AGRICULTURAL EXPERIMENT STATION

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Many varieties of farm crops are available. Successful crop production depends to a considerable extent on the selection of 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 Duluth; and on farmers' fields.

Recommended varieties, important old varieties, and promising new varieties are grown in replicated field 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 results from 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 of 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.*

Varities 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. Promising new varieties developed in other states or countries which are brought into the state for seed production or for use on farms before the 3 years of tests can be completed 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.

Those varieties listed in the "other varieties" category are usually inferior in one or more characteristics, as demonstrated in comparative tests.

The use of certified seed of recommended varieties is recommended. 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 that Minnesota seed growers wish to produce for export to other states. Certification does not imply recommendation of a variety.

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 1965 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul, Minnesota 55101, or from county agricultural agents' offices.

Authors of this publication are: barley, D. C. Rasmusson; oats, R. A. Kleese; winter rye, R. G. Robinson, R. L. Thompson, W. W. Nelson, and R. H. Anderson; spring wheat and winter wheat, E. R. Ausemus, D. R. Johnston, and E. C. Gilmore, Jr.; millet, R. G. Robinson; flax, V. E. Comstock and J. H. Ford; soybeans, J. W. Lambert and R. L. Cooper; sunflowers and dry edible peas and field peas, R. G. Robinson and F. K. Johnson; alfalfa, L. J. Elling; birdsfoot trefoil, red clover, sweet clover, bromegrass, kentucky bluegrass, and timothy, H. L. Thomas; and sudangrass, A. R. Schmid.

BARLEY

RECOMMENDED VARIETIES

Larker - Six-rowed, semi-smooth awned, white aleurone variety. Long rachilla hairs. High yield, good standing ability and excellent kernel plumpness. A malting variety. Originated at North Dakota State University, from the cross Traill x a selection from U. M. 570.

Parkland - Six-rowed, smooth-awned, blue aleurone variety. Long rachilla hairs. Relatively tall, but good resistance to lodging. High yielding. Careful threshing necessary to avoid excessive skinning and breaking. Acceptable for malting when grown in northwestern Minnesota. Originated at Brandon, Manitoba, from a cross of (Olli x Montcalm) x Brandon 1136.

Trophy - Six-rowed, rough-awned, white aleurone variety. Long rachilla hairs. Good kernel plumpness. Stands well and is medium in yield. A malting variety. Developed at North Dakota State University from the cross Traill x a selection from U. M. 570.

OTHER VARIETIES

Forrest - Six-rowed, smooth-awned, white aleurone variety. Medium straw strength and yielding ability. Good kernel plumpness. Not acceptable for malting. A single plant selection made at the University of Minnesota from Brandon 1136, which came from (Peatland x Newal) x O.A.C. 21.

Keystone - Six-rowed, smooth-awned, white aleurone variety. High yield; good standing ability. Resistant to loose smut and stem rust. Not suitable for malting. Developed at Brandon, Manitoba, from the cross Jet x Vantage 2 x Vantmore².

Kindred - Six-rowed, rough-awned, white aleurone variety. Short rachilla hairs. Low yield and highly susceptible to lodging. A malting variety. Selected by a farmer, S. T. Lykken of Kindred, North Dakota.

Liberty - Six-rowed, smooth-awned, white aleurone variety. High yielding with good straw strength. Not suitable for malting. Developed at the South Dakota Agricultural Experiment Station. Parentage involves Lion, Manchuria, Peatland, and Titan.

Traill - Six-rowed, rough-awned, white aleurone variety. Short rachilla hairs. Has good standing ability and high yield. Tends to produce low percentage of plump kernels. A malting variety. Developed at North State University from a cross of Kindred x Titan.

*Patterson, R. E. A method of adjustment for calculating comparable yields in variety tests. Agron. Jour. 42 (10) :509-11. 1950.

Table 1. Yields of barley varieties in bushels per acre, 1959-64*

Variety	Morris	Crookston	Lamberton	Waseca	St. Paul	Rosemount	Duluth	Grand Rapids	Northern Minn.	Average 50 tests
Kindred	46	46	45	56	36	50	27	45	43	44
Traill	56	51	52	61	45	56	34	55	53	52
Parkland	55	52	50	57	46	56	35	47	49	51
Trophy	55	53	52	53	42	55	31	47	49	50
Larker	58	56	58	60	50	60	31	50	51	54
LSD (5%)	3	4	5	10	6	3	4	4	4	2

* Morris and Crookston 10 tests; Lamberton, St. Paul, Rosemount, and Grand Rapids 5; Duluth 4; Waseca and northern Minnesota 3.

Table 2. Characteristics of barley varieties

Variety	Date of heading	Height	Lodging score*	Plump kernels†
	June	inches		percent
Kindred	25	33	5.2	38
Traill	26	32	3.7	28
Parkland	27	35	3.5	53
Trophy	25	31	3.5	52
Larker	25	33	3.8	64

* 1 erect, 9 flat.

† Kernels held on 6/64" x 3/4" screen.

OATS

RECOMMENDED VARIETIES

Dodge - Developed at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Maturity and height similar to Clintland 60. Yellow grain with good test weight. Good lodging resistance. Susceptible to yellow dwarf. Medium in yield.

Garland - Selected at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Medium yellow grain with high test weight. Less lodging resistance than Goodfield but higher in yield. Medium-early in maturity, shorter than most varieties, high in yield.

Garry - Developed in Canada from a cross of Victory x (Victoria x Hajira-Banner) and reselected for purity of agronomic characters and disease resistance. Tall, late, above average in yield, with large yellowish-white seed of good test weight.

Goodfield - Developed at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Medium-early in maturity, high in test weight. Short straw with excellent lodging resistance. Lower in yield than other varieties of similar maturity and is recommended for planting only where lodging is a serious problem.

Minhafer - Developed at the Minnesota Agricultural Experiment Station from a cross of Landhafer x (Bond-Rainbow x Hajira-Joanette). Yellow grain, similar to Andrew in yield, height and maturity. Somewhat superior to Andrew in straw strength, grain size, and test weight.

Portage - Tall, mid season, high-yielding, yellowish-white oat with high bushel weight. Medium in lodging resistance. Shows good resistance to crown rust. Developed at the Wisconsin Agricultural Experiment Station from a cross of Ajax x Hawkeye-Victoria.

Rodney - Tall, very late, high in yield. Large, plump, yellowish-white seed of good test weight. Developed in Canada from a cross [(Victoria x Hajira-Banner) x (Victory x Hajira)] x Roxton.

VARIETIES NOT ADEQUATELY TESTED

Brave - Early, above average in yield, with weak straw. Developed at the Illinois Agricultural Experiment Station from a cross of Putnam with a Minnesota selection.

Clintland 64 - Midseason, average in yield, bushel weight and straw strength. Good resistance to crown rust. A Clintland derivative released from the Purdue Agricultural Experiment Station.

Lodi - Late, tall, lodging resistant and excellent yielding ability. Only moderately susceptible to crown rust. Developed

in Wisconsin from (Richland-Bond) x (Garry x Hawkeye-Victoria).

Neal - Early, short, above average lodging resistance, with average yield potential. Is heterogeneous for reaction to stem rust races 7A and 8A. Developed in Nebraska from Nemaha x (Andrew-Landhafer).

Tippecanoe - Early, with good yield potential, and excellent straw strength. Released from Purdue Agricultural Experiment Station from a cross of (Clintland 60 x Mo. 0-205) x Clintland 60.

OTHER VARIETIES

Ajax - White grain, tall, medium-late in maturity. High in yield; medium in weight per bushel. Standing ability is not as good as other recommended varieties. Developed in Canada from the cross Victory x Hajira.

Andrew - Yellow grain, medium in height, early maturing, average yielding oat, with excellent adaptation throughout the Corn Belt. Good weight per bushel; desirable straw strength; high groat percentage. Selected at the Minnesota Agricultural Experiment Station from a cross of Bond x Rainbow.

Au Sable - Late, lodging susceptible and only fair in yield potential. Quite susceptible to stem rust and to smut. Developed in Michigan from (Beaver-Garry-Clinton x Clintland) Minor.

Beedee - Developed from Beacon x Hawkeye-Victoria by the Wisconsin Agricultural Experiment Station. Medium in maturity, height, and lodging resistance. Large brownish-white grain of medium test weight.

Bonda - Relatively tall, good-strawed, and medium-early maturing, with a large yellowish-white grain of superior bushel weight. Low in yield. Selected at the Minnesota Agricultural Experiment Station from a cross of Bond x Anthony.

Bonkee - Released from the Iowa Agricultural Experiment Station. Parentage is Bonham 5 x (Cherokee 2 x R.L.2105). White grain, medium-maturity, moderate straw strength. Medium in yield, good test weight.

Branch - Tall, white oat; late in maturity, and high in yield. Somewhat poor in standing ability. Developed in Wisconsin from the cross (Forward x Victoria-Richland) x Forward.

Burnett - Medium-early maturing, yellowish-white oat; large, plump grain of high test weight. Medium in height, good in yield and straw strength. Developed at the Iowa Agricultural Experiment Station from a cross of Victoria-Hajira-Banner x Colo.

Cherokee - Early and short, fair in yield and test weight. Selected from a cross of D69 x Bond and increased in Iowa and Kansas. Also grown under the names Ames No. 2, McCarthy, or 3846.

Coachman - Mid-season, lodging susceptible and only fair in yield potential. Developed in Michigan from (Beaver-Garry-Clinton x Clintland) Marne².

Clintland - Good-yielding yellow oat of high test weight. Medium in plant height and maturity. Developed in Indiana from the cross Clinton x Landhafer, backcrossed three times to Clinton.

Clintland 60 - Developed at the Indiana Agricultural Experiment Station from a series of backcrosses involving the parentage Clintland² x (Clinton 59⁷ x Landhafer)⁴ x (Clinton-Boone-Cartier x RL 2105). Medium-early maturing, yellow oat of medium-size seed and high test weight. Medium in yield, good in lodging resistance.

Fayette - Early yellow oat; medium in height, standing ability and test weight. Selected from a cross of Vicland x (Branch x Clinton²-Santa-Fe) by the Wisconsin Agricultural Experiment Station.

Glen - Tall, mid-season, high-yielding, yellowish-white oat. Low in bushel weight and poor in standing ability. Shows some resistance to crown rust. Developed at Macdonald College in Canada from a cross of Ajax x Roxton.

Gopher - White-grained, medium-maturing variety selected as a pure line from Sixty Day at the Minnesota Agricultural Experiment Station. Susceptible to stem rust, crown rust, and the smuts.

Manod - Very late, tall, low yield and bushel weight. An introduction from Wales.

Milford - Very late, stiff-strawed, poor yield and bushel weight. Susceptible to smut. An introduction from Wales.

Minton - Good yielding, yellow oat developed at the Minnesota Agricultural Experiment Station from the cross (Landhafer x (Mindo x Hajira-Joanette)) x Clinton. Medium in maturity, plant height, straw strength, and seed size. Test weight is lower than in recommended varieties.

Mo. 0-205 - Grayish-red oat, medium in yield, good in straw strength and test weight. Medium-early in maturity. Developed in Missouri from the cross Columbia x Victoria-Richland.

Nehawka - A re-selection from the Cherokee oat made at the Nebraska Agricultural Experiment Station. Very early, medium yielding oat. Medium in seed size and bushel weight. Short-strawed and good in standing ability.

Nemaha - Almost identical to Cherokee; fair in yield. Developed at Iowa from the cross Victoria-Richland x (Morota x Bond).

Newton - Brownish-yellow oat, medium in height and maturity. Selected from a cross of Nemaha x (Clinton x Boone-Cartier) at the Indiana Agricultural Experiment Station.

Nodaway - Developed at the Missouri Agricultural Experiment Station from the cross Columbia-Marion x (Victoria x Hajira-Banner) x (Victory x Hajira) x Roxton). White, short, plump grain of excellent test weight. Early maturing, medium in height and yield, good straw strength. Susceptible to yellow dwarf.

Ortley - Late, tall, lodging susceptible, with only fair yield potential. Developed in South Dakota from (Garry-Santa Fe-R.L. 1942) x R.L. 2228.

Ransom - Medium height and early maturity with yellow, medium-sized grain. Developed by the North Dakota Agricultural Experiment Station from a cross of Sac x Hajira-Joanette.

Russell - Developed at the Central Experiment Farm in Canada from a cross of (Garry x Ukraine) x Abegweit². Late, medium-tall, good yielding, yellowish-white oat with plump seed of good test weight. Poor in standing ability.

Sauk - Tall, late-maturing, high-yielding, somewhat susceptible to lodging. Large, yellow seed of good test weight. Developed in Wisconsin from the cross (Forward x Victoria-Richland) x Andrew.

Tonka - Selected at the Oklahoma Agricultural Experiment Station from an early-maturing Clinton line. Probably resulted from a cross of Clinton with another variety. Early maturity, medium height, good lodging resistance. Yellow grain of high test weight, low in yield.

Table 3. Adjusted yields of oat varieties in bushels per acre

Variety	Years of trial	Crookston*	Lamberton†	Morris	Rosemount	Waseca	Five-station average	Grand Rapids	Northern Minnesota‡	Seven-station average
Minhafer	1962-4	71	68	78	77	83	76	87	67	77
Neal	1963-4	75	59	68	84	79	74	-	-	-
Tippecanoe	1964	-	70	69	84	85	77	-	-	-
Andrew	1962-4	70	55	62	75	71	67	87	48	70
Bonkee	1962-4	72	52	70	73	68	68	-	-	-
Brave	1963-4	64	67	82	84	77	76	-	-	-
Burnett	1962-4	66	60	80	81	69	72	99	56	76
Clintland 64	1964	-	57	81	85	71	75	-	-	-
Garland	1962-4	78	64	86	99	77	82	99	45	79
Goodfield	1962-4	50	61	73	75	61	65	84	43	67
Coachman	1963-4	69	66	67	82	68	71	-	-	-
Dodge	1962-4	65	62	83	84	74	75	84	51	75
Portage	1962-4	67	66	87	84	90	81	95	53	82
Ajax	1962-4	78	63	77	73	78	74	90	46	75
Garry	1962-4	83	57	79	78	76	75	105	60	79
Lodi	1963-4	102	68	89	81	92	87	98	63	88
Ortley	1963-4	72	54	72	73	67	68	99	58	73
AuSable	1963-4	66	66	74	77	76	73	102	54	77
Rodney	1962-4	81	62	78	74	64	72	101	53	76
Milford	1964	-	49	53	50	52	51	-	-	-
Manod	1964	-	54	68	65	68	65	-	-	-
LSD (5%)		13	11	8	7	9	4	8	16	3

* No 1964 data.

† No 1963 data.

‡ No 1962 or 1963 data.

Table 4. Adjusted characteristics of oat varieties, 1962-4, and reactions to diseases, 1964

Variety	Heading date	Lodging score*	Height (inches)	Bushel weight (pounds)	Stem rust races†					Crown Rust†	Smut†
					6&6F	7	7A	8	6A,13A,6AF		
Minhafer	June 19	3.6	37	32.3	R	R	R	R	S	S	R
Neal	19	3.8	33	31.4	S	R,S	R,S	R,S	S	S	R
Tippecanoe	19	3.0	35	31.8	R	R	R	R	S	S	R(MS)
Andrew	20	4.8	37	30.6	S	R	R	S	S	S	R
Bonkee	21	4.5	36	31.5	R	R	R	R	S	S	R
Brave	21	5.2	37	30.8	R	R	S	R	S	S	R
Burnett	22	4.4	36	31.2	R	R	S	R	S	S	R
Clintland 64	22	3.9	37	31.2	R	R	R	R	S	MR	R(MS)
Garland	22	4.6	35	32.3	R	R	R	R	S	MS	R
Goodfield	22	3.2	34	33.9	R	R	R	R	S	S	R
Coachman	23	5.7	35	30.6	R	R	R	R	S	S	S
Dodge	23	3.6	37	33.3	R	R	R	R	S	MS	R(MS)
Portage	24	4.4	40	31.0	S	R	R	S	S	MR	R
Ajax	25	4.8	39	29.6	S	R	R	S	S	S	S
Garry	26	4.1	40	28.8	R	R	R	R	S	S	R
Lodi	27	3.6	41	29.8	R	R	R	R	S	MS	R(MS)
Ortley	28	5.8	40	30.0	R	R	R	R	S	S	R(S)
AuSable	29	6.0	38	30.2	S	S	S	S	S	S	R(S)
Rodney	29	5.9	40	28.9	R	R	S	R	S	MS	R
Milford	30	3.4	34	26.7	-	-	S	-	S	S	S
Manad	July 1	4.2	40	24.3	-	-	S	-	S	S	MR

* 1 erect, 9 flat.

† R = Resistant MR = Moderately Resistant R,S = Mixture of resistant and susceptible types in variety.
S = Susceptible MS = Moderately Susceptible

Reactions in parentheses are from tests in other states and indicate susceptibility to races other than those tested in Minnesota.

WINTER RYE

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

RECOMMENDED VARIETIES

Adams - High-yielding, winterhardy, medium maturity, and tall. Medium-size seed. Light brown in color, and high in bushel weight. A combination of lines from Imperial which were selected for high fertility. Released by the University of Wisconsin in 1953.

Caribou - High-yielding, very winterhardy, medium maturity, and tall. Small seed, somewhat mixed in color, and high bushel weight. Selected from Crown rye by the University of Saskatchewan; increased and released by the University of Minnesota in 1953.

Elk - Highest yielding recommended variety, fair winterhardness, late maturity, and tall. Medium-size seed, predominantly green in color, and high bushel weight. Originated from a small lot of seed obtained in 1953 from the Cereal Crops Division, Canada Department of Agriculture. Named and released by the University of Minnesota in 1959.

VARIETIES NOT ADEQUATELY TESTED

Frontier - High yielding, very winterhardy, medium maturity and tall. Medium size seed of high bushel weight. Developed by the Swift Current, Saskatchewan, Experimental Farm from a cross of Petkus x Dakold. Seed may be distributed by Canada Department of Agriculture in summer of 1965.

Pearl - High-yielding, fair winterhardness, late maturity, and tall. Medium-size seed of brown and green color and medium bushel weight. Seed obtained from Canada Department of Agriculture Experimental Farm, Swift Current, Saskatchewan and thought to originate from seed imported from Denmark about 1952.

Varne - High-yielding, fair winterhardness, late maturity, and medium height. Medium-size seed of brown and green color. Medium to low bushel weight. Released in 1956 by the Swedish Seed Association from a cross of King's II x Petkus I.

OTHER VARIETIES

Antelope - Appears identical to Caribou, its sister selection, except it has yielded less in Minnesota. Released by the University of Saskatchewan in 1952.

Von Lochow - High-yielding, fair winterhardness, late maturity, and short. Very good resistance to lodging. Large seed, predominantly green in color, and high in bushel weight. Seed obtained from the F. von Lochow-Petkus Ltd. of Germany.

Table 5. Yields of winter rye varieties in bushels per acre, 1958-64

Variety	Rosemount	Lamberton	Morris	Grand Rapids	Average four locations
Adams	42	38	34	65	45
Caribou	39	39	36	68	46
Elk	46	45	33	64	47
Von Lochow	45	48	34	61	47
LSD (5%)	3	3	4	4	2
Pearl*	49	44	36	65	48
Varne†	44	46	34	65	47

* Grown 1960-64 at Rosemount; 1961-64 other locations. Yields adjusted.

† Grown 1961-64. Yields adjusted.

Table 6. Characteristics of winter rye varieties, 1958-64

Variety	Winterkill* percent	Date heading	Date mature	Plant height inches	Lodging score†	Weight of 100 seeds grams	Bushel weight pounds
Adams	12	May 29	19	53	3.4	2.6	55.6
Caribou	4	May 30	19	50	3.6	2.3	55.8
Elk	32	June 1	21	48	3.3	2.7	55.6
Von Lochow	40	June 2	22	44	1.9	2.8	56.2
Pearl ‡	28	June 2	21	47	3.1	2.5	55.1
Varnet ‡	32	June 1	22	46	2.9	2.6	54.3

*Average of 15 trials in which winterkilling occurred (Rosemount 1959, 1963-64; Lamberton 1959, 61; Morris 1959-64; Grand Rapids 1960-61, 63-64).

†1 erect, 9 flat.

‡Data adjusted as not grown in all trials.

WINTER WHEAT

RECOMMENDED VARIETIES

Minter - Tall, bearded, winterhardy variety of medium straw strength. Susceptible to leaf rust and to some prevalent races of stem rust. High yielding with good test weight. Milling and baking characteristics are satisfactory. Selected from a backcross of Hope x Minturki² at the Minnesota Agricultural Experiment Station.

VARIETIES NOT ADEQUATELY TESTED

Lancer - Bearded variety of medium maturity and height with good straw strength. Susceptible to leaf rust and loose smut, but resistant to some prevalent races of stem rust. May not be sufficiently winterhardy. Selected from a cross of Turkey-Cheyenne x Hope-Cheyenne² at the Nebraska Agricultural Experiment Station.

OTHER VARIETIES

Blackhawk - Bearded variety of good quality. Susceptible to stem rust and moderately resistant to leaf rust. Winterhardness is not satisfactory. A selection from a Fultz x Minturki cross developed by the Wisconsin Agricultural Experiment Station.

Gaines - A semidwarf white wheat developed at the Washington Agricultural Experiment Station. Completely winter-killed in Minnesota trials.

Minturki - Bearded, white-chaffed, stiff-strawed variety. Early maturing; lower yielding than Minter. Moderately resistant to bunt, loose smut, and fusarial head blight. Susceptible to leaf and stem rust. Winterhardy. Selected from a cross of Turkey x Odessa by the Minnesota Agricultural Experiment Station.

Nebred - Short, bearded variety of medium maturity, straw strength, yield and bushel weight. Winterhardness is not satisfactory. Susceptible to leaf rust and stem rust. Quality

is satisfactory. It was selected from Turkey at the Nebraska Agricultural Experiment Station.

Omaha - Bearded, stiff-strawed variety. Lacks winterhardness and resistance to both stem and leaf rust. It is low in yield and test weight. Selected from a cross of Pawnee x Nebred at the Nebraska Agricultural Experiment Station.

Racine - Soft, bearded variety somewhat taller and earlier than Minter and stiffer strawed. Susceptible to stem rust and moderately susceptible to leaf rust. Higher yielding than Minter but not as winterhardy. A selection from a cross of (Gladden x Kansas 500) x (Fultz x Hungarian) x Kansas 500) developed by the Wisconsin Agricultural Experiment Station.

Rodco - Bearded, mixed white and brown chaff, early, short, stiff-strawed variety. Winterhardness is not satisfactory. Susceptible to leaf rust and stem rust. This variety is of unknown origin.

Warrior - Early, bearded, short-strawed variety with good straw strength. Winterhardness is not satisfactory. Susceptible to leaf rust and stem rust. Low yield with medium test weight. Quality is satisfactory. Selected from a cross of Pawnee x Cheyenne at the Nebraska Agricultural Experiment Station.

Winalta - Bearded variety of medium height and straw strength. Susceptible to leaf and stem rust. Test weight is good and milling and baking characteristics are satisfactory. Not sufficiently winterhardy, thus yields may be low. Selected from a cross of Minter x Wichita at the Canada Department of Agriculture Research Station, Lethbridge, Alberta.

Yogo - Bearded, weak-strawed variety with good winterhardness. Susceptible to leaf rust and stem rust. Medium in yield and test weight. Quality is not satisfactory. Selected from a cross of (Minturki x Beloglina) x Buffum at the Kansas Agricultural Experiment Station.

Table 7. Yields and other characteristics of winter wheat varieties, 1962-1964

Variety	Date heading	Plant height inches	Winter injury %	Lodging score*	Leaf rust reaction†	Stem rust reaction†	Test weight pounds	Yield, bushels per acre			
								St. Paul	Waseca	Lamberton	Grand Rapids
Minter	June 12	39	11	2.0	S	R-S	61.6	17	37	30	22
Lancer‡	9	34	14	1.1	S	R-S	60.6	13	41	---	---
Warrior	8	34	21	1.6	S	S-R	57.8	20	29	---	---
Winalta	11	36	17	2.2	S	S	60.7	19	33	29	20
Yogo	12	39	4	2.8	S	S	58.3	19	23	---	---
LSD 5%								5	3	2	N.S.

* 1 erect, 9 flat.

†Reaction to prevalent races; R = resistant, S = susceptible.

‡Lancer data are adjusted; tested only 2 years.

SPRING WHEAT

RECOMMENDED VARIETIES

HARD RED SPRING

Crim - Bearded variety of medium height, straw strength and maturity. Susceptible to loose smut and leaf rust but resistant to stem rust. High yielding with good test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Klein Titan-Thatcher³ x (Kenya 58-Newthatch x Thatcher²) at the Minnesota Agricultural Experiment Station.

Justin - Awnless, stiff-strawed and late maturing variety. Moderately susceptible to leaf rust but resistant to stem rust. Medium in yield. Milling and baking characteristics are satisfactory. Selected from a cross of Conley x (Thatcher-Kenya Farmer x Mida-Lee) at the North Dakota Agricultural Experiment Station.

Pembina - Awnless variety of medium height, maturity and straw strength. Moderately susceptible to leaf rust but resistant to stem rust. High yielding with good test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Thatcher x (McMurachy-Exchange x Redman³) by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

Selkirk - Awnless variety of medium height and maturity with good straw strength. Moderately susceptible to leaf rust but resistant to stem rust. High yielding with medium test weight. Milling and baking characteristics are satisfactory. Selected from a cross of McMurachy-Exchange x Redman³ by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

DURUM

Durum production for the semolina market should be confined to the west-central and northwestern sections.

Lakota - Early, bearded, short variety with medium straw strength. Resistant to stem rust, bunt and loose smut, and moderately resistant to leaf rust. High yielding with medium test weight; quality is satisfactory for semolina products. Selected from a cross of Sentry x (Ld. 379 x Ld. 357) at the North Dakota Agricultural Experiment Station.

Wells - Early, bearded, short, stiff-strawed variety. Resistant to stem and leaf rust, bunt and loose smut. High yielding with good test weight; quality is satisfactory for semolina products. Selected from a cross of Sentry x (Ld. 379 x Ld. 357) at the North Dakota Agricultural Experiment Station.

OTHER VARIETIES

HARD RED SPRING

Canthatch - Awnless variety; medium in maturity, height, and straw strength. Susceptible to leaf rust and stem rust. Medium in yield with good test weight. Satisfactory milling and baking qualities. Selected from a cross of Thatcher⁶ x

Kenya Farmer, by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

Conley - Late-maturing, bearded variety of medium height and fair straw strength. Resistant to stem rust, susceptible to leaf rust. Seriously injured by glume and stem-blackening, reducing yield and bushel weight. Milling and baking qualities are satisfactory. Selected from a cross of [Thatcher x (McMurachy-Exchange x Redman²)] x Lee at the North Dakota Agricultural Experiment Station.

Henry - Bearded variety developed by the Wisconsin Agricultural Experiment Station. Good yielding, moderately susceptible to bunt and susceptible to scab. Unsatisfactory in milling and baking characters.

Lathrop - Bearded variety of medium height and maturity with good straw strength. Moderately resistant to leaf rust and stem rust. High yielding with good test weight but poor quality. Selected from a backcross of Henry⁷ x P.I. 94587 made at the Wisconsin Agricultural Experiment Station.

Lee - Early, bearded, moderately susceptible to leaf rust, susceptible to bunt, loose smut, and stem rust. Short, medium-strength straw. Good test weight, satisfactory milling and baking characters. Selected from a cross of Hope x Timstein made at the Minnesota Agricultural Experiment Station.

Mida - Bearded, medium in maturity and strength of straw. Moderately susceptible to scab, loose smut, and stem rust. Satisfactory milling and baking characteristics. Selected from a cross of (Ceres-Double Cross) x (Ceres-Hope-Florence) at the North Dakota Agricultural Experiment Station.

Rushmore - Early, awnless variety that has yielded less than Lee. Susceptible to leaf rust and stem rust. Moderately resistant to bunt and loose smut. Good test weight and milling and baking qualities. Selected from a cross of Rival x Thatcher by the South Dakota Agricultural Experiment Station.

Russell - A bearded, high-yielding wheat recommended for feed in Wisconsin. It is resistant to mildew and Hessian fly, susceptible to stem and leaf rust and resistant to bunt. It is slightly later than Henry, is taller and has a weaker straw. This variety is only fair in milling and baking. It is a selection from a cross of Thatcher x W38-Hope made at the Wisconsin Agricultural Experiment Station.

Spinkcota - Bearded, susceptible to leaf rust, stem rust, and bunt, inferior milling and baking qualities. A selection of Velvet Chaff or Preston developed by a South Dakota farmer.

Thatcher - Beardless and strong-strawed. Susceptible to leaf rust, stem rust and scab, but has high milling and baking qualities. Developed at the Minnesota Agricultural Experiment Station.

Table 8. Yields and other characteristics of spring wheat varieties, 1962-64

Class and variety	Date of heading	Plant height	Lodging score*	Leaf rust reaction†	Stem rust reaction†	Test weight	Yield, bushels per acre					Average of five locations
							Rose-mount	Waseca	Lamber-ton	Morris	Crook-ston	
Hard Red Spring	June	inches				pounds						
Crim	23	39	3.3	S	R	57.8	22	29	21	29	30	26
Justin	26	37	1.9	MS	R	57.7	20	24	20	27	28	24
Pembina	23	35	3.2	MS-S	R	57.4	21	28	23	30	30	26
Selkirk	24	37	2.5	MS-S	R	56.0	20	28	22	31	31	27
Thatcher	24	38	2.9	S	S-R	57.2	14	22	18	23	27	21
Durum												
Lakota	25	39	2.4	R-MS	R	57.6	22		26	39	36	31
Wells	25	38	2.5	R	R	59.7	22		25	39	37	31
Mindum	27	46	5.6	R-MR	S-R	59.7	16		20	25	33	24
LSD 5%							2	3	3	2	3	1

* 1 erect, 9 flat.

† Reaction to prevalent races; R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. There are low frequencies of stem rust sub-races present in the rust population to which each of the hard red spring wheat varieties are susceptible.

DURUM

Langdon - Early, bearded variety of medium height and straw strength. Moderately resistant to leaf rust, moderately susceptible to stem rust, and resistant to bunt and loose smut. Has a good yield and test weight; is satisfactory for use in making semolina products. Selected from a cross of (Carleton x Ld. 194-Khapli x Ld. 308) x Stewart made at the North Dakota Agricultural Experiment Station.

Mindum - Bearded and amber-kerneled. Resistant to bunt, leaf rust, and loose smut; susceptible to scab and stem rust. Weak strawed; excellent in quality for semolina products. Resulted from a durum type selected from a common bread wheat field at the Minnesota Agricultural Experiment Station.

Ramsey - Bearded variety, medium in maturity and height. Resistant to leaf rust, loose smut and bunt. Moderately resistant to stem rust. Straw is somewhat weak. Lower in yield than Langdon; equal to it in quality. Selected from Carleton x P.I. 94701 at the North Dakota Agricultural Experiment Station.

Sentry - A selection from Ld. 308 x Nugget, made at the North Dakota Agricultural Experiment Station. Moderately susceptible to stem rust but appears to have tolerance to it, which allows good yield and grain quality. Resistant to leaf rust, bunt and loose smut. It is satisfactory for use in making semolina products.

MILLET

Three types 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. See Extension Bulletin 302 for more information.

RECOMMENDED VARIETIES

Turghai - Proso. Very early maturity. 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 Canada Department of Agriculture.

White Wonder - Foxtail. Late maturity. Fair lodging resistance. Small white or yellow seed. Too late for good seed production some years.

OTHER VARIETIES

Broomcorn or Yellow Hog - Proso. Seedlots tested were later maturing and lower yielding than Turghai. Medium-sized yellow seed.

Crown - Proso. Excellent variety but its grey-colored seed is usually not marketable. Originated by Canada Department of Agriculture.

Early Fortune - Proso. Seedlots tested appeared to be uncertified Turghai.

White Proso - Seedlots tested were later maturing and lower yielding than Turghai. Large white seed frequently brings a premium price for parakeet feed.

Barnyard or Japanese - Highest yielding forage millet but very coarse. Good seed producer. Excellent lodging resistance. Medium-size grey seed of low bushel weight.

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

Hungarian - Foxtail. Early maturity. Short. Poor lodging resistance. Low yield. Small yellow, black, and brown seeds.

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

Siberian - Foxtail. Similar to Manta except lower in yield.

Table 9. Yields and other characteristics of millet varieties at Rosemount, 1961-64

Variety	Yield per acre		Forage protein	Date of heading	Plant height	Lodging score†	Weight of 100 seeds	Bushel weight
	Seed	forage*						
		pounds	percent		inches		grams	pounds
Turghai	2,495	3,619	15.0	August 7	40	2.6	.58	54.0
Empire	1,679	6,645	11.2	August 24	46	4.2	.20	46.0
White Wonder	1,438	7,326	10.3	September 1	51	3.1	.23	41.7
LSD (5%)	278	432						
German‡	524	8,093	10.0	September 13	47	1.3	.16	44.2

* 15% moisture basis.

† 1 erect, 9 flat.

‡ Grown 1961-63-64. Data adjusted.

FLAX

RECOMMENDED VARIETIES

Bolley - Developed at North Dakota Agricultural Experiment Station from cross of Birio x C.I. 1134. Immunity to rust conditioned by N^1 gene, moderately wilt resistant, and moderately susceptible to pasmo; excellent oil content of excellent drying quality. Some evidence of greater susceptibility to aster yellows virus than other recommended varieties. Brown-seeded, blue-flowered, medium-early maturing. Superior to B5128 or Redwood for late sowing.

B-5128 - From a cross of Golden x Rio made at North Dakota Agricultural Experiment Station. Immunity to rust conditioned by N^1 gene; moderately susceptible to both wilt and pasmo. Good oil content of only fair drying quality. Contains a mixture of types, including a small percentage of both yellow-seeded plants and rust-susceptible plants. Brown-seeded, blue-flowered, late maturing. Not recommended for late sowing.

Redwood - Originated from a cross of B-5128 x Redson at Minnesota Agricultural Experiment Station. Has N^1 gene

which conditions immunity to rust; moderately wilt resistant and moderately susceptible to pasmo; good oil content of good drying quality; straw of excellent fiber quality. Brown-seeded, blue-flowered, mid-late in maturity. Not recommended for late sowing.

Summit - Released in 1964 by South Dakota Agricultural Experiment Station as selection from B-5128 x Zenith. Immunity to rust conditioned by N^1 gene; resistant to wilt and moderately susceptible to pasmo; fair oil content of good drying quality, brown-seeded, blue-flowered, early in maturity. Excellent seed yields.

Windom - Released in 1962 from Minnesota Agricultural Experiment Station from cross [Renew x Bison] (Koto x Redwing) [Redwood]. Immunity to rust conditioned by N^1 gene; resistant to wilt and moderately susceptible to pasmo; fair oil content of high drying quality, brown-seeded, blue-flowered, early in maturity. Good seed yield, whether sown early or late.

VARIETIES NOT ADEQUATELY TESTED

Caldwell - Cold-tolerant selection from Roman Winter x Argentine Pale Blue released from the Texas Agricultural Experiment Station in 1961. Susceptible to wilt, moderately susceptible to pasmo, mixed reaction to race 300 of rust, low in both oil content and iodine value. Brown seed, blue flowers, early maturing, extremely short, good seed yields when sown early.

OTHER VARIETIES

Arny - From a cross of Crystal x Redson made at Minnesota Agricultural Experiment Station. Highly resistant to wilt and moderately resistant to pasmo; rust reaction conditioned by L gene thus susceptible to race 300; resistant to lodging. Fair oil content of good drying quality. Brown-seeded, blue-flowered, late-maturing, sow early for best yields.

Bison - Developed at North Dakota Agricultural Experiment Station by mass selection. Susceptible to rust; moderately susceptible to pasmo; tends to lodge, resistant to wilt; low oil drying quality but good oil content. Brown seeds and blue flowers.

Cree - Developed by Canadian Department of Agriculture, Winnipeg, Manitoba. Licensed for distribution in Western Canada in 1962. Selection R.L. 219 from Crystal x Rocket. Moderately resistant to wilt; moderately susceptible to pasmo; rust reaction conditioned by L gene thus susceptible to race 300. Good oil content and good oil quality. Brown-seeded, blue-flowered, mid-late in maturity. Produces good seed yields when sown in northwestern Minnesota.

De Oro - Selection of Bolley Golden made at North Dakota Agricultural Experiment Station. Susceptible to rust, moderately resistant to wilt; but very susceptible to pasmo. Late maturity, medium yielding ability. Pink flowers with yellow seeds.

Linda - Selected from (Argentine 191 x Bison) (Viking x Bison) at North Dakota Agricultural Experiment Station. Moderately susceptible to rust; susceptible to pasmo; resist-

ant to wilt; good oil content of fair drying quality, medium early; large, brown seed; blue flowers.

Marine - Selected from cross of C.I. 975 x Sheyenne at North Dakota Agricultural Experiment Station. Moderately resistant to wilt and pasmo; rust reaction conditioned by L gene thus susceptible to race 300; fair oil content of high drying quality. Brown-seeded, blue-flowered, early maturing. Yields are inferior to those of late-maturing varieties when sown early but superior in yield when sowings are made in late May or June.

Marine 62 - Selection of Marine made at Minnesota Agricultural Experiment Station. Released in 1962. Similar to Marine but higher in oil content. Moderately resistant to wilt and pasmo; rust reaction conditioned by L gene thus susceptible to race 300; high oil content of high drying quality. Brown-seeded, blue-flowered, early maturity. Yields are inferior to those of late-maturing varieties when sown early but superior in yield when sowings are made in late May or June.

Norland - Selection from Victory made at North Dakota Agricultural Experiment Station; similar to Victory; resistant to rust; moderately susceptible to wilt; very susceptible to pasmo. Flowers are white with blue anthers, brown seeds, late maturity.

Raja - Selection from a cross of experimental varieties at Ottawa, Canada (Can. No. 39010). Moderately susceptible to wilt, susceptible to pasmo; rust reaction conditioned by L gene thus susceptible to race 300. Moderately short when sown early but relatively tall when sown late. While it is earlier than Marine, it has not been as dependable as Marine in producing good yields. Large brown seeds, blue flowers. Low in both oil content and oil quality.

Sheyenne - Developed at North Dakota Agricultural Experiment Station from cross of Ott. 770B x Buda. Resistant to wilt; rust reaction conditioned by L gene thus susceptible to race 300; moderately susceptible to pasmo. In Minnesota trials has yielded less than recommended varieties. Brown-seeded, blue-flowered, early maturity.

Table 10. Yields of flax varieties in pounds per acre

Variety	Early-sown			Late-sown			Ave. of 16 trials
	Lamberton 1962-64	Morris 1962-64	Crookston 1962-64	Lamberton 1963-64	Morris 1962-63	Crookston 1962-64	
Bolley	948	968	886	630	912	838	875
B-5128	913	1107	1011	592	969	920	936
Redwood	822	1016	1005	692	1074	924	927
Summit	981	1164	1084	636	1125	988	1011
Windom	1062	1055	1016	716	1062	889	976
Arny	930	1057	972	704	1050	927	948
Bison	896	995	935	771	783	926	898
Marine 62	1046	1017	813	533	1045	814	889

Table 11. Characteristics of flax varieties, 1962-64

Variety	Days from sowing to-			Plant height	Lodging*	Pasma*	Wilt*	Rust†	Oil content‡	Iodine value
	First bloom	Full bloom	Maturity							
No. of trials	19	20	16	20	7	8	4		25	25
				in.					%	
Bolley	49	54	95	21	3	5	4	R	41.0	186
B-5128	51	57	97	22	4	5	5	R	39.0	175
Redwood	51	56	95	21	5	6	3	R	39.3	179
Summit	49	55	94	20	2	5	4	R	38.4	179
Windom	49	55	93	20	3	6	3	R	38.9	184
Arny	52	57	97	24	1	3	2	S	39.1	180
Bison	50	56	95	23	4	5	3	S	39.6	171
Marine-62	49	54	95	21	3	4	3	S	39.8	185

* Rated on scale of 1 = best, 9 = poorest.

† R = resistant; S = susceptible to common North American races of rust.

‡ Oven-dry basis.

SOYBEANS

RECOMMENDED VARIETIES

Acme - A very early selection from the variety Pagoda, developed in Canada. In its maturity group has yielded well. Grows fairly short; stands well; good oil content. Plant pubescence (hairiness on stems and pods) is gray; entire seed is yellow. Recommended for northern zone.

A-100 - Medium late in maturity. Good in yield and oil content with very good lodging resistance. Pubescence is grey and flowers white. Seeds are fairly large and have a buff colored seed scar. Developed by the Anderson Brothers, St. Peter, Minnesota. Recommended only in the southern zone.

Chippewa - Superior in yielding ability, medium tall, very good resistance to lodging. Medium-size seeds, yellow with black seed scars. Good oil content. Pubescence color is brown. Selected at U. S. Regional Soybean Laboratory, Urbana, Illinois, from a backcross of Lincoln x (Lincoln x Richland). Recommended for south-central and southern zones, and about southern one-third of the central zone.

Chippewa-64 - Similar to Chippewa in all respects except for the addition of resistance to *Phytophthora* root rot, a serious disease in some areas of Ohio, Indiana, and Illinois. The variety was developed at the USDA Regional Soybean Laboratory, Urbana, Illinois, by using the backcross method.

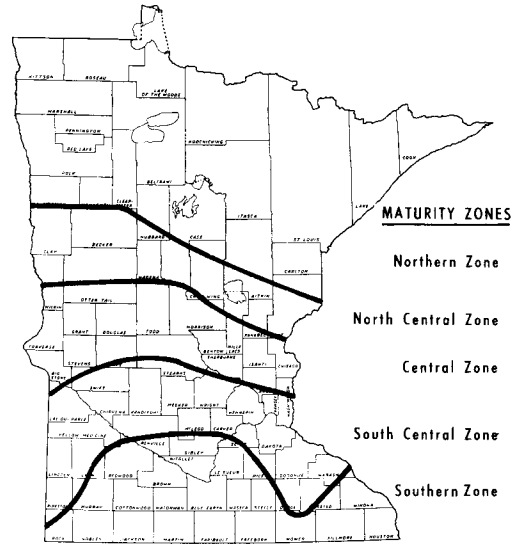
Flambeau - Rather short; with a considerable tendency to lodge. A good yielder among the early varieties. Yellow seeds with black seed scars; medium oil content. Pubescence is brown. Selected at the Wisconsin Agricultural Experiment Station from an introduction from Russia. Recommended for central, north central, and northern zones.

Grant - Medium-early, medium in height, has given good yields. Fair standing ability. Pubescence color is light brown; seeds yellow with black seed scars. Oil content relatively high. Selected at Spooner, Wisconsin, from a cross of Lincoln x Seneca. Recommended for central, south central, southern, and north central zones. Best adapted as a full-season variety to the central zone.

Harosoy - Medium-late selection from a backcross of Mandarin x (Mandarin x A.K.). Developed at the Dominion Experimental Farm, Harrow, Ontario. Good yields in south-western Minnesota. Matures about 10 days later than Chippewa, so is recommended only in the southern zone. Taller than Chippewa, and lodges more. Oil content medium, pubescence is gray. Medium-size seed; seed scar of same yellow as the seed coat.

Lindarin - A selection from a cross of Ottawa Mandarin x Lincoln made at the Purdue Agricultural Experiment Station. Similar in yield, maturity, and oil content to Harosoy

but has shorter plant height and better standing ability. Has buff seed scar and gray pubescence. Recommended in southern zone.



Merit - Similar in maturity to Norchief but taller. Selected at Central Experiment Farm, Ottawa, Canada. Recommended for central and north-central zones. Yellow seeds with buff seed scars. Gray pubescence. From Blackhawk x Capital.

Ottawa Mandarin - Short and highly resistant to lodging. Fairly large yellow seeds with yellow seed scars. Pubescence is gray. Oil content medium. Selected at the Central Experimental Farm, Ottawa, Canada, from the variety Mandarin. Recommended in areas of the state south of the northern zone.

VARIETIES NOT ADEQUATELY TESTED

Harosoy 63 - Similar to Harosoy in all respects except for the addition of *Phytophthora* root rot resistance. This variety was developed at the USDA Regional Soybean Laboratory in Urbana, Illinois, by using the backcross method.

Lindarin 63 - Similar to Lindarin in all respects except for the addition of *Phytophthora* root rot resistance. Developed at the Indiana Agricultural Experiment Station by the back-cross method.

Table 12. Adjusted average yields of soybean varieties in bushels per acre

Variety*	Years of trial	Waseca	Lamberton	Blue Earth	Average Wa., La., & B.E.	Rosemount	Morris	Ave. Ro. & Mo.	Crookston	Grand Rapids	Ave. Mo., Ro., & G.R.
VERY EARLY											
Acme	1962-64	-----	-----	-----	-----	-----	16.1	-----	14.0	19.4	16.5
Flambeau	1962-64	-----	-----	-----	-----	-----	21.9	-----	16.2	24.7	20.9
Norchief	1962-64	-----	-----	-----	-----	-----	28.0	-----	14.5	20.8	21.1
EARLY											
Merit	1962-64	34.6	24.4	25.9	28.3	26.2	28.6	27.4	19.6	21.4	23.2
Comet	1962-64	31.5	23.6	24.0	26.4	23.0	25.0	24.0			
Mandarin (Ott.)	1962-64	34.8	25.0	27.8	29.2	26.9	27.0	27.0			
Grant	1962-64	38.6	27.1	28.3	31.3	27.7	29.2	28.5			
Chippewa	1962-64	38.2	30.7	29.4	32.8	27.5	29.3	28.4			
Chippewa-64	1964	38.5	30.6	26.4	31.8	30.6	30.0	30.3			
LATE											
A-100	1962-64	39.0	29.1	31.3	33.1						
Lindarin	1962-64	39.6	30.4	27.4	32.5						
Lindarin-63	1964	38.9	30.0	26.5	31.8						
Harosoy	1962-64	40.7	30.6	28.5	33.2						
Harosoy-63	1963-64	39.2	30.7	29.7	33.2						
Hawkeye	1963-64	38.4	28.3	26.9	31.2						
Hawkeye-63	1964	41.8	31.2	25.8	32.9						
Ford	1962-64	37.7	31.2	26.6	31.8						

*Ranked by maturity.

OTHER VARIETIES

Blackhawk - Selected at the Iowa Agricultural Experiment Station from a cross of Mukden x Richland. Medium tall. Is about 5 to 6 days later in maturity than Chippewa yet averages somewhat lower in yield and has less resistance to lodging.

Capital - Selected at the Central Experimental Farm, Ottawa, Canada, from a cross of 171 x A.K. (Harrow). Similar to Grant in maturity and yield, but lodges more and has lower oil content.

Comet - A selection made at the Central Experiment Farm, Ottawa, Canada, from a cross of Pagoda x Mandarin. Similar to Merit in maturity, but lower in yield. Highly susceptible to iron chlorosis injury on high-lime soils.

Ford - Selected at Iowa Agricultural Experiment Station from a cross of Lincoln x (Lincoln x Richland). Two to

three weeks later than Chippewa. Too late for most of Minnesota. Earlier varieties yield as well.

Hawkeye - Selected at Iowa Agricultural Experiment Station from a cross of Mukden x Richland. Ten days to two weeks later than Chippewa. Very late for Minnesota. Earlier varieties yield as well.

Hawkeye-63 - Similar to Hawkeye in all respects except for the addition of Phytophthora root rot resistance.

Norchief - Selected at the Wisconsin Agricultural Experiment Station from a cross of Hawkeye x Flambeau. About the same maturity as Merit, but shorter and lower in yield.

Renville - Selected at the Minnesota Agricultural Experiment Station from a cross of Lincoln x (Lincoln x Richland). Similar in maturity and standing ability to Chippewa but is shorter and yields less.

Table 13. Characteristics of soybean varieties (1963-64)

Variety	Date mature	Lodging* Score	Plant height, inches	Seed size, gms/100 seeds	Seed† quality	Protein‡ percent	Oil‡ percent
Very Early 1/							
Acme	9-10	1.3	21	16.6	2.9	39.0	20.5
Flambeau	9-15	2.5	25	15.3	3.2	39.8	19.0
Norchief	9-21	1.8	24	15.5	3.0	38.1	19.2
Early 2/							
Merit	9-10	2.1	32	14.0	2.8	40.0	20.7
Comet	9-10	1.9	32	15.9	2.8	39.2	20.4
Mandarin (Ott.)	9-12	1.8	28	18.4	3.2	41.0	19.6
Grant	9-19	2.3	31	16.7	2.5	40.2	20.0
Chippewa	9-20	2.0	33	15.8	2.4	40.0	20.0
Chippewa-64	9-20	2.1	33	16.2	2.8	----	----
Late 3/							
A-100	9-24	2.1	34	18.2	2.9	39.2	21.0
Lindarin	9-25	2.3	35	17.5	2.6	39.2	20.3
Lindarin 63	9-26	2.3	35	15.9	2.6	----	----
Harosoy	9-24	3.3	38	17.3	2.6	39.1	20.4
Harosoy 63	9-24	2.9	39	17.6	3.0	39.5	20.5
Hawkeye	10-5	2.8	40	17.3	3.2	39.9	20.0
Hawkeye 63	10-4	2.6	42	18.6	3.1	----	----
Ford	10-7	2.3	41	16.6	2.2	39.7	19.6

1/ 3-station average (Morris, Crookston, Grand Rapids).

2/ 5-station average (Morris, Rosemount, Waseca, Lamberton, Blue Earth).

3/ 3-station average (Waseca, Lamberton, Blue Earth).

* 1 erect to 5 prostrate.

† 1 excellent to 5 poor.

‡ 1962-63 data.

SUNFLOWERS

Combine-harvested sunflowers are grown commercially in northwestern Minnesota. Most of the crop is sold to bird feed dealers and the confection trade. Occasionally seed is exported to Canada for processing as an oilseed crop like soybeans. See Minnesota Extension Bulletin 299 for more information.

RECOMMENDED VARIETIES

Arrowhead - High yielding, early maturing, and stands fairly well for combining. Plant grows slightly more than 5 feet tall and matures earlier than most recommended soybean varieties. Susceptible to rust. Seed is medium in size, low in hull, medium in oil content, high in bushel weight. Good seedling vigor. An open-pollinated variety; seed for next year's planting can be saved from the commercial crop. Selected from Mammoth Russian by M. J. Thompson at the Northeast Agricultural Experiment Station. Released in 1954.

Mingren - Medium to high yield. Later maturing and taller than Arrowhead. Susceptible to rust. Seed is very large, high in hull, and low in oil content and bushel weight. Recommended only for contract production where a higher price is paid for large seed. An open-pollinated variety selected from Mennonite by the Minnesota Agricultural Experiment Station. Released in 1964.

VARIETIES NOT ADEQUATELY TESTED

Admiral - Medium yield and maturity. About 5 feet tall. Small seed of medium oil content and high bushel weight. Rust-resistant three-way cross licensed in 1960 by Canada Department of Agriculture. Produced by crossing the inbred, S-37-388RR, with the single cross, CM5 x CM27. Seed harvested from the S-37-388RR rows in the crossing field is used for seed.

Advent - Medium yield and maturity. About 5 feet tall. Small seed of medium oil content and high bushel weight. Rust-resistant topcross hybrid licensed in 1959 by Canada Department of Agriculture. Produced by crossing the inbred, S-37-388RR, with the variety, Sunrise. Seed harvested from the S-37-388RR rows in the crossing field is used for seed.

Commander - Medium to high yield. Similar to Mingren in maturity, height, and susceptibility to rust. Slightly smaller and darker seed than Mingren but higher in bushel weight. An open-pollinated variety selected from Mennonite by the Morden Experimental Farm, Canada Department of Agriculture. Released in 1964.

Russian High-Oil Varieties - Many have been tested. Most are medium in yield, late maturing, and tall. Susceptible to rust. Small dark seed of very high oil content. Should be

Table 14. Yields and large seed percentage of sunflower varieties at Rosemount, 1962-64, and Crookston, 1961-64

Variety	Yield per acre, pounds			Large seed*, percent		
	Rosemount	Crookston	Average	Rosemount	Crookston	Average
Arrowhead	1,383	1,854	1,619	0	1	1
Mingren	1,238	1,886	1,562	23	37	30
Admiral	1,101	1,793	1,447	0	0	0
Mennonite	1,181	1,798	1,490	13	10	12
Peredovik	1,013	1,384†	1,199	0	0	0
LSD (5%)	214	268	171			
Commander‡	1,040	1,796	1,418	14	22	18
VNIIMK 89.31‡	771	1,825	1,298	0	0	0

* held on 20/64 round hole screen.

† 1962-64 at Crookston.

‡ Grown 1963-64. Data adjusted.

grown only for the oilseed market. Four varieties -- Donski 695, Peredovik, VNIIMK 65.40 and VNIIMK 89.31 -- were increased in Canada in 1962-63. In 1964, Peredovik was grown on over 60,000 acres in Canada and is the major variety for oil production.

OTHER VARIETIES

Commercial or second generation Admiral or Advent - Should not be planted. Use only first generation hybrid sunflower seed.

Greystripe and Manchurian varieties - Very tall and too late-maturing for commercial production.

Mennonite - Medium to high yield. Later maturing and taller than Arrowhead. Susceptible to rust. Seed is large, high in hull, low in oil content, and medium in bushel

weight. Large seed grades often sell at premium prices. Originated in Russia many years ago.

Table 15. Characteristics of sunflower varieties

Variety	Date flowering	Plant height	Weight of 100 seeds	Oil*	Bushel weight
	July	inches	grams	percent	pounds
Arrowhead	21	63	7.6	30.8	30.1
Mingren	25	64	10.7	28.3	24.5
Admiral	25	57	7.0	32.4	29.6
Mennonite	26	65	9.1	29.9	26.3
Peredovik	28	71	6.6	44.3	28.2
Commander†	26	65	9.6	28.6	26.3
VNIIMK 89.31†	28	71	-	38.2	29.0

* Dry matter basis, 1962-63.

† Data adjusted since not grown in all trials.

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 are usually sown in a mixture with oats. See Minnesota Extension Bulletin 300 for more information.

RECOMMENDED VARIETIES

Chancellor - Medium maturity. Long vined. Small, cream-colored seed of high bushel weight. Selected at the Experimental Station, Ottawa, Canada in 1906 from an English variety also called Chancellor. Grow for forage, feed grain, and pigeon feed market.

Strål - Medium maturity. Long vined. Cream-colored seed, medium in size, and high in bushel weight. Good cooking quality. Originated at the Weibullsholm Plant Breeding Institute, Landskrona, Sweden as an X-ray mutation from Kloster. Grow for soup market.

VARIETIES NOT ADEQUATELY TESTED

Victoria - Early maturity. Medium vine length. Very large, semi-smooth, cream-colored seed of high bushel weight. Introduced from Germany.

RECOMMENDED VARIETIES

Ranger - Wilt-resistant, winter-hardy variety developed by U. S. Department of Agriculture and Nebraska Agricultural Experiment Station. Good forage yield. Susceptible to leaf-spot diseases.

Vernal - Developed at the Wisconsin Agricultural Experiment Station, released in 1953. More wilt-resistant, winter-hardy, and yields more forage than Ranger. Susceptible to leafspot diseases.

VARIETIES NOT ADEQUATELY TESTED

Cayuga - A wilt resistant synthetic variety developed by Cornell University (NY). Limited information suggests it is winter-hardy and yields well.

OTHER VARIETIES

Century (formerly Creamette) - Medium maturity. Long vined. Large, cream-colored seed of high bushel weight. Good cooking quality. Licensed in 1960 by Canada Department of Agriculture from a cross of (Chancellor x Early Raymond) x Stirling. Large seed makes sowing cost higher than that of Strål.

Maple - Late maturity. Long vined. Large, olive-colored seed with brown mottle and indistinct hilum. An excellent variety for pigeon feed use. Grow under contract when buyers offer a higher price than for Chancellor or Strål.

Table 16. Yields and other characteristics of pea varieties at Crookston, 1960-63

Variety	Yield per acre	Weight of 100 seeds	Date first bloom	Date full bloom
	pounds	grams	June	
Chancellor	1,468	13.7	26	July 2
Strål	1,801	16.9	24	July 1
Century	1,749	22.0	24	June 30
Maple	1,574	19.5	27	July 3
LSD (5%)	186			
Victoria*	1,673	33.6	18	June 26

* Grown 1962-63. Data adjusted.

ALFALFA

Culver - A synthetic variety released by Purdue University in cooperation with the alfalfa improvement conference. Resistant to spittle bug and bacterial wilt; less hardy than Ranger and susceptible to the leafspot diseases.

Progress - is a synthetic variety selected for high seed yield. Bacterial wilt resistance is higher than in Ranger and lower than Vernal. Forage yield appears to be similar to Ranger and Vernal. Winterhardiness has not been well established, although limited information suggests it is satisfactory.

Rambler - Developed at the Swift Current Experiment Station in Canada. A creeping alfalfa (spreads underground by roots). Winterhardy, wilt resistant, susceptible to leaf-spot diseases, recovers slowly. May have use as pasture alfalfa, but shows little promise as hay type in Minnesota.

Teton - Developed by South Dakota Agricultural Experiment Station. Winterhardy, wilt resistant, moderately resistant to common leafspot, but susceptible to black stem. Slow recovery after clipping.

OTHER VARIETIES

Uncertified alfalfa seed, regardless of origin, is not recommended for forage production in Minnesota. Numerous tests have shown the advantages of seeding certified seed. Certified seed gives best assurance of true varietal performance.

Some of the alfalfas being sold in Minnesota are controlled by private companies. These may be the result of the company's private breeding program or they may be controlled by the company through an agreement with the originating concern. Some of these have been included in Minnesota Agricultural Experiment Station trials while others have not been tested. The varieties described in this bulletin have been tested in University of Minnesota trials. Other varieties are available, but are not described here because of a lack of information.

Arnim - Introduced from Europe. Susceptible to bacterial wilt. Appears to have recovery after cutting and growth habits similar to Ranger.

Atlantic - Synthetic variety developed by the New Jersey Agricultural Experiment Station. Yields about the same as Ranger where wilt is not present; susceptible to bacterial wilt and not sufficiently winterhardy in Minnesota. Susceptible to the leafspot diseases.

Buffalo - Wilt-resistant variety selected from Kansas Common, which it resembles in most other characteristics. Not sufficiently winterhardy for Minnesota. Susceptible to the leafspot diseases.

Cody - A selection out of Buffalo, resistant to spotted alfalfa aphid, otherwise appears to perform the same as Buffalo. Selection made at Kansas Agricultural Experiment Station.

Du Puits - Introduced from France. Very susceptible to bacterial wilt. Less winterhardy than Ranger. Forage yields slightly better than Ranger when wilt and winter injury are absent; somewhat inferior to Vernal in yield even under these conditions. Some resistance to common leafspot, susceptible to other leafspot diseases.

F.D. 100 - Introduced from France. Susceptible to bacterial wilt, less winterhardy than Ranger. Recovery and growth habits are typical of the Flemish alfalfas.

Flandria - Introduced from France. Very susceptible to bacterial wilt. Less winterhardy than Ranger. Recovery and growth habits are typical of the Flemish alfalfas.

Flemish Alfalfas - Several alfalfas controlled by private companies are of the Flemish type. These have been developed in France from the Flemish type alfalfa. All are susceptible to bacterial wilt, less winterhardy than Ranger and Vernal, and perform satisfactorily when bacterial wilt and winter injury are not factors.

Grimm - A winterhardy variety developed in Carver County, Minnesota, by Wendelin Grimm. Susceptible to bacterial wilt. Forage yield about the same as Ranger when wilt is not present, susceptible to leafspot diseases.

Ladak - Winterhardy, moderately wilt-resistant variety introduced by U. S. Department of Agriculture from Northern India. Slightly higher average forage yield than Ranger. Recovers slowly, but yield of second cutting has not been appreciably lower than for other varieties. Susceptible to leafspot diseases.

Lahontan - Developed cooperatively by U. S. Department of Agriculture and Nevada Agricultural Experiment Station. Resistant to bacterial wilt, stem nematode, and spotted alfalfa aphid. (Neither of the last two pests are important in Minnesota at this time.) Not sufficiently winterhardy for Minnesota. Susceptible to the leafspot diseases.

Narragansett - Developed by Rhode Island Agricultural Experiment Station. Yields more than Ranger when wilt is not present. Susceptible to bacterial wilt and leafspot diseases.

Orchies - Introduced from France. Very susceptible to bacterial wilt. Less winterhardy than Ranger. Recovery after cutting and growth habits are typical of Flemish alfalfas.

Rhizoma - Developed by the University of British Columbia. Under favorable conditions spreads by underground stems, but has not shown this characteristic in Minnesota. Yields about the same as Ranger when wilt is not present. Very susceptible to bacterial wilt. Susceptible to leafspot diseases.

Scandia (Alfa) - Introduced from northern Europe. Very susceptible to bacterial wilt. Less winterhardy than Ranger. Yields satisfactory when wilt and winter injury are not factors. Some resistance to common leafspot. Susceptible to other leafspot diseases.

Socheville - Introduced from France. Very susceptible to bacterial wilt, some resistance to common leafspot, susceptible to other leafspot diseases. Less winterhardy than Ranger. Forage yields are satisfactory when wilt and winter injury are not factors.

S C 118 - Introduced from France. Very susceptible to bacterial wilt and has less winterhardiness than Ranger. Recovery after cutting and growth habits are typical of Flemish alfalfas.

Table 17. Forage yields and disease and winter hardiness ratings for alfalfa varieties

Varieties	Crookston	Duluth	Grand	Lamber-	Morris	Rosemount			Bacterial	Common	Black	Winter-	
	1959-60	1964	Rapids	ton-	1962-64	1959-60	1959-62	1961-63					1962-64
			1963-64	1962-64						spot*			
Ranger	3.23	2.27	2.75	4.86	3.84	5.10	3.29	5.06	5.07	R	S	S	H
Vernal	3.23	2.70	3.15	5.18	4.35	5.26	3.73	5.09	4.91	VR	S	S	H
Cayuga	-	2.40	3.00	5.18	4.13	-	-	-	-	R	-	-	-
Culver	-	1.90	2.90	5.32	4.16	4.98	-	-	-	R	S	S	H
Progress	-	-	-	-	-	-	-	-	5.20	R	-	-	-
Rambler	2.96	-	-	4.77	3.72	4.24	2.97	-	3.99	R	S	S	H
Teton	2.42	1.67	-	4.97	3.95	3.87	3.19	-	4.70	R	MR	S	H
Arnim	-	-	-	-	-	-	-	5.15	-	S	-	-	-
Atlantic	-	2.12	-	-	-	4.73	-	-	-	S	S	S	MH
Buffalo	-	-	-	-	-	5.00	3.50	-	-	R	S	S	MH
Cody	-	1.82	2.88	-	-	-	-	-	-	R	S	S	MH
DuPuits	3.08	1.95	2.78	4.67	-	4.67	2.71	5.09	4.75	S	MR	S	MH
F D 100	-	2.10	-	4.86	4.15	-	2.72	5.36	-	S	MR	S	MH
Flandria	-	1.82	-	-	4.11	-	-	5.16	-	S	MR	S	MH
Grimm	-	2.45	-	-	-	5.08	3.35	-	-	S	S	S	H
Ladak	3.09	2.30	-	-	-	4.54	2.93	-	-	MR	S	S	H
Lahontan	2.79	1.20	-	-	-	1.91	2.90	-	-	R	S	S	NH
Narragansett	3.30	2.00	3.16	-	-	4.94	3.45	5.17	4.94	S	S	S	H
Orchies	-	2.12	-	-	-	-	-	5.02	-	S	MR	S	MH
Rhizoma	2.95	-	3.18	-	-	4.46	2.59	-	-	S	S	S	H
Scandia (Alfa)	2.98	1.60	2.41	-	-	4.22	2.65	4.96	-	S	MR	S	MH
Socheville	-	1.85	-	-	-	4.08	2.64	5.54	-	S	MR	S	MH
SC 118	-	2.10	3.03	-	-	-	-	5.28	-	S	MR	S	MH
LSD (5%)	0.24	N.S.	0.30	0.27	0.20	0.43	0.34	0.24	0.15				

* S = susceptible, MR = moderately resistant, R = resistant, and VR = very resistant.

† H = hardy, MH = moderately hardy, and NH = nonhardy.

BIRDSFOOT TREFOIL

RECOMMENDED VARIETIES

Empire - Selected at the New York Agricultural Experiment Station. Winterhardy, prostrate growth, good yield.

VARIETIES NOT ADEQUATELY TESTED

Tana - Developed at the Montana Agricultural Experiment Station.

Viking - Selected at the New York Agricultural Experiment Station. A little less winterhardy than Empire. Relatively upright growth. Good yield.

OTHER VARIETIES

Mansfield - Selected at the Vermont Agricultural Experiment Station. Erect growth, good yield but not winterhardy enough for Minnesota.

RED CLOVER

RECOMMENDED VARIETIES

Dollard - Selected at MacDonald College, Quebec, Canada. Resistant to several strains of northern anthracnose and viruses. Good forage and seed yield and better stand persistence into second crop year than varieties not recommended. Susceptible to powdery mildew.

Lakeland - Bred by the Wisconsin Experiment Station in cooperation with the U. S. Department of Agriculture. Released in 1959. Resistant to several strains of northern anthracnose and virus. Highly resistant to powdery mildew. Good forage and seed yield and relatively good persistence into second crop year. When northern anthracnose and virus are severe the superiority of the recommended varieties is evident.

At Grand Rapids in 1964 there was a heavy epidemic of northern anthracnose. Lakeland and Dollard were infected 15 and 18 percent respectively, but Chesapeake was infected 70, Kenland 84, and Pennscott 90 percent. This information is very important because at most experiment stations where variety tests are grown there is little red clover in the neighborhood and the disease is seldom a factor. However, surveys have shown that anthracnose is common in heavy red clover growing areas.

OTHER VARIETIES

Chesapeake - A strain developed on the farm of Elmer Stevens, Talbot County, Maryland. Susceptible to northern anthracnose and virus. Good forage yield when not attacked by disease, but in areas where red clover is grown diseases are apt to be prevalent.

Kenland - Developed by the Kentucky Agricultural Experiment Station and the U. S. Department of Agriculture. Very susceptible to northern anthracnose and virus.

Pennscott - A naturalized variety from the farm of Frank Scott, Lancaster, Pennsylvania. Very susceptible to northern anthracnose and virus.

Table 18. Average forage yields of red clover first crop year in tons per acre for 1956-64*

Variety	Rose mount	Wa-seca	Mor-ris	Crook-ston	Grand Rapids	Du-luth	Avg.
Dollard	3.57	2.10	2.52	1.61	2.97	3.03	2.63
Lakeland	3.58	2.20	2.60	1.43	2.79	3.10	2.62
Chesapeake	3.41	2.10	2.45	1.24	2.82	3.05	2.51
Kenland	3.75	1.99	2.51	1.36	2.86	3.07	2.59
Pennscott	3.62	2.05	2.41	1.35	3.16	2.54	2.52

* Not all stations represented in all years.

Table 19. Average forage yields of red clover second crop year in tons per acre 1961

Variety	Rosemount	Waseca	Average
Dollard	1.00	1.00	1.00
Lakeland	1.10	1.23	1.16
Chesapeake	.48	.51	.49
Kenland	.73	.70	.72
Pennscott	.59	.37	.48

Table 20. Average percent stand on June 19, 1964, of seedlings made from 1961 to 1964 at Rosemount

Variety	1961	1962	1963	1964
Dollard	77	10	100	100
Lakeland	73	8	98	100
Chesapeake	57	10	98	100
Kenland	66	4	----	100
Pennscott	50	3	99	100

SWEETCLOVER

RECOMMENDED VARIETIES

Evergreen - A white-blossomed, biennial sweetclover introduction from Ohio. It produces a larger growth than common types the fall of the first year, is a heavy forage producer the second year, and comes to full bloom two or three weeks later than common types. Therefore, it has a longer grazing season.

Goldtop - Bred at the Wisconsin Agricultural Experiment Station in cooperation with the U. S. Department of Agri-

culture. Yellow blossom biennial type. Outstanding for seedling vigor. Resistant to leaf and stem diseases. Good forage yield both seedling year and second year. A few days earlier than Evergreen, but much later than Madrid.

Madrid - A yellow-blossomed, biennial type introduced into the United States from Madrid, Spain in 1910. The first-year growth of Madrid is superior to common types and the forage and seed production the second year are satisfactory. Time of flowering, similar to common types.

Table 21. Average forage yields of sweetclover in tons per acre

Variety	Second year forage				Average	First year forage 1964		
	Rose-mount 1960	Waseca 1963	Crook-ston 1963	Grand Rapids 1960, 63		Rose-mount	Morris	Average
Goldtop	2.28	2.80	1.99	1.68	2.19	2.68	2.39	2.53
Evergreen	1.84	1.97	2.11	1.55	1.87	-----	-----	-----
Madrid	2.15	1.82	2.34	1.72	2.01	2.43	2.46	2.44
Cumino	.23	1.04	1.45	.98	.92	.73	1.36	1.04
Denta	1.32	1.00	2.03	1.06	1.35	1.62	2.10	1.86

VARIETIES NOT ADEQUATELY TESTED

Cumino - A white blossom biennial bred at Saskatoon and licensed in Canada in 1957. The result of 10 years of breeding work involving interspecific crosses with particular attention paid to low coumarin content. Gave consistently poor stands at five stations in 1961.

Denta - A white flowered, low coumarin synthetic bred by the Wisconsin Experiment Station in cooperation with the

U. S. Department of Agriculture. Has looked promising in two years of tests, but not as vigorous as Goldtop.

Israel - Annual white blossom. Introduced and evaluated by the U. S. Department of Agriculture and the Texas Agricultural Experiment Station. Yielded heavily at Crookston in 1959, but since then, has not responded well there or at other stations.

BROMEGRASS

RECOMMENDED VARIETIES

Achenbach - A naturalized southern strain from the farm of Achenbach brothers in Washington County, Kansas. Improved by mass selection and introduced by the Kansas Agricultural Experiment Station. In regional tests the highest forage yielder in the northern part of the North Central Region.

Fischer - Seed collection from old brome field on the E. A. Fischer farm, Shenandoah, Iowa. Increased and tested by the Agricultural Experiment Station in cooperation with the Soil Conservation Service at Ames, Iowa. Vigorous southern type.

Lincoln - Increased at the Nebraska Agricultural Experiment Station from collections from old brome fields. Good forage yield. Southern type. Seed plentiful in Minnesota.

OTHER VARIETIES

Elsberry - A southern, early-maturing type of bromegrass, the best of several accessions tested in the Soil Conservation Service Nursery at Elsberry, Missouri, believed to be derived from an old field of bromegrass located in northwestern Missouri or southeastern Iowa.

Homesteader - Composite of five strains originating from fields established in South Dakota 40 or 50 years ago. Has been increased at the South Dakota Agricultural Experiment Station.

Lancaster (Nebr. 44) - A new strain developed at the Nebraska Agricultural Experiment Station. A synthetic variety, produced by hybridization of several unrelated outstanding plants. Has shown superior forage yield, quality, and seed yield in tests at the Nebraska Agricultural Experiment Station.

Lyon (Nebr. 36) - Similar to Lincoln. Outstanding in its production of high quality, relatively heavy seed. Preliminary testing shows it to be equal or superior to Lincoln in forage and seed yields. Increased at the Nebraska Agricultural Experiment Station.

Saratoga - Selected at the New York Agricultural Experiment Station from a wide collection of seed lots obtained from plant breeders in the U. S. Synthetic variety of 5 clones. Equal to Lincoln in yield in New York.

Sac - Selected at the Wisconsin Agricultural Experiment Station in cooperation with the Agricultural Research Service. A southern type brome, it possesses superior tolerance to leaf spot.

Table 22. Average forage yields of bromegrass varieties in tons per acre

	1963							1964				3-Year State Average
	1962	Rose mount	Waseca	Lamber-	Morris	Grand Rapids	Duluth	Lamberton	Morris	Grand Rapids	Duluth	
Minn. Synthetic 1	4.60	5.43	2.50	6.08	3.94	4.13	4.24	2.92	1.01	1.01	3.48	3.63
Sac	5.30	4.66	2.26	6.28	3.61	4.46	4.22	3.11	1.54	1.37	3.57	3.67
Saratoga	5.57	5.29	2.41	5.77	3.74	4.21	4.48	2.82	1.91	1.04	3.74	3.72
Wisconsin 55	4.43	5.06	2.37	6.31	3.37	4.41	4.30	2.55	1.61	1.17	3.42	3.55
Achenbach	4.49	4.42	2.68	5.89	3.02	4.32	4.48	2.91	1.83	1.11	3.60	3.52
Lincoln	5.66	5.06	2.50	6.69	3.12	4.16	4.19	2.66	1.72	.80	3.39	3.63
Common	3.57	5.57	2.30	6.55	3.80	4.83	4.00	2.92	1.71	1.09	3.23	3.60

TIMOTHY

RECOMMENDED VARIETIES

Climax - Selected by Experimental Farms Service, Ottawa, Canada, from a wide collection of seedlots by combining several progeny tested clones. Described as tall, fine stemmed, and leafy. Superior forage yield under Minnesota conditions.

Itasca - A composite of seven inbred lines selected at the Minnesota Agricultural Experiment Station. Good forage and seed yielder. Time of maturity the same as commercial sorts.

Lorain - Selected from collections from old meadows and roadsides by the Ohio Agricultural Experiment Station. Good forage and seed yielder. Approximately a week later in maturity than Itasca and commercial.

OTHER VARIETIES

Essex - Bred at the New York Agricultural Station, Ithaca. It is a very late maturing leafy type.

Drummond - Selected at Macdonald College, Quebec, winter-hardy with an appreciable amount of rust resistance.

Clair - Extremely early strain increased by the Kentucky Experiment Station at Lexington. A naturalized strain from the farm of Clair Andrew, VeVay, Indiana.

Wisconsin T - A late variety bred at the Wisconsin Experiment Station, Madison.

Milton - Selected at Macdonald College, Quebec. It is winter-hardy and early maturing.

Table 23. Average forage yield in tons per acre 15-percent moisture from 10 Minnesota statewide replicated tests harvested 1960-61-62- and 63

Climax	2.57*
Itasca	2.52*
Drummond	2.28
Essex	2.20

* These two were significantly higher than the others.

KENTUCKY BLUEGRASS

RECOMMENDED VARIETIES

Park - A mixture of 15 apomictic lines selected by the Minnesota Agricultural Experiment Station. Excellent seedling vigor. Moderate resistance to rust, susceptible to mildew. Good forage and seed producer; makes tough, durable sod.

VARIETIES NOT ADEQUATELY TESTED

Newport - A single apomictic line collected near the Pacific Coast at Newport, Washington and developed by the Carnegie Institution at Stanford, California. Medium seedling vigor. Good rust resistance. Good forage and seed yield and has the desirable ability of not going dormant and brown as quickly as other varieties during hot dry periods. High seed yield at Rosemount 1963.

RECOMMENDED VARIETIES

Piper - Developed at the University of Wisconsin from crosses among Tift and Texas lines low in hydrocyanic acid (prussic acid). Released in 1950, high yielding, low in hydrocyanic acid content, and resistant to leaf diseases. Seed is a mixture of light and dark colored seeds.

VARIETIES NOT ADEQUATELY TESTED

Sorghum-sudangrass hybrids and a sudangrass hybrid were compared with Piper at St. Paul and Rosemount. These data are shown in table 25. Piper was the lowest in HCN content and showed the quickest recovery after cutting. Hydrocyanic acid contents of the sorghum-sudans were higher than the sudans. All but Excel F-33, with 108 mg HCN per 100 grams

Table 25. Yields and other characteristics of sudan varieties and sorghum x sudan hybrids harvested at grazing stage in a drilled stand, 6-inch rows, at St. Paul, 1962-63, and Rosemount, 1964. (Severe drought at Rosemount)

Variety	Tons per acre at 15% moisture			Estimated % stand in 1964	Height each cut in inches		Percent leaves each cut		Mg. HCN per 100 gm. dry matter			Recovery after cut*		
	1962	1963	1964		in 7/14	in 9/4	in 7/14	in 9/4	1962	1963	1964	1962	1963	1964
Sudans														
Piper	2.3	2.3	2.0	90	40	45	39	11	18	11	80	88	85	
Trudan (hybrid)		2.5	2.3	88	41	46	46		25	13		78	70	
Sorghum-sudan hybrids														
DeKalb X-1751			1.8	70	39	33	57			45			67	
Green Gro			2.1	75	41	36	57			51			70	
Sudax Sx 11	2.2		2.1	75	39	38	57	35	72	55	46		60	
Excel Grazer			2.4	80	41	37	57			45			70	
Excel F-33			1.7	60	33	30	65			108			30	
RP Mor Su		2.3	1.9	65	40	40	50		43	45		70	57	
NB 280 S			2.3	75	41	42	53			25			72	
Sweet Sioux	2.6	2.6	2.0	65	41	44	53	32	61	39	57	69	62	
Greenlan	2.0	2.0	2.1	75	40	40	56	36	63	43	55	68	60	
Lindsey/Funk G-77	F		2.2	75	44	39	51			40			70	
TE Haygrazer			1.9	60	38	44	54			60			50	
TE Grazemaster			2.1	75	39	42	56			52			62	
Hydan 37	2.2		2.0	80	41	39	55	37	69	41	50		57	
Volkman S 100			2.3	80	42	41	51			48			55	

* Percent ground cover 2 to 3 weeks after first cut.

OTHER FIELD CROP PUBLICATIONS

Single copies of the publications below are available without cost from your county agent or from The Bulletin Room, University of Minnesota, St. Paul, Minnesota 55101.

B154	Soybeans for Minnesota
B299	Sunflower Production in Minnesota
B300	Field Peas for Seed and Forage
B302	Millet, Annual Canarygrass, and Buckwheat Production in Minnesota
B310	Field Beans for Minnesota
B311	Mustard and Rape Oilseed Crops for Minnesota
F68	More Profits from Malting Barley
F182	Forage Mixtures
F212	Cultural and Chemical Weed Control in Field Crops (1965)
P194	Crop Production Guide for Minnesota (1965)
P203	Five Steps to Five Tons with Certified Alfalfa

OTHER VARIETIES

Merion - A single apomictic line collected on a golf course at Merion, Ohio and developed by the Pennsylvania Agricultural Experiment Station. Poor seedling vigor. Very susceptible to rust. Low forage yield.

Table 24. Forage yield, seedling vigor and rust reaction of bluegrass varieties at Rosemount

Variety	Forage yield tons per acre		Seedling vigor scale 1-5; 1 best	Percent rust 1960	
	1959	1960		Aug. 17	Oct. 19
Park	3.46	2.01	1	tr	50
Newport	3.80	2.01	3	tr	tr
Merion	-----	1.76	5	100	100

SUDANGRASS

dry matter, would be safe to graze with proper precautions against HCN poisoning.

OTHER VARIETIES

Common - Early introductions. Susceptible to leaf diseases, medium in yield, and high in hydrocyanic acid. Seed mostly tan in color. **Wheeler** is a Kansas strain of common.

Greenleaf - Developed at Kansas State University from sorghum x sudangrass crosses. Resistant to leaf diseases, medium in yield, and low in hydrocyanic acid.

Sweet - Developed by Texas Agricultural Experiment Station from a cross of Leoti sorgho x sudangrass and backcrossed to sudangrass. Distributed in 1943. Low in yield, somewhat resistant to leaf disease, and high in hydrocyanic acid content.

FS Agron 3	How About Oats for Silage
FS Agron 7	Emergency Crops
FS Agron 8	Cut Early for Quality Forage
FS Agron 9	Corn Silage
FS Agron 10	Safflower—An Oilseed Crop for Minnesota?
FS Agron 12	Haylage: Low Moisture Hay-Crop Silage
FS Agron 13	Birdsfoot Trefoil and Ladino Clover in Minnesota
FS Agron 14	Sunflower Attachment for Combines
S452	Beef from Grasslands
M28	Minnesota Hybrid Corn Performance Trials
M40	Grain Sorghum Variety and Herbicide Trials in Minnesota

The Annual Corn Seedstocks Announcement describes Experiment Station varieties for which seedstocks are available. It also gives the policy for release of inbred lines. Copies are available from Agronomy Seedstocks, University of Minnesota, St. Paul, Minnesota 55101.

RATE AND DATE OF SOWING

Rates are based on average seedbed and on use of good quality, medium-size seed of high germination. Increase rate for seed of lower germination or extra-large size. Decrease rate for small, good quality seed

Crop	Bushel weight* in pounds	Rate per acre in pounds	Date
Barley †	48	72-96	Early spring
Corn †	56	8-14	Early May
Flax †	56	42-56	April 15 to May 15
Forage Grasses (perennial)			
Bromegrass (with legumes)	14	5-8	Early spring or fall
Kentucky bluegrass (with timothy)	14	8-10	Early spring or fall
Meadow fescue (in mixture with brome and legume)	14-24	3-4	Early spring or fall
Timothy (with legumes)	45	4-6	Early spring or fall
In mixture with brome and legume or reed canary or bluegrass ..		2-4	
Reed canary	44-48		Early spring or fall:
Alone or with timothy		6-8	after freezeup
Forage Legumes (biennial or perennial)			
Alfalfa	60		With companion grain
Alone		8-12	or flax, early spring;
With grasses		5-8	or alone before Aug. 10
Birdsfoot trefoil	60	3-6	Early spring
Clover	60		Early spring
Red (in mixture)		4-8	
Alsike (in mixture)		2-4	
Ladino (in mixture)		1/2-1	
Sweet Clover	60		Early spring
Alone		10-12	
In mixture		2-4	
Oats †	32	64-80	Early spring
Rye	56	70-84	Aug. 1 to Sept. 10 for pasture. Aug. 25 to Sept. 30 for seed
Sorghum †	50 (sweet)		In warm soil, May 25
Corn planter rows	56 (grain)	4-10	to June 15
"Solid" drilled		10-30	
With 1 1/2 bushel soybeans		15	
Stangrass	40		In warm soil, May 20
Rows		10-20	to June 20
Broadcast		25-30	
With 1 1/2 bushels of soybeans		10	
Soybeans †	60		In warm soil, May 15-30
"Solid" drilled		120-150	
40-inch rows		60	
20-inch rows		90-100	
Wheat †	60		
Hard Red Spring		75-90	Early spring
Durum		90	Early spring
Winter		75-90	Aug. 20 to Sept. 20
Miscellaneous Crops			
Field peas †	60		Early spring
Alone		120-180	
With 1 1/2 to 2 bushels of oats		45-90	
Sunflowers	24	4-8	May 10-25
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
Rape for forage	50	4-6	Early spring with oats
Buckwheat	48-50	48	June 15 to July 15

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

† Use fungicide seed treatment.