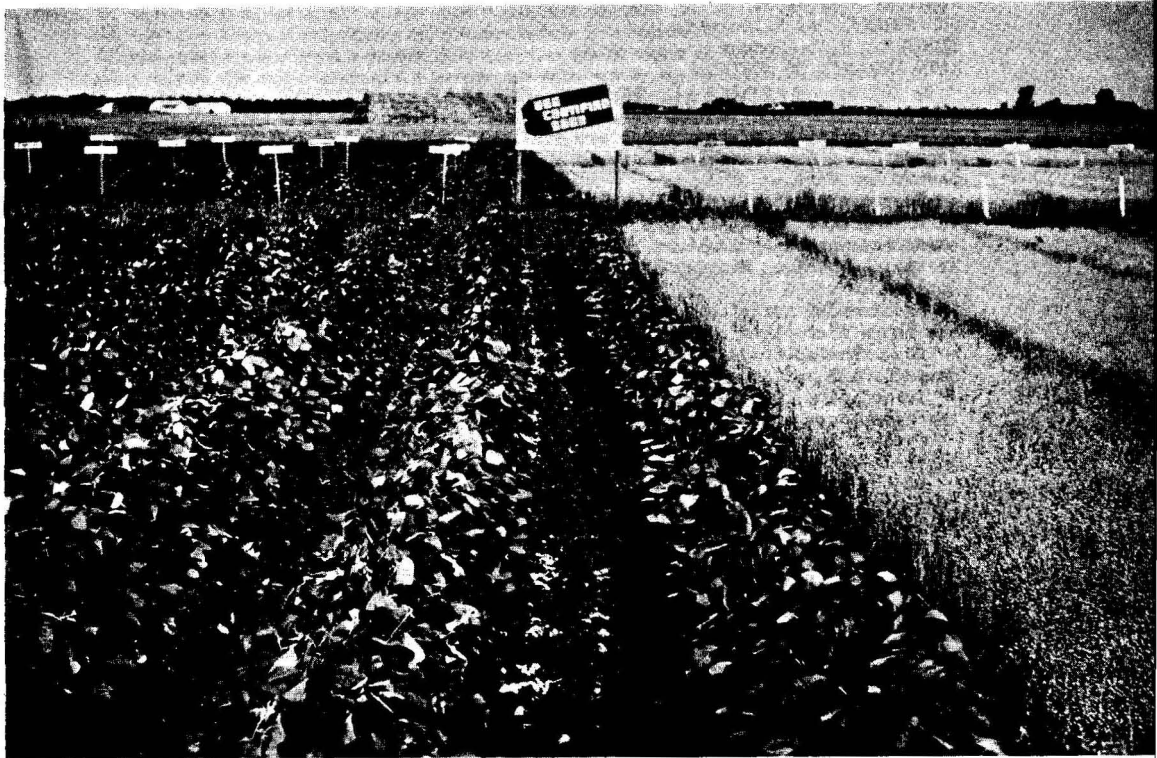


Varietal Trials OF FARM CROPS



Agricultural Experiment Station
UNIVERSITY OF MINNESOTA

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VARIETAL TRIALS OF FARM CROPS

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 located 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.

In addition to these field plot trials, disease resistance is determined in the greenhouse and in disease nurseries at St. Paul and Rosemount.

Feeding and market quality of the forage or seed harvested from the trial plots is determined by various chemical, laboratory, and industrial tests.

On the basis of results from these comparative trials, the list of varieties recommended for use in Minnesota is revised each year at the Experiment Station Varietal Recommendation Conference. Participating in the conference are: staff members of the Departments of Agronomy and Plant Genetics, Plant Pathology and Botany, and Agricultural Biochemistry; representatives of the Agricultural Extension Service; superintendents and agronomists of the branch Agricultural Experiment Stations; and representatives of the Minnesota Crop Improvement Association.

This report gives brief descriptions of varieties grown by Minnesota farmers in 1961, varieties tested in 1961, and varieties which may be introduced in the future. Yields and other agronomic data on varieties of barley, oats, rye, wheat, flax, soybeans, sunflowers, field peas, navy beans, alfalfa, birdsfoot trefoil, red clover, sweet clover, brome grass, Kentucky bluegrass, sudangrass, and timothy grown in field plot trials in 1961 are shown in tabular form.

Data of varieties which were 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.*

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

Lodging score or standability of a variety is reported on a scale of 1, erect, to 9, flat, unless indicated differently; thus, low scores indicate better standability than do high scores.

Data reported under Lamberton in the tables were obtained at the Lamberton station in 1960-61, Jackson County in 1959, Lyon County in 1958, Nobles County in 1957, and Brown County in 1956.

Varieties are arranged in order of Recommended Varieties, Varieties Not Adequately Tested, and Varieties Not Recommended and in alphabetical order within each group.

Recommended varieties have performed better than other varieties in important characteristics in comparative tests. A variety is not eligible for recommendation until it has been tested in Minnesota for at least three years.

New varieties developed in other states or countries which are brought into the state for seed production or for use on farms before the three 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 which are in the "not recommended" category are inferior in one or more characteristics, as demonstrated in comparative tests.

University personnel responsible for the field work at the various locations are: J. R. Thompson and D. A. Turner at Waseca, W. W. Nelson at Lamberton, R. L. Thompson and R. E. Smith at Morris, O. C. Soine and B. E. Youngquist at Crookston, C. H. Griffith and W. Matalamaki at Grand Rapids, and R. S. Grant at Duluth.

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 non-recommended 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 of the good varieties described in this report can be purchased from seed dealers or from growers listed in the Minnesota Registered and Certified Seed Directory for 1962 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul 1, Minnesota or from county agricultural agents' offices.

BARLEY

RECOMMENDED VARIETIES

Kindred (L) - Six-rowed, rough-awned, white aleurone variety. Short rachilla hairs. Medium yield, but highly susceptible to lodging. Resistant to stem rust. Recommended as a malting variety in all parts of Minnesota. Selected by a farmer, S. T. Lykken of Kindred, North Dakota.

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

Trall - Six-rowed, rough awned, white aleurone variety. Short rachilla hairs. Has good standing ability. Yields very well. Recommended as a malting variety in all parts of Minnesota. Developed at North Dakota State University from a cross of Kindred x Titan.

VARIETIES NOT ADEQUATELY TESTED

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

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

VARIETIES NOT RECOMMENDED

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.

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.

Peatland - Six-rowed, rough-awned, stiff-strawed, white aleurone variety. Has small seeds. Not acceptable for malting. A Minnesota selection from a variety introduced from Switzerland.

U.M. 570 - Six-rowed, smooth-awned mixture of blue and white aleurone kernels. Medium yield and straw strength. Not acceptable for malting. Developed at the University of Manitoba from the cross (Peatland x Newal) x Montcalm.

Table 1. Average date heading, plant height, lodging score, and kernel plumpness for barley varieties

Variety	Date of heading	Plant height	Lodging score	Percent of plump kernels *
	June	inches		
Kindred	25	32	6.4	46
Parkland	26	34	3.8	64
Traill	26	31	4.2	36
Larker	25	32	4.2	75
Trophy	26	31	4.0	64

*Percent of kernels held on 6/64" x 3/4" sieve.

OATS

RECOMMENDED VARIETIES

Ajax - White grain, tall, medium in maturity. High in yield; medium in weight per bushel. Standing ability is not as good as other recommended varieties. Susceptible to crown rust, smut, and race 8 of stem rust; resistant to stem rust races

Table 2. Average adjusted yields of barley varieties in bushels per acre

Variety	Years of trial	Rosemount	Waseca	Lamberton	Morris	Crookston	Grand Rapids	Duluth	Northern Minnesota	Average eight locations
Kindred	1955-61	49	61	42	59	43	38	40	39	46
Parkland	1955-61	58	68	46	65	49	43	49	46	53
Trall	1955-61	56	70	46	71	52	44	43	48	54
Larker	1960-61	57	65	52	68	48	47	44	50	54
Trophy	1960-61	52	69	43	71	44	43	42	50	52

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

Variety	Years of trial	Rosemount	Waseca	Lamberton	Morris ^{1/}	Grand Rapids	Duluth	Northern Minnesota	Adjusted grand average
Ajax	1956-1961	81	102	100	81	82	67	106	88
Andrew	1956-1961	75	99	111	71	65	63	88	82
Burnett	1957-1961	79	106	97	75	78	75	94	86
Garry	1956-1961	85	103	110	83	86	75	113	94
Goodfield	1959-1961	80	91	96	64	56	53	83	75
Minhafer	1956-1961	72	98	104	68	60	60	80	77
Minton	1956-1961	90	104	82	80	84	70	105	88
Rodney	1956-1961	76	104	99	80	90	71	112	90
Clintland 60	1959-1961	84	96	115	70	68	60	94	84
Dodge	1961	60	95	94	67	61	56	82	74
Glen	1960-1961	82	112	98	80	97	79	100	93
Nodaway	1961	80	98	82	72	52	58	86	75
Portage	1960-1961	87	103	101	81	89	64	98	89
Russell	1961	86	103	98	80	-	-	-	89
Tonka	1961	72	81	75	56	43	53	82	66
Bonda	1956-1961	71	82	78	67	59	54	76	70
Gopher	1956-1961	75	90	101	79	71	66	98	83
L. S. D. at 5% point		6	7	6	6	7	7	19	4

^{1/}Excluding 1960.

7 and 7A. Developed in Canada from the cross Victory x Hajira.

Andrew - Yellow grain, medium in height, very early maturing, good yielding oat, with excellent adaptability throughout the Corn Belt. Good weight per bushel; desirable straw strength; high groat percentage. Resistant to smut and races 7 and 7A of stem rust; susceptible to stem rust race 8 and crown rust. Selected at the Minnesota Agricultural Experiment Station from a cross of Bond x Rainbow.

Burnett - Medium-early maturing, yellowish-white oat; large, plump grain of high test weight. Medium in height and good in yield and straw strength. Resistant to all races of stem rust found in this area except 7A and to smuts; susceptible to crown rust. Developed at the Iowa Agricultural Experiment Station from a cross of Victoria-Hajira-Banner x Colo.

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, and outstanding in yield, with large yellowish-white seed of good test weight. Resistant to all races of stem rust found in this area, including race 7A; susceptible to crown rust. Also resistant to the smuts.

Goodfield - Developed at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Medium-early in maturity, medium in yield, high in test weight. Short straw with excellent lodging resistance. Resistant to smuts and to all races of stem rust found in this area including 7A. Resistant to most of the prevalent races of crown rust, but susceptible to certain races which have occurred in some parts of this region. Recommended for planting 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. Resistant to all races of stem rust found in this area, including 7A, and to smuts. Resistant to most of the prevalent races of crown rust in the north central states, but susceptible to certain races which have occurred in some parts of the region.

Minton - High-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 other recommended varieties. Resistant to smuts, to all races of stem rust found in this area except 7A. Resistant to most of the prevalent races of crown rust in the north central states, but susceptible to certain races which have occurred in some parts of the region.

Rodney - Tall, very late, and outstanding in yield. Large, plump, yellowish-white seed of high test weight. Resistant to all stem rust races found in this area except 7A and to the smuts; moderately susceptible to crown rust. Developed in Canada from a cross [(Victoria x Hajira-Banner) x (Victory x Hajira)] x Roxton.

VARIETIES NOT ADEQUATELY TESTED

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, very good in lodging resistance. Resistant to smuts, to all races of stem rust found in this area except 7A. Resistant to most of the prevalent races of

Table 4. Adjusted averages of oat varieties for date of heading, plant height, weight per bushel, weight of 200 kernels, standing ability

Variety	Date of heading	Plant height	Bushel weight	Weight of 200 kernels	Standing ability
	June	inches	pounds	grams	
Ajax	26	40	33.7	4.9	4.8
Andrew	20	36	35.0	5.0	4.8
Burnett	22	36	35.8	5.7	4.2
Garry	27	40	34.0	5.2	4.2
Goodfield	23	33	37.2	4.9	2.0
Minhafer	19	37	36.0	5.4	2.5
Minton	24	36	32.4	4.8	4.8
Rodney	30	40	34.5	5.6	5.2
Clintland 60	22	37	35.7	5.0	2.8
Dodge	22	38	34.5	5.5	2.2
Glen	25	39	32.2	6.0	5.0
Nodaway	19	38	37.4	5.8	2.0
Portage	26	40	35.7	5.6	4.2
Russell	26	37	33.6	6.0	4.8
Tonka	18	36	39.4	5.6	1.5
Bonda	22	38	36.5	5.8	4.0
Gopher	24	37	33.8	4.6	4.5

crown rust in the north central states, but susceptible to certain races which have occurred in some parts of the region.

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 but shows good resistance to smut, stem rust, and leaf rust. Medium in yield.

Glen - Tall, mid-season, high-yielding, yellowish-white oat. Low in bushel weight and poor in standing ability. Resistant to smuts, and to races 7 and 7A of stem rust but susceptible to stem rust race 8. Susceptible to crown rust. Developed at Macdonald College in Canada from a cross of Ajax x Roxton.

Nodaway - Developed at the Missouri Agricultural Experiment Station from the cross Columbia-Marion x [(Victoria x Hajira-Barner) x (Victory x Hajira)] x Roxton]. White, short, plump grain of excellent test weight. Early maturing, medium in height and yield, good straw strength. Resistant to smut and stem rust, moderately resistant to crown rust, susceptible to yellow dwarf.

Portage - Tall, mid-season, high-yielding, yellowish-white oat with high bushel weight. Medium in lodging resistance. Resistant to smuts, and to race 7 and 7A of stem rust but susceptible to stem rust race 8. Moderately susceptible to crown rust. Developed at the Wisconsin Agricultural Experiment Station from a cross of Ajax x Hawkeye-Victoria.

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. Resistant to races 7 and 8 of stem rust but susceptible to crown rust in the rust nursery test.

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. Resistant to yellow dwarf, susceptible to stem and crown rusts.

VARIETIES NOT RECOMMENDED

Beedes - 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. Resistant to races 7 and 7A of stem rust and smuts; susceptible to stem rust race 8 and moderately susceptible to crown rust.

Bonda - Relatively tall, good-strawed, and medium-early maturing, with a large yellowish-white grain of superior bushel weight. Low in yield. Susceptible to stem rust races 7 and 7A and crown rust. Resistant to smut and to race 8 of stem rust. Selected at the Minnesota Agricultural Experiment Station from a cross of Bond x Anthony.

Branch - Tall, white oat; late in maturity, and high in yield. Somewhat poor in standing ability. Resistant to smut and races 7 and 7A of stem rust. Has shown some tolerance to crown rust in the field. Developed in Wisconsin from the cross (Forward x Victoria-Richland) x Forward.

Cherokee - Early and short, fair in yield and test weight. Susceptible to crown rust and races 7 and 7A of stem rust; resistant to race 8. 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.

Clintland - Good-yielding yellow oat of high test weight. Medium in plant height and maturity. Resistant to stem rust race 8 and to most of the crown rust races prevalent in the region. Developed in Indiana from the cross Clinton x Landhafer, backcrossed three times to Clinton.

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. Resistant to most of the crown rust races prevalent in the region, to races 7 and 7A of stem rust, and to smuts; susceptible to stem rust race 8.

Fundy - Tall, medium-maturing, high yielding. Yellowish-white, large grain of low test weight. Developed in Canada from a cross of Ajax x Abegweit. Resistant to races 7 and 7A of stem rust and the smuts; susceptible to race 8 and crown rust.

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.

Mo. O-205 - Grayish-red oat, medium in yield, good in straw strength and test weight. Medium-early in maturity. Resistant to smut and races 7 and 7A of stem rust; susceptible to race 8. Has shown some tolerance to crown rust in the field. Developed in Missouri from the cross Columbia x Victoria-Richland.

Nehawks - A re-selection from the Cherokee oat made at the Nebraska Agricultural Experiment Station. Very early, good yielding oat. Medium in seed size and bushel weight. Short-strawed and good in standing ability. Resistant to smuts, races 7 and 7A of stem rust; but susceptible to crown rust.

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. Resistant to races 7 and 7A of stem rust and smuts; susceptible to race 8 and moderately susceptible to crown rust.

Ransom - Medium height and early maturity with yellow, medium-sized grain. Resistant to all races of stem rust found in this area and smuts; moderately susceptible to crown rust. Developed by the North Dakota Agricultural Experiment Station from a cross of Sac x Hajira-Joanette.

Snk - Tall, late-maturing, high-yielding, somewhat susceptible to lodging. Large, yellow seed of good test weight. Resistant to races 7 and 7A of stem rust and the smuts; susceptible to race 8. Has shown some tolerance to crown rust. Developed in Wisconsin from the cross (Forward x Victoria-Richland) x Andrew.

WINTER RYE

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

Table 5. Adjusted average yields of winter rye varieties

Variety	Years of trial	St. Paul	Years of trial	Lamberton	Morris	Grand Rapids	Average
		bushels per acre				bushels per acre	four locations
Adams	1958-61	48	1958-61	42	31	69	48
Caribou	1958-61	42	1958-61	42	35	72	48
Elk	1958-61	53	1958-61	49	32	79	53
Guelzower	1961	56	-	-	-	-	-
Pearl	1960-61	54	1961	47	34	70	51
Varne	1961	59	1961	49	34	68	54
Emerald	1958-61	40	1958-61	41	33	64	45
Petkus	1958-61	53	1958-61	47	29	69	50
L.S.D. at 5% point		5		4	4	5	2

61 Table 6. Adjusted averages of winter rye varieties at four locations for winterkilling, date heading, date mature, plant height, lodging score, kernel weight, and bushel weight

Variety	Winterkilling*	Date heading	Date mature	Plant height	Lodging score	Weight of 100 kernels	Bushel weight
		percent	July	inches		grams	pounds
Adams	14	May 30	20	51	2.4	2.8	56.3
Caribou	5	May 30	20	48	2.7	2.5	56.4
Elk	28	June 2	22	47	2.5	2.9	56.4
Guelzower	-	June 2	25	47	1.7	3.3	56.6
Pearl	23	June 2	22	45	2.3	2.7	55.6
Varne	22	June 2	23	44	2.0	2.7	54.9
Emerald	10	May 30	20	50	2.9	2.5	56.2
Petkus	41	June 3	23	43	1.3	3.0	56.5

*Average of 8 trials in which winterkilling occurred. (St. Paul 1959, Lamberton 1959, 61, Morris 1959-61, Grand Rapids 1960-61).

RECOMMENDED VARIETIES

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

Elk - Highest yielding variety, fair in winter-hardiness, late maturing, and tall. Medium-size seed, predominantly green in color, and high in 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

Quelzower - High-yielding, fair in winterhardiness, late maturing, and tall. Good resistance to lodging. Large seed, green in color, and high in bushel weight. Originated in Germany. Seed obtained from Canada Department of Agriculture Experimental Farm, Swift Current, Saskatchewan.

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

VARIETIES NOT RECOMMENDED

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

Emerald - Medium in yield, very winter-hardy, medium in maturity, and tall. Sometimes lodges badly. Small seed, green in color, and medium in bushel weight. Developed at the University of Minnesota by selecting green-colored seed in self-pollinated lines and their combinations.

Petkus - High-yielding, fair in winter-hardiness, late-maturing, and short in height. Very good resistance to lodging. Medium-size seed, predominantly green in color, and high in bushel weight. Seed obtained from the F. von Lochow-Petkus Ltd. of Germany. (This is a different variety than that licensed as Petkus in Canada).

SPRING WHEAT

RECOMMENDED VARIETIES

BREAD

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 Experiment Station.

Pembina - Awnless variety of medium height and maturity with good straw strength. Moderately resistant to leaf rust and stem rust. High yielding with a good test weight; satisfactory milling and baking qualities. 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 resistant to leaf rust and stem rust. High-yielding with a medium test weight; satisfactory milling and baking qualities. Selected from a cross of McMurachy-Exchange x Redman³ made at the Canada Department of Agriculture, Research Station, Winnipeg, Manitoba.

DURUM

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 Experiment Station.

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 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 Experiment Station.

VARIETIES NOT ADEQUATELY TESTED

BREAD

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 questionable quality. Selected from a backcross Henry⁷ x P.I. 94587 made at the Wisconsin Experiment Station.

VARIETIES NOT RECOMMENDED

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

Table 7. Average adjusted date heading, plant height, bushel weight, and yield of spring wheat varieties

Class and variety	Years of Trial	Date heading June	Plant height inches	Bushel weight pounds	Yield per acre				Average Morris and Crookston	
					Rosemount	Waseca	Lamberton bushels	Morris		
Bread Wheats										
Lee	1958-61	22	33	59.9	34	43	30	36	29	33
Pembina	1959-61	24	33	58.7	34	49	31	36	32	34
Selkirk	1958-61	25	34	57.6	35	48	31	40	31	36
Lathrop	1961	26	36	59.4	47	-	-	-	-	-
Thatcher	1958-61	25	35	58.2	24	34	23	34	31	32
Durum Wheats										
Lakota	1958-61	23	36	59.4	43	-	-	40	38	39
Langdon	1958-61	25	40	61.2	41	-	-	38	34	36
Wells	1958-61	25	36	60.9	42	-	-	39	36	37
Mindum	1958-61	28	45	62.3	37	-	-	38	34	36
L.S.D. at 5% point					2	2	3	2	4	2

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Table 8. Average adjusted date heading, plant height, winter injury, bushel weight, and yield of winter wheat varieties

Variety	Years of Trial	Date heading June	Plant height inches	Winter injury percent	Bushel weight pounds	Yield per acre				
						St. Paul	Waseca	Grand Rapids bushels	Station average	Lamberton
Minter	1957-61	15	40	10	60.3	39	44	39	41	25
Rodco	1961	11	35	38	59.8	45	42	8	32	44
Warrior	1960-61	12	36	28	56.6	39	45	15	33	27
Minturki	1957-61	16	42	10	56.8	31	37	29	32	19
Nebred	1957-61	13	36	22	57.9	35	39	28	34	22
Yogo*	1959-61	16	41	11	56.0	35	36	25	32	18
L.S.D. at 5% point						3	4	6	3	3

*Not grown at Lamberton in 1959.

baking qualities are satisfactory. Selected from a cross of [Thatcher x (McMurachy-Exchange x Redman²)] x Lee at the North Dakota Experiment Station.

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

Mida - Bearded, medium in maturity and strength of straw. Moderately susceptible to scab, loose smut, and stem rust. Satisfactory milling and baking characters. Selected from a cross of (Ceres-Double Cross) x (Ceres-Hope-Flour-ence) at the North Dakota 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 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 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. Very susceptible to leaf rust, stem rust and scab, but has high milling and baking qualities.

DURUM

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 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 Experiment Station.

Sentry - A selection from Ld. 308 x Nugget, made at the North Dakota 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.

WINTER WHEAT

RECOMMENDED VARIETIES

(All winter wheat varieties are susceptible to stem rust race 15B)

Minter - Bearded, white-chaffed, winter-hardy, and a high yielding winter wheat. Susceptible to leaf and stem rust. Satisfactory in quality. A selection from a backcross of (Hope x Minturki) x Minturki, developed by the Minnesota Experiment Station.

VARIETIES NOT ADEQUATELY TESTED

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

Warrior - Early, bearded, short strawed variety with good straw strength. Winterhardiness may not be 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 Experiment Station.

Winalta - No information about its performance in this area. Selected from a cross of Minter x Wichita at the Canada Department of Agriculture Research Station, Lethbridge, Alberta. In Canadian tests it has satisfactory winterhardiness, straw-strength, yield and quality characteristics.

VARIETIES NOT RECOMMENDED

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

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 Experiment Station.

Nebred - Short, bearded variety of medium maturity, straw strength, yield and bushel weight. Winterhardiness is not satisfactory. Susceptible to leaf rust and stem rust. Quality is satisfactory. It was selected from Turkey at the Nebraska 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 winter-hardy. A selection from a cross of (Gladden x Kansas 500) x [(Fultz x Hungarian) x Kansas 500] developed by the Wisconsin Experiment Station.

Yogo - Bearded, weak strawed variety with good winterhardiness. 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 Experiment Station.

FLAX

RECOMMENDED VARIETIES

Army - From a cross of Crystal x Redson made at Minnesota Agricultural Experiment Station. Immunity to rust conditioned by L gene which is not found in other recommended late-maturing varieties; highly resistant to wilt and moderately resistant to pasmo; resistant to lodging. Fair oil content of good drying quality. Brown-seeded, blue-flowered, late-maturing, recommended for early sowing for best yields.

B-5128 - From a cross of Golden x Rio made at North Dakota Agricultural Experiment Station. Immunity to rust conditioned by N¹ 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.

For best results it should be sown early.

Bolley - Developed at North Dakota Agricultural Experiment Station from cross of Birio x C.I. 1134. Immunity to rust conditioned by N¹ 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 Army, B5L28 or Redwood for late-sowing.

Marine - Selected from cross of C.I. 975 x Sheyenne at North Dakota Agricultural Experiment Station. Immunity to rust conditioned by L gene; moderately resistant to wilt and pasmo; 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.

Redwood - Originated from a cross of B-5L28 x Redson at Minnesota Agricultural Experiment Station. Has N¹ 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. Excellent yields in field trials, particularly when sown early.

VARIETIES NOT RECOMMENDED

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.

Crystal - Developed at Minnesota Agricultural Experiment Station from cross of Bison x Ottawa 770-B. Immunity to rust conditioned by L gene; moderate resistance to pasmo but susceptible to late wilt. High oil content of good drying quality. It has been difficult at times to obtain good stands of Crystal. White flowers and yellow seeds.

De Oro - Selection of Bolley Golden made at North Dakota Agricultural Experiment Station. Immunity to rust conditioned by M³ gene, moderately resistant to wilt; but very susceptible to pasmo. Late maturity, medium yielding ability. Pink flowers with yellow seeds.

Koto - From a cross of (Russian x Argentine) x Bison made at No. Great Plains Field Station, Mandan, North Dakota. Susceptible to rust; moderately susceptible to pasmo, resistant to wilt. Brown seeds, dark blue flowers, mid-late in maturity.

Linda - Selected from [Argentine 191 x Bison] [Viking x Bison] at North Dakota Agricultural Experiment Station. Moderately susceptible to rust; susceptible to pasmo; resistant to wilt; good oil content of fair drying quality, medium early; large, brown seed; blue flowers.

Minerva - Selected from a backcross of C.I. 649 x Bison₄ at Minnesota Agricultural Experiment Station. Moderately resistant to rust; moderately susceptible to pasmo and late wilt. Excellent oil content; good oil quality, straw slightly less valuable for paper production than other varieties. Yellow-seeded; dark blue flowers; late maturity.

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.

Table 9. Average of flax varieties for agronomic and disease characteristics, and oil content and iodine value

Variety	Days from sowing:		Maturity	Plant height	Lodging	Psmo*	Wilt	Oil content	Iodine value	Weight of 1000 seeds
	First bloom	Full bloom								
Number of trials	27	26	24	28	3	10	5	26	26	
				inches			percent	percent		grams
Army	55	60	105	25	1	2	9	38.8	182	6.0
Bolley	52	57	102	22	3	4	48	39.9	188	6.0
B-5128	54	60	106	23	3	4	49	39.2	178	6.5
Marine	52	57	101	22	4	2	28	38.7	186	5.4
Redwood	54	58	104	22	3	5	27	39.1	180	5.7
Bison	54	60	103	20	4	4	21	39.3	174	5.9

* 1=best, 9=poorest.

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Table 10. Average yields of flax varieties in bushels per acre

Variety	Early sown			Late sown	
	Morris 1958-61	Crookston 1958-61	Lamberton 1960-61	Morris 1958-60	Crookston 1959-61
Army	20	19	24	15	12
Bolley	18	15	24	-	14
B-5128	18	19	20	12	12
Marine	17	17	21	16	14
Redwood	20	20	21	16	12
Bison	18	20	24	16	13

Raja - Selection from a cross of experimental varieties of Ottawa, Canada (Can. No. 39010). Moderately susceptible to wilt, susceptible to pasmo; resistant to rust. 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.

Redwing - Selected at Minnesota from Acc. No. 91. Susceptible to rust and pasmo; moderately resistant to wilt. Small seeds with low oil content but high oil quality. Blue-flowered, brown seeded, early maturity.

Royal - Developed at Saskatoon, Saskatchewan, Canada as C.A.N. 1727. Moderately susceptible to rust and wilt; susceptible to pasmo. Weak straw, seeds are brown, flowers blue, mid-late in maturity.

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

Victory - Developed at North Dakota Agricultural Experiment Station from Czech x Argentine x Smoky Golden. Very susceptible to pasmo; moderately susceptible to rust and wilt. Lacks uniformity of type. Large white flowers with blue anthers, large brown seeds, late maturity.

SOYBEANS

Maturity before frost is an important consideration in soybean varieties used for seed production. Varieties must be earlier as the average growing season becomes shorter. For this reason the regions of adaptation for seed production are included in the description of varieties.

Varieties used for hay can be somewhat later maturing than those used for seed. In general, a variety can be used about one maturity zone (see the map) farther north for hay than for seed.

The "small plots" of table 11 are replicated three-row plots, which are 16 feet in length. At Grand Rapids the rows are spaced 24 inches apart. At other locations they are 40 inches apart.

The "large plots" are four or six rows wide and 100 to 150 feet in length. Planting and cultivating is done with ordinary corn-soybean equipment. Harvesting is done with a standard combine.

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 Corn Maturity 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 Corn Maturity Zones, and about southern one-third of the Central Zone.

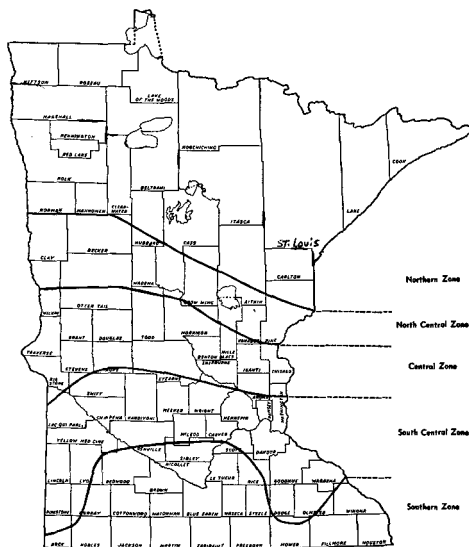
Comet - A selection made at the Central Experiment Farm, Ottawa, Canada, from a cross of Pagoda x Mandarin. Has unusual combination of earliness, good height

of plant and of lowest pods, and good resistance to lodging. Has yielded well as an early variety in the South Central and Southern Corn Maturity Zones where it is recommended. Is 2 to 3 days earlier than Ottawa Mandarin, is about 4 inches taller, and has similar standing ability. Good oil content. Is rather highly susceptible to chlorosis or "yellowing" observed frequently in western Minnesota.

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 Corn Maturity Zones.

Grant - Medium-early, medium in height, has given good yields. Good 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 Corn Maturity 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 southern Minnesota when compared to other varieties in 40- or 42-inch row spacings. Matures about 10 days later than Chippewa, so is recommended only in the Southern Corn Maturity 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.



MATURITY ZONES. For practical purposes, the same zones apply to soybeans that are used for corn hybrids. The zones indicate the approximate number of days growing season that may be expected from emergence after planting to maturity.

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.

Table 11. Averages of soybean varieties for yield, date mature, lodging score, plant height, protein content and oil content at Blue Earth, Crookston, Grand Rapids, Lamberton, Morris, Rosemount and Waseca

Variety	Yield per acre bushels	Date mature	Lodging score*	Plant height inches	Protein ⁺ percent	Oil ⁺
<u>Blue Earth, 1959 and 1961 (small plots)⁺</u>						
Chippewa	36	9-17	1.8	33	40.1	21.9
Ford	29	10-1	2.8	40	40.1	20.4
Harosoy	36	9-24	3.2	40	41.3	21.3
Lindarin	35	9-25	2.5	35	41.2	21.2
<u>Crookston, 1960-1961 (large plots)⁺</u>						
Acme	9	9-11	-	-	38.1	20.4
Comet	14	9-23	-	-	-	-
Flambeau	12	9-17	-	-	38.5	20.9
Merit	18	9-21	-	-	39.5	20.6
Norchief	19	9-20	-	-	40.1	20.2
<u>Grand Rapids 1960-1961 (small plots)</u>						
Acme	29	9-14	1.6	28	39.9	21.1
Comet	25	9-24	1.9	34	39.7	19.3
Flambeau	28	9-20	2.5	29	40.7	18.3
Merit	31	9-26	1.8	33	39.8	19.3
Norchief	26	9-24	1.6	29	41.2	19.0
<u>Lamberton, 1960-1961 (large plots)</u>						
Chippewa	29	9-21	2.3	34	40.0	21.2
Harosoy	29	10-2	3.5	44	40.6	20.3
Lindarin	29	10-1	2.5	37	39.7	20.9
<u>Morris, 1960-1961 (large plots)</u>						
Chippewa	23	9-24	-	-	-	-
Comet	21	9-16	-	-	-	-
Grant	24	9-23	-	-	-	-
Merit	23	9-18	-	-	-	-
Norchief	21	9-20	-	-	-	-
<u>Rosemount, 1960-1961 (small plots)</u>						
Chippewa	34	9-22	1.5	38	40.2	21.0
Grant	37	9-22	2.1	35	40.0	21.4
Merit	36	9-20	2.1	40	39.4	21.7
Norchief	34	9-16	2.4	34	40.5	21.3
<u>Rosemount, 1960-1961 (large plots)</u>						
Chippewa	31	9-29	2.0	-	-	-
Comet	29	9-22	2.5	-	-	-
Grant	32	9-27	2.5	-	-	-
Harosoy	30	10-7	3.1	-	-	-
Lindarin	30	10-6	2.3	-	-	-
<u>Waseca, 1959-1961 (large plots planted in late May or early June)⁺</u>						
Chippewa	33	9-24	2.3	32	40.5	20.9
Harosoy	33	10-8	3.2	38	41.0	20.2
Lindarin	34	10-7	2.5	35	41.7	20.4
<u>Waseca, 1960-1961 (large plots planted in late June or early July)</u>						
Acme	17	9-30	1.0	22	39.3	20.4
Comet	18	10-9	1.0	27	38.3	20.3
Merit	18	10-10	1.0	29	37.6	20.5

*1 = erect; 5 entirely lodged

+Comments on protein and oil data - None available for 1961; none available for Blue Earth; Waseca data for 1959-1960 substituted in Blue Earth section; 1959-1960 data at Crookston; 1956-1960 data for early planting at Waseca.

Merit - Similar in maturity to Norchief but taller. Good yielding and standing ability and high oil content. Selected at Central Experiment Farm, Ottawa, Canada. Recommended for Central and North Central Maturity Zones. Yellow seeds with light brown seed scars. Gray pubescence. From Blackhawk x Capital.

Norchief - Good in yield and oil content. Fairly short in growth with good resistance to lodging. Medium-size yellow seeds with black seed scars. Pubescence is brown. Selected at the Wisconsin Agricultural Experiment Station from a cross of Hawkeye x Flambeau. Matures a few days later than Flambeau, but several days earlier than Ottawa Mandarin; hence recommended for Central and North Central Corn Maturity Zones, and about southern one-half of the Northern Zone.

Ottawa Mandarin - Short and highly resistant to lodging. Fairly large yellow seeds with light-buff seed scars. Pubescence is gray. Oil content medium. Selected at the Central Experiment Farm, Ottawa, Canada, from the variety Mandarin. Recommended in areas of the state south of the Northern Corn Maturity Zone.

VARIETIES NOT RECOMMENDED

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 Experiment 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.

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, yields less, and is a poorer competitor with weeds in the row. Has a very high oil content but has a poor seed coat, which results in excessive splitting.

SUNFLOWERS

Short, combine-harvested sunflowers are grown commercially in northwestern Minnesota. Most of the crop is sold to bird feed dealers. Occasionally seed is exported to Canada for processing as an oilseed crop like soybeans.

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 Experiment Station about 1920.

VARIETIES NOT ADEQUATELY TESTED

Admiral - Medium in yield and maturity. About 4 1/2 feet tall. Small seed of high oil content and 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 in yield and maturity. About 4 1/2 feet tall. Small seed of high oil content and 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.

Table 12. Adjusted average yields of sunflower varieties

Variety	Years of trial	pounds per acre		Average two locations
		Rosemount	Crookston	
Arrowhead	1954-61	1220	1786	1503
Admiral	1960-61	679	1430*	1055
Advent	1960-61	834	1207	1021
Mennonite	1954-61	1151	1467	1309
L.S.D. at 5% point		87	141	83

*1961 only

Table 13. Adjusted averages of sunflower varieties at Rosemount and Crookston for date flowering, height, head diameter, seed weight, oil content, and bushel weight

Variety	Date flowering	Plant height	Head diameter	Weight of 100		Bushel Weight
	July	inches	grams	Oil*	pounds	
Arrowhead	25	63	5.7	7.9	28.9	27.5
Admiral	28	55	5.7	7.4	29.5	27.0
Advent	28	57	6.5	6.9	28.4	26.7
Mennonite	29	66	6.0	8.9	26.0	24.2

*dry matter basis

VARIETIES NOT RECOMMENDED

Advance - Medium in yield and maturity. About 4 1/2 feet tall. Small seed of high oil content and bushel weight. Rust-susceptible topcross hybrid released about 1945 by Canada Department of Agriculture. Produced by crossing the inbred, S-37-388, with the variety, Sunrise. Seed harvested from the S-37-388 rows in the crossing field is used for seed.

Beacon - Medium yield. Late maturity. Tall. Small seed of medium oil content and high bushel weight. Variable in height, maturity, and seed color. Open-pollinated combination of 27 rust-resistant lines licensed in 1955 by Canada Department of Agriculture.

Commercial or second generation Admiral, Advance, or Advent - Similar to hybrid corn, only first generation hybrid sunflower seed should be planted.

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

Mennonite - Medium to high yielding. Slightly 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.

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. Field peas are also used as a forage crop and, for this purpose, are usually sown in a mixture with oats.

Small-seeded varieties such as Chancellor are preferred for the pigeon feed and forage seed markets whereas medium- to large-seeded varieties are desired for commercial splitting. It is difficult to produce green varieties of high visual quality since bleaching often makes the harvested seed appear mixed in color.

RECOMMENDED VARIETIES

Chancellor - Medium in maturity and 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.

Strål - Medium in maturity and 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.

Table 14. Adjusted averages of pea varieties at Crookston for seed yield, date first bloom, date mature, vine length, seed weight, and bushel weight

Variety	Years of trial	Yield	Date	Date	Vine	Weight of	Bushel
		per acre bushels	first bloom June	mature	length inches	100 seeds grams	weight pounds
Chancellor	1956-61	28	24	August 11	43	13.0	63.6
Strål	1956-61	33	23	August 14	43	16.3	63.1
Bello	1960-61	36	21	August 9	41	19.1	62.8
Creamette	1960-61	32	21	August 11	40	21.2	64.3
Maple	1960-61	34	25	August 15	42	19.8	63.1
Marma	1960-61	35	21	August 13	40	16.9	62.0
Weitor	1960-61	24	14	July 28	32	17.5	63.3
First and Best	1956-61	30	17	August 8	42	16.8	62.9
L.S.D. at 5% point		3					

VARIETIES NOT ADEQUATELY TESTED

Bello - Medium in maturity and long vined. Large, salmon-colored seed with brown mottle and black hilum. Released in 1958 by the Swedish Seed Association from a cross of Hero x Artturi.

Creamette - Medium in maturity and 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.

Maple - Late in maturity and long vined. Large, olive-colored seed with brown mottle and indistinct hilum.

Marma - Medium in maturity and long vined. Medium-sized, olive-colored seed with brown mottle and indistinct hilum. Released in 1959 by the Weibullsholm Plant Breeding Institute, Landskrona, Sweden from a cross of Marmor x Parvus.

Weitor - Early in maturity and short vined. Medium-large, cream-colored seed. Originated at the Weibullsholm Plant Breeding Institute, Landskrona, Sweden.

VARIETIES NOT RECOMMENDED

Alaska - Low yielding, very early maturing, short vined. Green-colored seed, medium in size and bushel weight. Also used as a canning variety. Introduced as an American variety about 1884, but probably was the same as the English variety Earliest of All. Many strains are available.

First and Best - Early in maturity and various strains differ in vine length and yield. Cream-colored seed of medium size and bushel weight. Good quality for cooking and splitting. Of American origin, sometimes called Extra Early.

NAVY BEANS

Navy beans can be grown successfully, but Minnesota markets are few and they lack the electric eye machinery needed for economically cleaning large scale production.

RECOMMENDED VARIETIES

Michelite - Late maturing, large plants, viny growth, pods mostly off ground at harvest. Released in 1937 by Michigan State University from a cross of Early Prolific x Robust.

Sanilac - Medium in maturity and plant size, erect growth, pods off ground at harvest. Released in 1957 by Michigan State University from a cross of an x-ray mutation of Michelite with an anthracnose resistant strain.

VARIETIES NOT ADEQUATELY TESTED

Seaway - Early maturing and medium in plant size, erect growth, pods off ground at harvest, resistant to common bean mosaic. Released in 1961 by Michigan State University.

Table 15. 1960-61 average yield, date mature, seed weight, and bushel weight of navy bean varieties

Variety	Yield per acre		Date mature	Weight of 100 seeds	Bushel weight
	Rosemount	Crookston			
	bushels			grams	pounds
Michelite	35	31	September 10	19.6	63.3
Sanilac	36	27	September 5	17.9	64.1
Seaway	30	28	August 28	17.6	63.5
L.S.D. at 5% point	6	9			

ALFALFA

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 leafspot 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

Culver (A-600) - 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.

Rambler - Developed at the Swift Current Experiment Station in Canada. A creeping alfalfa (spreads underground by roots). Winter-hardy, wilt-resistant, susceptible to leafspot 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. Winter-hardy, wilt resistant, moderately resistant to common leafspot, but susceptible to black stem. Slow recovery after clipping.

VARIETIES NOT RECOMMENDED

Uncertified alfalfa seed, regardless of origin, is not recommended for forage production in Minnesota. Numerous tests have shown the advantages of seeding only certified seed. Only certified seed will give best assurance of satisfactory production.

Alfalfa blends sold under trade brands are being offered in Minnesota. These should not be considered as varieties, because varietal identification is lost when seed from different lots is blended. Blending does not increase winter-hardiness, disease resistance, or insect resistance over that expected in the original lots.

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 winter-hardy in Minnesota. Susceptible to the leafspot diseases.

Buffalo - Wilt-resistant variety selected from Kansas Common, which it resembles in most other characteristics. Not sufficiently winter-hardy 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 winter hardy 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.

Grimm - A winter-hardy 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 - Winter-hardy, 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. Removed from recommended list because of inadequate seed supplies.

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 winter-hardy 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 leaf-spot diseases. Removed from list of varieties recommended for short rotations because of inadequate seed supplies.

Table 16. Average forage yields for alfalfa varieties at five locations

Variety	Rosemount		Waseca		Morris	Crookston	Grand Rapids
	1958-59	1959-60	1959-61	1956-58	1960-61	1959-60	1957-59
	tons per acre						
Ranger	5.16	5.10	3.30	3.56	2.86	2.04	3.16
Vernal	5.13	5.26	3.72	3.80	2.86	2.41	3.57
Culver		4.98					3.22
Rambler	4.55	4.24	3.00		3.15	2.11	2.82
Teton		3.87	3.17		2.90	2.01	2.12
Atlantic		4.73		3.21			
Buffalo		5.00	3.65	3.16			
Du Puits	3.63	4.67	3.61	3.36	2.70	2.03	2.87
Grimm	4.79	5.08	3.53	3.43			
Ladak	4.49	4.54	2.94	3.53		2.35	2.93
Lahontan	2.24	1.91	2.81		2.46	1.21	2.50
Narragansett	4.84	4.94	3.81	3.74	2.83	2.35	3.03
Rhizoma	4.61	4.46	3.46	3.30		2.40	2.84
Scandia (Alfa)	3.14	4.22	3.53			1.95	2.58
Socheville	3.37	4.08	3.52		2.85		
L.S.D. at 5% point	.57	.43	.35	.28	N.S.	.22	.51

Table 17. Disease ratings, percent stand, and percent winter-kill for alfalfa varieties

Variety	Bacterial wilt	Common leafspot	Black stem	Percent plants winter-killed ^{1/}		Percent stand September 15, 1961 ^{2/}
				May 16, 1961	September 15, 1961	
Ranger	R	S	S	19.0		60.0
Vernal	VR	S	S	19.4		62.5
Culver	R	S	S	11.0		
Rambler	R	S	S	46.8		50.8
Teton	R	MR	S	20.8		70.0
Atlantic	S	S	S	56.0		
Buffalo	R	S	S	27.2		58.3
Cody	R	S	S			
Du Puits	S	MR	S	83.0		32.5
Grimm	S	S	S	39.4		56.7
Ladak	MR	S	S	55.4		38.3
Lahontan	R	S	S	17.4		35.8
Narragansett	S	S	S	59.0		42.5
Rhizoma	S	S	S	53.8		34.2
Scandia (Alfa)	S	MR	S	78.8		21.7
Socheville	S	MR	S	86.2		25.8

S = susceptible, MR = moderately resistant, R = resistant, and VR = very resistant.
^{1/} Test seeded May, 1958 at Rosemount. Winterkill includes plants weakened by bacterial wilt. ^{2/} Test seeded May, 1959 at Rosemount. Bacterial wilt partial cause for loss of stand.

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 winter-hardy 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 winter-hardy than Ranger. Forage yields are satisfactory when wilt and winter injury are not factors.

BIRDSFOOT TREFOIL

RECOMMENDED VARIETIES

Empire - Selected at the New York Agricultural Experiment Station. Winter-hardy, 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 winter hardy than Empire. Relatively upright growth. Good yield.

VARIETIES NOT RECOMMENDED

Mansfield - Selected at the Vermont Agricultural Experiment Station. Erect growth, good yield but not winter-hardy 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.

VARIETIES NOT RECOMMENDED

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/acre for 1956-61*

Variety	Rosemount	Waseca	Morris	Crookston	Grand Rapids	Duluth	Average
Dollard	3.57	2.10	2.69	1.61	3.33	3.03)	2.72
Lakeland	3.58	2.26	2.87	1.43	3.14	3.10)	2.73
Chesapeake	3.41	2.24	2.78	1.24	3.38	3.05)	2.68
Kenland	3.75	2.11	2.82	1.36	3.21	3.07)	2.72
Pennscott	3.62	2.18	2.68	1.35	3.57	2.54)	2.66

*Not all stations represented in all years.

Table 19. Average forage yields of red clover second crop year tons/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

SWEETCLOVER

Biennial sweetclover varieties were tested during the period 1945 to 1956. New tests were established in 1959 and have been continued through 1961.

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.D.A. 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. Maturity similar to common types.

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.D.A. Has looked promising in two years 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 has not responded well there in 1960 or 1961 or at other stations 1959 to 1961.

Table 20. Average forage yields of sweet clover in tons/acre for 1959-61

Variety	Second Year Forage					First Year Forage		
	Rosm. 1961	Rosm. 1960	G. Rap. 1960	Morris 1961	Average	G. Rap. 1960	Crookston 1959	Average
Evergreen	1.74	1.57	1.64	-	-	-	3.46	-
Madrid	2.20	1.68	1.83	1.43	1.78	1.33	2.67	2.00
Brandon Dwarf	1.01	0.93	2.19	-	-	0.99	2.59	1.79
Goldtop	2.36	1.89	1.62	1.41	1.82	1.49	2.71	2.10
Gumino	0.43	-	-	-	-	1.30	-	-
Denta	1.18	1.26	1.20	-	-	1.57	3.42	2.49

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.

VARIETIES NOT ADEQUATELY TESTED

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.

VARIETIES NOT RECOMMENDED

Elsberry - A southern, early maturing type of brome grass, the best of several accessions tested in the Soil Conservation Service Nursery at Elsberry, Missouri. Believed to be derived from an old field of brome grass 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.

Manchar - Tall, leafy, semibunch type of bromegrass introduced from Manchuria, under P.E.I. 109812, by the U.S. Department of Agriculture and subjected to mass selection at Pullman, Washington. Manchar gives a slightly higher second cutting than other varieties, but total season yield is less than Canadian Commercial and considerably less than southern types. It has good seed characteristics.

Table 21. Average forage and seed yields of bromegrass varieties from Rosemount, Waseca, Morris, Crookston, and Grand Rapids - 1951-61*

Variety	Forage yield (15 percent moisture)		Seed yield (pounds per acre)
	First cutting (tons per acre)	Second cutting	
Southern type			
Achenbach	2.00	.99	131
Fischer ⁺	1.95	.95	164
Lincoln	2.01	.94	168
Northern type			
Canadian Commercial	1.56	.80	153
Manchar	1.82	1.04	215

*Three replications were made at each station during the period. Not all stations were represented every year, but each of them were for at least 3 of the 9 years. Thirty-seven first cuttings, 17 second cuttings, and 7 seed harvests are included.

⁺Yield of Fischer estimated for 1959, 1960 and 1961.

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.

VARIETIES NOT RECOMMENDED

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

Variety	Forage yield tons/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

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 - sudan crosses - Seed companies are selling sorghum-sudan crosses. Two such crosses, Sudax SX-11 and Hydan 37, were compared to Piper in 1961. Piper yielded more pasturage, had lower HCN content, and recovered better after grazing.

Table 23. Pasturage yields, HCN content and recovery after grazing of sudans and sorghum-sudan crosses at St. Paul 1961

Variety	Tons per acre at 15% moisture	Mg. HCN per 100 gm dry weight	Percent recovery after grazing*
Piper	3.9	15	76
Greenleaf	3.1	23	61
Sudax SX-11	3.6	39	36
Hydan 37	3.7	34	37

*Percent ground cover 10 days after grazing.

VARIETIES NOT RECOMMENDED

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 sorgo x sudangrass and backcrossed to sudangrass. Distributed in 1943. Low in yield, somewhat resistant to leaf disease, and high in hydrocyanic acid content.

TIMOTHY

Variety tests of timothy were conducted during the period 1945 to 1948 inclusive. It is on this data the varietal recommendations are based. New tests were established in 1959.

RECOMMENDED VARIETIES

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.

Table 24. Average forage yields of timothy in tons per acre from Rosemount, Waseca, Crookston, and Grand Rapids 1960-61

Recommended varieties	Rosemount	Waseca	Crookston	Grand Rapids	State Average
Itasca	2.80	2.40	1.10	2.21	2.13
Lorain	2.60	2.25	1.08	2.28	2.05
Varieties not adequately tested					
Clair	2.86	2.46	1.07	2.21	2.15
Climax	2.62	2.75	1.31	2.26	2.24
Drummond	2.46	2.11	1.35	2.12	2.01
Essex	2.46	2.39	1.41	2.02	2.07

VARIETIES NOT ADEQUATELY TESTED

Clair - Naturalized strain from the farm of Clair Andrew, Vevoy, Indiana and increased by the Kentucky Agricultural Experiment Station. Early maturity, relatively coarse, vigorous, good aftermath according to Kentucky tests.

Climax - Selected by Experimental Farms Service, Ottawa, Canada, from a wide collection of seed lots by combining several progeny tested clones. Described as tall, fine stemmed and leafy. Seven to ten days later than common.

Drummond - Selected at MacDonald College, Quebec, Canada from strain S-48 (Northern Europe) and S-51 (Wales). Ten to 14 days later than common.

Essex - Bred at New York Agricultural Experiment Station. A synthetic variety from 4 clones obtained from a wide collection of seed lots from breeders in the United States. In New York it is leafier and freer of leaf diseases than common. Very late maturing, 7 days later than Climax and 14 days later than common.

CORN AND GRAIN SORGHUM TRIALS

Comparative trials of experiment station and commercial corn varieties are published annually in two bulletins of the Minnesota Agricultural Experiment Station:

Miscellaneous Report 20 - Maturity Ratings for Corn Hybrids in Minnesota.

Miscellaneous Report 28 - Minnesota Hybrid Corn Performance Trials.

Comparative trials of experiment station and commercial grain sorghum varieties are published in:

Miscellaneous Report 40 - Grain Sorghum Variety and Herbicide Trials in Minnesota.

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	Date
Barley ⁺ - - - - -	48	72-96 lbs.	Early spring
Corn ⁺ - - - - -	56	8-14 lbs.	Early May
Flax ⁺ - - - - -	56	42-56 lbs.	April 15 to May 15
Forage Grasses (perennial)			
Bromegrass (with legumes) - - - - -	14	5-8 lbs.	Early spring or fall
Kentucky bluegrass (with timothy) - - - - -	14	8-10 lbs.	Early spring or fall
Meadow fescue (in mixture with brome and legume) - - - - -	14-24	3-4 lbs.	Early spring or fall
Timothy (with legumes) - - - - -	45	4-6 lbs.	Early spring or fall
In mixture with brome and legume or reed canary or bluegrass		2-4 lbs.	
Reed canary - - - - -	44-48	6-8 lbs.	Early spring or fall; after freeze-up
Alone or with timothy - - - - -			
Forage Legumes (biennial or perennial)			
Alfalfa - - - - -	60		With companion grain or flax, early spring; or alone before August 10
Alone - - - - -		8-12 lbs.	
With grasses - - - - -		5-8 lbs.	
Birdsfoot trefoil - - - - -	60	3-6 lbs.	Early spring
Clover - - - - -	60		Early spring
Red (in mixture) - - - - -		4-8 lbs.	
Alsike (in mixture) - - - - -		2-4 lbs.	
Ladino (in mixture) - - - - -		1/2-1 lb.	
Sweet Clover - - - - -	60		Early spring
Alone - - - - -		10-12 lbs.	
In mixture - - - - -		2-4 lbs.	
Oats ⁺ - - - - -	32	64-80 lbs.	Early spring

Rye	56	70-84 lbs.	August 1 to September 10 for pasture August 25 to September 30 for seed
Sorghum ⁺	50	(sweet)	In warm soil, May 25 to June 15
Corn planter rows-	56	(grain)	4-10 lbs.
"Solid" drilled-			20-30 lbs.
With 1 1/2 bushel soybeans			15 lbs.
Sudangrass	40		In warm soil, May 20 to June 20
Alone		25-30 lbs.	
With 1 1/2 bushel of soybeans-		10 lb.	
Soybeans ⁺	60		
"Solid" drilled-		120-150 lbs.	In warm soil, May 15-30
40-inch rows		60 lbs.	
20-inch rows		90-100 lbs.	
Wheat ⁺	60		
Bread-		75-90 lbs.	Early spring
Durum-		90 lbs.	Early spring
Winter		75-90 lbs.	August 20 to September 20
Miscellaneous Crops			
Field peas ⁺	60		Early spring
Alone		120-180 lbs.	
With 1 1/2 to 2 bushel of oats		45-90 lbs.	
Sunflowers	24	4-8 lbs.	May 10-25
Millet	48-56	25-40 lbs.	June 15 to July 15
Navy beans	60	40 lbs.	June 1 to 20
Rape	50	4-6 lbs.	Early spring with oats
Buckwheat-	48-50	48 lbs.	June 15 to July 15

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

+ Use fungicide seed treatment.

Agricultural Research

NEARLY EVERY FARM in Minnesota today shows some practical result of the work done by the Agricultural Experiment Station. This unit of the Institute of Agriculture of the University of Minnesota carries on research in many widely varied fields. On the one hand, it seeks to develop new and better farm or home practices, crops, and animals. On the other, it seeks to increase our basic knowledge of nature, an end invaluable in itself.

The Experiment Station has about 300 research projects, ranging from improved diets for the family to better use of the products of our forests, and from a study of disease in plants or animals to the discovery of new markets for agricultural products. Results of this research are made available to the public through resident teaching facilities on campus, or through the off-campus work of the Agricultural Extension Service and its county agent organization.

The research is carried on at many places in the state. Some of it takes place in the laboratories and fields of the University's St. Paul Campus. Some is conducted at the Agriculture Experiment Station at Rosemount, or at the branch experiment stations—Waseca, Morris, Crookston, Grand Rapids, and Duluth.

Specialized research is carried on at the Fruit Breeding Farm, Excelsior; at the Potato Breeding Farm, Castle Danger; at the Forest Research Center, Cloquet; at the Hormel Institute, Austin; and at the Biological Station, Itasca State Park. In addition, hundreds of Minnesota farmers each year cooperate with the Station in experiments on their own farms, either as individuals or in groups that may represent several counties.

Agricultural Research in Minnesota has a broad scope. And its results underlie every major advance we make in modern agricultural knowledge or practice.

This publication is one of the many research reports issued by the University of Minnesota Agricultural Experiment Station. These reports—some more technical in nature—are distributed through your County Extension Agent or the Bulletin Room, University of Minnesota, Institute of Agriculture, St. Paul 1.