

Varietal Trials OF FARM CROPS



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VARIETAL TRIALS OF FARM CROPS

MANY VARIETIES of farm crops are available from which the farmer can select those he will plant. These varieties differ widely in yielding ability, maturity, standing ability, quality, disease resistance, and other important characteristics. Successful crop production depends to a considerable extent on whether the farmer selects varieties adapted to his farm.

To provide a basis for the selection of the most desirable varieties, the Minnesota Agricultural Experiment Station annually grows comparative tests of varieties of each of the important farm crops.

Trials are conducted at the University Agricultural Experiment Stations located at St. Paul, Rosemount, Waseca, Morris, Crookston, Grand Rapids, and Duluth; and on farmers' fields in southwestern Minnesota, northern Minnesota, and other locations.

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. Helping to formulate the list of recommended varieties are staff members from the Departments of Agronomy and Plant Genetics, Plant Pathology and Agricultural Botany, Agricultural Biochemistry, Soils, and Entomology and Economic Zoology; from the Agricultural Extension Service; and from the branch experiment stations.

This bulletin gives brief descriptions of varieties and summarizes yields and other comparative agronomic data on varieties of barley, oats, rye, wheat, corn, flax, soybeans, sunflowers, alfalfa, bromegrass, red clover, biennial sweet clover, birdsfoot trefoil, and field peas—all grown in field plots in 1955.

Usually the number of years of trial varies among varieties within the same crop. For some such tests, adjustment of part of the yields has been made so averages of varieties tested for different numbers of years can be compared directly.

University personnel responsible for the field work at the various locations are: J. R. Thompson and R. E. Hodgson at Waseca; R. O. Bridgford and A. W. Edson at Morris; O. C. Soine and T. M. McCall at Crookston; C. H. Griffith and C. L. Cole at Grand Rapids; W. W. Nelson and R. S. Grant at Duluth; and R. G. Robinson at Rosemount and in southwestern Minnesota.

BARLEY

RECOMMENDED VARIETIES

Kindred (L)—Six-rowed, rough-awned, white-aleurone variety with good malting quality. Yields well and is medium early, but highly susceptible to lodging. Selected

by a farmer, S. T. Lykken of Kindred, North Dakota. Recommended as a malting variety in all parts of Minnesota.

Montcalm—Six-rowed, smooth-awned, blue aleurone variety. Yields well and is readily accepted by a large part of the American malting industry. Tall, rather late maturing, with mediocre to poor strength of straw. Selected at MacDonald College, Quebec, from the cross (Michigan 31604 x Common Six-Rowed 4307 M. C.) x Mandscheuri 1807 M. C. Recommended as

a malting barley in the northwestern and cutover sections of Minnesota.

Peatland — Six-rowed, rough-awned stiff-strawed, white-aleurone variety. Yields better on peat soils than most other varieties. Has yielded well on mineral soils in northeastern Minnesota; recommended as a feed barley in that section. Has small seeds; not generally acceptable for malting purposes. A Minnesota selection from a variety introduced from Switzerland.

Vantage — Stiff-strawed, six-rowed, smooth-awned feed barley. Has a white aleurone and gives high yields. Developed at Brandon, Manitoba, from a cross (Newal x Peatland) x Plush. Recommended as a feed barley in all sections of Minnesota.

Fox—Six-rowed, smooth-awned, light-blue aleurone variety. Medium in height and maturity; medium-to-good strength of straw. At present recommended simply as "barley" with no quality designation. Small-scale malting and brewing tests have been made, but general acceptability will not be known until larger quantities become available. Developed at the University of Wisconsin from crosses involving Barbless, Pillsbury, and Composite cross Selection 12.

Trail—Six-rowed, rough-awned, white aleurone variety. Medium in maturity and height; has good standing ability. Has given excellent yields in nearly all locations where tested in Minnesota. Rather extensive quality tests have been made, but only on small samples. Any general acceptability for malting and brewing purposes must await trials with larger amounts.

VARIETIES NOT ADEQUATELY TESTED

Herta—Two-rowed, rough-awned variety. Has given good yields in Minnesota; matures rather late. Of medium height, with very good straw strength. Like all Minnesota-grown two-rowed varieties, not considered suitable for malting. Originated at the Weibullsholm Plant Breeding Station, Landskrona, Sweden, from a cross of Kenia x Isaria.

Husky—Six-rowed, smooth-awned, white aleurone variety. Rather late maturing; of medium height, with good straw strength. In limited trials in Minnesota has given only fair yields.

Rika—A sister selection of Herta; in almost all respects similar.

Vantmore — Six-rowed, smooth-awned, white aleurone feed barley. Has had only limited trial in Minnesota. Medium in maturity and plant height, with good straw strength.

VARIETIES NOT RECOMMENDED

Barbless (Wisconsin Ped. 38)—Six-rowed, smooth-awned, white-aleurone variety. Yields well under favorable conditions. Weak-strawed; lodges badly when seeded on heavy or fertile soils. Late in maturity. Selected at the Wisconsin Agricultural Experiment Station from Oderbrucker x Lion.

Feebar—High-yielding, stiff-strawed, six-rowed, stem rust-resistant feed barley. Developed for the dry conditions of central and western South Dakota. Selected from the cross Peatland x Vaughn.

Manchuria—A type rather than a single variety. Several selections have been made within the type, including Minnesota 184, North Dakota 2121, O.A.C. 21, and Oderbrucker. The type is six-rowed, rough-awned, medium-early, and medium-tall to tall. Kernels may have either blue or white aleurone.

Nearly all Manchuria selections are acceptable for malting. Yields of Manchuria selections tested in Minnesota have been mediocre. It originated in Manchuria but arrived in the United States by several routes.

Mars—Six-rowed, smooth-awned, stiff-strawed, white-aleurone variety. Produces plump, well-filled kernels. Early in maturity, with high weight per bushel. Seeds are small and low in diastatic activity; therefore considered undesirable for malting purposes. Parentage includes Lion, Manchuria, and Peatland. Selected at the Minnesota Agricultural Experiment Station.

Moore — Six-rowed, smooth-awned, white-aleurone feed variety. Late in maturity; moderately stiff straw; has yielded well in all locations except Crookston. Very susceptible to net blotch. Developed at the Wisconsin Agricultural Experiment Station from crosses involving Lion, Oderbrucker, Chevron, and Olli.

O.A.C. 21—Blue-aleurone selection from the Manchuria type. Yields moderately well; has rough awns and weak straw. It has limited acceptance in the American malting trade. Selected at the Ontario Agricultural College.

Plains—Very early, six-rowed, smooth-awned variety. Developed by the South Dakota Agricultural Experiment Station for the plains country of that state. Yields well in Minnesota, but is not acceptable for malting. Straw is short and stiff. Parentage is Peatland x Dryland.

Tregal—Six-rowed, smooth-awned variety. Yields relatively well in Minnesota, but is unsuited for malting purposes. Selected at the North Dakota Agricultural College from a cross of Trebi x Regal.

Table 1. Average Yields of Barley

Variety	Years of trial	Southern, central and western locations					Duluth		
		Waseca	Southwestern Minnesota	Rosemount	Morris	Crookston	Average, five locations	Years of Trial	Yield
				<i>(bushels per acre)</i>				<i>(bushels per acre)</i>	
Barbless	1948-55	45.1	43.9	48.5	57.4	37.5	46.5	1948-55	40.8
Fox	1955	.....	.....	50.3	64.3	30.3	.....	.....	.....
Herta*	1954-55	61.0	55.2	58.2	70.6	.....	.....	1955	47.1
Husky	1955	.....	.....	64.7	62.8	34.5	.....	.....	.....
Kindred (L)	1948-55	51.7	39.1	48.0	57.1	39.1	48.0	1948-55	41.4
Mars	1948-55	46.4	39.5	45.9	59.1	39.5	46.1	1948-55	36.5
Montcalm	1948-55	49.8	42.3	44.9	57.1	42.3	47.2	1948-55	42.2
Peatland	1948-55	.....	.....	.....	.....	.....	.....	1948-55	45.4
Rika*	1954-55	57.2	48.5	59.1	69.9	53.8	57.7	1955	45.8
Traill	1953-55	63.5	52.7	53.1	76.0	44.1	57.9	1954-55	49.1
Vantage	1948-55	54.7	45.5	52.0	70.8	45.1	53.8	1948-55	41.5
Vantmore	1955	.....	.....	62.1	83.6	43.2	.....	.....	.....
L.S.D. at 5 per cent† point		3.0	3.2	2.9	3.5	4.0	.....	.....	3.2

* Two-rowed varieties; the others are six-rowed.

† Applies specifically to varieties occurring entire period 1948-55.

Table 2. Averages of Barley Varieties for Date of Heading, Plant Height, Lodging Score, Weight of 1,000 kernels, and Weight per bushel

Variety	Date of heading	Average, Waseca, Southwestern Minnesota, Rosemount, Morris and Crookston, 1948-55*			Duluth, adjusted to the 1948-55 basis			
		Plant height	Lodging score†	Weight of 1,000 kernels	Weight per bushel	Plant height	Weight of 1,000 kernels‡	Weight per bushel
		<i>(inches)</i>		<i>(grams)</i>	<i>(pounds)</i>	<i>(inches)</i>	<i>(grams)</i>	<i>(pounds)</i>
Barbless	6-26	35	2.9	29.7	43.5	31	30.0	43.3
Fox	6-25	33	1.9	28.3	43.5	.....	.....	.....
Herta	6-27	27	1.9	30.3	49.3	28	35.8	50.1
Husky	6-27	33	1.5	27.0	43.2	.....	.....	.....
Kindred (L)	6-22	33	3.2	29.5	45.2	30	31.8	44.7
Mars	6-22	29	1.2	26.6	46.1	29	26.8	45.8
Montcalm	6-25	35	2.7	27.8	43.4	34	30.4	43.2
Peatland	.....	.....	.....	.....	.....	35	27.5	47.1
Rika	6-28	27	1.5	31.6	48.1	28	34.8	49.9
Traill	6-24	31	2.1	29.2	46.4	29	31.3	45.6
Vantage	6-26	30	1.6	30.6	44.1	29	31.4	42.9
Vantmore	6-25	31	1.5	27.8	46.0	.....	.....	.....

* Some of the varieties occurred at all locations, others at only part of the locations. Values for all characters except date of heading adjusted to five-station basis. No date-of-heading data in southwestern Minnesota, hence values for this character adjusted to four-station basis.

† 1=excellent standing ability; 5=very poor standing ability.

‡ Kernel weights on 1950-55 basis at Duluth.

Table 3. Reaction of Barley Varieties to Several Diseases.* (1=resistant; 2=moderately resistant; 3=moderately susceptible; 4=susceptible)

Variety	Stem rust	Leaf rust	Loose smut	Covered smut	Spot blotch	Net blotch	Stripe	Root rot	Scab	Bacterial blight	Powdery mildew	Septoria	Yellow dwarf	False stripe
Barbless	4	3	4	3	4	2	2	4	4	4	4	4	4	3
Feebar	1	3	4	.....	3	2	.....	3	.....	.....	.....	1	.....	.....
Fox	1	4	3	1	3	3	.....	3	3	.....	4	3	4	2
Herta	4	1	3	2	3	3	.....	3	3	4	2	3	4	2
Husky	1	3	4	1	3	3	.....	3	3	.....	4	4	4	4
Kindred (L)	1	3	3	2	3	2	4	3	3	4	3	4	4	4
Manchuria	4	3	3	1	2	2	.....	3	.....	4	4	4	4	2
Mars	1	4	3	4	3	2	4	2	3	4	3	4	.....	4
Montcalm	4	4	4	1	3	2	4	2	.....	4	4	4	.....	4
Moore	2	3	4	.....	3	4	3	3	3	.....	1	3	.....	.....
OAC 21	4	.....	3	.....	2	2	3	3	3	.....	4	.....	.....	.....
Peatland	1	4	2	2	2	2	4	2	2	4	4	4	3	4
Plains	1	.....	.....	.....	3	2	.....	3	3	.....	.....	.....	.....	.....
Rika	4	1	4	2	3	3	.....	4	.....	4	2	4	4	2
Trall	2	4	4	2	3	3	.....	2	3	4	4	4	4	4
Tregal	4	3	1	2	3	3	.....	3	3	.....	.....	.....	.....	.....
Vantage	1	4	3	4	4	2	.....	3	4	4	4	4	4	4
Vantmore	3	3	3	1	2	3	.....	2	.....	.....	4	4	3	4

* Based on infections which in some cases occurred naturally and in others were artificially introduced. One or several locations may have been involved. When reaction is not reasonably well established, no information is given. Reactions are all subject to change because of changes in prevalence of physiologic races of the causal organisms.

OATS

RECOMMENDED VARIETIES

Ajax—White-grained, tall oat; medium-late in maturity. Outstanding in yield; less desirable in weight per bushel. Standing ability is not as good as other recommended varieties, except Branch. Susceptible to crown rust, smut, and race 8 of stem rust; resistant to stem rust race 7. Developed in Canada from the cross Victory x Hajira.

Andrew—Yellow-grained, very early maturing, good-yielding oat, with excellent adaptability throughout the Corn Belt. Good weight per bushel; desirable straw strength; low hull percentage. Similar to Clinton in plant height. Resistant to smut and race 7 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.

Branch—Tall, white oat; late in maturity. Excellent yields; lodges somewhat more than other recommended varieties. Hull percentage is relatively high. Resistant to smut and to race 7 of stem rust; susceptible to race 8. Has shown some tolerance to crown rust in the field. Developed in Wisconsin from the cross (Forward x Victoria-Richland) x Forward.

Garry—Developed some years ago in Canada from a cross of Victory x (Victoria x Hajira-Banner). Reselected for purity of agronomic characters and disease resistance. Tall, late, and high-yielding, with large yellow seed of good test weight. Resistant to all races of stem rust, including race 7A; has some tolerance to crown rust. Also resistant to the smuts.

Minland—Developed at the Minnesota Agricultural Experiment Station from a cross of Landhafer x (Mindo x Hajira-Joanette). Resistant to all races of crown rust prevalent in North America, to all races of stem rust except 7A, and to the smuts. Light-brownish grain; similar to Andrew in maturity, height, yield, and hull percentage. Standing ability is somewhat superior to that of Andrew. Test weight is lower than other recommended varieties.

Mo.0-205—Grayish-red oat, relatively high in yield, with good straw strength, low hull percentage, and high test weight. About like Bonda in maturity. Resistant to smut and to race 7 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.

Rodney—Tall, very late, and high-yielding oat. Large, plump seed with a high test weight. Resistant to all stem rust races except 7A and the smuts; susceptible to crown rust. Developed in Canada from a cross [(Victoria x Hajira-Banner) x (Victory x Hajira)] x Roxton.

Sauk—Tall, late-maturing, high-yielding oat, somewhat susceptible to lodging. Large, yellow seed of good test weight. Resistant to race 7 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.

VARIETIES NOT ADEQUATELY TESTED

Abegweit—Tall, weak-strawed, late variety. Large, white grain of low test weight. Resistant to race 7 of stem rust; susceptible to race 8 and to crown rust and smut. Selected in Canada from Erban x Vanguard.

Bentland—Tall, medium-maturing, yellow oat. Resistant to all prevalent races of crown rust, to race 8 of stem rust, and smuts. Susceptible to race 7 of stem rust. Selected from a cross of Benton x Landhafer backcrossed to Benton six times at the Indiana Agricultural Experiment Station.

Clarion—Medium-tall and medium-maturing, with large, yellow seed of high test weight. Resistant to race 7 of stem rust and to smuts; susceptible to race 8 and crown rust. Selected in Iowa from the cross Clinton x Marion; released in several New England states in 1953.

Jackson—Developed from a cross of Clinton x Marion by the Michigan Agricultural Experiment Station. Resistant to race 7 of stem rust and smuts; susceptible to stem rust race 8 and crown rust. Medium in height; late in maturity, with good standing ability.

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 race 7 of stem rust and smuts; susceptible to race 8 and crown rust.

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

Simcoe—Tall, medium maturing, and good yielding, with large yellowish-white seed of medium test weight. Resistant to race 7 of stem rust; susceptible to stem rust race 8, crown rust, and the smuts. De-

Table 4. Average Adjusted Yields of Oats*

Variety	Years of trial	Rosemount	Wasecat†	Morris	Crookston	Grand Rapids	Duluth	Southwestern Minnesota‡	Grand average
(bushels per acre)									
Gopher	1945-55	67.5	71.7	90.3	63.5	66.3	65.1	66.3	70.1
Bonda	1945-55	69.3	71.4	74.1	61.4	59.2	62.3	61.6	65.6
Mindo	1945-55	68.3	75.0	77.1	62.0	59.8	65.7	58.4	66.6
Clinton	1945-55	71.6	76.5	77.3	62.8	63.7	65.4	61.8	68.4
Andrew	1945-55	73.6	74.2	85.2	67.1	67.0	68.4	67.2	71.8
Ajax	1945-55	75.4	79.7	91.1	72.9	76.4	74.4	72.4	77.5
Branch	1950-55	77.1	76.3	96.8	72.9	79.4	80.3	69.7	78.9
Mo.O-205	1951-55	76.5	79.2	90.0	72.7	68.2	70.0	72.7	75.6
Clintafe	1952-55	70.3	70.2	81.6	61.3	62.6	62.8	58.6	66.8
Waubay§	1952, 54, 55	78.3	76.8	95.1	70.4	78.5	72.9	68.1	77.2
Clintland	1953-55	82.6	73.7	81.6	67.7	57.5	62.4	58.2	69.1
Sauk	1953-55	80.9	83.7	104.1	86.8	87.8	77.3	69.3	84.3
Rodney	1954-55	73.9	83.1	109.1	80.0	91.2	90.0	73.2	85.5
Garry	1955	92.1	90.3	127.8	116.2	97.5	97.6	92.6	102.0
Minland	1955	66.6	76.4	86.1	89.8	80.3	67.3	76.4	77.6
L. S. D. at 5 per cent point		3.5	3.8	4.2	4.9	4.5	3.8	3.9	1.6

* Northern Minnesota not included because of crop failure in 1955.

† No data available in 1953.

‡ No data available in 1945 and 1946.

§ No tests conducted for this variety at Grand Rapids, Duluth, and Northern Minnesota in 1952.

|| Applies only to comparison between varieties grown for the entire period.

veloped in Canada from a cross of Ajax x Erban.

VARIETIES NOT RECOMMENDED

Benton—Tall and medium maturing. Same resistance to diseases as Clinton, but yields less in Minnesota than recommended varieties. Produced from a cross of D69 x Bond at the Iowa Station; increased in Illinois and Indiana.

Bonda—Relatively tall, good-strawed, and early maturing, with a large yellowish-white grain of superior bushel weight. Low in yield in the past few years since the prevalence of race 7 of stem rust to which it is susceptible. Also susceptible to 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.

Bonham—Earlier and slightly taller than Clinton; good test weight, but yields less than recommended varieties. Resistant to race 8 of stem rust. A mass selection made in Michigan from C.I. 3664, a cross of Bond x D69, it has been increased and distributed by the Michigan Station.

Cherokee—Slightly earlier and shorter than Clinton, with good test weight. Inferior to recommended varieties in yield. Susceptible to crown rust and race 7 of stem rust; resistant to race 8. Selected from a cross of D69 x Bond. It has been increased in Iowa and Kansas. Also grown under the names Ames No. 2, McCarthy, or 3846.

Clintafe—Taller and later in maturity than Clinton. Resistant to all prevalent races of crown rust, race 8 of stem rust, and smuts; susceptible to race 7. Lower in yield and in bushel weight than Clinton. Developed at the Iowa Agricultural Experiment Station from a cross of Clinton x Santa Fe, backcrossed three times to Clinton.

Clintland—Similar to Clinton in most characteristics, but has resistance to all prevalent North American races of crown rust. Developed in Indiana from the cross Clinton x Landhafer, backcrossed three times to Clinton.

Clinton—Yellow-grained and early maturing, with good weight per bushel. Intermediate in height between Bonda and Mindo; relatively low hull percentage. Inferior in yield since the prevalence of race 7 of stem rust to which it is susceptible; also susceptible to crown rust. Resistant to smut and race 8 of stem rust. Selected at the Iowa Agricultural Experiment Station from a cross of D69 x Bond.

Colo—Developed from a cross of Hancock x Morota-Bond. Inferior in yield to recommended varieties in tests in Minne-

sota. Taller and later than Clinton and Bonda; low in test weight. Susceptible to crown rust and race 7 of stem rust; resistant to race 8.

Craig—Medium-tall and late, with large, white seed of medium test weight. In Minnesota trials has been low in yield. Susceptible to both races 7 and 8 of stem rust and to crown rust; resistant to smuts. Developed in New York from the cross Ithacan x Victoria.

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.

James—A hull-less variety with good standing ability. About like Bonda and Clinton in time of maturity, with relatively low yielding ability. Resistant to smut and to race 8 of stem rust; susceptible to race 7 of stem rust and to crown rust. Selected in South Dakota from the cross (Bond-Double Cross B) x Nakota.

Larain—Selected from a cross between Gold Rain and Alaska made at the Central Experiment Farm, Ottawa. Weak straw; low test weight. Susceptible to the rusts and smuts; inferior in yield to the recommended varieties.

LaSalle—Early in maturity and medium in height. In preliminary tests in Minnesota, has been inferior in yield. Resistant to smut and race 8 of stem rust; susceptible to race 7 and to crown rust. Selected in Illinois from the cross Clinton x Marion.

Marion—Medium-maturing variety selected in Iowa from a cross of Markton x Rainbow. Somewhat low in yield in Minnesota. Resistant to race 7 of stem rust; susceptible to race 8 and to crown rust.

Mindo—Very early, yellow oat with good weight per bushel. Short straw; good resistance to lodging. Inferior in yield since the prevalence of race 7 of stem rust to which it is susceptible. Also susceptible to crown rust; resistant to smut and race 8 of stem rust. More susceptible to 2,4-D than other varieties tested. Selected at the Minnesota Agricultural Experiment Station from a cross of Bond x [(Minota x White Russian) x Black Mesdag].

Nemaha—Almost identical to Cherokee; likewise inferior in yield to recommended varieties. Developed at Iowa from the cross Victoria-Richland x (Morota x Bond).

Shelby—Yellowish-white grain; matures as late or slightly later than Ajax. Extreme susceptibility to race 7 of stem rust has caused a serious reduction in yield in the past few years. Resistant to race 8 of stem rust and smut; susceptible to crown rust. Selected in Iowa from a cross of Anthony x Bond.

Waubay—Medium in plant height and maturity, with large yellow seed of high test weight. Good lodging resistance. Resistant to race 7 of stem rust, it has been fair in yield but somewhat lower than

most of the recommended varieties with race 7 resistance. Also resistant to smut, but susceptible to crown rust and race 8 of stem rust. Developed in South Dakota from a cross of Clinton x Marion.

Table 5. Average Date of Heading, Plant Height, Weight per Bushel, Hull Percentage, Weight of 200 Kernels, and Standing Ability for Oats at Five Locations*

Variety	Date of heading	Plant height	Weight per bushel	Hull	Weight of 200 kernels	Standing ability†
		(inches)	(pounds)	(per cent)	(grams)	
Gopher	June 27	35	32.7	32.3	4.5	2
Bonda	June 25	38	35.8	33.3	5.8	1
Mindo	June 21	33	33.6	31.9	4.8	1
Clinton	June 25	36	34.1	30.5	4.7	1
Andrew	June 22	36	34.5	27.8	5.4	1
Ajax	June 29	41	33.3	33.0	4.9	2
Branch	July 1	41	33.9	34.3	4.9	2
Mo.0-205	June 24	38	35.7	26.8	4.5	1
Clintafe	June 27	37	32.4	34.0	4.0	2
Waubay	June 26	36	36.0	30.9	5.5	1
Clinton	June 24	35	35.0	29.2	4.9	2
Sauk	June 29	38	33.8	29.9	5.7	1
Rodney	July 2	41	34.9	32.3	5.6	1
Garry	June 30	42	34.7	29.9	5.7	1
Minland	June 20	37	32.4	27.3	5.5	1

* Rosemount, Waseca, Morris, Crookston, and Southwestern Minnesota.

† 1=good; 2=medium.

WINTER RYE

RECOMMENDED VARIETIES

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

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

VARIETIES NOT ADEQUATELY TESTED

German—Medium in yield, winterhardiness, maturity, and lodging resistance. Seed is medium in size and bushel weight. Originated in Germany.

King's II — Fair in winterhardiness; a high yielder if it overwinters without injury. Short straw; good-to-excellent lodg-

ing resistance; late-maturing. Small, light-brown seed of low bushel weight. Originated in Sweden from a selection of Star rye.

Von Rumker—Fair in winterhardiness; a high yielder if it overwinters without injury. Excellent lodging resistance. Late-maturing, low in bushel weight, medium in seed size. It originated in northern Germany.

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.

Dakold 23—Medium-to-high in yield, very winter-hardy, medium in maturity, and high in bushel weight. Seed is small. Selected for improved winterhardiness from Dakold by the University of Saskatchewan.

Emerald—Medium in yield, maturity, and bushel weight. Very winter-hardy; sometimes lodges badly. Seed is small and green. Developed at the University of Minnesota by selecting green seed in self-pollinated lines and their combinations.

Horton — Low-yielding, winter-hardy, high in bushel weight, and high in fall and early spring forage growth. Seed is small and mixed in color. Resembles Balbo in

Table 6. Average Adjusted Yields of Winter Rye. (Quantities are in Bushels per Acre)

Variety	Years of trial	St. Paul	Years of trial	Sandy soil*	Years of trial	Southwestern Minnesota	Years of trial	Morris	Years of trial	Grand Rapids	Adjusted average
Adams	1951-55	33.6	1951-55	22.3	1953-55	39.7	1953-55	37.5	1953-55	50.0	36.6
Caribou	1950-55	34.4	1950-55	22.2	1953-55	40.2	1953-55	38.3	1953-55	52.2	37.5
Antelope	1950-55	33.0	1950-55	23.1	1953-55	38.0	1953-55	38.7	1953-55	50.5	36.7
Dakota 23	1950-55	31.6	1950-55	19.9	1953-55	39.2	1953-55	36.9	1953-55	45.9	34.7
Emerald	1950-55	32.3	1950-55	21.0	1953-55	35.2	1953-55	33.9	1953-55	48.0	34.1
German	1953-55	23.3	1953-55	19.0	1954-55	36.6	1954-55	34.0	1955	55.5	33.7
Horton	1952-55	25.6	1952-55	21.7	1954-55	32.0	1954-55	30.9	1954-55	49.0	31.8
Imperial	1950-55	32.2	1950-55	22.1	1953-55	41.0	1953-55	32.6	1953-55	50.6	35.7
King's II	1950-51, 1953-55	31.0	1953-55	19.6	1955	40.7	1955	39.4	1955	56.3	37.4
Tetra Petkus	1953-55	11.3	1953-55	9.7	1953-55	14.6	1953-55	18.3	1953-55	34.2	17.6
Tetra Petkus isolated†	1953-55	24.6			1953-55	31.2	1953-55	29.9	1953-55	56.8	32.0
Von Rumker	1954-55	21.4	1954-55	21.8	1954-55	38.8	1955	39.1	1955	60.4	36.3
L.S.D. at 5 per cent point		2.8		2.3		5.5		4.5		6.9	2.1

* 1950 Stearns County, 1951-55 Anoka County.

† At least 100 feet from any other rye variety.

Table 8. Average Adjusted Yields of Spring Wheat. (Quantities Are in Bushels per Acre)

Variety	Years of trial	Rosemount	Waseca	Morris	Crookston	Southwestern Minnesota	Average, five locations	Years of trial	Grand Rapids	Duluth
BREAD WHEATS										
Thatcher	1953-55	13.7	19.3	19.6	23.8	12.3	17.7			
Mida	1953-55	13.2	19.8	19.5	24.1	12.4	17.8	1953-55	10.3	14.9
Henry	1953-55	20.9	30.7	30.2	32.5	16.4	26.1	1953-55	18.8	27.4
Lee	1953-55	21.3	30.9	29.3	30.5	18.3	26.1	1953-55	18.4	24.7
Rushmore	1953-55	17.5	25.3	26.0	26.2	17.3	22.5	1953-55	14.0	21.3
Selkirk	1953-55	30.6	35.7	40.8	41.8	28.3	35.4	1953-55	23.2	33.1
DURUMS										
Sentry	1953-55	13.6		31.4	30.7		25.2			
Stewart	1953-55	9.0		13.0	19.2*		13.7			
Mindum	1953-55	9.0		17.8	23.0*		16.6			
Yuma	1955	11.3		25.8	29.0		22.1			
Ramsey	1955	20.2		30.3	29.0		26.5			
Towner	1955	19.2		28.0	30.5		25.9			
Langdon	1955	19.4		41.6	47.1		36.0			
L.S.D. at 5 per cent point		3.2	2.7	4.1	4.1	2.1	1.5		2.6	3.8

*Crop failure in 1954.

growth habit and forage production; has the great advantage of winterhardiness, which Balbo lacks. May have a special place in Minnesota as a pasture rye and as a rye for plowing-under before planting corn, potatoes, or soybeans on sandy land. Originated at MacDonald College of McGill University in Canada. A single plant selection from Cochrane rye was selfed for two generations, then allowed to open-pollinate for several generations with other selections from Cochrane.

Imperial—Appears identical to Adams, except has yielded less in Minnesota and Wisconsin trials. Originated at the University of Wisconsin.

Pierre—Medium in yield, very winter-hardy, early maturing, and fairly good in lodging resistance. Seed is small and of

high bushel weight. A recombination of inbred lines from a population of Dakold and Swedish origin; released by South Dakota State College in 1950.

Tetra Petkus—High-yielding if there is no winter injury. But in most trials has been winterkilled or injured so badly that yield is low or medium. Late-maturing and low in bushel weight. Seed is very large and uniformly greenish-gray in color. Excellent lodging resistance is only advantage to the farmer. For maximum yield, must be grown isolated from other rye varieties; pollen from other rye will reduce the seed set of Tetra Petkus and vice versa. Originated in Germany as a result of increasing the number of chromosomes in the Petkus variety from fourteen to twenty-eight by using the chemical colchicine.

Table 7. Adjusted Averages of Winter Rye Varieties at Five Locations for Winterkilling, Date Mature, Plant Height, Lodging Score, Kernel Weight, and Bushel Weight

Variety	Winter-killing* (per cent)	Date mature	Plant height (inches)	Lodging score†	Weight of 100 kernels (grams)	Bushel weight (pounds)
Adams	5	July 18	49	1.7	2.5	55.2
Caribou	2	July 17	46	1.8	2.2	55.4
Antelope	2	July 17	47	1.7	2.2	55.2
Dakold 23	3	July 17	47	1.7	2.1	55.7
Emerald	2	July 17	48	1.9	2.3	55.0
German	23	July 18	47	1.8	2.6	54.5
Horton	4	July 16	51	1.8	2.4	55.5
Imperial	6	July 18	50	1.7	2.6	55.1
King's II	25	July 20	43	1.0	2.2	53.4
Tetra Petkus	50	July 23	46	1.0	4.1	49.5
Tetra Petkus isolated‡	37	July 23	46	1.1	3.9	51.5
Von Rumker	28	July 20	47	1.0	2.6	53.1

* Average of 9 trials at 5 locations in which some winterkilling occurred.

† 1.0 erect, 5.0 flat.

‡ At least 100 feet from any other rye variety.

SPRING WHEAT

RECOMMENDED VARIETIES BREAD

Lee—Early, bearded, moderately resistant to bunt. Resistant to leaf rust; susceptible to loose smut and race 15B of stem rust. Short, medium-strength straw. Good test weight; satisfactory milling and baking characters. Selected from a cross of Hope x Timstein made by the Minnesota Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture.

Selkirk—Awnless variety of medium height, maturity, and straw strength.

Moderately resistant to leaf rust and stem rust, including race 15B. High-yielding, with a good bushel weight; satisfactory milling and baking qualities. Selected from a cross of McMurachy-Exchange x Redman³ made at the Dominion Laboratory of Cereal Breeding, Winnipeg.

DURUM

West Central and Northwestern Sections

Langdon—Early, bearded variety of medium height and straw strength. Resistant to leaf rust and bunt, and moderately resistant to stem rust. Has a good yield and test weight; appears 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.

Ramsey—Bearded variety, medium in maturity and height. Resistant to leaf rust, stem rust, and bunt. 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. Develops considerable stem rust but appears to have tolerance to it, which allows good yield and grain quality. Preliminary tests show it to be satisfactory for use in making semolina products.

VARIETIES NOT ADEQUATELY TESTED

BREAD

Conley—Late-maturing, bearded variety of medium height and fair straw strength. Moderately resistant to stem rust; moderately susceptible to leaf rust. Seriously injured by glume and stem-blackening in 1955, reducing yield and bushel weight. Milling and baking qualities are satisfactory thus far. Selected from a cross of [Thatcher x (McMurachy-Exchange x Redman²) x Lee at the North Dakota Experimental Station.

DURUM

Towner—Bearded, late-maturing, tall, with slightly weak straw. Resistant to leaf rust, stem rust, and bunt. Showed a medium yield and good test weight in preliminary trials. Quality appears to be satisfactory. Selected from a cross of Carleton x P. I. 94701 at the North Dakota Experiment Station.

Yuma—Short, bearded, average in maturity, and low in yield. Resistant to leaf

rust, stem rust, and bunt. Quality appears to be satisfactory in the preliminary tests. Selected from a cross of Ld. 194-Khapli x Ld. 308; developed at the North Dakota Experiment Station.

VARIETIES NOT RECOMMENDED

All of these varieties are susceptible to stem rust race 15B, but many of them are resistant to other races.

BREAD

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.

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

Redman—Awnless variety, susceptible to leaf rust and stem rust. Inferior in yield to recommended varieties. Selected from a cross of Canus x Regent made at the Dominion Laboratory of Cereal Breeding, Winnipeg, Canada.

Rival—Bearded variety, susceptible to leaf rust and stem rust. Resistant to bunt and loose smut; moderately susceptible to scab; susceptible to black chaff. Straw is somewhat weaker than Thatcher; tends to shatter. Higher in test weight than Thatcher; about equal in milling and baking

Table 9. Averages of Spring Wheat Varieties for Date of Heading, Plant Height, and Weight per Bushel

Variety	Years of trial	Date of heading	Plant height (inches)	Weight per bushel (pounds)
BREAD WHEATS				
Thatcher	1953-55	6-24	37	49.2
Mida	1953-55	6-25	40	51.5
Henry	1953-55	6-25	41	52.1
Lee	1953-55	6-23	35	54.1
Rushmore	1953-55	6-23	37	53.1
Selkirk	1953-55	6-24	37	55.2
DURUMS*				
Mindum	1953-55	6-29	45	48.1†
Stewart	1953-55	6-30	47	47.7†
Sentry	1953-55	6-25	39	53.6
Yuma	1955	7-1	37	52.0
Ramsey	1955	6-29	42	52.8
Towner	1955	7-1	46	54.7
Langdon	1955	6-28	40	54.5

* Grown at Rosemount, Morris, and Crookston.

† Crop failure in 1954.

qualities. Selected from a cross of Ceres x (Hope-Florence) at the North Dakota Experiment Station.

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

Spinkota—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

Carleton — Bearded, amber-kerneled, strong-strawed, somewhat lower yielding than Mindum. Moderately resistant to leaf rust and loose smut; moderately susceptible to bunt; susceptible to scab and stem rust. About equal to Mindum in quality for semolina products. Selected from a Mindum x Vernal Emmer backcross made by the U. S. Department of Agriculture in

cooperation with the North Dakota Experiment Station.

Mindum — Bearded, amber-kerneled, high-yielding. Moderately susceptible to bunt; susceptible to scab and stem rust. Resistant to leaf rust. Weaker-strawed than Carleton; excellent in quality for semolina products. Resulted from a durum type selected from a common bread wheat at the Minnesota Agricultural Experiment Station.

Stewart—Bearded and amber-kerneled; yields as well as Mindum. Moderately resistant to leaf rust and loose smut; moderately susceptible to bunt; susceptible to scab and stem rust. Weaker-strawed than Carleton. Equal to Mindum in quality for semolina products. Selected from a Mindum x Vernal Emmer backcross made by the U. S. Department of Agriculture in cooperation with the North Dakota Experiment Station.

Vernum—A bearded variety resistant to leaf rust. Lower yielding than Mindum, Carleton, or Stewart; not equal to Carleton and Stewart in quality for semolina products. A selection from Mindum x Vernal Emmer backcrossed to Mindum, developed cooperatively by the U. S. Department of Agriculture and the North Dakota Experiment Station.

WINTER WHEAT

The comparative data on yield and agronomic characters for winter wheat grown at four stations during 1943-54 are given in tables 10 and 11. There were no plots grown in 1955, because none of the varieties is resistant to stem rust race 15B.

RECOMMENDED VARIETIES

Minter—Bearded, white-chaffed winter wheat. Equal to Minturki in winterhardi-

ness, slightly better in yielding ability. Somewhat higher weight per bushel, whiter crumb color, and lower pigment content than Minturki. A selection from a backcross of (Hope x Minturki) x Minturki, developed by the Minnesota Agricultural Experiment Station.

Minturki—Bearded, white-chaffed, stiff-strawed variety. Early maturing; yields well. Moderately resistant to bunt, loose smut, and fusarial head blight; moderately susceptible to leaf rust. Very winterhardy, but not as reliable on sandy lands as winter rye. Selected from a cross of Turkey x Odessa by the Minnesota Agricultural Experiment Station.

Table 10. Average Yield of Winter Wheat. (Quantities Are in Bushels per Acre)*

Variety	Years of trial	St. Paul	Waseca	Grand Rapids	Average, three locations	Years of trial	South-western Minnesota
Minturki	1943-54	30.7	24.6	34.1	29.8	1950-54	17.9
Minter	1943-54	32.6	26.2	36.0	31.6	1950-54	22.1
Blackhawk	1943-54	31.6	25.0	31.9	29.5	1950-54	19.1
Iohardi	1949-54	30.4	23.8	30.3	28.2	1950-54	17.4

* Crops failed at St. Paul in 1943, 1944, 1948, and 1954; at Waseca in 1948 and 1954; and at Grand Rapids in 1943, 1944, and 1946.

VARIETIES NOT RECOMMENDED

Blackhawk—Bearded variety of good quality. Less winterhardy than Minturki or Minter; yields less than either when winter injury is severe. A selection of a Fultz x Minturki cross developed by the

Wisconsin Agricultural Experiment Station.

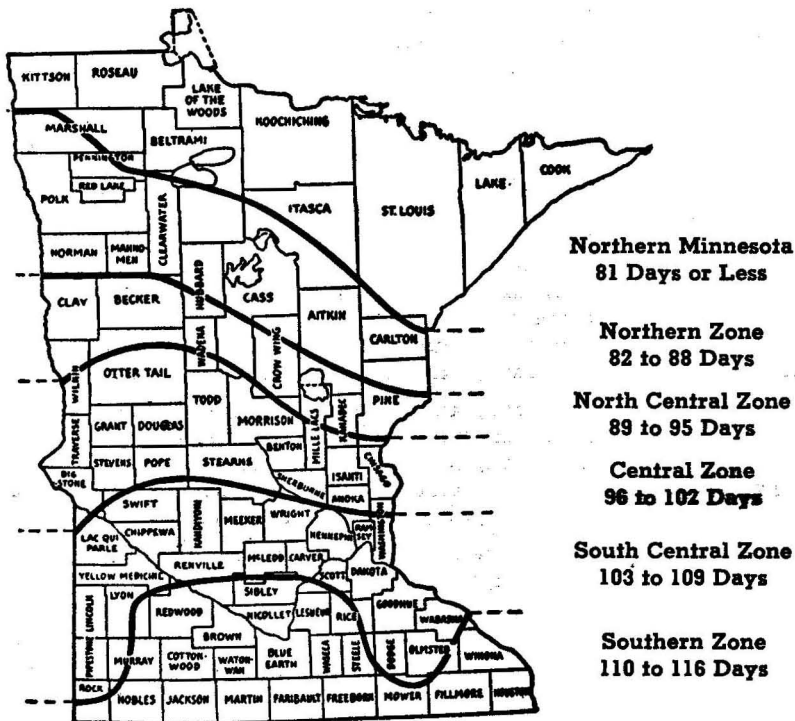
Iohardi—Bearded variety, released to Iowa farmers in the fall of 1948. A selection from an Iobred x Minhardi cross developed at the Iowa Agricultural Experiment Station.

Table 11. Average Date of Heading, Plant Height, Winter Injury, and Weight Per Bushel for Winter Wheat*

Variety	Years of trial	Date of heading	Height (inches)	Winter injury (per cent)	Weight per bushel (pounds)
Minturki	1943-54	6-20	38	37	58.4
Minter	1943-54	6-19	37	36	59.7
Blackhawk	1943-54	6-20	40	39	58.8
Iohardi	1949-54	6-18	38	42	59.7

* Crops failed at St. Paul in 1943, 1944, 1948, and 1954; at Waseca in 1948 and 1954; and at Grand Rapids in 1943, 1944, and 1946.

Corn Maturity Zones in Minnesota



Zones indicate the approximate number of days growing season that may be expected from emergence after planting to maturity, the stage of being well denting before a killing frost.

CORN

Long time data are given on the performance of recommended hybrids and also of a few widely grown open-pedigree hybrids. Accurate comparisons of hybrids can be made only when the data are from the same trials.

In some tables data on hybrids recommended for an adjacent zone are presented for the information of those who prefer to grow hybrids somewhat earlier or later than those recommended for the zone.

Data are obtained from test plantings on experiment station and farmers' fields. Varieties are planted at population levels of approximately 12,000 or 16,000 plants per acre. Fertilization is determined by each farmer on whose farm the test plot is grown.

About 98 per cent of the corn acreage of Minnesota is planted to hybrid varieties. Over 650 hybrids are registered for sale in Minnesota. These include open-pedigree hybrids developed by state experiment stations and closed-pedigree hybrids produced by commercial seed companies.

Only open-pedigree hybrids that have been adequately tested are included on the recommended list. It has not been possible to make extensive trials of closed-pedigree hybrids.

Table 12. Pedigrees and Maturity Ratings of Hybrids Recommended for Minnesota

Hybrid	Pedigree	Maturity zone	Maturity rating in days
Minhybrid 408	(Oh51A x Os420) (A73 x A375)	Southern zone	113-117
Minhybrid 415	(Oh5 x Oh43) (W22 x M14)	Southern zone	112-116*
A.E.S. 610	(A73 x M14) (Oh43 x Oh51A)	Southern zone	112-116
Minhybrid 412	(Oh5 x Oh51A) (A73 x W22)	Southern zone	112-116
Minhybrid 411	(Oh5 x A73) (Oh43 x Oh51A)	Southern zone	112-116
Minhybrid 414	(A286 x A295) (A73 x A375)	Southern zone	110-114*
Minhybrid 409	(A73 x A334) (Oh5 x Oh51A)	Southern zone	108-112
Minhybrid 508	(Oh51A x A334) (A73 x A223)	South Central zone	107-111
Minhybrid 503	(A73 x A334) (Oh51A x A375)	South Central zone	107-111
Minhybrid 511	(A73 x A401) (Oh51A x A286)	South Central zone	107-111*
Minhybrid 509	(A286 x A295) (Oh51A x A375)	South Central zone	107-111*
Minhybrid 507	(W10 x A334) (B9A x Oh51A)	South Central zone	103-107
Wisconsin 464A	(WM13R x R3) (W153R x W374)	South Central zone	103-107
Minhybrid 512	(A340 x A556) (A427 x A495)	South Central zone	101-105*
Minhybrid 608	(A334 x A340) (A357 x A392)	Central zone	99-103
Minhybrid 609	(A203 x A218) (A344 x A385)	Central zone	96-100*
Minhybrid 711	(A116 x A208) (W9 x A96)	North Central zone	93-97*
Minhybrid 706 (white)	(A166 x A188) (A34 x A171)	North Central zone	90-94
Minhybrid 707	(A116 x A204) (W9 x A96)	North Central zone	89-93*
Wisconsin 279	(W9 x M13) (WD x C49)	Northern zone	86-90
Nodak 301	(A90 x A111) (ND203 x ND230)	Northern zone	84-88
Wisconsin 240	(WD x W9) (W85 x W15)	Northern zone and Northern Minnesota	82-86
Wisconsin 255	(WD x W9) (WJ x WH)	Northern zone and Northern Minnesota	82-86
Morden 77	(V3 x A116) (WD x ND255)	Northern Minnesota	78-82
A.E.S. 101	(WD x ND203) (V3 x W103)	Northern Minnesota	76-80*

* Tentative ratings on new hybrids.

Table 13. Average Corn Hybrid Performance in Southern Maturity Zone

Variety	Maturity		Smut	Height			Lodging		Ear		Good ears per 100 plants	Appearance		Corn borer resistance	Ear moisture	Yield per acre
	Days	Zone		Plant	Ear	Shank	Root	Stalk	Length	Rows		Plant	Ear			
			(per cent)	(inches)	(inches)	(inches)	(per cent)	(inches)	(number)		(1-5)*	(1-5)*	(per cent)	(bushels)		
SOUTHERN ZONE (17 trials, 1952-55)																
Minhybrid 415†	112-116	S	2	101	40	6	16	3	9.0	18	90	1.6	1.6	2.0	27.6	95.5
Minhybrid 412	112-116	S	2	97	42	8	13	2	9.2	16	92	1.9	2.0	2.0	28.3	92.1
Minhybrid 411	112-116	S	2	95	38	4	8	2	8.8	16	90	2.4	2.4	2.0	27.4	89.4
A.E.S. 610	112-116	S	2	93	36	5	10	4	9.0	16	88	2.8	2.4	2.6	27.7	87.5
Minhybrid 414	110-114	S	2	95	39	6	19	3	8.8	17	88	2.6	2.0	2.0	26.3	91.7
Minhybrid 409	108-112	S	4	94	40	5	14	4	8.8	16	90	2.5	2.2	2.6	26.0	87.7
Minhybrid 511	107-111	SC	2	93	40	8	15	4	8.5	15	86	2.6	2.4	2.5	25.1	89.3
Minhybrid 509	107-111	SC	3	96	41	6	14	3	8.8	16	90	3.1	2.6	2.3	24.8	88.2
Minhybrid 508	107-111	SC	4	91	37	6	3	4	8.8	16	88	2.5	2.2	2.8	25.5	85.5
Minhybrid 503	107-111	SC	2	95	40	5	10	4	8.0	16	86	2.9	2.4	3.7	25.6	83.5
Minhybrid 507	103-107	SC	2	99	42	6	11	5	9.2	16	91	2.7	2.5	3.4	23.0	89.5
Murdock O P Variety			7	91	37	6	28	11	7.0	16	63	4.8	4.6	3.3	23.0	63.7
L.S.D. at 5 per cent point														0.8	3.1	
SOUTHERN ZONE (12 trials, 1951-53)																
Minhybrid 408	113-117	S	3	91	38	6	.....	2	9.2	18	94	1.9	2.3	3.0	30.1	78.3
Minhybrid 412	112-116	S	3	94	38	7	.....	1	9.5	18	94	2.1	2.1	2.0	29.7	80.2
Minhybrid 411	112-116	S	3	92	35	6	.....	1	9.4	17	94	2.3	2.3	1.9	28.7	79.9
A.E.S. 610	112-116	S	3	90	33	6	.....	2	9.3	18	93	2.9	2.3	2.6	29.0	78.4
L.S.D. at 5 per cent point														1.0	3.0	

* These characters rated in five classes: 1=excellent; 5=poor.

† Seed of Minhybrid 415 will be available for planting in 1957.

Table 14. Average Corn Hybrid Performance in South Central and Central Maturity Zones

Variety	Maturity		Smut	Height			Lodging		Ear		Good ears per 100 plants	Appearance		Ear moisture	Yield per acre	
	Days	Zone		Plant	Ear	Shank	Root	Stalk	Length	Rows		Plant	Ear			
			(per cent)	(inches)	(inches)		(per cent)	(inches)	(number)		(1-5)*	(per cent)	(bushels)			
SOUTH CENTRAL ZONE (11 trials, 1953-55)																
Minhybrid 503	107-111	SC	3.5	99	40	---	7.0	6.2	6.8	15	85	2.7	2.6	25.1	91.4	
Minhybrid 508	107-111	SC	3.5	94	37	---	3.5	3.8	6.8	16	85	2.3	2.6	24.1	89.6	
Minhybrid 509	107-111	SC	2.5	102	41	---	28.0	4.2	6.5	15	91	2.3	2.5	23.8	97.1	
Minhybrid 507	103-107	SC	5.5	101	40	---	15.0	4.9	7.3	16	90	2.5	2.1	22.7	92.4	
Wis. 464A	103-107	SC	4.5	98	42	---	26.0	7.3	6.3	14	82	2.7	2.6	22.9	85.2	
Minhybrid 512	101-105	SC	6.0	95	37	---	1.0	4.3	7.5	14	87	2.7	2.5	21.0	84.6	
L.S.D. at 5 per cent point													0.8	3.3		
SOUTH CENTRAL ZONE (8 trials, 1954-55)																
Iowa 4417	107-111	SC	1	---	28	---	20	8	6.5	17	83	2.8	2.5	23.5	96.3	
Minhybrid 503	107-111	SC	3	---	35	---	1	7	6.8	16	85	2.7	2.6	25.8	95.9	
Minhybrid 508	107-111	SC	3	---	32	---	2	5	6.8	16	82	2.3	2.6	25.1	92.8	
Minhybrid 509	107-111	SC	2	---	35	---	10	5	6.5	15	88	2.3	2.5	25.0	100.2	
Minhybrid 511	107-111	SC	0	---	36	---	5	5	7.0	16	88	2.2	2.5	25.8	102.7	
Wis. 513	107-111	SC	3	---	35	---	5	5	6.8	14	90	2.2	2.0	24.8	99.0	
Sokota 400	105-109	SC	1	---	29	---	17	6	6.8	15	85	3.0	2.4	24.4	97.1	
Minhybrid 507	103-107	SC	9	---	35	---	5	6	7.3	16	88	2.5	2.1	23.9	95.6	
Wis. 435	103-107	SC	2	---	30	---	10	8	6.5	15	90	3.0	2.8	23.5	94.8	
Wis. 464A	103-107	SC	4	---	39	---	16	9	6.3	14	87	2.7	2.6	24.2	90.0	
Wis. 453	100-104	C	3	---	32	---	8	4	7.0	15	88	2.5	2.7	22.5	94.5	
L.S.D. at 5 per cent point													0.9	3.9		
CENTRAL ZONE (12 trials, 1952-55)																
Minhybrid 608	99-103	C	4	---	90	41	7	16	10	7.7	16	83	1.8	3.1	27.0	64.3
Minhybrid 609	96-100	C	2	---	83	36	7	15	6	8.2	15	87	1.2	2.7	27.5	62.4
Minhybrid 711	93-97	NC	3	---	86	35	7	18	13	8.1	15	82	2.5	2.5	27.4	59.9
L.S.D. at 5 per cent point													0.9	2.9		
CENTRAL ZONE (6 trials, 1954-55)																
Wis. 353	100-104	C	1	---	97	43	6	39	13	8.3	15	68	2.7	1.8	31.4	59.5
Minhybrid 608	99-103	C	4	---	94	43	7	33	10	7.7	16	70	2.6	3.6	28.5	62.4
Wis. 335A (Red)	98-102	C	1	---	93	41	6	15	5	8.3	16	77	2.1	2.4	30.5	66.0
Wis. 413	98-102	C	1	---	94	40	6	17	5	8.5	16	74	2.3	3.0	29.4	63.7
Minhybrid 609	96-100	C	1	---	90	40	7	30	10	8.2	15	74	2.3	2.9	29.1	60.4
L.S.D. at 5 per cent point													1.1	4.4		

* These characters rated in five classes: 1=excellent; 5=poor.

Table 15. Average Corn Hybrid Performance in North Central and Northern Maturity Zones

Variety	Maturity		Smut (per cent)	Height			Lodging		Ear		Good ears per 100 plants	Appearance		Ear moist- ure (per cent)	Yield per acre (bushels)
	Days	Zone		Plant	Ear	Shank	Root	Stalk	Length	Rows		Plant	Ear		
NORTH CENTRAL ZONE (10 trials, 1951-55)															
Minhybrid 711	93-97	NC	1	85	34	7	2	5	6.9	16	89	2.0	2.1	30.5	60.1
Minhybrid 706	90-94	NC	1	86	32	7	13	5	7.7	16	87	2.6	1.9	30.7	60.8
Minhybrid 707	89-93	NC	1	84	34	7	5	7	6.5	15	88	2.5	2.6	28.8	62.5
L.S.D. at 5 per cent point														1.0	2.7
NORTH CENTRAL ZONE (5 trials, 1954-55)															
Minhybrid 711	93-97	NC	1	88	37	6	2	9	7.3	14	84	2.0	2.3	31.5	64.4
Wis. 313	91-95	NC	1	88	34	4	18	3	8.0	15	82	1.3	1.8	30.9	70.5
Minhybrid 707	89-93	NC	1	89	34	6	9	10	7.0	15	84	2.6	3.0	29.9	66.8
L.S.D. at 5 per cent point														1.0	4.8
NORTHERN ZONE (15 trials, 1951-55)															
Wis. 279	86-90	N	4	78	27	5	3	5	7.0	16	78	3.0	2.8	31.5	52.8
Nodak 301	84-88	N	4	77	27	5	5	5	7.5	15	80	2.9	2.7	30.8	53.0
Wis. 255	82-86	N	2	75	26	6	8	4	7.0	14	80	2.9	2.9	29.3	50.2
Wis. 240	82-86	N	2	74	24	5	9	11	7.9	14	78	3.2	2.5	31.1	49.6
Morden 77	78-82	NM	6	77	26	5	9	7	6.7	16	78	2.9	2.8	27.1	49.5
L.S.D. at 5 per cent point														0.8	1.7
NORTHERN ZONE (11 trials, 1953-55)															
A.E.S. 101	76-80	NM	3	76	26	6	9	6	6.9	15	83	3.5	2.6	25.2	53.1
Morden	78-82	NM	2	81	28	6	17	10	6.9	16	79	3.1	2.6	27.1	54.3
L.S.D. at 5 per cent point														0.7	2.3

* These characters rated in five classes: 1=excellent; 5=poor.

FLAX

An attempt is made to sow all flax yield trials at an early date at each station. This early sowing usually favors the late maturing varieties, so such varieties as Redwood and B5128 probably had an advantage over Marine, an early maturing variety.

No single variety has been best for all locations or in all seasons. During the years of these trials, seasons generally have been favorable for late maturing varieties and these frequently have shown up best in the trials. It is likely that in very hot, dry years, a variety such as Marine would yield fully as well as Redwood or B5128.

RECOMMENDED VARIETIES

ALL SECTIONS

B5128 — Brown-seeded, blue-flowered, late-maturing variety. From a cross of Golden x Rio made at the North Dakota Agricultural Experiment Station. Immune to races of rust found in Minnesota; moderately susceptible to both wilt and pasmo. For best results it should be sown early. Good oil content, of only fair quality. Contains a mixture of types, including a small percentage of both yellow-seeded plants and rust-susceptible plants.

Marine—Brown-seeded, blue-flowered, early-maturing flax. Selected from a cross of C.I. 975 x Sheyenne at the North Dakota Agricultural Experiment Station. Immune to races of rust found in Minnesota; resistant to wilt; moderately resistant to pasmo. Has not yielded as well as Redwood or B5128 when sown early, but in late sowings seems superior in yield to both. Fairly good oil content; oil is of high quality. Recommended for sowing wherever an early-maturing, disease-resistant variety is desired.

Redwood—Brown-seeded, blue-flowered variety. Originated from a cross of B5128 x Redson at the Minnesota Agricultural Experiment Station in 1941. Mid-late in maturity, immune to races of rust found in Minnesota, moderately wilt resistant, and moderately susceptible to pasmo. Excellent yields in field trials; good oil content of good quality. Straw of excellent fiber quality.

Table 16. Average Yields of Flax

Variety	Rosemount		Waseca		Morris		Crookston		Grand Rapids		Northern Minnesota		Southwestern Minnesota	
	Number of trials	Yield per acre (bushels)	Number of trials	Yield per acre (bushels)	Number of trials	Yield per acre (bushels)	Number of trials	Yield per acre (bushels)	Number of trials	Yield per acre (bushels)	Number of trials	Yield per acre (bushels)	Number of trials	Yield per acre (bushels)
Bison	6	15.1	6	17.3	7	20.3	5	14.4	7	10.9	5	14.7	7	16.7
B5128	5	16.5	5	21.2	7	21.0	5	15.8	6	11.6	5	18.7	7	19.8
Redwood	6	18.5	6	22.0	7	22.9	5	15.6	7	12.3	5	19.2	7	19.2
Marine	6	16.2	6	19.5	7	21.8	5	13.0	7	12.4	5	18.5	7	17.5
Norland	2	15.4	2	19.9	4	21.6	2	13.4	3	10.6	3	19.7	4	18.8
Raja	1	11.2	1	18.0	1	28.3	.....	.....	1	9.8	1	14.5	1	16.5
L.S.D. at 5 per cent point		1.6		1.6		1.2		1.6		1.2		2.6		1.1

VARIETIES NOT ADEQUATELY TESTED

Raja—A new blue-flowered Canadian variety tested only one year in field plots in Minnesota. Medium-tall and early-maturing with medium-size brown seeds. Preliminary trials indicate it is low in both oil content and quality when grown in Minnesota. Resistant to rust and wilt; susceptible to pasmo.

VARIETIES NOT RECOMMENDED

B. Golden—Yellow-seeded variety with pink flowers that fade to white on exposure to light. Moderately susceptible to wilt. Immune to races of rust common to the United States; very susceptible to pasmo. High in oil content; oil is of good drying quality. Not recommended because of susceptibility to pasmo, and because short straw limits its ability to compete with weeds and causes some difficulty in harvesting. Developed at the North Dakota Agricultural Experiment Station.

Bison—Susceptible to rust but has yielded well in the Red River Valley in years when rust was not severe. Resistant to wilt; moderately susceptible to pasmo. High in oil content, low in oil quality. Developed at the North Dakota Station by plant selection. Brown seeds and blue flowers.

Crystal—Developed by the Minnesota Agricultural Experiment Station. It has been difficult at times to obtain good stands of Crystal. Immune to races of rust found in Minnesota; moderately resistant to pasmo; susceptible to late wilt. Seeds are yellow, with high oil content of good quality; flowers are white.

Dakota—Not recommended because it is susceptible to races of rust now prevalent in Minnesota. A selection from a cross of Renew x Bison first introduced in North Dakota. Brown seeds and blue flowers.

De Oro—Developed at the North Dakota Experiment Station as a selection from B. Golden. Appears to have medium yielding ability. Late in maturity; medium tall, with yellow seeds of medium size. Flow-

ers are pink. Immune to races of rust found in Minnesota; moderately resistant to wilt; very susceptible to pasmo.

Koto—Brown seeded, high-yielding, mid-late in maturity. Resistant to wilt; moderately susceptible to pasmo; susceptible to races of rust common in Minnesota. Distinguished from Redwing by characteristic dark blue flowers. Medium-sized seed of satisfactory oil content and quality. A selection from a cross of (Russian x Argentine) x Bison made at the Northern Great Plains Field Station, Mandan, North Dakota.

Minerva—Yellow seeded; flowers are very dark blue. Yields have been moderately good. While it has been moderately susceptible to late wilt at St. Paul, it has been much more resistant at Fargo. Moderately resistant to rust; moderately susceptible to pasmo. Has exceeded all varieties in percentage of oil content; oil quality is similar to that of Redwing. Straw is slightly less valuable for fiber for paper production than other varieties. A selection made in Minnesota from a back-cross of C. I. 649 x Bison.

Norland—Developed at the North Dakota Experiment Station as a selection from Victory, and similar in general appearance. Flowers are white; seeds are brown. Appears equal to Victory in yield. Like Victory is moderately susceptible to wilt, very susceptible to pasmo. More uniform than Victory, but still contains some rust susceptible types.

Redwing—Well-adapted for southern and central Minnesota. Not adapted for northwestern Minnesota, but has been satisfactory in Koochiching and Lake of the Woods Counties and parts of Roseau County. Early in maturity; moderately resistant to wilt; susceptible to pasmo and rust. Seed is small; produces an oil of high drying quality. Selected at Minnesota from Acc. No. 91. Where an early variety is required, Marine has been superior to Redwing.

Rocket—Developed in Canada. In Minnesota trials has yielded slightly less than Redwood. Resistant to rust; moderately susceptible to wilt and pasmo. Brown

Table 17. Average of Flax Varieties for Date Ripe, Plant Height, Weight per 1,000 Seeds, Oil Content, and Iodine Number

Variety	Date Ripe	Plant height (inches)	Weight of 1,000 seeds (grams)	Oil content (per cent)	Iodine number
Bison	August 1	26	5.9	37.6	173
B5128	August 5	26	6.5	37.6	174
Redwood	August 4	25	5.7	37.6	178
Marine	July 29	24	5.4	37.3	185
Norland	August 5	27	6.8	38.1	183
Raja	July 28	24	6.6	36.7	178

seeds, with good oil content of good quality; blue flowers.

Royal—Mid-late in maturity; moderately susceptible to rust and wilt; susceptible to pasmo. Oil content and quality similar to Bison. Weak straw. Developed at Saskatoon, Saskatchewan, Canada as C.A.N. 1727. Seeds are brown, flowers blue.

Sheyenne—Early variety, immune to races of rust found in Minnesota. Resistant to wilt; moderately susceptible to pasmo. In Minnesota trials has yielded less

than recommended varieties, when both planted at an early date. Developed at the North Dakota Agricultural Experiment Station. Seeds are brown, flowers blue.

Victory—High-yielding; moderately susceptible to rust and wilt; very susceptible to pasmo. Lacks uniformity of type. Easily distinguished by the characteristic large white flowers and large brown seeds. Developed at the North Dakota Station.

Viking—Very similar to B. Golden.

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 map, page 15, giving corn maturity zones referred to in descriptions) farther north for hay than for seed.

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; medium oil content. Plant pubescence (hairiness on stems and pods) is gray; entire seed is yellow. Recommended for Northern Corn Maturity Zone and Northern Minnesota.

Blackhawk—Good yielding, medium tall, fairly resistant to lodging. Tends to bear lowest pods fairly well above the ground. Medium-size seeds, yellow except for light-brown seed scars. Pubescence color is gray. Relatively high oil content. Selected at the Iowa Agricultural Experiment Station from a cross of Mukden x Richland. Recommended for Southern and South Central Corn Maturity Zones.

Capital—High-yielding, medium in height, with a distinct tendency to lodge. Small seeds, dull yellow with light-brown seed scars. Relatively high oil content.

Plant pubescence is brown. Selected at the Central Experimental Farm, Ottawa, Canada, from a cross of 171 x A.K. (Harrow). Recommended for areas of the state south of Northern Corn Maturity Zone.

Chippewa—Superior in yielding ability, medium tall, very good resistance to lodging. Medium-size seeds, yellow with black seed scars. Relatively high oil content. Pubescence color is brown. Selected at U. S. Regional Soybean Laboratory, Urbana, Illinois, from the cross of Lincoln x (Lincoln x Richland). Averages six to eight days earlier than Blackhawk in maturity. Recommended for South Central and Southern Corn Maturity Zones, and about southern one-third of the Central Zone.

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 very good yields. Good standing ability. Pubescence color is 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 cross 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 four to six days later than Blackhawk, so is recommended only in the Southern Corn Maturity Zone. Taller than Blackhawk, tends to lodge somewhat more. Oil content medium. Pubescence is gray. Medium-size seed; seed scar of same yellow as the seed coat.

Norchief—Has been outstanding in yield and oil content among the early varieties. 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 Experimental Farm, Ottawa, Canada, from the variety Mandarin. Recommended in areas of the state south of the Northern Corn Maturity Zone.

Renville—Short-to-medium in height; highly resistant to lodging. Medium-size yellow seeds with light-brown seed scars. Plants are gray. Highest oil content of any variety tested in Minnesota in recent years. Selected at the Minnesota Agricultural Experiment Station from a cross of Lincoln x (Lincoln x Richland) made at the United States Regional Soybean Laboratory at Urbana, Illinois. Averages about a week earlier in maturity than Blackhawk. Recommended for South Central and Southern Corn Maturity Zones, and southern one-third of the Central Zone.

VARIETIES NOT ADEQUATELY TESTED

Comet—Early variety developed at the Central Experimental Farm, Ottawa, Canada, from a cross of Pagoda x Mandarin. In cooperative regional trials—including tests at St. Paul, Morris, and Crookston—has averaged one or two days earlier than Ottawa Mandarin, several inches taller, about the same in yield and standing ability, and slightly higher in oil content. Yet to be tested in regular Minnesota field plots.

VARIETIES NOT RECOMMENDED

Bavender Special—Selected by an Iowa farmer; very late in maturity, lodges excessively, and is rather low in oil content.

Earlyanna—Selected from a natural hybrid at the Purdue Agricultural Experiment Station. Has given only fair yields in Minnesota and lodged excessively. Matures two or three days later than Blackhawk.

Habaro—Tested and used in Minnesota longer than any other variety. Yields well; well-adapted to southern Minnesota. But low in oil content, tends to lodge, and often shatters in dry autumns. Selected at the Minnesota Agricultural Experiment Station from an early introduction.

Hardome—Early selection from a cross of Mandarin x (Mandarin x A.K.) made at the Dominion Experimental Farm, Harrow, Ontario. Matures the same or slightly earlier than Ottawa Mandarin; grows much taller and lodges considerably. Oil content medium; yielding ability fair-to-good in its maturity group.

Harman—A selection made in Ontario from the variety Manchu. Late and lodges rather badly. In Minnesota tests has yielded medium to low; oil content has been low.

Hawkeye—Developed cooperatively by the Iowa Agricultural Experiment Station and the U. S. Department of Agriculture from a cross of Mukden x Richland. Matures a week to 10 days later than Blackhawk; has not outyielded it in Minnesota.

Korean—Selected in Canada, from an importation from the Orient. A Mr. Rickard of Champaign, Illinois, brought it to the United States. Gives relatively good yields in southern Minnesota, but oil content is only fair. Matures about four days later than Blackhawk, grows to medium height, and lodges rather badly. Very large seeds.

Lincoln—Selected at the U. S. Regional Soybean Laboratory from a cross of Mandarin x Manchu. Too late in maturity for Minnesota.

Manchu, Wis. 606—Selected at the Wisconsin Agricultural Experiment Station from the older Manchu variety, has been grown rather extensively in Minnesota. Similar to Habaro in yielding ability, maturity, and height; lodges somewhat more, but has an appreciably higher oil content.

Mandarin, Wis. 507—Selected at Wisconsin from the original Mandarin type. Once recommended for Minnesota, but yields less, lodges more, and has a lower oil content than Ottawa Mandarin. Not recommended after Ottawa Mandarin seed became available.

Monroe—Tall-growing and about mid-way in maturity between Capital and Blackhawk. Has yielded lower than either in several years of testing, with a marked tendency to lodge. Selected at the Ohio Agricultural Experiment Station from a cross of Mukden x Mandarin.

Pridesoy 57—An early variety with good standing ability. Plants slightly shorter and oil content lower than Ottawa Mandarin. It is a selection from the older variety, Pridesoy.

Table 18. Averages of Soybean Varieties for Date of Maturity, Plant Height, Lodging Score, Weight per 100 seeds, and Oil Content in Southern and Central Locations and at Crookston*

Variety	Blue Earth, Dodge Center, Southwestern Minnesota, and Waseca				Morris and Rosemount				Crookston				Oil Content		
	Date mature	Plant height (inches)	Lodging score†	Weight per 100 seeds (grams)	Date mature	Plant height (inches)	Lodging score†	Weight per 100 seeds (grams)	Date mature	Plant height (inches)	Lodging score†	Weight per 100 seeds (grams)	Waseca	Morris	Crookston
Acme									9-4	27	1.7	15.4			
Blackhawk	9-20	36	2.0	16.0	9-28	40	3.4	16.4					21.0	21.2	
Capital	9-11	31	2.4	13.2	9-20	35	3.4	13.3					19.9	21.0	
Chippewa	9-14	33	1.3	15.5	9-20	35	2.1	15.6					21.0	20.9	
Flambeau					9-9	31	3.3	16.7	9-7	31	2.7	15.2		18.9	19.4
Grant	9-10	31	1.5	15.9	9-17	32	2.4	17.6					20.7	21.3	
Habaro	9-19	31	2.2	19.6	9-26	35	3.0	18.6					18.0	19.2	
Hardome	9-8	34	2.9	16.3	9-15	37	3.1	17.0	9-21	40	5.0	14.7	20.0	20.7	20.9
Harosoy	9-23	39	2.4	18.1	10-2	42	3.9	17.6					19.7	18.7	
Hawkeye	9-28	40	2.1	17.2									20.3		
Norchief	9-6	28	1.5	16.8	9-12	30	3.1	16.2	9-17	31	3.5	15.2		20.7	20.5
Ottawa Mandarin	9-8	28	1.2	19.3	9-16	30	2.2	20.5	9-22	32	2.2	16.8	20.1	19.4	20.1
Renville	9-14	31	1.3	18.7	9-22	32	2.0	18.4					21.5	21.3	

* For same years as shown in table 19 except (1) lodging at Morris and Crookston for 1955 only, (2) maturity dates at Crookston for 1954-55 only and (3) oil contents at all three locations for 1954 only.
 † 1=erect; 5=completely lodged.

Table 19. Average Yields of Soybeans (Quantities are in Bushels per Acre)

Variety	Years of trial	Southern locations				Average, four locations	Central locations			Northern (Crookston)		
		Blue Earth	Southwestern Minnesota	Waseca	Dodge Center		Years of trial	Morris	Rosemount	Average, two locations	Years of trial	Yield
Acme											1953-55	23.6
Blackhawk	1953-55	36.5	28.4	34.6	27.1	31.6	1953-55	34.3	35.7	35.0		
Capital	1953-55	37.2	30.2	33.2	28.9	32.4	1953-55	35.2	39.8	37.5		
Chippewa	1953-55	40.7	31.5	39.3	31.5	35.7	1953-55	34.6	39.4	37.0		
Flambeau							1953-55	33.2	31.7	32.4	1953-55	25.8
Grant	1954-55	38.4	30.6	36.8	28.7*	33.6	1953-55	37.0	40.3	38.6		
Habaro	1953-55	37.3	28.5	34.6			1953-55	31.7	35.1	33.4		
Hardome	1954-55	33.5	28.0	31.1	26.7*	29.8	1953-55	33.7	39.1	36.4	1954-55	23.8
Harosoy	1953-55	37.5	31.3	34.2	27.8	32.7	1954-55	32.8	34.5	33.6		
Hawkeye	1953-55	31.9	28.4	33.2								
Norchief	1955	34.2	27.5	34.1	26.6*	30.6	1953-55	34.9	37.5	36.2	1953-55	27.2
Ottawa Mandarin	1953-55	37.0	27.7	34.2	27.0	31.5	1953-55	37.1	37.6	37.3	1954-55	27.1
Renville	1953-55	38.2	30.0	37.1	29.2	33.6	1953-55	36.3	35.8	36.0		
L.S.D. at 5 per cent point		2.6	2.4	2.7	2.2	1.2		2.6	3.3	2.0		2.3

* Years in test at Dodge Center 1953-55

SUNFLOWERS

Short, combine-harvested sunflowers are grown commercially in northwestern Minnesota. Most of the crop is sold to bird feed dealers and to a Canadian cooperative which processes sunflower seed as an oilseed crop like soybeans.

RECOMMENDED VARIETIES

Advance—Medium in maturity; stands well for combining. Seed is small, low in hull, high in oil content and bushel weight. Plant grows about 5 feet tall; matures about same time as early soybean varieties. A topcross hybrid released about 1945 by the Dominion Experimental Farms in Canada, produced by crossing the inbred, S-37-388, with the variety Sunrise. Only seed harvested from the S-37-388 in the crossing field should be used for seed. Farmers should buy new, certified seed every year just as they do with hybrid corn.

Arrowhead—About six days earlier than Advance, slightly taller, not quite as strong-stalked. Seed is medium in size, low in hull, medium in oil content, high in bushel weight. Shows more seedling vigor and less bird damage than Advance. 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. Recommended as a feed variety only.

VARIETIES NOT ADEQUATELY TESTED

Beacon—Late-maturing and taller than Arrowhead. Seed is small, medium in hull and oil content, high in bushel weight. Variety lacks uniformity in height, maturity, and seed color. Most rust-resistant variety tested; developed at the Dominion Experimental Farm, Morden, Manitoba, by combining 27 rust-resistant lines.

VARIETIES NOT RECOMMENDED

Commercial Advance or "Advance, second generation" yields considerably less than Advance; should not be used for planting.

Mennonite—Slightly later maturing and taller than Arrowhead. Seed is large, high in hull, low in oil content, medium in bushel weight. Originated in Russia many years ago.

Table 20. Average Adjusted Yields of Sunflower Seed. (Quantities are in pounds per acre)

Variety	Years of trial	Crookston	Years of trial	Southwestern Minnesota	Years of trial	Rosemount	Years of trial	Anoka	Adjusted average
Advance	1948-55	1047	1951-55	1039	1953-55	794	1953, 1955	655	884
Arrowhead	1948-55	1221	1951-55	973	1953-55	1218	1953-55	1028	1110
Beacon	1954-55	597	1954-55	911	1954-55	950	1955	715	793
Mennonite	1953-55	1138	1953-55	882	1954-55	1034	1953-55	868	981

Table 21. Adjusted Averages of Sunflower Varieties at Four Locations for Date Mature, Plant Height, Head Diameter, Bird Damage, Kernel Weight, Oil Content, Hull Percentage, and Bushel Weight

Variety	Date mature	Plant height (inches)	Head diameter (inches)	Bird damage (per cent)	Weight of 100 kernels (grams)	Oil* (per cent)	Hull (per cent)	Bushel weight (pounds)
Advance	September 15	57	5.9	18	6.2	31.9	41.2	28.6
Arrowhead	September 9	60	5.0	5	7.7	30.7	42.1	28.3
Beacon	September 21	68	5.9	24	5.3	29.8	45.9	32.1
Mennonite	September 13	64	5.3	6	8.2	28.0	47.1	25.4

* Dry matter basis.

ALFALFA

RECOMMENDED VARIETIES

FOR ALL ROTATIONS

Ladak—Winter-hardy, wilt-resistant variety. Introduced by the U. S. Department of Agriculture from northern India. Slightly higher average than Ranger in forage yield. Recovers slowly after cutting, but yield of second cutting has not been much lower than other varieties. Recommended for seeding in both long and short rotations. Susceptible to leafspot diseases.

Ranger—Winter-hardy, wilt-resistant variety. Developed by the U. S. Department of Agriculture and the Nebraska Agricultural Experiment Station. Slightly superior to Ladak in wilt resistance. Recommended for seeding in both long and short rotations. Susceptible to leafspot diseases.

Vernal—Developed at the Wisconsin Agricultural Experiment Station; released in 1953. More wilt-resistant than Ranger; yields more forage. In Wisconsin trials, has shown excellent winter-hardiness. Susceptible to leafspot diseases.

FOR SHORT ROTATIONS ONLY

(Two Crop Years or Less)

Narragansett—Developed by the Rhode Island Agricultural Experiment Station. In Minnesota trials, has produced forage yields definitely higher than Ranger, slightly higher than Ladak. Winter-hardy; recovers rapidly after cutting; seedlings are vigorous. Susceptible to leafspot diseases and bacterial wilt. Should be seeded only in short rotations (one or two years of hay production). Appears to be low in seed production; may never become a widely grown variety.

VARIETIES NOT ADEQUATELY TESTED

DuPuits—A variety introduced from France. Very susceptible to bacterial wilt

and may not be sufficiently winter-hardy for Minnesota. Forage yields satisfactory in limited trials. Susceptible to leafspot diseases.

Lahontan—Developed cooperatively by the U. S. Department of Agriculture and the Nevada Agricultural Experiment Station. Resistant to bacterial wilt, stem nematode, and the spotted alfalfa aphid. (Neither of the last two pests are found at present in Minnesota.) May not be sufficiently winter-hardy for Minnesota, as it was first sown here in 1956.

Rambler—Developed at the Swift Current Experiment Station in Canada. A creeping alfalfa (spreads under ground by roots) first sown in Minnesota in 1956.

VARIETIES NOT RECOMMENDED

Uncertified southwestern-grown seed should never be seeded for forage production; plants grown from such seed lack winter-hardiness. However, certified seed of adapted varieties produced in southwestern United States is perfectly satisfactory in Minnesota.

Common alfalfas are named for state or region in which they are grown. The seed is not designated as a variety, and performance is not consistent from one lot to another. Generally, the common alfalfas are susceptible to bacterial wilt and yield somewhat less than improved varieties.

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—A synthetic variety developed by the New Jersey Agricultural Experiment Station. Yields about the same as

Table 22. Forage Yields and Stand Readings for Three Varieties of Alfalfa Grown on Wilt-Infested Soil

Variety	MORRIS		WASECA			
	Seeded 1940		Seeded 1943		Seeded 1945	
	Five-year average forage yield	Stand, 1946	Two-year average forage yield	Stand, 1947	Four-year average forage yield	Stand, 1949
	(tons per acre)	(per cent)	(tons per acre)	(per cent)	(tons per acre)	(per cent)
Grimm	3.91	17	2.7	10	2.1	5
Ladak	4.42	80	.....	.....	2.6	77
Ranger	4.32	90	2.8	51	3.0	87

Ranger; but susceptible to bacterial wilt and not sufficiently winter-hardy for Minnesota. Susceptible to leafspot diseases.

Buffalo—A wilt-resistant variety developed by selection from Kansas Common, which it resembles in most other characteristics. Not sufficiently winter-hardy for use in Minnesota. Resistant to leafspot diseases.

Grimm—A winter-hardy variety developed in Carver County by Wendelin Grimm. Where bacterial wilt is prevalent, persistence of Grimm is decidedly less than Ranger or Ladak. Forage yield equal to Ranger and lower than Narragansett or Vernal, where wilt is not a factor. Susceptible to leafspot diseases.

Nomad—Developed in Oregon from plants of an old stand that spread by underground stems. Under conditions where adapted, Nomad is a spreading or creeping variety. Not adapted to Minnesota.

Rhizoma—Developed by the University of British Columbia. Under favorable conditions, spreads by underground stems—but has not shown this characteristic in Minnesota. In trials, yielded about equal to Ranger but is very susceptible to bacterial wilt. Susceptible to leafspot diseases.

Talent—Selected from the French variety, Provence. Susceptible to bacterial wilt, the leafspot diseases, and is not sufficiently winter-hardy for Minnesota.

Williamsburg—Selected from Kansas Common for stem rot resistance. Like Kansas Common, is not sufficiently winter-hardy for Minnesota. Susceptible to leafspot diseases.

Table 23. Average Forage Yields for Eleven Alfalfa Varieties When Bacterial Wilt Did not Affect Yields

Variety	Crookston 1951-52, 1954-55		Grand Rapids 1951-52, 1954-55		Morris 1950-53, 1954-55		Rosemount 1950-53, 1954-55		Waseca 1951-52, 1954-55		Winona 1949-52	
	(tons per acre)		(tons per acre)		(tons per acre)		(tons per acre)		(tons per acre)		(tons per acre)	
Ladak	1.41	3.11	3.44	3.25	2.85	2.58	4.07	4.54	2.71	3.56	2.36	
Narragansett	1.36	3.17	3.54	3.58	2.95	2.79	4.14	4.73	3.05	3.84		
Ranger	1.29	2.99	2.90	3.16	2.85	2.72	3.70	4.55	2.72	3.37	2.40	
Vernal		3.34		3.48		3.19		4.96		4.07		
Atlantic	1.25	3.16	3.11	3.13	2.84	2.77	3.96	4.70	2.75	3.77	2.08	
Buffalo	1.14	2.75	2.63	2.96	2.84	2.56	3.73	4.56	2.32	3.03	2.48	
DuPuits		3.51		3.25		2.69		4.64		3.84		
Grimm	1.14	2.97	3.08	3.24	2.64	2.63	3.64	4.26	2.69	3.75	2.29	
Rhizoma	1.22	3.13	3.56	3.53		2.58		4.40	2.75	3.44		
Italian No. 121				3.26		2.59						
Socheville (France)		3.26						4.74		3.43		
L.S.D. at 5 per cent point		.10	.17	.23	.14	.34	.21	.22	.16	.49		

BROMEGRASS

RECOMMENDED VARIETIES

Lincoln, Achenbach, and Fischer—All recommended. These southern strains start growth earlier in the spring than Canadian brome and are somewhat more productive. Lincoln was selected in Nebraska, Achenbach in Kansas, and Fischer in Iowa. All are so-called farm strains. That is, they have been grown by one or two farmers, in the areas designated, for a long period of time and seem to have acquired a natural adaptation.

VARIETIES NOT RECOMMENDED

B.in.12—A mass selection chiefly of non-spreading or restricted-spreading plants increased at the Utah Agricultural Experiment Station, Logan, Utah.

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 Station.

Lyon (Nebr. 36)—Similar to Lincoln, shows considerable refinement of plant characters over it. 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. Outstanding characteristics are seedling vigor and high seed production. Intermediate in growth habit between the southern type, as exemplified by Achenbach, and the northern type of smooth bromegrass. Increased at the Washington Agricultural Experiment Station, Pullman.

Martin—A mass selection developed from plants obtained from seed produced on an old bromegrass field in Martin County, Minnesota. Increased at the Minnesota Agricultural Experiment Station.

Table 24. Average Forage and Seed Yields of Bromegrass Varieties from Rosemount, Waseca, Morris, Crookston, and Grand Rapids—1951-1954*

Variety	Forage yield (15 per cent moisture)		Seed yield
	First cutting	Second cutting	
(tons per acre)			
(pounds per acre)			
SOUTHERN TYPE			
Lincoln	1.86	1.35	140
Achenbach	1.86	1.41	118
Fischer	1.76	1.19	155
Elsberry	1.75	1.23	91
Lyon	1.84	1.40	107
Lancaster	1.84	1.37	156
Minnesota Synthetic A	2.10	2.18	.....
Oklahoma No. 1	1.46	.90	.....
Oklahoma Synthetic	1.46	1.01	.....
NORTHERN TYPE			
Canadian Commercial	1.49	1.07	150
Martin	1.85	1.40	.....
B. in.-12	1.71	1.18	180
Manchar	1.80	1.45	208
Mandan 404	1.60	1.53	.....
Homesteader	1.77	1.31	130
Alta Fescue	1.15	1.25	.....
L.S.D. at 5 per cent point .....	.14	.21	.....

* 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 two of the four years.

BIENNIAL SWEETCLOVER

RECOMMENDED VARIETIES

Evergreen—White-blossomed, introduced from Ohio. Produces a larger growth than common types the fall of first year, is a heavy forage producer the second year, and comes to full bloom two weeks later than common types. Therefore, has a longer grazing season.

Madrid—Yellow-blossomed, biennial type introduced from Madrid, Spain, in 1910. First-year growth is superior to common types; forage and seed production the second year are satisfactory.

VARIETIES NOT RECOMMENDED

Alpha—Dwarf variety developed at the University of Saskatchewan.

Brandon Dwarf—Dwarf white variety developed at Brandon, Manitoba.

Erector—White-blossomed variety mass-selected at Brandon, Manitoba. Lower branches ascend at an acute angle.

Nebraska Fine Stem—A selection made at the Nebraska Experiment Station.

No. 1 Arctic—Derived from a Siberian importation. White blossoms.

Spanish, Reg. No. 1—White-blossom; introduced from Madrid, Spain, in 1910 and formerly called Madrid white.

Table 26. Maturity Rating and Forage Yield of Biennial Sweet Clover Varieties

Variety	Maturity rating	Yield score* fall seedling year	Yield forage, second year in per cent of Commercial yellow (per cent)
Evergreen	Very late	1.7	115
Madrid	Early	2.0	102
Commercial white	Medium	3.2	102
Commercial yellow ...	Early	3.5	100

* Scores 1 to 5; 1 is best.

RED CLOVER

Tests conducted from 1923-27 by Professor A. C. Army showed that locally grown strains of medium red clover were markedly superior to introductions from foreign countries and the southern United States. Average yields of forage collected from experiments conducted from 1945 through 1955 show the recommended varieties Wegener and Midland to be equal in yield to good

commercial seed purchased in Minnesota. With this situation existing, it is considered advisable to use named, adapted varieties so that the seed is of known origin and performance.

RECOMMENDED VARIETIES

Midland—A blend of strains from Ohio, Indiana, Illinois, and Iowa produced through the cooperation of several mid-west experiment stations and the U. S. Department of Agriculture. Under Minnesota conditions, equal to Wegener in forage yield for both first and second cuttings. A good seed producer.

Table 25. Average Forage and Seed Yields of Red Clover Varieties at All Minnesota Experiment Stations—1954-1955*

Variety	Forage yield (15 per cent moisture)		Seed yield (pounds per acre)
	First cutting	Second cutting	
Wegener	1.71	1.35	125
Midland	1.69	1.69	110
Dollard	1.72	1.72	139
Minnesota Commercial	1.77	1.77	113
L.S.D. at 5 per cent point	N.S.	N.S.	20

* The number of years at each station varied. There were 23 experiments in all.

Wegener—A strain grown for a number of years by E. C. Wegener, Bertha, Minnesota. Adapted to Minnesota conditions; good forage and seed yield, and provides a good second cutting.

VARIETIES NOT RECOMMENDED

Altaswede—Late, single-cut type developed by the Alberta, Canada, Agricultural Experiment Station. Despite claims made for it, has not proved to be perennial in tests in Minnesota, and has yielded significantly less than commercial Mammoth. Smooth (not hairy) leaves, reputed to make it susceptible to leafhopper attacks.

Dollard—Selected several years ago at MacDonald College, Quebec, Canada. Superior in seed yield, it has been shown to be resistant to some forms of anthracnose and black stem in regional tests. The seed is being increased for possible recommendations on a regional basis.

Kenland—Only variety of which large amounts of seed are commercially available. Resistant to southern anthracnose; adapted to approximately the southern half of the red clover belt. Susceptible to northern anthracnose, and probably not sufficiently winter-hardy for Minnesota. Developed by the Kentucky Agricultural Experiment Station and the U. S. Department of Agriculture.

BIRDSFOOT TREFOIL

Among trefoil varieties adequately tested to date, only **Empire** and **Viking** (both New York selections) appear winter-hardy enough for Minnesota conditions. **Empire** is recommended because it is slightly superior to **Viking** in win-

ter-hardiness and because **Viking** has been tested less extensively. **Empire** grows along the ground; **Viking** is upright.

Cascade, **Granger**, new introductions of European broadleaf, and all the narrow-leaf types tested are clearly inferior in winter-hardiness. This is especially true of the narrow leaf types.

From one year's results at Rosemount, **Mansfield** is satisfactory in yield but no test of winter hardiness has been obtained. **Mansfield** is erect-growing and somewhat earlier blooming than **Empire** and **Viking**.

Table 27. Yields and Stands of Birdsfoot Trefoil at the Rosemount Station, 1953 and 1954

Variety	Total yield, 1953*	Stand 6/16/53	Total yield, 1954*	Stand 5/5/54
	(tons per acre)	(per cent)	(tons per acre)	(per cent)
Empire	2.71	93	.83	88
Viking	2.92	93	.87	83
Cascade†	2.98	95	.50	47
Granger†	2.96	95	.40	42
Italian Broadleaf	2.69	87	.80	42
Oregon narrowleaf	1.22	85	zero	3

* Yields tested at 15 per cent moisture.

† Cascade and Granger are Oregon selections.

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.

RECOMMENDED VARIETIES

Chancellor—Medium in maturity and long vined. Small, cream-colored seed, high in bushel weight. Selected at the Dominion Experimental Farm, Ottawa, Canada in 1906 from an English variety also called Chancellor.

Dashaway—Like Chancellor, but one day earlier and has slightly smaller seeds. Selected in 1914 from Golden Vine by F. J. Dash, a Saskatchewan farmer, and distributed by the University of Saskatchewan in 1922. Generally grown on more acres in Minnesota than any other variety of dry, edible peas.

Multiplier—Like Chancellor, but flowers and matures somewhat later; slightly

larger seeds. Thought to be of Canadian origin.

VARIETIES NOT ADEQUATELY TESTED

O.A.C. 181—Early maturing and long-vined. Cream-colored seed, medium in size and bushel weight. Originated in 1918 at the Ontario Agricultural College from a cross of Prussian Blue x White Wonder.

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—Short-vined and earliest maturing of the cream-colored varieties. Seed is medium in size and bushel weight; seems to be desirable for splitting. Of American origin, has sometimes been called Extra Early. Grown on more acres in the United States than any other cream-colored pea.

Valley—Early maturing and long-vined. Large, cream-colored seed, medium in bushel weight. Originated in 1924 at the Dominion Experimental Farm, Ottawa, Canada, from a cross of Chancellor x Early Raymond.

Table 28. Adjusted Averages of Pea Varieties at Crookston for Seed Yield, Date of First Bloom, Date Mature, Seed Weight, and Bushel Weight

Variety	Years of trial	Yield per acre	Date first bloom	Date mature	Weight of 100 seeds	Bushel weight
						(pounds)
		(bushels)			(grams)	(pounds)
Chancellor	1948-55	22.2	July 2	August 20	12.8	63.3
Dashaway	1948-55	22.7	July 1	August 20	12.6	63.5
Multiplier	1948-55	22.3	July 4	August 21	13.4	63.5
Valley	1952-55	22.8	July 1	August 13	19.5	62.4
O.A.C. 181	1953-55	23.7	June 23	August 11	15.9	62.1
First and Best	1948-52, 1955	22.1	June 22	August 8	15.7	62.3
L.S.D. at 5 per cent point		2.5				

CERTIFIED SEED DIRECTORY

Registered and certified seed of most of the good varieties described in this bulletin can be purchased from growers listed in the Minnesota Registered and Certified Seed Directory. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul Campus, University of Minnesota, St. Paul 1, Minnesota.