

Varietal Trials OF FARM CROPS



W. M. MYERS

E. R. AUSEMUS

J. W. LAMBERT

H. L. THOMAS

V. E. COMSTOCK

D. C. RASMUSSEN

L. J. ELLING

R. G. ROBINSON

F. K. S. KOO

O. C. SOINE

D. W. SUNDERMAN

D. R. JOHNSTON

Agricultural Experiment Station
UNIVERSITY OF MINNESOTA

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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.

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 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 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; the superintendents and agronomists of the branch Agricultural Experiment Stations; and representatives of the Minnesota Crop Improvement Association.

This bulletin gives brief descriptions of varieties and summarizes yields and other comparative agronomic data on varieties of barley, oats, rye, wheat, flax, soybeans, sunflowers, alfalfa, brome grass, red clover, and field peas—all grown in field plots in 1958.

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.

Many of the disease reactions cited are the results of cooperative work between the Department of Plant Pathology and Botany and the Department of Agronomy and Plant Genetics.

University personnel responsible for the field work at the various locations are: J. R. Thompson and R. E. Hodgson at Waseca; R. L. Thompson at Morris; O. C. Soine and B. E. Youngquist at Crookston; C. H. Griffith and W. Matalamaki 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

Forrest—Six-rowed, smooth-awned, white aleurone variety. Medium height and maturity. Good straw strength, bushel weight,

and kernel size. Medium yielding ability. Recommended at present as "barley." Malting quality not yet established. A single plant selection made at the University of Minnesota from Brandon 1136, which came from (Peatland x Newal) x O.A.C. 21.

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

Table 1. Average yields of Barley in bushels per acre

Variety	Years of trial	Rosemount	Waseca	Morris	Crookston	South-western	Grand Rapids	Duluth	Northern Minn.	Average eight locations
Barbless	1954-58	46.9	55.4	57.2	43.8	35.6	36.1	40.5	40.3	44.5
Mars	1954-58	42.7	57.3	60.3	44.5	29.9	30.0	39.2	43.2	43.4
Kindred	1954-58	44.5	59.4	61.5	43.7	34.7	35.7	43.1	45.8	46.1
Vantage	1954-58	50.6	70.8	70.2	53.0	37.8	38.7	50.6	47.9	52.5
Forrest	1954-58	46.8	56.5	62.1	46.0	34.2	36.7	46.9	44.2	46.7
Trall	1954-58	52.8	68.5	75.8	55.1	38.0	39.4	49.4	56.5	53.9
Parkland	1955-58	52.8	64.9	64.9	49.3	33.7	40.0	55.8	53.4	51.9
Liberty	1955-58	61.9	65.7	65.7	46.8	38.5	32.3	45.8	45.3	50.3
Peatland	1954-58						39.8	48.0	42.3	.....
Herta*	1955-58							53.5	59.6	
L.S.D. at 5% point†		4.3	3.8	4.3	5.6	3.7	4.7	4.5	7.4	

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

† Applies specifically to varieties occurring the entire period.

Table 2. 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	4
Forrest	1	3	3	1	3	3	...	3	3	3	4	4	3	2
Fox	1	4	2	2	3	3	...	3	3	3	4	4	4	2
Herta	4	3	3	2	3	3	...	3	3	3	4	4	4	3
Husky	1	3	4	2	4	3	...	3	3	...	4	4	4	4
Kindred (L)	1	4	3	2	3	2	3	3	3	3	3	4	4	4
Liberty	1	4	2	1	3	2	...	3	3	3	2	4	4	4
Mars	1	4	3	3	3	2	3	3	3	4	3	4	3	4
Montcalm	4	4	4	1	3	2	3	3	3	4	4	4	4	4
Parkland	1	4	3	1	3	3	...	3	3	3	4	4	4	2
Peatland	1	4	3	2	3	2	4	2	2	4	4	4	3	4
Trall	2	4	4	2	3	3	...	2	3	3	4	4	4	4
U.M. 570	1	4	3	2	3	2	...	3	3	3	4	4	4	4
Vantage	1	4	3	3	4	2	...	3	4	3	4	4	4	4
Vantmore	2	4	2	1	3	3	...	3	3	3	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.

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

Trall—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. Malting quality acceptable. Developed at North Dakota Agricultural Experiment Station from a cross of Kindred x Titan.

VARIETIES NOT ADEQUATELY TESTED

Liberty—A new six-rowed, smooth-awned, white aleurone variety developed at the South Dakota Agricultural Experiment Station. In rod row tests in Minnesota has given high yields. Good straw strength. Medium maturity. Parentage involves Lion, Manchuria, Peatland, and Titan. Malting quality not thoroughly evaluated, though its tendency to produce greyish kernels is not considered desirable.

Parkland—Six-rowed, smooth-awned, blue aleurone variety. Medium late. Good straw. Licensed as malting variety in Canada. Medium to good yielding ability. Originated at Brandon, Manitoba, from a cross of (Olli x Montcalm) x Brandon 1136.

VARIETIES NOT RECOMMENDED

Peatland—Six-rowed, rough-awned, stiff-strawed, white aleurone variety. 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. Developed at Brandon, Manitoba, from a cross (Newal x Peatland) x Plush.

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

Feebar—Stiff-strawed, six-rowed feed barley. Developed for the dry conditions of central and western South Dakota. Selected from the cross Peatland x Vaughn.

Fox—Six-rowed, smooth-awned, light blue aleurone feed variety. Medium in height and maturity; medium to good straw strength. Developed at the University of Wisconsin from crosses involving Barbless, Pillsbury, and Composite cross Selection 12.

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

Husky—Six-rowed, smooth-awned, white aleurone feed variety. Rather late maturing; of medium height, with good straw strength. Originated at Saskatoon, Saskatchewan, from a cross involving Peatland, Regal, O.A.C. 21, and Newal.

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

Table 3. 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	Plant height (inches)	Lodging score†	Weight of 1000 kernels (grams)	Weight per bushel (pounds)
Barbless	6-27	35.8	3.0	30.7	43.5
Mars	6-23	30.8	1.1	27.5	46.5
Kindred	6-25	33.6	3.2	30.9	45.1
Vantage	6-27	32.6	1.2	31.7	45.3
Forrest	6-26	34.7	1.9	31.2	46.5
Trall	6-25	31.8	2.0	31.0	46.1
Parkland	6-26	34.9	1.7	30.4	45.9
Liberty	6-26	31.4	1.5	30.4	45.3
Peatland	6-26	35.9	1.7	29.3	47.2
Herta	6-28	30.1	1.8	32.0	49.7

* For the same years and stations as in table 1 except for lodging (6 stations only).

† 1 indicates excellent standing ability, 5 very poor standing ability.

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 Agriculture Experiment Station.

Montcalm—Six-rowed, smooth-awned, blue aleurone variety. 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.

Moore—Six-rowed, smooth-awned, white aleurone feed variety. Late in maturity; moderately stiff straw. 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. Has rough awns and

weak straw. 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. 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.

U.M. 570—Six-rowed, smooth-awned mixture of blue and white aleurone kernels. Good straw. Medium late. Not acceptable as malting variety in Canada or the United States. Developed at the University of Manitoba from the cross (Peatland x Newal) x Montcalm. Never officially released but now grown on considerable acreage in North Dakota and Minnesota.

Vantmore—Six-rowed, smooth-awned, white aleurone feed barley. Medium in maturity and plant height, with good straw strength. Developed at Brandon, Manitoba, from Titan x Vantage. Similar in performance to Vantage.

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

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 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; has some tolerance to crown rust. Also resistant to the smuts.

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 height and maturity. Somewhat higher in yield than Andrew and superior to it in straw strength, grain size, and test weight. Resistant to all races of

stem rust found in this area, including 7A, all races of crown rust prevalent in this region, and smuts.

Minton—High-yielding, yellow oat developed at the Minnesota Agricultural Experiment Station from the cross [(Landhafer x (Mindó 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, and to all races of crown rust prevalent in this 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 59² x Landhafer)⁴ x (Clinton-Boone-Cartier x RL 2105)]. Early, yellow oat of large seed and high test weight. Medium in yield and maturity; good in lodging resistance. Resistant to smuts, to all races of stem rust found in this area except 7A, and to all crown rust races prevalent in this region.

Fundy—Tall, medium-maturing, high yielding. Yellowish-white, large grain of medium 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.

Goodfield—Early in maturity, good in yield, and high in test weight. Short straw with very good lodging resistance. Resistant to smuts, to all races of stem rust found in this area including 7A, and to all crown rust races prevalent in the region. Developed at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria).

Macon—Early, good-yielding oat. Medium in plant height, test weight, and straw strength. Resistant to smuts and races 7 and 7A of stem rust, and also somewhat tolerant to crown rust in the field. Developed at the Missouri Agricultural Experiment Station from the cross Columbia x Marion.

Nehawka—A re-selection from the Cherokee oat made at the Nebraska Agricul-

tural Experiment Station. Early, good yielding oat with large seed and high bushel weight. Short-strawed and medium in standing ability. Resistant to smuts, races 7 and 7A of stem rust; but susceptible to crown rust.

Vicar—High yielding, hull-less oat developed at the Cereal Breeding Laboratory in Winnipeg, Canada, from a hull-less plant selected in Garry oat field by G. McVicar of Manitoba. Tall, good-strawed, late variety, with the same disease resistance as Garry.

VARIETIES NOT RECOMMENDED

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

Beedee—Developed from Beacon x Hawkeye-Victoria by the Wisconsin Agricultural Experiment Station. Medium in maturity, height, and lodging resistance. Large brownish-white grain of medium test weight. Resistant to races 7 and 7A of stem rust and smuts; susceptible to stem rust race 8 and moderately susceptible to crown rust.

Bentland—Medium in plant height, maturity, seed size, and test weight. Resistant to all races of crown rust prevalent in the region, race 8 of stem rust, and smuts. Susceptible to races 7 and 7A of stem rust. Selected from a cross of Benton x Landhafer backcrossed to Benton six times at the Indiana Agricultural Experiment Station.

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. Hull percentage is relatively high. 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 Wisconsin from the cross (Forward x Victoria-Richland) x Forward.

Cherokee—Early and short, fair in test weight. Inferior to recommended varieties in yield. Susceptible to crown rust and races 7 and 7A of stem rust; resistant to race 8. Selected from a cross of D69 x

Table 4. Average yields of Oats

Variety	Years of trial	Rosemount	Waseca	Morris	Crookston	Grand Rapids	Duluth	Northern Minnesota	Southwestern Minnesota	Adjusted grand average
						(bushels per acre)				
Gopher	1956-58	68.7	95.0	88.0	71.2	74.1	79.9	92.5	48.3	77.2
Bonda	1956-58	59.9	82.0	73.4	59.4	59.6	64.7	65.6	38.5	62.9
Andrew	1956-58	63.7	96.9	74.7	68.1	65.9	78.0	84.6	41.7	71.7
Ajax	1956-58	72.3	106.1	92.3	74.1	91.7	81.8	101.8	49.3	83.7
Branch	1956-58	72.5	102.9	86.8	78.2	89.3	83.1	103.9	52.0	83.6
Sauk	1956-58	76.5	110.3	91.6	69.1	84.9	85.2	107.0	48.0	84.1
⊗ Rodney	1956-58	70.4	106.8	95.3	76.0	94.6	86.2	107.2	52.6	86.1
Garry	1956-58	74.3	111.9	98.9	76.7	95.6	94.4	107.2	50.4	88.7
Minland	1956-58	61.4	92.8	77.8	58.8	65.4	75.4	82.7	46.0	70.0
Simcoe	1956-58	77.3	105.6	87.5	78.2	94.7	86.0	95.4	45.4	83.8
Minhafer	1956-58	62.6	97.2	72.7	54.0	66.3	76.4	71.7	43.9	68.1
Minton	1956-58	85.1	117.3	91.0	72.2	91.8	87.1	113.7	55.0	89.2
Burnett	1957-58	61.3	111.4	84.0	69.7	84.7	92.5	91.6	44.0	79.9
Vicar*	1957-58	60.2	111.5	91.7	67.6	102.4	88.1	130.0	47.2	87.3
Fundy	1958	67.6	106.8	89.8	70.4	95.9	101.9	104.7	53.2	86.3
L.S.D. (5%) †		5.9	8.1	8.5	7.9	9.1	11.8	14.1	5.9	3.3

* Vicar is hull-less so its actual yield was multiplied by 10/7 to give a yield comparable to the other varieties.

† Applies only to comparisons between varieties grown for the entire period.

Bond and increased in Iowa and Kansas. Also grown under the names Ames No. 2, McCarthy, or 3846.

Clarion—Medium-tall and medium-maturing with large, yellow seed of high test weight. Resistant to races 7 and 7A 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.

Clintland—Good-yielding yellow oat of high test weight. Medium in plant height and maturity. Resistant to stem rust race 8 and to all races of crown rust 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 all races of crown rust prevalent in the region, to races 7 and 7A of stem rust, and to smuts; susceptible to stem rust race 8.

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.

Jackson—Developed from a cross of Clinton x Marion by the Michigan Agricultural Experiment Station. Resistant to races 7 and 7A of stem rust and smuts; susceptible to stem rust race 8 and crown rust. Somewhat lower in yield than the

recommended varieties. Medium in height and maturity, with good standing ability.

Logan—Selected at the Illinois Agricultural Experiment Station from Benton x Marion. Early, brownish-yellow oat. Medium in plant height, straw strength, and test weight. Resistant to races 7 and 7A of stem rust and smuts; susceptible to crown rust and race 8 of stem rust.

Minland—Developed at the Minnesota Agricultural Experiment Station from a cross of Landhafer x (Mindoo x Hajira-Joanette). Resistant to all races of crown rust prevalent in the region, all races of stem rust found in this area except 7A, and 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 low.

Mo. O-205—Grayish-red oat, medium in yield, with good straw strength, low hull percentage, and high 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.

Nemaha—Almost identical to Cherokee; likewise inferior in yield to recommended varieties. 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 Experi-

Table 5. Average date of heading, plant height, weight per bushel, hull percentage, weight of 200 kernels, and standing ability for Oats

Variety	Date of heading	Plant height	Weight per bushel	Hull	Weight of 200 kernels	Standing ability*
		(inches)	(pounds)	(percent)	(grams)	
Gopher	June 27	38	33.8	28.5	4.9	1.8
Bonda	June 24	40	35.7	29.3	6.0	1.4
Andrew	June 22	38	35.3	25.8	5.4	1.5
Ajax	June 28	43	34.2	31.1	5.3	2.1
Branch	June 30	42	35.2	31.3	5.2	2.1
Scuk	June 28	40	34.1	29.5	5.7	1.7
Rodney	July 1	42	35.1	30.3	5.8	1.8
Garry	June 29	43	34.8	31.2	5.7	1.5
Minland	June 21	39	31.3	27.2	5.5	1.3
Simcoe	June 28	43	34.8	28.7	5.5	1.9
Minhafer	June 22	39	35.8	27.3	5.8	1.1
Minton	June 26	39	33.1	31.0	5.4	1.8
Burnett	June 24	38	36.4	26.8	5.8	1.7
Vicar	July 3	44	39.2	0.0	3.9	2.0
Fundy	June 26	42	33.6	27.8	5.8	1.6

* Standing ability rating: 1 — 5 (1 = excellent, 5 = very poor).

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

Putnam—Early, brownish-yellow oat of medium height. Good kernel size and test weight. Resistant to race 8 of stem rust and smuts; susceptible to races 7 and 7A of stem rust and crown rust. Selected from a cross of Boone-Cartier x Clinton at the Indiana Agricultural Experiment Station.

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.

Sauk—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.

Scottian—Tall, late, high-yielding, yellowish-white oat developed in Canada

from a cross of Erban x Vanguard. Resistant to races 7 and 7A of stem rust; susceptible to crown rust, smuts, and stem rust race 8.

Shield—Early, yellowish-white oat. Medium in plant height, seed size, and test weight. Resistant to races 7 and 7A of stem rust and the smuts; susceptible to race 8 and crown rust. Developed in Canada from a cross of [Roxton x (Victoria x Hajira-Banner)] x [Ajax x (Victoria x Hajira-Banner)].

Simcoe—Tall, medium maturing, and high yielding, with large yellowish-white seed of medium test weight. Resistant to races 7 and 7A of stem rust; susceptible to stem rust race 8, crown rust, and the smuts. Developed in Canada from a cross of Ajax x Erban.

Waubay—Medium in plant height and maturity, with large yellow seed of high test weight. Good lodging resistance. Somewhat lower in yield than the recommended varieties. Resistant to races 7 and 7A of stem rust and smuts, but susceptible to crown rust and race 8 of stem rust. Developed in South Dakota from a cross of Clinton x Marion.

WINTER RYE

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—High-yielding, fair in winter-hardiness, late-maturing, and medium in height. Good resistance to lodging. Medium-size seed, predominantly green in color, and medium in bushel weight. Seed increased from a small lot of seed obtained from the Canadian Department of Ag-

riculture in 1953. The Cereal Crops Division, Canadian Department of Agriculture, received its seed from Mr. Morck of Dickson, Alberta, who got the original seed in Denmark in 1946.

VARIETIES NOT ADEQUATELY TESTED

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 Hasselhorst, Germany. (This is a different variety than that licensed as Petkus in Canada.)

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.

Dominant—High yielding, fair in winter-hardiness, late-maturing, and medium in height. Good resistance to lodging. Me-

Table 6. Average adjusted yields of Winter Rye

Variety	St. Paul		Southwestern Minnesota		Morris		Grand Rapids		Adjusted Average
	Years of trial	Yield per acre	Years of trial	Yield per acre	Years of trial	Yield per acre	Years of trial	Yield per acre	Yield per acre
	<i>(bushels)</i>		<i>(bushels)</i>		<i>(bushels)</i>		<i>(bushels)</i>		<i>(bushels)</i>
Adams	1954-58	38.4	1955-58	27.6	1955-58	42.6	1955-58	52.6	40.3
Caribou	1954-58	37.7	1955-58	28.7	1955-58	42.8	1955-58	51.8	40.3
Elk	1954-58	39.9	1955-58	29.4	1955-58	47.5	1955-58	68.9	46.4
Emerald	1954-58	38.6	1955-58	27.9	1955-58	42.3	1955-58	41.5	37.6
Sangaste	1954, 56-58	35.7	1956-58	25.0	1956-58	39.5	1956,58	63.0	40.8
Petkus	1958	41.3	1958	31.3	1958	46.9	1958	68.3	47.0
L.S.D. at 5% point		2.5		3.5		5.1		5.6	2.2

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Table 7. Adjusted averages of Winter Rye varieties at four locations for winterkilling, date mature, plant height, lodging score, kernel weight, and bushel weight

Variety	Winterkilling	Date mature	Plant height	Lodging score*	Weight of 100 kernels	Bushel weight
	<i>(percent)</i>		<i>(inches)</i>		<i>(grams)</i>	<i>(pounds)</i>
Adams	6	July 19	50	1.8	2.6	54.7
Caribou	7	July 18	47	1.9	2.4	54.7
Elk	19	July 20	46	1.6	2.8	54.4
Emerald	6	July 18	49	1.9	2.4	54.3
Sangaste	11	July 22	53	1.7	2.7	53.5
Petkus		July 21	42	1.3	3.0	55.1

* Average of 8 trials in which some winterkilling occurred.

† 1.0 erect, 5.0 flat.

dium-size seed, predominantly green in color, and medium in bushel weight. Originated in Holland from a cross of Lochow's Short-Straw x Brandt's Marien.

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.

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

Sangaste—Medium in yield, winter-hardy, late-maturing, and very tall. Good resistance to lodging. High in fall forage

growth. Medium-size seed, mixed in color, and medium in bushel weight. Originated in Estonia; introduced into Canada by Rene Berg, grandson of original breeder.

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. Very late-maturing and very low in bushel weight. Seed is very large and uniformly greenish-gray in color. Excellent lodging resistance. 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.

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 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. High-yielding, with a good bushel weight; satisfactory milling and baking qualities. Selected from a cross of McMurachy-Exchange x Redman² 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. Moderately resistant to leaf rust, moderately susceptible to stem rust, and resistant to bunt and loose smut. Has a good yield and test weight; is satisfactory for use in making semolina products. Selected from a cross of Carleton x Ld. 194-Khapli x Ld 308) x Stewart made at the North Dakota Agricultural Experiment Station.

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.

VARIETIES NOT RECOMMENDED BREAD

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

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

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-Florence) 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.

Table 8. Average adjusted yields of Spring Wheat

Variety	Years of trial	Rosemount	Waseca	Southwest	Morris	Crookston	Average Morris and Crookston	Grand Rapids	Duluth	Northern Minnesota
<i>Bread Wheats</i>										
Thatcher	1953-58	17.6	24.9	14.0	26.4	29.2	27.8			
Lee	1953-58	22.9	33.2	18.6	32.6	31.6	32.1	29.3	28.3	23.4
Selkirk	1953-58	30.1	36.8	24.6	40.3	37.8	39.1	33.5	33.8	33.9
Conley	1955-58	21.3	30.5	19.1	33.4	32.2	32.8	29.0	33.0	30.7
Russell	1956-58	26.7	33.6	21.4	36.2	35.3	35.8	34.6	33.1	39.1
<i>Durums</i>										
Mindum	1953-58	18.0			26.2	29.3	27.8			
Ramsey	1955-58	25.5			33.5	32.3	32.9			
Langdon	1955-58	25.3			37.1	38.9	38.0			
L.S.D. (5%)	1953-58	2.1	1.9	1.4	2.0	4.1	2.3	2.6	2.4	
	1958	4.2	4.1	2.7	6.9	6.5	4.7	10.7	9.4	6.9

Table 9. Adjusted averages for Spring Wheat varieties for date of heading, plant height and weight per bushel

Variety	Years used in average	Date of heading	Height (inches)	Bushel weight (pounds)
<i>Bread Wheats</i>				
Thatcher	1953-58	June 24	36	53.1
Lee	1953-58	June 23	35	55.8
Selkirk	1953-58	June 25	36	55.8
Conley	1955-58	June 28	38	54.8
Russell	1956-58	June 26	42	55.2
<i>Durums</i>				
Mindum	1953-58	June 29	46	54.3
Ramsey	1955-58	June 27	42	56.6
Langdon	1955-58	June 26	41	56.7

Selected from a cross of Rival x Thatcher by the South Dakota Agricultural Experiment Station.

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

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. Weaker strawed than Carleton; excellent in quality for semolina products. Resulted from a durum type selected from a common bread wheat field at the Minnesota Agricultural 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. Preliminary tests show it to be satisfactory for use in making semolina products.

Stewart—Bearded and amber-kerneled. Resistant to leaf rust, bunt and loose smut; susceptible to scab and stem rust. Weaker strawed than Carleton. Equal to Mindum in quality for semolina products. Selected from a Mindum² x Vernal Emmer cross made by the U.S. Department of Agriculture in cooperation with the North Dakota Experiment Station.

Towner—Bearded, late-maturing, tall with slightly weak straw. Resistant to leaf rust, and bunt and moderately resistant to stem rust. 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 test. Selected from a cross of Ld. 194-Khapli x Ld. 308; developed at the North Dakota Experiment Station.

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 Agricultural Experiment Station.

VARIETIES NOT ADEQUATELY TESTED

Racine—Soft, bearded variety somewhat taller and earlier than Minter and stiffer strawed. Susceptible to stem rust and moderately susceptible to leaf rust. High-

er 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 Agricultural Experiment Station.

VARIETIES NOT RECOMMENDED

Blackhawk—Bearded variety of good quality. Susceptible to stem rust and resistant to leaf rust. Less winter-hardy than Minter; yields less when winter injury is severe. A selection from a Fultz x Minturki cross developed by the Wisconsin Agricultural 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, 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 adjusted yields of Winter Wheat

Variety	Years of trial*	St. Paul	Waseca	Grand Rapids	Average three locations	Years of trial*	Southwestern Minnesota
(bushels per acre)							
Minturki	1953-58	29.8	27.8	23.4	27.0	1953-58	10.7
Minter	1953-58	31.8	32.2	27.8	30.6	1953-58	14.0
Blackhawk	1953-58	30.7	32.0	31.9	31.5	1953-57	11.7
Racine	1957-58	38.9	38.9	38.4	38.7	1957	8.8

* No trials conducted in 1955. Crops failed at St. Paul and Waseca in 1954.

Table 11. Adjusted averages for Winter Wheat varieties for date of heading, plant height, winter injury and weight per bushel

Variety	Date headed	Height	Winter injury	Bushel weight
		(inches)	(percent)	(pounds)
Minturki	June 19	39	21	58.4
Minter	June 18	38	18	60.2
Blackhawk	June 18	40	19	58.8
Racine	June 17	42	24	58.2

FLAX

The flax trials are sown as soon as the danger of killing frost is past. 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 as 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

Arny — Brown-seeded, blue-flowered late-maturing variety. From a cross of Crystal x Redson made at the Minnesota Agricultural Experiment Station. Immunity to races of rust found in Minnesota is conditioned by a different gene than is present in the other recommended late-maturing varieties; highly resistant to wilt and moderately resistant to pasmo; resistant to lodging. Good oil content of good quality. For best results it should be sown early.

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.

Bolley — Brown-seeded, blue-flowered medium-early maturity. Originated from a cross of two experimental varieties at the North Dakota Agricultural Experiment Station. Immune to races of rust found in Minnesota; moderately wilt resistant; and moderately susceptible to pasmo. Good yields in field trials; excellent oil content of excellent quality. It is expected this variety will be superior to B5128 or Redwood for late sowing.

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 made in 1941 of B5128 x Redson at the Minnesota Agricultural Experiment Station. 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.

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,

Table 12. Average adjusted yields of Flax

Variety	Rosemount		Waseca		Morris		Crookston		Grand Rapids		Northern Minnesota		Southwestern Minnesota	
	Number of trials	Yield per acre	Number of trials	Yield per acre	Number of trials	Yield per acre	Number of trials	Yield per acre	Number of trials	Yield per acre	Number of trials	Yield per acre	Number of trials	Yield per acre
		(bushels)		(bushels)		(bushels)		(bushels)		(bushels)		(bushels)		(bushels)
Bison	7	15.0	7	18.6	10	19.5	7	15.2	8	11.1	7	14.5	10	15.1
B-5128	8	16.8	7	22.2	10	20.6	7	15.8	7	12.6	7	18.3	10	17.7
Redwood	8	18.0	7	23.2	10	22.3	7	15.4	8	13.4	7	18.7	10	17.2
Marine	8	16.1	7	19.7	10	20.8	7	13.5	8	13.0	7	16.9	10	15.9
Bolley	4	16.6	3	20.0	4	22.7	2	15.2	2	12.4	3	17.3	4	16.4
Army	3	15.8	2	19.7	3	21.2	2	14.8	1	11.7	2	22.6	3	15.4
L.S.D. at 5% point		2.8		1.0		0.8		1.3		1.1		2.3		2.7

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Table 13. Average of Flax varieties for date ripe, plant weight, weight per 1,000 seeds, oil content and iodine value

Variety	Date ripe	Plant height	Weight of 1,000 seeds	Oil content	Iodine value
		(inches)	(grams)	(percent)	
Bison	August 16	25	5.9	39.4	176
B-5128	August 22	26	6.5	39.5	179
Redwood	August 18	24	5.7	39.4	182
Marine	August 14	23	5.4	38.7	187
Bolley	August 18	24	6.0	40.1	190
Army	August 20	27	6.0	39.2	184

with yellow seeds of medium size. Flowers 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 (Russia 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 backcross 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 it is moderately susceptible to wilt, very susceptible to pasmo. More uniform than Victory, but still contains some rust susceptible types.

Raja — Blue-flowered, brown-seeded, early-maturing. Seeds larger than Redwood or Bison. Moderately short straw when sown early; moderately tall when sown late. Resistant to rust, moderately susceptible to wilt; susceptible to pasmo. While it is slightly earlier than Marine,

it has not been as dependable in producing a good yield. Oil content and quality are both low.

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. The 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 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, previously described.

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 14 are replicated three-row plots, which are 16 feet in length. At Crookston and 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. These plots have been in use at Waseca since 1954, at Morris since 1955, and at Crookston since 1957.

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 and Northern Minnesota.

Capital — High-yielding, medium in height, with a distinct tendency to lodge. Small seeds, dull yellow with light-brown seed scars. Good 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, but particularly for the central zone.

Chippewa—Superior in yielding ability, medium tall, very good resistance to lodg-

ing. 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 the cross of Lincoln x (Lincoln x Richland). Averages 3 or 4 days later than Capital in maturity. 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 Experimental 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 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 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.

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

Table 14. Average yields of Soybeans (quantities are in bushels per acre)

Variety	Small plots									Large plots			
	Southern locations					Northern locations				1957-58 Waseca		1957-58 Morris	1957-58 Crook- ston
	Years of trial	Blue Earth	Rose- mount	South- western Minnesota	Average three locations	Years of trial	Crook- ston	Grand Rapids	Average two locations	Early* planting	Late† planting		
Acme	1956-58	.....	.....	20.3	.....	1956-58	29.2	33.2	31.2	.....	20.1	23.3	11.2
Blackhawk	1953-58	34.4	35.1	26.2	31.9	.....	.....	.....	.....	35.2	.....	.....	.....
Capital	1953-58	34.5	37.8	28.0	33.4	.....	.....	.....	.....	.....	.....	32.9	.....
Chippewa	1953-58	38.2	36.8	29.0	34.6	.....	.....	.....	.....	36.0	.....	32.6	.....
Comet	1956-58	31.5	36.9	25.6	31.3	1956-58	22.9	21.2	22.0	27.8	24.2	29.6	.....
Crest	1958	.....	35.2	22.8	.....	1958	25.3	32.9	29.1	.....	.....	20.6	10.2
Flambeau	1953-58	.....	31.5	22.7	.....	1956-58	28.2	27.1	27.6	.....	23.1	28.1	12.0
Grant	1953-58	34.6	38.3	28.5	33.8	.....	.....	.....	.....	.....	.....	31.3	.....
Harosoy	1953-58	35.7	36.8	28.6	33.7	.....	.....	.....	.....	35.6	.....	.....	.....
Lindarin	1958	33.0	.....	27.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norchief	1953-58	.....	36.4	27.4	.....	1956-58	27.7	25.9	26.8	.....	23.9	31.7	13.2
Ottawa Mandarin	1953-58	32.3	36.5	25.9	31.6	.....	.....	.....	.....	30.5	24.4	30.7	.....
Renville	1953-58	33.5	34.8	27.1	31.8	.....	.....	.....	.....	.....	.....	.....	.....
L.S.D. at 5% point		1.9	1.8	1.5	1.0		2.4	2.8	1.9	2.4	5.7	2.8	.....

* Last week of May.

† First days of July.

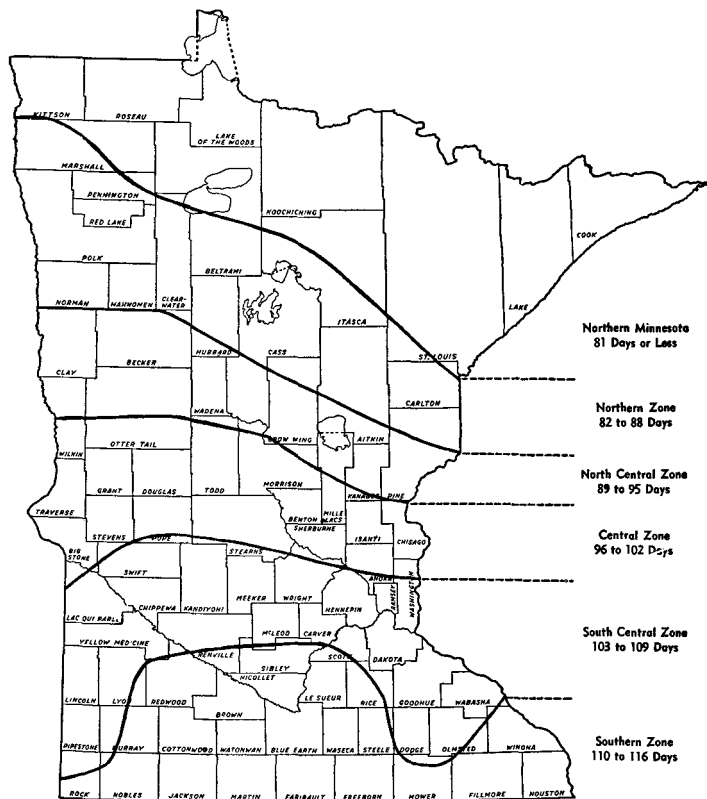
of Hawkeye x Flambeau. Matures a few days later than Flambeau, but several days earlier than Ottawa Mandarin; hence recommended for Central and North Central Corn Maturity Zones, and about southern one-half of the Northern Zone.

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 ADEQUATELY TESTED

Crest—A selection from a cross of ND 8-291 x Mandarin made at the University of Manitoba. In limited testing has averaged 1 or 2 days later and 4 or 5 inches taller than Acme and has similar oil content and standing ability. Yields have averaged slightly lower than Acme.

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



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.

Table 15. Averages of Soybean varieties for date of maturity, plant height, lodging score, and weight per 100 seeds at three southern locations and for protein content and oil content at Waseca, Morris, and Crookston

Variety	Blue Earth, Rosemount and Southwestern Minnesota*				Waseca†		Morris†		Crookston†	
	Date mature	Plant height	Lodging score‡	Weight per 100 seeds	Protein	Oil	Protein	Oil	Protein	Oil
		(inches)		(grams)	(percent)		(percent)		(percent)	
Acme	8-31	25	1.4	18.4	.....	.....	37.6	22.2	40.4	19.6
Blackhawk	9-25	37	2.6	16.1	40.7	20.5	38.4	20.9	.....	.....
Capital	9-15	33	2.9	13.1	40.9	20.2	39.1	21.0	.....	.....
Chippewa	9-18	36	1.9	15.4	40.9	20.8	38.9	20.9	.....	.....
Comet	9-9	33	1.7	16.6	40.0	21.1	37.6	20.7	40.0	19.3
Crest	9-1	30	1.2	20.4	.....	.....	.....	.....	.....	.....
Flambeau	9-3	30	2.7	16.1	.....	.....	39.8	19.8	41.2	18.8
Grant	9-15	32	2.3	16.5	40.4	20.9	37.8	21.1	.....	.....
Harosoy	9-29	40	3.0	18.4	41.4	20.2	40.0	19.7	.....	.....
Lindarin	9-25	33	2.0	16.2	.....	.....	.....	.....	.....	.....
Norchief	9-10	30	2.1	16.3	41.6	20.8	38.7	21.4	40.7	19.5
Ottawa Mandarin	9-13	29	1.7	19.6	41.9	20.2	39.6	20.6	.....	.....
Renville	9-18	33	1.8	18.0	40.3	21.5	38.7	21.7	.....	.....

* For the same years as indicated in table 14.

† For the years 1954-57.

‡ Lodging score of 1, all plants erect; 5, all plants entirely lodged.

Harosoy but has shorter plant height and better standing ability. In two years of testing at Waseca has yielded less than Harosoy. Tested only one year at other locations.

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.

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 and to a Canadian cooperative which processes sunflower seed 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. 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.

VARIETIES NOT RECOMMENDED

Advance—Medium in yield and maturity and stands well for combining. Seed is

small, low in hull and high in oil content and bushel weight. Plant grows about 4½ feet tall and matures about same time as early soybean varieties. Is a topcross hybrid released about 1945 by the Experimental Farms Service in Canada and is 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 seed every year just as they do with hybrid corn.

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

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

Greystripe and Manchurian varieties are very tall and too late-maturing for commercial production in Minnesota.

Mennonite—High-yielding. 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 16. Average adjusted yields of Sunflower Seed

Variety	Crookston		Southwestern Minnesota		Rosemount		Average
	Years of trial	Yield per acre	Years of trial	Yield per acre	Years of trial	Yield per acre	Yield per acre
		(pounds)		(pounds)		(pounds)	
Arrowhead	1948-58	1,383	1951-58	1,069	1953-58	1,171	1,208
Advance	1948-58	1,015	1951-58	1,043	1953-58	813	957
Beacon	1954-58	588	1954-58	957	1954-58	925	823
Mennonite	1953-58	1,158	1953-58	961	1954-58	1,053	1,057
L.S.D. at 5% point		90		137		169	78

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Table 17. Adjusted averages of Sunflower varieties at three locations for date flowering, plant height, head diameter, shattering loss, kernel weight, oil content, hull percentage, and bushel weight

Variety	Date flowering	Plant height	Head diameter	Shattering loss	Weight of 100 kernels*	Oil†	Hull*	Bushel weight
		(inches)		(percent)	(grams)	(percent)		(pounds)
Arrowhead	July 25	62	5.4	3	7.9	29.4	43.0	28.5
Advance	July 30	56	6.2	4	6.6	30.5	41.8	28.1
Beacon	August 1	69	6.2	5	5.4	28.3	45.7	31.3
Mennonite	July 29	66	5.7	1	8.6	25.8	47.5	25.0

* 1958 data not included.

† Dry matter basis. 1958 not included.

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 leaf spot diseases.

Vernal — Developed at the Wisconsin Agriculture Experiment Station, released in 1953. More wilt-resistant, winter-hardy, and yields more forage than any other variety. Susceptible to leaf spot diseases.

VARIETIES NOT ADEQUATELY TESTED

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

Teton—Developed by South Dakota Agricultural Experiment Station. Winter-hardy, wilt-resistant. Slow recovery.

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 considered 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—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.

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.

Table 18. Forage yields, stand readings, and winterkilling for ten varieties of Alfalfa grown on wilt-infested soil at Rosemount, Minnesota

Variety					Stand*		Winter killing† 1955-56
	1954	1955	1956	Three-year average	1954	1956	
	(tons per acre)	(tons per acre)	(tons per acre)	(tons per acre)	(percent)	(percent)	(percent)
Ladak	4.06	5.01	4.00	4.36	70	44	24.8
Narragansett	4.26	5.19	3.65	4.37	85	47	37.3
Ranger	3.97	5.13	4.02	4.37	79	68	24.4
Vernal	4.45	5.47	4.66	4.86	73	69	16.5
Atlantic	4.09	5.30	3.37	4.25	83	43	29.7
Buffalo	3.98	5.14	3.44	4.19	80	57	42.0
DuPuits	4.09	5.18	0.51	3.26	80	6	64.2
Grimm	3.73	4.78	3.00	3.84	82	41	20.0
Rhizoma	4.08	4.72	3.00	3.93	84	42	23.3
Socheville	4.17	5.30	0.78	3.42	81	11	63.0
L.S.D. at 5% point	0.38	0.37	0.92	0.34			

* Based on visual estimates of stand.

† Based on actual plant counts. Winterkilling occurred during 1955-56 winter.

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 Minne-

sota 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 leafspot diseases. Removed from list of varieties recommended for short rotations because of inadequate seed supplies.

Nomad—Developed in Oregon from plants of an old stand that spread by underground stems. Not adapted in Minnesota.

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.

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

Socheville—Introduced from France. Very susceptible to bacterial wilt. Less winter-hardy than Ranger. Forage yields satisfactory when wilt and winter injury are not factors. Susceptible to leafspot diseases.

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

Table 19. Reaction to bacterial wilt and percent winterkilling for ten Alfalfa varieties

Variety	Reaction to bacterial wilt	Percent Winterkill	
		1956-57	1957-58
Vernal	Very resistant	12	3
Ranger	Resistant	18	5
Atlantic	Susceptible	*	10
Buffalo	Resistant	*	34
DuPuits	Susceptible	51	35
Grimm	Susceptible	*	2
Ladak	Moderately resistant	25	0
Narragansett	Susceptible	16	0
Rhizoma	Susceptible	24	0
Socheville	Susceptible	*	39

* These varieties were not included in this test.

Table 20. Average forage yields for eleven Alfalfa varieties when Bacterial Wilt did not influence yields

Variety	Crookston		Duluth	Grand Rapids		Morris	Rosemount		Waseca	
	1954-56	1957-58	1955-57	1954-57	1957-58	1954-56	1956-58	1957-58	1954-55	1956-58
	(tons per acre)									
Ranger	2.91	2.45	2.52	3.09	3.21	2.64	2.76	4.88	3.37	3.56
Vernal	3.01	2.41	3.17	3.27	3.62	3.17	3.06	5.24	4.07	3.80
Atlantic	3.03		2.73	2.89		2.61	2.80		3.77	3.21
Buffalo	2.38			2.86		2.45	2.94		3.03	3.16
DuPuits	3.22	2.49	3.16	3.07	3.32	2.61	2.88	4.63	3.84	3.36
Grimm	2.82		2.97	2.92		2.56	2.71		3.75	3.43
Ladack	2.91	2.52	2.75	2.94	3.11	2.47	2.97	4.33	3.56	3.53
Narragansett	2.94	2.24	3.08	3.25	3.42	2.63	3.12	4.75	3.84	3.74
Rhizoma	2.85	2.44	3.23	3.19	3.67	2.50	3.32	4.65	3.43	3.30
Socheville	3.04								3.43	
Lahontan		2.09			2.60			2.80		
L.S.D. at 5% point .....	.25	.22	.25	.19	.29	.31	.25	.29	.49	.28

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. In extreme northern Minnesota the recommended varieties can be

VARIETIES NOT RECOMMENDED

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

Table 21. Average forage and seed yields of Bromegrass varieties from Rosemount, Waseca, Morris, Crookston, and Grand Rapids—1951-57*

Variety	Forage yield (15 percent moisture)		
	First cutting	Second cutting	Seed yield
	(tons per acre)		(pounds per acre)
SOUTHERN TYPE			
Lincoln	1.76	1.16	168
Achenbach	1.74	1.17	131
Fischer	1.72	1.14	164
Elsberry	1.62	1.08	104
Lyon	1.74	1.19	124
Lancaster	1.74	1.20	179
NORTHERN TYPE			
Canadian Commercial	1.35	.90	153
Manchar	1.62	1.35	215
Mandan 404	1.47	1.26	.....
Homesteader	1.61	1.10	142

* 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 2 of the 6 years. Twenty-two first cuttings, 10 second cuttings, and 7 seed harvests are included.

expected to yield about 0.15 tons more than Canadian Commercial. In southern Minnesota the difference will be approximately 0.25 tons.

VARIETIES NOT ADEQUATELY TESTED

Saratoga—A bred variety from Cornell, the New York Agricultural Experiment Station. Only one year's data available in Minnesota.

Wisconsin 63 and Wisconsin 55—Numbered selections from the Wisconsin Agricultural Experiment Station at Madison. Only one year's data available in Minnesota.

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.

ADAPTATION CHANGE FROM NORTH TO SOUTH

As one moves south in the state, the relative advantage of southern varieties over northern increases. The change is continuous and therefore the difference in adaptation would not be expressed clearly by dividing the state into zones. This trend is best shown by data from a summary of uniform tests over the North Central group of states (table 22).

The Crookston station is in the 48°-49° range and Waseca is in the 44°-45° group. According to Canadian workers the same

trend continues northward, with both types about equal in the vicinity of Winnipeg and the northern types higher in yield as you go north from Winnipeg.

Table 22. Increase in forage yield of southern varieties of bromegrass in relation to northern varieties as influenced by latitude where tests were conducted

Latitude	Increase of Southern over Northern varieties T/Acre
48°-49°	0.15
46°-47°	0.13
44°-45°	0.24
42°-32°	0.43
40°-41°	0.45
37°-39°	0.69

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 Dollard 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

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 in regional tests. Limited Minnesota data indicate resistance to black stem, virus, and root rot.

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

VARIETIES NOT ADEQUATELY TESTED

Wisconsin Synthetic—A variety bred at the Wisconsin Agricultural Experiment Station. A good yielder, and has resistance to northern anthracnose, stemphylium, and mildew. There is a possibility that this variety will be named and released by the Wisconsin Station.

VARIETIES NOT RECOMMENDED

Altaswede—Late, single-cut type developed by the Alberta, Canada, Agricultural Experiment Station. Despite claims made

Table 23. Average forage and seed yields of Red Clover varieties at all Minnesota experiment stations, 1945-58*

Variety	Forage yield (15 percent) moisture	Seed yield
	(tons per acre)	(pounds per acre)
Wegener	2.49	119
Dollard	2.50	129
Minnesota Commercial	2.56	119

* The number of years at each station varied. There were 60 tests in all, each with 3 or 4 replications. Seed yield represents 7 harvests in 1955, 2 in 1957 and 4 in 1958.

Table 24. Average forage yield of Red Clover varieties in 1958

	Rosemount	Waseca	Morris	Crookston	Grand Rapids	State Average
			(tons per acre)			
Wisconsin Synthetic	3.42	2.09	3.85	0.55	3.19	2.62
Houston County	3.22	2.02	4.10	0.55	3.17	2.61
Wegener	3.44	1.99	3.96	0.55	3.03	2.59
Commercial	3.39	2.11	3.93	0.63	2.79	2.57
Dollard	3.16	1.86	3.67	0.47	3.60	2.55
Kenland	3.32	2.13	3.50	0.47	2.51	2.39
Stevens	2.88	2.06	3.34	0.35	2.74	2.27

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.

Kenland—Only variety of which large amounts of seed are commercial 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.

Midland—Has been dropped from the recommended list because breeders' seed is no longer available. However, registered and certified seed now on hand is satisfactory.

Table 25. Effect of grass mixtures on yield of Red Clover varieties in 1956 and 1958. Forage yield in tons per acre*

	Clover alone	Clover and timothy	Clover and brome
Morris 1956	1.43	1.40	1.42
Crookston 1956	1.97	1.71	2.08
Grand Rapids 1956	2.24	1.79	2.21
Duluth 1956	3.66	3.54	3.83
Rosemount 1958	3.18	3.14	3.45
Waseca	2.29	1.80	2.02
Morris 1958	3.78	3.65	3.84
Crookston 1958 .....	.33	.45	.56
Average	2.36	2.18	2.42

* In these tests the forage yield of the red clover-timothy mixture was significantly less than for the brome mixture or for the clover alone. All the varieties included in table 23 are averaged for this comparison.

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.

Chancellor and Dashaway are recommended because they have produced relatively large yields of seed that have met market requirements for edible peas, pigeon feed, and seed peas for forage production. Medium- to large-

seeded varieties are not as desirable for pigeon feed and the forage seed market, have not produced such consistently high quality seed, and have a higher cost of production. Medium to large seed is desired for commercial splitting.

RECOMMENDED VARIETIES

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

Dashaway—Very similar to Chancellor. Selected in 1914 from Golden Vine by F. J. Dash, a Saskatchewan farmer, and distributed by the University of Saskatchewan in 1922.

VARIETIES NOT ADEQUATELY TESTED

Strål—Medium in maturity and long vined. Cream-colored seed, medium in size, and high in bushel weight. 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—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.

Manitoulin—Low yielding, early maturing, long vined. Green colored seed, medium in size and bushel weight. Seed obtained from the Canadian Department of Agriculture. Originally selected from a good field on Manitoulin Island.

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

Table 26. 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	Bushel
					100 seeds	weight
		(bushels)			(grams)	(pounds)
Chancellor	1948-58	25.1	6-25	8-12	13.0	63.3
Dashaway	1948-58	24.4	6-26	8-14	13.1	63.5
First and Best	1948-52,54-58	25.0	6-16	8-10	17.4	62.9
O.A.C. 181	1953-58	26.0	6-18	8-14	16.9	63.2
Strål	1958-58	30.9	6-22	8-15	16.0	63.1
Alaska	1948-50,53,57-58	22.1	6-5	7-24	17.5	60.6
Manitoulin	1957-58	20.0	6-17	8-10	16.8	62.5
L.S.D. at 5% point		2.2				

CORN TRIALS

Information on corn is not included in this report. Comparative trials of experiment station and commercial corn varieties are now published annually in two bulletins of the Minnesota Agricultural Experiment Station:

Miscellaneous Report 20—MATURITY RATINGS FOR CORN HYBRIDS IN MINNESOTA, 1959-60.

Miscellaneous Report 28—1958 MINNESOTA HYBRID CORN PERFORMANCE TRIALS.

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.