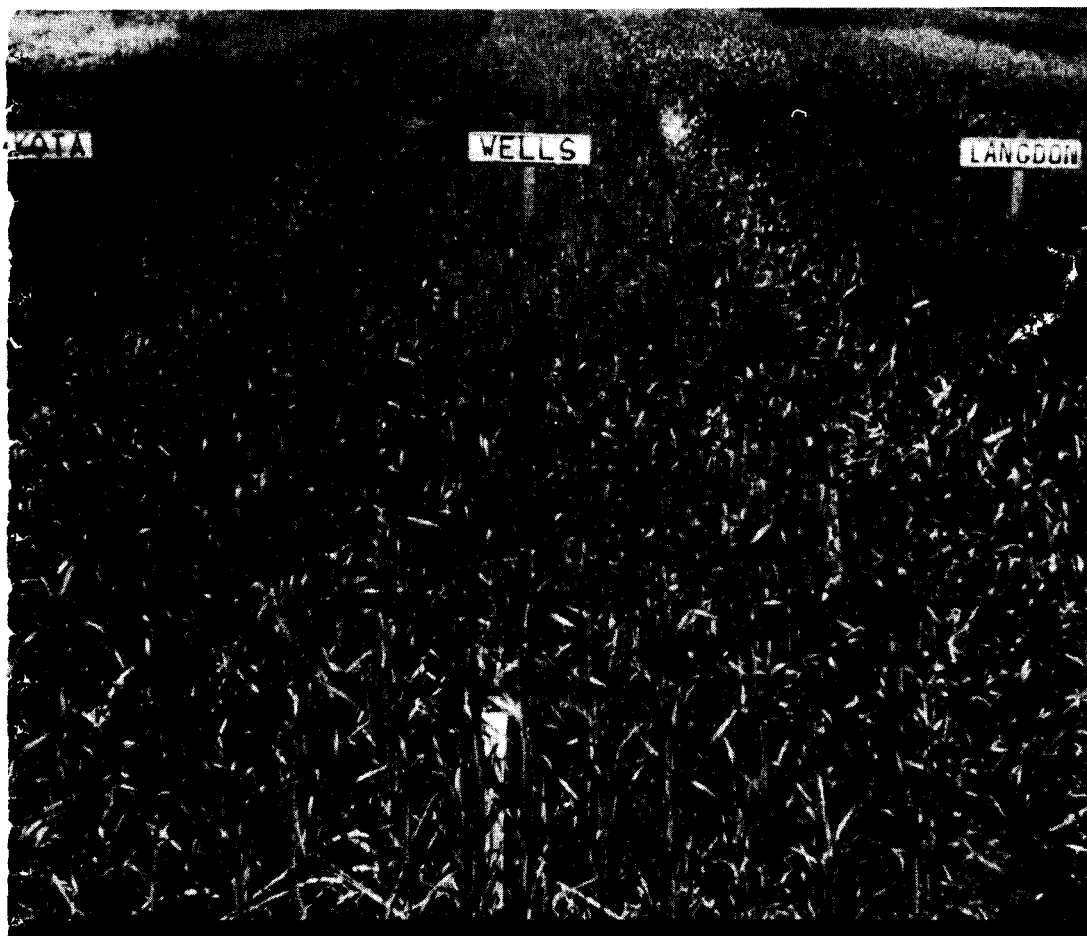


# Varietal Trials OF FARM CROPS



*Agricultural Experiment Station*

**UNIVERSITY OF MINNESOTA**

CONTENTS

INTRODUCTION . . . . . 2  
 BARLEY. D. C. Rasmusson . . . . . 3  
 OATS. R. A. Kleese. . . . . 4  
 WINTER RYE. R. G. Robinson, R. L. Thompson, and W. W. Nelson. . . . . 8  
 SPRING WHEAT. E. R. Ausemus, D. R. Johnston, and E. C. Gilmore Jr. . . . . 9  
 WINTER WHEAT. E. R. Ausemus, D. R. Johnston, and E. C. Gilmore Jr. . . . . 11  
 MILLET. R. G. Robinson. . . . . 12  
 FLAX. V. E. Comstock and J. H. Ford . . . . . 13  
 SOYBEANS. J. W. Lambert and R. L. Cooper. . . . . 15  
 SUNFLOWERS. R. G. Robinson and F. K. Johnson. . . . . 18  
 DRY, EDIBLE PEAS AND FIELD PEAS. R. G. Robinson and F. K. Johnson . . . . . 19  
 ALFALFA. L. J. Elling . . . . . 21  
 BIRDSFOOT TREFOIL. H. L. Thomas . . . . . 24  
 RED CLOVER. H. L. Thomas. . . . . 24  
 SWEET CLOVER. H. L. Thomas. . . . . 25  
 BROMEGRASS. H. L. Thomas. . . . . 25  
 KENTUCKY BLUEGRASS. H. L. Thomas. . . . . 27  
 SUDANGRASS. A. R. Schmid. . . . . 28  
 TIMOTHY. H. L. Thomas . . . . . 27  
 RATE AND DATE OF SOWING. . . . . 29

## Varietal Trials of Farm Crops

Many varieties of farm crops are available. Successful crop production depends to a considerable extent on the selection of the best varieties for a particular farm.

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

Recommended varieties, important old varieties, and promising new varieties are grown in replicated field plots at each location. These plots are handled so that the factors affecting yield and other characteristics are as nearly the same for all varieties at each location as is possible.

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

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

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

This report gives brief descriptions of varieties grown by Minnesota farmers in 1963, varieties tested in 1963 and varieties which may be introduced in the future. Yields and other agronomic data on varieties of barley, oats, rye, wheat, millet, flax, soybeans, sunflowers, field peas, alfalfa, birdsfoot trefoil, red clover, sweet clover, brome grass, Kentucky bluegrass, sudangrass, and timothy grown in field plot trials in 1963 are shown in tabular form.

Data of varieties which were not included in all trials averaged within a table have been adjusted so that averages of varieties tested for different numbers of years can be compared directly.\*

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

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

Recommended varieties have performed better than other varieties in important characteristics in comparative tests. A variety is not eligible for recommendation

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

until it has been tested in Minnesota for at least three years.

New varieties developed in other states or countries which are brought into the state for seed production or for use on farms before the three years of tests can be completed are listed as "not adequately tested." Information now available regarding these varieties is presented but no conclusions are drawn regarding their suitability under Minnesota conditions.

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

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

The use of certified seed of recommended varieties is recommended. Varieties eligible for certification by the Minnesota Crop Improvement Association include varieties recommended by the Minnesota Agricultural Experiment Station, certain new varieties not adequately tested in Minnesota, and certain non-recommended varieties that Minnesota seed growers wish to produce for export to other states. Certification does not imply recommendation of a variety.

Registered and certified seed of most of the good varieties described in this report can be purchased from seed dealers or from growers listed in the Minnesota Registered and Certified Seed Directory for 1964 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul 1, Minnesota or from county agricultural agents' offices.

## BARLEY

### RECOMMENDED VARIETIES

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

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

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

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

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

### OTHER VARIETIES

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

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

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

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.

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

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

Table 1. Average yields of barley varieties in bushels per acre, 1959-63\*

Variety	St. Rose- Paul	Rose- mount	Waseca	Lamber- ton	Morris	Crooks- ton	Grand Rapids	Du- luth	No. Minn.	Average 40 tests
Kindred	40	49	56	45	41	43	49	27	52	44
Larker	55	59	60	59	53	53	54	31	59	53
Parkland	53	55	57	51	51	52	53	35	57	51
Traill	54	55	61	52	51	49	55	34	62	51
Trophy	49	52	53	51	50	49	50	31	59	49
LSD (5%)	9	4	10	6	3	4	5	4	6	2

\*Morris and Crookston 8 tests; Lamberton, Rosemount, Duluth, and Grand Rapids 4; Waseca and St. Paul 3; Northern Minnesota 2.

Table 2. Average date heading, plant height, lodging score, and kernel plumpness for barley varieties, 1959-63

Variety*	Date of heading	Plant height inches	Lodging score	Percent plump kernels†
Kindred	June 25	33	5.2	38
Larker	25	33	4.0	64
Parkland	26	35	3.7	54
Traill	26	32	3.9	29
Trophy	25	31	3.8	53

\*All varieties resistant to stem rust, susceptible to spot blotch, septoria leaf blotch and loose smut.

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

## OATS

### RECOMMENDED VARIETIES

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

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

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

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

yellow dwarf. Medium in yield.

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

Goodfield - Developed at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Medium-early in maturity, medium in yield, high in test weight. Short straw with excellent lodging resistance. Recommended for planting where lodging is a serious problem.

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

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

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

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

Variety	Years		Rose- mount	Was- eca	Mor- ris	Lam- ber- ton	Crook- ston	Five Station Average	Grand Rapids	Du- luth	Seven Station Average
	of	trial									
<b>EARLY</b>											
Tonka	1961-63	78	69	51	51	51	51	60	-	-	-
Minhafer	1961-63	83	84	70	86	71	79	79	45	74	
Neal	1963	85	78	77		74	79	-	-	-	
Nodaway	1961-63	84	79	63	60	62	70	-	-	-	
Andrew	1961-63	79	83	60	75	70	73	82	39	70	
Bonkee	1962-63	72	73	65	68	72	70	-	-	-	
<b>MID-SEASON</b>											
Burnett	1961-63	83	79	72	71	66	74	88	52	73	
Dodge	1961-63	81	79	78	77	65	76	78	41	72	
Garland	1962-63	104	85	88	78	78	86	-	-	-	
Goodfield	1961-63	80	66	68	75	50	68	72	45	65	
Coachman	1963	77	72	61	-	68	70	-	-	-	
Ajax	1961-63	80	82	71	80	78	78	86	52	75	
Portage	1961-63	85	93	84	81	67	82	88	49	78	
Russell	1961-63	82	82	71	68	84	78	106	52	78	
Garry	1961-63	74	80	71	75	83	77	107	52	77	
<b>LATE</b>											
Lodi	1963	75	101	84	-	101	90	100	63	87	
Ortley	1963	73	74	62	-	70	70	89	52	70	
Au Sable	1963	70	81	66	-	64	70	82	56	70	
Rodney	1961-63	67	76	72	71	81	74	104	56	76	
LSD (5%)		7	11	8	15	16	5	8	6	4	

\*No 1963 data.

+No 1961 data.

VARIETIES NOT ADEQUATELY TESTED

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

Bonkee - Released from the Iowa Agricultural Experiment Station. Parentage is Bonham<sup>3</sup> x (Cherokee<sup>2</sup> x R.L.2105). White grain, medium-maturity, moderate straw strength. Medium in yield, good test weight.

Coachman - Mid-season, lodging susceptible and only fair in yield potential. Developed in Michigan from (Beaver-Garry-Clinton x Clintland) Marne<sup>2</sup>.

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

Lodi - Late, tall, lodging resistant and excellent yielding ability. Only moderately susceptible to crown rust. Developed in Wisconsin from (Richland-Bond) x (GarryxHawkeye-Victoria).

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

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

Table 4. Adjusted averages of oat varieties for date headed, lodging score, plant height, bushel weight and disease reaction

Variety	Date headed	Lodging score	Plant height	Bushel weight	Reaction to Diseases					
					stem	rust	race	Crown* rust	Smut*	
	June		inches	pounds	6,13	7	7A	8		
EARLY										
Tonka	20	4.0	34	31.6	S	R	R	S	S	R
Minhafer	21	4.5	38	32.0	R	R	R	R	S	R
Neal	21	4.4	33	29.5	S	R,S	R,S	R,S	S	R
Nodaway	21	4.8	36	30.5	S	R	R	R	S	R
Andrew	22	5.2	38	28.3	R	R	R	S	S	R
Bonkee	22	5.0	37	29.2	R	R	R	R	S	R
MID-SEASON										
Burnett	24	5.2	36	28.9	R	R	S	R	S	R
Dodge	24	4.4	38	32.0	R	R	R	R	MS	R
Garland	24	5.5	36	30.2	R	R	R	R	MS	R
Goodfield	24	4.0	32	32.3	R	R	R	R	S	R
Coachman	25	6.4	36	27.1	R	R	R	R	S	MR
Ajax	26	5.2	40	27.6	S	R	R	S	S	S
Portage	26	5.3	40	29.3	S	R	R	S	MR	R
Russell	26	5.6	38	26.6	R	R	R	R	S	R
Garry	27	5.0	40	25.8	R	R	R	R	S	R
LATE										
Lodi	29	4.1	42	26.9	R	R	R	R	MS	R
Ortley	29	6.4	40	27.1	R	R	R	R	S	MR
Au Sable	30	6.1	38	26.9	S	S	S	S	S	S
Rodney	30	6.1	41	26.3	R	R	S	R	S	R

\*MS - Moderately susceptible, MR - Moderately resistant.

#### OTHER VARIETIES

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

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

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

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

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

Clintonland 60 - Developed at the Indiana Agricultural Experiment Station from a series of backcrosses involving the parentage Clintonland<sup>2</sup> x [(Clinton 597 x Landhafer)<sup>4</sup>, x (Clinton-Boone-Cartier x RL 2105)]. Medium-early maturing, yellow oat of medium-size seed and high test weight. Medium in yield, good in lodging resistance.

Fayette - Early yellow oat; medium in height, standing ability and test weight. Selected from a cross of Vicland x (Branch x Clinton<sup>2</sup>-Santa-Fe) by the Wisconsin Agricultural Experiment Station.

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

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

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

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

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

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

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

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

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

Russell - Developed at the Central Experiment Farm in Canada from a cross of (Garry x Ukraine) x Abegweit<sup>2</sup>. Late, medium-tall, good yielding, yellowish-white oat with plump seed of good test weight. Poor in standing ability.

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

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

# WINTER RYE

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

## RECOMMENDED VARIETIES

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

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

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

Table 5. Adjusted average yields of winter rye varieties

Variety	Years of trial	Rosemount	Lamberton	Morris	Grand Rapids	Average four locations
			bushels per acre			
Adams	1958-63	42	38	34	68	46
Caribou	1958-63	39	40	36	71	47
Elk	1958-63	46	45	33	66	48
Pearl	1961-63*	50	43	35	67	49
Värne	1961-63	44	47	32	67	47
Guelzower	1962-63+	38	47	19	68	43
Petkus	1958-63	44	47	32	63	47
LSD (5%)		4	5	5	5	2

\*1960-63 at Rosemount.

+1961-63 at Rosemount.

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

Variety	Winter-killing*	Date heading	Date mature	Plant height	Lodging score	Weight of 100 seeds	Bushel weight
	percent		July	inches		grams	pounds
Adams	13	May 29	20	53	2.9	2.6	55.5
Caribou	5	May 30	19	49	3.2	2.4	55.7
Elk	38	June 1	21	48	2.9	2.8	55.5
Pearl	36	June 2	22	47	2.7	2.6	54.9
Värne	42	June 1	22	46	2.5	2.6	54.1
Guelzower	64	June 3	23	48	2.8	2.9	55.6
Petkus	49	June 3	23	44	1.6	2.9	56.0

\*Average of 12 trials in which winterkilling occurred (St. Paul 1959, Rosemount 1963, Lamberton 1959, 61, Morris 1959-63, Grand Rapids 1960-61, 63).

## VARIETIES NOT ADEQUATELY TESTED

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

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



## OTHER VARIETIES

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

Guelzower - Medium-yielding, poor winterhardiness, late maturity, and tall. Large seed, green in color, and high bushel weight. Originated in Germany. Seed obtained from Canada Department of Agriculture Experimental Farm, Swift Current, Saskatchewan.

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

## SPRING WHEAT

### RECOMMENDED VARIETIES

#### BREAD

Crim - Bearded variety of medium height, straw strength and maturity. Susceptible to loose smut and leaf rust but resistant to stem rust. Yield and test weight are good and quality is satisfactory. Selected from a cross of Klein Titan-Thatcher<sup>3</sup> x (Kenya 58-Newthatch x Thatcher<sup>2</sup>) at the Minnesota Agricultural Experiment Station.

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

Pembina - Awnless variety of medium height and maturity with good straw strength. Moderately resistant to leaf rust and stem rust. High yielding with a good test weight; satisfactory milling and baking qualities. Selected from a cross of Thatcher x (McMurachy-Exchange x Redman<sup>3</sup>) by the Canada Department of Agriculture, Research Station, Winnipeg, Manitoba.

Selkirk - Awnless variety of medium height and maturity with good straw strength. Moderately resistant to leaf rust and stem rust. High-yielding with a medium test weight; satisfactory milling and baking qualities. Selected from a cross of McMurachy-Exchange x Redman<sup>3</sup> made at the Canada Department of Agriculture, Research Station, Winnipeg, Manitoba.

#### DURUM

##### West Central and Northwestern Sections

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

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

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

Table 7. Average adjusted date heading, plant height, bushel weight and yield of spring wheat varieties, 1960-63

Class and variety	Date heading	Plant height	Bushel weight	Yield per acre				
				Rose-mount	Was-eca	Lamber-* ton	Morris	Crook-ston
	June	inches	pounds			bushels		
Hard Red Spring								
Crim	26	39	57.3	28	33	25	33	27
Justin	28	38	57.1	26	31	20	30	30
Pembina	26	36	57.0	27	37	25	34	29
Selkirk	26	37	55.7	28	38	24	35	30
Thatcher	26	37	56.4	19	28	16	27	30
Durum								
Lakota	26	38	57.0	34		27	41	35
Langdon	28	41	59.4	31		25	38	34
Wells	27	38	58.8	32		26	39	33
Mindum	29	46	60.5	26		26	35	34
LSD (5%)				2	3	3	2	4

\*Durums grown at Lamberton in 1962 and 1963 only.

#### OTHER VARIETIES

##### BREAD

Canthatch - Awnless variety, medium in maturity, height and straw strength. Susceptible to leaf rust and stem rust. Medium in yield with good test weight. Satisfactory milling and baking qualities. Selected from a cross of Thatcher<sup>6</sup> x Kenya Farmer, by the Canada Department of Agriculture, Research Station, Winnipeg, Manitoba.

Conley - Late-maturing, bearded variety of medium height and fair straw strength. Resistant to stem rust, susceptible to leaf rust. Seriously injured by glume and stem-blackening, reducing yield and bushel weight. Milling and baking qualities are satisfactory. Selected from a cross of [Thatcher x (McMurachy-Exchange x Redman<sup>2</sup>)] x Lee at the North Dakota Agricultural Experiment Station.

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

Lathrop - Bearded variety of medium height and maturity with good straw strength. Moderately resistant to leaf rust and stem rust. High yielding with good test weight but poor quality. Selected from a backcross Henry<sup>7</sup> x P.I. 94587 made at the Wisconsin Agricultural Experiment Station.

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

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

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

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

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

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

#### DURUM

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

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

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

## 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.

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

Variety	Years of trial	Date heading	Plant height	Winter injury	Bushel weight	Yield per acre			
						St. Paul	Waseca	Lam- berton	Grand Rapids
		June	inches	percent	pounds	bushels			
Minter	1961-63	14	42	11	61.7	24	37	34	28
Lancer	1963	10	34	38	59.4	8	33	--	--
Winalta	1962-63	14	38	20	59.6	24	31	33	23
Gaines	1963	--	--	100	----	0	0	--	--
Warrior	1961-63	10	36	22	56.6	25	27	--	--
Yogo	1961-63	14	42	4	56.0	20	23	--	--
LSD (5%)						5	4	4	5

### VARIETIES NOT ADEQUATELY TESTED

Lancer - Bearded variety of medium maturity and height with good straw strength. Susceptible to leaf rust and loose smut but resistant to stem rust. May not be sufficiently winterhardy. Selected from a cross of Turkey-Cheyenne x Hope-Cheyenne<sup>2</sup> at the Nebraska Agricultural Experiment Station.

Winalta - Limited information about its performance in this area. Selected from a cross of Minter x Wichita at the Canada Department of Agriculture Research Station, Lethbridge, Alberta. In Canadian tests it has satisfactory winterhardiness, straw-strength, yield and quality characteristics.

## OTHER VARIETIES

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

Gaines - A semi-dwarf club wheat developed at the Washington Agricultural Experiment Station. Completely winterkilled in Minnesota trials.

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

Nebred - Short, bearded variety of medium maturity, straw strength, yield and bushel weight. Winterhardiness is not satisfactory. Susceptible to leaf rust and stem rust. Quality is satisfactory. It was selected from Turkey at the Nebraska Agricultural Experiment Station.

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

Racine - Soft, bearded variety somewhat taller and earlier than Minter and stiffer strawed. Susceptible to stem rust and moderately susceptible to leaf rust. Higher yielding than Minter but not as 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.

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

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

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

## **MILLET**

Three types are adapted in Minnesota - proso, foxtail, and barnyard (Japanese). Proso varieties are grown for grain for bird or livestock feed. Foxtail varieties and Japanese are grown for silage or hay.

See Extension Bulletin 302 for more information.

## RECOMMENDED VARIETIES

Turohai - Proso. Very early maturity. Large, orange seed. Introduced from Russia by the U. S. Department of Agriculture in 1903.

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

White Wonder - Foxtail. Late maturity. Good lodging resistance. Reported to be less drouth resistant than other varieties but not observed in Minnesota. Small white or yellow seed. Too late for good seed production some years.

Table 9. Adjusted averages of millet varieties at Rosemount for seed yield, forage yield, date heading, height, lodging score, seed weight, and bushel weight, 1958-63

Varieties	Years of trial	Yield per acre		Forage protein percent	Date heading	Height inches	Lodging score	Weight of 100 seeds grams	Bushel weight pounds
		seed	forage*						
Turghai	4	2455	3348	15	Aug. 7	41	2.6	.59	54.0
Empire	5	1672	6070	11	Aug.24	46	4.9	.19	48.2
White Wonder	5	1466	6414	10	Sept.1	49	3.6	.24	43.0
German	4	594	6929	9	Sept.10	44	1.1	.15	40.0
LSD (5%)		238	412						

\*15% moisture basis.

#### OTHER VARIETIES

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

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

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

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

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

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

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

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

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

## FLAX

#### RECOMMENDED VARIETIES

Bolley - Developed at North Dakota Agricultural Experiment Station from cross of Birio x C.I. 1134. Immunity to rust conditioned by N1 gene; moderately wilt resistant; and moderately susceptible to pasmo; excellent oil content of excellent drying quality. Some evidence of greater susceptibility to aster yellows virus than other recommended varieties. Brown-seeded, blue-flowered, medium-early maturing. Superior to B5128 or Redwood for late-sowing.

B-5128 - From a cross of Golden x Rio made at North Dakota Agricultural Experiment Station. Immunity to rust conditioned by N1 gene; moderately susceptible to both wilt and pasmo. Good oil content of only fair drying quality. Contains a mixture of types, including a small percentage of both yellow-seeded plants and rust-susceptible plants. Brown-seeded, blue-flowered, late maturing. For best results it should be sown early.

Redwood - Originated from a cross of B-5128 x Redson at Minnesota Agricultural Experiment Station. Has N1 gene which conditions immunity to rust; moderately wilt resistant and moderately susceptible to pasmo; good oil content of good dry-

ing quality; straw of excellent fiber quality. Brown-seeded, blue-flowered, mid-late in maturity. Excellent yields in field trials, particularly when sown early.

Summit - To be released in 1964 by South Dakota Agricultural Experiment Station as selection from B-5128 x Zenith. Immunity to rust conditioned by N1 gene; resistant to wilt and moderately susceptible to pasmo; fair oil content of good drying quality, brown-seeded, blue-flowered, early in maturity. Excellent seed yields.

Window - Released in 1962 from Minnesota Agricultural Experiment Station from cross [Renew x Bison) (Koto x Redwing)] [Redwood]. Immunity to rust conditioned by N1 gene; resistant to wilt and moderately susceptible to pasmo; fair oil content of high drying quality, brown-seeded, blue-flowered, early in maturity. Excellent seed yield - whether sown early or late.

Table 10. Average of flax varieties for agronomic and disease characteristics and oil content and iodine value

Variety	Days from sowing to-			Plant ht.	Lodg-ing*	Pas-mo*	Wilt*	Rust+	Oil	
	First bloom	Full bloom	Matur-ity						con-tent	Iodine value
No. of trials	18	17	11	16	4	11	3		37	37
				inches					percent	
Bolley	54	59	103	22	3	5	3	R	39.0	187
B-5128	56	61	100	23	3	5	4	R	37.6	177
Redwood	55	60	104	22	5	6	2	R	37.5	179
Summit	54	60	102	22	3	5	2	R	36.9	180
Window	54	60	102	22	3	6	2	R	37.2	184
Arny	56	62	105	25	1	3	1	S	37.5	180
Bison	56	62	105	24	4	4	2	S	37.9	171
Marine 62	54	59	104	22	3	3	3	S	38.1	184

\*Rated on scale of 1 = best; 9 = poorest.

+R - resistant; S = susceptible to one or more North American races including the new race 300.

Table 11. Average yields of flax varieties in pounds per acre

Variety	Early sown			Late sown		
	Morris 1960-63	Crookston 1960-63	Lamberton 1960-63	Morris 1960, 62-63	Crookston 1960-63	Lamberton 1963
Bolley	1010	895	1105	845	930	670
B-5128	1070	1060	980	820	840	495
Redwood	1095	1115	960	970	975	500
Summit	1165	1195	1110	965	980	590
Window	1060	1180	1200	950	1040	610
Arny	1075	1015	1100	900	940	735
Bison	1065	1040	1060	750	910	620
Marine 62	1025	885	1135	880	950	545

#### OTHER VARIETIES

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

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

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

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

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

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

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

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

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

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

## 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 indicated 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 data from Grand Rapids and Blue Earth are based on replicated three-row plots, which are 16 feet in length. Harvesting is done with a small plot thresher.

At all other locations, large plots, four or six rows wide and 100 to 150 feet in length are used. Planting and cultivating are done with ordinary corn-soybean equipment. Harvesting is done with a standard combine.

At Grand Rapids rows are spaced 24 inches apart, but at all other locations 40 inch spacing is used.

### RECOMMENDED VARIETIES

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

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

Comet - A selection made at the Central Experiment Farm, Ottawa, Canada, from a cross of Pagoda x Mandarin. Has good combination of earliness, height of plant and of lowest pods, and resistance to lodging. Has yielded well as an early variety in the South Central and Southern 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 Zones.

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

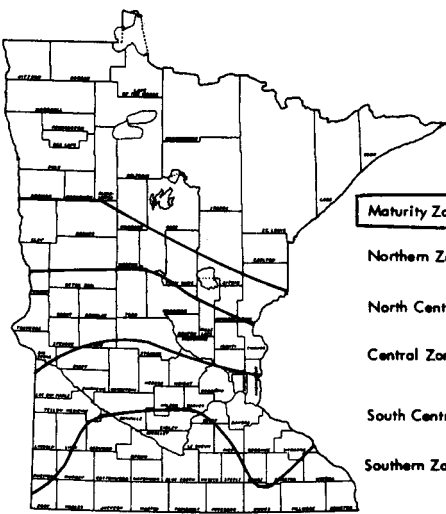
Harosoy - Medium-late selection from a backcross of Mandarin x (Mandarin x A.K.). Developed at the Dominion Experimental Farm, Harrow, Ontario. Good yields in southwestern Minnesota. Matures about 10 days later than Chippewa, so is recommended only in the Southern zone. Taller than Chippewa, and lodges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

Lindarin - A selection from a cross of Ottawa Mandarin x Lincoln made at the Purdue Agricultural Experiment Station. Similar in yield, maturity and oil content to Harosoy but has shorter plant height and better standing ability. Has buff seed scar and gray pubescence. Recommended in Southern zone.

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

Variety	Years of trial	Locations		Average
		Grand Rapids	Crookston	
<u>Very Early</u>				
Acme	1961-63	22.8	15.1	19.0
Flambeau	1961-63	26.0	17.1	21.6
Norchief	1961-63	21.8	18.8	20.3
Merit	1961-63	23.5	21.3	22.4
Comet	1961-63	18.8	18.5	18.6
<u>Early</u>		<u>Morris</u>	<u>Rosemount</u>	
Norchief	1961-63	27.9	27.2	27.6
Merit	1961-63	29.2	28.1	28.6
Comet	1961-63	26.5	24.5	25.5
Ottawa Mandarin	1962-63	28.6	28.7	28.6
Grant	1961-63	30.7	28.4	29.6
Chippewa	1961-63	31.2	28.4	29.8
A 100	1961-63	----	28.2	----
<u>Late</u>		<u>Waseca</u>	<u>Lamberton</u>	<u>Blue Earth</u>
Merit	1961-63	35.8	23.6	27.7
Chippewa	1961-63	39.1	28.8	35.7
A 100	1961-63	39.7	28.7	35.4
Lindarin	1961-63	38.4	31.6	31.3
Harosoy 63	1963	41.0	34.3	33.4
Harosoy	1961-63	38.4	32.9	32.1
Hawkeye	1963	40.0	29.4	30.4
Ford	1962-63	36.4	33.8	30.2





**Maturity Zones**

Northern Zone

North Central Zone

Central Zone

South Central Zone

Southern Zone

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

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

Ottawa Mandarin - Short and highly resistant to lodging. Fairly large yellow seeds with yellow seed scars. Pubescence is gray. Oil

content medium. Selected at the Central Experimental Farm, Ottawa, Canada, from the variety Mandarin. Recommended in areas of the state south of the Northern Zone.

VARIETIES NOT ADEQUATELY TESTED

A-100 - Medium late in maturity. Good standing ability. Medium height. Buff seed scars and gray pubescence. Selected by a Minnesota farmer.

Harosoy 63 - Similar to Harosoy in all respects except for the addition of Phytophthora root rot resistance. This variety was developed at the USDA Regional Soybean Laboratory in Urbana, Illinois, by using the backcross method. Phytophthora root rot is a serious disease in some areas of Ohio, Indiana, and Illinois and was found for the first time in Iowa last year.

Table 13. Adjusted averages of soybean varieties for date mature, lodging score, plant height, and protein and oil percentage

Variety	Date mature	Lodging score	Plant height inches	Protein* perçcentage	Oil* percentage
<u>Very Early (Grand Rapids and Crookston 1963)</u>					
Acme	9/9	1.2	25	41.2	19.0
Flambeau	9/16	2.8	30	40.7	18.0
Norchief	9/22	2.0	30	41.3	18.7
Merit	9/22	1.4	28	40.4	19.4
Comet	9/23	1.5	36	39.8	18.6
<u>Early (Morris and Rosemount 1961-63)</u>					
Norchief	9/18	2.6	28	41.2	20.0
Merit	9/18	2.4	31	40.4	20.8
Comet	9/19	2.4	30	39.9	20.0
Ott. Mandarin	9/24	2.2	28	42.1	19.1
Grant	9/24	3.0	30	40.2	19.7
Chippewa	9/26	2.6	32	40.7	20.1
A-100	10/5	2.3	33	42.1	19.6
<u>Late (Waseca, Lambertson, Blue Earth 1961-63)</u>					
Merit	9/14	2.6	36	40.9	20.8
Chippewa	9/20	2.4	37	41.3	19.9
A-100	10/1	2.6	37	39.9	20.8
Lindarin	10/2	3.0	38	40.7	19.6
Harosoy 63	10/2	3.6	43	40.4	19.6
Harosoy	10/2	3.4	42	40.2	19.9
Hawkeye	10/12	3.5	43	40.6	19.6
Ford	10/13	2.9	46	40.8	19.3

## OTHER VARIETIES

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

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

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

Hawkeye - Selected at Iowa Agricultural Experiment Station from a cross of Mukden x Richland. Ten days to two weeks later than Chippewa.

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

## **SUNFLOWERS**

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

See Minnesota Extension Bulletin 299 for more information.

### RECOMMENDED VARIETIES

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

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

### VARIETIES NOT ADEQUATELY TESTED

Admiral - Medium yield and maturity. About 5 feet tall. Small seed of medium oil content and high bushel weight. Rust-resistant three-way cross licensed in 1960 by Canada Department of Agriculture. Produced by crossing the inbred, S-37-388RR, with the single cross, QM5 x QM27. Seed harvested from the S-37-388RR rows in the crossing field is used for seed.

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

Russian high-oil varieties - Many have been tested. Most are medium in yield, late maturing, and tall. Susceptible to rust. Small dark seed of very high oil content. Should be grown only for the oilseed market. Four varieties - Donski 695, Peredovik, VNIIMK 65.40. and VNIIMK 89.31 - were increased in Canada in 1962-63.

Table 14. Adjusted average yields and large seed percentage of sunflower varieties

Variety	Years of trial	Yield per acre			Large seed*			
		Rosemount	Crookston	Average	Rosemount	Crookston	Average	
			pounds			percent		
Arrowhead	1958-63	1582	1693	1638	1	1	1	
Mingren	1958-63	1494	1676	1585	30	35	32	
Admiral	1960-63+	1150	1593	1371	0	0	0	
Mennonite	1958-63	1477	1480	1478	12	16	14	
Russian varieties for oil. Seed from Canada may be available for 1964 planting.								
Donski 695	1962-63‡	1508	1428	1468	0	0	0	
Peredovik	1962-63	1350	1313	1331	0	0	0	
VNIIMK 65.40	1962-63‡	1231	1524	1377	0	0	0	
VNIIMK 89.31	1963	1391	1597	1494	0	0	0	
LSD (5%)		127	180	110				

\*held on 20 round hole screen. †1961-63 at Crookston. ‡1963 at Crookston.

64

Table 15. Adjusted averages of sunflower varieties at Rosemount and Crookston for date flowering, height, seed weight, oil content, and bushel weight

Variety	Date flowering	Plant height	Weight of 100 seeds	Oil*	Bushel weight
		inches	grams	percent	pounds
Arrowhead	July 23	64	7.7	30.1	28.7
Mingren	July 27	66	10.3	27.4	23.8
Admiral	July 26	58	6.8	32.1	28.5
Mennonite	July 28	65	9.5	28.4	25.3
Donski 695	July 31	80	---	38.1	31.4
Peredovik	July 30	73	---	43.9	27.4
VNIIMK 65.40	August 1	84	---	40.8	30.2
VNIIMK 89.31	-----	--	---	40.3	29.8

\*dry matter basis.

#### OTHER VARIETIES

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

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

Mennonite - Medium to high yield. Later-maturing and taller than Arrowhead. Susceptible to rust. Seed is large, high in hull, low in oil content, and medium in bushel weight. Large seed grades often sell at premium prices. Originated in Russia many years ago.

## **DRY EDIBLE PEAS AND FIELD PEAS**

Dry edible peas are sold to processors for use in soup and pigeon feed or fed on the farm to sheep, hogs, or cattle. Field peas are also used as a forage crop and, for this purpose, are usually sown in a mixture with oats.

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

See Minnesota Extension Bulletin 300 for more information.

#### RECOMMENDED VARIETIES

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

Stral - Medium maturity. Long vined. Cream-colored seed, medium in size, and high in bushel weight. Good cooking quality. Originated at the Weibullsholm

VARIETIES NOT ADEQUATELY TESTED

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

Table 16. Adjusted averages of pea varieties at Crookston for seed yield, seed weight, date first bloom, and date full bloom

Variety	Years of trial	Yield per acre pounds	Weight of 100 seeds grams	Date	
				first bloom	full bloom
Chancellor	1960-63	1468	13.7	26 June	July 2
Strål	1960-63	1801	16.9	24	July 1
Victoria	1962-63	1673	33.6	18	June 26
Aureool	1962-63	1495	38.5	18	June 26
Bello	1960-63	1794	18.5	24	July 1
Creamette	1960-63	1749	22.0	24	June 30
Maple	1960-63	1574	19.5	27	July 3
Maple CB 5610	1962-63	995	39.1	13	June 24
Marma	1960-63	1665	16.7	24	June 30
Marrowfat CB564	1962-63	1446	32.8	21	June 28
Rancher	1962-63	1644	16.3	21	June 30
LSD (5%)		186			

OTHER VARIETIES

Aureool - Early maturity. Short vined. Very large, semi-smooth, greenish-pink colored, edible seed of medium bushel weight. Released in 1951 by Centraal Bureau of Holland from a cross of Unica x Hala.

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

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

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

Maple CB 5610 - Early maturity. Short vined. Very large semi-smooth, salmon-colored seed with brown mottle and black hilum. Edible. Low bushel weight. Centraal Bureau Plant Breeding Station in Holland.

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

Marrowfat CB 564 - Early maturity. Short vined. Very large, semi-smooth, light green-colored edible seed of high bushel weight. Centraal Bureau Plant Breeding Station in Holland.

Rancher - Medium maturity. Long vined. Medium-sized, cream-colored seed of high bushel weight.

# ALFALFA

## RECOMMENDED VARIETIES

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

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

## VARIETIES NOT ADEQUATELY TESTED

Culver (A-600) - A synthetic variety released by Purdue University in cooperation with the alfalfa improvement conference. Resistant to spittle bug and bacterial wilt, less hardy than Ranger and susceptible to the leafspot diseases.

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

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

## OTHER VARIETIES

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

Some of the alfalfas being sold in Minnesota are controlled by private companies. These may be the result of the company's private breeding program or they may be controlled by the company through an agreement with the originating concern. Some of these have been included in Minnesota Agricultural Experiment Station trials while others have not been tested.

In 1961 the Minnesota Agricultural Experiment Station initiated a program for testing privately controlled alfalfas. The company entering the variety does so on a voluntary basis and pays a fee to partially cover the cost of testing. Inclusion of these varieties does not, therefore, imply approval or disapproval of privately controlled alfalfas. The data reported in table 17 do not include results from entries in the fee-testing program as no privately controlled entries on the market were included in this program prior to the 1962 seeding year. In the future data from these trials will be reported.

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

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

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

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

Table 17. Average forage yields and disease and winterhardiness ratings for alfalfa varieties

Variety	Crooks-	Grand	Lamber-	Morris	Rosemount			Waseca	Bac- terial wilt*	Common leaf spot*	Black stem*	Winter hardi- ness <sup>†</sup>
	ton	Rapids	ton		1959-	1959-	1961-	1960-				
	1959- 62	1957- 59	1962- 63	1962- 63	1959- 60	1959- 62	1961- 63	1960- 61				
				tons per acre								
Ranger	3.23	3.16	4.86	4.50	5.10	3.29	5.06	2.86	R	S	S	H
Vernal	3.23	3.57	5.12	4.89	5.26	3.73	5.09	2.86	VR	S	S	H
Culver		3.22	5.28	4.71	4.98				R	S	S	H
Rambler	2.96		5.03	4.25	4.24	2.97		3.15	R	S	S	H
Teton	2.42		5.06	4.48	3.87	3.19		2.90	R	MR	S	H
Arnim							5.15		S	-	-	-
Atlantic					4.73				S	S	S	MH
Buffalo					5.00	3.50			R	S	S	MH
Cody									R	S	S	MH
Du Puits	3.08	3.28	4.81		4.67	2.71	5.09	2.70	S	MR	S	MH
F D 100			4.99	4.67		2.72	5.36		S	MR	S	MH
Flandria				4.63			5.16		S	MR	S	MH
Grimm					5.08	3.35			S	S	S	H
Ladak	3.09	3.12			4.54	2.93			MR	S	S	H
Lahontan	2.79	2.63			1.91	2.90		2.46	R	S	S	NH
Narragansett	3.30	3.37			4.94	3.45	5.17	2.83	S	S	S	H
Orchies							5.02		S	MR	S	MH
Rhizoma	2.95	3.72			4.46	2.59			S	S	S	H
Scandia (Alfa)	2.98				4.22	2.65	4.96		S	MR	S	MH
Socheville					4.08	2.64	5.54	2.85	S	MR	S	MH
S C 118							5.28		S	MR	S	MH
LSD (5%)	.24	.57	.27	.27	.43	.34	.24	N.S.				

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

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

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.

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

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

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

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

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

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

Narraquansett - 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.

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

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

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

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

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

# BIRDSFOOT TREFOIL

## RECOMMENDED VARIETIES

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

## VARIETIES NOT ADEQUATELY TESTED

Tana - Developed at the Montana Agricultural Experiment Station.

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

## OTHER VARIETIES

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

# RED CLOVER

## RECOMMENDED VARIETIES

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

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

Table 18. Average forage yields of red clover first crop year in tons per acre for 1956-63\*

Variety	Rose-mount	Waseca	Morris	Crook-ston	Grand Rapids	Duluth	Average
Dollard	3.57	2.10	2.69	1.61	3.25	3.03	2.71
Lakeland	3.58	2.20	2.87	1.43	3.07	3.10	2.71
Chesapeake	3.41	2.10	2.78	1.24	3.13	3.05	2.62
Kenland	3.75	1.99	2.82	1.36	3.18	3.07	2.69
Pennscott	3.62	2.05	2.68	1.35	3.51	2.54	2.62

\*Not all stations represented in all years.

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

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

## OTHER VARIETIES

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



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

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

## SWEETCLOVER

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

### RECOMMENDED VARIETIES

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

Goldtop - Bred at the Wisconsin Agricultural Experiment Station in cooperation with the U.S.D.A. Yellow blossom biennial type. Outstanding for seedling vigor. Resistant to leaf and stem diseases. Good forage yield both seedling year and second year. A few days earlier than Evergreen, but much later than Madrid.

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

Table 20. Average forage yields of sweet clover in tons per acre

Variety	Second Year Forage					First Year Forage		
	Rose- mount 1960, 61,63	Waseca 1963	Crook- ston 1963	Grand Rapids 1960, 63	Average	Grand Rapids 1960	Crook- ston 1959	Average
Goldtop	2.28	2.80	1.99	1.68	2.19	1.49	2.71	2.10
Evergreen	1.84	1.97	2.11	1.55	1.87	----	3.46	----
Madrid	2.15	1.82	2.34	1.72	2.01	1.33	2.67	2.00
Cumino	.23	1.04	1.45	.98	.92	1.30	----	----
Denta	1.32	1.00	2.03	1.06	1.35	1.57	3.42	2.49

### VARIETIES NOT ADEQUATELY TESTED

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

Denta - A white flowered, low coumarin synthetic bred by the Wisconsin Experiment Station in cooperation with the U.S.D.A. Has looked promising in two years tests but not as vigorous as Goldtop.

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

## BROMEGRASS

### RECOMMENDED VARIETIES

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

the northern part of the North Central Region.

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

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

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

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

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

<sup>†</sup>Yield of Fischer estimated for 1959, 1960 and 1961.

Table 22. Species comparisons among bromegrass, timothy and orchard grass are shown below. Data are gathered from 3 stations in 1960, 4 in 1961 from a 1959 planting and 6 stations in 1963 from a 1962 planting

	Season total forage	Forage in second cutting	% stands	
	yield in tons per acre	in tons per acre	1961	1963
Bromegrass	3.11	1.32	93	89
Timothy	2.30	.77	93	78
Orchardgrass	1.53	1.02	58	23

#### VARIETIES NOT ADEQUATELY TESTED

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

#### OTHER VARIETIES

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

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

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

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

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.

## TIMOTHY

### RECOMMENDED VARIETIES

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

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

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

### VARIETIES NOT ADEQUATELY TESTED

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

Table 23. Average forage yields of timothy in tons per acre from Rosemount, Waseca, Crookston, and Grand Rapids 1960-62. Six stations in 1963

	State Average
Climax	2.57*
Itasca	2.52*
Lorain	2.37+
Drummond	2.28
Essex	2.20
Clair	2.45+

\*Significantly higher than all other varieties.

+Not in 1963 tests.

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

### OTHER VARIETIES

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

## KENTUCKY BLUEGRASS

### RECOMMENDED VARIETIES

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

### VARIETIES NOT ADEQUATELY TESTED

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

OTHER VARIETIES

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

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

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

**SUDANGRASS**

RECOMMENDED VARIETIES

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

VARIETIES NOT ADEQUATELY TESTED

Sorghum-sudan grass crosses and a sudangrass hybrid sold by seed companies were compared with Piper in 1962 and 1963. Piper sudan was again lowest in HCN and had the best recovery after grazing in 1963.

Table 25. Pasturage yields, HCN content and recovery after grazing of sudan, sudan crosses and sorghum-sudan crosses at St. Paul 1962-63

Variety	Tons per acre at 15% moisture		Mg. HCN per 100 gm dry matter		Percent recovery after grazing*	
	1962	1963	1962	1963	1962	1963
Piper	2.3	2.3	11	18.4	80	88
Greelan	2.0	2.0	36	62.5	55	68
Hydan 37	2.2	+	37	69.2	50	
Royal Su	2.2		31		60	
Sudax Sx 11	2.2	+	35	72.1	46	
Sweet Sioux	2.6	2.6	32	60.9	57	69
RP Mor-Su		2.3		43.2		70
Trudan		2.5		24.5		78

\*Percent ground cover about 3 weeks after grazing.

+Inadequate stand for yield determination.

OTHER VARIETIES

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

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

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

# RATE AND DATE OF SOWING

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

Crop	Bushel weight*	Rate per acre	Date
	in pounds	in pounds	
Barley <sup>+</sup>	-48	72-96	Early spring
Corn <sup>+</sup>	-56	8-14	Early May
Flax <sup>+</sup>	-56	42-56	April 15 to May 15
<b>Forage Grasses (perennial)</b>			
Bromegrass (with legumes)	-14	5-8	Early spring or fall
Kentucky bluegrass (with timothy)	-14	8-10	Early spring or fall
Meadow fescue (in mixture with brome and legume)	-14-24	3-4	Early spring or fall
Timothy (with legumes)	-45	4-6	Early spring or fall
In mixture with brome and legume or reed canary or bluegrass	-	2-4	
Reed canary	-44-48		
Alone or with timothy	-	6-8	Early spring or fall: after freeze-up
<b>Forage Legumes (biennial or perennial)</b>			
Alfalfa	-60		With companion grain or flax, early spring; or alone before Aug. 10
Alone	-	8-12	
With grasses	-	5-8	
Birdsfoot trefoil	-60	3-6	Early spring
Clover	-60		Early spring
Red (in mixture)	-	4-8	
Alsike (in mixture)	-	2-4	
Ladino (in mixture)	-	1/2-1	
Sweet Clover	-60		Early spring
Alone	-	10-12	
In mixture	-	2-4	
Oats <sup>+</sup>	-32	64-80	Early spring
Rye	-56	70-84	Aug. 1 to Sept. 10 for pasture. Aug. 25 to Sept. 30 for seed
<b>Sorghum<sup>+</sup></b>			
	-50 (sweet)		In warm soil, May 25 to June 15
Corn planter rows	-56 (grain)	4-10	
"Solid" drilled	-	10-30	
With 1 1/2 bushel soybeans	-	15	
<b>Sudangrass-</b>			
	-40		In warm soil, May 20 to June 20
Alone	-	25-30	
With 1 1/2 bushel of soybeans	-	10	
<b>Soybeans<sup>+</sup></b>			
"Solid" drilled	-60	120-150	
40-inch rows	-	60	In warm soil, May 15-30
20-inch rows	-	90-100	
<b>Wheat<sup>+</sup></b>			
Bread	-60	75-90	Early spring
Durum	-	90	Early spring
Winter	-	75-90	Aug. 20 to Sept. 20
<b>Miscellaneous Crops</b>			
Field peast	-60		Early spring
Alone	-	120-180	
With 1 1/2 to 2 bushels of oats	-	45-90	
Sunflowers	-24	4-8	May 10-25
Millet	-48-56	20-40	June 15 to July 15
Mustard	-50-58	10	
Navy beans	-60	40	June 1 to 20
Pinto beans	-60	60-80	

Crop	Bushel weight* Rate per acre		Date
	in pounds	in pounds	
Rape - - - - -	50	4-6	Early spring with oats
Buckwheat- - - - -	48-50	48	June 15 to July 15

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

†Use fungicide seed treatment.

#### CORN AND GRAIN SORGHUM TRIALS

Comparative trials of experiment station and commercial corn varieties are published annually in two bulletins of the Minnesota Agricultural Experiment Station: Miscellaneous Report 20 - Maturity Ratings for Corn Hybrids in Minnesota. Miscellaneous Report 28 - Minnesota Hybrid Corn Performance Trials.

The Annual Corn Seedstocks Announcement describes experiment station varieties for which seedstocks are available. It also gives the policy for the release of inbred lines.

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

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

#### OTHER FIELD CROP PUBLICATIONS

B134	Soybeans for Minnesota
E299	Sunflower Production in Minnesota
B300	Field Peas for Seed and Forage
B302	Millet, Annual Canarygrass, and Buckwheat Production in Minnesota
F68	More Profits from Malting Barley
F182	Forage Mixtures
F212	Cultural and Chemical Weed Control in Field Crops
P194	Crop Production Guide for Minnesota
P203	Five Steps to Five Tons with Certified Alfalfa
FS Agron 3	How About Oats for Silage?
FS Agron 4	Using Ladino Clover in Minnesota
FS Agron 5	Birdsfoot Trefoil
FS Agron 7	Emergency Crops
FS Agron 8	Cut Early for Quality Forage
FS Agron 9	Corn Silage
FS Agron 10	Safflower - An Oilseed Crop for Minnesota?
S452	Beef from Grasslands
----	Sunflower Attachment for Combines

## NOTES

# *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 Agricultural Experiment Station at Rosemount, or at the branch experiment stations—Crookston, Duluth, Grand Rapids, Lamberton, Morris, and Waseca.

Specialized research is carried on at the Fruit Breeding Farm and Arboretum, Excelsior; at the Potato Breeding Farm, Castle Danger; at the Forest Research Center, Cloquet; at the Hormel Institute, Austin; and at the Biological and Forestry Station, Lake Itasca. 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.