

# VARIETAL TRIALS OF FARM CROPS



University of Minnesota - Agricultural Experiment Station



## BARLEY

### RECOMMENDED VARIETIES

**Larker**—Six-rowed, semi-smooth awned, colorless 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 Trill x a selection from U. M. 570.

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

**Trophy**—Six-rowed, rough-awned, colorless 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 Trill x a selection from U. M. 570.

### VARIETIES NOT ADEQUATELY TESTED

**Conquest**—Six-rowed, smooth-awned, blue aleurone variety. Long rachilla hairs. Two or three days earlier than Parkland. High yield, good standing ability. Highly resistant to loose smut and stem rust. Malting quality status undetermined. Developed at Brandon, Manitoba, Canada.

**Dickson**—Six-rowed, rough-awned, colorless aleurone variety. Short rachilla hairs. High yield, good standing ability. Has resistance to prevalent leaf spotting diseases and stem rust. Kernel plumpness inferior to Trophy and Larker. Malting quality status undetermined. Developed at North Dakota State University from a cross involving Trill, Kindred, and CI 7117-77.

### OTHER VARIETIES

**Forrest**—Six-rowed, smooth-awned, colorless 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, colorless 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<sup>2</sup>.

**Kindred**—Six-rowed, rough-awned, colorless 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.



Removal of the male flowers (anthers) with tweezers is the first step in making a barley cross. Lines developed from this cross will be tested and an improved variety may result.

**Liberty**—Six-rowed, smooth-awned, colorless 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.

**Trill**—Six-rowed, rough-awned, colorless 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.

Table 1. Yields of barley varieties in bushels per acre, 1963-66

Variety	No. of trials:	Yields, avg. of 24 trials						
		Morris	Crooks-ton	St. Paul	Rose mount	Lamber-ton	Grand Rapids	
Larker	60	6	6	6	2	2	2	53
Trophy	59	57	55	45	49	56	38	52
Dickson	60	59	59	42	51	60	34	53
Parkland	65	51	46	45	53	35	51	
Conquest	64	51	51	54	58	37	54	
LSD (5%)	4	5	4	6	7	6	2	

Table 2. Characteristics of barley varieties

Variety	Date of heading	Height	Lodging score*	Plump kernels†	Disease reaction‡		
					Stem rust	Spot blotch	Loose smut
Larker	June 25	32 inches	4.7	66	R	S	S
Trophy	26	32	3.8	51	R	S	S
Dickson	26	31	4.2	42	R	R	S
Parkland	28	34	4.5	55	R	S	S
Conquest	26	36	3.5	57	R	S	R

\* 1 erect, 9 flat:

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

‡ R resistant, S susceptible.



Lodging resistance is an important factor to consider in choosing an oat variety. Agronomist Roger Kleese compares varieties of (left to right) Rodney, Lodi, Garry, and Portage.

## OATS

### RECOMMENDED VARIETIES

**Garland**—Selected at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Medium maturing, high yield, average straw strength.

**Lodi**—Late, tall, excellent standing ability, and highest overall yields of varieties tested. Only moderately susceptible to crown rust. Developed in Wisconsin from (Richland-Bond) x (Garry x Hawkeye-Victoria).

**Minhafer**—Developed at the Minnesota Agricultural Experiment Station from a cross of Landhafer x (Bond-Rainbow x Hajira-Joanette). Similar to Tippecanoe in yield, maturity, and test weight but taller and slightly poorer in straw strength. Only recommended variety with some resistance to the most prevalent race of stem rust (6AF).

**Tippecanoe**—Released from Purdue Agricultural Experiment Station from a cross of (Clintland 60 x Mo. 0-205) x Clintland 60. Ranks high in yield among early maturing varieties. Very stiff

straw. Probably the best oat variety available for use as a companion crop.

### VARIETIES NOT ADEQUATELY TESTED

**Dawn**—Tall, early, good yield and bushel weight but very weak straw. Some resistance to crown rust. Good smut resistance. Susceptible to yellow dwarf and moderately susceptible to Septoria. Resistant to the 6F and 7A races of oat stem rust but susceptible to race 6AF, the most prevalent race in Minnesota the past 2 years. Developed and released by the North Dakota Agricultural Experiment Station from a cross of Ajax-Ransom x [Roxton x (Victory x Hajira-Banner)]-Ajax x (Victoria x Hajira-Banner).

**Jaycee**—Short, early, good yield, good bushel weight, and acceptable straw strength. Resistant to races 6F and 7A of oat stem rust but susceptible to race 6AF. Good resistance to smut and yellow dwarf. Susceptible to crown rust. Released by the Illinois Agricultural Experiment Station from the cross Clintland 3x Garry 2x Hawkeye x Victoria 4x Putman.

**Orbit**—Midseason to late in maturity, good yield and straw strength. Bushel weights were poor in 1966 Minnesota variety

Table 3. Adjusted average yields of oat varieties in bushels per acre; varieties are arranged in order of maturity from early to late

Variety	Years of trial	Crookston	Lamberton*	Morris	Rosemount	Waseca	Grand Rapids	Average
Tippecanoe	1964-5-6	65	87	86	75	81	62	77
Minhafer	1964-5	66	80	89	70	94	65	79
Jaycee	1966	85	—	92	76	86	65	81
Dawn	1966	84	—	94	76	95	74	84
Wyndmere	1966	87	—	97	85	89	73	86
Santee	1964-5-6	84	91	87	75	81	72	82
Clintford	1965-6	79	81	98	75	86	66	82
Andrew	1964-5-6	69	88	83	69	77	58	73
Tyler	1965-6	81	86	83	75	84	69	79
Garland	1964-5-6	75	93	91	88	89	72	85
Clintland 64	1964-5-6	80	78	98	83	88	66	84
Stormont	1966	85	—	88	68	81	66	78
Orbit	1966	94	—	94	75	95	77	87
Portage	1964-5-6	94	89	98	77	86	77	86
Lodi	1964-5-6	89	90	107	84	98	81	92
LSD (5%)		8	10	8	5	8	7	3

\* No 1966 data.



Table 4. Adjusted characteristics of oat varieties, 1964,65,66, and reactions to disease, 1966

Variety	Heading date June	Lodging* score	Height (inches)	Bushel weight (pounds)	Reaction to disease†				
					Stem rust races			Crown rust	Smut
					6AF	6F	7A		
Tippecanoe	23	1.5	34	32.3	S	R	R	VS	MR(S)‡
Minhafer	23	2.1	36	32.7	MR-MS	R	R	MS	R
Jaycee	23	2.7	32	33.5	S	R	R	S	R
Dawn	23	3.7	39	33.3	S	R	R	MS	R(S)
Wyndmere	23	3.2	37	32.5	S	R	R	S	R(MS)
Santee	24	2.7	35	32.3	S	R	R	VS	R(MS)
Clintford	24	1.9	32	34.9	S	S	S	VS	MR(S)
Andrew	24	3.7	35	31.4	S	S	R	S	R
Tyler	25	1.9	33	31.7	S	S	R	VS	MR(S)
Garland	25	2.6	34	33.5	S	R	R	S	R
Clintland 64	25	2.5	36	33.2	S	R	R	MR-MS	R(MS)
Stormont	26	1.2	35	29.1	S	R	R	S	R
Orbit	27	2.0	34	28.9	S	R	R	MS-S	R(S)
Portage	28	3.6	39	32.6	S	S	R	MR	R
Lodi	30	2.0	41	33.1	S	R	R	MS	R(MS)

\* Scale from 1 to 5: 1 = lodging resistant, 5 = lodging susceptible.

† R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, VS = very susceptible.

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

Races of Oat Stem Rust - Race 6AF has been the most prevalent race in Minnesota the past 2 years. Nearly all oat varieties grown in Minnesota are susceptible to 6AF; however, the variety Minhafer has been moderately resistant to 6AF for 2 years in rust tests at St. Paul.

tests. Resistant to races 6F and 7A but susceptible to race 6AF of oat stem rust. Susceptible to some of the prevalent races of crown rust. Developed and released by the New York Agricultural Experiment Station.

**Stormont**—Midseason to late in maturity with excellent straw strength. Moderately poor yield and bushel weights in 1966 Minnesota variety tests. Resistant to races 6F and 7A but susceptible to race 6AF of oat stem rust. Susceptible to some of the prevalent races of crown rust. Developed by the Ontario Project Group from the cross Shield x Garry-Klein and released by the Canada Department of Agriculture.

**Wyndmere**—Early, good yield and good bushel weight, but moderately weak straw. Resistant to the 6F and 7A races of oat stem rust but susceptible to race 6AF. Susceptible to crown rust and smut. Developed and released by the North Dakota Agricultural Experiment Station from a cross of Ajax x Ransom.

#### OTHER VARIETIES

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

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

**Brave**—Early-midseason, above average yield and bushel weight. Very weak straw. Generally susceptible to crown rust and to prevalent races of stem rust. Possesses good tolerance to yellow dwarf and is resistant to smut. Developed at the Illinois Agricultural Experiment Station from a cross of Putnam x an unnamed Minnesota selection.

**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.

**Clintford**—Early, midseason, good yield; high bushel weight and excellent straw strength. Susceptible to crown rust and prevalent races of stem rust. Moderately resistant to smut. Developed

at the Purdue Agricultural Experiment Station from a cross of Milford to a selection from Clinton 59 x Landhafer.

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

**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. 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, has large yellowish-white seed of good test weight.

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

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

**Portage**—Tall, late midseason, high-yielding, yellowish-white oat with high bushel weight, weak straw, and 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.

**Santee**—Early midseason, average to good yield and bushel weight, and good straw strength. Susceptible to crown rust and prevalent races of stem rust. Moderately susceptible to some races of smut. Released by the Nebraska Agricultural Experiment Station from a cross of Clinton [(Victoria x Hajira-Banner) x Victory].

**Tyler**—Midseason, average yield and bushel weight, and very stiff straw. Susceptible to crown rust and prevalent races of stem rust. Moderately resistant to smut. Released by the Purdue Agricultural Experiment Station from a cross of Clintland 60 type x Mo. 0-205.

## WINTER RYE

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

### RECOMMENDED VARIETIES

**Caribou**—High yield, very winterhardy, medium maturity, tall. Small seed, somewhat mixed in color, and high bushel weight. A Crown rye selection obtained from the University of Saskatchewan in 1949. Named and released by the University of Minnesota in 1953.

**Elk**—Yields more than Caribou when winter injury is not severe. Fair winterhardiness, late maturity, tall. Medium-size seed, predominantly green in color, 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.

**Pearl**—High yield, fair winterhardiness, late maturity, tall. Medium-size seed of brown and green color and medium bushel weight. Obtained from Canada Department of Agriculture Experimental Farm, Swift Current, Saskatchewan, under the name *Pearl*, and thought to originate from seed imported from Denmark about 1952.

**Von Lochow**—High yield, fair to poor winterhardiness, late maturity, medium height. Very good resistance to lodging. Large seed, predominantly green in color, and high in bushel weight. Obtained from F. von Lochow-Petkus Ltd. of Germany.

Table 5. Yields of winter rye varieties in bushels per acre

Variety	Rosemount	Waseca	Lamberton	Morris	Grand Rapids	Average of 5 locations
	1960-66	1966	1961-66	1961-66	1961-66	
Caribou	39	59	41	35	62	47
Elk	41	70	41	29	55	47
Pearl	43	74	42	31	60	50
Von Lochow	41	74	47	32	62	51
Adams	37	54	39	33	58	44
LSD (5%)	4	10	4	4	5	3
	1965-66	1966	1966	1966	1966	
Caribou	34	59	32	43	54	44
Frontier	39	69	40	43	62	51
LSD (5%)	5	10	5	7	9	3

Table 6. Characteristics of winter rye varieties, 1960-66

Variety	Winterkill	Date of heading	Date mature	Plant height	Lodging*	Weight of 100 seeds	Bushel weight
	percent			inches		grams	pounds
Caribou	2	May 30	July 19	52	3.4	2.2	55.5
Elk	20	June 2	July 21	50	3.6	2.6	55.3
Pearl	17	June 2	July 21	49	3.2	2.4	54.9
Von Lochow	20	June 2	July 21	47	2.0	2.7	56.1
Adams	8	May 29	July 18	54	3.2	2.5	55.1
Data from Rosemount 1965-66 and other locations 1966							
Caribou	4	June 2	July 17	52	2.8	2.2	55.2
Frontier	4	June 4	July 18	52	4.0	2.3	56.0

\* 1 erect, 9 flat.



Plots of three high-yielding rye varieties at the Southern Experiment Station, Waseca. Varieties shown, left to right, are Elk, Pearl, and Von Lochow.

## VARIETIES NOT ADEQUATELY TESTED

**Frontier**—High yield, very winterhardy, medium maturity, tall. Small seed, predominantly blue-gray in color, high bushel weight, poor lodging resistance. Developed by the Swift Current, Saskatchewan, Experimental Farm from a cross of Dakold 23 x Petkus. Seed distributed by Canada Department of Agriculture in 1965.

### OTHER VARIETIES

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

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

## HARD RED SPRING WHEAT

### RECOMMENDED VARIETIES

**Chris**—Awnless variety of medium height, straw strength, and maturity. Resistant to leaf and stem rust. High yielding with very good test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Frontana-Thatcher<sup>3</sup> x (Kenya 58-Newthatch x Thatcher<sup>2</sup>) at the Minnesota Agricultural Experiment Station.

**Manitou**—Awnless variety of medium height, straw strength, and maturity. Resistant to stem and leaf rust. High yielding with good test weight. Milling and baking characteristics are satisfactory. Selected from a cross of (Thatcher<sup>7</sup>-Frontana x Canthatch) x Thatcher<sup>8</sup>-P.I. 170925 by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

### OTHER VARIETIES

**Crim**—Bearded variety of medium height, straw strength, and maturity. Susceptible to loose smut and leaf rust but resistant to stem rust. Good yield and test weight. Milling and baking characteristics are 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.

**Fortuna**—Beardless sawfly resistant variety of medium height, straw strength, and maturity. Resistant to leaf and stem rust but very susceptible to black chaff. High yielding with good test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Rescue-Chinook x (Frontana-K58 x Newthatch) at the North Dakota Agricultural Experiment Station.

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

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

**Pembina**—Awnless variety of medium height, maturity, and straw strength. Good yield with medium test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Thatcher x (McMurachy-Exchange x Redman<sup>2</sup>) by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

**Selkirk**—Awnless variety of medium height and maturity with good straw strength. Susceptible to leaf rust but resistant to stem rust. Good yield with medium test weight. Milling and baking characteristics are satisfactory. Selected from a cross of McMurachy-Exchange x Redman<sup>3</sup> by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

**Sheridan**—Bearded variety of medium height, maturity, and straw strength. Resistant to leaf and stem rust and loose smut. High yielding with good test weight. Baking characteristics are satisfactory but milling characteristics are not. Selected from a cross of (Frontana-K58 x Newthatch) x Pilot at the Montana Agricultural Experiment Station.

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

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

Table 7. Yields and other characteristics of spring wheat varieties, 1964-66

Class and variety	Date of heading	Plant		Lodging score*	Leaf rust reaction †	Stem rust reaction †	Test weight	Yield, bushels per acre		
		height, inches	height, inches					St. Paul	Morris	Crookston
<b>Hard Red Spring</b>										
Chris	June 28	36	3.1	R	R	60.3	27	37	34	32
Manitou	June 27	35	3.0	R-MR	R	58.9	27	37	33	32
Crim	June 26	37	3.7	S	R	59.0	25	34	28	29
Justin	June 28	37	2.4	S	R	58.3	22	28	26	25
Pembina	June 26	35	2.5	S	R	57.1	27	31	28	28
Selkirk	June 27	35	2.4	S	R	56.6	26	32	29	28
Thatcher	June 27	35	2.6	S	S-R	57.3	22	26	22	23
LSD 5%							3	4	4	2
<b>Data for 1964-65</b>										
Chris	June 26	38	3.0	R	R	60.4	27	40	37	34
Fortuna	June 25	36	3.5	R	R	59.8	28	40	31	34
Sheridan	June 27	40	2.8	R	R	60.8	29	44	31	35
LSD 5%							3	5	6	3
<b>Durum</b>										
Lakota	June 29	38	2.4	MR	R	59.1	23	36	33	30
Wells	June 29	38	2.9	R	R	60.5	26	38	32	32
Leeds	June 29	37	2.4	R	R	61.8	26	33	27	29
Mindum	July 2	46	4.2	R-MR	S-R	59.4	18	20	26	20
Stewart 63	July 3	47	4.8	R	R	61.6	21	34	35	31
LSD 5%							3	4	6	2

\* 1 erect, 9 flat.

† Reaction to prevalent races: R=resistant, MR=moderately resistant, S=susceptible. Low frequencies of stem rust sub-races present in the rust population can attack the resistant varieties.

‡ Hard red spring average includes Waseca, 1966.

## DURUM WHEAT

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

### RECOMMENDED VARIETIES

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

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

### OTHER VARIETIES

**Langdon**—Early, bearded variety of medium height and straw strength. Moderately resistant to leaf rust, susceptible to

stem rust, and resistant to bunt and loose smut. Medium 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.

**Leeds**—Bearded, early, short variety with good straw strength. Resistant to leaf and stem rust and loose smut. Very good test weight with large kernels. Quality is satisfactory for semolina products. Selected from a cross of Brandon 180 x Wells at the North Dakota Agricultural Experiment Station.

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

**Stewart 63**—Bearded, tall, late-maturing variety with weak straw. Resistant to leaf and stem rust. Good yield and test weight. Quality is satisfactory for semolina products. Developed by a backcross of Stewart<sup>3</sup> x St 464 by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.



Agronomists David Johnston and Robert Heiner inspect durum wheat plots at the West Central Experiment Station, Morris.



Table 8. Yields and other characteristics of winter wheat varieties, 1964-1966

Variety	Date of heading	Plant height, inches	Winter injury, percent	Lodging score*	Leaf rust reaction†	Stem rust reaction†	Test weight, pounds	Yield, bushels per acre		
								St. Paul	Waseca	Average
Minter	June 17	43	29	2.6	S	R-S	60.0	26	26	26
Lancer	June 14	37	33	1.8	S	R-S	60.2	26	30	28
Warrior	June 14	37	32	3.4	S	S	55.7	24	26	25
Winalta	June 15	39	36	3.1	S	S	58.1	23	27	25
LSD 5%								5	7	4

\* 1 erect, 9 flat.

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

### WINTER WHEAT RECOMMENDED VARIETIES

**Minter**—Tall, bearded, winterhardy variety of medium straw strength. Susceptible to leaf rust and to some prevalent races of stem rust. High yielding with good test weight. Quality characteristics are satisfactory. Selected from a backcross of Hope x Minturki<sup>2</sup> at the Minnesota Agricultural Experiment Station.

### OTHER VARIETIES

**Gaines**—A semidwarf white wheat developed at the Washington Agricultural Experiment Station. Completely winterkilled in Minnesota trials.

**Hume**—Bearded variety of medium height and straw strength. Susceptible to leaf rust and some prevalent races of stem rust. Test weight and quality characteristics are satisfactory. Not sufficiently winterhardy. Selected from a cross of unknown parentage at the South Dakota Agricultural Experiment Station.

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

**Warrior**—Early, bearded, mid-tall 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.

**Winalta**—Bearded variety of medium height and straw strength. Susceptible to leaf and stem rust. Test weight and quality characteristics are satisfactory. Not sufficiently winterhardy. Selected from a cross of Minter x Wichita at the Canada Department of Agriculture Research Station, Lethbridge, Alberta.

### MILLET

Three types of millet are adapted in Minnesota: proso, foxtail, and barnyard (Japanese). Proso varieties are grown for grain for bird or livestock feed. Foxtail varieties and Japanese are grown for silage or hay. See Extension Bulletin 302 for more information.

### RECOMMENDED VARIETIES

**Turghai**—Proso. Very early maturity. Fair lodging resistance. Large, orange seed. Introduced from Russia by the U. S. Department of Agriculture in 1903. Grow for grain.

**Empire**—Foxtail. Medium maturity. Poor lodging resistance. Very small, plump, yellow seed. Originated by Canada Department of Agriculture. Grow for hay or silage.

**White Wonder**—Foxtail. Late maturity. Fair lodging resistance. Small white or yellow seed. Too late for good seed production some years. Grow for hay or silage.

### OTHER VARIETIES

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

**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.

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

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

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

**Siberian**—Foxtail. Similar to Manta except lower in yield.

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

### FLAX

### RECOMMENDED VARIETIES

**Bolley**—Developed at North Dakota Agricultural Experiment Station from cross of Birio x C.I. 1134. Immunity to rust conditioned by N<sup>1</sup> 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 B-5128 or Redwood for late sowing.

Table 9. Yields and other characteristics of millet varieties sown in late June at Rosemount, 1961-66

Variety	Yield per acre		Forage protein*	Date heading	Plant height	Lodging†	Weight of 100 seeds	Bushel weight
	Seed	Forage*						
	pounds		percent	August	inches		grams	pounds
Turghai	2,069	3,901	14.2	7	40	3.5	0.56	54.2
Empire	1,324	7,014	10.8	23	45	5.1	0.19	46.0
White Wonder	1,046	7,654	10.0	31	51	3.8	0.23	41.7
LSD (5%)	217	411						

\* 15 percent moisture basis.

† 1 erect, 9 flat.

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

**Redwood**—Originated from a cross of B-5128 x Redson at Minnesota Agricultural Experiment Station. Has N<sup>1</sup> gene which conditions immunity to rust. Moderately wilt resistant and moderately susceptible to pasmo. Good oil content of good drying quality. Straw of excellent fiber quality. Brown-seeded, blue-flowered, mid-late in maturity. Not recommended for late sowing.

**Summit**—Released in 1964 by South Dakota Agricultural Experiment Station as selection from B-5128 x Zenith. Immunity to rust conditioned by N<sup>1</sup> gene. Resistant to wilt and moderately susceptible to pasmo. Fair oil content of good drying quality. Brown-seeded, blue-flowered, early in maturity. Excellent seed yields.

**Windom**—Released in 1962 from Minnesota Agricultural Experiment Station from cross [(Renew x Bison) (Koto x Redwing) (Redwood)]. Immunity to rust conditioned by N<sup>1</sup> gene. Resistant to wilt and moderately susceptible to pasmo. Fair oil content of high drying quality. Brown-seeded, blue-flowered, early in maturity. Good seed yield, whether sown early or late.

#### OTHER VARIETIES

**Army**—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.

**Marine 62**—Selection of Marine made at Minnesota Agricultural Experiment Station. Released in 1962. 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.

**Noralta**—Selection from a cross of Rocket x Redwing made at Ft. Vermillion, Canada (F.V. 387) released in 1964. Moderately susceptible to wilt and pasmo. Resistant to race 300 of rust. Good in seed yield, very low in oil content, and fair in iodine value. Blue-flowered, brown-seeded, mid-late in maturity.

**Norland**—Selection from Victory made at North Dakota Agricultural Experiment Station; similar to Victory. Resistant to rust. Moderately susceptible to wilt. 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. Resistant to rust, including race 300. Moderately short when sown early but relatively tall when sown late. While it is earlier than Windom it has not been as dependable in producing good yields. Large brown seeds, blue flowers. Low in both oil content and oil quality.

**Redwood-65**—Irradiated selection of Redwood developed in Canada (F.P. 342) and released in 1964. Similar to Redwood in maturity and appearance, superior to Redwood in seed yield and oil content. This selection is more susceptible to pasmo than Redwood.

Table 10. Yields of flax varieties in pounds per acre

Variety	Early-sown				Late-sown			
	Lamberton 1963-66	Morris 1963-66	Crookston 1963-66	Average of 12 trials	Lamberton 1963,64,66	Morris 1963,65,66	Crookston 1963-66	Average of 10 trials
Bolley	1,140	1,096	670	956	646	1,225	706	844
B-5128	1,160	1,183	814	1,052	650	1,127	794	851
Redwood	1,018	1,142	792	984	679	1,188	770	868
Summit	1,084	1,252	872	1,069	684	1,312	916	965
Windom	1,224	1,222	830	1,092	786	1,319	822	960
Bison	1,235	1,182	802	1,073	760	1,113	784	876
Noralta*	1,136	1,272	808	1,072	656	1,359	817	931

\* Grown in 1964, 1965, and 1966, data adjusted.

Table 11. Characteristics of flax varieties 1963-66

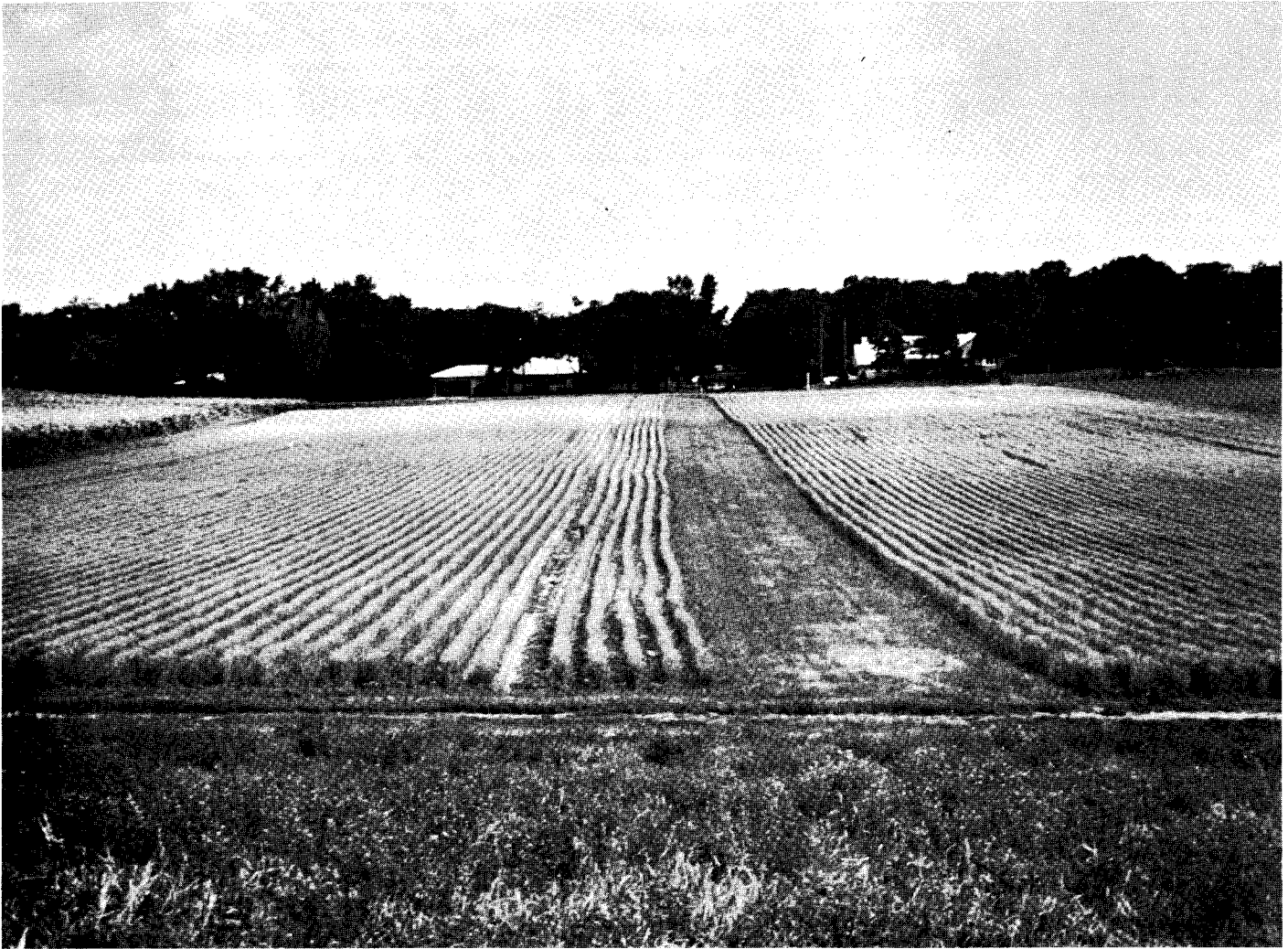
Variety	Days from sowing to:			Plant height (in.)	Seed weight (gm/1000)	Lodging*	Pasmo*	Wilt*	Rust †	Oil‡ content	Iodine value
	First bloom	Full bloom	matur- ity								
No. trials	26	25	12	26	3	4	8	3		30	30
Bolley	50	55	94	22	5.4	4	5	4	R	41.3	186
B-5128	52	58	95	23	5.9	6	6	6	R	39.7	177
Redwood	52	57	94	22	5.4	6	6	3	R	40.0	179
Summit	50	56	93	21	5.1	5	6	4	R	38.8	180
Windom	50	55	92	21	4.9	4	7	2	R	39.5	184
Bison	51	57	94	23	5.7	6	5	4	S	39.9	172
Noralta§	51	57	95	24	4.4	6	-	5	R	38.4	181

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

† R = resistant, S = susceptible.

‡ Oven-dry basis.

§ Grown in 1964, 1965, and 1966; data adjusted.



Purification of a flax variety by removal of off-type lines. These lines are removed by mowing before flowering, as shown by the missing stand in the foreground and elsewhere in the field.



Agronomist Jean Lambert studies a field of Traverse, a new medium-maturing soybean variety developed by the Minnesota Agricultural Experiment Station.

## SOYBEANS

### RECOMMENDED VARIETIES

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

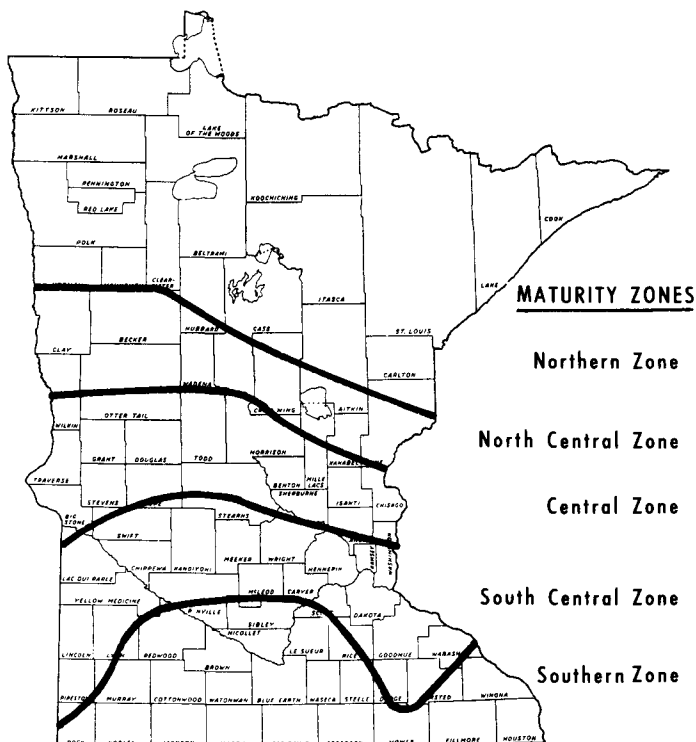
**Chippewa 64**—Phytophthora-root-rot resistant variety developed at the USDA Regional Soybean Laboratory from Chippewa by back-crossing. Similar in all other respects to Chippewa which was a selection from a backcross of Lincoln x (Lincoln x Richland) made at the Regional Laboratory. Medium maturity, superior in yielding ability; medium height, very good resistance to lodging. Medium-size seed, yellow with black seed scars. Good oil content. Pubescence brown, flowers purple. Recommended for south-central and southern zones and southern one-third of central zone.

**Flambeau**—Rather short, with a considerable tendency to lodge. A good yielder among the early varieties. Yellow seeds with black seed scars; medium oil content. Pubescence brown, flowers purple. 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 very good yields. Fair standing ability. Pubescence light brown, flowers white. Seeds yellow with black seed scars. Oil content good. Selected at Spooner, Wisconsin, from a cross of Lincoln x Seneca. Recommended for central, south-central, southern, and north-central zones.

**Hark**—Fairly tall, high-yielding, full-season variety for the southern zone. Good resistance to lodging. Pubescence gray, flowers purple. Medium-size seed with yellow seed scars. Good oil content. Developed at the Iowa Agricultural Experiment Station from a cross of Hawkeye x Harosoy. Recommended for southern zone only.

**Harosoy 63**—Phytophthora-root-rot resistant variety developed at the USDA Regional Soybean Laboratory from Harosoy by backcrossing. Similar in all other respects to Harosoy, which was a selection from the cross Mandarin x (Mandarin x A.K.) made at the Dominion Experimental Farm, Harrow, Ontario. Several days later than Chippewa 64. Tall and tends to lodge. Pubescence is grey, flowers purple. Seeds solid yellow and of medium size with good oil content. Recommended in southern zone only.



**Lindarin 63**—Phytophthora-root-rot resistant variety developed at the Indiana Agricultural Experiment Station from Lindarin by backcrossing. Similar to Lindarin, which was developed at the same station from a cross of Ottawa Mandarin x Lincoln. Matures at about the same time as Harosoy; has yielded slightly less in Minnesota, is shorter, and has greater resistance to lodging. Pubescence grey, flowers purple. Seeds yellow with buff seed scars. Recommended for southern zone only.

**Merit**—An early, yet fairly tall variety developed at the Central Experimental Farm, Ottawa, Canada, from a cross of Blackhawk x Capital. Pubescence grey, flowers white. Seeds fairly small and yellow with buff seed scars. Good oil content. Resistant to Phytophthora root rot. Recommended for central and north-central zones.

**Portage**—A very early selection made at the University of Manitoba from a cross of Acme x Comet. Yields well in its maturity group. Good standing ability. Grey pubescence, flowers purple. Solid yellow seed of good size and good oil content. Recommended for the northern zone.

**Traverse**—Medium maturity selection made at the Minnesota Agricultural Experiment Station from the cross Lincoln x Ottawa Mandarin. Good yield and standing ability. Medium height. Pubescence grey, flowers white. Solid yellow seed of good size and good oil content. Has shown promise in preliminary testing for use in certain Oriental food products. Recommended for south-central, central, and southern zones.

#### OTHER VARIETIES

**Acme**—A very early selection from the variety Pagoda, developed in Canada. Similar in most respects to Portage but somewhat inferior to it in yield.

**Amsoy**—Selected at the Iowa Agricultural Experiment Station from a cross of Adams x Harosoy. An outstanding yielder in Iowa. Yields well in southern Minnesota in favorable seasons. Tall with adequate standing ability. Solid yellow seed. Too late except in perhaps the southern half of the southern zone.

**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.

Table 12. Average yields of soybean varieties in bushels per acre

Variety*	Crookston 1964-66	Grand Rapids 1964, 1966	Moor- head 1966	Morris		Big Lake 1964- 66	Rose- mount 1963- 66	Waseca		Lamberton			
				1963- 66	1964- 66			Late May planting 1963-66	Late May planting 1964-66	Early May planting 1965-66	Blue Earth 1964-66		
<b>Early-Maturing Group</b>													
Acme	15.2	20.4	—	—	22.7	—	—	—	—	—	—	—	
Portage	14.9	22.4	26.4	—	24.2	—	—	—	—	—	—	—	
Flambeau	19.5	19.5	35.7	—	25.9	—	—	—	—	—	—	—	
Merit	21.7	17.3	39.0	—	28.9	—	—	—	—	—	—	—	
<b>Medium-Maturing Group</b>													
Merit	—	—	39.0	30.9	—	25.9	29.5	34.2	—	25.4	—	30.3	
Ottawa Mandarin	—	—	38.2	31.9	—	25.7	29.5	34.3	—	26.1	—	30.5	
Traverse	—	—	39.2	32.0	—	28.6	30.7	36.7	—	27.7	—	31.7	
Grant	—	—	39.2	32.7	—	26.5	31.3	39.8	—	27.5	—	33.4	
Chippewa 64	—	—	—	33.8	—	24.7	31.5	38.5	—	30.0	—	31.8	
<b>Late-Maturing Group</b>													
Chippewa 64	—	—	—	—	—	24.7	—	—	37.7	—	24.6	27.8	33.4
A-100	—	—	—	—	—	26.4	—	—	36.6	—	26.5	—	33.0
Hark	—	—	—	—	—	—	—	—	39.9	—	26.5	—	37.3
Harosoy 63	—	—	—	—	—	25.4	—	—	35.6	—	25.1	26.3	33.7
Lindarin 63	—	—	—	—	—	22.5	—	—	34.5	—	24.3	—	32.3
Amsoy	—	—	—	—	—	—	—	—	38.3	—	28.4	31.2	34.4
Hawkeye 63	—	—	—	—	—	—	—	—	33.5	—	24.4	28.6	32.6
Ford	—	—	—	—	—	—	—	—	33.2	—	25.0	29.3	29.8

\* Ranked according to maturity adaptation from north to south.



Table 13. Characteristics of soybean varieties

Variety	Date mature	Lodging score*	Plant height, inches	Seed size, grams/100 seeds	Seed quality score†
<b>Early-maturing group</b> (average of Crookston and Morris 1964-66)					
Acme	9-7	1.2	21	16.1	3.2
Portage	9-6	1.1	22	15.8	3.0
Flambeau	9-15	2.5	25	16.1	2.8
Merit	9-19	1.8	29	13.7	3.1
<b>Medium-maturing group</b> (average of Morris and Rosemount 1963-66)					
Merit	9-16	2.5	33	14.9	2.8
Ottawa Mandarin	9-16	2.0	28	20.2	2.8
Traverse	9-21	2.4	33	18.5	2.5
Grant	9-21	2.9	31	17.6	2.6
Chippewa 64	9-25	2.5	35	16.2	2.4
<b>Late-maturing group</b> (average of Waseca and Lambertson 1964-66)					
Chippewa 64	9-18	1.6	31	14.7	2.4
A-100	9-28	1.6	30	17.8	2.6
Hark	9-27	1.6	34	16.7	2.6
Harosoy 63	9-27	2.4	36	17.2	2.8
Lindarin 63	9-28	1.7	31	15.7	2.6
Amsoy	10-3	2.3	37	16.7	2.6
Hawkeye 63	10-6	2.4	37	17.6	3.1
Ford	10-8	2.5	36	16.2	2.1

\* 1 erect, 5 flat.

† 1 excellent, 5 very poor.

**Chippewa**—Similar in all respects to Chippewa 64 except that it is susceptible to Phytophthora root rot.

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

**Ford**—Selected at Iowa Agricultural Experiment Station from a cross of Lincoln x (Lincoln x Richland). Two to three weeks later than Chippewa. Too late for most of Minnesota. Earlier varieties yield as well or better.

**Harosoy**—Similar in all respects to Harosoy 63 except it is not resistant to Phytophthora root rot.

**Hawkeye**—Selected at Iowa Agricultural Experiment Station from a cross of Mukden x Richland. Ten days to 2 weeks later than Chippewa. Very late for Minnesota. Earlier varieties yield as well or better.

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

**Lindarin**—Similar in all respects to Lindarin 63 except it is not resistant to Phytophthora root rot.

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



A northwestern Minnesota field of sunflowers in August.

**Ottawa Mandarin**—Selected at the Central Experimental Farm, Ottawa, Canada, from the variety Mandarin. Medium early and fairly short. Highly resistant to lodging. Large, solid-yellow seeds.

**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

Most of the commercial crop is used for birdfeed, nutmeats, and salted whole seed. Part of the 1966 crop will be processed for oil, and this use is expected to increase greatly in 1967.

### RECOMMENDED VARIETIES

**Arrowhead**—Medium to high yield. Early maturity and medium height. Stands well for combining but tends to shatter when dry. Should be planted thicker than Mingren or Peredovik. Seed is medium in size, medium in hull, low in oil, high in protein, and high in bushel weight. Good seedling vigor. Excellent for birdfeed production. An open-pollinated variety released in 1954 by the Minnesota Agricultural Experiment Station.

Table 14. Yields, large seed percentage, oil content, and bushel weight of sunflower varieties at Rosemount and Crookston, 1962-66

Variety	Years of trial	Yield per acre, pounds			Large seed,* %			Oil content,† %			Bushel weight, lb.
		Rosemount	Crookston	Average	Rosemount	Crookston	Average	Rosemount	Crookston	Average	Average
Arrowhead	1962-66	1,548	1,757	1,653	1	2	1	31.1	29.3	30.2	29.8
Mingren	1962-66	1,486	1,792	1,639	28	45	36	27.9	28.7	28.3	24.6
Peredovik	1962-66	1,289	1,421	1,355	0	1	0	42.6	44.9	43.8	28.6
LSD (5%)		167	229	142							
Armavirec	1965-66	1,085	1,376	1,231	0	1	0	43.8	42.1	42.9	30.8
Commander	1963-66	1,362	1,623	1,493	22	38	30	29.1	27.1	28.1	25.2
Kubanek	1966	972	1,830	1,401	0	0	0	41.5	41.1	41.3	30.0
Smena	1964-66	1,227	1,629	1,428	0	0	0	47.5	45.3	46.4	29.7
VNIIMK 89.31‡	1963-66	1,224	1,852	1,538	0	1	0	43.9	44.9	44.4	29.3
Vostok	1966	1,208	1,959	1,584	0	0	0	46.3	42.4	44.4	29.1

\* Held on 20/64 round-hole screen.

† Dry matter basis.

‡ 1964-66 at Crookston.

**Mingren**—Medium to high yield. Medium maturity and height. Seed is very large, high in hull, and low in oil and bushel weight. More resistant to bird feeding loss than Arrowhead. Large seed used for dehulled and whole seed food uses and the smaller seed for birdfeed. An open-pollinated variety selected from Mennonite by the Minnesota Agricultural Experiment Station. Released in 1964.

**Peredovik**—Medium yield. Late maturity and tall. Small black seed of high bushel weight, low hull percentage, and very high oil content. Lodging medium. Excellent for the oilseed market but not for the birdfeed or whole seed food markets. An open-pollinated variety developed in Russia.

#### VARIETIES NOT ADEQUATELY TESTED

**Armavirec**—Medium to low yield. Very early maturing and short. Small black seed of high bushel weight and very high oil content. An open-pollinated variety developed in Russia.

**Kubanek**—Medium yield. Early maturity and tall. Small black seed of high bushel weight and very high oil content. Lodging medium. An open-pollinated variety developed in Russia.

**Smena**—Medium yield. Medium late maturity and tall. Small black seed of high bushel weight and very high oil content. Lodging medium. An open-pollinated variety developed in Russia.

**VNIIMK 89.31**—Medium to high yield. Late maturity and tall. Small black seed of high bushel weight and very high oil content. Lodging medium. An open-pollinated variety developed in Russia.

**Vostok**—Medium to high yield. Early maturity and tall. Small black seed of high bushel weight and very high oil content. Lodged severely. An open-pollinated variety developed in Russia.

#### OTHER VARIETIES

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

**Advent**—Medium yield, maturity, and height. Small seed of low 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.

**Note:** Commercial or second generation Admiral or Advent should not be planted. Use only first generation hybrid sunflower seed.

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

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

**Mennonite**—Medium to high yield. Similar to Mingren in maturity, height, and use. Smaller and less uniform seed than Mingren. Originated in Russia.

Table 15. Characteristics of sunflower varieties at Rosemount and Crookston\*, 1962-66

Variety	Date of flowering	Plant height	Lodging†	Weight of 100 seeds
		inches		grams
Arrowhead	7-22	63	3.0	8.0
Mingren	7-26	63	3.5	11.0
Peredovik	7-29	69	3.9	6.3
Armavirec	7-19	55	2.9	7.1
Commander	7-27	64	3.1	10.9
Kubanek	7-24	62	3.2	6.6
Smena	7-28	64	3.5	6.2
VNIIMK 89.31	7-28	70	3.4	6.0
Vostok	7-25	57	5.0	6.7

\* 1966 data from Gonvick for date flowering, height, and lodging.

† 1 erect, 9 flat.

#### Disease Reaction of Presently-Grown Varieties

All varieties except Admiral and Advent are susceptible to rust. However recommended varieties have more tolerance to rust than certain varieties used for rust experiments. Peredovik and some other high-oil Russian varieties are reported to have considerable tolerance to Verticillium. All varieties are susceptible to downy mildew and Sclerotinia.

#### DRY EDIBLE PEAS AND FIELD PEAS

Dry edible peas are sold to processors for use in soup and pigeon feed or fed on the farm to sheep, hogs, or cattle. When used for a forage or feed grain crop they are usually sown in a mixture with oats. See Minnesota Extension Bulletin 300 for more information.

#### RECOMMENDED VARIETIES

**Century**—Medium to early 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. Grow for soup market.

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

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

#### OTHER VARIETIES

**Flavanda**—Early maturity. Very large, cream-colored seed. Admitted to Dutch Variety Descriptive List in 1963. A cross of C. B. clone of blue peas x Strube Yellow Viktoria. Cebeco, Rotterdam, Holland. Large seed makes seed cost per acre high.

Table 16. Yields and other characteristics of pea varieties at Crookston, 1960-63, 1965-66

Variety	Years of trial	Seed yield per acre	Weight of 100 seeds	Seed protein*	Sowing rate per acre
		pounds	grams	percent	pounds
Century	1960-63, 1965-66	1,789	22.0	26.1	225
Chancellor	1960-63, 1965-66	1,488	13.6	27.5	124
Strål	1960-63, 1965-66	1,650	16.4	27.4	148
LSD (5%)		166			
Flavanda	1965-66	1,594	31.6	25.6	326
Imposant	1965-66	1,870	36.7	24.8	363
Victoria	1962-63, 1965-66	1,708	32.3	25.4	315

\* Dry matter basis.

**Imposant**—Early maturity. Short vined. Purple flowers. Very large, angular, tan seed. Named in 1965. Cebece, Rotterdam, Holland. Not used in the United States.

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

**Victoria**—Early maturity. Medium vine length. Very large, semi-smooth, cream-colored seed of high bushel weight. Introduced from Germany. Large seed makes seed cost per acre high.

### ALFALFA

In the past the Minnesota Agricultural Experiment Station has recommended specific alfalfa varieties. During the past several years there has been a decided increase in the number of varieties available to Minnesota growers. These varieties, released by both private and public plant breeders, represent a continuous range in winterhardiness, fall dormancy, recovery after harvest, bacterial wilt resistance, and yield. Therefore, realistic classifications of "satisfactory" and "unsatisfactory" varieties can no longer be made. The Agricultural Experiment Station will describe varieties available and present performance data that will permit an alfalfa grower to exercise his own judgement in selecting the variety which most completely suits his needs. When selecting a variety, study the data available and consider the factors indicated in light of your needs.

The following characteristics are important:

**WINTERHARDINESS**—Severe winters in Minnesota make winterhardiness a primary consideration in variety selection. Under favorable conditions, less hardy varieties will survive. But under more severe conditions, less hardy varieties will yield less than winterhardy varieties, even the first year after seeding.

**BACTERIAL WILT RESISTANCE**—This disease is prevalent in most areas of the state. Wilt-susceptible varieties generally show economic losses in stand by the end of the second year after seeding. In some cases where infection is severe, stand losses are often observed by the end of the first year after seeding. Infected plants are more susceptible to winterkilling. Stand reductions after winter are often due to a combination of wilt damage and winter injury.

**OTHER DISEASES**—Common leafspot, blackstem, and *Pseudopeziza* leafspot are other diseases of some importance in Minnesota. Losses from these diseases are more difficult to observe and do not normally destroy stands as does bacterial wilt. Resistance to these diseases is a consideration in selecting varieties, but is secondary to bacterial wilt resistance and winterhardiness.

**FORAGE YIELD**—The ultimate value of a variety depends upon total forage yield. Most varieties will yield well, but some are consistently high yielders. All varieties have an inherent yield potential which is largely influenced by inherited characteristics: for example, winterhardiness, disease resistance, and insect resistance. Environment (including soil fertility, climate, and management) also influences yield. Top yields are only obtained when all these factors are favorably combined.

The Minnesota Agricultural Experiment Station recommends the use of certified seed. Purchase of certified seed provides the best assurance of obtaining varietal purity. Numerous tests have shown that uncertified seed generally performs less consistently than certified seed. For consistent performance from year to year, insist on certified seed. A "blend" is not necessarily composed of the same sources each year. Therefore, the performance of a blend may vary from year to year. Some seed is sold on basis of area where grown (i.e. Kansas common). Seed of this type is not a variety and varies from lot to lot.

### **CLASSIFICATION OF ALFALFA VARIETIES**

Alfalfa varieties are grouped according to winterhardiness and bacterial wilt reaction. In some cases very limited data are available and classifications may be revised when more complete information is obtained.

#### **Very winterhardy, wilt-resistant varieties**

Varieties in this group are characterized by exceptional winter-

hardiness, slower recovery after cutting, early dormancy in late August, and little growth after a second harvest. First-crop yields are normally competitive with other varieties, but slow recovery makes second cuttings later than normal. The third crop is usually small due to early dormancy.

The varieties are Beaver, Norseman, Teton, and Travois.

#### **Winterhardy, wilt-resistant varieties**

This group exhibits good hardiness even under severe winter conditions. Average recovery after cutting, with normal fall re-growth and average dormancy. Bacterial wilt resistance ranges from moderately resistant varieties to high resistance in Vernal. Forage yields vary between varieties but are adequate for economic production.

Varieties in this group are Cayuga, Culver, Ladak, Progress, Ranger, Rambler, Scout, Uinta, Vernal, WL202, 522, and 525.

#### **Winterhardy, wilt-susceptible varieties**

These varieties are sufficiently hardy to survive severe winters. They maintain adequate stands when wilt is not a factor, but stands and yields will be poor when plants are infected with the wilt organism.

Varieties in this group are Atlantic, Grimm, and Narragansett.

#### **Moderately hardy, wilt-resistant varieties**

Varieties in this group are resistant to bacterial wilt but are less hardy than those in the hardy, resistant group above. Following a mild winter they will respond like the winterhardy, wilt-resistant group, but severe winter conditions will reduce stands and yields. Varieties in this group are: Buffalo, Cody, Haymore, Lahontan, Saranac, and Warrior.

#### **Moderately hardy, wilt-susceptible varieties**

This group is generally characterized by rapid recovery after harvest, late dormancy, less winterhardiness, and more fall growth than the winterhardy wilt-resistant group. Most varieties in this group are Flemish varieties introduced from Europe and are completely susceptible to bacterial wilt. When winter injury and wilt are not factors, they perform quite well. After a severe winter or when plants are infected with wilt, yields will be considerably lower. Yields the first year after seeding are normally good, but they tend to decline in succeeding years. Even the first year after seeding, yields can be low following a severe winter. Minnesota trials have seldom shown any advantage for this group, even when winter injury and wilt were not factors.

Varieties in this group are: Alfa, Altfranken-Schmidt, Arnim, Cardinal, Cherokee, DuPuits, Europa, F.D. 100, Flandria, Glacier, Milfeuil, Orchies, S.C. 118, Socheville, and W.L. 302.

#### **Nonhardy varieties**

These varieties are not sufficiently winterhardy to be grown in Minnesota except for plowdown in the seeding year.

Varieties in this group are: African, Hairy Peruvian, Moapa, and Sonora.

#### **Varieties not classified**

The following varieties have not been tested sufficiently to place them into a specific group above. As more information becomes available they will be classified.

Included are: Apex, Aphidor, Franck's Langmeiler, PAT-30, Resistador, Stride, Triesdorfer, and W.L. 303.



Alfalfa variety test—right, winterhardy variety resistant to bacterial wilt; left, less winterhardy variety susceptible to bacterial wilt.

Table 17. Forage yields expressed as percent of the average of two check varieties (Vernal and Ranger), bacterial wilt resistance, and fall dormancy of alfalfa varieties (1966 yield data from 1965 seedings)

	Crook- ston	Grand Rapids	Lam- berton	Morris	Rose- mount	Waseca	Average	Bac- terial wilt	Fall dor- mancy†
<b>Moderately Hardy Varieties‡</b>									
Alfa	100	99	102	97	112	98	101	S	3.6
Cardinal	90	94	99	92	102	99	96	S	3.2
DuPuits	108	95	88	101	109	103	101	S	3.0
Europa	90	95	99	100	109	103	98	S	3.3
F.D. 100	97	93	105	100	109	103	101	S	3.5
Flandria§	89	96	102	98	106	100	97	S	2.7
Glacier	110	96	99	98	109	100	102	S	4.4
Haymore	87	103	112	99	105	102	101	MR	4.3
Orchies	105	96	99	94	105	97	99	S	3.5
Saranac	97	101	114	100	109	107	105	VR	4.5
S.C. 118	89	96	112	97	106	108	101	S	2.9
Socheville§	-	-	-	-	-	-	-	S	3.4
Warrior	101	104	102	98	107	101	102	MR	4.3
W.L. 302	92	96	91	97	106	100	97	S	3.9
Ranger ✓	101	94	96	96	94	97	96	R	5.4
Vernal ✓	99	106	103	103	106	103	103	VR	6.5
LSD (5%)	N.S.	9	18	10	7	11			.5
Average of checks in tons per acre	4.40	3.64	3.47	5.13	5.05	4.65	4.39		
<b>Hardy Varieties †</b>									
Altfranken-Schmidt	123	96	108	-	102	101	106	S	4.4
Arnim	105	102	116	-	106	94	105	S	4.7
Beaver	104	101	108	-	107	98	104	R	7.4
Cayuga	99	107	108	-	95	98	101	R	5.1
Culver	98	103	109	-	99	98	101	R	6.7
Franck's Langmeiler	110	102	121	-	107	98	108	S	4.8
Narragansett	114	107	104	-	100	100	105	S	5.9
Norseman	111	105	100	-	-	105	104	R	7.9
Progress	95	105	99	-	100	101	100	R	5.4
Ranger ✓	96	97	101	-	96	93	97	R	5.4
Scout	-	-	-	-	97	-	-	MR	5.8
Vernal ✓	104	103	99	-	104	107	103	VR	6.5
W.L. 202	108	102	93	-	102	97	100	R	6.0
552	105	96	111	-	102	102	103	R	5.3
525	113	107	104	-	106	94	105	R	5.7
LSD (5%)	16	13	24	-	7	10			.5
Average of checks in tons per acre	3.91	3.70	3.27	-	5.28	4.84	4.20		
<b>Very Hardy Varieties‡ £</b>									
Beaver					97				
Norseman					102				
Teton					87				
Travois					88				
Ranger ✓					95				
Vernal ✓					105				
LSD (5%)					7				
Average of checks in tons per acre					4.07				

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

† Fall growth recorded 10-11-66: 9 = 0-2 inches, 8 = 2-4 inches, 7 = 4-6 inches, 6 = 6-8 inches, 5 = 8-10 inches, 4 = 10-12 inches, 3 = 12-14 inches, 2 = 14-16 inches in height.

‡ Varieties were classified into (3) trials according to available information. The same check varieties were used in each trial. Therefore, check yields are not necessarily the same for each group.

§ Land races of Flemish type used as variety designation in this country.

✓ Check varieties.

£ Only two cuttings from these varieties.



## BIRDSFOOT TREFOIL

### RECOMMENDED VARIETIES

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

### VARIETIES NOT ADEQUATELY TESTED

**Leo**—Bred at MacDonald College, Quebec, Canada. Outstanding seedling vigor and high forage yield.

**Tana**—Developed at the Montana Agricultural Experiment Station.

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

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

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

### OTHER VARIETIES

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

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

Table 18. Average forage yields of red clover first crop year in tons per acre for 1956-66\*

Variety	Rose- mount	Wa- seca	Mor- ris	Crook- ston	Grand Rapids	Du- luth	Avg.
Dollard	3.47	2.10	2.52	1.61	2.83	3.03	2.59
Lakeland	3.47	2.20	2.60	1.43	2.72	3.10	2.59
Kenland	3.62	1.99	2.51	1.36	2.74	3.07	2.54
Pennscott	3.51	2.05	2.41	1.35	3.01	2.54	2.47

\* Not all stations represented in all years

## SWEETCLOVER

### RECOMMENDED VARIETIES

**Evergreen**—A white-blossomed, biennial sweetclover introduction from Ohio. It produces a larger growth than common types the fall of the first year, is a heavy forage producer the second year, and comes to full bloom 2 or 3 weeks later than common types. Therefore, it has a longer grazing season.

Table 19. Average yields of brome grass varieties in tons per acre

	Rosemount 1963, 1965-66	Waseca 1963, 1966	Lamberton 1963-66	Morris 1963-64, 1966	Grand Rapids 1963-66	Duluth 1963-64	4-Year state average
Sac	4.41	2.62	4.95	2.62	3.46	3.88	3.76
Saratoga	4.37	2.53	4.75	2.72	3.34	4.11	3.72
Achenbach	4.23	2.67	4.94	2.52	3.39	4.04	3.72
Lincoln	4.44	2.69	3.99	2.53	3.33	3.79	3.51
Common	4.38	2.57	4.64	2.69	3.28	3.61	3.62

**Goldtop**—Bred at the Wisconsin Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. 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 is similar to common types.

### VARIETIES NOT ADEQUATELY TESTED

**Cumino**—A white-blossomed 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 Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. Has looked promising in 2 years of tests, but not as vigorous as Goldtop.

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

## BROMEGRASS

### RECOMMENDED VARIETIES

**Achenbach**—A naturalized southern strain from the farm of Achenbach brothers in Washington County, Kansas. Improved by mass selection and introduced by the Kansas Agricultural Experiment Station. In regional tests the highest forage yielder in the northern part of the north central region.

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

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

### VARIETIES NOT ADEQUATELY TESTED

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

**Saratoga**—Selected at the New York Agricultural Experiment Station from a wide collection of seedlots obtained from plant breeders in the United States. Synthetic variety of five clones. Equal to Lincoln in yield in New York.

## TIMOTHY

### RECOMMENDED VARIETIES

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

**Itasca**—A composite of seven inbred lines selected at the Minnesota Agricultural Experiment Station. Good forage and seed yield. 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 yield. Approximately a week later in maturity than Itasca and commercial.

Table 20. Yields and time of bloom of timothy varieties

	Forage yields, tons/acre						
	Rosemount 1962-66	Waseca 1962, 63	Lamberton 1963-65	Morris 1963, 65	Crookston 1962, 65-66	Grand Rapids 1963, 65	5- year state average
Climax	2.27	2.38	3.36	2.73	2.31	3.37	2.73
Itasca	2.45	2.33	2.95	2.91	2.00	3.36	2.66
Drummond	1.99	2.16	2.63	2.33	1.74	3.08	2.32
Essex	2.24	2.04	2.44	2.60	2.13	3.08	2.42

	Seed yields, pounds/acre				Maturity Rosemount, % bloom July 1, 1964
	Rosemount 1964	Grand Rapids 1964	Grand Rapids 1966	State average	
Climax	427	242	324	331	8*
Itasca	334	194	252	260	27
Drummond	395	265	245	301	0
Essex	273	224	212	236	10

\* In other observations Climax was closer to Itasca in time of bloom.

**OTHER VARIETIES**

**Engmo**—The best adapted forage variety for Alaska conditions. May be useful for future seed production in Minnesota.

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

**Drummond**—Selected at MacDonal College, Quebec. Winter-hardy with an appreciable amount of rust resistance.

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

**Wisconsin T**—A late variety bred at the Wisconsin Agricultural Experiment Station, Madison.

**Milton**—Selected at MacDonal College, Quebec. It is winter-hardy and early maturing.

**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.

**SUDANGRASS, SORGHUM-SUDAN, AND SWEET SORGHUM**

Sudangrass and sorghum-sudan hybrids were solid-seeded in 1966 at 30 pounds per acre with ample P and K fertilizer plus the equivalent of 100 pounds N per acre. They were evaluated at the green-chop stage. Sweet sorghums were grown in 40-inch rows with similar fertilization and harvested at the silage stage.

The green-chop yields of the sudans and sorghum-sudans was considerably better in 1966 than in 1965 because of the much warmer weather of 1966. This was particularly true of the North Central Experiment Station, Grand Rapids, where only one cutting was obtained in 1965. Two cuttings were obtained at all stations in 1966. Prussic acid (HCN) contents as measured at Rosemount were lower for the sudans than the sorghum-sudans.

In the sweet-sorghum trials harvested at the silage stage, wide differences in maturity were observed, as shown by the percent composition and maturity. Since the heads and leaves are considered to be more nutritious than the stems, the percentages of these are an indication of the nutritive value. Corn produced a higher yield of ears plus leaves than did the sorghums (heads plus leaves).



Plots of sudangrass, sudangrass hybrids, and sorghum-sudan hybrids as they appeared in July 1966 at the North Central Experiment Station, Grand Rapids. Rye is the grain crop in the background.

Table 21. Yield and other characteristics of sudan and sorghum-sudan hybrids at a stage to simulate green feeding (first cut about 4 feet tall)

Variety or cross and Co.	Tons dry matter per acre						Mg. HCN per 100 gm. D.M.		% protein		Recovery	
	4-station average 1965	1966				4-station average	Rosemount		1st cut		after cut*	
		Rosemount	Waseca	Morris	Grand Rapids		1965	1966	1965	1966	1965	1966
<b>Sudans</b>												
Piper	1.95	2.96	2.67	4.62	2.56	3.20	10	10	10.5	17.4	80	74
Trudan II, Northrup King	1.97	3.16	2.91	5.28	2.88	3.56	13	12	10.8	17.4	78	70
Trudan IV, Northrup King	-	3.57	3.02	5.25	2.32	3.54	-	18	-	17.2	-	75
<b>Sorghum-Sudan Hybrids</b>												
Sordan, Northrup King	1.88	3.50	2.87	5.01	2.47	3.46	24	26	10.8	18.3	60	59
Grazemaster, Taylor Evans	1.97	3.12	2.92	5.15	2.28	3.37	42	32	10.7	17.9	51	60
Haygrazer, Taylor Evans	1.98	3.66	3.43	5.80	2.49	3.85	19	32	10.7	17.7	57	66
Sweet Sioux, Paymaster	2.12	3.77	3.49	5.35	2.30	3.73	23	23	9.9	18.0	61	65
Thunderbird, Paymaster	1.95	3.19	2.34	4.37	2.18	3.02	25	19	11.5	18.1	63	61
Orbit, Asgrow	-	3.56	2.79	5.01	2.12	3.37	-	26	11.6	18.7	-	65
Grazer A, Asgrow	1.97	3.11	2.84	5.14	2.48	3.39	23	19	11.3	18.3	62	65
FS 550, Midw. Res. Assoc.	-	3.32	3.30	5.05	2.56	3.56	-	18	-	17.7	-	60
SX-5, DeKalb	-	3.46	3.89	5.63	2.66	3.91	-	21	-	18.7	-	66
SX-6, DeKalb	-	4.04	3.62	5.67	2.81	4.03	-	30	-	16.8	-	66
SX-11, DeKalb	1.79	3.17	2.65	4.64	1.99	3.11	43	31	11.0	17.6	56	58
X1733, DeKalb	2.14	3.86	3.22	5.38	2.62	3.77	24	24	-	17.2	66	68
RP Mor Su, Rudy Patrick	2.19	3.39	2.87	5.28	2.58	3.53	26	26	-	17.2	56	66
Rancher 555, Midw. Res. Assoc.	-	3.32	2.66	5.10	2.30	3.35	-	25	-	18.6	-	66
Hidan 35, Frontier	2.05	3.49	2.98	5.41	2.39	3.57	15	17	10.9	17.8	60	61
Hidan 39, Frontier	-	3.66	3.30	5.72	2.68	3.84	-	16	-	16.9	-	68
77F, Lindsey Funk	2.00	3.53	2.92	4.86	2.13	3.36	28	25	10.2	17.1	61	61
Chowmaker, Excel	1.78	3.26	3.70	5.67	2.22	3.71	29	25	10.5	16.9	58	63
985, Pioneer	2.10	3.18	2.87	5.22	2.35	3.41	32	19	10.7	18.6	64	59
Master Farmer, Farmer S. & N.	-	3.54	3.21	5.50	2.53	3.70	-	31	-	17.9	-	63
FFR 66, Farm Forage Res.	-	3.25	3.72	5.51	2.47	3.74	-	27	-	18.4	-	69
Greenlan, Coladino	2.23	3.16	3.20	5.50	2.77	3.66	23	31	12.3	17.1	53	69
N280, Nebraska	-	3.53	3.62	5.31	2.50	3.74	16	15	11.6	18.0	58	63
Land O'Lakes, Land O'Lakes	1.79	3.67	3.17	5.30	2.33	3.62	22	17	9.3	18.5	59	60

\* Percent ground cover 10 days after cut.

Table 22. Yield and other characteristics of sweet sorghums (corn check) grown in 40-inch rows and harvested at the silage stage

Company and sorghum		Tons dry matter per acre*				% composition, Rosemount			Maturity 1966†		Height inches 1966	
		1965		1966		Heads or ears	Leaves	Stems	Rosemount	Lamberton	Rosemount	Lamberton
		Rosemount	Lamberton	Rosemount	Lamberton							
<b>Sorghum</b>												
Taylor Evans	Silomaker	5.08	6.73	5.82	5.88	18	33	49	M	EM	79	93
Taylor Evans	Yieldmaker	4.66	6.11	5.56	7.70	11	32	57	P	EM	96	116
Taylor Evans	Goldmaker	-	-	5.45	6.43	19	26	55	SD	M	88	101
Taylor Evans	Yieldmaker A	5.12	6.46	5.78	6.93	16	33	52	PP	EM	83	89
Paymaster	3 Little Indians R	3.98	5.09	3.85	6.29	33	25	42	M	HD	68-112	119
Paymaster	Cropguard	4.90	6.23	5.64	5.07	10	29	61	M	EM	96	106
Northrup King	315	5.02	5.87	5.25	7.51	17	33	50	M	M	94	104
Asgrow	Beefbuilder	-	-	5.87	9.12	7	36	57	PP	H	100	117
Asgrow	Titan R	-	-	5.12	6.37	15	30	55	SD	M	95	105
Midw. Res. Assoc.	FS 445	-	-	4.12	5.67	19	25	56	M	M	85	97
Midw. Res. Assoc.	FS 500	-	-	6.53	6.85	9	31	60	M	EM	107	128
DeKalb	FS-1a	4.53	5.48	4.95	4.78	21	36	42	M	EM	73	80
Rudy Patrick	RP 30F	5.43	6.10	4.89	7.27	13	26	61	M	D	89	99
Frontier	S 205	-	-	4.53	5.42	36	21	43	SD	HD	103	91
Lindsey Funk	92 F	4.63	5.82	5.37	7.60	20	26	54	SD	EM	103	107
Lindsey Funk	101 F	4.99	6.39	5.82	6.43	14	33	53	M	EM	87	90
Pioneer	936	-	-	6.19	8.31	11	36	53	P	M	126	155
Pioneer	931	6.25	8.31	6.41	9.16	10	37	53	P	EM	123	159
<b>Corn</b>												
3 corn hybrids (late planted)		-	-	5.46	6.16	44	28	28	1/3 dent	dent	92	99
3 corn hybrids (early planted)		-	-	5.43	6.34	47	32	21	1/3 dent	dent	93	98

† All harvested prior to last killing frost.

† Maturity—Headed (H), pollen shedding (P), past pollen (PP), early milk (EM), milk (M) soft dough (SD), dough (D), hard dough (HD).

## RATE AND DATE OF SOWING

Rates are based on average seedbed and on use of good quality seed of high germination. Use high rate for large-seeded and low rate for small-seeded recommended varieties. Increase rate for seed of low germination.

Crop	Bushel weight* in pounds	Rate per acre in pounds	Date
Barley † .....	48	72-96	Early spring
Corn † .....	56	8-14	Early May
Flax † .....	56	42-56	April 15 to May 15
<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		Early spring or fall:
Alone or with timothy .....		6-8	after freezeup
<b>Forage Legumes (biennial or perennial)</b>			
Alfalfa .....	60		With companion grain
Alone .....		8-12	or flax, early spring;
With grasses .....		5-8	or alone before Aug. 10
Birdsfoot trefoil .....	60	3-6	Early spring
Clover .....	60		Early spring
Red (in mixture) .....		4-8	
Alsike (in mixture) .....		2-4	
Ladino (in mixture) .....		1/2-1	
Sweet Clover .....	60		Early spring
Alone .....		10-12	
In mixture .....		2-4	
Oats † .....	32	64-80	Early spring
Rye .....	56	70-90	Aug. 1 to Sept. 10 for pasture. Aug. 25 to Sept. 30 for seed
Sorghum † .....	50 (sweet)		In warm soil, May 25 to June 15
Corn planter rows .....	56 (grain)	5-10	
"Solid" drilled .....		8-20	
With 1 1/2 bushel soybeans .....		10	
Sudangrass .....	40		In warm soil, May 20 to June 20
Rows .....		10-20	
Broadcast .....		25-30	
With 1 1/2 bushels of soybeans .....		10	
Soybeans † .....	60		In warm soil after May 1
"Solid" drilled .....		120 (4 seeds/ft.)	
20-inch rows .....		90 (10 seeds/ft.)	
30-inch rows .....		75 (11 seeds/ft.)	
40-inch rows .....		60 (12 seeds/ft.)	
Wheat † .....	60		
Hard Red Spring .....		75-90	Early spring
Durum .....		90	Early spring
Winter .....		75-90	Aug. 20 to Sept. 20
<b>Miscellaneous Crops</b>			
Field peas † .....	60		Early spring
Alone .....		120-225	
With 1 1/2 to 2 bushels of oats .....		45-90	
Sunflowers .....	24	4-8	May 1-25
Millet .....	48-56	20-40	June 15 to July 15
Mustard and oilseed rape .....	50-58	10	May 1 - June 15
Navy beans † .....	60	40	May 20 to June 15
Pinto beans † .....	60	60-80	May 20 to June 15
Rape for forage .....	50	4-6	Early spring with oats
Buckwheat .....	48-50	40-48	June 15 to July 15

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

† Use fungicide seed treatment.