

1975 EDITION  
REVISED DECEMBER 1975

# VARIETAL TRIALS OF FARM CROPS

MISCELLANEOUS REPORT 24 — AGRICULTURAL EXPERIMENT STATION — UNIVERSITY OF MINNESOTA



in the Minnesota Registered and Certified Seed Directory for 1976 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul, Minnesota 55108, or from county extension agents' offices.

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Information on the reaction of varieties to specific pathogens was largely obtained by the following members of the Department of Plant Pathology: F.I. Frosheiser, alfalfa; B.W. Kennedy, soybeans; D.V. McVey, wheat; A.P. Roelfs, barley, oats, and wheat; P.G. Rothman, oats; R.D. Wilcoxson, barley, wheat, and oats.

Field work of the variety trials at Waseca, Lamberton, Morris, Crookston, and Grand Rapids was supervised by W.E. Lueschen, J.H. Ford, D.D. Warnes, L.J. Smith, and D.L. Rabas, respectively.

## BARLEY

### RECOMMENDED VARIETIES

**Beacon** — Medium yield. Early, good resistance to lodging. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by Malting Barley Improvement Association (MBIA). Resistant to prevalent leaf spotting diseases, stem rust and loose smut. Developed by North Dakota Agricultural Experiment Station from a cross between Conquest and Dickson. Released in 1973.

**Bonanza** — Medium yield. Later maturing than other recommended varieties. Six-row, semi-smooth awn, long rachilla hairs, blue aleurone. Classified as a malting variety by MBIA. Resistant to loose smut. Developed by Agriculture Canada, Brandon, from a cross involving Vantage, Jet, Vantmore, Parkland, and Conquest. Licensed in 1970.

**Larker** — Medium yield. Six-row, semi-smooth awn, long rachilla hairs, colorless aleurone. Excellent kernel plumpness. Classified as a malting variety by MBIA. Susceptible to loose smut and leaf spotting diseases. Developed by North Dakota Agricultural Experiment Station from a cross of Traill and a selection from UM 570. Released in 1961.

**Manker** — High yield. Medium early, good lodging resistance. Intermediate in kernel plumpness. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by MBIA. Good leaf spotting resistance, susceptible to loose smut. Resulted from cross involving Cree, M2, Vantage, Kindred, and Jotun. Released by Minnesota Agricultural Experiment Station in 1974.

### OTHER VARIETIES

**Conquest** — Medium yield, good lodging resistance. Six-row, smooth-awn, long rachilla hairs, blue aleurone. Classified as a malting variety by MBIA. Resistant to loose smut. Developed by Agriculture Canada, Brandon, from crosses involving Vantage, Jet, Vantmore, Br. 4634-4456, UM 570, and Parkland. Released in 1965.

**Cree** — High yield, medium in maturity and lodging. Kernel plumpness low. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a nonmalting variety by MBIA. Resistant to loose smut, moderately resistant to leaf spotting diseases. Developed at Minnesota Agricultural Experiment Station from crosses involving Traill, Br. 5750-2 and Dickson. Released in 1972.

**Dickson** — Medium yield and lodging resistance. Kernel plumpness low. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by MBIA. Resistant to leaf diseases, susceptible to loose smut. Developed by North Dakota Agricultural Experiment Station from crosses involving Traill, Kindred, and CI 7117-77. Released in 1964.

**Nordic** — Medium-high yield. Medium lodging resistance. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a nonmalting variety by MBIA. Resistant to leaf spotting diseases, including Septoria leaf blotch. Developed by North Dakota Agricultural Experiment Station from crosses of Dickson, CI 4738, Traill, and UM 570. Released in 1971.

**Primus II** — Medium-high yield. Early. Good kernel plumpness. Six-row, smooth-awn, long rachilla hairs, colorless aleurone. Classified as a nonmalting variety by MBIA. Susceptible to prevalent diseases, except stem rust. Developed by South Dakota Agricultural Experiment Station from crosses of Brandon 3902, Liberty, and Swan. Released in 1966.



Manker malting barley variety is examined by agronomist D.D. Warnes.

Table 1. Yield of barley varieties in bushels per acre, 1971-1975

Variety or selection	Morris 8 <sup>1</sup>	Crookston 8	Stephen 3	St. Paul 3	Lamberton 3	Average (25 Trials)
Beacon	56	72	46	60	74	63
Larker	54	73	43	59	77	62
Manker	60	74	42	65	75	65
Cree	55	77	56	66	78	66
Nordic	61	72	44	63	70	64
Bonanza	56	74	48	60	70	63
LSD 5%	5	4	3	5	7	2

<sup>1</sup> Number of trials.

Table 2. Characteristics of barley varieties

Variety	Heading (June)	Height (inches)	Lodging (percent)	Plump kernels (percent)	Reactions to Disease <sup>1</sup>		
					Stem rust	Loose smut	Spot blotch
Beacon	20	33	26	55	R	R	R
Larker	22	32	40	71	R	S	S
Manker	21	32	27	58	R	S	R
Cree	22	31	38	45	R	R	MR
Nordic	22	33	37	64	R	S	R
Bonanza	24	35	30	57	R	R	S

<sup>1</sup> R = resistant, MR = moderately resistant, S = susceptible.

## OATS

### RECOMMENDED VARIETIES

**Chief** — Early-medium maturity, high yield, medium height, good lodging resistance, high test weight and groat percentage, medium protein content, yellow seed. Susceptible to crown rust. Selected at South Dakota Agricultural Experiment Station from a cross between Clintland 64 and Garland. Released in 1972.

**Dal** — Late, medium yield and height, fair lodging resistance, high test weight, medium groat percentage, high protein content, ivory seed. Resistant to crown rust and smut. Selected at Wisconsin Agricultural Experiment Station from a cross involving Trispernia, Belar and Beedee. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

**Froker** — Late, high yield, medium height, good lodging resistance, high test weight and groat percentage, medium protein content, yellow seed. Susceptible to crown rust and smut. Selected at Wisconsin Agricultural Experiment Station from a cross involving sister lines of Beedee and Garland, and a foreign introduction. Released in 1970.

**Lodi** — Late, high yield, tall, fair lodging resistance, medium test weight, groat percentage and protein content, white seed. Susceptible to crown rust. Selected at Wisconsin Agricultural Experiment Station from a cross involving several lines. Released in 1963.

**Noble** — Early-medium maturity, high yield, medium height, good lodging resistance, medium test weight, low groat percentage, medium protein content, yellow seed. Susceptible to crown rust. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

**Otee** — Early-medium maturity, high yield, medium height, good lodging resistance, high test weight, medium groat percentage, high protein content, white seed. Susceptible to crown rust, tolerant to red leaf. Selected at Illinois Agricultural Experiment Station from a cross involving several lines. Released in 1973.

**Stout** — Early-medium maturity, high yield, short, good lodging resistance, medium test, high groat percentage, medium protein content, white seed. Some resistance to crown rust. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

### VARIETIES NOT ADEQUATELY TESTED

**Goodland** — Late, low yield, medium height, good lodging resistance, medium test weight and groat percentage, high protein content, yellow seed. Resistant to crown rust and smut. Selected at Wisconsin Agricultural Experiment Station from a cross of several lines, including Garland. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

**Hudson** — Late, high yield, medium height, poor lodging resistance, low test weight, medium groat percentage, low protein content, white seed. Resistant to crown rust. Selected by Agriculture Canada, Winnipeg, from a cross involving several lines. Licensed in 1974.

**Korwood** — Late, high yield, medium height, poor lodging resistance, medium test weight, high groat percentage, medium protein content, white seed. Susceptible to crown rust and smut. Selected at Michigan Agricultural Experiment Station from a cross involving several lines. Released in 1974.

**Spear** — Early-medium maturity, high yield, medium height, good lodging resistance; medium test weight, groat percentage, and protein content; white seed. Susceptible to crown rust. Selected at South Dakota Agricultural Experiment Station from a cross between Neal and Clintland 64. Released in 1974.

**Wright** — Late, medium yield and height, poor lodging resistance, high test weight, medium groat percentage and protein content, tan seed. Selected at Wisconsin Agricultural Experiment Station from a Beedee backcross. Released in 1975.

### OTHER VARIETIES

**Diana** — Early-medium maturity, high yield, medium height, good lodging resistance, high test weight and groat percentage, medium protein content, yellow seed. Susceptible to crown rust. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1970.

**Garland** — Early-medium maturity, medium yield, short, poor lodging resistance, high test weight and groat percentage, yellow seed. Susceptible to crown rust, resistant to smut. Selected at Wisconsin Agricultural Experiment Station from a cross involving several lines. Released in 1962.

**Grundy** — Early, medium yield, short, poor lodging resistance, high test weight and groat percentage, yellow seed. Susceptible to crown rust. Selected at Iowa Agricultural Experiment Station from the cross Clintland x Garry-5. Released in 1971. Seed sale regulated by U.S. Variety Protection Act.

**Harmon** — Late, medium yield, tall, poor lodging resistance, low test weight and groat percentage, white seed. Susceptible to crown rust. Selected by Agriculture Canada, Winnipeg, Canada, from a cross involving several lines. Licensed in 1965.

**Holden** — Medium maturity, high yield, medium height, good lodging resistance, high test weight and medium groat percentage, yellow seed. Susceptible to crown rust. Selected at Wisconsin Agricultural Experiment Station from the same cross as Garland. Released in 1966.

**Iowa Early Multiline Blend (E73 and E74)** — Early, low yield, medium height, good lodging resistance, high test weight and groat percentage, medium protein content, yellow seed.

Heterogeneous crown rust reaction, susceptible to smut. The recurrent parent is C.I. 7970. Developed at Iowa Agricultural Experiment Station and originally released in 1968.

**Iowa Midseason Multiline Blend (M73)** — Early-medium maturity, medium yield and height, fair lodging resistance, high test weight and groat percentage, medium protein content, yellow seed. Heterogeneous reaction to crown rust, susceptible to smut. The recurrent parent is C.I. 7555, a Clintland type. Developed at Iowa Agricultural Experiment Station and originally released in 1968.

**Otter** — Medium maturity, high yield, short, good lodging resistance, medium test weight and high groat percentage, white

seed. Some resistance to crown rust. Selected at Minnesota Agricultural Experiment Station from crosses involving several lines. Released in 1970.

**Portal** — Medium-late maturity, high yield, medium height, fair lodging resistance, high test weight and groat percentage, yellow seed. Some resistance to crown rust. Selected at Wisconsin Agricultural Experiment Station from the cross PI 174544 x Garland. Released in 1966.

**Rodney** — Late, medium yield, tall, poor lodging resistance, medium test weight, white seed. Some resistance to crown rust. Selected by Agriculture Canada, Winnipeg, from a cross involving several lines. Licensed in 1952.

Table 3. Yield of oat varieties in bushels per acre, 1973-75

Variety	Rosemount	Waseca	Lamberton	Morris	Crookston	Grand Rapids	Average
E73 or 74	74	91	79	75	77	70	78
Diana	84	95	104	86	87	78	89
Otee	88	104	97	83	82	76	88
Chief	95	109	93	86	87	81	92
M73	89	93	86	89	80	79	86
Noble	90	109	103	98	93	83	96
Spear <sup>1</sup>	97	104	106	94	88	71	93
Stout	92	108	101	90	95	78	94
Goodland <sup>1</sup>	85	84	76	71	75	62	76
Korwood <sup>1</sup>	89	111	95	88	90	75	91
Wright <sup>1</sup>	86	98	93	82	91	67	86
Froker	93	105	98	92	90	75	92
Dal	83	98	91	87	81	75	86
Hudson <sup>2</sup>	97	107	76	76	102	88	91
Lodi	88	106	95	92	96	82	93
LSD 5%	7	8	9	8	6	8	3

<sup>1</sup> 1974-75.      <sup>2</sup> 1975.

Table 4. Characteristics of oat varieties, 1973-75

Variety	Heading (date)	Height (inches)	Lodging (score) <sup>1</sup>	Test weight/bushel (pounds)	Groat (percent)	Groat protein (percent)	Protein/acre (pounds)	Reactions to disease	
								Crown rust <sup>2</sup>	Smut <sup>3</sup> (percent)
E73 or 74	6-23	34	1.4	40.4	74.8	18.0	338	50MR-MS, TrR	30
Diana	25	35	1.4	39.6	73.5	19.7	413	80S	25
Otee	25	34	1.2	39.4	73.3	20.3	425	100S	15
Chief	26	36	1.7	39.2	75.9	18.6	414	100S	20
M73	26	36	1.9	39.1	75.0	18.6	380	50MR-MS, TrR	30
Noble	26	34	1.4	38.5	72.0	18.0	401	100S	12
Spear <sup>4</sup>	26	36	1.6	37.1	73.5	19.3	427	100S	20
Stout	26	31	1.2	38.4	74.9	17.9	402	50R-MR	10
Goodland <sup>4</sup>	29	34	1.6	37.1	73.6	20.8	372	50R-MR	0
Korwood <sup>4</sup>	29	37	2.4	37.5	74.8	17.9	392	100S	40
Wright <sup>4</sup>	29	38	2.8	39.2	74.2	18.5	385	50R-MR	7
Froker	30	38	1.6	39.8	75.0	17.9	394	50MS-S	50
Dal	7-1	37	1.9	39.3	74.3	19.7	404	50R-MR	0
Hudson <sup>5</sup>	1	36	3.6	33.1	73.7	15.9	360	60R-MR	—
Lodi	1	41	2.0	38.2	73.4	18.1	401	100S	6

<sup>1</sup> 1 = erect, 5 = flat.

<sup>2</sup> 1975. R = resistant, MR = moderately resistant, MS = moderately susceptible; letters separated by commas indicate both kinds of plants in the variety.

<sup>3</sup> Numbers indicate percentage susceptible plants in smut nursery in 1974.

<sup>4</sup> 1974-75.

<sup>5</sup> 1975.

# WINTER RYE

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

## RECOMMENDED VARIETIES

**Cougar** — Medium yield, winterhardy (only fair hardiness in eastern Minnesota trials), late, medium height. Fair lodging resistance. Small seed of green and tan color, and medium test weight. Originated by University of Manitoba from an open-pollinated selection in a composite cross of European and Canadian varieties. Licensed in 1967.

**Rymin** — High yield, fair winterhardiness, medium late, medium height. Good lodging resistance. Large plump seed of predominantly greenish-gray color and high test weight. Originated by Minnesota Agricultural Experiment Station from a cross of Von Lochow and WR5. Released in 1973.

## VARIETIES NOT ADEQUATELY TESTED

**Kustro** — High yield, poor winterhardiness, late, short. Excellent lodging resistance. Large seed of predominantly greenish-gray color and high test weight. Developed in Germany and named about 1970. Licensed in Canada in 1971.

**Puma** — Medium yield, good winterhardiness, late, medium height. Fair lodging resistance. Small seed of predominantly green color and medium test weight. Winterhardy selection from Dominant by University of Manitoba. Licensed in 1972.

## OTHER VARIETIES

**Coloma** — Medium yield, winterhardy, medium maturity, tall. Good lodging resistance. Medium size seed of tan color ("white") and low test weight. Originated by Wisconsin Agricultural Experiment Station from five selfed plants from crosses of inbred lines of Adams. Released in 1970.

**Frontier** — Medium yield, very winterhardy, medium maturity, tall. Poor lodging resistance. Small seed of predominantly blue-gray color and high test weight. Developed by Agriculture Canada, Swift Current, from a cross of Dakold 23 and Petkus. Licensed in 1965. *If winterhardiness is of primary concern, grow Frontier instead of the recommended varieties.*

**Kodiak** — Medium yield, winterhardy, medium maturity, tall. Poor lodging resistance. Medium size seed of light tan color and low test weight. Selected from Sangaste by University of Alberta. Licensed in 1971.

**Von Lochow** — High yield, fair to poor winterhardiness, late, medium height. Good lodging resistance. Large seed of predominantly green color and high test weight. Obtained from F. Von Lochow-Petkus Ltd. of Germany in 1958. Released by Minnesota Agricultural Experiment Station in 1964.



Agronomist R.G. Robinson between plots of the high yielding rye varieties — Rymin and Kustro. But the thin stand of Kustro illustrates its poor winterhardiness.

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

Variety	Rosemount 1970-75	Morris 1970-75	Grand Rapids 1970-75	Average of 3 locations	Crookston 1975
Cougar	46	48	43	46	35
Rymin	57	50	52	53	40
Von Lochow	58	45	47	50	35
LSD 5%	2	3	3	2	10
Puma <sup>1</sup>	47	47	48	47	36
Kustro <sup>2</sup>	58	51	30	46	32

<sup>1</sup> 1973-75.      <sup>2</sup> 1974-75.

Table 6. Characteristics of winter rye varieties, 1970-75

Variety	Winterkill (percent)	Heading (June)	Mature (July)	Lodging (score) <sup>1</sup>	Height (inches)	Weight/100 seeds (grams)	Test weight/bushel (pounds)
Cougar	8	5	23	3.6	49	2.4	54.1
Rymin	5	3	22	2.7	51	2.9	55.7
Von Lochow	10	3	23	3.1	52	2.9	55.7
Puma <sup>2</sup>	8	3	22	3.9	52	2.4	54.7
Kustro <sup>3</sup>	21	5	24	1.9	48	2.8	55.8

<sup>1</sup> 1 = erect, 9 = flat.      <sup>2</sup> 1973-75.      <sup>3</sup> 1974-75.

# HARD RED SPRING WHEAT

## RECOMMENDED VARIETIES

**Era** — Awned, midseason to late semidwarf with high lodging resistance. Resistant to stem and leaf rust. Tolerant of Septoria, bunt, and ergot. Very high yield and high test weight. Milling characteristics are satisfactory. Protein content and bake absorption are low. Selected from crosses involving Frontana, Thatcher, Mida, Kenya 117A, Kenya 58, Lee, Newthatch, Pembina, and Polk "sib." Released by Minnesota Agricultural Experiment Station in 1970.

**Kitt** — Awned, midseason to late semidwarf with high lodging resistance. Resistant to stem rust and has broader spectrum of resistance to leaf rust than Chris and Era. Tolerant of black chaff, bacterial leaf blight, ergot, and loose smut. Very high yield and medium to low test weight. Milling characteristics are satisfactory. Protein content and bake absorption are lower than Chris, but better than Era. Selected from crosses involving Frontana, Thatcher, Mida, Kenya 117A, Kenya 58, Lee, Newthatch, Pembina, and Polk "sib." Released by Minnesota Agricultural Experiment Station and ARS-USDA in 1975.

**Olaf** — Awned, semidwarf, medium maturity with high lodging resistance. Resistant to stem and leaf rust. High yield and medium test weight. Protein content and bake absorption are lower than Chris, but better than Era. Tendency to have long dough mixing requirements. Selected from crosses involving Conley, Justin and Waldron. Released by North Dakota Agricultural Experiment Station in 1973.

**World Seeds 1809** — Awnless, early semidwarf with high lodging resistance. Resistant to stem and leaf rust but susceptible to loose smut. High yield and medium test weight. Milling characteristics are satisfactory. Protein content and bake absorption are lower than Chris, but better than Era. Released by World Seeds Inc. in 1970. Seed sale regulated by U.S. Variety Protection Act.

## VARIETIES NOT ADEQUATELY TESTED

**Bounty 309** — Awned, medium to early maturing semidwarf with high lodging resistance. Moderately susceptible to leaf rust. Moderately resistant to stem rust if planted early; moderately susceptible to stem rust if planted late. Preliminary data show high yield and medium test weight. Insufficient data on milling and baking characteristics. Developed by Cargill, Inc., and approved

for certification in 1972. Seed sale regulated by U.S. Variety Protection Act.

**Glenlea** — Awnless, medium height and maturity with high lodging resistance. Resistant to stem rust, but moderately susceptible to leaf rust. Preliminary data show high yield and medium test weight with very large kernels. Insufficient data on milling and baking characteristics. Developed by University of Manitoba. Licensed in 1972.

**Nowesta** — Awned, medium height, maturity, and lodging resistance. Moderately susceptible to leaf rust and moderately resistant to stem rust. Medium to high yield and medium test weight. Insufficient data on milling and baking characteristics. Selected as an individual plant from the variety Waldron. Originated in Drayton, North Dakota.

**Produx** — Awned, semidwarf, medium maturity with high lodging resistance. Susceptible to leaf rust, but resistant to stem rust. Preliminary data show high yield and medium to low test weight. Insufficient data on milling and baking characteristics. Developed by Northrup, King & Co. and approved for certification in 1974. Seed sale regulated by U.S. Variety Protection Act.

**Profit 75** — Awned, early semidwarf with high lodging resistance. Resistant to stem and leaf rust. Preliminary data show high yield and medium test weight. Insufficient data on milling and baking characteristics. Released by World Seeds Inc., Oceanside, California, in 1974. Seed sale regulated by U.S. Variety Protection Act.

## OTHER VARIETIES

**Chris** — Awnless, medium height and maturity. Fair resistance to lodging. Resistant to stem rust but ranges from resistant to moderately susceptible to leaf rust. Medium yield and test weight. Milling and baking characteristics are satisfactory. Selected from crosses involving Frontana, Kenya 58, Newthatch, and Thatcher. Released by Minnesota Agricultural Experiment Station and ARS-USDA in 1965.

**Ellar** — Awnless, early, medium height and lodging resistance. Resistant to stem rust and moderately resistant to leaf rust. Medium yield and test weight. Flour yield and wheat protein are lower than Chris, but better than Era. Milling and baking characteristics are satisfactory. Selected from crosses involving Waldron, Kenya Farmer, Lee, Mida, and Cadet. Released by North Dakota Agricultural Experiment Station in 1974.



Agronomist R.L. Thompson discusses winter wheat varieties at a crop and soil specialists' conference in East Polk County.

Table 7. Characteristics of spring wheat varieties, 1973-75

Variety	Heading (June)	Plant height (inches)	Lodging (score) <sup>1</sup>	Rust reaction <sup>2</sup>		Test weight per bushel (pounds)	Wheat protein (percent)	Milling, baking quality	Yield, bushels/acre				
				Leaf	Stem				St. Paul	Morris	Crookston	Stephen <sup>3</sup>	Av. <sup>5</sup>
<b>Hard red spring</b>													
Era	26	28	2.3	R-MR	R	61.7	13.5	low-med.	42	47	51	75	47
Kitt	25	28	2.3	R	R	59.1	15.2	med.-high	39	44	47	66	43
Olaf	24	30	2.2	R	R	60.8	14.6	low-med.	41	45	42	58	43
World Seeds 1809	20	27	1.6	R-MR	R	60.5	14.5	medium	42	43	40	57	42
Bounty 309 <sup>4</sup>	21	29	2.5	MS	MS	59.9	14.0	med.-low	35	41	47	61	41
Chris	25	37	4.0	R-MS	R	61.5	15.6	V. high	31	39	39	52	36
Ellar	24	35	2.5	MR-MS	R	60.7	15.0	medium	33	46	42	58	40
Fletcher	27	28	2.2	MS	R	60.5	14.4	medium	36	38	42	65	39
Glenlea <sup>4</sup>	25	37	2.3	MS	MR	59.8	14.6	med.-low	33	43	44	64	40
Lark	22	28	2.3	MR	R	59.9	14.2	low-med.	38	39	36	51	38
Nowesta <sup>4</sup>	23	36	3.5	MS-S	MR	60.1	15.0	med.-low	36	43	47	58	42
Polk	25	37	3.8	R-MS	R	62.8	15.3	V. high	34	37	41	51	37
Prodax <sup>4</sup>	23	28	2.3	S	R	58.2	14.3	low-med.	38	38	50	68	42
Profit 75 <sup>4</sup>	22	27	2.3	R-MR	R	60.6	13.7	low	37	42	46	70	42
Protor	22	27	2.2	MS	R	61.5	14.7	low	43	46	43	67	44
Waldron	23	35	2.4	R	R	60.4	15.4	high	37	44	43	62	41
WS 6	22	27	2.3	R	R	59.5	14.0	low	41	40	38	54	40
LSD 5%									3	5	3	4	2
<b>Durum</b>													
Crosby	27	38	2.1	R	R	61.5	—	—	—	41	39	—	40
Rugby	28	38	1.8	R	R	62.1	—	—	—	42	39	—	41
Ward	27	37	1.8	MS	R	61.5	—	—	—	41	38	—	40
Botno	26	36	1.7	MR	R	62.1	—	—	—	43	36	—	40
Lakota	27	39	2.1	MS	R	59.2	—	—	—	42	37	—	40
Leeds	27	38	2.8	MR	R	62.5	—	—	—	40	35	—	38
Macoun	29	37	2.4	MS	R	60.1	—	—	—	33	31	—	32
Mindum	30	45	4.5	R	S	62.3	—	—	—	31	31	—	31
Rolette	25	35	2.7	MS	R	62.8	—	—	—	40	41	—	41
Wakooma	29	39	2.8	MS	R	60.3	—	—	—	35	35	—	35
Wells	28	38	3.6	MR	R	61.4	—	—	—	39	32	—	36
LSD 5%										5	5		4

<sup>1</sup> 1 = erect, 9 = flat.

<sup>2</sup> Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

<sup>3</sup> 1975. <sup>4</sup> 1974-75. <sup>5</sup> Stephen not included.

**Fletcher** — Awned, midseason to late semidwarf with high lodging resistance. Resistant to stem rust but moderately susceptible to leaf rust. Tolerant of Septoria, bunt, and ergot. High yield and medium test weight. Milling characteristics are satisfactory. Protein content and bake absorption are lower than Chris, but better than Era. Selected from crosses involving Frontana, Thatcher, Mida, Kenya 117A, Kenya 58, Lee, Newthatch, Pembina, and Polk "sib." Released by Minnesota Agricultural Experiment Station and ARS-USDA in 1970.

**Lark** — Awned, early semidwarf with high lodging resistance. Resistant to stem and leaf rust. Moderately susceptible to black chaff. High yield and medium test weight. Quality data show lower protein and bake adsorption than Chris. Released by World Seeds Inc. in 1971.

**Nordak** — Awned, medium height and maturity. Fair resistance to lodging. Resistant to stem rust and resistant to moderately susceptible to leaf rust; susceptible to loose smut. Medium yield and test weight. Satisfactory milling and baking quality. Selected as a single plant in a field of durum wheat by A.H. Berg, Barney, North Dakota. Released to farmers in 1971.

**Polk** — Awned, bronze chaff, medium height and maturity. Medium resistance to lodging. Resistant to stem rust but ranges

from resistant to moderately susceptible to leaf rust. Medium yield and very high test weight. Satisfactory milling and baking characteristics. Selected from crosses involving Thatcher, Supreza, Frontana, Kenya 58, and Newthatch. Released by Minnesota Agricultural Experiment Station and ARS-USDA in 1968.

**Protor** — Awned, early semidwarf with high lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust; susceptible to ergot. High yield and medium test weight. Low milling and baking quality. Selected from the cross of Tobar by Ciano. Released by Northrup, King & Co. in 1972.

**Waldron** — Awnless, yellow chaff, early, and medium height. Very lodging resistant. Resistant to stem and leaf rust. Very susceptible to ergot. Susceptible to Septoria. High yield and medium test weight. Satisfactory milling and baking characteristics. Selected from crosses involving Lee, Mida, K338AA, and Justin. Released by North Dakota Agricultural Experiment Station in 1969.

**WS 6** — Awned, early semidwarf with high lodging resistance. Resistant to stem and leaf rust. Medium yield and test weight. Unsatisfactory milling and baking characteristics. Released by World Seeds Inc. in 1973. Seed sale regulated by U.S. Variety Protection Act.



# DURUM WHEAT

## RECOMMENDED VARIETIES

**Crosby** — Awned, early, medium height and lodging resistance. Resistant to leaf and stem rust. High yield and medium test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Langdon, ST 464, and Leeds. Released by North Dakota Agricultural Experiment Station in 1973.

**Rugby** — Awned, early, medium height with high lodging resistance. Resistant to stem and leaf rust. High yield and medium test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Heiti, Stewart, Carleton, Mindum, and Nugget. Released by North Dakota Agricultural Experiment Station in 1973.

**Ward** — Awned, early, medium height and lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield, test, and 1,000 kernel weight. Satisfactory quality for semolina products. Selected from crosses involving Langdon, Leeds, and Wells. Released by North Dakota Agricultural Experiment Station in 1972.

## VARIETIES NOT ADEQUATELY TESTED

**Botno** — Awned, early, medium height, and high lodging resistance. Resistant to stem rust, but moderately susceptible to leaf rust. High yield and medium test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Heiti, Stewart, Carleton, Mindum, and Nugget. Released by North Dakota Agricultural Experiment Station in 1973.

## OTHER VARIETIES

**Hercules** — Awned, early, medium height, and high lodging resistance. Resistant to stem rust, susceptible to leaf rust and Septoria. Medium yield and test weight. Satisfactory quality for semolina products. Released by Agriculture Canada, Winnipeg in 1969.

**Lakota** — Awned, early, medium height and lodging resistance. Resistant to stem rust, bunt, and loose smut. Moderately susceptible to leaf rust. High yield and fair test weight. Satisfactory quality for semolina products. Selected from crosses involving Sentry, Ld. 379, and Ld. 357. Released by North Dakota Agricultural Experiment Station in 1960.

**Leeds** — Awned, early, medium height and lodging resistance. Moderately resistant to leaf rust, resistant to stem rust and loose smut. Medium yield and very high test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving Br. 180 and Wells. Released by North Dakota Agricultural Experiment Station in 1966.

**Macoun** — Awned, medium maturity and height with high lodging resistance. Resistant to stem rust; moderately susceptible to leaf rust. Medium yield and test weight with large kernels. Satisfactory quality for semolina products. Selected from crosses involving RL3607/DT182. Licensed by Agriculture Canada, Swift Current, in 1973.

**Mindum** — Awned and amber-kerneled. Resistant to bunt, leaf rust, and loose smut; susceptible to scab and stem rust. Susceptible to lodging. Medium yield and high test weight. Excellent for semolina products. Resulted from a durum type selected from a common bread wheat field at Minnesota Agricultural Experiment Station in 1917.

**Rolette** — Awned, early, medium height, and high lodging resistance. Resistant to stem rust, moderately susceptible to leaf rust. High yield and high test weight. Satisfactory quality for semolina products. Selected from crosses involving Ld. 393, Langdon, Ld. 398, Ld. 357, and St. 464. Released by North Dakota Agricultural Experiment Station in 1971.

**Wakooma** — Awned, early, medium height and high lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. Medium yield and low test weight. Satisfactory quality for semolina products. Selected from crosses involving Lakota and Pelissier. Licensed by Agriculture Canada, Swift Current, in 1973.

**Wascana** — Awned, early, medium height and lodging resistance. Resistant to stem rust and moderately resistant to leaf rust. Medium yield and low test weight. Satisfactory quality for semolina products. Selected from crosses involving Lakota and Pelissier. Licensed by Agriculture Canada, Swift Current, in 1971.

**Wells** — Awned, early, medium height and lodging resistance. Moderately resistant to leaf rust; resistant to stem rust, bunt, and loose smut. High yield, medium test weight and small kernel size. Satisfactory quality for semolina products. Selected from crosses involving Sentry, Ld. 379, and Ld. 357. Released by North Dakota Agricultural Experiment Station in 1960.

# WINTER WHEAT

## RECOMMENDED VARIETIES

**Gent** — Awned, early, medium height and lodging resistance. Winterhardiness lower than Minter but better than Centurk. Moderately resistant to leaf and stem rust. High yield and test weight. Satisfactory quality. Made by compositing nine selections from crosses of Agent and Scout. Developed at Hays, Kansas, but tested and released by South Dakota Agricultural Experiment Station in 1974.

**Minter** — Awned, tall, winterhardy, and medium lodging resistance. Moderately susceptible to leaf and stem rust. Medium yield and test weight. Satisfactory quality characteristics. Selected from a backcross of Hope and Minturki. Released by the Minnesota Agricultural Experiment Station and ARS-USDA in 1949.

**Winoka** — Awned, winterhardy, medium height, maturity, and lodging resistance. Susceptible to leaf rust and moderately resis-

tant to stem rust. Severe leaf necrosis in certain years. Satisfactory milling and baking characteristics. Reselection from Winalta by South Dakota Agricultural Experiment Station in 1968.

## OTHER VARIETIES

**Bronze** — Awned, early, medium height and lodging resistance. Moderately winterhardy. Susceptible to leaf rust, but resistant to stem rust. High yield and medium test weight. Milling and baking characteristics satisfactory. Selected from Cycle II, Series I of a recurrent selection scheme. Released by South Dakota Agricultural Experiment Station in 1972.

**Centurk** — Awned, early, medium height and lodging resistance. Winterhardiness is not satisfactory. Susceptible to leaf rust and moderately resistant to stem rust. Satisfactory quality. Selected from crosses involving Kenya 58, Newthatch, Hope,

Turkey, Cheyenne, and Parker. Released by Nebraska Agricultural Experiment Station in 1971. Seed sale regulated by U.S. Variety Protection Act.

**Froid** — Awned, winterhardy, medium height, maturity, and lodging resistance. Moderately resistant to stem rust, susceptible to leaf rust. High yield, but lower than average test weight. Satisfactory milling and baking characteristics. Selected from a population of unknown origin at Montana Agricultural Experiment Station in 1968.

**Sundance** — Awned, tall, winterhardy, medium lodging resistance. Susceptible to leaf and stem rust. Low yield and medium test weight. Satisfactory quality characteristics. Selected from a cross involving Cheyenne and Kharkof. Licensed by Agriculture Canada, Winnipeg, in 1971.

**Warrior** — Awned, early, medium height and lodging resistance. Winterhardiness is not satisfactory. Susceptible to leaf and stem rust. Medium yield and test weight. Satisfactory quality. Selected from a cross of Pawnee and Cheyenne at Nebraska Agricultural Experiment Station.



Gent, very high yielding winter wheat variety, is hip-high to agronomist R.E. Heiner.

Table 8. Characteristics of winter wheat varieties, 1974-75

Variety	Heading (June)	Plant height (inches)	Winter survival (percent)	Lodging <sup>1</sup> (score)	Rust reaction <sup>2</sup>		Test weight per bushel (pounds)	Yield, bushels/acre	
					Leaf	Stem		St. Paul <sup>3</sup>	6-Location <sup>4</sup> average
Gent	4	40	75	3	MR	MR	62.3	46	42
Minter	8	45	85	5	MS	MS	61.8	30	33
Winoka	6	42	80	5	S	MR	61.0	34	33
Bronze	5	39	65	4	S	R	60.3	35	32
Centurk	4	39	50	3	S	MR-S	60.4	46	39
Froid	5	44	80	5	S	MR-S	60.0	30	31
Sundance	8	43	85	4	S	S	59.0	30	34
Warrior	5	41	55	4	S	S	60.8	35	—
LSD 5%								6	

<sup>1</sup> 1 = erect, 9 = flat.

<sup>2</sup> Reaction to prevalent races: R = resistant, S = susceptible, MR = moderately resistant.

<sup>3</sup> 1974-75.

<sup>4</sup> 1975 data from Crookston, Waseca, Lamberton, Staples, Fosston, and St. Paul.

## 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.

The trials reported in tables 9 and 10 were on fertile silt loam soil at Rosemount and on infertile sand at Elk River.

### RECOMMENDED VARIETIES

**Snobird** — Proso. Early. Poor lodging resistance. Large white seed. Higher yielding and more uniform than common white proso and Panhandle in Minnesota trials. Selected from white proso by Minnesota Agricultural Experiment Station. Released in 1973.

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

**Empire** — Foxtail. Medium maturity. Poor lodging resistance. Very small, plump yellow seed. Originated by Agriculture Canada.

**White Wonder** — Foxtail. Late. Fair lodging resistance. Small white or yellow seed. Often too late for good seed production.

### VARIETIES NOT ADEQUATELY TESTED

**Abarr** — Proso. Medium maturity. Poor lodging resistance. Large white seed. Selected from white proso by Colorado Agricultural Experiment Station. Released in 1975.

**Cerise** — Proso. Very early. Poor lodging resistance. Large orange seed. A red-seeded composite selection from P.I. 170603 by Nebraska Agricultural Experiment Station. Released in 1974.

**Butte** — Foxtail. Late. Fair lodging resistance. Medium size yellow seed. A head or spray millet for birdfeeding. A bulk selection made by Colorado Agricultural Experiment Station from the Russian variety Harkovakaja. Released in 1975.

### OTHER VARIETIES

**Barnyard or Japanese** — High yielding forage millet but very coarse. Good seed producer. Very good lodging resistance. Medium-size gray seed of low test weight.

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

**Golden German** — Foxtail. Medium maturity. Poor lodging resistance. Small yellow seed. Much earlier than German and very uniform. Selected from German foxtail millet by Mr. Deschamps of Wray, Colorado. Named Golden German by Colorado Agricultural Experiment Station in 1968.

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

**Panhandle** — Proso. Early. Poor lodging resistance. Large white seed. Lower yield than Snobird in Minnesota trials. Selected from white proso by Nebraska Agricultural Experiment Station and released in 1967.

**Red Proso** — (A type, not a variety). Usually Turghai or Early Fortune. Seedlots of Early Fortune tested did not differ from Turghai.

**White Proso** — (A type, not a variety). Snobird is a variety of white proso.

Table 9. Characteristics of proso millet varieties, 1974-75

Variety	Grain yield/acre (pounds)		Test weight/bushel (pounds)	Weight/100 seeds (grams)	Averages, Rosemount and Elk River			Height (inches)
	Rosemount	Elk River			Planting to heading (days)	Planting to maturity (days)	Lodging (score) <sup>1</sup>	
Snobird	3284	1296	53.7	.71	49	84	3.1	36
Abarr	3429	1211	50.9	.72	53	87	3.4	37
Turghai	3173	1439	57.8	.58	48	79	1.9	35
Cerise	3209	1489	57.9	.60	48	77	2.5	35
LSD 5%	371	209						

<sup>1</sup> 1 = erect, 9 = flat.

Table 10. Characteristics of foxtail millet varieties

Variety	Yield/acre (pounds)			Forage protein <sup>1</sup> (percent)	Planting to heading (days)	Other characteristics, Rosemount			
	Rosemount		Elk River			Lodging (score) <sup>2</sup>	Height (inches)	Test weight/bushel (pounds)	Weight/100 seeds (grams)
	1974-75 Seed	1974-75 Forage <sup>1</sup>	1971-73 Forage <sup>1</sup>						
Empire	2026	8952	6799	9.2	55	1.9	46	49.2	.20
White Wonder	1421	9191	6468	7.8	60	1.0	49	44.1	.25
Butte	1223	8287	—	8.7	59	1.2	43	40.4	.30
LSD 5%	428	834	531						

<sup>1</sup> Oven-dry moisture basis. Forage was cut 1 week after heading.

<sup>2</sup> 1 = erect, 9 = flat.

## ANNUAL CANARYGRASS

Annual canarygrass is grown as a cash grain crop and used for feeding caged and wild birds. Kittson County is the North American production and processing center for the crop.

Few named varieties exist but about 100 seed collections from commercial lots, other states, and other countries have been tested. The best commercial lot is designated as Common in table 11.

### RECOMMENDED VARIETIES

**Alden** — High yield, late and tall. Fair to poor lodging resis-

tance. Large heads with good shattering resistance. Developed cooperatively by Minnesota Agricultural Experiment Station and Minn-Dak Growers Association from P.I. 251390 from Iran. Released in 1973.

### VARIETIES NOT ADEQUATELY TESTED

**Heracles** — High yield, late and tall. Good lodging resistance. Large, broad heads and large seed. Selected from the Dutch variety Spaans. Released in Holland in 1974.

Table 11. Characteristics of annual canarygrass varieties

Variety	Grain yield/A (pounds)			Test weight/bushel (pounds)	Weight/100 seeds (grams)	Averages, Rosemount and Northwest			Height (inches)
	Rosemount 1969-75	Northwest <sup>1</sup> 1969-71, 73, 75	Average			Planting to heading (days)	Planting to mature (days)	Lodging (score) <sup>2</sup>	
Alden	1038	1440	1239	46.6	.70	70	105	3.2	37
Common <sup>3</sup>	926	1302	1114	47.2	.72	66	103	4.3	36
Heracles <sup>4</sup>	711	1428	1070	43.4	.77	68	106	1.9	33
LSD 5%	101	103	72						

<sup>1</sup> Robbin 1969-73, Stephen 1975.

<sup>2</sup> 1 = erect, 9 = flat.

<sup>3</sup> 1969-73.

<sup>4</sup> 1975.

# CORN

Many corn hybrids are produced by private plant breeders. Information on the performance of these closed-pedigree or private hybrids is usually available from the individuals or companies selling them. The Minnesota Agricultural Experiment Station does not conduct performance trials of most private hybrids, but does develop and test open-pedigree or public hybrids. Those public hybrids developed by the Minnesota Agricultural Experi-

ment Station are called Minhybrids. Minhybrids are produced and offered for sale by private growers.

The relative maturity ratings (RM) listed in table 12 correspond to zones of adaptation shown in the accompanying map. Yield and stalk breakage data reported in the table are from replicated, hand-harvested, single row plots. The plant population was approximately 21,000 plants per acre.



Agronomist R.M. Granger is flanked by tall, late tropical corn and short, early flint corn. Both types are used to develop high yielding hybrids for Minnesota.

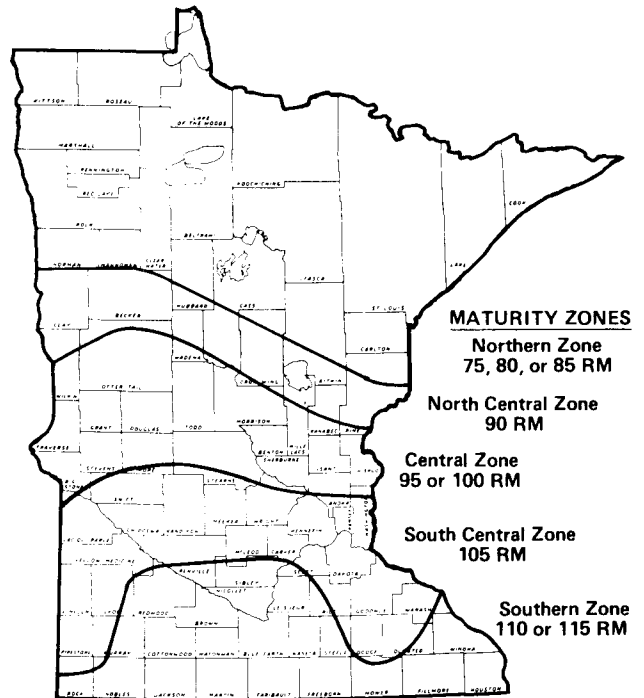


Table 12. Performance of corn hybrids

Hybrid	Type of cross	Relative maturity	Yield per acre <sup>1</sup> (bushels)						Broken stalks <sup>2</sup> (percent)					
			Crook-ston 1974-75	Staples <sup>6</sup> 1975	Morris 1972-75	Rose-mount 1975	Lamber-ton 1975	Waseca 1972-75	Crook-ston 1974-75	Staples <sup>6</sup> 1975	Morris 1972-75	Rose-mount 1975	Lamber-ton 1975	Waseca 1972-75
Minhybrid 8301	3-way	80	110	119	113			4	8	8				
Minhybrid 8201	single	80	117	121	121 <sup>5</sup>			8	10	14 <sup>5</sup>				
Minhybrid 806	double	85	111	99				9	3					
Minhybrid 7301	3-way	90		117	127	150	81	118 <sup>4</sup>	2	6	3	4	8 <sup>4</sup>	
Minhybrid 6304	3-way	95			124 <sup>4</sup>	153	86	142 <sup>3</sup>		1 <sup>4</sup>	1	3	1 <sup>3</sup>	
Minhybrid 6301	3-way	95			127	144	84	129		5	2	5	12	
Minhybrid 621	double	95			117 <sup>3</sup>	129				6 <sup>3</sup>	2			
Minhybrid 613	double	95			121 <sup>3</sup>	135				3 <sup>3</sup>	4			
M309	3-way	100			137 <sup>3</sup>	165	108	138 <sup>3</sup>		4 <sup>3</sup>	6	8	11 <sup>3</sup>	
Minhybrid 5302	3-way	105						134 <sup>5</sup>					16 <sup>5</sup>	
Minhybrid 5301	3-way	105					109	134				2	17	
Minhybrid 5201	single	105					115	146				3	19	
Minhybrid 4301	3-way	110					97	132 <sup>3</sup>				0	11 <sup>3</sup>	
Minhybrid 4201	single	110					108	148				4	11	
Minhybrid 417	double	110					105	131 <sup>4</sup>				2	13 <sup>4</sup>	
LSD 5%			10	16	6	14	17	11	5	9	7	9	6	8

<sup>1</sup> 15.5% moisture basis.

<sup>2</sup> Below ear.

<sup>3</sup> 1975.

<sup>4</sup> 1974-75.

<sup>5</sup> 1973-75.

<sup>6</sup> Irrigated.

## GRAIN SORGHUM

Many hybrids are available. Most are too late for Minnesota. Even the earliest hybrids generally require drying after combine-harvest. The hybrids shown in the table are of acceptable maturity for southern Minnesota, and the earliest hybrids usually are satisfactory for some parts of central Minnesota. Late hybrids usually yield less than early hybrids in years with low temperatures

in August or early September.

Trials were planted between May 22 and June 3 at the rate of 150,000 seeds per acre in rows 30 inches apart. Hybrids in the table are ranked from earliest to latest, based on head moisture at harvest. Data for varieties not tested for 4 years are adjusted to be comparable with 1972-75 data.

Table 13. Characteristics of grain sorghum varieties at Lamberon

Variety <sup>1</sup> and originator	Years of trial	Grain yield/acre (pounds) <sup>2</sup>		Head moisture <sup>3</sup>		Test weight/ bushel (pounds)	Weight/ 100 seeds (grams)	Heading (date)	Height (inches)
		1972-75 <sup>3</sup>	1975	September 14	September 29				
1, Minnesota	1972-75	4485	3373	26.5	22.0	55.8	2.1	7-22	58
200, Pride	1975	—	2819	27.7	22.5	56.0	2.0	7-22	44
52, Northrup, King	1973-75	4266	3098	32.2	23.4	55.7	1.6	7-23	40
106, South Dakota	1974-75	3935	3009	34.8	24.7	56.6	2.5	7-27	42
R-920, Acco	1972,75	5063	4013	35.9	25.5	56.4	1.6	7-27	49
121, Northrup, King	1972-75	4632	4039	32.4	25.6	55.6	2.0	7-29	45
894, Pioneer	1972-73,75	4782	3619	34.3	25.8	56.8	1.8	7-28	40
8901, Pioneer	1972-75	4258	3386	35.4	26.0	50.6	1.8	7-29	42
350, Frontier	1973-75	4740	3676	35.3	27.5	58.0	1.7	7-31	48
104, South Dakota	1974-75	3216	2290	32.9	27.9	57.7	2.1	7-24	40
A-25, DeKalb	1972-73,75	4565	3398	36.7	28.7	54.1	1.8	7-27	45
129, Northrup, King	1973-75	5625	3969	39.7	29.1	58.4	2.3	8-1	47
180, Northrup, King	1972-75	5153	4806	42.0	30.6	57.3	1.9	8-3	50
A25a, DeKalb	1975	—	4279	39.2	31.0	54.4	2.1	7-31	38
LSD 5%		461	624	3.3	1.5	1.8	.1		

<sup>1</sup> All are hybrids except South Dakota 104 and 106.

<sup>2</sup> Oven-dry moisture basis.

<sup>3</sup> 1974 data not used because birdfeeding loss affected varietal comparisons.

## BUCKWHEAT

Buckwheat is cross-pollinated and very little certified seed is available. Consequently, variety designations may not be valid except for the few available certified seedlots. Since 1972, only Pennquad, Tempest, and Tokyo have been certified in the United States.

Trials at Rosemount from 1960 to 1969 failed to show consistent superiority of named varieties over good common buckwheat. Therefore, variety recommendations have not been made.

Trials at Elk River were conducted on infertile sandy soil; drought accounts for the low yields.

**Mancan** — Large seed. Diploid. Selected by Agriculture Canada, Morden, from common buckwheat. Licensed in 1974.

**Pennquad** — Very large seed. Tetraploid. Should probably be isolated from diploid varieties. Released by Pennsylvania Agricultural Experiment Station in 1966.

**Tempest** — Small seed. Diploid. Selected by Agriculture Canada from a Russian seedlot. Licensed in 1971.

**Tokyo** — Small seed. Diploid. Originated by Agriculture Canada from a Japanese introduction. Released in 1955.

Table 14. Characteristics of buckwheat varieties at Elk River

Variety	Years of trial	Seed yield/acre (pounds)	Weight/100 seeds (grams)	Planting to bloom (days)	Height (inches)	Lodging (score) <sup>1</sup>
Common	1973-75	791	2.5	31	31	1.4
Giant American	1973-75	696	3.3	34	34	1.1
Pennquad	1973-75	457	3.5	31	32	1.4
Tempest	1973-75	562	2.2	33	37	2.4
LSD 5%		88			1	.4
Mancan	1974-75	709	3.1	33	35	1.5
Tokyo	1974-75	657	2.4	32	34	1.6

<sup>1</sup> 1 = erect, 9 = flat.

## FLAX

### RECOMMENDED VARIETIES

**Culbert** — Very high yield. Early, brown seed, blue flowers. High oil percent and very high iodine value. Resistant to rust, very resistant to wilt, moderately susceptible to pasmo. Released in 1975 by Minnesota Agricultural Experiment Station from a cross of Windom and Bison 70.

**Linott** — Very high yield. Early, brown seed, blue flowers. High oil percent and iodine value. Resistant to rust (has a trace of sus-

ceptible plants), moderately susceptible to wilt and pasmo. Licensed in 1967 by Agriculture Canada, Ottawa, from crosses involving 770B, Argentine C, Arrow, and C.I. 974.

**Norstar** — High yield. Medium-late, resistant to lodging, brown seed, blue flowers. High oil percent, medium to low iodine value. Moderately susceptible to rust (exhibits some field tolerance to current races), resistant to wilt, moderately resistant to pasmo. Released in 1969 by Minnesota Agricultural Experiment Station from a cross of Redwood and Crystal.

## VARIETIES NOT ADEQUATELY TESTED

**Dufferin** — High yield. Late, brown seed, blue flowers, variable plant height. Medium oil percent. Resistant to rust and wilt. Licensed in 1975 by Agriculture Canada, Ottawa from a cross of Redwood 65 and FP 441.

## OTHER VARIETIES

**Army** — Medium to low yield. Late, brown seed, blue flowers, resistant to lodging. Medium oil percent, high iodine value. Susceptible to rust, resistant to wilt, moderately resistant to pasmo. Released in 1958 by Minnesota Agricultural Experiment Station from a cross of Crystal and Redson.

**Bison** — Medium yield. Medium-late, brown seed, blue flowers, susceptible to lodging. Medium oil percent, low iodine value. Released in 1927 by North Dakota Agricultural Experiment Station by mass selection.

**Bolley** — Medium yield. Early, brown seed, blue flowers. More susceptible to chlorosis than recommended varieties. Very high oil percent and iodine value. Susceptible to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in 1957 by North Dakota Agricultural Experiment Station from a cross of Birio and C.I. 1134.

**B-5128** — Medium yield but low in yield when sown late. Late, brown seed, blue flowers. Medium oil percent, low iodine value. Susceptible to rust, moderately susceptible to both wilt and pasmo. Contains a mixture of types including a small percentage of yellow-seeded plants and rust-susceptible plants. Released in 1943 by North Dakota Agricultural Experiment Station from a cross of Golden and Rio.

**Foster** — Low yield, especially when sown late. Medium-late, yellow seed, dark blue flowers. Very high oil percent, medium iodine value. Immune to rust, moderately resistant to wilt and pasmo. Released in 1969 by North Dakota Agricultural Experiment Station from a cross of C.I. 1665 and Minerva.

**Marine 62** — Low yield but better than most varieties when sown late. Early, brown seed, blue flowers. Medium to low oil percent, high iodine value. Susceptible to rust, moderately resistant to wilt and pasmo. Released in 1962 by Minnesota Agricultural Experiment Station from a selection of Marine.

**Noralta** — High yield. Medium-late, brown seed, blue flowers. Very low oil percent, high iodine value. Susceptible to rust,

moderately susceptible to wilt and pasmo. Released in 1964 at Ft. Vermilion, Canada from a cross of Rocket and Redwing.

**Nored** — High yield, especially when sown early. Late, brown seed, blue flowers, resistant to lodging. More tolerant of herbicides MCPA and Dalapon than other commercial varieties. High oil percent, medium iodine value. Moderately susceptible to rust (exhibits some field tolerance to current races), resistant to wilt and pasmo. Released in 1968 by Minnesota Agricultural Experiment Station from an irradiated population of a cross of B-5128 and Redson.

**Norland** — Low yield, especially when sown late. Late maturity, brown seed, white flowers with blue anthers. Medium oil percent and iodine value. Susceptible to rust, moderately susceptible to wilt, susceptible to pasmo. Released in 1955 by North Dakota Agricultural Experiment Station from a selection of Victory.

**Raja** — Low yield. Very early maturity, brown seed, blue flowers. Height and appearance changes from early to late sowing. Very low oil percent and iodine value. Resistant to rust, moderately susceptible to wilt, susceptible to pasmo. Released in 1954 by Agriculture Canada, Ottawa from crosses involving Arg. M.S., F.G. 1025, and JWS 15339.

**Redwood** — High yield when sown early. Medium-late, brown seed, blue flowers. Medium oil percent and iodine value. Susceptible to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in 1951 by Minnesota Agricultural Experiment Station from a cross of B-5128 and Redson.

**Redwood 65** — Superior to Redwood in yield and oil percent. Similar to Redwood in maturity and appearance. Susceptible to rust, more susceptible to pasmo than Redwood. Released in 1965 by University of Saskatchewan from irradiated Redwood.

**Summit** — Very high yield. Early, brown seed, blue flowers. Medium to low oil percent, high iodine value. Susceptible to rust, resistant to wilt, and moderately susceptible to pasmo. Released in 1964 by South Dakota Agricultural Experiment Station from a cross of B-5128 and Zenith.

**Windom** — Very high yield whether sown early or late. Early, brown seed, blue flowers. Medium oil percent, high iodine value. Susceptible to rust, resistant to wilt, and moderately susceptible to pasmo. Released in 1962 by Minnesota Agricultural Experiment Station from crosses involving Renew, Bison, Koto, Redwing, and Redwood.

Table 15. Yields of flax varieties in bushels per acre, 1972-75

Variety	Early-sown								Late-sown							
	Morris		Lamberton		Crookston		Average		Morris		Lamberton		Crookston		Average	
	1972-75	1975	1972-75	1975	1972-75	1975	1972-75	1975	1972-75	1975	1972-75	1975	1972-75	1975	1972-75	1975
Culbert	29	32	30	30	19	15	26	25	22	17	24	27	19	12	22	18
Linott	28	28	29	30	21	20	26	26	20	16	22	21	20	17	20	18
Norstar	27	30	30	26	21	20	26	25	21	20	21	14	17	15	20	16
Nored	27	32	29	26	22	19	26	26	18	17	19	15	18	19	19	17
Dufferin		38	29		19		29		21		20		17		19	
LSD 5%	4	4	4	3	4	NS	4	4	4	6	4	5	4	NS	5	NS

Table 16. Characteristics of flax varieties, 1975

Variety	Days from sowing to		Plant height (inches)	Wt./1000 seeds (grams)	Lodging <sup>1</sup> (score)	Wilt <sup>1</sup> (score)	Major <sup>2</sup> rust genes	Oil (percent)
	First bloom	Full bloom						
Culbert	44	49	22	5.1	1	1	L <sup>6</sup> N <sup>1</sup>	39.5
Linott	43	48	22	4.7	2	7	L <sup>6</sup>	39.0
Norstar	47	53	25	4.7	3	4	L N <sup>1</sup>	39.3
Nored	48	54	25	5.0	2	3	N <sup>1</sup>	39.2
Dufferin	48	55	24	4.7	2	4	'Raja'	39.3

<sup>1</sup> 1 = best, 9 = poorest.

<sup>2</sup> L<sup>6</sup> and 'Raja' rust genes condition resistance to all known races of rust in North America.

# SOYBEANS

Information on soybeans is presented in two sections. The first section deals with varieties that have been developed and released by publicly supported institutions and that are considered for recommendation by the Minnesota Agricultural Experiment Station. The second section deals primarily with privately developed varieties, although several public varieties are included for comparison. These private varieties are not considered for recommendation because only those submitted voluntarily by their owners were tested, and the experiment station does not have adequate long-time data (3 years or more) on most of them.

## PUBLICLY DEVELOPED VARIETIES

Yield data are reported in table 17 and in most cases are averages of three or more years. The data from Crookston, Moorhead, Morris, St. Paul, Lamberton, and Waseca are from replicated combine-harvested plots. Data from Grand Rapids, Elk River, and Fairmont are from replicated multiple-row nursery plots. The row spacing was 24 inches at Grand Rapids; 28 in 1972 and 1973, and 22 in 1974 and 1975 at Crookston; and 22 in 1972 and 1974, and 28 in 1973 and 1975 at Moorhead. At all other locations the spacing was 30 inches. At all locations, seeding rate was about 10 viable seeds per foot of row. The majority of the tests in 1975 were planted from May 5 to 29. However, the early plantings at Waseca and Lamberton were May 10 and May 2 respectively, and the very late plantings at these two locations were July 3 and July 8.

Varieties are grouped in three maturity categories. Certain transitional varieties appear in more than one maturity grouping. Comparisons should be made only within a grouping because varying numbers of years or plot locations may be involved between groupings.

Data on maturity, lodging resistance, plant height, seed size, and seed quality in table 18 are from locations suited to particular maturity groups. Phytophthora reactions were determined by University of Minnesota's Department of Plant Pathology and by the U.S. Regional Soybean Laboratory, Urbana, Illinois. Chlorosis

scores were obtained from plantings at Crookston and on a high-lime soil near Lamberton. Protein and oil determinations were made at the regional laboratory.

From the standpoint of maturity, soybean varieties have a narrow range of adaptation. The accompanying map relates Minnesota production areas to varietal recommendations in the text.

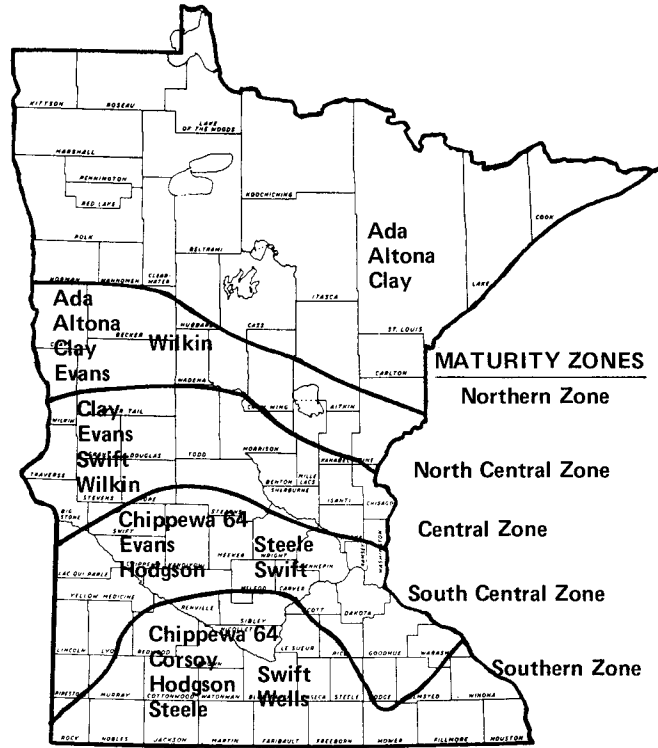


Table 17. Yields of publicly developed soybean varieties in bushels per acre

Variety	Crook- ston 1972-75	Grand Rapids 1970-75	Moor- head 1971-75	Morris 1972-75	Elk River <sup>1</sup> 1972-75	St. Paul 1972-75	Lamberton			Waseca			Fairmont 1971-75
							Early planting date 1974-75	Normal planting date <sup>2</sup>	Very late planting date 1972-75 <sup>3</sup>	Early planting date 1974-75	Normal planting date <sup>2</sup>	Very late planting date 1972-75	
<b>Early-maturing group</b>													
Norman	23	31	25	28									27
Ada	23	29	25	28									27
Altona	22	31	26	27									27
Clay	28	31	32	32									29
Wilkin	28	31	30	29									28
LSD 5%	2	2	2	2									1
<b>Medium-maturing group</b>													
Clay			32	31	47	39							
Wilkin					48								
Merit			32	29	51	39		26			37		44
Evans			34	34	55	45		28			40		50
Swift			31	34	47	44		29			42		49
Chippewa 64				30	44	41		28			40		45
Hodgson				36	56	47		31			44		51
Steele				34	50	42		28			41		47
LSD 5%			2	2	3	2		1			2		3
<b>Late-maturing group</b>													
Hodgson							30	29			41	43	51
Corsoy							29	29			42	43	55
Wells							27	27			41	39	50
LSD 5%							2	1			1	2	3

<sup>1</sup> Irrigated. <sup>2</sup> Testing period 1971-75 for medium-maturing group; 1974-75 for late-maturing group. <sup>3</sup> No data in 1974.

Table 18. Characteristics of publicly developed soybean varieties

Variety	Mature (date)	Lodging resistance (score) <sup>1</sup>	Plant height (inches)	Weight of 100 seeds (grams)	Seed quality (score) <sup>1</sup>	Protein (percent) <sup>2</sup>	Oil (percent) <sup>2</sup>	Phytophthora (reaction) <sup>3</sup>	Chlorosis (score) <sup>1</sup>	Flower (color) <sup>4</sup>	Pubescence (color) <sup>4</sup>	Hilum (color) <sup>4</sup>
Early-maturing group (average of Crookston and Morris, 1972-75)												
Ada	9-6	1.9	28	17.3	2.4	39.9	19.7	R	1.3	W	G	Y
Norman	9-7	2.3	24	17.8	2.3	38.6	20.9	S	2.0	P	G	Y
Altona	9-8	2.3	26	18.3	2.6	40.1	20.1	R	2.7	P	T	Bl
Clay	9-13	1.8	26	16.5	2.4	38.8	22.0	S	1.5	P	G	Y
Wilkin	9-15	1.1	26	15.5	2.1	38.8	20.3	R	1.4	W	G	Y
Medium-maturing group (average of Morris and St. Paul, 1972-75)												
Clay	9-10	1.9	26	17.5	2.6	39.7	22.2	S	1.5	P	G	Y
Wilkin	9-11	1.2	27	16.5	2.4	39.5	20.5	R	1.4	W	G	Y
Merit	9-16	2.4	33	15.0	2.1	38.9	20.4	R	1.8	W	G	Bf
Evans	9-16	2.1	33	16.3	2.0	39.3	21.2	R	1.8	W	G	Y
Swift	9-20	3.2	36	16.2	2.0	37.3	20.9	S	1.3	W	T	Bl
Chippewa 64	9-21	2.5	36	15.0	2.2	40.3	20.0	R	2.2	P	T	Bl
Hodgson	9-24	2.6	34	15.9	2.2	38.0	21.2	S	1.5	P	G	Bf
Steele	9-25	2.7	37	16.9	2.2	39.6	19.8	R	2.3	P	G	Y
Late-maturing group (average of Lamberton and Waseca, 1972-75)												
Hodgson	9-16	1.5	32	16.7	2.3	38.2	23.0	S	1.4	P	G	Bf
Corsoy	9-22	1.9	36	15.4	1.8	39.9	20.8	S	2.5	P	G	Y
Wells	9-24	1.2	39	15.7	2.6	40.1	20.7	R	2.1	P	G	Ib

<sup>1</sup> 1 = excellent, 5 = very poor.

<sup>2</sup> Moisture-free basis; average 1972 and 1974.

<sup>3</sup> R = resistant, S = susceptible.

<sup>4</sup> Flower color: P = purple, W = white; pubescence color: G = gray, T = tawny; hilum color: Bl = black, Bf = buff, Ib = imperfect black, Y = yellow.

Table 19. Yields of private soybean varieties in bushels per acre, early group, 1975 and average 1974-1975

Brand	Variety	Morris		Rosemount		Average of 2 locations	
		1975	1974-75	1975	1974-75	1975	1974-75
	Anoka	41	34	50	41	45	38
	Chippewa 64	40	34	45	36	43	35
	Evans	35	34	46	42	40	38
	Harlon	37	35	44	38	40	37
	Hodgson	43	38	49	41	46	40
	Merit	31	33	42	35	37	34
	Steele	33	31	47	39	40	35
	Swift	38	32	48	42	43	37
Agripro	Osage	40	35	49	39	44	37
	1235	37	32	47	38	42	35
Asgrow	XP1057	37		45		41	
Clemens	12E	39		50		44	
	CX282	32		46		39	
Jacques	J84	31		45		38	
	J94	35	33	44	38	40	35
	J7492	39		48		43	
L.O.L.-Felco	Go45A	38	34	48	39	43	36
Northrup, King	Multivar 30	33		41		37	
	S1244	42	36	45	38	43	37
Peterson-Pioneer	81	28		37		33	
	85	33	31	49	43	41	37
	PX118-11	41		50		45	
S.R.F.	100	36	34	43	38	39	36
Teweles	XK101	39		47		43	
	XR102	40		48		44	
Trojan	22	39		41		40	
	94	37		41		39	
	C935	45		49		47	
	LSD 5%	7	5	4	3	4	3



## RECOMMENDED VARIETIES

**Ada** — Northern and north central zones. Excellent seedling vigor. Resistant to phytophthora root rot. Good tolerance to high-lime soils. Developed at Minnesota Agricultural Experiment Station from a cross of Merit and Norman. Released in 1972.

**Altona** — Northern and north central zones. Resistant to phytophthora root rot. Developed at University of Manitoba from a cross of P.I. 194654 and Flambeau. Released in 1966.

**Chippewa 64** — South central and southern zones and southern one-half of the central zone. Similar in all respects, except phytophthora resistance, to Chippewa which was selected from crosses involving Lincoln and Richland at U.S. Regional Soybean Laboratory. Blackhawk was the phytophthora-resistant, nonrecurrent backcross parent in the development of Chippewa 64. Released in 1964.

**Clay** — North central, central, and northern zones. Outstanding in yield and oil content in its maturity class. Rather highly susceptible to phytophthora root rot. Developed at Minnesota Agricultural Experiment Station from a cross of Renville and Capital. Released in 1968.

**Corsoy** — Southern zone. Outstanding in yield among the later-maturing varieties. Has only medium resistance to lodging. Occupied a large part of the soybean acreage in southern Minnesota in 1975. Developed at Iowa Agricultural Experiment Station from a cross of Harosoy and Capital. Released in 1967.

**Evans** — North central, central, and south central zones. Has performed well in southern zone also. Resistant to phytophthora rot. Developed at Minnesota Agricultural Experiment Station from a cross of Merit and Harosoy. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

**Hodgson** — South central and southern zones. Outstanding in yield in its maturity class. Good resistance to lodging. Tolerant to high-lime soils. High oil content. Susceptible to phytophthora rot. Developed at Minnesota Agricultural Experiment Station from crosses involving Corsoy, Lincoln, Richland, and P.I. 180501. Seed sale regulated by U.S. Variety Protection Act.

**Steele** — South central and southern zones. Yields more than Chippewa 64. Resistant to phytophthora root rot. Developed at Minnesota Agricultural Experiment Station from a cross of Blackhawk and Harosoy. Released in 1972.

**Swift** — South central, central, and southern zones. High yield. Very good tolerance to high-lime soils. Only fair resistance to lodging. Susceptible to phytophthora root rot. Developed at Minnesota Agricultural Experiment Station from crosses involving Lincoln, Richland, Capital, and Korean. Released in 1972.

**Wells** — Southern zone. Similar in maturity to Corsoy. Yields less than Corsoy, but has greater resistance to lodging and has resistance to phytophthora root rot. Developed at Indiana Agricultural Experiment Station from crosses involving Harosoy, Lincoln, Ogden, and Blackhawk. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

**Wilkin** — Central and north central zones. Excellent resistance to lodging. Resistant to phytophthora root rot. Good tolerance to high-lime soils. Developed at Minnesota Agricultural Experiment Station from a cross of Merit x Harosoy. Released in 1972.

## VARIETIES NOT ADEQUATELY TESTED

**Harcor** — Similar to Corsoy in many respects but resistant to phytophthora root rot. Developed by Agriculture Canada, Harrow, Ontario, from crosses involving Corsoy and Harosoy 63. Licensed in 1975.

**Harlon** — Similar to Swift in maturity. Resistant to phytophthora root rot. Developed by Agriculture Canada, Harrow, Ontario from a cross of Blackhawk and Harosoy 63. Licensed in 1975.

## OTHER VARIETIES

**Amsoy** — Several days later than Corsoy and has yielded less. Susceptible to phytophthora rot. Selected at Iowa Agricultural Experiment Station from a cross of Adams and Harosoy. Released in 1965.

**Amsoy 71** — Similar to Amsoy, but resistant to phytophthora. Developed by backcrossing at Indiana Agricultural Experiment Station. Released in 1971. Seed sale regulated by U.S. Variety Protection Act.

**Anoka** — Similar to Chippewa 64 in maturity. Yields more but lodges more than Chippewa 64. High oil content. Large seed. Susceptible to phytophthora rot and very susceptible to chlorosis on high-lime soils. Developed at Minnesota Agricultural Experiment Station from crosses involving Lincoln, Richland, and Korean. Released in 1970.

**Chippewa** — Similar in all respects to Chippewa 64 except in its susceptibility to phytophthora root rot. Released in 1955.



Agronomists A. Baihaki and J.W. Lambert compare Anoka (iron chlorosis susceptible) and Swift (iron chlorosis tolerant) soybean varieties. Anoka was bred for sandy soils where iron chlorosis is not a problem. Swift is a product of the Minnesota Agricultural Experiment Station's breeding program to develop chlorosis resistance.

**Hark** — Similar to Corsoy in maturity and is more resistant to lodging. Yields less than Corsoy. Susceptible to phytophthora rot and very susceptible to chlorosis on high-lime soils. Developed at Iowa Agricultural Experiment Station from a cross of Hawkeye and Harosoy. Released in 1966.

**Merit** — Similar to Evans in maturity, height, and resistance to lodging but yields less. Resistant to phytophthora root rot. Developed by Agriculture Canada from a cross of Blackhawk and Capital. Released in 1959.

**Norman** — Similar to Ada in maturity, yield, height and lodging. Susceptible to phytophthora root rot. Developed at Minnesota Agricultural Experiment Station from a cross of Acme and Hardome. Released in 1969.

**Ottawa Mandarin** — Similar to Swift in maturity, but yields less. Highly resistant to lodging. Susceptible to phytophthora and chlorosis on high-lime soils. Selected by Agriculture Canada, Ottawa, from the variety Mandarin. Released in 1945.

**Portage** — Earlier than Norman. Good resistance to lodging. Susceptible to shattering, to chlorosis on high-lime soils, and to phytophthora root rot. Developed at University of Manitoba from a cross of Acme and Comet. Released in 1964.

**Rampage** — Slightly earlier than Hark and Corsoy and has better lodging resistance; yields less, however. Developed at Iowa Agricultural Experiment Station from a cross of Chippewa and Clark. Released in 1969.

**Traverse** — Similar to Chippewa 64 in yield but several days earlier. Susceptible to chlorosis on high-lime soils. Highly susceptible to phytophthora root rot. Developed at Minnesota Agri-

cultural Experiment Station from a cross of Lincoln and Ottawa Mandarin. Released in 1965.

**Wirth** — Similar in maturity to Chippewa 64. Excellent resistance to lodging, but has yielded only slightly better than Chippewa 64 and is susceptible to phytophthora root rot. Selected at Iowa Agricultural Experiment Station from a cross of Chippewa and Clark. Released in 1969.

## PRIVATELY DEVELOPED VARIETIES

A group of varieties considered "early" by the companies submitting them was tested at Morris and Rosemount in 1975. A "later" group was tested at Fairmont, Lambertson, and Waseca. Some of these varieties had been tested in previous years, also. All tests in all years were planted in four-row plots, 12 feet long with

Table 20. Yields of private soybean varieties in bushels per acre, late group, 1975

Brand	Variety	Fairmont	Lamberton	Waseca	Average three locations
	Amsoy	58	38	50	48
	Chippewa 64	51	30	44	42
	Corsoy	61	35	53	50
	Harcor	57	40	48	49
	Hark	55	31	48	45
	Hodgson	57	32	47	45
	Steele	51	28	45	41
	Wells	58	40	55	51
Agripro	Osage	55	32	48	45
	14	65	41	52	53
	20	58	38	50	49
	514	60	32	53	48
	1235	52	34	42	43
Asgrow	A2340	54	41	49	48
	A2440	63	43	55	54
	XP2070	56	34	49	46
	XP2444	54	31	48	44
Clemens	2E	56	36	52	48
	2ER75	52	38	48	46
	12E	51	34	45	43
	CX114	47	30	46	41
F.F.R.	111	48	31	45	41
	112	55	40	43	46
Jacques	J98	58	38	51	49
	J104	54	38	44	45
Kruger	Desoy 222	58	37	53	49
	Desoy 333	51	34	50	45
L.O.L.-Felco	Go 44	51	37	53	47
	Go 45A	54	32	46	44
	LL 4301	53	34	46	45
Northrup, King	Multivar 40	54	31	49	45
	S1244	42	37	44	41
	S1346	50	38	45	45
Peterson-Pioneer	85	47	31	42	40
	105P	49	40	48	46
	3100	56	35	47	46
	PX118-11	56	37	51	48
Pride	B186	56	34	49	46
S.R.F.	100	50	30	44	41
	150	55	31	47	44
	174AT	50	31	54	45
	200	50	35	53	46
Teweles	XK101	52	34	48	45
	XK125	52	32	49	44
	XK140	49	32	41	41
	XK505	44	37	47	43
	XR102	50	31	44	42
Trojan	22	43	37	44	41
	93	54	32	50	45
	94	55	38	45	46
	980	51	39	48	46
	C935	53	32	52	46
	LSD 5%	8	9	8	5

Table 21. Yields of private soybean varieties in bushels per acre, late group, various periods

Brand	Variety	Fairmont			Lamberton			Waseca			Average three locations		
		72-75	73-75	74-75	72-75	73-75	74-75	72-75	73-75	74-75	72-75	73-75	74-75
	Chippewa 64	45	45	45	37	35	31	39	43	41	40	41	39
	Corsoy	54	54	53	41	36	33	46	48	44	47	46	43
	Hark			50			30			42			41
	Hodgson		54	52		39	33		48	43		47	43
	Steele	50	50	48	37	35	29	43	46	44	43	44	40
	Wells			49			34			45			43
	Osage	50	49	48	38	35	31	42	45	41	44	43	40
Agripro	14		56	55		37	35		49	46		47	45
	1235		53	50		37	31		46	41		45	41
F.F.R.	111			46			30			36			37
Jacques	98			54			34			41			43
	104			52			34			37			41
Kruger	Desoy 333		52	49		39	33		45	41		45	41
L.O.L.-Felco	Go 44		53	50		37	34		47	43		45	42
	Go 45		50	49		35	32		43	41		43	41
Northrup, King	S1244			46			35			41			41
Peterson-Pioneer	85	52	51	47	41	37	31	42	44	40	45	44	39
	105P			49			34			40			41
	3100		56	52		40	34		45	40		47	42
S.R.F.	100	46	46	46	36	34	31	39	42	40	40	41	39
	150	51	50	49	38	34	31	44	44	41	44	43	40
	174AT			46			30			42			39
	200	49	50	48	36	33	31	40	44	40	42	42	40
Teweles	XK125	50	49	48	39	36	31	44	48	43	44	44	40
	XK505	46	46	43	38	33	31	41	43	39	41	40	38
	LSD 5%	3	4	6	3	4	5	3	4	5	2	2	3

30-inch spacings between rows. There were three replications in 1975 and four in previous years at each location. Eight feet of each of the two interior rows were harvested for yield. Planting dates varied in the several years involved. In 1975 planting was done at Morris on May 10, Rosemount on May 15, Fairmont on May 20, Lambertton on May 7, and Waseca on May 14. Seeding rate in all tests was about 10 viable seeds per foot of row.

Yields of the early group of varieties for 1975 and for the average of 1974 and 1975 are given in table 19. Yields of the late group for 1975 are given in table 20 and for various periods in table 21. The varieties are arranged in two groupings with the publicly developed varieties first and the privately developed varieties second. Varieties in each grouping are listed alphabetically.

Other characteristics for 1975 are given in tables 22 and 23 for the late and early groups, respectively. For several of the characteristics, an average is shown for all locations within a group. However, chlorosis scores in both tables are an average from special nurseries at Crookston and Lambertton, and phytophthora reactions are from laboratory tests made by the Department of Plant Pathology, University of Minnesota.

One-year data must always be viewed with caution. For example, the 1975 growing season was characterized by timely planting, favorable June conditions, excessive heat and low rainfall in July, good rains in August, and a warm, frost-free September, resulting in the late-maturing varieties generally yielding higher than the early and mid-season varieties. Contrariwise, the 1974 season with its unprecedented early frost greatly favored the earlier-maturing varieties. Thus averages over longer periods of time are better indices of varietal performance than are one-year figures.

The companies entering varieties in the 1975 Minnesota tests, along with mailing addresses are as follows: Agripro, Inc., P.O.

Box 1668, Ames, Iowa 50010; Asgrow Seed Co., 4244 Clinton Ave., Des Moines, Iowa 50310; Clemens Seed Co., Beaman, Iowa 50609; Jacques Seed Co., Prescott, Wisconsin 54021; Kruger Seed Co., R.R. 4, Cedar Falls, Iowa 50613; FFR Cooperative, 4112 E. State Road 225, West Lafayette, Indiana 47906; Land O'Lakes Inc., Research Farm, R.R. 2, Webster City, Iowa 50595; Northrup, King & Co., Washington, Iowa 52353; Peterson Soybean Seed Division, Pioneer Hi-bred International, Inc., 3261 West Airline Highway, Waterloo, Iowa 50701; Pride Co., Inc., Glen Haven, Wisconsin 53801; Soybean Research Foundation, Inc., P.O. Box 72, Mason City, Illinois 62664; Teweles Seed Co., R.R. 1, Clinton, Wisconsin 53525; Trojan Seed Co., Olivia, Minnesota 56277.



Clay County Extension Agent O.A. Daellenbach (right) shows visitors the soybean varietal trials near Moorhead.

Table 22. Characteristics of private soybean varieties; average Fairmont, Lambertson, and Waseca, 1975

Brand	Variety	Mature (date)	Lodging resistance (score) <sup>1</sup>	Plant height (inches)	Weight of 100 seeds (grams)	Seed quality (score) <sup>1</sup>	Phytophthora (reaction) <sup>2</sup>	Chlorosis (score) <sup>1</sup>	Flower (color) <sup>3</sup>	Pubescence (color) <sup>3</sup>	Hilum (color) <sup>3</sup>
	Amsoy 71	9-24	2.2	43	16.2	2.0	R	1.5	P	G	Y
	Chippewa 64	9-8	1.3	33	14.3	2.3	R	1.0	P	T	Bl
	Corsoy	9-19	2.2	37	15.1	2.1	S	2.0	P	G	Y
	Harcor	9-22	2.4	39	15.1	2.0	R	2.8	P	G	Y
	Hark	9-16	1.6	35	15.9	1.8	S	3.5	P	G	Y
	Hodgson	9-10	1.4	31	15.1	2.0	S	1.0	P	G	Bf
	Steele	9-10	1.6	33	16.6	2.3	R	2.0	P	G	Y
	Wells	9-20	1.6	38	16.8	2.1	R	1.5	P	G	Ib
Agripro	Osage	9-10	1.3	29	18.7	2.0	S	1.0	P	T	Y
	14	9-16	1.8	37	16.8	1.9	R	3.3	P	M	M
	20	9-23	1.8	36	20.6	2.0	R	3.5	P	G	Bf
	514	9-14	1.6	35	16.5	2.1	S	3.0	P	G	Y
	1235	9-12	1.4	31	16.0	2.1	S	1.8	P	G	Y
Asgrow	A2340	9-21	2.3	40	14.8	2.2	S	2.0	P	G	Y
	A2440	9-21	2.6	39	15.3	2.0	R	1.8	P	G	Y
	XP2070	9-21	1.9	33	17.1	1.9	H	4.2	W	G	M
	XP2444	9-20	2.1	36	17.7	2.1	R	3.0	W	G	Y
Clemens	2E	9-20	2.1	38	16.0	2.0	R	3.0	P	G	Y
	2ER75	9-20	2.0	38	15.9	2.2	-	2.4	P	G	M
	12E	9-9	1.4	31	15.1	2.2	R	2.2	P	G	Bf
	CX114	9-16	1.9	35	14.5	2.2	R	1.8	W	G	M
F.F.R.	111	9-15	2.0	39	17.4	2.1	R	3.2	P	G	Y
	112	9-26	3.3	40	15.4	2.0	R	2.8	M	G	Y
Jacques	J98	9-18	2.3	37	15.2	2.0	R	2.0	P	G	Y
	J104	9-19	2.3	38	15.4	2.2	R	2.0	P	G	Y
Kruger	Desoy 222	9-19	2.0	38	15.6	2.0	R	1.5	P	G	M
	Desoy 333	9-17	2.1	37	15.0	2.2	S	2.3	P	G	Y
L.O.L.-Felco	Go 44	9-16	2.1	36	15.2	2.2	S	3.0	P	G	Y
	Go 45A	9-11	1.4	33	15.9	2.1	H	2.0	P	G	Y
	LL 4301	9-17	1.7	34	18.5	1.9	R	1.5	W	G	Y
Northrup, King	Multivar 40	9-11	1.3	33	15.8	2.2	H	2.0	P	M	M
	S1244	9-10	1.6	33	17.0	2.2	S	2.3	P	T	Bl
	S1346	9-11	1.3	30	16.9	3.2	S	3.0	P	G	Y
Peterson-Pioneer	85	9-7	1.3	28	16.1	2.2	S	3.0	P	G	Bf
	105P	9-20	2.3	38	16.0	2.1	S	2.0	P	G	Y
	3100	9-19	1.8	37	15.6	2.3	H	3.0	P	G	M
	PX118-11	9-11	1.8	30	15.2	2.0	S	2.0	P	T	Br
Pride	B186	9-9	1.6	33	15.1	2.2	S	4.0	P	T	Br
S.R.F.	100	9-8	1.3	31	14.0	2.0	R	1.0	P	T	Bl
	150	9-16	1.3	34	14.7	1.7	S	3.0	P	G	Y
	174AT	9-14	2.0	37	15.7	1.8	R	1.3	P	G	Y
	200	9-23	2.6	41	15.1	2.0	R	1.7	P	G	Y
Teweles	XK101	9-9	1.6	34	15.1	2.7	S	1.5	M	M	M
	XK125	9-17	2.2	37	15.2	2.2	H	1.0	M	G	M
	XK140	9-9	1.4	32	14.6	2.6	R	1.0	P	T	Bl
	XK505	9-20	1.8	36	16.9	1.9	R	2.0	P	T	Bl
	XR102	9-8	2.0	34	14.4	2.2	H	1.0	M	T	Bl
Trojan	22	9-9	2.1	29	18.9	2.4	R	1.2	P	G	Y
	93	9-25	2.3	40	18.7	2.4	H	2.0	P	G	M
	94	9-26	2.6	38	19.3	2.4	H	4.0	P	G	M
	980	9-25	2.3	37	17.5	2.0	R	3.0	P	T	Bl
	C935	9-13	1.3	33	14.2	2.0	S	2.0	W	G	Y

<sup>1</sup> 1 = excellent, 5 = very poor.<sup>2</sup> H = heterogeneous, R = resistant, S = susceptible.<sup>3</sup> Flower color: M = mixed, P = purple, W = white; pubescence color: G = gray, M = mixed, T = tawny; hilum color: Bl = black, Bf = buff, Br = brown, Ib = imperfect black, M = mixed, Y = yellow.

Table 23. Characteristics of private soybean varieties; average Morris and Rosemount, 1975

Brand	Variety	Mature (date)	Lodging resistance (score) <sup>1</sup>	Plant height (inches)	Weight of 100 seeds (grams)	Seed quality (score) <sup>1</sup>	Phytophthora (reaction) <sup>2</sup>	Chlorosis (score) <sup>1</sup>	Flower (color) <sup>3</sup>	Pubescence (color) <sup>3</sup>	Hilum (color) <sup>3</sup>
	Anoka	9-18	2.5	31	18.4	2.3	S	2.8	P	T	Bl
	Chippewa 64	9-17	2.5	36	14.1	2.0	R	1.0	P	T	Bl
	Evans	9-6	1.5	29	15.2	2.2	R	1.3	W	G	Y
	Harlon	9-14	2.4	37	14.4	2.2	R	1.3	W	G	Y
	Hodgson	9-18	2.4	34	15.2	2.2	S	1.0	P	G	Bf
	Merit	9-6	2.0	31	12.6	2.5	R	1.0	W	G	Bf
	Steele	9-17	2.2	34	16.2	2.0	R	1.5	P	G	Y
	Swift	9-14	3.2	32	14.4	2.2	S	1.0	W	T	Bl
Agripro	Osage	9-18	2.5	30	19.0	2.4	S	1.0	P	T	Y
	1235	9-20	2.2	35	16.0	2.4	S	1.8	P	G	Y
Asgrow	XP1057	9-14	2.8	35	15.1	2.5	R	1.8	M	T	Bl
Clemens	12E	9-18	2.5	34	15.2	2.2	R	2.0	P	G	Bf
	CX282	9-12	2.4	33	14.7	2.2	R	1.3	P	T	Bl
Jacques	J84	9-17	2.4	35	15.4	2.2	R	1.3	P	M	Y
	J94	9-14	2.6	35	14.6	2.5	R	1.0	W	T	Bl
	J7492	9-18	2.4	36	15.8	2.2	H	1.0	P	G	M
L.O.L.-Felco	Go 45A	9-19	2.2	35	15.7	2.4	H	1.8	P	G	Y
Northrup, King	Multivar 30	9-4	1.8	30	14.4	2.3	H	2.0	M	G	M
	S1244	9-20	2.3	38	17.0	2.3	S	2.3	P	T	Bl
Peterson-Pioneer	81	8-28	2.0	24	14.6	2.8	R	1.5	P	M	M
	85	9-12	2.0	28	16.0	2.2	S	2.7	P	G	Bf
	PX118-11	9-19	2.5	31	15.0	2.0	S	2.0	P	T	Br
S.R.F.	100	9-14	2.2	31	13.3	2.0	R	1.0	P	T	Bl
Teweles	XR101	9-17	2.4	35	15.4	2.5	S	1.3	M	M	M
	XR102	9-16	2.6	34	14.8	2.2	H	1.0	M	T	Bl
Trojan	22	9-18	3.0	31	19.6	2.4	R	1.3	P	G	Y
	94	10-6	2.0	39	16.9	2.0	H	3.3	P	G	M
	C935	9-23	2.2	37	14.6	1.8	S	1.7	W	G	Y

<sup>1</sup> 1 = excellent, 5 = very poor.

<sup>2</sup> H = heterogeneous, R = resistant, S = susceptible.

<sup>3</sup> Flower color: M = mixed, P = purple, W = white; pubescence color: G = gray, M = mixed, T = tawny; hilum color: Bf = buff, Bl = black, Br = brown, M = mixed, Y = yellow.

## SUNFLOWERS

Nonoilseed varieties and hybrids are grown for use as nutmeats, salted whole seed, or birdfeed. Oilseed varieties and hybrids are grown for oil and protein extraction. Varieties are still more commonly grown than hybrids, but the proportion of sunflower acreage planted to hybrids is increasing.

Most of the available hybrids are produced by the cytoplasmic male-sterility and genetic fertility-restoration method. Names for open-pedigree hybrids in this report are based on the last digits of the parents' names. Single crosses are named from the last two digits of the female's name and the last digit of the male's name; for example, cms HA 89 X RHA 266 is called 896. For a three-way cross, the last digit of the second parent's name is also shown; for example, (cms HA 89 X HA 234) X RHA 266 is called 8946.

Row widths in these trials were 30 inches and plant populations were between 20,000 and 25,000 plants per acre for all varieties and hybrids.



An industrial agronomist inspects sunflower plants dwarfed by downy mildew disease. Resistant hybrids shown in the table.

Table 24. Characteristics of sunflower varieties, 1973-75

Variety and originator	Seed yield/acre (pounds)			Averages, Crookston and Morris							Disease ratings <sup>1</sup>		
	Crookston 1973-75	Morris 1973-75	Average 1975	Large seed (percent) <sup>1</sup>	Oil (percent) <sup>2</sup>	Weight/100 seeds (grams)	Test weight/ <sup>3</sup> bushel (pounds)	Flowering (date)	Lodging (score) <sup>4</sup>	Height (inches)	Rust	Downy mildew	Leaf mottle, <i>Verticillium</i> wilt
<b>Nonoilseed varieties tested in 1973-75</b>													
Sundak, USDA	1907	1558	1585	29	29.4	10.5	26.8	8-1	2.3	67	R	S	S
<b>Nonoilseed hybrids tested in 1973-75</b>													
852, USDA	2133	1974	1950	4	33.8	9.2	29.3	7-30	2.4	66	R	S	S
<b>Nonoilseed hybrids tested in 1974-75</b>													
850, USDA	1852	1973	1861	25	28.8	11.4	28.3	7-31	2.5	67	R	S	S
860, USDA	2299	2358	2057	47	26.6	12.4	26.3	8-1	2.7	67	R	S	S
862, USDA	2188	1528	1822	12	32.5	10.0	27.4	7-31	1.6	62	R	S	S
872, USDA	2307	1979	2076	2	29.4	10.0	28.2	7-27	1.6	62	R	S	S
882, USDA	2168	1875	2095	5	32.5	10.3	27.3	7-29	1.8	58	R	S	S
D-747, Dahlgren	1949	1477	1776	46	32.0	11.8	24.9	8-2	2.5	61	R,S	S	S
<b>Nonoilseed varieties tested in 1975</b>													
ARI 4, Agway	—	—	1581	8	—	10.7	25.5	8-4	2.3	64	R	S	S
ARI 6, Agway	—	—	1596	3	—	10.1	26.8	8-2	1.9	65	R	S	S
ARI 7, Agway	—	—	1444	20	—	11.5	25.2	8-4	2.6	65	R	S	S
<b>Nonoilseed hybrids tested in 1975</b>													
880, USDA	—	—	2039	24	—	12.5	25.3	8-1	1.9	63	R	S	S
D508, Dahlgren	—	—	2691	0	—	9.9	28.5	7-27	2.6	63	R	S	S
D509, Dahlgren	—	—	1861	33	—	11.3	24.7	8-2	2.6	69	R	S	S
D613, Dahlgren	—	—	2190	3	—	8.5	26.8	7-30	1.6	67	R	S	S
<b>Oilseed varieties tested in 1973-75</b>													
Peredovik 66, U.S.S.R.	1867	1796	2007	0	46.9	5.8	29.3	8-2	2.2	71	MS	S	MS
Sputnik 71, U.S.S.R.	1900	1919	1917	0	48.6	6.4	30.8	7-31	1.4	68	MS	S	MS
<b>Oilseed hybrids tested in 1973-75</b>													
891, USDA	1821	1918	1912	0	48.0	4.7	33.0	8-3	1.5	64	R	R	R
896, USDA	1800	1720	1812	0	47.9	4.3	31.1	8-3	1.0	68	R	S	R
901, USDA	1978	2328	2483	0	48.1	5.7	34.0	7-29	1.5	62	R	R	R
8941, USDA	1869	2154	2038	0	48.0	5.2	34.6	8-1	1.2	69	R	R	R,S
8946, USDA	1765	1607	1779	0	45.4	5.0	31.7	8-1	1.8	72	R	S	R,S
52, Rumania <sup>5</sup>	1714	1959	2017	0	45.9	5.0	28.5	8-5	1.8	65	MS	S	S
<b>Oilseed hybrids tested in 1974-75</b>													
344, USDA	2195	2338	2407	0	43.4	5.4	34.6	7-28	1.6	68	R	R	S
893, USDA	2277	1775	1920	0	48.6	4.5	33.5	8-2	1.3	63	R	R	R
894, USDA	2037	2114	2090	0	47.0	4.0	32.7	8-2	1.6	65	R	R	R
903, USDA	2046	2242	2102	0	45.4	5.9	34.4	7-30	2.3	65	R	R	R
904, USDA	2051	2462	2141	0	43.7	5.2	33.1	8-1	2.0	65	R	R	R
8944, USDA	2015	2190	2104	0	45.0	4.9	34.4	7-30	1.6	68	R	R	R,S
201, Cargill	1935	2137	2114	0	47.7	4.7	32.7	8-4	1.6	66	R	R	R
DO-411, Dahlgren	1977	1588	1954	0	45.2	5.2	30.5	8-6	1.9	75	R	S	S
DO-413, Dahlgren	1832	1772	1945	0	47.8	5.9	29.8	8-5	3.0	76	R	S	S
Sun-Hi 304, P.O.I.	2248	2041	2181	0	46.3	4.5	32.8	8-3	1.6	66	R	R	R
<b>Oilseed hybrids tested in 1975</b>													
241, USDA	—	—	2150	0	48.3	5.0	33.5	8-2	1.6	66	R	R	R
243, USDA	—	—	2072	0	46.3	5.5	32.3	8-2	1.6	66	R	R	R
244, USDA	—	—	2167	0	45.1	4.5	31.6	8-4	1.6	68	R	R	R
343, USDA	—	—	2055	0	46.1	6.1	33.9	7-29	1.9	66	R	R	S
8903, USDA	—	—	2120	0	49.1	5.0	33.5	8-2	1.6	62	R	R	R,S
8943, USDA	—	—	2386	0	47.0	5.3	34.0	7-31	1.6	68	R	R	R,S
53, Rumania	—	—	1987	0	47.0	5.2	28.5	8-5	1.9	68	MS	S	S
204, Cargill	—	—	2088	0	46.8	4.4	32.3	8-3	1.6	66	R	R	R
Sun-Gro 372, G.S.A.	—	—	2045	0	48.1	4.9	31.3	8-4	1.6	62	R	S	R
Sun-Gro 380, G.S.A.	—	—	2107	0	48.1	5.0	33.7	8-4	1.6	65	R	R	R
Sunbred 212, NK	—	—	2064	0	46.9	5.7	33.7	7-31	1.9	70	R	R	S
Sunbred 223, NK	—	—	2095	0	47.1	5.4	32.4	7-31	1.6	65	R	R	S
LSD 5%	245	306	351										

<sup>1</sup> Held on a 20/64 round-hole screen. <sup>2</sup> Oven-dry basis. <sup>3</sup> Morris; 1 = erect, 9 = flat.

<sup>4</sup> Ratings based on known parentage and plot observations but not on controlled tests with the fungi. R = resistant; S = susceptible; MS = moderately susceptible; R,S = about half of plants resistant. All varieties are susceptible to stem and head rots caused by *Sclerotinia*.

<sup>5</sup> Not tested in 1974.

## 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 usually are sown in a mixture with oats.

Varieties with cream-colored seed are most commonly grown. Buyers in Minnesota have not encouraged production of green varieties because of bleaching at harvest time.

### RECOMMENDED VARIETIES

**Century** — High yield. Medium to early. Long vined. Large, cream-colored seed. Good cooking quality. Originated by Agriculture Canada, Ottawa, from crosses involving Chancellor, Early Raymond, and Stirling. Licensed in 1960.

### VARIETIES NOT ADEQUATELY TESTED

**Latah** — High yield. Early. Long vined. Medium size, cream-

colored seed. Originated by Washington Agricultural Experiment Station. Released about 1972.

**Triumph** — High yield. Late. Medium vine length. Very large green seed. Good cooking quality. Selected from P.I. 206852 by Agriculture Canada, Morden. Licensed in 1973.

### OTHER VARIETIES

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

**Trapper** — Medium to high yield. Medium to early. Medium vine length. Small, cream-colored seed. Good cooking quality. Originated by Agriculture Canada, Morden, from a cross of Chancellor x Weibull's 700. Licensed in 1970.

Table 25. Characteristics of pea varieties at Elk River, 1974-75

Variety	Seed yield/acre (pounds)			Weight/100 seeds (grams)	Seed protein (percent)	First bloom (June)	Mature (July)	Vine length (inches)
	Dryland	Irrigated	Average					
Century	1651	2187	1919	21.0	25.1	6-17	7-20	47
Latah	1520	1883	1702	17.6	26.8	6-12	7-15	47
Triumph	1610	2200	1905	28.3	26.4	6-20	7-22	32
LSD 5%	312	356	237					

## DRY EDIBLE BEANS OR FIELD BEANS

Field beans are combine-harvested as mature dry beans. They are used for human food and reach the grocer's shelf in either canned or dry form. Minnesota farmers usually raise beans under contract and buy seed from the contractor.

There are more than 15 market classes of dry, edible beans, but only eight have been grown commercially in Minnesota. Minnesota's 1974 production amounted to 60 percent navy, 38 percent pinto, 1 percent dark red kidney, and 1 percent pink. Varietal recommendations are confined to varieties within the navy, pinto, dark red kidney, and great northern classes. Other classes such as pink are grown successfully, but important differences among varieties within their classes have not yet been identified in our trials. The only varieties described in the Not Adequately Tested and Other Varieties groups are those of most current interest and availability.

### RECOMMENDED VARIETIES

**Emerson great northern** — High yield. Medium-late maturity. Large, prostrate vine. Large white seed. Tolerant to bacterial wilt and moderately tolerant to bacterial blight. Developed by Nebraska Agricultural Experiment Station from a cross of GN 1140 and P.I. 165078. Released in 1971.

**Montcalm dark red kidney** — Medium to high yield. Late. Large, erect bush. Very large dark red seed. Resistant to mosaic and tolerant to halo blight. Susceptible to white mold, anthracnose, and common and fuscous blights. Named and released by Michigan Agricultural Experiment Station in 1974.

**Seafarer navy** — Medium yield. Early. Erect bush. Small white seed. Resistant to anthracnose and mosaic V-1, V-1A, V-15.

Tolerant of halo blight. Susceptible to white mold and common and fuscous blights. Developed by Michigan Agricultural Experiment Station from crosses involving X-ray bush mutants, Emerson 847, Michelite, Trag 279-1, and Florida Belle. Released in 1967.

**UI-114 pinto** — High yield. Medium-late maturity. Large prostrate vine. Tan and brown mottled seed. Resistant to mosaic V-1, V-1A. Tolerant of halo blight. Susceptible to white mold, rust, and common and fuscous blights. Developed by Idaho Agricultural Experiment Station from a cross of UI-111 pinto and J378 great northern. Released in 1965.



Pathologist H.G. Johnson looks for bacterial blight in UI-114 pinto beans in a variety trial.

## VARIETIES NOT ADEQUATELY TESTED

**Charity navy** — Medium to high yield. Medium maturity. Medium-size bush. Medium-size white seed. Reported resistant to common mosaic and fuscous blight. Susceptible to white mold, root rot, and common blight. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from a cross of experimental navy strains. Released in 1974.

**Snow-Bunting navy** — Medium to high yield. Early. Medium-size bush. Small white seed. Reported resistant to common mosaic and root rot. Susceptible to white mold and common and fuscous blights. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from crosses involving Gratiot, Sanilac, Snow-Flake, and experimental navy strains. Released in 1974.

**Snow-Flake navy** — Medium yield. Very early. Small erect bush. Small white seed. Reported resistant to common mosaic and fuscous blight. Susceptible to white mold and common blight. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from crosses involving red kidney, Michelite, and experimental navy strains. Released in 1974.

**Up-Land navy** — Medium to high yield. Medium maturity. Medium-size bush. Small white seed. Reported resistant to common mosaic and root rot. Susceptible to white mold and common and fuscous blights. Developed by Clarence Muehlfeld (Bridgeport, Mich.) from a cross of Snow-Flake and a navy bean mutation. Released in 1974.

## OTHER VARIETIES

**Gratiot navy** — Medium yield. Between Sanilac and Seafarer in maturity. Released by Michigan Agricultural Experiment Station in 1963.

**Sanilac navy** — Medium yield. Medium-late maturity. Developed by Michigan Agricultural Experiment Station from crosses involving a bush mutant (X-ray induced) of Michelite and an anthracnose-resistant line. Released in 1956.

**UI-111 pinto** — Lower yield than UI-114 but earlier maturing. Less resistant to mosaic and root rot than UI-114. Developed by Idaho Agricultural Experiment Station from a cross of UI-34 small red and pinto. Released in 1945.

Table 26. Characteristics of field bean varieties

Class and variety	Seed yield/acre (pounds)				Averages		
	Rosemount 1972-75	Lamberton 1973-75	Morris 1974-75	Crookston 1974-75	Weight/100 seeds (grams)	Mature (date)	Growth (form)
<u>Pinto</u>							
UI-114	2202	1842	1742	1485	38.3	9-1	vine
UI-111	1782	1682	1652	1690 <sup>4</sup>	37.6	8-30	vine
<u>Navy</u>							
Sanilac	1546	1527	881	751	18.7	9-1	bush
Seafarer	1583	1605	1172	1178	19.1	8-22	bush
Charity	1732 <sup>1</sup>	1779 <sup>5</sup>	1214	1383	23.1	8-23	bush
Gratiot	1599 <sup>2</sup>	1558	890	975 <sup>4</sup>	19.7	8-30	bush
Harkell	2122 <sup>3</sup>	1418 <sup>6</sup>	1434 <sup>4</sup>	927 <sup>4</sup>	24.6	9-5	vine
Kentwood	2062 <sup>3</sup>	1531 <sup>6</sup>	1174 <sup>4</sup>	662 <sup>4</sup>	25.8	9-12	bush
Snow-Bunting	1777 <sup>1</sup>	1698 <sup>5</sup>	1144	1586	20.5	8-19	bush
Snow-Flake	1523 <sup>1</sup>	1517 <sup>5</sup>	978	1405	20.1	8-17	bush
Up-Land	1615 <sup>1</sup>	1746 <sup>5</sup>	1328	1511	19.9	8-23	bush
<u>Small White</u>							
Aurora	1745 <sup>2</sup>	1613	1479	—	15.2	8-27	viny bush
Bonus	1745	1615	1433	—	18.1	9-13	vine
Chief	2113	1575	1624	—	17.5	9-16	vine
Duty	1559 <sup>3</sup>	1846 <sup>6</sup>	1397 <sup>4</sup>	—	17.2	8-29	vine
<u>Great Northern</u>							
Emerson	2371	1876	1840	—	46.6	8-29	vine
UI-59	2146	1658	1632	—	33.6	9-2	vine
Valley	2246 <sup>1</sup>	1610 <sup>5</sup>	1841	—	34.3	9-16	vine
<u>Pink</u>							
Gloria	1875 <sup>1</sup>	1963 <sup>5</sup>	1616	—	33.5	9-1	vine
Roza	1910 <sup>2</sup>	1633	1333	—	33.3	9-3	vine
Sutter	1979	1843	1393	—	29.1	9-4	vine
Viva	1967	1787	1693	—	25.7	9-2	vine
<u>Dark Red Kidney</u>							
Montcalm	1884	1457	1422	865	49.5	9-7	bush
Charlevoix	1426	1218	891	—	48.3	9-7	bush
<u>Light Red Kidney</u>							
Manitou	1155	1073	746	—	45.5	9-14	bush
Mecosta	1958	1364	1405	—	53.6	9-11	bush
Redkcloud	1165 <sup>1</sup>	1193 <sup>5</sup>	800	—	45.5	8-23	bush
Redkote	1282 <sup>2</sup>	1052	—	—	53.0	9-15	bush
<u>Small Red</u>							
UI-36	1893 <sup>4</sup>	1282 <sup>6</sup>	1434 <sup>4</sup>	—	32.6	8-27	vine
Rufus	1932 <sup>4</sup>	1499 <sup>4</sup>	1786 <sup>4</sup>	—	32.5	9-4	vine
<u>Black Turtle Soup</u>	1817 <sup>3</sup>	1501 <sup>6</sup>	1410 <sup>4</sup>	—	20.5	8-28	viny bush
<u>Marrow</u>							
Idaho Marrow	1617 <sup>3</sup>	1871 <sup>6</sup>	1438 <sup>4</sup>	—	42.6	8-29	semi-vine
<u>Cranberry</u>							
Michicran	1848	1523 <sup>5</sup>	1212	—	47.1	9-6	vine
LSD 5%	203	200	352	229			

<sup>1</sup> Not tested in 1972-73. <sup>2</sup> Not tested in 1972. <sup>3</sup> Not tested in 1972-74. <sup>4</sup> Not tested in 1974. <sup>5</sup> Not tested in 1973. <sup>6</sup> Not tested in 1973-74.



# ALFALFA

Many alfalfa varieties are available from both private and public plant breeders. Certified seed should be used because it provides the best assurance of varietal purity and performance. For this reason only varieties for which certified seed is available are listed in this report.

**WINTERHARDINESS AND YIELD** — Severe Minnesota winters make winterhardiness a primary consideration in variety selection. Greater winterhardiness is usually needed in southern and western Minnesota and in the Red River Valley than in other parts of the state.

The varieties listed in tables 27 and 28 are ranked according to fall growth score, which is an indication of rate of growth and degree of winterhardiness. Very winterhardy varieties are slow to recover after cutting. These varieties will survive nearly all winters, but usually are not high yielding because they recover slowly for the second crop and produce only a small third crop because of early dormancy. Winterhardy varieties are adapted to all areas of the state. Forage yields vary among varieties in this group, primarily because of disease and insect resistance. Three or four years of production can be expected from most winterhardy varieties. Moderately winterhardy varieties usually reach 1/10 bloom several days earlier than more winterhardy varieties. They are also characterized by rapid recovery after harvest.

Nonwinterhardy varieties should not be grown in Minnesota except for plowdown in the seedling year. Varieties in this group are not listed in the tables but include African, Bonanza, Caliente, Caliverde, Caliverde 65, Delta, El-Unico, Florida 66, Hairy Peruvian, Hayden, Joaquin II, Mesa Sirsa, Mesilla, Moapa, Moapa 69, Salton, Sonora, Sonora 70, 183, WL 504, WL 508, WL 600, and Unico.

**BACTERIAL WILT RESISTANCE** — This disease is prevalent in most areas of the state. Wilt-susceptible varieties are poor risks and should not be grown, because they generally show 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. Stand reductions after winter often are due to a combination of wilt damage and winter injury.

**PHYTOPHTHORA ROOT ROT** — This disease is important on poorly drained soils. It can cause stand losses of seedlings and can contribute to lower productivity in older stands if the soil remains wet for a week or more. The first Phytophthora resistant variety, Agate, was released in 1973 by Minnesota Agricultural Experiment Station and USDA.

**FOLIAR DISEASE** — Common leafspot, blackstem and Lepto leafspot are the most important foliar diseases throughout Minnesota. Losses from these diseases usually result in leaf losses which reduce both total yield and forage quality.

**INSECT RESISTANCE** — Losses caused by insects are usually less than those caused by diseases. Potato leafhopper can cause injury in July and August if harvest is delayed past 1/10 bloom. Potato leafhoppers are most serious in southern Minnesota.

Table 27. Average yields expressed as percentage of Vernal for all tests in Minnesota, 1959-1975

Variety	Yield (percent of Vernal)					Average 1st 4 years
	1st	2nd	3rd	4th	5th-8th	
<b>VERY WINTERHARDY</b>						
Norseman	97	93	89	—	—	93
Ladak	87	88	78	89	—	86
Teton	89	93	86	93	—	90
Travois	88	88	88	87	—	88
Ramsey	101	103	104	115	110	106
<b>WINTERHARDY</b>						
Dawson	100	104	104	100	98	102
Titan	101	101	102	103	104	102
123	101	104	101	102	—	102
WL 215	101	106	109	101	—	104
Agate	100	102	104	98	—	101
Vernal, tons hay/acre	4.8	4.6	4.5	4.3	4.3	4.6
ATRA 55	110	108	106	107	—	108
Iroquois	109	104	104	110	106	107
Ladak 65	99	104	101	99	—	101
WL 202	101	101	104	106	100	103
Narragansett	100	101	95	92	81	97
Nuggett	104	103	101	—	—	103
Scout	101	100	100	99	90	100
SX-10	95	97	103	103	—	100
153	97	103	85	92	—	94
525	101	98	101	105	99	101
520	108	110	109	113	—	110
Valor	100	104	107	—	—	104
Weevlchek	107	107	109	103	—	107
Anchor	104	108	111	109	—	108
Gladiator	103	—	—	—	—	103
Progress	98	100	102	105	98	101
Polar I	97	98	100	—	—	98
Ranger	97	98	97	99	93	98
Team	101	101	99	90	—	98
<b>MODERATELY WINTERHARDY</b>						
522	97	101	100	103	97	100
Arc	104	100	—	—	—	102
Citation	101	107	—	—	—	104
Marathon	112	109	106	98	—	106
WL 216	109	108	108	102	—	107
WL 307	105	104	104	102	—	104
Tempo	100	106	98	103	—	102
WL 306	105	110	103	105	—	106
A59	101	104	108	110	100	106
530	101	102	97	—	—	100
Bonus	98	100	101	99	—	100
WL 305	97	100	108	—	—	101
WL 309	106	105	114	103	—	107
Apex	101	109	102	105	55	104
Chimo	102	103	—	—	—	103
G777	101	101	—	—	—	101
Saranac	101	101	104	105	101	103
Thor	103	104	104	99	—	103
A-57	97	102	101	—	—	100
Glacier	101	104	84	85	25	94
Warrior	97	103	99	101	80	100
A-24	109	101	—	—	—	105
Europa	98	100	81	89	25	92
Stride	94	102	99	85	25	95

Table 28. Winterhardiness index and disease and insect resistance of certified alfalfa varieties

Variety	Developer or owner <sup>1</sup>	Winter hardiness (index) <sup>2</sup>	RESISTANT PLANTS					
			Bacterial wilt (percent) <sup>3</sup>	Phytophthora root rot (percent) <sup>3</sup>	Common leaf spot (percent) <sup>3</sup>	Lepto leaf spot (percent) <sup>3</sup>	Spring blackstem (percent) <sup>3</sup>	Leafhopper yellowing (percent) <sup>3</sup>
<b>VERY WINTERHARDY</b>								
----- highest values best -----								
Norseman	Barzen of Minneapolis	7.9	34	5	34	10	27	36
Ladak	USDA (foreign introduction) <sup>a</sup>	7.5	9	2	22	7	23	43
Teton	S. Dakota Agr. Exp. Sta. <sup>b</sup>	7.4	17	9	51	6	30	61
Travois	S. Dakota Agr. Exp. Sta. <sup>b</sup>	7.4	42	1	42	7	44	72
Ramsey	Minnesota Agr. Exp. Sta. & USDA <sup>b</sup>	6.7	42	12	94	23	64	48
<b>WINTERHARDY</b>								
Dawson	Nebraska Agr. Exp. Sta. & USDA <sup>b</sup>	6.5	16	1	32	13	22	18
Titan	Rudy-Patrick Co. <sup>c</sup>	6.4	68	3	31	16	60	47
123	DeKalb AgResearch Inc.	6.3	46	4	8	22	39	51
WL 215	Waterman-Loomis Co. <sup>de</sup>	6.3	40	5	23	15	38	23
Agate	Minnesota Agr. Exp. Sta. & USDA <sup>b</sup>	6.0	73	55	66	16	10	19
Vernal	Wisconsin Agr. Exp. Sta. & USDA <sup>b</sup>	6.5	47	3	23	14	41	29
ATRA 55	Pioneer Hi-Bred International Inc.	6.0	27	1	44	33	22	30
Iroquois	Cornell University <sup>b</sup>	6.0	69	1	44	10	40	26
Ladak 65	Montana Agr. Exp. Sta. <sup>b</sup>	6.0	40	2	16	4	29	23
WL 202	Waterman-Loomis Co. <sup>de</sup>	6.0	39	2	7	12	39	29
Narragansett	Rhode Island Agr. Exp. Sta. <sup>2</sup>	5.9	<1	2	44	11	44	24
Nuggett	PAG	5.9	52	<1	—	—	—	—
Scout	Farmers Forage Res. Coop.	5.8	13	2	30	9	19	32
SX-10	Sexauer Co.	6.7	6	4	—	—	—	—
153	DeKalb AgResearch Inc.	5.7	2	10	7	5	19	27
525	Pioneer Hi-Bred International Inc.	5.7	43	1	29	24	52	21
520	Pioneer Hi-Bred International Inc.	5.6	45	1	25	17	42	42
Valor	Felco-Land O'Lakes <sup>f</sup>	5.5	40	<1	—	—	—	—
Weevlchek	Farmers Forage Res. Coop.	5.5	64	2	47	22	38	74
Anchor	Rudy-Patrick Co. <sup>c</sup>	5.4	40	4	58	13	18	13
Gladiator	Northrup, King & Co.	5.4	64	2	—	—	—	—
Progress	Cal/West Seeds <sup>g</sup>	5.4	29	2	18	9	18	39
Polar I	Pride Seed Co.	5.4	55	9	—	—	—	—
Ranger	Nebraska Agr. Exp. Sta. & USDA <sup>b</sup>	5.4	16	2	11	1	7	16
Team	USDA <sup>b</sup>	5.4	<1	1	51	10	38	59
<b>MODERATELY WINTERHARDY</b>								
522	Pioneer Hi-Bred International Inc.	5.3	45	4	15	10	40	30
Arc	USDA <sup>b</sup>	5.2	8	4	—	—	—	—
Citation	North American Plant Breeders <sup>e</sup>	5.2	50	3	—	—	—	—
Marathon	Cargill	5.2	40	2	—	—	—	—
WL 216	Waterman-Loomis Co. <sup>de</sup>	5.2	28	2	11	8	27	44
WL 307	Waterman-Loomis Co. <sup>de</sup>	5.2	29	<1	—	—	—	—
Tempo	Farmers Forage Res. Coop.	5.1	29	3	42	11	19	31
WL 306	Waterman-Loomis Co. <sup>de</sup>	5.1	25	1	16	8	40	28
A59	E.F. Mangelsdorf & Bros. Inc. <sup>h</sup>	5.0	18	5	21	12	42	18
530	Pioneer Hi-Bred International Inc.	5.0	43	2	68	6	46	20
Bonus	Cal/West Seeds <sup>g</sup>	4.7	13	1	17	18	40	45
WL 305	Waterman-Loomis Co. <sup>de</sup>	4.7	25	6	13	9	47	36
WL 309	Waterman-Loomis Co. <sup>de</sup>	4.7	28	4	—	—	—	—
Apex	Rudy-Patrick Co. <sup>c</sup>	4.6	<1	2	48	10	20	28
Chimo	Americana Seed Co.	4.6	22	1	—	—	—	—
G777	Funk Bros. Seed Co.	4.5	28	5	—	—	—	—
Saranac	Cornell University <sup>b</sup>	4.5	55	2	49	18	37	20
Thor	Northrup, King & Co.	4.5	78	1	—	—	—	—
A-57	Embro Seed Co. Inc. <sup>h</sup>	4.4	14	8	—	—	—	—
Glacier	Northrup, King & Co.	4.4	<1	1	56	16	42	24
Warrior	Northrup, King & Co.	4.3	22	<1	55	12	26	16
A-24	Embro Seed Co. Inc. <sup>h</sup>	4.2	5	2	64	3	28	25
Europa	H.W. Walcott & Co.	3.3	1	1	81	12	21	20
Stride	Cal/West Seeds <sup>g</sup>	3.0	2	1	58	7	17	31

<sup>1</sup> Sold in Minnesota by: a. seed not available or very limited, b. seed available from several sources, c. Associated Producers Inc. and Interstate Seed Co., d. Cenex Seed Co., e. Midland Cooperatives Inc., f. Land O'Lakes-Felco, g. Peterson Seed Co. and h. Ramy Seed Co.

<sup>2</sup> Based on fall growth after cutting in 1st week of September: 1 = tallest, 9 = shortest. <sup>3</sup> Plants with little or no injury are classed as resistant.

## BIRDSFOOT TREFOIL

Birdsfoot trefoil is primarily a pasture legume but also can be harvested for hay. It is suitable on sandy soils of medium to low fertility, but is tolerant to a wide range in soil fertility, acidity, and drainage. It is persistent when grown with bluegrass, but is also suitable with timothy. This highly palatable forage will not cause bloat.

### RECOMMENDED VARIETIES

**Empire** — Winterhardy, prostrate growth habit.

**Carrol** — Winterhardy, prostrate, persistent pasture type. Slightly earlier in maturity, better seedling vigor and larger seed than Empire. Released in 1970. Distributed by Peterson Seed Co. Seed sale regulated by U.S. Variety Protection Act.

**Leo** — Winterhardy, higher yielding, less prostrate growth habit, and better seedling vigor than Empire. Released in 1963.

Table 29. Average yields expressed as percentage of Empire for all tests in Minnesota 1967-75

Variety	Developer	Yield (percent of Empire)			
		Year after seeding			Average
		1	2	3	
Empire	New York Agr. Exp. Sta. (tons hay/acre)	3.11	3.24	2.96	3.10
Leo	MacDonald College, Canada	119	109	112	113
Carrol	Iowa Agr. Exp. Sta.	116	112	106	111
Dawn	Missouri Agr. Exp. Sta.	107	108	107	107
Viking	New York Agr. Exp. Sta.	109	105	95	103
NK (N6-128)	Northrup, King & Co.	100	100	99	100
Maitland	Univ. of Guelph, Canada	116	101	77	98
Winnar	Soil Conservation Serv.	100	86	88	91
Tana	Montana Agr. Exp. Sta.	92	95	74	87
Mansfield	Vermont Agr. Exp. Sta.	27	51	99	59

## RED CLOVER

Red clover is grown in association with timothy for hay or silage. Winterhardy varieties will generally not persist beyond two crop years because of susceptibility to crown rot and other diseases. Red clover should not be seeded with alfalfa because red clover seedlings are more aggressive than alfalfa seedlings and may prevent alfalfa from becoming established. Where alfalfa can be grown successfully, it will yield more than red clover.

### RECOMMENDED VARIETIES

**Dollard** — Persistent with good forage yield in second crop year. Resistant to northern anthracnose but susceptible to powdery mildew. Released in 1937 and distributed by Maple Leaf Mills Ltd., Toronto, Canada.

**Lakeland** — Persistent with good forage yield in second crop year. Highly resistant to powdery mildew and resistant to northern anthracnose and virus. Released in 1959.

### VARIETIES NOT ADEQUATELY TESTED

**Arlington** — Very persistent, may be productive for 3 or 4 years. Limited quantity of seed available.

**Emerson** — Local strain from Marion County, Iowa. Distributed by Peterson Seed Co.

**Kenstar** — Selected from Kenland for greater persistence under Kentucky conditions. Seed sale regulated under U.S. Variety Protection Act.

**Redman** — Distributed by Land O'Lakes-Felco.

### OTHER VARIETIES

**Kenland** — Very susceptible to northern anthracnose and virus.

**Pennscott** — Very susceptible to northern anthracnose and virus.

Table 30. Average yields expressed as percentage of Lakeland for all tests in Minnesota 1966-75

Variety	Developer or owner	Yield (percent of Lakeland)			Average 1st 2 years	Stand 3 years after seeding <sup>1</sup> (percent)
		Year after seeding				
		1	2	3		
Lakeland	Wisconsin Agr. Exp. Sta. & USDA (tons hay/acre)	3.65	3.49	1.76	3.57	55
Arlington	Wisconsin Agr. Exp. Sta. & USDA	109	102	100	106	85
Kenstar	Kentucky Agr. Exp. Sta. & USDA	108	95	88	102	63
Redman	Farmer's Forage Res. Coop.	104	97	89	101	70
Dollard	MacDonald College, Canada	101	91	97	96	23
Kenland	Kentucky Agr. Exp. Sta. & USDA	98	90	68	94	38
Clovage	Americana Seed Co.	96	90	78	93	38
Truver	Americana Seed Co.	101	80	65	91	28
Pennscott	Pennsylvania Agr. Exp. Sta.	94	71	0	83	28
Emerson	Iowa Agr. Exp. Sta.	84	75	58	80	25
Orbit	Mississippi Agr. Exp. Sta.	92	66	0	79	15
Tensar	Louisiana Agr. Exp. Sta.	56	62	0	59	23

<sup>1</sup> Rosemount.

# BROMEGRASS

Bromegrass is generally grown for hay in mixture with alfalfa or is used as pasture in mixture with other grasses and legumes. Present varieties can be classed as southern, intermediate, and northern types. Varieties of the southern type may not be higher yielding, but they are generally less susceptible to leaf diseases and earlier in maturity than northern types. All varieties tested are of the southern type and are satisfactory in winterhardiness. Some stand losses may occur when bromegrass is managed under a three-cut system.

## RECOMMENDED VARIETIES

**Baylor** — Leafy, good seedling vigor.

**Blair** — Leafy, good seedling vigor.

**Fox** — Spreading, good seedling vigor, good tolerance to leaf diseases. Maturity similar to Lincoln. Released in 1968.

**Lincoln** — Spreading, good seedling vigor. Released in 1942.

**Sac** — Leafy, moderately coarse, good tolerance to leaf diseases. Released in 1962.

**Saratoga** — Leafy, good aftermath production. Released in 1955.

Table 31. Dry matter yields of bromegrass varieties expressed as percentage of Fox at five locations, 1966-75

Variety	Developed or owned by	Crookston	Grand Rapids	Lamberton	Morris	Rosemount
No. trial years		2	4	1	2	4
Fox ton/acre	Minnesota Agr. Exp. Sta.	3.1	4.7	3.6	3.6	4.1
Barton	Land O'Lakes	—	—	—	102 <sup>1</sup>	109 <sup>1</sup>
Baylor	Rudy Patrick Co.	106	93	104	100	104
Beacon	F.S. Services, Inc.	—	—	—	93 <sup>1</sup>	113 <sup>1</sup>
Blair	Midland Coop.	105	93	103	112 <sup>2</sup>	104
Bromage	Americana Seed Company	—	—	—	96 <sup>1</sup>	104 <sup>1</sup>
Lincoln	Nebraska Agr. Exp. Sta.	97	89	98	98	97
Sac	Wisconsin Agr. Exp. Sta.	102	92	99	95	105
Saratoga	New York Agr. Exp. Sta.	103	102	105	105	100
LSD 5%		15	9	12	11	12

<sup>1</sup> One year. <sup>2</sup> Two years.

# ORCHARDGRASS

Orchardgrass is used with other grasses in mixtures with legumes because it establishes rapidly and recovers quickly after grazing or harvest. Its chief limitation is lack of winterhardiness, but in areas with reliable snow cover it may persist and remain productive. Orchardgrass should be grown in mixtures with adapted grasses having similar heading characteristics. Heading differences were greater among varieties grown at Rosemount than at Grand Rapids. Early heading varieties and common types tested

are generally less satisfactory than those with medium to late heading in mixtures.

Orchardgrass is affected more by leaf diseases than other grasses. Rust will particularly reduce quality and may affect yield and winterhardiness of pure orchardgrass stand. Diseases are less serious when orchardgrass is grazed or harvested frequently and when grown in mixtures with other grasses and legumes.

Table 32. Characteristics of orchardgrass varieties with dry matter yields expressed as percentage of Hallmark at three locations, 1971-75

Variety	Developed or owned by	Yield (percent of Hallmark)			Leaf rust reaction <sup>1</sup>		
		Grand Rapids	Morris	Rosemount	Rosemount	Arlington, Wisconsin	Ames, Iowa
No. trial years		4	3	4	1	1	2
<u>Early</u>							
Boone	Kentucky Agr. Exp. Sta.	85	—	96	4.8	3.5	2.5
Chinook	Agriculture Canada, Lethbridge	83	81	85	4.5	—	4.0
<u>Medium</u>							
Able	Farmers Forage Res. Coop.	86 <sup>2</sup>	—	93 <sup>2</sup>	—	—	3.0 <sup>2</sup>
Dart	Land O'Lakes	102 <sup>2</sup>	—	93 <sup>2</sup>	—	—	5.0
Dayton	Midland Coop.	93	—	94	—	3.9	2.5
Frode	Swedish Seed Assoc.	94	89	92	—	—	2.0
Grassage	Americana Seed Co.	—	—	102	—	—	—
Hallmark ton/acre	Farmers Forage Res. Coop.	3.3	3.0	4.3	4.8	4.1	3.0
Ina	Ontario Agr. Coll., Guelph	90	—	89	3.3	—	2.0
Juno	Agriculture Canada, Ottawa	97 <sup>2</sup>	—	96 <sup>2</sup>	—	—	—
Napier	Rudy Patrick Co.	95	—	94	3.8	4.0	2.5
Orbit	Northrup, King & Co.	87	—	96	2.3	—	1.0
Sterling	Iowa Agr. Exp. Sta.	95	103	92	4.9	4.1	5.0
<u>Late</u>							
Kay	Agriculture Canada, Ottawa	89	—	87	—	—	—
Majestic	Maple Leaf Mills, Inc.	—	—	90 <sup>2</sup>	—	—	2.6 <sup>2</sup>
Nordstern	Northrup, King & Co.	94	92	92	3.0	4.1	3.0
LSD 5%		11	9	9			

<sup>1</sup> 1 = resistant, 5 = most susceptible. <sup>2</sup> One year.

## REED CANARYGRASS

Reed canarygrass is adapted throughout Minnesota for use as hay, pasture, or silage. It is one of the best grass species for use on poorly drained soil, in swampy areas, and in areas subject to spring flooding. The species is also well adapted to upland soils. The seedling vigor is not as good as that of other commonly used forage grasses. Reed canarygrass is less palatable than most species seeded for hay and pasture, but cattle will produce well on the grass if it is used before it becomes mature. Satisfactory pasture utilization occurs if the grass is grazed when it is between 6 and 24 inches tall. Harvesting hay between heading and early bloom is preferred, because the quality declines with advanced maturity. The varieties tested are winterhardy and persistent.

### RECOMMENDED VARIETIES

**Frontier** — Slightly later in maturity and leafier than Ioreed. Licensed in 1959.

**Ioreed** — Moderately productive in first year's stand, mid-early in maturity. Appears similar to common types from older stands in Minnesota. Released in 1946.

**Rise** — Stand establishment better and slightly later in maturity than Ioreed.

### VARIETIES NOT ADEQUATELY TESTED

**Castor** — Higher seed retention but similar to Frontier in maturity and forage yield. Licensed in 1972.

**Grove** — About 7-10 days later in maturity than Frontier, equal to Frontier in forage yield and slightly more palatable to cattle in Canadian trials. Licensed in 1970.

**Vantage** — Slightly earlier than Rise. Higher seed yield and less shattering than Rise in Minnesota trials. Released in 1972. Seed sale regulated under U.S. Variety Protection Act.

Table 33. Dry matter yields of reed canarygrass varieties expressed as percentage of Rise at four locations, 1972-75

Variety	Developed by	Heading	Lamberton	Grand Rapids	Morris	Rosemount
No. of trial years			2	3	2	2
Rise ton/acre	Rudy Patrick Co.	Medium	2.9	4.7	3.2	5.0
Castor	Agriculture Canada, Beaverlodge	Medium	91	—	96	—
Frontier	Agriculture Canada, Ottawa	Medium	96	94	101	97
Grove	Agriculture Canada, Ottawa	Late	—	87	82	91
Vantage	Iowa Agr. Exp. Sta.	Medium	96	102	102	99
LSD 5%			10	6	5	6

## TIMOTHY

Timothy is adapted throughout Minnesota for use in hay and pasture mixtures. When timothy is the major component in hay, its stage of maturity affects yield and quality. Harvesting at early bloom stage is preferred to later harvesting. Because timothy varieties differ in maturity, care should be taken in choosing varieties that will fit the management of the crop. Only very early varieties are adapted to a three-cut system with alfalfa. Varieties of medium and medium-late maturity should not be harvested more than twice during the growing season.

### RECOMMENDED VARIETIES

**Clair** — Vigorous, and very early. Adapted to a three-cut system with alfalfa. Released in 1958.

**Climax** — Tall, fine-stemmed, leafy, medium-late maturity. Licensed in 1947.

**Itasca** — Less leafy than Climax, medium maturity. Well adapted throughout Minnesota.

**Lorain** — Medium-late maturity. Released in 1939.

**Timfor** — Medium-early, very leafy variety relatively free of leaf diseases. Named in 1971.

### VARIETIES NOT ADEQUATELY TESTED

**Basho** — Similar to Champ in maturity and forage yield in Canadian trials.

**Champ** — Leafy with good aftermath in Canadian trials. Five to seven days earlier in maturity than Climax. Licensed in 1967.

**Pronto** — Similar in maturity to Itasca.

### OTHER VARIETIES

**Drummond** — Relatively tolerant to rust, medium-late maturity.

**Verdant** — Leafy, relatively disease free, but low yielding, late maturity. Released in 1968.

Table 34. Dry matter yields of timothy varieties expressed as percentage of Itasca at three locations, 1965-75

Variety	Developed or owned by	Grand Rapids	Morris	Rosemount
No. trial years		6	3	4
<u>Very early</u>				
Clair	Kentucky Agr. Exp. Sta.	97	101	106
<u>Medium-early</u>				
Basho	Agriculture Canada, Ottawa	—	—	97 <sup>1</sup>
Champ	Agriculture Canada, Ottawa	96	—	—
Timfor	Northrup, King & Co.	—	—	102
<u>Medium</u>				
Climax	Agriculture Canada, Ottawa	95	100	99
Itasca ton/acre	Minnesota Agr. Exp. Sta.	4.0	3.7	3.2
Pronto	Pride Seed Co.	90 <sup>1</sup>	—	97
<u>Medium-late</u>				
Lorain	Ohio Agr. Exp. Sta. & USDA	90 <sup>1</sup>	91	99 <sup>1</sup>
Verdant	Wisconsin Agr. Exp. Sta.	94	87	93
LSD 5%		6	10	8

<sup>1</sup> One year.

# NOTES

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## 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/acre in pounds	Date
Barley . . . . .	48	72-96	Early spring
Corn . . . . .	56	10-20	Late April or early May
Flax . . . . .	56	42-56	April 15 to May 15
Forage Grass (perennial) If mixed with legumes, sow at time indicated for the legume.			
Bromegrass in mixtures . . . . .	14	5-8	Early spring or late summer
Orchardgrass in mixtures . . . . .	14	2-6	Early spring or late summer
Reed canarygrass . . . . .	44-48		Early spring or late summer
Alone . . . . .		6-8	
In mixtures . . . . .		4-6	
Timothy in mixtures . . . . .	45	2-6	Early spring or late summer
Forage Legumes (biennial or perennial)			
Alfalfa . . . . .	60		Early spring to August 10
Alone . . . . .		10-12	
With grasses . . . . .		5-8	
Birdsfoot trefoil (with grasses) . . . . .	60	5-6	Early spring
Clover . . . . .	60		Early spring
Alsike (in mixture) . . . . .		2	
Ladino (in mixture) . . . . .		½-1	
Red (in mixture) . . . . .		4-8	
Sweet Clover . . . . .	60		Early Spring
Alone . . . . .		10-12	
In mixture . . . . .		2-4	
Oats . . . . .	32	64-80	Early Spring
Rye . . . . .	56	56-70	September
Sorghum . . . . .	50 (sweet), 56 (grain)		May 20 to June 5 for grain
18- to 40-inch rows . . . . .		5-10	
6- to 14-inch rows . . . . .		7-15	
Sudangrass . . . . .	40		May 20 to June 10
18- to 40-inch rows . . . . .		10-20	
6- to 14-inch rows . . . . .		25-30	
With 1½ bushels of soybeans . . . . .		10	
Soybeans . . . . .	60		May 5-25
6- to 7-inch rows . . . . .		100 (4 seeds/ft.)	
20-inch rows . . . . .		65 (7 seeds/ft.)	
30-inch rows . . . . .		55 (9 seeds/ft.)	
40-inch rows . . . . .		50 (11 seeds/ft.)	
Wheat . . . . .	60		
Hard Red Spring . . . . .		75-90	Early spring
Durum . . . . .		90	Early spring
Winter . . . . .		75-90	Aug. 20 to Sept. 20
Miscellaneous Crops			
Annual canarygrass . . . . .	50	40	Early spring
Buckwheat . . . . .	48-50	40-48	June 15 to July 15
Field peas . . . . .	60	120-225	Early spring
With 1½ to 2 bushels of oats . . . . .		45-90	
Fababeans — medium size . . . . .	60	180	Early spring
With 2 bushels of oats . . . . .		60	
Millet . . . . .	48-56	20-40	June 15 to July 15
Mustard and oilseed rape . . . . .	50-58	10	May 1 to June 15
Navy beans . . . . .	60	40	May 20 to June 15
Pinto beans . . . . .	60	60-80	May 20 to June 15
Kidney beans . . . . .	60	75-100	May 20 to June 15
Rape for forage . . . . .	50	4-6	Early spring with oats
Sunflowers . . . . .	24	3-8	May 1-25

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