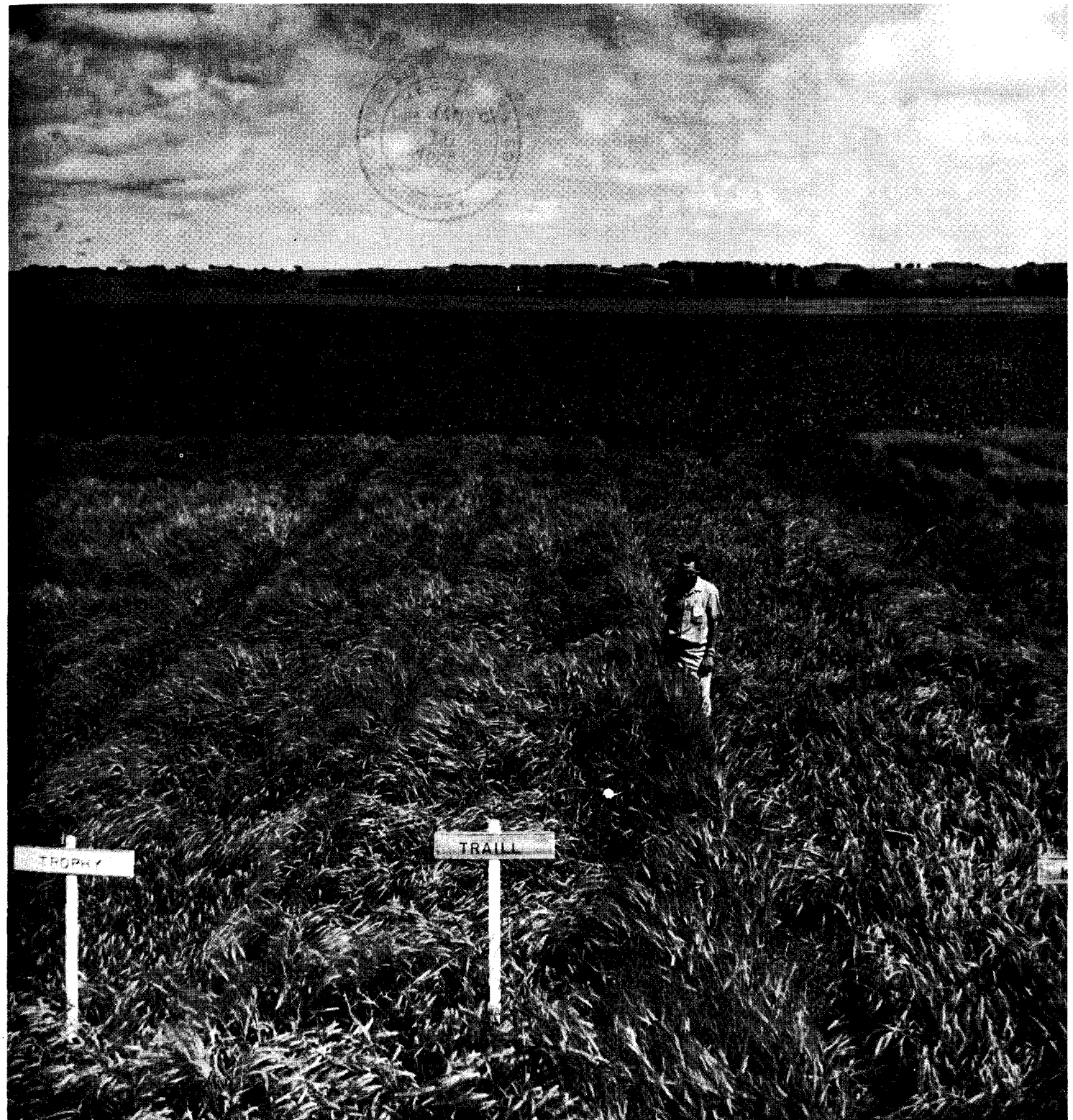


VARIETAL TRIALS OF FARM CROPS



University of Minnesota Agricultural Experiment Station

VARIETAL TRIALS OF FARM CROPS

Successful crop production depends to a considerable extent on selecting the best varieties for a particular farm.

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

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

On the basis of results from these comparative trials, the list of varieties recommended for use in Minnesota is revised each year by the Experiment Station Crop Variety Review Committee.

Data for varieties not included in all trials averaged within a table have been adjusted by Patterson's method so that averages of varieties tested for different numbers of years can be compared directly.

For most crops, varieties are arranged in order of "recommended varieties," "varieties not adequately tested," and "other varieties;" and in alphabetical order within each group.

Recommended varieties have performed better than other varieties in important characteristics in comparative tests. A variety usually is not eligible for recommendation until it has been tested in Minnesota for at least 3 years. Promising new varieties developed in other states or countries which are brought into the state for seed production or for use on farms before 3 years of testing can be completed are listed as "not adequately tested." Information now available regarding these varieties is presented but no conclusions are drawn regarding their suitability under Minnesota conditions.

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

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

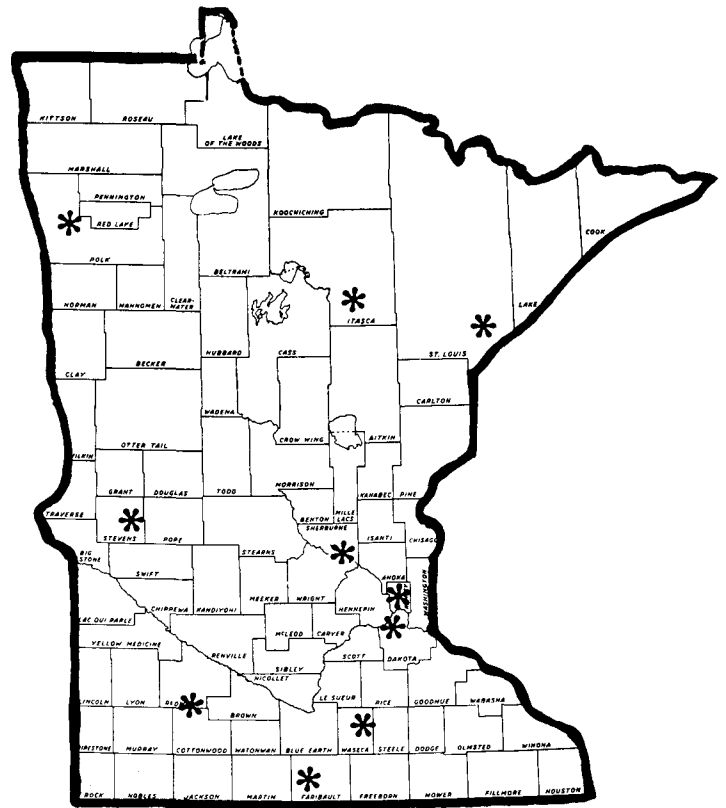
Registered and certified seed of most varieties described in this report can be purchased from seed dealers or from growers listed in the Minnesota Registered and Certified Seed Directory for 1966 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, St. Paul, Minnesota 55101, or from county agricultural agents' offices.

Authors of this publication are: barley, D. C. Rasmusson; oats, R. A. Kleese; spring and winter wheat, D. R. Johnston and R. E. Heiner; rye, millet, and peas, R. G. Robinson; sunflowers, R. G. Robinson and F. K. Johnson; flax, V. E. Comstock and J. H. Ford; soybeans, J. W. Lambert and R. L. Cooper; alfalfa, L. J. Elling; birdsfoot trefoil, red clover, sweet clover, brome grass, Kentucky bluegrass, and timothy, H. L. Thomas; sudangrass, sorghum-sudan, and sweet sorghum, A. R. Schmid. Extension agronomists H. J. Otto and J. R. Justin also participated in preparation of this publication.

Field work of the variety trials at Waseca, Lamberton, Morris, Crookston, Grand Rapids, and Duluth was supervised by J. R. Thompson, W. W. Nelson, R. L. Thompson, F. K. Johnson, R. H. Anderson, and R. S. Grant, respectively.

CONTENTS

<i>Barley</i>	3
<i>Oats</i>	3
<i>Winter Rye</i>	6
<i>Winter Wheat</i>	6
<i>Durum Wheat</i>	7
<i>Hard Red Spring Wheat</i>	7
<i>Millet</i>	8
<i>Flax</i>	9
<i>Soybeans</i>	10
<i>Sunflowers</i>	12
<i>Dry Edible Peas and Field Peas</i>	13
<i>Alfalfa</i>	13
<i>Birdsfoot Trefoil</i>	15
<i>Red Clover</i>	15
<i>Sweetclover</i>	15
<i>Brome grass</i>	16
<i>Timothy</i>	16
<i>Kentucky Bluegrass</i>	17
<i>Sudangrass, Sorghum-Sudan, and Sweet Sorghum</i>	17
<i>Rate and Date of Sowing</i>	19



1965 varietal trials were conducted at these locations.

BARLEY

RECOMMENDED VARIETIES

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

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

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

VARIETIES NOT ADEQUATELY TESTED

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

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

OTHER VARIETIES

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

Keystone—Six-rowed, smooth-awned, colorless aleurone variety. High yield; good standing ability. Resistant to loose smut and stem rust. Not suitable for malting. Developed at Brandon, Manitoba, from the cross Jet x Vantage 2 x Vantmore².

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

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

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

OATS

RECOMMENDED VARIETIES

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

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

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

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

Tippecanoe—Early, with good yield potential, and excellent straw strength. Released from Purdue Agricultural Experiment Station from a cross of (Clintland 60 x Mo. 0-205) x Clintland 60.

VARIETIES NOT ADEQUATELY TESTED

Clintford—Early, good yield, high bushel weight, and very stiff straw. Susceptible to crown rust and prevalent races of stem

Table 1. Yields of barley varieties in bushels per acre

Variety	Years of Trial	Morris	Crookston	St. Paul	Rosemount	Lamberton	Grand Rapids	Average
Larker	1959-65	58	57	51	59	58	49	55
Trophy	1959-65	55	54	44	54	54	48	52
Parkland	1959-65	57	52	48	55	53	47	52
LSD (5%)		3	4	6	3	5	4	2
Larker	1963-65	64	62	41	—	—	—	56
Trophy	1963-65	62	60	39	—	—	—	54
Dickson	1963-65	66	64	36	—	—	—	55
Parkland	1963-65	69	54	37	—	—	—	53
Conquest	1963-65	70	55	46	—	—	—	57
LSD (5%)		6	7	6				4

Table 2. Characteristics of barley varieties

Variety	Date of Heading	Height	Lodging Score*	Plump Kernels†	Disease Reaction‡		
					Stem Rust	Spot Blotch	Loose Smut
	June	inches					
Larker	24	34	4.2	62	R	S	S
Trophy	25	33	3.3	50	R	S	S
Dickson	25	33	3.5	40	R	R	S
Parkland	27	36	4.0	54	R	S	S
Conquest	24	36	2.8	55	R	S	R

* 1 erect, 9 flat

† Kernels held on 6/64" x 3/4" screen

‡ R = resistant, S = susceptible



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

rust. Moderately resistant to smut. Developed at the Purdue Agricultural Experiment Station from a cross of Milford to a selection from Clinton 59 x Landhafer.

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

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

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

OTHER VARIETIES

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

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

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

Bonkee—Released from the Iowa Agricultural Experiment Station. Parentage is Bonham² x (Cherokee² x R.L.2105). White

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

Variety	Years of trial	Crookston*	Lambertont†	Morris	Rosemount	Waseca	Grand Rapids	Average
Neal	1963-4-5	78	84	92	84	83	78	83
Tippecanoe	1964-5	65	87	95	78	79	71	80
Clintford	1965	78	81	102	76	74	80	82
Minhafer	1963-4-5	77	80	96	76	86	74	82
Andrew	1963-4-5	72	88	86	73	72	70	77
Santee	1964-5	85	91	91	77	76	84	84
Brave	1963-4-5	80	96	106	80	83	99	91
Clintland 64	1964-5	78	78	103	87	85	78	86
Goodfield	1963-4-5	65	79	86	72	65	70	73
Tyler	1965	72	86	86	68	76	82	78
Garland	1963-4-5	78	93	104	97	83	86	91
Dodge	1963-4-5	75	77	97	85	81	77	83
Portage	1963-4-5	89	89	101	78	92	88	90
Garry	1963-4-5	91	89	99	67	84	98	88
Lodi	1963-4-5	101	90	106	86	97	95	96
Rodney	1963-4-5	92	94	92	62	79	95	85
LSD (5%)		11	10	8	7	8	8	4

* No 1964 data

† No 1963 data

Table 4. Adjusted characteristics of oat varieties, 1963-4-5, and reactions to disease, 1965

Variety	Heading date (June)	Lodging score*	Height (inches)	Bushel weight (pounds)	Reaction to disease†				
					Stem rust races			Crown rust	Smut
					6F	6A,6AF	7A,12A,7AF		
Neal	19	2.8	33	33.3	S	S	R,S	VS	R
Tippecanoe	19	2.2	35	33.4	R	S	R	VS	MR(S)
Clintford	20	2.2	32	35.8	S	S	S	S-VS	MR(S)
Minhafer	20	2.6	38	33.5	R	S	R	MS	R
Andrew	21	3.9	36	32.5	S	S	R	VS	R
Santee	21	2.6	36	32.7	R	S	R,S	S	R(MS)
Brave	22	4.6	37	33.0	R	S	S	VS	R
Clintland 64	22	3.0	36	33.4	R	S	R	MR-MS	R(MS)
Goodfield	22	2.4	34	35.6	R	S	R	S-VS	R
Tyler	22	2.7	33	32.3	S	S	R	VS	MR(S)
Garland	23	3.4	35	33.8	R	S	R	S	R
Dodge	24	2.2	37	34.3	R	S	R	S	R(MS)
Portage	25	4.0	40	32.9	S	S	R	MR	R
Garry	27	3.6	41	31.1	R	S	R	S	R
Lodi	28	2.6	42	32.4	R	S	R	MS	R(MS)
Rodney	30	5.5	42	31.4	R	S	S	MS	R

* Scale from 1 to 9: 1 = lodging resistant, 9 = lodging susceptible.

† R = Resistant
S = Susceptible

MR = Moderately Resistant
MS = Moderately Susceptible
VS = Very Susceptible

R,S = Mixture of resistant and susceptible types in variety.

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

Races of Oat Stem Rust – Twenty different races of oat stem rust have been present in the United States during the past 3 years. However, only three of these races (6F, 6AF, and 7A) have been commonly found in Minnesota and in the Corn Belt. In 1965 race 6AF was the most prevalent race in Minnesota, followed by races 6F and 7A. All varieties grown commercially in Minnesota and essentially throughout the United States are susceptible to race 6AF. Many of the varieties recommended for Minnesota have a high degree of resistance to races 6F and 7A, including resistance to races 7AF and 12A. Races 7AF and 12A have been found only in trace amounts in Minnesota in past years. Races 7 and 8, so common a few years ago, have all but disappeared; they have been replaced by new and more dangerous races such as 6AF. Resistance to 6AF has been found and this resistance is being used to develop stem rust resistant varieties for Minnesota

grain, medium maturity, moderate straw strength. Medium in yield, good test weight.

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

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

Coachman—Midseason, lodging susceptible, and only fair in yield potential. Developed in Michigan from (Beaver-Garry-Clinton x Clintland) Marne².

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

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

Goodfield—Developed at the Wisconsin Agricultural Experiment Station from the cross Clintland x (Garry x Hawkeye-Victoria). Medium-early in maturity, high in test weight. Short straw with excellent lodging resistance. Lower in yield than other varieties of similar maturity.

Manod—Very late, tall, low yield and bushel weight. An introduction from Wales.

Milford—Very late, stiff-strawed, poor yield and bushel weight. Susceptible to smut. An introduction from Wales.

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

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

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

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

Russell—Developed at the Central Experiment Farm in Canada from a cross of (Garry x Ukraine) x Abegweit². Late, medium-tall, good yielding, yellowish-white oat with plump seed of good test weight. Poor in standing ability.

WINTER RYE

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

RECOMMENDED VARIETIES

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

Elk—Yields more than Caribou when winter injury is not severe. Fair winterhardiness, late maturity, and tall. Medium-size seed, predominantly green in color, and high bushel weight. Originated from a small lot of seed obtained in 1953 from the Cereal Crops Division, Canada Department of Agriculture. Named and released by the University of Minnesota in 1959.

Table 5. Yields of winter rye varieties in bushels per acre, 1958-65

Variety	Rose- mount	Lamber- ton	Morris	Grand Rapids	Average
Caribou	38	38	35	69	45
Elk	41	39	29	67	44
Adams	37	36	32	66	43
Von Lochow	39	42	29	65	44
LSD (5%)	3	3	4	4	2
Pearl*	42	38	30	69	45

*Grown 1960-65 at Rosemount, 1961-65 at other locations. Yields adjusted.

VARIETIES NOT ADEQUATELY TESTED

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

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

OTHER VARIETIES

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

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

Von Lochow—High-yielding, fair winterhardiness, late maturity, and short. Very good resistance to lodging. Large seed, predominantly green in color, and high in bushel weight. Seed obtained from the F. von Lochow-Petkus Ltd. of Germany.

Table 6. Characteristics of winter rye varieties, 1958-65

Variety	Winterkill	Date heading	Date mature	Plant height	Lodging score*	Weight of 100 seeds	Bushel weight
	percent		July	inches		grams	pounds
Caribou	3	May 30	19	50	3.4	2.3	55.8
Elk	24	June 2	20	48	3.1	2.8	55.6
Adams	10	May 29	20	53	3.0	2.6	55.5
Von Lochow	28	June 3	22	44	1.6	2.8	56.2
Pearl†	23	June 2	21	46	2.8	2.6	55.2

* 1 erect, 9 flat.

† Grown 1960-65 at Rosemount, 1961-65 at other locations. Data adjusted.

WINTER WHEAT

RECOMMENDED VARIETIES

Minter—Tall, bearded, winterhardy variety of medium straw strength. Susceptible to leaf rust and to some prevalent races of stem rust. High yielding with good test weight. Quality characteristics are satisfactory. Selected from a backcross of Hope x Minturki² at the Minnesota Agricultural Experiment Station.

VARIETIES NOT ADEQUATELY TESTED

Lancer—Bearded variety of medium maturity and height with good straw strength. Susceptible to leaf rust and loose smut, but resistant to some prevalent races of stem rust. May not be sufficiently winterhardy. Selected from a cross of Turkey-Cheyenne x Hope-Cheyenne² at the Nebraska Agricultural Experiment Station.

OTHER VARIETIES

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

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

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

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

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

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

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

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

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

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

Table 7. Yields and other characteristics of winter wheat varieties, 1963-65

Variety	Date of heading	Plant height	Winter injury	Lodging score*	Leaf rust reaction†	Stem rust reaction†	Test weight	Yield, bushels per acre		
								St. Paul	Waseca	Average
	June	inches	percent				pounds			
Minter	15	43	38	2.9	S	R-S	60.7	27	27	27
Lancer	12	38	52	1.4	S	R-S	60.9	20	27	23
Winalta	13	39	51	2.8	S	S	59.7	19	24	22
Yogo	16	42	32	3.1	S	S	57.0	26	19	22
LSD 5%								6	5	4

* 1 erect, 9 flat.

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

DURUM WHEAT

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

RECOMMENDED VARIETIES

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

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

OTHER VARIETIES

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

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

Ramsey—Bearded variety, medium in maturity and height. Resistant to leaf rust, loose smut, and bunt. Moderately resistant to stem rust. Straw is somewhat weak. Medium in yield. Quality is satisfactory. Selected from Carleton x P.I. 94701 at the North Dakota Agricultural Experiment Station.

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

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

HARD RED SPRING WHEAT

RECOMMENDED VARIETIES

Chris—Awnless variety of medium height, straw strength, and maturity. Resistant to leaf and stem rust. High yielding with very good test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Frontana-Thatcher³ x (Kenya 58-Newthatch x Thatcher²) at the Minnesota Agricultural Experiment Station.

Crim—Bearded variety of medium height, straw strength, and maturity. Susceptible to loose smut and leaf rust but re-



Chris wheat is a new rust-resistant, high-yielding variety developed at the Minnesota Agricultural Experiment Station. The field of Chris is being examined by Minnesota Crop Improvement field supervisor Elmer Grathwohl.

sistant to stem rust. Good yield and test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Klein Titan-Thatcher³ x (Kenya 58-Newthatch x Thatcher²) at the Minnesota Agricultural Experiment Station.

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

Table 8. Yields and other characteristics of spring wheat varieties, 1963-65

Class and Variety	Date of heading	Plant height	Lodging score*	Leaf rust reaction†	Stem rust reaction†	Test weight, pounds	Yield, bushels per acre			
							St. Paul	Morris	Crookston	Average
Hard Red Spring	June	inches								
Chris	24	37	3.0	R	R	59.8	24	40	39	34
Crim	23	37	3.6	S	R	58.9	23	35	37	31
Justin	25	37	2.2	S	R	58.4	21	31	37	29
Pembina	23	35	2.6	S	R	56.8	23	32	35	29
Selkirk	23	35	2.4	S	R	56.1	23	33	35	29
Manitou	24	36	2.7	R-MR	R	58.5	26	38	39	34
Thatcher	23	35	2.6	S	S-R	57.2	19	24	28	23
LSD 5%							3	3	6	2
Durum										
Lakota	26	38	2.0	MR	R	57.9	23	34	44	33
Wells	26	38	2.3	R	R	59.2	25	37	41	34
Stewart 63	30	49	4.6	R	R	60.9	22	36	40	32
Mindum	29	47	3.9	R-MR	S-R	57.7	17	20	30	21
LSD 5%							3	4	7	3

* 1 erect, 9 flat.

† Reaction to prevalent races; R = resistant, MR = moderately resistant, S = susceptible. There are low frequencies of stem rust sub-races present in the rust population which can attack the resistant varieties.

Pembina—Awnless variety of medium height, maturity, and straw strength. Good yield with medium test weight. Milling and baking characteristics are satisfactory. Selected from a cross of Thatcher x (McMurachy-Exchange x Redman³) by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

Selkirk—Awnless variety of medium height and maturity with good straw strength. Susceptible to leaf rust but resistant to stem rust. Good yield with medium test weight. Milling and baking characteristics are satisfactory. Selected from a cross of McMurachy-Exchange x Redman³ by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

VARIETIES NOT ADEQUATELY TESTED

Manitou—Awnless variety of medium height, straw strength and maturity. Resistant to stem and leaf rust. High yielding with good test weight. Insufficient information on milling and baking characteristics. Selected from a cross of (Thatcher⁷-Frontana x Canthatch) x Thatcher⁶-P.I. 170935 by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

OTHER VARIETIES

Canthatch—Awnless variety; medium in maturity, height, and straw strength. Susceptible to leaf rust and stem rust. Medium in yield with good test weight. Satisfactory milling and baking qualities. Selected from a cross of Thatcher⁶ x Kenya Farmer by the Canada Department of Agriculture Research Station, Winnipeg, Manitoba.

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

Lathrop—Bearded variety of medium height and maturity with good straw strength. Moderately resistant to leaf rust and

stem rust. High yielding with good test weight but poor quality. Selected from a backcross of Henry⁷ x P.I. 94587 made at the Wisconsin Agricultural Experiment Station.

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

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

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

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

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

MILLET

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

Table 9. Yields and other characteristics of millet varieties planted about July 1 at Rosemount, 1963-65

Variety	Yield per acre		Forage protein	Date heading	Plant height	Lodging score†	Weight of 100 seeds	Bushel weight
	seed	forage*						
	pounds		percent		inches		grams	pounds
Turghai	2,214	4,469	14.6	August 4	43	4.3	.55	56.6
Empire	1,595	6,556	11.6	August 22	47	5.7	.20	48.0
White Wonder	1,158	8,019	10.5	August 29	51	4.7	.23	43.1
German R	611	7,356	10.7	September 15	46	1.2	.20	46.5
LSD (5%)	264	648						

* 15% moisture basis.

† 1 erect, 9 flat.

RECOMMENDED VARIETIES

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

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

White Wonder—Foftail. Late maturity. Fair lodging resistance. Small white or yellow seed. Too late for good seed production some years.

OTHER VARIETIES

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

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

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

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

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

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

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

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

Siberian—Foftail. Similar to Manta except lower in yield.

FLAX

RECOMMENDED VARIETIES

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

B-5128—From a cross of Golden x Rio made at North Dakota Agricultural Experiment Station. Immunity to rust conditioned by N¹ gene; moderately susceptible to both wilt and pasmo.

Good oil content of only fair drying quality. Contains a mixture of types, including a small percentage of both yellow-seeded plants and rust-susceptible plants. Brown-seeded, blue-flowered, late maturing. Not recommended for late sowing.

Redwood—Originated from a cross of B-5128 x Redson at Minnesota Agricultural Experiment Station. Has N¹ gene which conditions immunity to rust; moderately wilt resistant and moderately susceptible to pasmo; good oil content of good drying quality; straw of excellent fiber quality. Brown-seeded, blue-flowered, mid-late in maturity. Not recommended for late sowing.

Summit—Released in 1964 by South Dakota Agricultural Experiment Station as selection from B-5128 x Zenith. Immunity

Table 10. Yields of flax varieties in pounds per acre

Variety	Early-sown				Late-sown			
	Lamberton 1963-65	Morris 1963-65	Crookston 1963-65	Average of 9 trials	Lamberton 1963-64	Morris 1963-65	Crookston 1963-65	Average of 7 trials
Bolley	1,177	1,198	785	1,053	630	1,372	811	920
B-5128	1,181	1,315	942	1,146	592	1,238	939	925
Redwood	1,071	1,237	945	1,084	692	1,317	878	950
Summit	1,145	1,377	1,025	1,182	636	1,431	1,067	1,048
Windom	1,271	1,326	983	1,193	716	1,436	952	1,023
Arny	1,135	1,292	978	1,135	704	1,393	927	996
Bison	1,294	1,271	955	1,173	771	1,202	907	952
Caldwell	1,395	1,302	729	1,142	594	1,386	822	918
Noralta*	1,163	1,382	942	1,162	—	—	—	—

* Grown in 1964-65, data adjusted.

Table 11. Characteristics of flax varieties, 1963-65

Variety	Days from sowing to:				Lodging*	Pasmo*	Wilt*	Rust†	Oil content‡	Iodine value
	First bloom	Full bloom	Maturity	Plant height						
No. trials	20	19	12	21	4	8	2		23	23
Bolley	50	56	94	22	4	5	5	R	41.3	186
B-5128	52	58	95	23	6	6	6	R	39.6	176
Redwood	52	58	94	22	6	6	3	R	39.9	179
Summit	51	57	93	21	5	6	5	R	38.7	180
Windom	50	56	92	21	4	7	2	R	39.4	184
Arny	53	59	96	24	2	3	2	S	39.4	181
Bison	51	58	94	23	6	5	4	S	39.8	171
Caldwell	51	57	92	17	4	5	7	M	38.7	174
Noralta§	51	59	95	24	6	—	6	R	38.3	181

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

† R = resistant, S = susceptible, M = mixed reaction.

‡ Oven-dry basis.

§ Grown in 1964-65, data adjusted.

to rust conditioned by N¹ gene; resistant to wilt and moderately susceptible to pasmo; fair oil content of good drying quality, brown-seeded, blue-flowered, early in maturity. Excellent seed yields.

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

OTHER VARIETIES

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

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

Caldwell—Cold-tolerant selection from Roman Winter x Argentine Pale Blue released from the Texas Agricultural Experiment Station in 1961. Susceptible to wilt, moderately susceptible to pasmo, mixed reaction to race 300 of rust, low in both oil content and iodine value. Brown seed, blue flowers, early maturing, extremely short, good seed yields when sown early.

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

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

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

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

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

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

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

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

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

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

SOYBEANS

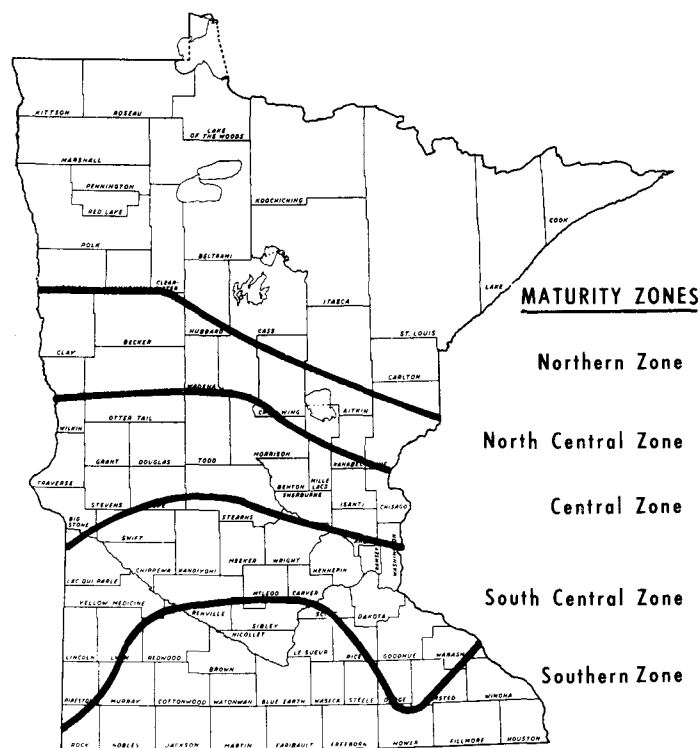
RECOMMENDED VARIETIES

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

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

Chippewa 64—Similar to Chippewa in all respects except for the addition of resistance to Phytophthora root rot, a serious disease in some areas of Ohio, Indiana, and Illinois. The variety was developed at the USDA Regional Soybean Laboratory, Urbana, Illinois, by using the backcross method.

Flambeau—Rather short, with a considerable tendency to lodge. A good yielder among the early varieties. Yellow seeds with black seed scars; medium oil content. Pubescence is brown. Selected at the Wisconsin Agricultural Experiment Station from an introduction from Russia. Recommended for central, north-central, and northern zones.



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

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

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

Merit—An early, yet fairly tall variety developed at the Central Experimental Farm, Ottawa, Canada, from a cross of Blackhawk x Capital. Pubescence grey, seeds fairly small and

yellow with buff seed scars. Good oil content. Resistant to Phytophthora root rot. Recommended for central and north-central zones.

Ottawa Mandarin—Medium-early maturity. Short and highly resistant to lodging. Fairly large yellow seeds with yellow seed scars. Pubescence is grey. Oil content medium. Selected at the Central Experimental Farm, Ottawa, Canada, from the variety Mandarin. Recommended in areas of the state south of the northern zone.

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

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

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

Variety*	Waseca		Lamberton		Blue Earth		Rosemount		Morris		Crookston		Big Lake
	1964-5	1963-5	1964-5	1963-5	1964-5	1963-5	1964-5	1963-5	1964-5	1963-5	1964-5	1963-5	1964-5
Early-maturing Group													
Acme	—	—	—	—	—	—	—	—	19.5	20.8	12.5	14.3	—
Portage	—	—	—	—	—	—	—	—	21.4	—	12.8	—	—
Flambeau	—	—	—	—	—	—	—	—	23.8	—	14.4	—	—
Merit	—	—	—	—	—	—	—	—	26.2	29.4	17.4	19.6	—
Medium-maturing Group													
Merit	—	34.4	—	26.6	26.1	27.5	—	27.5	—	29.5	—	—	19.9
Ottawa Mandarin	—	33.9	—	27.8	26.2	—	—	30.2	—	30.9	—	—	20.9
Traverse	—	36.5	—	29.2	27.3	28.9	—	30.7	—	30.9	—	—	23.6
Grant	—	39.7	—	28.6	28.1	—	—	31.1	—	31.9	—	—	21.2
Chippewa 64	—	37.7	—	30.9	27.8	30.4	—	29.1	—	32.5	—	—	18.8
Late-maturing Group													
Chippewa 64	36.8	38.8	23.5	28.7	30.2	32.3	—	—	—	—	—	—	18.8
A-100	34.5	38.1	23.2	28.0	29.4	31.6	—	—	—	—	—	—	21.3
Harosoy 63	34.8	38.7	22.9	29.8	29.4	31.3	—	—	—	—	—	—	20.0
Lindarin	33.0	37.1	23.0	29.1	27.7	29.2	—	—	—	—	—	—	—
Lindarin 63	33.5	—	21.7	—	27.9	—	—	—	—	—	—	—	14.8
Amsoy	36.8	—	25.6	—	29.1	—	—	—	—	—	—	—	—
Hawkeye 63	31.7	36.3	21.7	26.6	27.3	28.3	—	—	—	—	—	—	—
Ford	31.4	36.2	21.6	28.3	26.2	27.8	—	—	—	—	—	—	—

* Ranked according to maturity adaptation going from north to south in Minnesota.

Table 13. Characteristics of soybean varieties

Variety	Date mature	Lodging score	Plant height, inches	Seed size, grams/100 seeds	Seed quality	Protein percent*	Oil percent*
Early-maturing Group (average of Morris and Crookston, 1964-65)							
Acme	9-1	1.0	21	14.9	3.2	41.0	19.1
Portage	9-1	1.0	22	14.9	2.9	39.5	19.0
Flambeau	9-9	2.1	24	15.9	2.8	42.8	17.7
Merit	9-17	1.3	28	14.1	3.2	40.5	19.3
Medium-maturing Group (average of Rosemount and Morris, 1963-65)							
Merit	9-16	2.6	33	14.7	2.6	39.3	20.5
Ottawa Mandarin	9-15	1.9	28	19.9	2.8	39.8	19.8
Traverse	9-20	2.5	32	18.1	2.4	40.4	19.2
Grant	9-21	3.0	31	17.3	2.5	41.2	19.8
Chippewa 64	9-25	2.5	34	16.0	2.3	40.6	19.3
Late-maturing Group (average of Waseca and Lamberton, 1964-65)							
Chippewa 64	9-22	1.7	32	14.3	2.2	39.1	20.5
A-100	10-2	1.5	31	17.0	2.4	38.0	21.0
Harosoy 63	9-30	2.1	38	16.0	2.8	38.6	20.8
Lindarin	10-1	1.6	32	14.4	2.7	38.5	20.7
Lindarin 63	10-1	1.7	32	14.8	2.5	39.0	20.3
Amsoy	10-5	2.0	37	15.8	2.7	36.7	21.7
Hawkeye 63	10-9	2.2	39	16.8	3.1	39.4	20.5
Ford	10-11	2.3	37	15.1	1.9	39.0	19.8

* No 1965 data available for protein or oil.



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

VARIETIES NOT ADEQUATELY TESTED

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

SUNFLOWERS

Combine-harvested sunflowers are grown commercially in northwestern Minnesota. Most of the crop is sold to bird feed dealers and the confection trade. Occasionally seed is exported to Canada for processing as an oilseed crop like soybeans. See Minnesota Extension Bulletin 299 for more information.

RECOMMENDED VARIETIES

Arrowhead—High yielding, early maturing, and stands fairly well for combining. Plant grows slightly more than 5 feet tall and matures earlier than most recommended soybean varieties. Susceptible to rust. Seed is medium in size, low in hull, medium in oil content, high in bushel weight. Good seedling vigor. An open-pollinated variety. Selected from Mammoth Russian at the Northeast Agricultural Experiment Station. Released in 1954.

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

OTHER VARIETIES

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

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

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

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

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

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

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

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

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

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

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

VARIETIES NOT ADEQUATELY TESTED

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

Peredovik—Medium yield. Late maturity and tall. Small black seed of high bushel weight and very high oil content. Susceptible to rust but has some tolerance. Grown on thousands of acres in Canada for their oilseed markets. An open-pollinated variety developed in Russia from crossing and selection.

Other Russian High-Oil Varieties—Medium in yield. Small dark seed of very high oil content. Armavirec, Iennissei, and Tchernianka 66 were short and early. Smena, VNIIMK 89.31, Donski 695, VNIIMK 65.40 and others tested were tall and late.

OTHER VARIETIES

Admiral—Medium yield and maturity. About 5 feet tall. Small seed of medium oil content and high bushel weight. Rust-resistant

Table 14. Yields and large seed percentage of sunflower varieties at Rosemount and Crookston, 1963-65

Variety	Yield per acre, pounds			Large seed*, percent		
	Rosemount	Crookston	Average	Rosemount	Crookston	Average
Arrowhead	1,363	1,535	1,449	T	2	1
Mingren	1,206	1,570	1,388	27	50	39
Commander	1,121	1,487	1,304	22	46	34
Mennonite	1,296	1,489	1,393	19	35	27
Admiral	1,082	1,467	1,275	T	1	1
Peredovik	887	1,362	1,125	0	1	1
LSD (5%)	225	320	196			

* Held on 20/64 round hole screen.

Table 15. Characteristics of sunflower varieties at Rosemount and Crookston, 1963-65

Variety	Date flowering	Plant height	Weight of 100 seeds	Oil*	Bushel weight
		inches	grams	percent	pounds
Arrowhead	7-21	61	8.3	28.5	29.7
Mingren	7-25	60	11.1	26.7	24.3
Commander	7-26	62	11.3	26.5	25.2
Mennonite	7-25	60	10.5	27.0	26.0
Admiral	7-24	53	7.4	31.0	29.0
Peredovik	7-28	68	6.3	41.7	28.9

*Dry matter basis.

three-way cross licensed in 1960 by Canada Department of Agriculture. Produced by crossing the inbred, S-37-388RR, with the single cross CM5 x CM27. Seed harvested from the S-37-388RR rows in the crossing field is used for seed.

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

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

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

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

DRY EDIBLE PEAS AND FIELD PEAS

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

RECOMMENDED VARIETIES

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

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

VARIETIES NOT ADEQUATELY TESTED

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

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

Variety	Years of trial	Seed per acre	Weight of 100 seeds	Date mature	Sowing rate per acre
		pounds	grams	August	pounds
Chancellor	1960-63, 1965	1,467	13.6	18	123
Strål	1960-63, 1965	1,785	16.6	16	154
Century	1960-63, 1965	1,760	21.9	13	226
LSD (5%)		175			
Victoria	1962-63, 1965	1,701	33.0	4	312
Flavanda	1965	1,515	31.8	6	337
Imposant	1965	2,224	36.4	6	367
Parvus	1965	1,724	16.7	6	143

Imposant—Early maturity. Short vined. Purple flowers. Very large, angular, tan seed. Named in 1965. Cebeco, Rotterdam, Holland.

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

OTHER VARIETIES

Century (formerly Creamette)—Medium maturity. Long vined. Large, cream-colored seed of high bushel weight. Good cooking quality. Licensed in 1960 by Canada Department of Agriculture from a cross of (Chancellor x Early Raymond) x Stirling. Large seed makes sowing cost higher than that of Strål.

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

Parvus—Early maturity. Purple flowers. Medium sized, speckled green seed. Intended for forage or feed grain uses. Released in 1948 by the Weibullsholm Plant Breeding Institute, Landskrona, Sweden, from a cross of Monopol x Ambrosia.



Alfalfa variety test. Variety at right is winterhardy and resistant to bacterial wilt. Variety on left is susceptible to bacterial wilt and less winterhardy.

ALFALFA

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

The following characteristics are important:

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

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

Table 17. Forage yields expressed as percent of the average of 3 check varieties, Vernal, Ranger, and Narragansett; disease, winterhardness, and fall dormancy ratings

	Crookston		Grand Lamber-		Morris	Rosemount			Bacterial wilt*	Common-leaf-spot*	Winter-hardness†	Fall-dormancy‡
	1959-60	Duluth 1964-65	Rapids 1963-64	ton 1962-65		1962-65	1963-65	1964-65				
Alfa	92	88	80						S	MR	MH	6.0
Altfranken-Schmidt									S		MH	6.5
Arnim									S		MH	6.7
Atlantic		95						99	S		H	6.8
Beaver									R		VH	7.6
Buffalo							95	91	R	S	MH	6.4
Cardinal									S		MH	5.8
Cayuga		101	99	106	101		102	98	R		H	6.8
Cherokee							96		S		MH	
Cody		90					97		R		MH	
Culver		92	96	106	102		99		R	S	H	7.3
DuPuits	95	91	92	94		92	90		S	MR	MH	5.4
Europa									S		MH	5.3
F.D. 100		91		97	101				S	MR	MH	5.7
Flandria§		94			100			99	S	MR	MH	5.4
Franck's Langmeiler							99		S			6.7
Glacier									S			6.3
Grimm		101							S		H	
Haymore									S			6.1
Ladak	95	93							MR		H	7.6
Lahontan	86	70							R	S	MH	6.2
Milfuiel								95	S			5.3
Moapa									S		NH	4.2
Narragansett	101	92	105			97	102	101	S	S	H	6.8
Nomad									S		H	7.7
Norseman							90	92	R		VH	7.9
Orchies		98							S	MR	MH	6.0
Progress						105			R		H	6.6
Rambler						82			R		H	
Ranger	99	99	91	97	94	102	97	99	R	S	H	6.7
Saranac									R		MH	6.3
S.C. 118		93	100				91		S	MR	MH	5.6
Scout								100	R		H	6.9
Socheville§		92							S	MR	MH	5.6
Teton	74			97	96	97		88	R	MR	VH	7.9
Travois								87	R		VH	7.9
Triesdorfer									S			6.0
Vernal	99	109	104	104	106	100	101	100	VR	S	H	7.0
Warrior									MR			5.9
W.L. 202									R		H	6.9
W.L. 302									S			5.8
522									R			6.7
525							103		R		H	6.8
LSD (5%)	7	14	10	5	5	3	3	2	2			
Average of checks in tons per acre	3.25	3.67	3.03	4.88	4.10	4.92	5.68	6.15	5.94			

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

† VH = very hardy, H = hardy, MH = moderately hardy, NH = nonhardy

‡ Fall growth recorded 10/30/65, 8 = 0.4 inches, 7 = 4.6 inches, 6 = 6.8 inches, 5 = 8-10 inches, 4 = 10-12 inches, 3 = 12-14 inches, 2 = 14-16 inches. Less growth indicates better fall dormancy.

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

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

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

The Minnesota Agricultural Experiment Station recommends the use of certified seed. Purchase of certified seed provides the best assurance of obtaining varietal purity. Numerous tests have shown that uncertified seed generally performs less consistently

than certified seed. For consistent performance from year to year, insist on certified seed. A "blend" is not necessarily composed of the same sources each year. Therefore, the performance of a blend may vary from year to year. Some seed is sold on basis of area where grown (i.e. Kansas common). Seed of this type is not a variety and varies lot to lot.

CLASSIFICATION OF ALFALFA VARIETIES

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

Very winterhardy, wilt-resistant varieties

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

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

Winterhardy, wilt-resistant varieties

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

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

Winterhardy, wilt-susceptible varieties

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

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

Moderately hardy, wilt-resistant varieties

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

Moderately hardy, wilt-susceptible varieties

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

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

Nonhardy varieties

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

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

Varieties not classified

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

Included are: Apex, Aphidor, Franck's Langmeiler, Glacier, Haymore, Resistador, Saranac, Triesdorfer, Warrior, WL302, and 522.

BIRDSFOOT TREFOIL

RECOMMENDED VARIETIES

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

VARIETIES NOT ADEQUATELY TESTED

Tana—Developed at the Montana Agricultural Experiment Station.

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

OTHER VARIETIES

Mansfield—Selected at the Vermont Agricultural Experiment Station. Erect growth, good yield but not winterhardy enough for Minnesota.

RED CLOVER

RECOMMENDED VARIETIES

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

Table 18. Average forage yields of red clover first crop year in tons per acre for 1956-65*

Variety	Rose-mount	Wa-seca	Mor-ris	Crook-ston	Grand Rapids	Du-luth	Avg.
Dollard	3.57	2.10	2.52	1.61	3.00	3.03	2.64
Lakeland	3.58	2.20	2.60	1.43	2.80	3.10	2.62
Chesapeake	3.41	2.10	2.45	1.24	2.76	3.05	2.50
Kenland	3.75	1.99	2.51	1.36	2.80	3.07	2.58
Pennscott	3.62	2.05	2.41	1.35	3.10	2.54	2.51

* Not all stations represented in all years.

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

Variety	Rosemount 1961	Waseca 1961	Grand Rapids 1965	Average
Dollard	1.00	1.00	2.95	1.65
Lakeland	1.10	1.23	3.11	1.81
Chesapeake	.48	.51	2.27	1.08
Kenland	.73	.70	2.30	1.24
Pennscott	.59	.37	2.34	1.10

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

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

OTHER VARIETIES

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

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

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

Table 20. Average percent stand on June 19, 1964, of seedlings made from 1961 to 1964 at Rosemount

Variety	1961	1962	1963	1964
Dollard	77	10	100	100
Lakeland	73	8	98	100
Chesapeake	57	10	98	100
Kenland	66	4	—	100
Pennscott	50	3	99	100

SWEETCLOVER

RECOMMENDED VARIETIES

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

Goldtop—Bred at the Wisconsin Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. Yellow-blossom biennial type. Outstanding for seedling vigor. Resistant to leaf and stem diseases. Good forage yield both

Table 21. Average forage yields of sweetclover in tons per acre

Variety	Second-year forage					First-year forage 1964		
	Rose-mount 1960 61,63	Waseca 1963	Crook- ston 1963	Grand Rapids 1960, 63	Average	Rose- mount	Morris	Average
Goldtop	2.28	2.80	1.99	1.68	2.19	2.68	2.39	2.53
Evergreen	1.84	1.97	2.11	1.55	1.87	-----	-----	-----
Madrid	2.15	1.82	2.34	1.72	2.01	2.43	2.46	2.44
Cumino	.23	1.04	1.45	.98	.92	.73	1.36	1.04
Denta	1.32	1.00	2.03	1.06	1.35	1.62	2.10	1.86

seedling year and second year. A few days earlier than Evergreen, but much later than Madrid.

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

VARIETIES NOT ADEQUATELY TESTED

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

Denta—A white flowered, low-coumarin synthetic bred by the Wisconsin Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture. Has looked promising in 2 years of tests, but not as vigorous as Goldtop.

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

BROMEGRASS

RECOMMENDED VARIETIES

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

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

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

OTHER VARIETIES

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

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

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

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

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

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

TIMOTHY

RECOMMENDED VARIETIES

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

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

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

Table 23. Average forage yield in tons per acre, 15-percent moisture, from 10 Minnesota statewide replicated tests harvested 1960-61-62-63

Climax	2.57*
Itasca	2.52*
Drummond	2.28
Essex	2.20

* These two were significantly higher than the others.

OTHER VARIETIES

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

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

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

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

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

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

Table 22. Average forage yields of brome grass varieties in tons per acre

	1963								1964				1965			4-Year state average
	1962	Rose- mount	Wa- seca	Lamber- ton	Mor- ris	Grand Rapids	Du- luth	Lamber- ton	Mor- ris	Grand Rapids	Du- luth	Rose- mount	Grand Rapids	Lamber- ton		
Sac	5.30	4.66	2.28	6.28	3.61	4.46	4.22	3.11	1.54	1.37	3.57	5.74	4.71	6.42	4.09	
Saratoga	5.57	5.29	2.41	5.77	3.74	4.21	4.48	2.82	1.91	1.04	3.74	5.39	4.63	6.30	4.08	
Achenbach	4.49	4.42	2.68	5.89	3.02	4.32	4.48	2.91	1.83	1.11	3.60	5.77	4.71	6.83	4.00	
Lincoln	5.66	5.06	2.50	6.69	3.12	4.16	4.19	2.66	1.72	.80	3.39	5.61	4.97	2.36	3.78	
Common	3.57	5.57	2.30	6.55	3.80	4.83	4.00	2.92	1.71	1.09	3.23	5.29	3.83	5.28	3.86	



Comparative performance test of timothy varieties. Climax, a currently recommended variety, is at left.

Table 24. Average 1965 forage season total, seed yields, and time of bloom from tests seeded in 1964

	Forage yield, tons/acre				Seed, pounds/acre			% in bloom July 1
	Rose- mount	Crook- ston	Grand Rapids	Average	Rose- mount	Grand Rapids	Average	Rosemount
Climax	3.57	2.44	4.59	3.53	427	242	334	8
Itasca	3.60	2.50	4.61	3.57	334	194	264	27*
Drummond	3.11	1.73	4.24	3.03	395	265	330	0
Essex	3.56	2.47	4.42	3.48	273	224	248	10
Engmo	3.48	2.06	3.94	3.16	414	231	322	17

* In earlier test Itasca was closer to Climax in time of bloom.

KENTUCKY BLUEGRASS RECOMMENDED VARIETIES

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

VARIETIES NOT ADEQUATELY TESTED

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

Table 25. Forage yield, seedling vigor and rust reaction of bluegrass varieties at Rosemount

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

OTHER VARIETIES

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

SUDANGRASS, SORGHUM-SUDAN, AND SWEET SORGHUM

Sudangrass and sorghum-sudan hybrids were solid-seeded at 30 pounds per acre, using ample P and K fertilizer plus 60 to 80 pounds N per acre, and evaluating at the green-chop stage. Sweet sorghums were grown in 40-inch rows with similar fertilization and harvested at the silage stage.

The yields of green chop of the sudans and sorghum-sudans were somewhat low this year because of the cool weather in the spring and fall. At the North Central Experiment Station, Grand Rapids, only one cutting was obtained. Two cuttings were obtained at all other stations. Prussic acid (HCN) contents as measured at Rosemount were also low as compared to last year, but again the sudans were lower in HCN than the sorghum-sudans. However, the sorghum-sudan HCN contents are considered to be well within the safe-to-feed range.

The sweet sorghums yielded well at Rosemount and Lamberton but were down in yield at Crookston. Wide differences in maturity were obtained as shown by the percent composition and maturity. Since the heads and leaves are considered to be more nutritious than the stems, the percentages of these are an indication of the nutritive value. Excessive lodging was noted in some sweet sorghums.

Table 26. Yield and other characteristics of sudan and sorghum-sudan hybrids at a stage to simulate green feeding (first cut about 4 feet tall)

Variety or Cross and Co.	Tons dry matter per acre						Mg. HCN per 100 gm. D.M., Rosemount		% C. Protein 1st Cut, Rosemount		Recovery after cut* Rosemount	
	Rosemount 1964	Rosemount 1965	Waseca 1965	Morris 1965	Grand Rapids 1965	4-Station average 1965	1964	1965	1964	1965	1964	1965
	Sudans											
Piper	2.08	1.71	2.64	2.22	1.24	1.95	11	10	9.9	10.5	85	80
Trudan I, Northrup King	2.12	1.54	2.08	2.38	.83	1.71	13	13	9.7	10.2	70	68
Trudan II, Northrup King		1.88	2.40	2.38	1.22	1.97		13		10.8		78
	Sorghum-sudan Hybrids											
Sordan, Northrup King		1.88	2.30	2.12	1.22	1.88		24		10.8		60
RP Mor Su, Rudy Patrick	1.89	1.82	2.70	2.72	1.52	2.19	45	26	9.7	10.7	57	56
Grazer A, Asgrow		1.99	2.25	2.24	1.39	1.97		23		11.3		62
Sudax SX11, De Kalb	2.53	1.42	2.44	2.05	1.24	1.79	55	43	9.4	11.0	60	56
Sudax SX12, De Kalb		2.09	2.67	2.53	1.48	2.19		28		13.3		66
Sudax X1733, De Kalb		1.88	2.50	2.63	1.56	2.14		24		11.3		66
Frontier H35X		1.67	2.61	2.57	1.35	2.05		15		10.9		60
Hydan 37, Frontier	2.16	1.27	1.98	2.36	1.05	1.67	41	40	11.1	11.4	57	60
Land O'Lakes		1.64	1.99	2.45	1.07	1.79		22		9.3		59
NB 280S, Nebraska	2.16	1.95	2.68	2.48			25	16	9.8	11.6	72	58
Pioneer 981		1.99	2.34	2.97	1.37	2.17		26		11.2		55
Pioneer 985		1.74	2.61	2.54	1.50	2.10		32		10.7		64
Greenlan, Caladino	2.08	2.19	2.77	2.38	1.58	2.23	43	23	9.7	12.3	60	53
Sure-Graze, Dorman		1.58	1.97	2.09	1.02	1.67		28		10.6		63
Grazemaster, Taylor Evans	2.59	1.71	2.45	2.55	1.16	1.97	52	42	10.6	10.7	62	51
Haygrazer, Taylor Evans	1.85	1.89	2.32	2.36	1.33	1.98	60	19	9.5	10.7	50	57
Thunderbird, Paymaster		1.73	2.32	2.42	1.33	1.95		25		11.5		63
Sweet Sioux, Paymaster	2.41	1.95	2.41	2.40	1.73	2.12	39	23	9.1	9.9	62	61
Green Gro, Ben Harvey	1.85	1.55	2.06	2.03	.88	1.63	51	44	10.6	9.8	70	60
Chowmaker 21, Excel		1.96	2.83	2.52	1.53	2.21		16		10.3		63
Chowmaker, Excel		1.70	2.35	2.07	1.01	1.78		29		10.5		58
Lindsay-Funk 77F	2.09	1.76	2.40	2.44	1.38	2.00	40	28	9.5	10.2	70	61
Su-chow PAG 34, Pfister		1.86	2.43	2.54	1.30	2.03		19		11.6		58
Orbit, Asgrow			2.22	2.40	1.38							
LSD 5%		0.35	0.53	N.S.	0.45							

* Percent ground cover 10 days after cut.

Table 27. Yield and other characteristics of sweet sorghums grown in 40-inch rows and harvested at the silage stage 1965.

Company and sorghum	Tons dry matter/acre*			Height, inches			Percent composition at Rosemount			Maturity †			Percent Lodged ‡	
	Rose-mount	Lamb-erton	Crookston	Rose-mount	Lamb-erton	Crookston	heads	leaves	stems	Rose-mount	Lamb-erton	Crookston	Rose-mount	Lamb-erton
Northrup King 300	4.69	6.16	2.71	77	77	66	30	25	45	SD	D	NH	0	40
Northrup King 315	5.02	5.87	3.62	90	94	81	26	17	57	SD	D	NH	0	10
Rudy Patrick RP30F	5.43	6.10	3.26	108	103	81	6	22	72	PP	M	SH	8	15
Asgrow Dairy D	4.44	5.48	2.95	98	105	74	5	27	68	PP	M	H	72	35
Asgrow Sorgasbord	3.85	4.82	2.11	96	96	71	26	26	48	M	D	NH	0	20
De Kalb FS1A	4.53	5.48	2.08	78	77	53	20	23	57	M	M	NH	0	25
Frontier S209	5.17	5.51	3.25	128	116	92	9	21	70	PP	M	NH	0	10
Pioneer 931	6.25	8.31	3.76	136	115	53	5	31	64	PP	PP	H	0	15
Taylor Evans Yieldmaker A	5.12	6.46	2.40	97	88	62	15	21	64	M	M	SH	0	45
Taylor Evans Yieldmaker	4.66	6.11	3.13	99	105	74	20	23	57	M	M	NH	98	70
Taylor Evans Silomaker	5.08	6.73	3.20	92	89	68	19	23	58	M	M	NH	0	50
Taylor Evans Milkmaker	4.87	6.23	2.42	106	100	78	14	24	62	M	D	NH	100	90
Paymaster 3 Little Indians	4.49	4.78	3.21	90-126	120	86	20	21	59	M	D	NH	0	20
Paymaster 3 Little Indians R	3.98	5.09	2.91	117	111	89	25	15	60	M	D	NH	0	25
Paymaster Cropguard	4.90	6.23	3.06	113	107	78	6	22	72	PP	M	H	10	15
Excel Bundle-N-Bale	5.82	6.86	4.04	108	103	77	9	21	70	M	M	NH	0	25
Lindsey 101 F	4.99	6.39	3.27	94	95	69	15	23	62	M	M	NH	3	50
Lindsey 92 F	4.63	5.82	2.60	109	102	81	8	23	69	M	M	SH	80	50
Pioneer X8B14	5.73	8.41	3.62	137	121	93	7	25	68	PP	M	H	0	10
Northrup King 133 (Grain sorg)	3.15	3.03	1.72	48	51	42	42	23	35	D	D	NH	0	10
Sudax Sx11 (Sorghum-sudan)	4.47	5.04	2.48	108	109	86	33	19	48	D	D	NH	5	30
Hybrid corn §	3.77	4.23	3.34	105	95	78	19	32	49	Dent	¼ Dent	¼ Dent	0	10
Piper sudan	-	-	1.24	-	-	74	-	-	-	-	-	NH	-	-
LSD 5%	.78	.78	.74											

* All harvested at dough stage or after being frozen in late September.

§ Corn at Rosemount harvested from adjoining area because of poor plot stands.

† Maturity - Soft dough (SD), post pollen (PP), milk (M), dough (D), no heads (NH), starting heading (SH), headed no seed (H).

‡ No lodging at Crookston.

RATE AND DATE OF SOWING

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

Crop	Bushel weight* in pounds	Rate per acre in pounds	Date
Barley †	48	72-96	Early spring
Corn †	56	8-14	Early May
Flax †	56	42-56	April 15 to May 15
Forage Grasses (perennial)			
Bromegrass (with legumes)	14	5-8	Early spring or fall
Kentucky bluegrass (with timothy)	14	8-10	Early spring or fall
Meadow fescue (in mixture with brome and legume)	14-24	3-4	Early spring or fall
Timothy (with legumes)	45	4-6	Early spring or fall
In mixture with brome and legume or reed canary or bluegrass ..		2-4	
Reed canary	44-48		Early spring or fall:
Alone or with timothy		6-8	after freezeup
Forage Legumes (biennial or perennial)			
Alfalfa	60		With companion grain
Alone		8-12	or flax, early spring;
With grasses		5-8	or alone before Aug. 10
Birdsfoot trefoil	60	3-6	Early spring
Clover	60		Early spring
Red (in mixture)		4-8	
Alsike (in mixture)		2-4	
Ladino (in mixture)		1/2-1	
Sweet Clover	60		Early spring
Alone		10-12	
In mixture		2-4	
Oats †	32	64-80	Early spring
Rye	56	70-84	Aug. 1 to Sept. 10 for pasture. Aug. 25 to Sept. 30 for seed
Sorghum †	50 (sweet)		In warm soil, May 25
Corn planter rows	56 (grain)	5-10	to June 15
"Solid" drilled		10-20	
With 1 1/2 bushel soybeans		10	
Sudangrass	40		In warm soil, May 20
Rows		10-20	to June 20
Broadcast		25-30	
With 1 1/2 bushels of soybeans		10	
Soybeans †	60		In warm soil after May 10
"Solid" drilled		120 (4 seeds/ft.)	
20-inch rows		90 (10 seeds/ft.)	
30-inch rows		75 (11 seeds/ft.)	
40-inch rows		60 (12 seeds/ft.)	
Wheat †	60		
Hard Red Spring		75-90	Early spring
Durum		90	Early spring
Winter		75-90	Aug. 20 to Sept. 20
Miscellaneous Crops			
Field peas †	60		Early spring
Alone		120-180	
With 1 1/2 to 2 bushels of oats		45-90	
Sunflowers	24	4-8	May 1-25
Millet	48-56	20-40	June 15 to July 15
Mustard and oilseed rape	50-58	10	May 1 - June 15
Navy beans †	60	40	May 20 to June 15
Pinto beans †	60	60-80	May 20 to June 15
Rape for forage	50	4-6	Early spring with oats
Buckwheat	48-50	40-48	June 15 to July 15

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

† Use fungicide seed treatment.



Foundation oats seed field being inspected by Elmer Grathwohl, Minnesota Crop Improvement Association field supervisor. All fields producing certified seed are inspected by a representative of this association, the official seed-certifying agency in Minnesota.