

1983 EDITION

Revised December

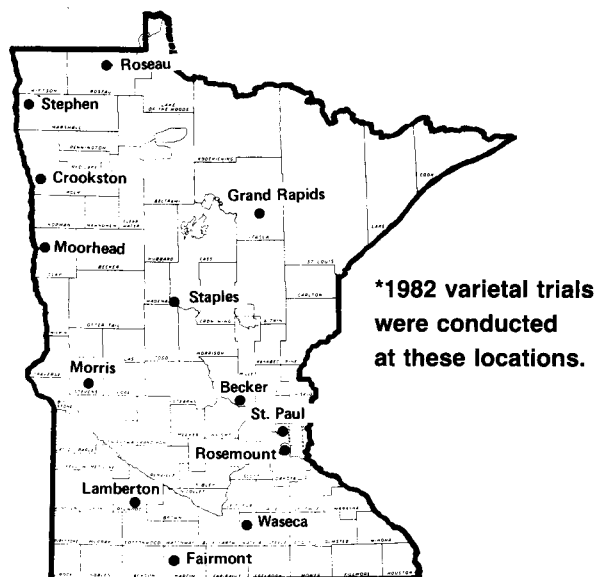
1982

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VARIETALS OF TBIALS OF ES OF FARM CROPS

VARIETAL TRIALS OF FARM CROPS



Successful crop production depends to a considerable extent on selecting the best varieties for a particular farm. For that reason, varieties are compared in trial plots on Minnesota Agricultural Experiment Station fields at St. Paul, Rosemount, Waseca, Lambertson, Morris, Crookston, Grand Rapids, and Becker, and on farmers' fields. Important old varieties and 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.

Varieties of many of the crops are classed into three groups: "recommended varieties," "varieties not adequately tested," and "other varieties." For these crops, the varietal descriptions are arranged in alphabetical order within the groups. The classifications of varieties as "recommended varieties" and "other varieties" are determined each year by the Minnesota Agricultural Experiment Station Crop Variety Review Committee. A variety is not usually eligible for the "recommended varieties" group unless it has been better than other varieties in important characteristics in 3 years of testing. New varieties from other public experiment stations and private plant breeders but not sufficiently evaluated here are listed as "varieties 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.

Varieties of all three groups may be eligible for certification, and the use of certified seed is suggested. However, certification does not imply recommendation. 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 1983 Planting. This annual publication can be obtained without charge from the Minnesota Crop Improvement Association, 1900 Hendon Avenue, St. Paul, Minnesota 55108, or from county extension agents' offices.

The LSD (Least Significant Difference) figures listed under the yield columns in the tables are statistical measures of variability within the trials. This statistic is used to determine whether the difference between two yields is due to genetic difference in the varieties or to other causes such as soil variability. If the yield difference between two varieties equals or exceeds the LSD, one can conclude that the higher yielding variety was superior in yield. If the difference is less than the LSD, the yield difference was probably due to environmental rather than varietal differences. The 5 percent significance level used in this report is based on odds of 19 to 1 that yields differing by the amount of the LSD were truly different.

Data for varieties not included in all trials averaged within a table have been adjusted so that averages of varieties tested for different numbers of years can be compared directly. But use of the LSD for these comparisons is not valid.

These trials are not designed for crop (species) comparisons, because the various crops are grown on different fields or with different management. The data should only be used to compare varieties within a table.

Relative maturities of varieties are indicated in the tables as date mature, heading, or blooming; days to mature, heading, or blooming; or moisture percentage at harvest.

Yields of some forage crops are given in pounds or tons of dry matter per acre. To convert to hay yield at 15 percent moisture (85 percent dry matter), divide the figure given by 0.85. To convert to haylage yield at 55 percent moisture (45 percent dry matter), divide by 0.45.

Authors of the crop sections are: R.G. Robinson (adzuki, annual canarygrass, buckwheat, fieldbean, fieldpea, grain sorghum, millet, sunflower, and rye); D.K. Barnes and F.I. Froshaiser (alfalfa, birdsfoot trefoil, and red clover); D.C. Rasmusson (barley); D.K. Barnes (bromegrass, orchardgrass, reed canarygrass, tall fescue, and timothy); J.L. Geadelmann and R.H. Peterson (corn); V.E. Comstock (flax); D.D. Stuthman (oat); J.H. Orf (soybean); R.H. Busch (wheat—durum, hard red spring, and winter); R.E. Stucker (wild rice). Extension agronomist L.L. Hardman also participated in preparing this publication.

Information on the reaction of varieties to specific pathogens was largely obtained by the following members of the Department of Plant Pathology: F.I. Froshaiser (alfalfa); A.P. Roelfs (wheat); R.D. Wilcoxson (barley and oat); J.S. Baumer (wheat); P.G. Rothman (oat); B.W. Kennedy (soybean); D.V. McVey and J.H. Schafer (wheat).

Field work of the varietal trials at Waseca, Lambertson, Morris, Crookston-Stephen, and Grand Rapids was supervised by W.E. Lueschen, J.H. Ford, D.D. Warnes, J.V. Wiersma, and D.L. Rabas, respectively.

ADZUKI

Adzuki is combine-harvested as mature, dry seed. Consumption in the United States is small, but the potential export market is large. A processed mixture of adzuki, sugar, and water is used for many confections in Japan.

All varieties in these trials since 1980 were severely damaged by a disease (probably bacterial) for which no control has been

developed. The uncertainty of where or when severe losses will occur has delayed rapid expansion of adzuki production.

Takara, and to a lesser extent Minoka, occupied most of the adzuki acreage; the other varieties in tables 1 and 2 were introduced but did not become established in Minnesota.

Minoka—Medium yield. Medium-late maturity. Medium

Table 1. Yields of adzuki varieties in pounds per acre

| Variety | Rosemount 1979-82 | Becker 1980-82 | Grand Rapids 1980-82 | Morris 1980-82 | Lamberton 1980-82 | Waseca 1980-82 | Average 6 locations |
|-------------------|----------------------|-------------------|-------------------------|-------------------|----------------------|-------------------|------------------------|
| Minoka | 1930 | 980 | 685 | 717 | 811 | 1087 | 1035 |
| Kasho | 2068 | 1082 | 718 | 631 | 973 | 1236 | 1118 |
| Takara | 1961 | 1198 | 863 | 775 | 818 | 817 | 1072 |
| Takara SNB | 1952 | 1095 | 540 | 851 | 861 | 1183 | 1080 |
| Dainagon | 1489 | 647 | 390 | 657 | 769 | 574 | 754 |
| Express | 1873 | 1152 | 462 | 697 | 932 | 1142 | 1043 |
| Hokaido Hashimoto | 1911 | 990 | 560 | 699 | 913 | 1069 | 1024 |
| LSD 5% | 164 | 127 | 172 | 154 | 158 | 322 | 79 |

height. Large, red seed. Selected by the Minnesota Agricultural Experiment Station from an introduction from Taiwan. Released in 1980.

Takara—Medium yield. Early. Medium height. Medium size, red seed. Imported from Japan by the Red River Edible Bean Growers Association in 1977-78.

Table 2. Characteristics of adzuki varieties

| Variety | Planting to maturity (days) | Lodging (score) ¹ | Height (inches) | Weight/ 100 seeds (grams) |
|-------------------|-----------------------------------|---------------------------------|--------------------|---------------------------------|
| Minoka | 110 | 2.8 | 21 | 13.0 |
| Kasho | 111 | 3.4 | 23 | 10.5 |
| Takara | 105 | 2.7 | 20 | 9.1 |
| Takara SNB | 110 | 2.8 | 22 | 9.4 |
| Dainagon | 110 | 4.7 | 19 | 12.0 |
| Express | 109 | 2.7 | 23 | 9.3 |
| Hokaido Hashimoto | 111 | 4.3 | 23 | 11.2 |

¹1 = erect, 9 = flat.

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 eligible for certification, that will be sold in Minnesota in 1983, 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 3 and 4 are ranked according to winterhardiness index 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. They 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, but a few can be productive for five or more years. *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 Amador, Ardiente, AS-13R, AS-49R, Caliente, Calverde 65, CUF 101, Florida 77, Hayden, Joaquin II, Lew, Maxidor, Mesa Sirsa, Mesilla, Moapa 69, Sonora 70, 183, WL 504, WL 508, WL 514, WL 515, WL 600, UC Salton, Validor, 572, and 581.

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 fungus 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.

FUSARIUM WILT—The fungus that causes Fusarium wilt is present in most soils. In Minnesota it is usually not a serious problem by itself, but it contributes to stand decline in combination with other disease organisms. Resistance to Fusarium wilt in addition to resistance to bacterial wilt and Phytophthora root rot contribute to longer lived stands.

ANTHRACNOSE—This fungus disease was first found in Minnesota in 1978 and has become more prevalent each year. It infects stems and crowns and will kill susceptible plants. The disease is favored by hot, moist conditions, therefore it will be most frequently observed in SE Minnesota.

VERTICILLIUM WILT— This is a new, potentially destructive fungus disease that was first found in several Minnesota fields in 1981. Very few additional infested fields were found in 1982. It



Winterkill in the alfalfa variety at the right resulted in low yield and weeds. Agronomist W.E. Lueschen examines the winterhardy variety at the left.

has usually been found in 2- or 3-year-old fields. If the disease has been identified in the immediate vicinity, consider planting a resistant variety. The only varieties listed in tables 3 and 4 having at least moderate levels of resistance are Apollo II, Trumpetor, and WL 316.

Table 3. Average yields of alfalfa varieties expressed as percentage of Vernal for all tests in Minnesota, 1959-82

| Variety | Number tests | Yield (percent of Vernal) | | | | | | |
|--------------------------|--------------|---------------------------|-----|-----|-----|---------|--------------------|-----|
| | | Year after seeding | | | | | Average over years | |
| | | 1st | 2nd | 3rd | 4th | 5th-9th | 1-2 | 3-9 |
| VERY WINTERHARDY | | | | | | | | |
| Norseman | 12 | 96 | 93 | 91 | 86 | 90 | 95 | 90 |
| Ladak | 3 | 87 | 88 | 78 | 89 | — | 88 | 82 |
| Teton | 3 | 89 | 93 | 86 | 93 | — | 91 | 90 |
| Travois | 3 | 88 | 88 | 88 | 87 | — | 88 | 88 |
| WINTERHARDY | | | | | | | | |
| Vernal, tons/acre, 15% M | 70 | 4.8 | 4.6 | 4.5 | 4.4 | 4.2 | 4.7 | 4.2 |
| Baker | 10 | 96 | 100 | 106 | 106 | 112 | 98 | 108 |
| Dawson | 4 | 100 | 104 | 104 | 100 | 98 | 102 | 101 |
| 526 | 0 | — | — | — | — | — | — | — |
| 123 | 6 | 101 | 104 | 101 | 102 | 110 | 102 | 102 |
| WL 215 | 6 | 101 | 101 | 101 | 101 | 109 | 101 | 102 |
| Vancor | 1 | 102 | — | — | — | — | — | — |
| Agate | 28 | 98 | 99 | 101 | 98 | 100 | 99 | 100 |
| Algonquin | 3 | 99 | 104 | 104 | 102 | 100 | 101 | 102 |
| Iroquois | 12 | 107 | 105 | 105 | 111 | 103 | 106 | 106 |
| Ladak 65 | 4 | 99 | 101 | 101 | 99 | 100 | 101 | 100 |
| 130 | 3 | 105 | 106 | 117 | 114 | — | 105 | 115 |
| Nugget | 8 | 102 | 100 | 102 | 100 | 103 | 101 | 102 |
| 520 | 13 | 104 | 105 | 109 | 111 | 109 | 104 | 109 |
| 524 | 9 | 106 | 103 | 106 | 105 | — | 105 | 106 |
| Blazer | 9 | 105 | 105 | 113 | 114 | 99 | 105 | 111 |
| 545 | 8 | 100 | 104 | 105 | 108 | — | 102 | 106 |
| SX-10 | 6 | 94 | 95 | 96 | 102 | 99 | 95 | 98 |
| Thunder | 2 | 103 | 102 | — | — | — | 103 | — |
| Phytor | 8 | 103 | 104 | 109 | 116 | — | 103 | 111 |
| Valor | 9 | 100 | 103 | 103 | 107 | 111 | 101 | 106 |
| Weevlchek | 6 | 106 | 107 | 108 | 102 | 98 | 106 | 104 |
| 120 | 7 | 111 | 110 | 117 | 118 | — | 111 | 117 |
| A-54 | 3 | 104 | 106 | 115 | 89 | — | 105 | 102 |
| Anchor | 11 | 103 | 107 | 111 | 110 | 116 | 105 | 111 |
| Gladiator | 4 | 105 | 102 | 102 | 109 | — | 104 | 105 |
| Ranger | 26 | 97 | 98 | 97 | 99 | 93 | 97 | 97 |
| WL 220 | 6 | 101 | 102 | 105 | 115 | — | 101 | 108 |
| 532 | 3 | 115 | 111 | — | — | — | 113 | — |

Table 3 (continued). Average yields of alfalfa varieties expressed as percentage of Vernal for all tests in Minnesota, 1959-82

| Variety | Number tests | Yield (percent of Vernal) | | | | | | |
|-------------------------------|--------------|---------------------------|-----|-----|-----|---------|--------------------|-----|
| | | Year after seeding | | | | | Average over years | |
| | | 1st | 2nd | 3rd | 4th | 5th-9th | 1-2 | 3-9 |
| MODERATELY WINTERHARDY | | | | | | | | |
| Pacer | 9 | 102 | 104 | 108 | 107 | 105 | 103 | 107 |
| Polar II | 1 | 101 | — | — | — | — | — | — |
| Arc | 4 | 102 | 101 | 98 | — | — | 102 | 98 |
| Citation | 10 | 104 | 103 | 108 | 107 | 110 | 103 | 108 |
| Marathon | 6 | 104 | 104 | 100 | 98 | 93 | 104 | 99 |
| Apollo | 10 | 102 | 102 | 103 | 107 | 100 | 102 | 103 |
| Tempo | 8 | 100 | 106 | 92 | 103 | 86 | 103 | 93 |
| A-59 | 11 | 101 | 103 | 107 | 109 | 96 | 102 | 102 |
| Classic | 7 | 101 | 101 | 105 | 114 | — | 101 | 107 |
| G7730 | 3 | 102 | 103 | 120 | 128 | — | 102 | 124 |
| Magnum | 4 | 107 | 106 | 125 | 132 | — | 107 | 128 |
| WL 309 | 5 | 106 | 103 | 103 | 102 | 110 | 104 | 104 |
| Advantage | 1 | 101 | 107 | — | — | — | 104 | — |
| Answer | 7 | 105 | 105 | 107 | 102 | — | 105 | 106 |
| Primal | 7 | 105 | 105 | 103 | 105 | — | 105 | 103 |
| Saranac AR | 13 | 105 | 102 | 103 | 104 | 106 | 103 | 104 |
| WL 318 | 6 | 100 | 96 | 101 | 97 | 89 | 98 | 96 |
| Apollo II | 1 | 104 | — | — | — | — | — | — |
| Duke | 2 | 101 | 105 | — | — | — | 102 | — |
| G777 | 4 | 100 | 100 | 97 | 104 | 98 | 100 | 100 |
| Peak | 9 | 106 | 108 | 115 | 124 | 108 | 107 | 116 |
| Saranac | 39 | 104 | 103 | 101 | 102 | 98 | 103 | 100 |
| Thor | 10 | 103 | 103 | 100 | 102 | 105 | 103 | 102 |
| Trident | 7 | 103 | 106 | 103 | 115 | — | 104 | 106 |
| Spectrum | 0 | — | — | — | — | — | — | — |
| SX-418 | 6 | 103 | 106 | 104 | 102 | — | 104 | 103 |
| G-2815 | 1 | 94 | 105 | 109 | 102 | — | 100 | 105 |
| A-57 | 7 | 99 | 101 | 94 | 105 | — | 100 | 97 |
| Trumpetor | 1 | 107 | — | — | — | — | — | — |
| Aquarius | 4 | 97 | 103 | 101 | 114 | — | 100 | 107 |
| 131 | 3 | 106 | 103 | 104 | 98 | 102 | 104 | 101 |
| WL 312 | 6 | 102 | 105 | 102 | — | — | 103 | — |
| Armor | 2 | 105 | 105 | — | — | — | 105 | — |
| A-24 | 1 | 109 | 101 | — | — | — | 105 | — |
| WL 219 | 9 | 102 | 104 | 100 | 99 | 100 | 103 | 100 |
| Hi-Phy | 6 | 103 | 109 | 113 | 142 | — | 106 | 119 |
| Epic | 4 | 101 | 110 | 136 | 151 | — | 105 | 143 |
| WL 316 | 1 | 101 | 104 | — | — | — | 102 | — |

Table 4. Winterhardiness index and disease resistance of alfalfa varieties eligible for certification

| Variety | Developer or owner ¹ | Winter hardiness (index) ² | RESISTANT PLANTS ³ | | | Anthracnose (rating) ⁴ |
|-------------------------|---|---------------------------------------|-------------------------------|---------------------------------|-------------------------|-----------------------------------|
| | | | Bacterial wilt (percent) | Phytophthora root rot (percent) | Fusarium wilt (percent) | |
| VERY WINTERHARDY | | | | | | |
| Norseman | Barzen of Minneapolis ^c | 7.9 | 30 | 3 | 27 | S |
| Prowler | Pride Seed Co. ^f | 7.9 | 72 | — | 18 | S |
| Ladak | USDA (foreign introduction) ^{achu} | 7.5 | 8 | 2 | — | S |
| Spredor II | Northrup King Co. ^l | 7.5 | 58 | — | 24 | S |
| Teton | S. Dakota Agr. Exp. Sta. ^a | 7.4 | 15 | 7 | 26 | S |
| Travois | S. Dakota Agr. Exp. Sta. ^{acju} | 7.4 | 37 | 1 | 15 | S |

Table 4 (continued). Winterhardness index and disease resistance of alfalfa varieties eligible for certification

| Variety | Developer or owner ¹ | Winter hardness (index) ² | RESISTANT PLANTS ³ | | | Anthracnose (rating) ⁴ |
|-------------------------------|--|--|--------------------------------|---------------------------------------|-------------------------------|--------------------------------------|
| | | | Bacterial wilt (percent) | Phytophthora root rot (percent) | Fusarium wilt (percent) | |
| WINTERHARDY | | | | | | |
| Vernal | Wisconsin Agr. Exp. Sta. & USDA ^{achijnloqtuwx} | 6.5 | 42 | 5 | 32 | S |
| Baker | USDA & Nebraska Agr. Exp. Sta. ^{achjw} | 6.5 | 50 | 2 | 37 | LR |
| Dawson | USDA & Nebraska Agr. Exp. Sta. ^j | 6.5 | 15 | 1 | 35 | S |
| 526 | Pioneer Hi-Bred International Inc. ^p | 6.5 | — | 7 | — | LR |
| 123 | DeKalb-Pfizer Genetics ^e | 6.3 | 41 | 3 | 40 | LR |
| WL 215 | W.L. Research Inc. ^c | 6.3 | 36 | 4 | 34 | LR |
| Vancor | Northrup King Co. ^j | 6.2 | 56 | 22 | 38 | R |
| Agate | USDA & Minnesota Agr. Exp. Sta. ^{achjooqtuw} | 6.0 | 65 | 43 | 54 | MR |
| Argonquin | Agriculture Canada ^w | 6.0 | 51 | 3 | 40 | — |
| Iroquois | Cornell University ^{cijooqtw} | 6.0 | 61 | 1 | 22 | S |
| Ladak 65 | Montana Agr. Exp. Sta. ^{acj} | 6.0 | 36 | 2 | 15 | S |
| 130 | DeKalb-Pfizer Genetics ^e | 6.0 | 66 | 29 | 73 | MR |
| Nugget | PAG Seeds ^m | 5.9 | 46 | 1 | 29 | — |
| 520 | Pioneer Hi-Bred International Inc. ^p | 5.9 | 40 | 4 | 29 | LR |
| 524 | Pioneer Hi-Bred International Inc. ^p | 5.9 | 24 | 8 | 44 | LR |
| Blazer | Land O'Lakes ⁱ | 5.9 | 53 | 26 | 26 | LR |
| 545 | Pioneer Hi-Bred International Inc. ^p | 5.8 | 35 | 30 | 30 | LR |
| SX-10 | Sexauer Co. ^u | 5.7 | 5 | 2 | 46 | — |
| Thunder | Northrup King Co. ^j | 5.7 | 43 | 49 | 55 | MR |
| Phytor | Northrup King Co. ^j | 5.5 | 34 | 30 | 39 | S |
| Valor | Land O'Lakes ^j | 5.5 | 36 | 2 | 30 | — |
| Weevlichek | Farmers Forage Res. Coop. ^c | 5.5 | 57 | 2 | 30 | S |
| 120 | DeKalb-Pfizer Genetics ^e | 5.5 | 57 | 39 | 20 | LR |
| A-54 | Ramey Seed Co. ^u | 5.4 | 26 | 11 | — | — |
| Anchor | Rudy Patrick Co. ^{fx} | 5.4 | 36 | 5 | 17 | LR |
| Gladiator | Northrup King Co. ^j | 5.4 | 57 | 1 | 37 | MR |
| Ranger | USDA & Nebraska Agr. Exp. Sta. ^{achjnoqu} | 5.4 | 18 | 4 | 25 | S |
| WL 220 | W.L. Research Inc. ⁱ | 5.4 | 49 | 12 | 64 | MR |
| 532 | Pioneer Hi-Bred International Inc. ^p | 5.4 | 63 | 7 | 37 | MR |
| MODERATELY WINTERHARDY | | | | | | |
| Pacer | Land O'Lakes ⁱ | 5.3 | 33 | 8 | 20 | — |
| Polar II | Pride Seed Co. ^r | 5.3 | 57 | — | 34 | S |
| Arc | USDA & N. Carolina Agr. Exp. Sta. ^j | 5.2 | 7 | 3 | 34 | HR |
| Citation | North American Plant Breeders ⁱ | 5.2 | 45 | 3 | 30 | — |
| Marathon | Cargill ^p | 5.2 | 36 | 2 | 13 | S |
| Apollo | North American Plant Breeders ^{fx} | 5.1 | 36 | 36 | 40 | S |
| Tempo | Farmers Forage Res. Coop. ^c | 5.1 | 26 | 8 | 31 | LR |
| A-59 | E. F. Mangelsdorf & Bros. Inc. ^t | 5.0 | 16 | 4 | 34 | LR |
| Classic | Farmers Forage Res. Coop. ^c | 5.0 | 39 | 7 | — | — |
| G7730 | Funk Seed Int. ^g | 4.7 | 55 | 62 | 62 | LR |
| Magnum | Dairyland Seed Co. Inc. ^d | 4.7 | 51 | 5 | 32 | MR |
| WL 309 | W.L. Research Inc. ^c | 4.7 | 25 | 4 | 50 | — |
| Advantage | DeKalb-Pfizer Genetics ^e | 4.6 | 42 | 44 | 23 | MR |
| Answer | Midland Cooperatives, Inc. ⁱ | 4.6 | 50 | 66 | 58 | LR |
| Primal | Pride Seed Co. ^r | 4.6 | 62 | 9 | 33 | S |
| Saranac AR | Cornell University | 4.6 | 29 | 8 | 44 | HR |
| WL 318 | W.L. Research Inc. ^{ci} | 4.6 | 32 | 21 | 52 | MR |
| Apollo II | North American Plant Breeders ^{fx} | 4.5 | 43 | 54 | 47 | MR |
| Duke | North American Plant Breeders ^x | 4.5 | 43 | 55 | 43 | MR |
| G 777 | Funk Seed Int. ^g | 4.5 | 25 | 4 | 12 | — |
| Peak | Research Seeds, Inc. ^q | 4.5 | 52 | 16 | 28 | LR |

Table 4. (continued) Winterhardness index and disease resistance of alfalfa varieties eligible for certification

| Variety | Developer or owner ¹ | Winter hardness (index) ² | RESISTANT PLANTS ³ | | | Anthracnose (rating) ⁴ |
|-----------|--|--|--------------------------------|---------------------------------------|-------------------------------|--------------------------------------|
| | | | Bacterial wilt (percent) | Phytophthora root rot (percent) | Fusarium wilt (percent) | |
| Saranac | Cornell University ^{19tw} | 4.5 | 49 | 3 | 34 | S |
| Thor | Northrup King Co. ¹ | 4.5 | 69 | 1 | 30 | S |
| Trident | PAG Seeds ^m | 4.5 | 37 | 71 | 55 | MR |
| Spectrum | W.L. Research Inc. ^c | 4.5 | 56 | 29 | 33 | MR |
| SX-418 | Sexauer Co. ^u | 4.5 | 33 | 5 | — | LR |
| G 2815 | Funk Seed Int. ^g | 4.4 | 51 | 16 | 56 | MR |
| A-57 | Embro Seed Co. Inc. ¹ | 4.4 | 12 | 7 | — | — |
| Trumpetor | Northrup King Co. ¹ | 4.4 | 28 | 8 | 51 | R |
| Aquarius | Lincoln Seed & Feed Co. ¹ | 4.3 | 75 | 2 | 47 | HR |
| 131 | Cal/West Seeds ^o | 4.3 | 10 | 8 | — | — |
| WL 312 | W.L. Research Inc. ^o | 4.3 | 38 | 25 | 54 | MR |
| Armor | North American Plant Breeders ^x | 4.2 | 39 | 43 | 44 | MR |
| A-24 | Ramy Seed Co. ¹ | 4.2 | 5 | 2 | — | S |
| WL 219 | W.L. Research Inc. ^c | 4.2 | 27 | 9 | 45 | — |
| Hi-Phy | Farmers Forage Res. Coop. ^c | 4.1 | 64 | 27 | 57 | — |
| Epic | Larry Peterson, Ltd. ^{sv} | 3.9 | 58 | 34 | 45 | S |
| WL 316 | W.L. Research Inc. ^{ci} | 3.6 | 19 | 9 | 53 | HR |

¹1983 seed suppliers: a. Arrowhead, Inc.; b. Cargill Seeds; c. Cenex; d. Dairyland Seed Co., Inc.; e. DeKalb-Pfizer Genetics; f. Field Seed Farms; g. Funk Seeds International, Inc.; h. Interstate Seed and Grain Co.; i. Land O'Lakes, Inc.; j. Lincoln Seed and Feed Co.; k. Migro Seeds; l. Northrup King Co.; m. PAG Seeds; n. Payco Seeds; o. Peterson-Biddick Co.; p. Pioneer Hi-Bred International, Inc.; q. Premium Seed Co.; r. Pride Seed Co., Inc.; s. Profiseed Co.; t. Ramy Seed Co.; u. The Sexauer Co.; v. Stamer Seed Co.; w. Werner Farm Seeds; x. Ziller Seed Farms. ²Based on fall growth after cutting 1st week of September: 1 = tallest (least winterhardy), 9 = shortest. ³Plants with little or no injury are classified as resistant. ⁴Resistance rating (percent resistant plants): HR = high resistance (51 +), R = resistant (31-50), MR = moderate resistance (16-30), LR = low resistance (6-15), and S = susceptible (0-5).

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.

RECOMMENDED VARIETIES

Alden—Medium yield, medium maturity and height. Poor lodging resistance. Medium size seed of medium test weight. May outyield Keet in favorable environments for canarygrass. Devel-

oped cooperatively by Minnesota Agricultural Experiment Station and Minn-Dak Growers Association from PI 251390 from Iran. Released in 1973.

Keet—High yield, early, medium height. Fair lodging resistance. Medium size seed of high test weight. Selected from PI 250741 by Minnesota Agricultural Experiment Station. Released in 1979.

Table 5. Yields of annual canarygrass varieties in pounds per acre

| Variety | Rosemount 1972-82 | Crookston 1976-82 | Stephen 1975-82 | Average 3 locations |
|---------|----------------------|----------------------|--------------------|------------------------|
| Alden | 1040 | 1380 | 1304 | 1241 |
| Keet | 1173 | 1454 | 1486 | 1371 |
| LSD 5% | 62 | 118 | 37 | 17 |

Table 6. Characteristics of annual canarygrass varieties

| Variety | Planting to heading (days) | Planting to maturity (days) | Lodging (score) ¹ | Height (inches) | Weight/ 100 seeds (grams) | Test weight/ bushel (pounds) |
|---------|----------------------------------|-----------------------------------|---------------------------------|--------------------|---------------------------------|------------------------------------|
| Alden | 63 | 105 | 4.4 | 35 | .74 | 47.3 |
| Keet | 60 | 103 | 3.1 | 35 | .74 | 48.6 |

¹1 = erect, 9 = flat.

BARLEY

RECOMMENDED VARIETIES

Glenn—High yield. Early maturity. Good lodging resistance. Six-row, rough-awn, long rachilla hairs, colorless aleurone. Classified as a malting variety by Malting Barley Improvement Association (MBIA). Resistant to stem rust, loose and covered smut and spot blotch. Developed by North Dakota Agricultural Experiment Station from crosses involving Br 5755-3, ND B138, and Trophy. Released in 1977.

Morex—High yield. Early maturity. Medium lodging resistance. Kernel plumpness intermediate to high. Six-row, semi-smooth awn, short rachilla hairs, colorless aleurone. Awns may drop off as crop approaches maturity. Threshes easily. Classified as a malting variety by MBIA. Resistant to stem rust and loose smut. Moderately resistant to spot blotch. Developed by Minnesota Agricultural Experiment Station from cross of Cree and Bonanza. Released in 1978.

OTHER VARIETIES

Azure—High yield. Six-row, semi-smooth awn, long rachilla hairs, blue aleurone. Classified as a malting variety by MBIA. Resistant to stem rust and spot blotch. Not recommended because of limited demand for a blue aleurone malting variety and the associated marketing problem. Developed by North Dakota Agricultural Experiment Station from a cross involving Bonanza, Nordic, and NDB130. Released in 1982.

Beacon—Medium yield, early, good lodging resistance. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by MBIA. Resistant to stem rust, spot blotch, and loose smut. Developed by North Dakota Agricultural Experiment Station from a cross between Conquest and Dickson. Released in 1973.



Agronomist D.C. Rasmusson and pathologist D.W. French with two Minnesota malting barley varieties. Morex released in 1978 exceeds all other barley varieties in U.S. acreage.

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 stem rust and loose smut. Susceptible to spot blotch. Developed by Agriculture Canada. Brandon, from a cross involving Vantage, Jet, Vantmore, Parkland, and Conquest. Licensed in 1970.

Bumper—High yield. Later in maturity than Morex or Glenn. Medium lodging resistance. Six-row, rough-awn, long rachilla hairs, colorless aleurone. Malting quality status undetermined. Lower extract percent than Morex. Resistant to stem rust and spot blotch. Developed by North American Plant Breeders. Selected from a bulk population which involved Larker as a parent. Released in 1980.

Cree—High yield. Medium 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 spot diseases. Developed at Minnesota Agricultural Experiment Station from crosses involving Traill, Br. 5750-2 and Dickson. Released in 1972.

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

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 spot blotch. Yield loss from spot blotch may reach 25 bushels per acre. 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 maturity, good lodging resistance. Six-row, rough-awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by MBIA. Resistant to stem rust and spot blotch, susceptible to loose and covered smut. Developed by Minnesota Agricultural Experiment Station from cross involving Cree, M2, Vantage, Kindred, and Jotun. Released in 1974.

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 spot blotch and Septoria leaf blotch. Developed by North Dakota Agricultural Experiment Station from crosses of Dickson, CI 4738, Traill, and UM 570. Released in 1971.

Valley—Medium yield. Later in maturity than Morex or Glenn. Lodging resistance not equal to Morex. Six-row, smooth-awn, long rachilla hairs, colorless aleurone. Malting quality status undetermined. Lower extract percent than Morex. Resistant to stem rust and spot blotch. Developed by North American Plant Breeders. Selected from a bulk population which involved Larker as a parent. Released in 1980.

Table 7. Yield of barley varieties in bushels per acre, 1978-82

| | Crookston 6 ¹ | Morris 7 | Stephen 3 | St. Paul 2 | Lamberton 1 | Roseau 1 | Average 22 |
|--------|-----------------------------|-------------|--------------|---------------|----------------|-------------|---------------|
| Larker | 59 | 73 | 78 | 61 | 69 | 70 | 68 |
| Morex | 72 | 75 | 92 | 70 | 74 | 80 | 76 |
| Glenn | 75 | 71 | 78 | 76 | 85 | 77 | 75 |
| Bumper | 70 | 73 | 89 | 73 | 77 | 73 | 75 |
| LSD 5% | 11 | 7 | 17 | 15 | 17 | 14 | 5 |

¹Number of trials.

Table 8. Characteristics of barley varieties

| | Heading (June) | Height (inches) | Lodging (percent) | Plump kernels (percent) | Protein (percent) ¹ | Malt Extract (percent) ¹ | Reaction to disease ² | | |
|--------|-------------------|--------------------|----------------------|-------------------------------|-----------------------------------|---|----------------------------------|----------------|----------------|
| | | | | | | | stem rust | loose smut | spot blotch |
| Larker | 18 | 35 | 49 | 72 | 13.5 | 76.6 | R | S | S |
| Morex | 17 | 36 | 34 | 66 | 12.9 | 78.7 | R | R ³ | MR |
| Glenn | 16 | 34 | 25 | 72 | 12.7 | 77.0 | R | R ³ | R |
| Bumper | 21 | 35 | 36 | 74 | 12.8 | 76.0 | R | S | R |

¹Regional data from 1979-1982 (19 trials). Protein based on dry matter.

²R = resistant, MR = moderately resistant, and S = susceptible.

³Loose smut observed in some fields in 1982.

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.

Table 9. Average yields of birdsfoot trefoil varieties expressed as percentage of Empire for all tests in Minnesota, 1967-81

| Variety | Developer ¹ | Yield (percent of Empire) | | | |
|----------|---|---------------------------|-----|-----|---------|
| | | Year after seeding | | | |
| | | 1 | 2 | 3 | Average |
| Empire | New York Agr. Exp. Sta. tons/acre, 15% M ^{acdefghijk} | 3.7 | 3.2 | 3.0 | 3.1 |
| Leo | Macdonald College Canada ⁱ | 116 | 107 | 112 | 112 |
| Carroll | Iowa Agr. Exp. Sta. ^g | 114 | 107 | 106 | 109 |
| Dawn | Missouri Agr. Exp. Sta. ^b | 108 | 108 | 107 | 108 |
| Viking | New York Agr. Exp. Sta. | 102 | 102 | 95 | 100 |
| Maitland | Univ. of Guelph, Canada ⁱ | 111 | 101 | 77 | 96 |

¹1983 seed suppliers: a. Cenex, b. Field Seed Farms, c. Interstate Seed and Grain Co., d. Lincoln Seed and Feed Co., e. Peterson-Biddick Co., f. Land O'Lakes, Inc., g. Premium Seed Co., h. The Sexauer Co., i. Twin City Seed Co., j. Werner Farm Seeds, Inc., k. Ramy Seed Co.

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. Nearly all tested varieties

are of the southern type and are satisfactory in winterhardiness. Some stand losses may occur when bromegrass is managed under a three-cut system.

The varieties have been evaluated in pure stands. Therefore, performance may be different when a variety is grown in mixtures with other grasses and legumes.

Table 10. Dry matter yields of bromegrass varieties expressed as percentage of Fox at five locations, and average for 1966-1981

| Variety | Developer or owner ¹ | Crookston | Grand Rapids | Lamberton | Morris | Rosemount | Average |
|--------------------|---|-----------|--------------|-----------|--------|-----------|---------|
| No. of trial years | | 2 | 5 | 1 | 2 | 10 | |
| Fox ton/acre | Minnesota Agr. Exp. Sta. ^a | 3.1 | 4.7 | 3.6 | 3.6 | 3.9 | 4.0 |
| Barton | Land O'Lakes Inc. ^f | — | 86 | — | 102 | 109 | 105 |
| Baylor | Rudy Patrick Co. ^{ej} | 106 | 94 | 104 | 100 | 105 | 101 |
| Beacon | F.S. Services, Inc. | — | 96 | — | 93 | 110 | 106 |
| Blair | Midland Coop. Inc. ^a | 105 | 93 | 103 | 112 | 104 | 102 |
| Bromex | Northrup King Co. ^h | — | — | — | — | 106 | 103 |
| Lincoln | Nebraska Agr. Exp. Sta. ^b | 97 | 91 | 98 | 98 | 96 | 95 |
| Rebound | South Dak. Agr. Exp. Sta. ^{cg} | — | 99 | — | — | 104 | 102 |
| Sac | Wisconsin Agr. Exp. Sta. ^a | 102 | 93 | 99 | 95 | 106 | 100 |
| Saratoga | New York Agr. Exp. Sta. ^a | 103 | 102 | 105 | 105 | 102 | 103 |
| Tempo | Agr. Canada, Ottawa ^a | — | 99 | — | — | 96 | 97 |
| LSD 5% | | 15 | 9 | 12 | 11 | 5 | 2 |

¹1983 seed supplies and sources: a. not available or very limited, b. available from most sources, c. Arrowhead, Inc., d. Cenex Coop. Inc., e. Field Seed Farms, f. Land O'Lakes, Inc., g. Lincoln Seed and Feed Co., h. Northrup King Co., i. PAG Seeds, j. Ziller Seed Farms.

BUCKWHEAT

RECOMMENDED VARIETIES

Mancan—High yield. Large seed. Low test weight but good market acceptability. Released by Agriculture Canada, Morden. Licensed in 1974.

Manor—High yield. Large seed. Low test weight but good market acceptability. Released by Agriculture Canada, Morden. Licensed in 1980. Production of certified seed limited to Canada.

VARIETIES NOT ADEQUATELY TESTED

Royal—High yield. Large seed. Low test weight but good market acceptability. Released by Winsor Grain Co., Grain Exchange, Minneapolis, MN 55415 in 1982. Variety protection pending.

OTHER VARIETIES

Common—Seed lots tested under this name ranged from low to high yield. Small or medium seed of high test weight.

Giant American—High yield. Large seed. Very low test weight.

Pennquad—Low yield. Very large seed. Low test weight. Good lodging resistance. Tetraploid so fields should probably be isolated from other varieties. Released by Pennsylvania Agricultural Experiment Station in 1966.

Tempest—Low yield. Small seed. High test weight. Poor lodging resistance. Continues bloom later than other varieties. Released by Agriculture Canada, Morden. Licensed in 1971.

Tokyo—High yield. Small to medium seed. High test weight. Originated by Agriculture Canada, Ottawa in 1955.

Table 11. Characteristics of buckwheat varieties

| Variety | Seed yield/acre (pounds) | | | | | Test weight/ bushel (pounds) | Weight/ 100 seeds (grams) | Height (inches) | Lodging (score) ¹ | Planting to bloom (days) |
|--------------------|--------------------------|----------------------|----------------------------|-------------------|------------------------|------------------------------------|---------------------------------|--------------------|---------------------------------|--------------------------------|
| | Becker 1979-82 | Rosemount 1980-82 | Grand Rapids 1980-82 | Lamberton 1982 | Average (11 trials) | | | | | |
| Mancan | 1311 | 1131 | 478 | 1224 | 1027 | 790 | 44.2 | 3.0 | 4.3 | 31 |
| Manor | 1363 | 1188 | 496 | 1503 | 1092 | 897 | 44.9 | 2.9 | 4.3 | 31 |
| Royal ² | 1341 | 1267 | 431 | 1632 | 1099 | — | 44.4 | 2.9 | 4.1 | 30 |
| Tokyo ³ | 1292 | 1160 | 415 | 1125 | 1002 | 808 | 47.4 | 2.4 | 3.9 | 28 |
| LSD 5% | 123 | 104 | 198 | 751 | 97 | 394 | | | | |

¹1 = erect, 9 = flat. ²1982. ³1981-82.

CORN

Many corn hybrids are produced by private companies. A total of 1,477 hybrids were registered for sale in Minnesota in 1982. Information on the performance of these closed-pedigree or private hybrids is usually available from the companies selling them.

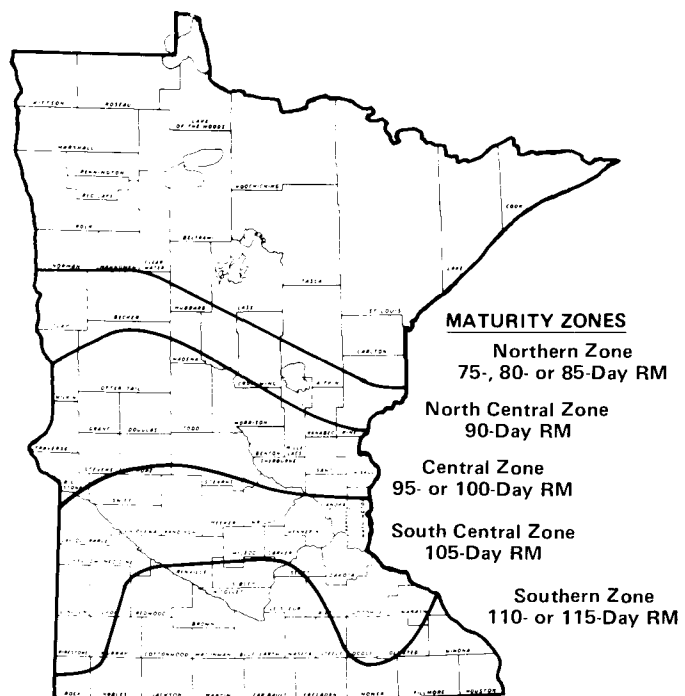
The Minnesota Agricultural Experiment Station conducts research in corn breeding, including the development of inbred lines which are used as parents of hybrids. These Minnesota inbreds, designated by the letter "A", are released to private companies through the Minnesota Crop Improvement Association. Private companies may use these inbreds to produce hybrid seed corn for farmers. Inbreds developed by the Minnesota Agricultural Experiment Station accounted for 16 percent of the total United States' hybrid seed production in 1979, the most recent year for which accurate survey data are available. Information on the performance of these inbreds is available from the Corn Breeding Project, 303 Agronomy, University of Minnesota, 1509 Gortner Avenue, St. Paul, MN 55108.

Open-pedigree or public hybrids developed by the Minnesota Agricultural Experiment Station are called Minhybrids. Some

recent Minhybrids, their pedigrees, and their Minnesota relative maturity (RM) ratings are listed in table 12. The zones of adaptation on the accompanying map show the areas for which hybrids of a particular RM rating are considered to be full-season maturity.

Table 12. Description of some recent Minhybrids

| Minhybrid | Pedigree | Relative maturity |
|-----------|-----------------------|-------------------|
| 8201 | A641 × W182B | 80 |
| 8301 | (A639 × A641) × W182B | 80 |
| 7301 | (A638 × A639) × W182B | 90 |
| 6301 | (B9A × A239) × A635 | 95 |
| 6305 | (A658 × A659) × A665 | 95 |
| 5202 | A665 × Mo17 | 105 |
| 5303 | (A658 × A659) × A632 | 105 |
| 4201 | A619 × A632 | 110 |
| 4202 | A634 × Mo17 | 110 |
| 4303 | (A665 × A634) × Mo17 | 110 |



FIELD BEAN

Fieldbean is combine-harvested as mature, dry seed. It is used for human food and reaches the grocer's shelf in either canned or dry form.

There are more than 15 market classes of dry, edible bean, but only eight have been grown commercially in Minnesota. Minnesota's 1981 production amounted to 46 percent navy, 49 percent pinto, 3 percent red kidney, and 2 percent other classes. Varietal recommendations are confined to varieties within the navy, small white, pinto, dark red kidney, pink, black turtle soup, great northern, and small red classes. Other classes are grown successfully, but important differences among varieties within their classes have not yet been identified in our trials.

RECOMMENDED VARIETIES

Aurora small white—High yield. Medium late. Erect vine. Very small, white seed. Released by New York Agricultural Experiment Station in 1973.

Emerson great northern—High yield. Medium late. Large, prostrate vine. Large, white seed. Released by Nebraska Agricultural Experiment Station in 1971.

Fleetwood navy—High yield. Late. Medium-size bush. Small, white seed. Released by Agriculture Canada, Harrow. Licensed in 1977.

Montcalm dark red kidney—Medium yield. Late. Large, erect bush. Very large, dark red seed. Released by Michigan Agricultural Experiment Station in 1974.

Seafarer navy—Medium yield. Early. Erect bush. Small white seed. Released by Michigan Agricultural Experiment Station in 1967.

Snow-Bunting navy—Medium yield. Early. Medium-size bush. Small, white seed. Released by Clarence Muehlfeld, Bridgeport, MI 48722 in 1974.

T39 black turtle soup—High yield. Medium late. Erect vine. Small, black seed. Released by California Agricultural Experiment Station.

UI-37 small red—Low yield. Very early. Short, usually erect vine. Large, dark red seed. Released by Idaho Agricultural Experiment Station in 1964. *Recommended only as a very early maturing fieldbean; other small red varieties yield more in a normal growing season.*

UI-114 pinto—High yield. Late. Large, prostrate vine. Tan and brown mottled seed. Released by Idaho Agricultural Experiment Station in 1965.

Up-Land navy—Medium yield. Medium maturity. Medium-size bush. Small, white seed. Released by Clarence Muehlfeld, Bridgeport, MI 48722 in 1974.

Viva Pink—High yield. Late maturity. Large, prostrate vine. Pink seed resistant to splitting. Released by Washington Agricultural Experiment Station and USDA in 1974.

VARIETIES NOT ADEQUATELY TESTED

Admiral navy—Medium yield. Late. Bush. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Agate pinto—Medium yield. Early. Bush. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982.

Amber pinto—Medium yield. Medium maturity. Bush. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982.

Black Beauty black turtle soup—High yield. Late. Vine. Wilbur-Ellis Co., Spokane, WA 99206.

Black Magic black turtle soup—High yield. Late. Erect vine. Released by Michigan Agricultural Experiment Station in 1981.

Bos'n navy—Medium yield. Late. Bush. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Captain navy—Low yield. Late. Bush. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Domino black turtle soup—High yield. Late. Erect vine. Released by Michigan Agricultural Experiment Station in 1981.

Ebony black turtle soup—High yield. Medium late. Erect vine. Wilbur-Ellis Co., Spokane, WA 99206. Seed sale regulated by U.S. Variety Protection Act.

Ex Rico 23 navy—High yield. Late. Medium-size bush. Large, navy seed. Released by University of Guelph, Ontario, Canada. Licensed in 1980.

Fiesta pinto—High yield. Early. Large, prostrate vine. Large, pinto seed. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Fleetwood 80 navy—Similar to Fleetwood except resistant to delta race of anthracnose. Released by Agriculture Canada, Harrow in 1980.

Gala pinto—High yield. Medium maturity. Large, prostrate vine. Released by Idaho Seed Bean Co., Twin Falls, ID 83301 in 1981. Variety protection pending.

Garnet small red—Medium yield. Medium maturity. Large, prostrate vine. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982.

Harris great northern—High yield. Very late. Large, prostrate vine. Seed quality frequently poor. Released by Nebraska Agricultural Experiment Station in 1980. Seed sale regulated by U.S. Variety Protection Act.

Loop black turtle soup—Medium yield. Late. Erect vine. Released by Saskatchewan Wheat Pool, Watrous, Saskatchewan S0K 4T0 in 1982.

Midnight black turtle soup—Medium yield. Late. Erect bush of excellent type for combine-harvest. Released by Cornell University Agricultural Experiment Station in 1980. Seed sale regulated by U.S. Variety Protection Act.

Neptune navy—Medium yield. Very late. Erect vine. Released by Michigan Agricultural Experiment Station in 1981.

Opal navy—Medium yield. Late. Vine. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982.

Pindak pinto—High yield. Medium maturity. Large, prostrate vine. Small, pinto seed. Released by USDA and North Dakota Agricultural Experiment Station in 1981.

Red Kloud light red kidney—Medium yield. Early. Large, erect bush. Released by Cornell University Agricultural Experiment Station in 1973.

Ruddy light red kidney—Medium yield. Early. Large, erect bush. Released by Cornell University Agricultural Experiment Station in 1982.

Seafarer 80 navy—Similar to Seafarer except resistant to delta race of anthracnose. Released by Agriculture Canada, Harrow in 1980.

Swan Valley navy—High yield. Very late. Large bush. Released by Michigan Agricultural Experiment Station in 1981.

Tall Bun-Yan navy—Medium yield. Late. Large bush. Released by Clarence Muehlfeld, Bridgeport, MI 48722 in 1981.

Zircon small white—High yield. Very late. Small seed. Vine. Released by Rogers Brothers Seed Co., Idaho Falls, ID 83401 in 1982.

OTHER VARIETIES

Navajo pinto—Too late for Minnesota. Large, prostrate vine. Purchased by Agrigenetics Corporation, Eden Prairie, MN 55344 from New Mexico Agricultural Experiment Station in 1982.

NW 410 pinto—Lower yield than UI-114. Late. Large, prostrate vine. Small, pinto seed. Released by USDA and Washington Agricultural Experiment Station in 1980.

Olathe pinto—Medium yield. Late. Small, pinto seed. Large, prostrate vine. Lower yield than UI-114 but is tolerant of rust.

Released by Colorado Agricultural Experiment Station in 1979. Seed sale regulated by U.S. Variety Protection Act.

Sanilac navy—Medium yield. Medium late. Bush. Released by Michigan Agricultural Experiment Station in 1956.

Tuscola navy—Medium yield. Late. More resistance to splitting than most navy varieties. Released by Michigan Agricultural Experiment Station in 1977.

UI-36 small red—Medium yield. Medium maturity. Large, prostrate vine. Seed quality frequently poor. Released by Idaho Agricultural Experiment Station in 1964.

UI-111 pinto—Medium yield. Late. Large, prostrate vine. Released by Idaho Agricultural Experiment Station in 1945.

Wyo 166 pinto—High yield. Late. Large, prostrate vine. Released by Wyoming Agricultural Experiment Station in 1965.

Table 13. Characteristics of fieldbean varieties, 1980-82

| Class and variety | Seed yield/acre (pounds) | | | | Average—4 locations | | | |
|---------------------------|--------------------------|-------------------|-------------------|-----------|---------------------|--------------------------|-----------------------------|-----------------------------|
| | Becker | Lamberton | Morris | Crookston | Yield/acre (pounds) | Weight/100 seeds (grams) | Planting to maturity (days) | Growth (habit) ¹ |
| Pinto | | | | | | | | |
| UI-114 | 2693 | 1990 | 2131 | 1804 | 2155 | 37.0 | 108 | V |
| Agate ² | 2140 | 1434 | 1337 | 1532 | 1611 | 36.4 | 98 | B |
| Amber ² | 2079 | 1184 | 1422 | 1513 | 1550 | 34.0 | 101 | B |
| Fiesta | 2574 | 1867 ² | 1704 | 1915 | 2015 | 41.0 | 97 | V |
| Gala | 2698 | 1854 ² | 1888 | 1830 | 2068 | 38.5 | 100 | V |
| Navajo ³ | 0 | 0 | 0 | 0 | 0 | — | — | V |
| Olathe | 2228 | 1399 | 1417 | 1651 | 1674 | 32.8 | 103 | V |
| Pindak | 2557 | 1788 ² | 1756 | 1599 | 1925 | 31.0 | 99 | V |
| UI-111 | 2063 | 1638 | 1526 | 1671 | 1725 | 35.3 | 104 | V |
| Wyo 166 | 2583 | 1726 | 1542 | 1599 | 1863 | 35.5 | 104 | V |
| Navy | | | | | | | | |
| Fleetwood | 2421 | 1886 | 1452 | 1686 | 1861 | 17.4 | 105 | B |
| Seafarer | 1573 | 1394 | 1016 | 1291 | 1319 | 17.7 | 92 | B |
| Snow-Bunting | 1851 | 1155 | 1183 | 1400 | 1397 | 17.9 | 93 | B |
| Up-Land | 1996 | 1371 | 1309 | 1400 | 1519 | 17.5 | 95 | B |
| Admiral ² | 2151 | 1495 | 1353 | 1027 | 1507 | 16.3 | 107 | B |
| Bos'n ² | 1983 | 1016 | 1218 | 1166 | 1346 | 15.9 | 105 | B |
| Captain ² | 1774 | 1219 | 956 | 783 | 1183 | 14.7 | 106 | B |
| Ex Rico 23 ³ | 2720 | 1380 | 1920 | 1315 | 1834 | 18.9 | 104 | B |
| Fleetwood 80 ³ | 2609 | 1797 | 1485 | 1850 | 1935 | 17.1 | 105 | B |
| Neptune ³ | 2264 | 1723 | 1970 | 891 | 1712 | 16.5 | 112 | EV |
| Opal ² | 1851 | 1256 | 1312 | 1208 | 1407 | 17.1 | 103 | V |
| Sanilac | 1717 | 1387 | 1256 | 948 | 1327 | 17.0 | 102 | B |
| Seafarer 80 ³ | 1939 | 1490 | 865 | 713 | 1252 | 17.2 | 92 | B |
| Swan Valley ³ | 2475 | 1692 | 1896 | 1303 | 1842 | 16.5 | 112 | B |
| Tall Bun-Yan ² | 2208 | 1476 | 1313 | 1143 | 1535 | 19.8 | 106 | B |
| Small White | | | | | | | | |
| Aurora | 2367 | 1528 | 1888 | 1519 | 1826 | 14.6 | 105 | EV |
| Zircon ² | 2495 | 1723 | 1840 | 1364 | 1856 | 15.5 | 110 | V |
| Great Northern | | | | | | | | |
| Emerson | 2843 | 1900 | 1861 | 1901 | 2126 | 44.8 | 101 | V |
| Harris | 2549 | 2036 | 1962 ⁴ | 2053 | 2150 | 34.6 | 113 | V |
| Small Red | | | | | | | | |
| UI-37 | 1784 | 809 | 923 | 1128 | 1161 | 29.4 | 90 | EV |
| Garnet ² | 2356 | 1244 | 1623 | 1565 | 1697 | 28.1 | 99 | V |
| UI-36 | 2370 | 1360 | 1736 | 1702 | 1792 | 31.6 | 99 | V |
| Pink | | | | | | | | |
| Viva | 2136 | 1623 | 1754 | 1714 | 1807 | 25.3 | 107 | V |
| Dark Red Kidney | | | | | | | | |
| Montcalm | 2300 | 1316 | 1527 | 1141 | 1571 | 47.9 | 109 | B |
| Light Red Kidney | | | | | | | | |
| Red Kloud ³ | 2642 | 666 | 1507 | 1219 | 1509 | 46.4 | 97 | B |
| Ruddy ³ | 2386 | 558 | 1471 | 1298 | 1428 | 40.2 | 95 | B |
| Black Turtle Soup | | | | | | | | |
| T 39 | 2476 | 1500 | 2003 | 1583 | 1891 | 20.1 | 100 | EV |
| Black Beauty ² | 2622 | 1305 | 1927 | 1581 | 1859 | 18.8 | 105 | V |
| Black Magic ³ | 2391 | 1755 | 1872 | 1407 | 1856 | 18.9 | 106 | EV |
| Domino ³ | 2627 | 1351 | 2067 | 1476 | 1880 | 19.4 | 107 | EV |
| Ebony ² | 2611 | 1366 | 2081 | 1780 | 1960 | 19.3 | 103 | EV |
| Loop ³ | 2389 | 1595 | 1872 | 1303 | 1790 | 18.7 | 107 | EV |
| Midnight | 2081 | 1067 | 1609 | 1158 | 1479 | 17.4 | 106 | B |
| LSD 5% | 286 | 242 | 232 | 225 | 124 | | | |

¹V = vine, B = bush, EV = erect vine.

²1981-82.

³1982.

⁴1978-81.

Table 14. Reaction of fieldbean varieties to some important pathogens¹

| Class and variety | Rust ² | Blight ² | | Mosaic ² | | Anthracnose ³ | Fusarium root rot ² | White mold ² |
|--------------------------|-------------------|---------------------|------|---------------------|----|--------------------------|--------------------------------|-------------------------|
| | | common | halo | 1 | 15 | | | |
| <u>Pinto</u> | | | | | | | | |
| UI-114 | S | S | S | T | T | S | T | S |
| Agate | T | S | S | T | T | S | T | S |
| Amber | S | S | S | T | T | — | — | S |
| Fiesta | T | S | S | T | T | — | S | S |
| Gala | S | S | S | T | T | B | S | S |
| Navajo | T | S | T | — | — | — | — | — |
| Olathe | T | S | S | T | T | BG | S | S |
| Pindak | T | S | T | T | T | — | T | S |
| UI-111 | S | S | S | T | S | S | S | S |
| Wyo 166 | S | S | S | T | S | — | S | S |
| <u>Navy</u> | | | | | | | | |
| Fleetwood | T | S | T | T | T | ABG | S | S |
| Seafarer | S | S | T | T | T | ABG | S | S |
| Snow-Bunting | S | S | T | T | S | AB | S | S |
| Up-Land | T | S | T | T | S | A | S | S |
| Admiral | T | S | T | T | T | — | S | S |
| Bos'n | T | S | T | T | T | — | S | S |
| Captain | T | S | T | T | T | — | S | S |
| Ex Rico 23 | — | S | — | T | T | ABG | — | T |
| Fleetwood 80 | T | S | T | T | T | ABGD | S | S |
| Neptune | T | — | T | T | T | S | T | T |
| Opal | T | — | T | T | T | AG | — | — |
| Sanilac | S | S | T | T | S | ABG | S | S |
| Seafarer 80 | S | S | T | T | T | ABGD | S | S |
| Swan Valley | T | S | T | T | T | BGD | T | T |
| Tall Bun-Yan | — | S | — | — | — | — | — | — |
| <u>Small White</u> | | | | | | | | |
| Aurora | — | S | T | T | T | BG | T | T |
| Zircon | T | S | T | T | T | — | T | — |
| <u>Great Northern</u> | | | | | | | | |
| Emerson ⁴ | S | T | T | T | T | — | — | — |
| Harris | S | T | T | T | T | — | — | — |
| <u>Small Red</u> | | | | | | | | |
| UI-37 | S | S | — | T | T | — | S | S |
| Garnet | S | S | — | T | T | — | — | — |
| UI-36 | S | S | — | T | T | BG | S | S |
| <u>Pink</u> | | | | | | | | |
| Viva | S | S | — | T | T | — | T | S |
| <u>Dark Red Kidney</u> | | | | | | | | |
| Montcalm | T | S | T | T | T | A | S | T |
| <u>Light Red Kidney</u> | | | | | | | | |
| Red Kloud | T | S | T | T | T | G | S | T |
| Ruddy | — | S | T | T | T | S | — | — |
| <u>Black Turtle Soup</u> | | | | | | | | |
| T 39 | T | S | T | T | T | G | T | T |
| Black Beauty | T | S | T | T | T | G | T | T |
| Black Magic | T | S | T | T | T | G | T | T |
| Domino | T | S | T | T | — | BGD | T | T |
| Ebony | T | S | S | T | T | — | T | S |
| Loop | — | S | — | — | — | — | — | — |
| Midnight ⁵ | T | S | S | T | T | BGD | T | T |

¹Most of these reactions are adapted from a survey of public and private bean researchers conducted by Dr. David Nuland, University of Nebraska, Scottsbluff. ²T=tolerant or resistant. S=susceptible. ³Resistant to A=alpha, B=beta, G=gamma, and D=delta races of anthracnose.

⁴Resistant to bacterial wilt. ⁵Resistant to pythium root rot.

FIELDPEA

Fieldpea is usually combine-harvested as mature, dry seed. The seed is sold 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, fieldpea usually is sown in a mixture with oat.

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. Released by Agriculture Canada, Ottawa. Licensed in 1960.

Paloma—Very high yield. Early. Very short. Large, cream-colored seed. Released by Cebeco-Handelsraad of The Netherlands.

VARIETIES NOT ADEQUATELY TESTED

Lenca—High yield. Medium to early. Long-vined. Medium size, cream-colored seed. Good cooking quality. Susceptible to powdery mildew. Released by Agriculture Canada, Morden, in 1979. Production of certified seed limited to Canada.

Marrowfat CEB 207—Very high yield. Early. Short. Very large, flat, dimpled, green seed. Released by Cebeco-Handelsraad of The Netherlands.

Miranda—Very high yield. Very early. Very short. Very large, cream-colored seed. Released by Cebeco-Handelsraad of The Netherlands. Variety protection pending.

OTHER VARIETIES

Maple—Medium to low 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.

Tara—High yield. Medium to early. Long-vined. Medium size, cream-colored seed. Satisfactory cooking quality, but irregular seed shape undesirable. Resistant to powdery mildew. Released by Agriculture Canada, Morden. Licensed in 1978. Production of certified seed limited to Canada.

Trapper—High yield. Medium to early. Medium vine length. Small, cream-colored seed. Good cooking quality. Released by Agriculture Canada, Morden. Licensed in 1970.

Table 15. Characteristics of fieldpea varieties

| Variety | Seed yield/acre (pounds) | | | Weight/ 100 seeds (grams) | Seed protein (percent) ¹ | Planting to | | Vine length (inches) |
|--------------------------------|--------------------------|-------------------------|----------------------|---------------------------------|---|-----------------|--------------------|----------------------------|
| | Becker 1977-78, 80-82 | Grand Rapids 1980-82 | Crookston 1980-82 | | | bloom (days) | maturity (days) | |
| Century | 1736 | 1913 | 2000 | 21.7 | 26.2 | 58 | 96 | 52 |
| Paloma | 2818 | 2703 | 2285 | 27.6 | 25.4 | 53 | 92 | 20 |
| Lenca ² | 2069 | 2232 | 2259 | 18.2 | 25.6 | 57 | 94 | 46 |
| Marrowfat CEB 207 ² | 3027 | 2689 ³ | — | 32.2 | 23.2 | 52 | 91 | 24 |
| Miranda ² | 3280 | 2734 | 2901 | 32.2 | 23.7 | 50 | 90 | 19 |
| Tara | 1886 | 2235 | 2225 | 19.1 | 24.8 | 58 | 94 | 47 |
| Trapper | 1817 | 2123 | 1773 | 13.3 | 26.1 | 55 | 95 | 45 |
| LSD 5% | 139 | 418 | 379 | | | | | |

¹Oven-dry. ²1981-82. ³1982.

FLAX

RECOMMENDED VARIETIES

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

Dufferin—High yield when sown early, *not recommended for late sowing*. Very late, brown seed, blue flowers, variable plant height. High oil percent. Resistant to rust and wilt. Licensed in 1975 by Agriculture Canada, Ottawa from a cross of Redwood 65 and FP 441.

Flor—High yield. Medium-maturity, brown seed, blue flowers. High oil percent and medium iodine value. Resistant to rust, moderately susceptible to wilt and pasmo. Avoid sowing on soil that grew flax during any of 3 previous years. Released in 1981 by North Dakota Agricultural Experiment Station from backcrossing Linott to Bison M³ and Bison P³.

Linott—High yield. Early, brown seed, blue flowers. High oil percent and iodine value. Resistant to rust (has a trace of susceptible plants), moderately susceptible to wilt and pasmo. Licensed in 1967 by Agriculture Canada, Ottawa, from crosses involving 770B, Argentine C, Arrow, and CI 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.



Flax is grown as both an early-planted and a late-planted crop. Flax in the early-planted trial at the left is flowering while that in the late-planted trial is still in the seedling stage. Agronomist E.A. Oelke.

OTHER VARIETIES

Culbert 79—High yield. Early, brown seed, blue flowers. High oil percent and high iodine value. Resistant to rust, moderately resistant to wilt, moderately susceptible to pasmo. Released in 1979 by South Dakota Agricultural Experiment Station as a selection of Culbert.

McGregor—High yield when sown early. Very late, brown seed, blue flowers. Very resistant to lodging. Medium in oil percent. Resistant to rust, moderately resistant to wilt, and susceptible to pasmo. Licensed in 1981 by Agriculture Canada, Ottawa from a cross of Redwood 65 and FP 539. Production of certified seed limited to Canada.

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.

Norlin—High yield. Medium maturity, brown seed, blue flowers. Medium oil percent and iodine value. Resistant to rust, moderately susceptible to wilt. Licensed in 1982 by Agriculture Canada, Ottawa from crosses involving Linott, Rocket, and Raja. Production of certified seed limited to Canada.

Wishek—High yield. Early, brown seed, blue flowers. High oil percent and iodine value. Resistant to rust, moderately susceptible to wilt and pasmo. Released in 1979 by North Dakota Agricultural Experiment Station from a cross of Koto and CI.1220B sel.

Table 16. Yields of flax varieties in bushels per acre, 1980-82

| Variety | Early-sown | | | | | | | Late-sown | | |
|------------|----------------------|-------------------|----------------------|--------------------|-------------------------|-----------------------|--------------------|------------------------|----------------|--------------------|
| | Lamberton 1980-82 | Morris 1980-82 | Crookston 1980-82 | Stephen 1980-82 | Grand Rapids 1980-82 | Roseau Co. 1980-82 | Average 1980-82 | Lamberton 1980-1982 | Morris 1982 | Average 1980-82 |
| Culbert | 25 | 32 | 17 | 15 | 21 | 15 | 21 | 18 | 19 | 20 |
| Dufferin | 25 | 37 | 19 | 16 | 21 | 17 | 22 | 9 | 32 | 15 |
| Flor | 23 | 34 | 19 | 16 | 23 | 17 | 21 | 14 | 27 | 17 |
| Linott | 23 | 33 | 16 | 15 | 22 | 18 | 21 | 15 | 28 | 18 |
| Norstar | 25 | 33 | 18 | 14 | 20 | 17 | 21 | 12 | 29 | 16 |
| Culbert 79 | 23 | 33 | 17 | 15 | 23 | 16 | 21 | 17 | 25 | 19 |
| McGregor | 25 | 32 | 18 | 17 | — | — | 21 | 14 | 31 | 18 |
| Norlin | 19 | 35 | 20 | 19 | — | — | 22 | 12 | 30 | 17 |
| Wishek | 23 | 32 | 20 | 16 | 21 | 18 | 21 | 16 | 27 | 18 |
| LSD 5% | 4 | 3 | 3 | 3 | 5 | 5 | 4 | 3 | 3 | 3 |

Table 17. Characteristics of flax varieties, 1979-82

| Variety | Days from sowing to | | Height (inches) | Lodging (score) ¹ | Pasmo (score) ¹ | Wilt (score) ¹ | Rust ² | Oil (percent) ³ |
|------------|---------------------|------------|--------------------|---------------------------------|-------------------------------|------------------------------|-------------------|-------------------------------|
| | first bloom | full bloom | | | | | | |
| Culbert | 49 | 54 | 22 | 2.8 | 2.4 | 1 | R | 40.6 |
| Dufferin | 54 | 60 | 25 | 3.3 | 4.7 | 2 | R | 41.0 |
| Flor | 52 | 57 | 22 | 3.5 | 3.9 | 6 | R | 40.5 |
| Linott | 49 | 54 | 23 | 3.0 | 4.5 | 5 | R | 40.2 |
| Norstar | 53 | 58 | 24 | 3.5 | 4.4 | 2 | MS | 40.2 |
| Culbert 79 | 49 | 54 | 22 | 3.1 | 2.9 | 1 | R | 40.8 |
| McGregor | 54 | 60 | 25 | 2.6 | 5.0 | 5 | R | 40.0 |
| Norlin | 51 | 57 | 23 | 3.5 | 3.0 | 5 | R | 40.0 |
| Wishek | 49 | 54 | 22 | 3.1 | 4.7 | 6 | R | 40.2 |

¹1 = best, 9 = poorest. ²R = resistant, MS = moderately susceptible. ³8 percent moisture basis.

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 may be 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 21 and June 4 at the rate of 150,000 seeds per acre in rows 30 inches apart. Sorghum was harvested when it was dry enough to combine but not dry enough to store without artificial drying. Consequently, these trials do not measure lodging that might occur during natural drying in the field. All hybrids were harvested the same day for relative moisture

comparisons. Hybrids in the table are ranked from earliest to latest based on head moisture at harvest.

Companies with hybrids in these trials include: Cargill Seed Division, Box 9300, Minneapolis, MN 55440; DeKalb-Pfizer Genetics, Box 225, Glenvil, NE 68941; Jacques Seed Co., Prescott, WI 54021; Northrup King Co., 1500 NE Jackson, Minneapolis, MN 55413; PAG Seeds, Box 9480, Minneapolis, MN 55440; Paymaster Seeds, Box 9493, Minneapolis, MN 55440; Pioneer Hi-Bred International Inc., 7000 Pioneer Parkway, Johnston, IA 50131; Pride Company, Glen Haven, WI 53810. Company reports indicate hybrids in the table that are resistant to greenbug biotype C (not E) include 1210, 22, J-150, P151GB, P508GB, 2250, DK-28, DK-38, and X-223.

Table 18. Characteristics of grain sorghum hybrids at Lamberton, 1977-82

| Hybrid and company | Grain yield/acre (pounds) ¹ | | Head moisture (percent) | | Test weight/ bushel (pounds) | Weight/ 100 seeds (grams) | Planting to heading (days) | Height (inches) |
|-----------------------------------|---|----------------|----------------------------|-----------|------------------------------------|---------------------------------|----------------------------------|--------------------|
| | 1982 | 1977-79, 81-82 | September 21 | October 7 | | | | |
| M1, Minnesota AES | 5267 | 4131 | 28.8 | 24.4 | 57.4 | 2.5 | 58 | 57 |
| 1040 ² , Northrup King | 5338 | — | 29.3 | 24.9 | 56.6 | 2.5 | 59 | 43 |
| RS 455, Minnesota AES | 5630 | 5255 | 32.9 | 26.1 | 57.4 | 2.7 | 62 | 58 |
| X-223 ² , DeKalb | 7193 | — | 33.2 | 28.1 | 58.7 | 2.6 | 63 | 47 |
| 894, Pioneer | 6091 | 5281 | 36.2 | 28.5 | 58.1 | 2.1 | 67 | 43 |
| 1210 ³ , Northrup King | 6272 | 5627 | 33.5 | 29.4 | 56.5 | 2.2 | 69 | 44 |
| P151GB ³ , Pride | 6530 | 5615 | 36.0 | 29.7 | 56.7 | 2.1 | 70 | 44 |
| 8790 ³ , Pioneer | 6067 | 5295 | 37.3 | 30.2 | 58.5 | 2.2 | 70 | 45 |
| R-920, Paymaster | 5594 | 5261 | 37.0 | 30.5 | 57.7 | 2.2 | 67 | 50 |
| J-101, Jacques | 5757 | 5422 | 39.1 | 30.8 | 57.8 | 2.4 | 68 | 47 |
| 1580, Northrup King | 6027 | 5581 | 39.9 | 30.9 | 58.5 | 2.4 | 72 | 49 |
| DK-28 ² , DeKalb | 6472 | — | 39.1 | 31.8 | 59.0 | 2.4 | 68 | 45 |
| P508GB ⁴ , Pride | 6382 | 5422 | 39.4 | 32.1 | 57.8 | 2.2 | 72 | 48 |
| 2250 ³ , PAG | 6200 | 5040 | 39.9 | 32.1 | 56.0 | 2.2 | 71 | 45 |
| DK-38 ³ , DeKalb | 6778 | 5291 | 39.0 | 33.4 | 55.4 | 2.0 | 74 | 57 |
| J-150 ³ , Jacques | 5758 | 5280 | 39.1 | 33.5 | 58.1 | 2.0 | 71 | 47 |
| 22 ² , Cargill | 5660 | — | 39.8 | 34.6 | 58.1 | 1.7 | 70 | 47 |
| R-930 ² , Paymaster | 6143 | — | 41.4 | 36.9 | 58.7 | 2.1 | 71 | 45 |
| LSD 5% | 786 | 342 | 3.4 | 1.3 | | | | |

¹Oven-dry. ²1982. ³1981-82. ⁴1978-79, 81-82.

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.

RECOMMENDED VARIETIES

FORAGE

Empire—Foxtail. Very late. Very tall. Poor lodging resistance. Very small, plump yellow seed of low test weight. Released by Agriculture Canada.

GRAIN

Cerise—Red proso. Very early. Medium height. Fair lodging resistance. Medium size, orange seed of high test weight. Released by Nebraska Agricultural Experiment Station in 1974.

Dawn—White proso. Very early. Short. Fair lodging resistance. Large, white seed of medium test weight. Released by Nebraska Agricultural Experiment Station in 1976.

Minco—White proso. Late. Medium height. Fair lodging resistance. Medium size, white seed of high test weight. Released by Minnesota Agricultural Experiment Station in 1976.

Minsum—White proso. Early. Medium height. Poor lodging resistance. Large, white seed of medium test weight. Open heads with long, spreading branches contrast with more compact heads of

other white proso varieties. Released by Minnesota Agricultural Experiment Station in 1980.

OTHER VARIETIES

Barnyard or Japanese—Forage. Late. Very tall. Very good lodging resistance. Medium size, gray seed of low test weight. High yielding forage millet but very coarse.

Cope—White proso. Late. Very tall. Fair lodging resistance. Large, white seed of medium test weight. Released by Colorado Agricultural Experiment Station in 1978.

German, German R, and German No. 8—Foxtail. Very late. Very tall. Good lodging resistance. Very small, yellow seed of low test weight. High forage yield but too late for good seed production.

Panhandle—White proso. Early. Medium height. Poor lodging resistance. Large, white seed of medium test weight. Lower yield than Minsum. Released by Nebraska Agricultural Experiment Station in 1967.

Sno-Fox—Foxtail. Late. Medium height. Poor lodging resistance. Small, white seed of medium test weight. Released by Nebraska Agricultural Experiment Station in 1980.

Turghai—Red proso. Very early. Medium height. Good lodging resistance. Medium size, orange seed of high test weight. Introduced from Russia by USDA in 1903.

Table 19. Yields of millet varieties in pounds per acre, 1980-82

| Type and variety | Grain ¹ | | | Forage ² | | |
|------------------|--------------------|--------|---------|---------------------|--------|---------|
| | Rosemount | Becker | Average | Rosemount | Becker | Average |
| Foxtail | | | | | | |
| Empire | 2335 | 1325 | 1830 | 10093 | 7013 | 8553 |
| Sno-Fox | 2265 | 790 | 1528 | 7735 | 2954 | 5345 |
| Proso | | | | | | |
| Dawn | 2432 | 1124 | 1778 | 5584 | 3415 | 4500 |
| Minco | 3021 | 1234 | 2128 | 7652 | 4113 | 5883 |
| Minsum | 2667 | 1448 | 2058 | 6735 | 4464 | 5600 |
| Cerise | 2998 | 1346 | 2172 | 7131 | 4473 | 5802 |
| LSD 5% | 301 | 185 | 177 | 506 | 501 | 356 |

¹10 percent moisture basis. ²Oven-dry including grain.

Table 20. Characteristics of millet varieties, two location average

| Type and variety | Planting to heading (days) | Planting to maturity (days) | Lodging (score) ¹ | Height (inches) | Weight/100 seeds (grams) | Test weight/bushel (pounds) |
|------------------|----------------------------|-----------------------------|------------------------------|-----------------|--------------------------|-----------------------------|
| Foxtail | | | | | | |
| Empire | 63 | 105 | 3.1 | 48 | .19 | 46.3 |
| Sno-Fox | 55 | 93 | 2.8 | 33 | .22 | 52.5 |
| Proso | | | | | | |
| Dawn | 45 | 74 | 3.6 | 27 | .66 | 51.8 |
| Minco | 48 | 89 | 3.4 | 40 | .67 | 54.4 |
| Minsum | 45 | 81 | 5.0 | 37 | .73 | 51.5 |
| Cerise | 43 | 73 | 3.4 | 39 | .57 | 56.1 |

¹1 = erect, 9 = flat.

OAT

The losses from oat smut in susceptible varieties increased greatly in recent years. Since the disease is primarily seed carried, seed of susceptible varieties should be treated with a chemical to control oat smut.

RECOMMENDED VARIETIES

Benson—Medium maturity, high yield, medium height, fair lodging resistance, medium test weight, high groat percent, medium protein percent, cream colored seed. Some resistance to crown rust, resistant to smut, some tolerance to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Portage and Burnett. Released in 1979. Seed sale regulated by U.S. Variety Protection Act.

Lyon—Medium-late maturity, high yield, tall, fair lodging resistance, high test weight and groat percent, medium protein percent, white seed. Some resistance to crown rust, resistant to smut, susceptible to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Lodi and Portage. Released in 1977.

Moore—Late, very high yield, tall, fair lodging resistance, high test weight and groat percent, low protein percent, white seed. Some resistance to crown rust and smut, some tolerance to red leaf. Selected at Minnesota Agricultural Experiment Station from a cross between Lodi and Mn 65B1286, a crown rust resistant selection. Released in 1979.

Noble—Early-medium maturity, medium yield, medium height, good lodging resistance, medium test weight, groat percent and protein percent, yellow seed. Susceptible to crown rust, resistant to smut, some tolerance to red leaf. Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1973. Seed sale regulated by U.S. Variety Protection Act.

Ogle—Medium maturity, very high yield, medium height, good lodging resistance, medium test weight, high groat percent, low protein percent, yellow seed. Susceptible to crown rust and smut, tolerant to red leaf. Selected at Illinois Agricultural Experiment Station from a cross of Brave, Tyler and Egdolon. Released in 1981.

Preston—Early maturity, medium yield and height, good lodging resistance, high test weight, groat percent and protein percent, ivory seed. Moderately resistant to crown rust, resistant to smut, some tolerance to red leaf. Selected at the Minnesota Agricultural Experiment Station from a cross between Dal and Otec. Released in 1982.

VARIETIES NOT ADEQUATELY TESTED

Porter—Late, very high yield, medium height, poor lodging resistance, medium test weight, groat percent and protein percent, ivory seed. Resistant to crown rust and smut, tolerant to red leaf.

Selected at Purdue Agricultural Experiment Station from a cross involving many lines. Released in 1981. Seed sale regulated by U.S. Variety Protection Act.

OTHER VARIETIES

Chief—Early-medium maturity, medium yield and height, fair lodging resistance, high test weight and groat percent, medium protein percent, yellow seed. Susceptible to crown rust, smut, and red leaf. 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 percent, high protein percent, ivory seed. Resistant to crown rust and smut, susceptible to red leaf. Selected at Wisconsin Agricultural Experiment Station from a cross involving Trispermia, Belar and Beedee. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

Iowa Early Multiline Blend (E73, E74, E76, and E77)—Early, low yield, medium height, good lodging resistance, high test weight and groat percent, medium protein percent, yellow seed. Heterogeneous crown rust reaction, susceptible to smut. The recurrent parent is CI 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 percent, medium protein percent, yellow seed. Heterogeneous reaction to crown rust, susceptible to smut and red leaf. The recurrent parent is CI 7555, a Clintland type. Developed at Iowa Agricultural Experiment Station and originally released in 1968.



Preston, Minnesota's newest oat variety, is an early maturing, companion crop for establishing alfalfa and other forage crops. Agronomists C.C. Sheaffer, forage specialist, and D.D. Stuthman, oat breeder.

Lancer—Early-medium maturity, high yield, medium height, good lodging resistance, high test weight, groat percent and protein percent, white seed. Susceptible to crown rust, smut, and red leaf. Selected at South Dakota Agricultural Experiment Station from a cross between Neal and Clintland 64. Released in 1979.

Lang—Early, high yield, short, good lodging resistance, medium test weight and groat percent, low protein percent, yellow seed. Susceptible to crown rust and smut. Tolerant to red leaf. Selected at Illinois Agricultural Experiment Station from a cross of Tyler and Orbit. Released in 1976.

Larry—Early, medium yield, short, good lodging resistance, high test weight, medium groat percent and protein percent, yellow seed. Susceptible to crown rust and smut. Tolerant to red leaf. Selected at Illinois Agricultural Experiment Station from a cross of Tyler, Egdolon and Orbit. Released in 1981.

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

Marathon—Late, high yield, tall, good lodging resistance, medium test weight, high groat percent and protein percent, ivory seed. Resistant to crown rust. Susceptible to smut and red leaf. Selected at Wisconsin Agricultural Experiment Station from a cross between Holden and a sister line of Dal. Released in 1979.

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

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

Table 21. Yield of oat varieties in bushels per acre, 1980-1982

| Variety | Rosemount | Waseca ¹ | Lamberton ² | Morris | Crookston ¹ | Grand Rapids | Stephen | Average 7 locations |
|----------------------|-----------|---------------------|------------------------|--------|------------------------|--------------|------------------|---------------------|
| Preston ¹ | 89 | 87 | 111 | 102 | 118 | 61 | 73 ³ | 92 |
| Larry | 81 | 83 | 121 | 103 | 135 | 57 | 85 ¹ | 95 |
| Noble | 81 | 79 | 115 | 110 | 130 | 55 | 82 | 93 |
| Lancer | 92 | 93 | 109 | 108 | 138 | 56 | 90 ⁴ | 98 |
| Ogle | 99 | 105 | 131 | 118 | 141 | 72 | 101 ¹ | 109 |
| Benson | 93 | 99 | 105 | 110 | 119 | 63 | 89 | 97 |
| Lyon | 88 | 91 | 120 | 109 | 132 | 56 | 93 | 98 |
| Moore | 95 | 98 | 111 | 122 | 132 | 68 | 106 | 104 |
| Porter ¹ | 90 | 93 | 113 | 113 | 134 | 82 | 120 ³ | 106 |
| LSD 5% | 8 | 11 | 13 | 9 | 11 | 7 | 9 | 4 |

¹1981-82. ²1980 and 1982. ³1982. ⁴1980-81.

Table 22. Characteristics of oat varieties, 1980-1982¹

| Variety | Heading (June) | Height (inches) | Lodging (score) ² | Test weight/bushel (pounds) | Groat (percent) | Protein percent ³ | | Protein/acre (pounds) | Reactions to disease ⁴ | |
|----------------------|----------------|-----------------|------------------------------|-----------------------------|-----------------|------------------------------|------|-----------------------|-----------------------------------|------|
| | | | | | | groat | seed | | crown rust | smut |
| Preston ⁵ | 23 | 39 | 2.3 | 39 | 76 | 20.6 | 15.5 | 452 | MR | R |
| Larry | 24 | 35 | 2.4 | 36 | 74 | 17.0 | 12.6 | 379 | S | S |
| Noble | 24 | 37 | 2.0 | 37 | 74 | 17.4 | 12.8 | 381 | S | HR |
| Lancer | 25 | 37 | 2.0 | 38 | 77 | 18.1 | 13.9 | 427 | MS | MS |
| Ogle | 26 | 37 | 2.1 | 36 | 76 | 15.5 | 11.8 | 407 | S | S |
| Benson | 26 | 40 | 2.7 | 37 | 76 | 17.8 | 13.4 | 410 | MR | R |
| Lyon | 26 | 42 | 2.6 | 36 | 76 | 18.1 | 13.8 | 424 | MR | HR |
| Moore | 28 | 41 | 2.7 | 38 | 77 | 16.4 | 12.6 | 410 | MR | MR |
| Porter ⁵ | 30 | 39 | 3.2 | 37 | 75 | 17.1 | 12.8 | 420 | MR | HR |

¹Does not include Stephen. ²1 = erect, 5 = flat. ³10 percent moisture. ⁴HR = highly resistant, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. ⁵1981-82.

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.

The varieties have been evaluated in pure stands. Therefore, performance may be different when a variety is grown in mixtures with other grasses and legumes.

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

Table 23. Characteristics of orchardgrass varieties with dry matter yields expressed as percentage of Hallmark at two locations, 1971-1981

| Variety | Developer or owner ¹ | Yield (percent of Hallmark) | | | Winter injury ² | | Rust reaction ³ |
|---------------------------|---|-----------------------------|------------|---------|----------------------------|------------|----------------------------|
| | | Grand Rapids | Rose-mount | Average | Grand Rapids | Rose-mount | |
| No. of trial years | | 10 | 9 | | | | |
| Early | | | | | | | |
| Boone | Kentucky Agr. Exp. Sta. ^a | 85 | 96 | 90 | — | 4.8 | MS |
| Chinook | Agr. Canada, Lethbridge ^a | 83 | 85 | 83 | — | 4.5 | — |
| Medium | | | | | | | |
| Able | Farmers Forage Res. Coop. ^c | 89 | 95 | 92 | 1.5 | 2.3 | MS |
| Comet | Northrup King Co. ^g | 97 | 99 | 98 | 4.1 | 3.3 | S |
| Dart | Land O'Lakes Inc. ^e | 102 | 99 | 101 | 1.5 | 3.0 | S |
| Dayton | Midland Coop. Inc. ^a | 94 | 101 | 97 | 2.7 | 5.0 | S |
| Frode | Swedish Seed Assoc. ^g | 94 | 92 | 92 | — | — | — |
| <i>Hallmark, ton/acre</i> | Farmers Forage Res. Coop. ^c | 3.4 | 3.9 | 3.6 | 2.2 | 4.8 | S |
| Hawk hybrid | North American Plant Breeders ^{dk} | 72 | 101 | 91 | 3.1 | — | MS |
| Ina | Ontario Agr. Coll., Guelph ^a | 90 | 89 | 89 | — | 3.3 | MS |
| Juno | Agr. Canada, Ottawa ^a | 100 | 100 | 100 | 1.7 | 4.7 | S |
| Napier | Rudy Patrick Co. ^{dhk} | 99 | 101 | 100 | 3.7 | 3.8 | MS |
| Potomac | USDA and Coop. State Exp. Sta. ^b | 88 | 89 | 87 | 1.7 | — | MS |
| Prime | Pride Seed Co. ^j | — | 84 | — | — | 8.3 | MS |
| Sterling | Iowa Agr. Exp. Sta. ^{chl} | 103 | 96 | 100 | 4.3 | 4.9 | S |
| Late | | | | | | | |
| Kay | Agr. Canada, Ottawa ^a | 92 | 89 | 91 | 3.7 | — | S |
| Majestic | Maple Leaf Mills, Inc. ^a | — | 91 | 91 | — | 3.0 | S |
| Orion | Northrup King Co. ^g | 88 | 107 | 98 | 8.1 | — | MR |
| LSD 5% | | 8 | 7 | 2 | | | |

¹1983 seed supplies and sources: a. not available or very limited, b. available from most sources, c. Cenex Coop. Inc., d. Field Seed Farms, e. Land O'Lakes, f. Lincoln Seed & Feed Co., g. Northrup King Co., h. PAG Seeds, i. Payco Seeds, j. Pride Seed Co., k. Ziller Seed Farms Inc., l. Werner Farm Seeds. ²1 = most damaged, 9 = least damaged. ³MR = moderately resistant, MS = moderately susceptible, S = susceptible.

RED CLOVER

Red clover can be seeded in pure stands or with timothy for hay or silage. It is more easily established in pasture renovation than either alfalfa or trefoil. Historically, winterhardy varieties have not persisted beyond two crop years because of susceptibility to crown rot and other diseases. Some of the new varieties may persist for 3

years. Red clover should not be seeded with alfalfa for hay because red clover seedlings are more aggressive than alfalfa seedlings and may prevent alfalfa from becoming established. Red clover is better adapted to acid soils than alfalfa, but where alfalfa can be grown successfully it will yield more than red clover.

Table 24. Average yields of red clover varieties expressed as percentage of Lakeland for all tests in Minnesota 1966-1979

| Variety | Developer or owner ¹ | Yield (percent of Lakeland) | | | | Stand 3 years after seeding (percent) |
|-----------------|--|-----------------------------|-----|-----|-------------|---------------------------------------|
| | | Year after seeding | | | Average | |
| | | 1 | 2 | 3 | 1st 2 years | |
| <i>Lakeland</i> | Wisconsin Agr. Exp. Sta. & USDA (tons/acre, 15% M) ^{acdjhkno} | 3.6 | 3.5 | 2.2 | 3.5 | 55 |
| Florex | Northrup King Co. ^e | 125 | 100 | 102 | 116 | — |
| Arlington | Wisconsin Agr. Exp. Sta. & USDA ^{adhjkno} | 118 | 105 | 100 | 113 | 85 |
| Prosper I | Pride Co. Inc. ⁱ | 113 | 105 | 106 | 111 | — |
| Dollard | Macdonald College, Canada ^m | 104 | 96 | 95 | 100 | 23 |
| Redman | Farmers Forage Res. Coop. ^{ad} | 98 | 100 | 97 | 99 | 70 |
| Redland | Illinois Agr. Exp. Sta. ^{bm} | 96 | 92 | 88 | 95 | 55 |
| Kenland | Kentucky Agr. Exp. Sta. & USDA ^l | 98 | 89 | 86 | 94 | 38 |
| Kenstar | Kentucky Agr. Exp. Sta. & USDA ^l | 90 | 100 | 97 | 93 | 63 |
| Pennscott | Pennsylvania Agr. Exp. Sta. ^l | 96 | 78 | 0 | 89 | 28 |
| Tensas | Louisiana Agr. Exp. Sta. ^l | 56 | 62 | 0 | 59 | 23 |

¹1983 seed suppliers: a. Cenex, b. Field Seed Farms, c. Interstate Seed and Grain Co., d. Land O'Lakes, Inc., e. Northrup King Co., f. Peterson-Biddick Co., g. Peterson Forage Seed Div., h. Premium Seed Co., i. Pride Co. Inc., j. The Sexauer Co., k. Werner Farm Seeds, Inc., l. not available or very limited, m. Ziller Seed Farms, Inc., n. Lincoln Seed & Feed Co., o. Ramy Seed Co.

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.

The varieties have been evaluated in pure stands. Therefore, performance may be different when a variety is grown in mixtures with other grasses and legumes.

Table 25. Dry matter yields of reed canarygrass varieties expressed as percentage of Rise at four locations and average for 1972-81

| Variety | Developer or owner ¹ | Lamberton | Grand Rapids | Morris | Rosemount | Average |
|----------------------|---------------------------------|-----------|--------------|--------|-----------|---------|
| No. of trial years | | 2 | 8 | 2 | 12 | |
| <i>Rise ton/acre</i> | Rudy Patrick Co. ^b | 2.9 | 4.2 | 3.2 | 4.6 | 4.4 |
| Flare | Land O'Lakes Inc. ^a | — | 99 | — | 101 | 100 |
| Frontier | Agr. Canada, Ottawa | 96 | 101 | 101 | 97 | 99 |
| Vantage | Iowa Agr. Exp. Sta. | 96 | 101 | 102 | 97 | 99 |
| LSD 5% | | 10 | 3 | 5 | 3 | 2 |

¹1983 seed supplies and sources: a. Land O'Lakes Inc., b. Interstate Seed & Grain.

SOYBEAN

Information on soybean 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 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 many of them.

PUBLICLY DEVELOPED VARIETIES

The data for all locations except Grand Rapids and Roseau are from replicated, combine-harvested plots. Data from these two locations are from smaller replicated, multiple-row nursery plots. Row spacings at Crookston, Grand Rapids, Moorhead and Roseau varied from 12 to 28 inches in various years. At all other locations the spacing was 30 inches. Seeding rate was about 10 viable seeds per foot of row in 30-inch rows and slightly less in narrower row spacings. The majority of the tests were planted from May 5 to May 30. However, at Lamberton and Waseca, certain tests were planted in late April and mid-June. The tests at Becker were irrigated.

Varieties are placed in three geographical groupings. Certain transitional varieties appear in more than one grouping. Comparisons should be made within groupings.

Data on maturity, lodging resistance, plant height, seed size, and seed quality in table 30 are from locations suited to particular maturity groups. Phytophthora reactions were determined by University of Minnesota's Department of Plant Pathology. Chlorosis scores were obtained from plantings on a high-lime soil near Lamberton. Protein and oil determinations were made on a Neotec GQA 41 Grain Analyzer.

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

RECOMMENDED VARIETIES

Clay—North central, central, and northern zones. Has given good yields and is outstanding for oil and protein in its maturity class. Highly susceptible to phytophthora. Developed by Minne-

sota Agricultural Experiment Station from a cross of Renville and Capital. Released in 1968.

Corsoy 79—Southern zone. Very similar to Corsoy, which has been the leading variety in Minnesota for several years, except that it is resistant to races 1, 2, 3, 6, 7, 8 and 9 of phytophthora. Developed by Illinois Agricultural Experiment Station by five backcrosses in which Corsoy was the recurrent parent and Lee 68 was the nonrecurrent source of phytophthora resistance. Released in 1979.

Evans—North central, central, and south central zones. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station from a cross of Merit and Harosoy. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

Hardin—Southern zone. Resistance to race 1 of phytophthora. Developed by Iowa Agricultural Experiment Station from two backcrosses in which Corsoy was the recurrent parent and Cutler 71 was the resistant, nonrecurrent parent. Released in 1980. Seed sale regulated by U.S. Variety Protection Act.



Agronomist P.J. Schaus drives the tractor while students J.C. Heindl and J.R. Schussler plant soybean seed.

Hodgson 78—South central and southern zones. Similar to Hodgson, except resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station by six backcrosses involving Hodgson as recurrent parent and Merit as the non-recurrent, phytophthora-resistant parent. Released in 1978. Seed sale regulated by U.S. Variety Protection Act.

McCall—Northern and North Central zones. High yield, tall and good lodging resistance in its maturity class. Susceptible to phytophthora. Developed by Minnesota Agricultural Experiment Station from crosses involving Acme, Chippewa, and Hark. Released in 1978.

Simpson—Central and south central zones. High yield with good lodging resistance. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station from a cross of Hodgson and Steele. Released in 1982. Seed sale regulated by U.S. Variety Protection Act.

Swift—South central and central zones. Very good tolerance to high-lime soils. Fair resistance to lodging. Susceptible to phytophthora. Developed by Minnesota Agricultural Experiment Station from crosses involving Lincoln, Richland, Capital, and Korean. Released in 1972.

Vickery—Southern Zone. Similar to Corsoy except that it is resistant to races 1, 2, 3, 5, 6, 7, 8 and 9 of phytophthora. Developed jointly by the Iowa and Ohio Agricultural Experiment Stations by three backcrosses in which Corsoy was the recurrent parent and Mack was the nonrecurrent source of phytophthora resistance. Released in 1978. Seed sale regulated by U.S. Variety Protection Act.

Weber—Southern zone. Similar to Corsoy in yield and lodging. Good tolerance to high lime soils. Susceptible to phytophthora rot. Developed by Iowa Agricultural Experiment Station from crosses involving Swift, Blackhawk, Harosoy, Lincoln and Ogden. Released in 1979. Seed sale regulated by U.S. Variety Protection Act.

VARIETIES NOT ADEQUATELY TESTED

BSR 201—Similar in maturity to Corsoy 79. Good resistance to brown stem rot and high yield potential. Resistant to race 1 of phytophthora. Suggested for fields where 75 percent or more of the plants had brown stem rot in previous years' soybean crops. Developed by Iowa Agricultural Experiment Station from a cross of Pride B216 and an Iowa experimental line with brown stem rot resistance. Released in 1982. Seed sale regulated by U.S. Variety Protection Act.

Lakota—Similar in maturity to Hodgson 78. Taller and lodges more than Hodgson 78. Resistant to chlorosis on high lime soils. Resistant to races 1 and 2 of phytophthora. Developed at Iowa Agricultural Experiment Station from crosses involving a number of parental strains. Released in 1981. Seed sale regulated by U.S. Variety Protection Act.

Maple Amber—Similar in maturity to Portage, about 6 days earlier than McCall. High percentage of oil and protein. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Ottawa from crosses involving Altona, Harosoy 63, and Holmberg 840-70-3. Licensed in 1982.

Maple Presto—About 10 days earlier than McCall. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Ottawa, from crosses involving Amsoy, Portage, and Holmberg 840-7-3. Licensed in 1979. Production of certified seed limited to Canada.

OTHER VARIETIES

Altona—Similar to McCall in maturity but yields less. Resistant to several races of phytophthora. Developed at University of Manitoba from a cross of PI 194654 and Flambeau. Released in 1966.

Coles—Taller, lodges more, and several days later than Hodgson. Susceptible to phytophthora. Developed at Iowa Agri-

cultural Experiment Station from crosses involving Hark, Provar, Magna, and Disoy. Released in 1976.

Corsoy—A leading variety in Minnesota for many years. Now largely superseded by its phytophthora-resistant backcross derivatives. Developed by Iowa Agricultural Experiment Station from a cross of Harosoy and Capital. Released in 1967.

Harcor—Similar to Corsoy in yield but later and lodges more. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada, Harrow, from crosses involving Corsoy and Harosoy 63. Licensed in 1975.

Harlon—Similar to Evans in yield but several days later and lodges more. Resistant to races 1 and 2 of phytophthora. Developed by Agriculture Canada from a cross of Blackhawk and Harosoy 63. Licensed in 1975.

Hodgson—A leading variety in south central Minnesota for several years. Now largely superseded by its phytophthora-resistant backcross derivative, Hodgson 78. Developed by Minnesota Agricultural Experiment Station from crosses involving Corsoy, Lincoln, Richland, and PI 180501. Released in 1974. Seed sale regulated by U.S. Variety Protection Act.

Maple Arrow—About 4 days later than McCall. Good resistance to lodging. Resistant to several races of phytophthora. Developed by Agriculture Canada, Ottawa, from a cross of Harosoy and Holmberg 840-7-3. Licensed in 1976.

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

Steele—Similar to Hodgson in maturity but yields less. Resistant to races 1 and 2 of phytophthora. Developed by Minnesota Agricultural Experiment Station from a cross of Blackhawk and Harosoy. Released in 1972.

Wells—Similar in maturity to Corsoy. Yields less than Corsoy, but has greater resistance to lodging. Resistant to races 1 and 2 of phytophthora. Developed by Indiana Agricultural Experiment Station from crosses involving Harosoy, Lincoln, Ogden, and Blackhawk. Released in 1972. Seed sale regulated by U.S. Variety Protection Act.

Wells II—Very similar to Wells except that it is resistant to races 1, 2, 3, 5, 6, 7, 8 and 9 of phytophthora. Developed by Indiana Agricultural Experiment Station by six backcrosses in which Wells was the recurrent parent and Arksoy was the nonrecurrent source of phytophthora resistance. Released in 1978. Seed sale regulated by U.S. Variety Protection Act.

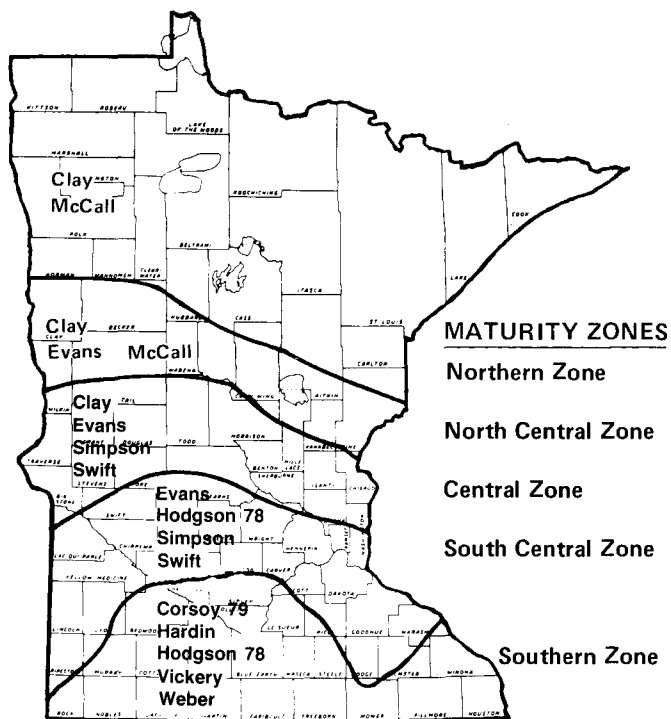
Wilkin—Similar to Clay in maturity. Excellent resistance to lodging. Resistant to races 1 and 2 of phytophthora. Good tolerance to high-lime soils. Developed at Minnesota Agricultural Experiment Station from a cross of Merit x Harosoy. Released in 1972.

PRIVATELY DEVELOPED VARIETIES

A group of varieties considered "early" by the companies submitting them was planted in replicated tests at Becker, Morris, and Rosemount in 1980, 1981, and 1982. A later group was planted at Fairmont, Lamberton, and Waseca in the same years. The test at Becker was irrigated.

The tests were planted in four-row plots, 12 feet long with 30-inch spacings between rows. There were three or four replications. Eight feet of each of the two interior rows were harvested for yield. Planting dates varied among years, but all trials were planted between May 5 and June 5. Seeding rate in all tests was about 10 viable seeds per foot of row.

Yields of the early group of varieties for 1982, 1981-82 and 1980-82 are given in table 31. Yields of the late group for the same periods are given in table 33. The varieties are arranged in two sections with the publicly developed varieties first and the privately developed varieties second. Each section is arranged alphabetically, according to company names.



Other characteristics for 1982 are given in tables 32 and 34 for the early and late groups, respectively. For several of the characteristics, an average is shown for the three locations of each group. The phytophthora reactions, chlorosis scores, and protein and oil determinations were obtained in a manner similar to the public varieties.

The companies entering varieties in the 1982 Minnesota tests and the brand names were: Agrigenetics Private Label Division, P.O. Drawer M, Plymouth, IN 46563 (Agrigenetics); Anderson Seeds, Route 1 Box 133, Dassel, MN 55325 (Andersons); Arrowhead Inc., West Hwy 212, Watertown, SD 57201 (Arrowhead);

Asgrow Seed Company, 7000 Portage Road, Kalamazoo, MI 49001 (Asgrow); Dairyland Seed Company, Inc., P.O. Box 958, 3570 Hwy. H, West Bend, WI 53095 (Dairyland); Pharmacy Seed Company, Route 2 Box 123, Dodge Center, MN 55927 (Pharmacy); Ferry-Morse Seed Co., P.O. Box 24, Geneseo IL 61254 (Gold Tag Brand); Funk Seeds International, 1300 West Washington St., Bloomington, IL 61701 (Funk); Hoffman Seed Farms, Inc., Route 1, Iowa Falls, IA 50126 (Hoffman); Hofler Seed Company Inc., Nora Springs, IA 50458 (Hofler); Hy-Vigor Seeds, Paullina, IA 51046 (Hy-Vigor); Jacques Seed Company, 720 St. Croix St., Prescott, WI 54021 (Jacques); Kaltenberg Seed Farms, Route 2, Waunakee, WI 53597 (Kaltenberg Seeds); Kruger Seed Company, Hwy. 57 West, P.O. Box 807, Cedar Falls, IA 50613 (Kruger, DeSoy); Land O'Lakes, Inc., Minneapolis, MN 55413 (SoyGro); Latham Seed Company, Route 1, Alexander, IA 50420 (Latham); Land O'Lakes—Midland, P.O. Box 1395, Minneapolis, MN 55440 (HC); Lynnville Seed Company, Lynnville, IA 50153 (Riverside); Midwest Oilseeds, Inc., Route 3, Box 204, Adel, IA 50003 (Midwest Oilseeds); Mogensen Seed Farm, Route 1, Trimont, MN 56176 (Morgensen Seed Farm); Agripro—Division of North American Plant Breeders, Hwy 30 East, Ames, IA 50010 (Agripro); Migro—Division of North American Plant Breeders, P.O. Box 2955, Mission, KS 66201 (Migro); Northrup King Company, 4124 Quebec Ave. North, New Hope, MN 55427 (Northrup King); Paymaster Seeds, P.O. Box 9493, Minneapolis, MN 55440 (Paymaster Seeds); DeKalb-Pfizer Genetics, P.O. Box 166, Olivia, MN 56277 (Pfizer Genetics, Inc.); Pine Grove Farm, Marcus, IA 51035 (Pine Grove Farm); Pioneer Hi-Bred International, Inc., Soybean Seed Division, 3261 West Airline Hwy, Waterloo, IA 50701 (Pioneer Brand); Pride Company, Inc., Route 1, Box 58, Glen Haven, WI 53810 (Pride); Profiseed Inc., Route 2, Hampton, IA 50441 (Profiseed); The J. C. Robinson Seed Company, Waterloo, NE 68069 (Golden Harvest); Sand Seed Service, Inc., P.O. Box 648, Marcus, IA 50135 (Soi); Schettler Seeds, Inc., 626 North Court, Carrol, IA 51401 (Schettler); Soybean Research Foundation, Inc., 115 North Perry, Mason City, IL 62664 (SRF); Stamer Seed and Grain, Route 3, Hector, MN 55342 (Stamer Brand); Stine Seed Farm, Inc., Route 3, Box 204, Adel, IA 50003 (Stine); Willette Seed Farm, Inc., Delavan, Mn 56023 (Willette, Wilsoy).

Table 26. Yields of publicly-developed soybean varieties in northern Minnesota in bushels per acre

| Variety | Crookston 1981-82 | Grand Rapids 1980-82 | Moorhead 1981-82 | Morris 1980-82 | Roseau 1980-82 |
|--------------|----------------------|----------------------------|---------------------|-------------------|-------------------|
| Clay | 30 | 33 | 35 | 30 | 26 |
| Evans | — | — | 38 | 34 | — |
| Maple Amber | 26 | 32 | 31 | — | 25 |
| Maple Arrow | 26 | 37 | 32 | 25 | 30 |
| Maple Presto | 26 | 25 | — | — | 19 |
| McCall | 33 | 37 | 34 | 28 | 36 |
| Portage | — | 31 | — | — | 25 |
| Simpson | — | — | 36 | 37 | — |
| LSD 5% | 6 | 4 | 3 | 2 | 5 |

Table 27. Yields of publicly-developed soybean varieties in central Minnesota in bushels per acre

| Variety | Becker 1980-82 | Morris 1980-82 | Rosemount 1980-82 | St. Paul 1980-82 | Average 12 trials |
|------------|-------------------|-------------------|----------------------|---------------------|----------------------|
| Clay | 43 | 30 | 33 | 35 | 35 |
| Evans | 48 | 34 | 38 | 41 | 40 |
| Hodgson 78 | 50 | 35 | 41 | 42 | 42 |
| Simpson | 49 | 37 | 42 | 42 | 43 |
| Swift | 44 | 35 | 37 | 40 | 39 |
| LSD 5% | 5 | 2 | 3 | 2 | 1 |

Table 28. Yields of publicly-developed soybean varieties in southern Minnesota in bushels per acre

| Variety | Lamberton | | | Waseca | | | Fairmont | Average Mid-May 30-inch rows 8 trials |
|------------|-----------------------------------|--------------------------------|---------------------------------|-----------------------------------|--------------------------------|---------------------------------|-----------------------------------|--|
| | Late April planting 1980-82 | Mid-May planting 1980-82 | Mid-June planting 1981-82 | Late April planting 1980-82 | Mid-May planting 1980-82 | Mid-June planting 1980-82 | Mid-May planting 1980, 1982 | |
| Clay | — | — | 38 | — | — | 31 | — | — |
| Corsoy 79 | 52 | 49 | 43 | 41 | 47 | 35 | 52 | 49 |
| Evans | — | 40 | 40 | — | 47 | 35 | 47 | 44 |
| Hardin | 48 | 48 | — | 44 | 51 | — | 53 | 50 |
| Hodgson 78 | 45 | 46 | 47 | 39 | 48 | 36 | 53 | 49 |
| Lakota | 45 | 42 | — | 42 | 42 | — | 49 | 45 |
| McCall | — | — | 40 | — | — | 33 | — | — |
| Simpson | — | 42 | — | — | 47 | — | 53 | 47 |
| Swift | — | 42 | 42 | — | 44 | 31 | 47 | 44 |
| Vickery | 50 | 49 | 44 | 43 | 48 | 35 | 52 | 49 |
| Weber | 49 | 48 | 42 | 40 | 46 | 36 | 52 | 48 |
| LSD 5% | 3 | 2 | 3 | 3 | 2 | 2 | 4 | 1 |

Table 29. Yields of publicly-developed soybean varieties in 10-inch and 30-inch row spacings in southern Minnesota in bushels per acre planted in mid-May, 1982

| Variety | Lamberton | | Waseca | | Average | |
|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 10-inch row | 30-inch row | 10-inch row | 30-inch row | 10-inch row | 30-inch row |
| BSR 201 | 56 | 50 | 37 | 33 | 46 | 41 |
| Corsoy 79 | 49 | 50 | 34 | 34 | 41 | 42 |
| Gnome | 44 | 50 | 27 | 29 | 36 | 39 |
| Hardin | 51 | 51 | 40 | 38 | 46 | 45 |
| Hodgson 78 | 43 | 43 | 33 | 33 | 38 | 38 |
| Lakota | 42 | 40 | 30 | 31 | 36 | 36 |
| Vickery | 49 | 51 | 35 | 34 | 42 | 43 |
| Weber | 45 | 46 | 34 | 33 | 39 | 39 |
| LSD 5% | 7 | 7 | 5 | 5 | 4 | 4 |

Table 30. Characteristics of publicly-developed varieties

| Variety | Mature | | Lodging (score) ¹ | Height (inches) | Weight/ 100 seeds (grams) | Seed quality (score) ¹ | Protein (percent) ² | Oil (percent) ² | Phytoph- thora (reaction) ³ | Chlorosis (score) ¹ |
|---------------------------|--|----------------------|---------------------------------|--------------------|---------------------------------|---|-----------------------------------|-------------------------------|--|-----------------------------------|
| | Mid-May planting (days after August 31) | Mid-June planting | | | | | | | | |
| Northern Minnesota | | | | | | | | | | |
| Clay | 20 | — | 1.4 | 27 | 17.1 | 3.0 | 42.0 | 19.0 | S | 1.8 |
| Evans | 26 | — | 1.6 | 30 | 17.2 | 2.4 | 41.4 | 20.1 | R | 1.8 |
| Maple Amber | 10 | — | 1.2 | 26 | 16.2 | 2.5 | 43.5 | 19.4 | R | 2.4 |
| Maple Arrow | 20 | — | 1.7 | 31 | 17.2 | 2.7 | 41.9 | 18.7 | R | 2.7 |
| Maple Presto | 3 | — | 1.0 | 22 | 17.3 | 3.0 | 40.6 | 18.1 | R | 2.6 |
| McCall | 16 | — | 1.4 | 30 | 15.1 | 2.3 | 41.3 | 18.3 | S | 2.1 |
| Portage | 10 | — | 1.1 | 28 | 17.8 | 2.4 | 40.8 | 16.9 | S | 1.5 |
| Simpson | 29 | — | 1.5 | 29 | 16.8 | 2.3 | 41.1 | 19.2 | R | 2.2 |
| Central Minnesota | | | | | | | | | | |
| Clay | 9 | — | 2.2 | 29 | 17.7 | 2.9 | 40.9 | 21.1 | S | 1.8 |
| Corsoy 79 | 35 | — | 2.6 | 42 | 16.2 | 2.2 | 40.3 | 19.5 | R | 3.7 |
| Evans | 15 | — | 2.4 | 36 | 16.8 | 2.7 | 40.4 | 20.2 | R | 1.8 |
| Hardin | 30 | — | 2.7 | 41 | 16.0 | 2.2 | 39.7 | 19.6 | R | 1.8 |
| Hodgson 78 | 26 | — | 2.8 | 38 | 17.4 | 2.2 | 40.3 | 20.0 | R | 2.1 |
| Lakota | 28 | — | 3.5 | 44 | 16.4 | 2.5 | 41.2 | 19.2 | R | 2.0 |
| Simpson | 21 | — | 2.0 | 35 | 16.1 | 2.6 | 40.4 | 20.0 | R | 2.2 |
| Swift | 22 | — | 3.2 | 40 | 17.4 | 2.6 | 39.7 | 20.1 | S | 1.1 |
| Vickery | 35 | — | 2.9 | 41 | 15.9 | 2.3 | 40.6 | 18.7 | R | 3.4 |
| Weber | 30 | — | 2.4 | 38 | 14.2 | 1.9 | 39.9 | 19.9 | S | 1.1 |

Table 30 (continued). Characteristics of publicly-developed varieties

| Variety | Mature | | Lodging (score) ¹ | Height (inches) | Weight/100 seeds (grams) | Seed quality (score) ¹ | Protein (percent) ² | Oil (percent) ² | Phytophthora (reaction) ³ | Chlorosis (score) ¹ |
|--------------------|---|--|------------------------------|-----------------|--------------------------|-----------------------------------|--------------------------------|----------------------------|--------------------------------------|--------------------------------|
| | Mid-May planting (days after August 31) | Mid-June planting (days after August 31) | | | | | | | | |
| Southern Minnesota | | | | | | | | | | |
| BSR 201 | 29 | — | 2.5 | 36 | 16.2 | 2.3 | 39.8 | 19.8 | R | 3.5 |
| Clay | — | 20 | 1.6 | 27 | 17.4 | 2.7 | 41.0 | 19.3 | S | 1.8 |
| Corsoy 79 | 26 | 37 | 2.6 | 42 | 16.2 | 2.2 | 40.3 | 19.5 | R | 3.7 |
| Evans | 10 | 26 | 1.8 | 34 | 17.0 | 2.2 | 39.0 | 21.1 | R | 1.8 |
| Gnome | 32 | — | 1.5 | 28 | 17.1 | 1.8 | 42.2 | 17.5 | S | 1.6 |
| Hardin | 23 | — | 2.7 | 41 | 16.0 | 2.2 | 39.7 | 19.6 | R | 1.8 |
| Hodgson 78 | 18 | 31 | 2.0 | 36 | 16.5 | 2.6 | 39.2 | 20.6 | R | 2.1 |
| Lakota | 20 | — | 3.5 | 44 | 16.4 | 2.5 | 41.2 | 19.2 | R | 2.0 |
| McCall | — | 19 | 1.6 | 38 | 15.9 | 2.6 | 41.2 | 18.1 | S | 2.1 |
| Swift | 22 | 28 | 2.5 | 35 | 16.4 | 2.2 | 38.2 | 19.9 | S | 1.1 |
| Vickery | 25 | 37 | 2.9 | 41 | 15.9 | 2.3 | 40.6 | 18.7 | R | 3.4 |
| Weber | 22 | 33 | 2.4 | 38 | 14.2 | 1.9 | 39.9 | 19.9 | S | 1.1 |

¹1 = excellent, 5 = very poor. ²Moisture-free. ³R = resistant, S = susceptible.

Table 31. Yields of private soybean varieties in bushels per acre, early group, 1980-82

| Variety or number | Brand | 1982 | | | | 1981 | 1981-82 | 1980 | 1980-82 |
|-------------------|----------------------|--------|--------|-----------|---------|---------|---------|---------|---------|
| | | Becker | Morris | Rosemount | Average | Average | Average | Average | Average |
| Evans | | 48 | 31 | 36 | 39 | 43 | 41 | 43 | 41 |
| Hodgson 78 | | 49 | 35 | 41 | 42 | 47 | 44 | 45 | 45 |
| Simpson | | 46 | 36 | 43 | 42 | — | — | — | — |
| Swift | | 43 | 31 | 39 | 38 | 44 | 41 | 42 | 41 |
| 108 | Andersons | 44 | 29 | 39 | 38 | — | — | — | — |
| 109 | Andersons | 52 | 31 | 40 | 43 | — | — | — | — |
| 9010 | Arrowhead | 40 | 27 | 31 | 33 | — | — | — | — |
| 9144 | Arrowhead | 41 | 27 | 32 | 34 | 44 | 39 | — | — |
| A1179 | Asgrow | 45 | 31 | 35 | 38 | 43 | 40 | — | — |
| DSR-120 | Dairyland | 48 | 37 | 39 | 42 | 46 | 43 | 43 | 43 |
| Enterprise | Farmacy | 42 | 30 | 32 | 36 | — | — | — | — |
| Butler | Hy-Vigor | 40 | 33 | 37 | 37 | — | — | — | — |
| J78-1514 | Jacques | 50 | 33 | 36 | 41 | — | — | — | — |
| J77-1633 | Jacques | 51 | 29 | 37 | 40 | — | — | — | — |
| K199 | Kruger | 34 | 29 | 39 | 34 | — | — | — | — |
| 299 | DeSoy | 49 | 31 | 39 | 40 | — | — | — | — |
| L4503 | SoyGro | 48 | 34 | 40 | 41 | 46 | 43 | — | — |
| L4504 | SoyGro | 50 | 33 | 39 | 41 | 47 | 43 | 48 | 45 |
| 800 | HC (Midland) | 44 | 32 | 40 | 39 | 45 | 42 | 43 | 42 |
| 1350 | Midwest Oilseeds | 45 | 34 | 37 | 39 | — | — | — | — |
| 0300 | Midwest Oilseeds | 43 | 30 | 35 | 37 | — | — | — | — |
| MSF 110 | Mogensen Seed Farm | 43 | 27 | 32 | 35 | — | — | — | — |
| MSF 220 | Mogensen Seed Farm | 49 | 30 | 37 | 40 | — | — | — | — |
| AP10 | Agripro | 46 | 31 | 39 | 39 | 49 | 44 | 47 | 45 |
| AP120 | Agripro | 49 | 31 | 33 | 39 | — | — | — | — |
| S09-90 | Northrup King | 47 | 32 | 39 | 40 | 46 | 43 | — | — |
| X701043 | Northrup King | 52 | 36 | 39 | 44 | — | — | — | — |
| 101 | Paymaster Seeds | 44 | 32 | 39 | 39 | 44 | 44 | 43 | 42 |
| CX282 | Pfizer Genetics Inc. | 37 | 32 | 33 | 34 | 42 | 38 | 42 | 39 |
| EC1105 | Pfizer Genetics Inc. | 33 | 30 | 34 | 33 | — | — | — | — |
| B070 | Pride | 43 | 30 | 35 | 37 | 41 | 38 | — | — |
| B152 | Pride | 53 | 33 | 48 | 45 | — | — | — | — |
| 1004 | ProfiSeed | 45 | 33 | 38 | 39 | — | — | — | — |
| H1180 | Golden Harvest | 48 | 31 | 34 | 39 | — | — | — | — |
| SRF101 | SRF | 48 | 35 | 41 | 42 | — | — | — | — |
| 1100 | Stine | 45 | 33 | 36 | 39 | 45 | 42 | — | — |
| LSD 5% | | 7 | 4 | 5 | 3 | 3 | 2 | 4 | 2 |

Table 32. Characteristics of private soybean varieties, early group, average Becker, Morris, and Rosemount, 1982

| Variety or number | Brand | Mature (days after August 31) Type | Lodging (score) ² | Height (inches) | Weight/ 100 seeds (grams) | Seed quality (score) ² | Protein (percent) ³ | Oil (percent) | Phytoph- thora (reaction) ⁴ | Chlorosis (score) ² | |
|-------------------------|----------------------|---|---------------------------------|--------------------|---------------------------------|---|-----------------------------------|------------------|--|-----------------------------------|---|
| | | | | | | | | | | | |
| Evans | | P | 20 | 2.4 | 40 | 15.6 | 2.7 | 39.3 | 19.8 | R | 2 |
| Hodgson 78 | | P | 26 | 3.0 | 41 | 16.0 | 2.5 | 39.9 | 19.0 | R | 2 |
| Simpson | | P | 22 | 2.4 | 36 | 15.8 | 2.8 | 39.8 | 18.4 | R | 3 |
| Swift | | P | 22 | 3.3 | 42 | 15.5 | 3.2 | 39.6 | 18.8 | S | 1 |
| 108 | Andersons | B | 30 | 3.0 | 42 | 15.8 | 2.9 | 40.5 | 18.0 | R | 3 |
| 109 | Andersons | B | 34 | 3.6 | 47 | 14.6 | 3.4 | 40.7 | 17.3 | R | 3 |
| 9010 | Arrowhead | P | 12 | 2.2 | 36 | 13.8 | 3.3 | 40.8 | 19.3 | S | 2 |
| 9144 | Arrowhead | P | 19 | 2.4 | 35 | 15.2 | 3.2 | 39.8 | 19.3 | S | 2 |
| A1179 | Asgrow | P | 25 | 2.1 | 41 | 15.9 | 3.2 | 40.7 | 19.2 | R | 2 |
| DSR-120 | Dairyland | P | 25 | 2.0 | 37 | 17.8 | 3.0 | 43.0 | 18.8 | S | 2 |
| Enterprise | Farmacy | P | 27 | 2.8 | 41 | 16.9 | 2.9 | 41.0 | 18.1 | R | 2 |
| Butler | Hy-Vigor | P | 28 | 2.8 | 37 | 17.5 | 3.4 | 41.4 | 18.3 | M | 2 |
| J78-1514 | Jacques | P | 17 | 2.3 | 40 | 15.3 | 3.1 | 41.7 | 16.8 | S | 2 |
| J77-1633 | Jacques | P | 29 | 3.0 | 42 | 15.5 | 3.1 | 41.7 | 17.3 | S | 2 |
| K1199 | Kruger | P | 31 | 2.8 | 40 | 18.5 | 3.2 | 42.9 | 18.4 | S | 2 |
| 299 | DeSoy | B | 31 | 3.0 | 41 | 15.4 | 3.1 | 41.0 | 17.0 | R | 2 |
| L4503 | SoyGro | P | 27 | 3.2 | 35 | 19.0 | 3.6 | 41.5 | 18.2 | M | 2 |
| L4504 | SoyGro | P | 26 | 2.6 | 36 | 19.5 | 3.7 | 41.4 | 18.2 | R | 3 |
| 800 | HC (midland) | B | 19 | 2.6 | 40 | 16.5 | 2.9 | 39.6 | 19.7 | R | 3 |
| 1350 | Midwest Oilseeds | P | 30 | 2.4 | 35 | 17.0 | 3.3 | 42.7 | 17.4 | S | 2 |
| 0300 | Midwest Oilseeds | P | 22 | 2.0 | 35 | 16.6 | 4.1 | 42.6 | 18.4 | R | 2 |
| MSF 110 | Mogensen Seed Farm | P | 12 | 2.5 | 36 | 14.4 | 2.1 | 40.8 | 20.3 | S | 2 |
| MSF 220 | Mogensen Seed Farm | P | 25 | 2.1 | 39 | 16.0 | 3.6 | 40.4 | 19.1 | R | 2 |
| AP10 | Agripro | P | 27 | 2.9 | 41 | 16.8 | 2.7 | 42.3 | 17.6 | R | 2 |
| AP120 | Agripro | P | 22 | 2.5 | 38 | 17.1 | 3.6 | 41.4 | 18.2 | S | 2 |
| S09-90 | Northrup King | P | 24 | 2.4 | 41 | 16.8 | 3.7 | 39.0 | 16.8 | R | 2 |
| X701043 | Northrup King | P | 27 | 2.6 | 37 | 16.5 | 2.9 | 42.2 | 17.6 | S | 2 |
| 101 | Paymaster Seeds | P | 27 | 2.8 | 45 | 16.1 | 3.3 | 41.1 | 18.6 | R | 2 |
| CX282 | Pfizer Genetics Inc. | P | 23 | 2.5 | 41 | 16.5 | 3.1 | 41.6 | 18.9 | S | 2 |
| EC1105 | Pfizer Genetics Inc. | P | 27 | 3.2 | 42 | 17.0 | 2.8 | 40.4 | 17.4 | R | 2 |
| B070 | Pride | P | 20 | 2.9 | 39 | 14.8 | 2.7 | 42.0 | 18.8 | R | 3 |
| B152 | Pride | P | 28 | 2.3 | 38 | 16.8 | 3.1 | 38.8 | 18.4 | R | 2 |
| 1004 | ProfiSeed | P | 29 | 2.8 | 35 | 18.3 | 3.6 | 41.5 | 17.5 | R | 2 |
| H1180 | Golden Harvest | B | 30 | 2.8 | 40 | 17.1 | 3.6 | 40.5 | 19.2 | M | 2 |
| SRF101 | SRF | P | 25 | 2.2 | 38 | 15.0 | 2.7 | 41.5 | 18.1 | S | 4 |
| 1100 | Stine | P | 27 | 3.1 | 42 | 17.1 | 2.7 | 41.3 | 18.2 | R | 2 |

¹P = pure line, B = blend. ²1 = excellent, 5 = very poor. ³Moisture-free. ⁴R = resistant, S = susceptible, M = mixture of R and S.

Table 33. Yields of private soybean varieties in bushels per acre, late group, 1980-82

| Variety or number | Brand | 1982 | | | | 1981 Average | 1981-82 Average | 1980 Average | 1980-82 Average |
|-------------------------|--------------|----------|-----------|-----------|---------|-----------------|--------------------|-----------------|--------------------|
| | | Fairmont | Lamberton | Rosemount | Average | | | | |
| Corsoy 79 | | 55 | 48 | 38 | 47 | | | | |
| Hodgson 78 | | 53 | 41 | 41 | 45 | 51 | 48 | 49 | 48 |
| Vickery | | 49 | 55 | 41 | 48 | 53 | 50 | 51 | 51 |
| Weber | | 56 | 54 | 39 | 50 | 54 | 51 | 49 | 51 |
| 1101A | Agrigenetics | 54 | 52 | 38 | 48 | — | — | — | — |
| 1102A | Agrigenetics | 45 | 48 | 35 | 43 | — | — | — | — |
| 2188 | Arrowhead | 53 | 46 | 38 | 46 | — | — | — | — |
| 8155 | Arrowhead | 51 | 52 | 39 | 48 | 51 | — | — | — |
| A1564 | Asgrow | 50 | 45 | 38 | 44 | 51 | 47 | — | — |
| A1937 | Asgrow | 56 | 53 | 45 | 51 | 54 | 52 | — | — |
| A2575 | Asgrow | 49 | 51 | 34 | 45 | 52 | 48 | 47 | 47 |
| DSR-141 | Dairyland | 50 | 46 | 39 | 45 | 49 | 47 | 45 | 46 |
| DSR-171 | Dairyland | 47 | 51 | 39 | 45 | 54 | 49 | 47 | 48 |
| DSR-207 | Dairyland | 48 | 49 | 35 | 44 | 56 | 49 | 50 | 49 |
| Abel | Farmacy | 52 | 55 | 41 | 50 | 55 | 52 | — | — |
| Eve II | Farmacy | 53 | 51 | 41 | 49 | — | — | — | — |

Table 33 (continued). Yields of private soybean varieties in bushels per acre, late group, 1980-82

| Variety or number | Brand | 1982 | | | | 1981 Average | 1981-82 Average | 1980 Average | 1980-82 Average |
|-------------------------|----------------------|----------|-----------|-----------|---------|-----------------|--------------------|-----------------|--------------------|
| | | Fairmont | Lamberton | Rosemount | Average | | | | |
| GT1170 | Gold Tag Brand | 52 | 48 | 37 | 46 | — | — | — | — |
| 11215 | Funk | 49 | 51 | 38 | 46 | — | — | — | — |
| G-3236 | Funk | 48 | 52 | 34 | 44 | 51 | 47 | 44 | 46 |
| 7800 | Hoffman | 54 | 51 | 37 | 47 | 54 | 50 | 47 | 49 |
| 8001 | Hoffman | 50 | 53 | 36 | 46 | 58 | 51 | — | — |
| Star | Hofler | 51 | 46 | 35 | 44 | — | — | — | — |
| Jade | Hofler | 53 | 48 | 44 | 48 | — | — | — | — |
| Rowtunda | Hy-Vigor | 53 | 51 | 37 | 47 | 55 | 50 | 51 | 51 |
| 1198 | Hy-Vigor | 45 | 46 | 33 | 41 | — | — | — | — |
| J102A | Jacques | 57 | 55 | 40 | 51 | 54 | 52 | 49 | 52 |
| J103 | Jacques | 57 | 56 | 39 | 51 | 57 | 53 | — | — |
| KB212 | Kaltenberg Seeds | 52 | 47 | 39 | 46 | — | — | — | — |
| KB231 | Kaltenberg Seeds | 61 | 51 | 43 | 52 | — | — | — | — |
| KB212C | Kruger | 56 | 55 | 38 | 50 | — | — | — | — |
| 302A | DeSoy | 54 | 53 | 37 | 48 | 55 | 51 | 53 | 52 |
| L4303 | SoyGro | 47 | 50 | 38 | 45 | 54 | 49 | — | — |
| L4404 | SoyGro | 55 | 51 | 39 | 48 | 49 | 49 | 52 | 50 |
| 300 | Latham | 53 | 53 | 39 | 49 | 51 | 50 | 47 | 49 |
| 350 | Latham | 50 | 46 | 39 | 45 | — | — | — | — |
| 500 | Latham | 52 | 49 | 40 | 47 | 56 | 51 | — | — |
| 4042 | Riverside | 51 | 52 | 38 | 47 | 56 | 51 | — | — |
| 4044 | Riverside | 52 | 53 | 36 | 47 | — | — | — | — |
| 1350 | Midwest Oilseeds | 50 | 48 | 42 | 47 | — | — | — | — |
| 2100A | Midwest Oilseeds | 51 | 49 | 31 | 44 | 53 | 48 | — | — |
| MSF350 | Mogensen Seed Farm | 50 | 49 | 41 | 47 | — | — | — | — |
| MSF440 | Mogensen Seed Farm | 51 | 50 | 39 | 47 | — | — | 48 | 47 |
| AP10 | Agripro | 54 | 45 | 42 | 47 | 52 | 49 | 47 | 48 |
| AP200 | Agripro | 55 | 55 | 40 | 50 | 57 | 53 | 47 | 51 |
| HP20-20 | Migro | 54 | 53 | 43 | 50 | 55 | 52 | 49 | 51 |
| S1346 | Northrup King | 55 | 48 | 42 | 48 | 52 | 50 | 46 | 48 |
| S1492 | Northrup King | 50 | 53 | 38 | 47 | 57 | 51 | — | — |
| S1884 | Northrup King | 57 | 51 | 38 | 49 | — | — | — | — |
| 201 | Paymaster Seeds | 50 | 54 | 37 | 47 | 58 | 51 | 48 | 50 |
| 251 | Paymaster Seeds | 51 | 48 | 42 | 47 | 51 | 49 | — | — |
| CB151P | Pfizer Genetics Inc. | 56 | 54 | 42 | 50 | 53 | 51 | 53 | 52 |
| CX155 | Pfizer Genetics Inc. | 56 | 51 | 34 | 47 | 56 | 51 | 48 | 50 |
| B-211 | Pine Grove Farm | 50 | 49 | 39 | 46 | — | — | — | — |
| P-2191 | Pine Grove Farm | 52 | 50 | 42 | 48 | — | — | — | — |
| 9220 | Pioneer Brand | 54 | 47 | 39 | 47 | — | — | — | — |
| B203 | Pride | 51 | 50 | 39 | 47 | — | — | — | — |
| B216 | Pride | 60 | 55 | 41 | 52 | 52 | 52 | 54 | 53 |
| 1138 | ProfiSeed | 57 | 53 | 39 | 50 | — | — | — | — |
| 1280 | ProfiSeed | 46 | 50 | 36 | 44 | — | — | — | — |
| H1210 | Golden Harvest | 55 | 50 | 40 | 48 | — | — | — | — |
| H1275 | Golden Harvest | 49 | 50 | 34 | 45 | — | — | — | — |
| 201-1 | Soi | 48 | 48 | 35 | 44 | — | — | — | — |
| Ex. 293 | Soi | 54 | 51 | 40 | 48 | — | — | — | — |
| TC137 | Schettler | 54 | 49 | 41 | 48 | 52 | 49 | 52 | 50 |
| D180 | Schettler | 53 | 50 | 38 | 47 | — | — | — | — |
| SRF205 | SRF | 51 | 54 | 38 | 48 | — | — | — | — |
| 1123 | Stamer Brand | 52 | 50 | 40 | 47 | — | — | — | — |
| 1129 | Stamer Brand | 49 | 45 | 33 | 43 | — | — | — | — |
| 1800 | Stine | 56 | 51 | 39 | 49 | 52 | 50 | — | — |
| 2210 | Stine | 52 | 52 | 39 | 48 | — | — | — | — |
| 2220 | Stine | 56 | 54 | 39 | 50 | — | — | — | — |
| Wilsoy 82 | Willette | 56 | 50 | 40 | 49 | 55 | 51 | — | — |
| LSD 5% | | 6 | 10 | 8 | 5 | 5 | 4 | 4 | 3 |

Table 34. Characteristics of private soybean varieties, late group, average Fairmont, Lambertson, and Waseca, 1982

| Variety or number | Brand | Type ¹ | Mature (days after August 31) | Lodging (score) ² | Height (inches) | Weight/100 seeds (grams) | Seed quality (score) ² | Protein (percent) ³ | Oil (percent) | Phyto-phthora (reaction) ⁴ | Chlorosis (score) ² |
|-------------------|----------------------|-------------------|-------------------------------|------------------------------|-----------------|--------------------------|-----------------------------------|--------------------------------|---------------|---------------------------------------|--------------------------------|
| Corsoy 79 | | P | 30 | 2.8 | 41 | 15.6 | 2.2 | 40.5 | 19.9 | R | 4 |
| Hodgson 78 | | P | 20 | 2.7 | 35 | 16.4 | 2.4 | 39.3 | 20.8 | R | 2 |
| Vickery | | P | 30 | 3.2 | 40 | 16.1 | 2.4 | 40.9 | 18.9 | R | 4 |
| Weber | | P | 25 | 2.4 | 38 | 13.5 | 2.2 | 40.0 | 19.7 | S | 1 |
| 1101A | Agrigenetics | P | 22 | 2.2 | 35 | 17.2 | 2.5 | 40.7 | 20.8 | S | 2 |
| 1102A | Agrigenetics | P | 33 | 2.2 | 41 | 14.8 | 2.1 | 41.3 | 16.8 | S | 2 |
| 2188 | Arrowhead | P | 23 | 2.1 | 38 | 17.2 | 2.9 | 40.8 | 19.0 | R | 2 |
| 8155 | Arrowhead | P | 24 | 2.6 | 39 | 15.7 | 2.0 | 39.4 | 20.5 | R | 2 |
| A155 | Asgrow | P | 22 | 2.6 | 41 | 16.6 | 3.0 | 41.2 | 19.6 | R | 2 |
| A1937 | Asgrow | P | 23 | 2.6 | 35 | 16.3 | 2.3 | 39.7 | 19.9 | M | 3 |
| A2575 | Asgrow | P | 30 | 2.0 | 40 | 17.1 | 2.6 | 40.6 | 19.7 | R | 2 |
| DSR-141 | Dairyland | P | 23 | 2.6 | 41 | 18.2 | 2.7 | 41.6 | 20.9 | S | 3 |
| DSR-171 | Dairyland | P | 27 | 2.7 | 40 | 16.5 | 2.3 | 40.3 | 16.9 | S | 2 |
| DSR-207 | Dairyland | P | 32 | 2.2 | 38 | 17.4 | 2.2 | 41.9 | 17.1 | S | 3 |
| Abel | Farmacy | P | 27 | 3.0 | 39 | 15.7 | 2.5 | 39.8 | 19.8 | S | 2 |
| Eve II | Farmacy | P | 30 | 2.6 | 39 | 18.6 | 2.4 | 40.3 | 18.4 | R | 3 |
| GT1170 | Gold Tag Brand | P | 38 | 2.6 | 40 | 16.4 | 2.7 | 38.8 | 17.6 | R | 3 |
| 12215 | Funk | P | 29 | 2.3 | 35 | 17.8 | 2.7 | 40.2 | 19.0 | R | 2 |
| G-3236 | Funk | P | 33 | 2.7 | 36 | 18.9 | 1.9 | 42.2 | 19.6 | R | 3 |
| 7800 | Hoffman | P | 30 | 2.8 | 40 | 15.3 | 2.1 | 39.8 | 18.5 | S | 3 |
| 8001 | Hoffman | B | 29 | 2.7 | 40 | 15.4 | 2.2 | 39.2 | 17.4 | M | 2 |
| Star | Hofler | P | 25 | 2.2 | 37 | 16.5 | 2.3 | 40.3 | 18.0 | R | 2 |
| Jade | Hofler | P | 27 | 2.8 | 37 | 16.9 | 3.1 | 39.3 | 20.1 | S | 2 |
| Rowtunda | Hy-Vigor | P | 26 | 2.7 | 38 | 17.9 | 3.3 | 40.2 | 19.1 | M | 2 |
| 1198 | Hy-Vigor | P | 21 | 2.2 | 31 | 17.7 | 2.3 | 40.2 | 18.8 | R | 1 |
| J102A | Jacques | P | 28 | 2.8 | 40 | 16.0 | 2.4 | 39.8 | 19.1 | S | 3 |
| J103 | Jacques | P | 29 | 2.6 | 34 | 16.5 | 2.7 | 38.9 | 21.1 | S | 2 |
| KB212 | Kaltenberg Seeds | P | 25 | 2.4 | 36 | 16.2 | 2.4 | 40.9 | 18.7 | R | 2 |
| KB231 | Kaltenberg Seeds | P | 31 | 2.4 | 37 | 16.0 | 2.4 | 40.3 | 20.9 | S | 2 |
| KB212C | Kruger | B | 31 | 2.6 | 37 | 16.6 | 2.2 | 39.7 | 18.4 | M | 2 |
| 302A | DeSoy | B | 30 | 2.7 | 40 | 14.8 | 2.3 | 40.1 | 20.3 | M | 3 |
| L4303 | SoyGro | P | 30 | 2.6 | 37 | 17.5 | 2.7 | 41.5 | 19.2 | R | 3 |
| L4404 | SoyGro | P | 24 | 2.6 | 36 | 18.7 | 3.6 | 39.1 | 19.7 | R | 3 |
| 300 | Latham | B | 26 | 2.7 | 35 | 16.6 | 2.7 | 39.0 | 21.1 | M | 3 |
| 350 | Latham | P | 22 | 2.1 | 38 | 17.4 | 2.9 | 41.4 | 19.8 | R | 2 |
| 500 | Latham | P | 28 | 2.3 | 39 | 17.2 | 3.6 | 41.2 | 19.8 | R | 3 |
| 4042 | Riverside | B | 32 | 2.6 | 41 | 16.6 | 2.0 | 40.3 | 20.6 | R | 2 |
| 4044 | Riverside | B | 32 | 2.6 | 41 | 17.0 | 2.2 | 40.2 | 19.5 | R | 2 |
| 1350 | Midwest Oilseeds | P | 22 | 1.7 | 30 | 15.7 | 2.3 | 42.1 | 19.6 | S | 2 |
| 2100A | Midwest Oilseeds | P | 27 | 2.4 | 38 | 16.5 | 2.2 | 40.1 | 17.9 | R | 3 |
| MSF350 | Mogensen Seed Farm | P | 21 | 2.6 | 36 | 16.8 | 2.3 | 40.1 | 18.7 | R | 2 |
| MSF440 | Mogensen Seed Farm | P | 22 | 2.7 | 38 | 16.3 | 2.5 | 39.9 | 21.2 | R | 2 |
| AP10 | Agripro | P | 23 | 2.4 | 37 | 17.2 | 2.3 | 41.8 | 18.9 | R | 2 |
| AP200 | Agripro | P | 26 | 2.6 | 39 | 16.2 | 2.3 | 39.4 | 18.8 | R | 2 |
| HP20-20 | Migro | P | 28 | 2.2 | 39 | 17.7 | 2.4 | 40.2 | 20.1 | S | 3 |
| S1346 | Northrup King | P | 25 | 1.7 | 31 | 18.5 | 3.8 | 37.7 | 20.3 | S | 4 |
| S1492 | Northrup King | P | 31 | 2.6 | 37 | 14.9 | 2.3 | 40.8 | 19.1 | S | 5 |
| S1884 | Northrup King | P | 26 | 2.3 | 36 | 15.2 | 2.5 | 41.1 | 19.4 | R | 4 |
| 201 | Paymaster Seeds | B | 27 | 2.6 | 38 | 16.4 | 2.4 | 39.5 | 19.3 | S | 4 |
| 251P | Paymaster Seeds | P | 24 | 2.9 | 35 | 17.6 | 2.7 | 41.0 | 19.7 | R | 2 |
| CB151P | Pfizer Genetics Inc. | B | 27 | 2.6 | 38 | 15.8 | 2.3 | 40.8 | 20.2 | M | 2 |
| CX155 | Pfizer Genetics Inc. | P | 28 | 3.0 | 40 | 15.3 | 2.4 | 39.6 | 19.4 | S | 3 |
| B-211 | Pine Grove Farm | B | 30 | 2.7 | 41 | 16.5 | 2.8 | 39.8 | 18.7 | R | 2 |
| P-2191 | Pine Grove Farm | P | 31 | 2.2 | 38 | 18.3 | 2.2 | 40.7 | 18.1 | R | 2 |
| 9220 | Pioneer Brand | B | 29 | 2.6 | 39 | 16.3 | 2.8 | 40.4 | 18.9 | S | 2 |
| B203 | Pride | P | 29 | 2.7 | 40 | 15.2 | 2.3 | 40.8 | 19.3 | R | 3 |

Table 34 (continued). Characteristics of private soybean varieties, late group, average Fairmont, Lamberton, and Waseca, 1982

| Variety or number | Brand | Type ¹ | Mature (days after August 31) | Lodging (score) ² | Height (inches) | Weight/100 seeds (grams) | Seed quality (score) ² | Protein (percent) ³ | Oil (percent) | Phytophthora (reaction) ⁴ | Chlorosis (score) ² |
|-------------------|----------------|-------------------|-------------------------------|------------------------------|-----------------|--------------------------|-----------------------------------|--------------------------------|---------------|--------------------------------------|--------------------------------|
| B216 | Pride | P | 31 | 2.7 | 37 | 16.3 | 2.3 | 41.5 | 19.0 | S | 5 |
| 1138 | ProfiSeed | P | 28 | 2.7 | 39 | 17.0 | 2.2 | 40.2 | 19.3 | M | 2 |
| 1280 | ProfiSeed | P | 34 | 2.6 | 39 | 16.0 | 2.3 | 41.5 | 19.1 | S | 3 |
| H1210 | Golden Harvest | B | 27 | 2.4 | 37 | 17.8 | 2.6 | 41.3 | 19.7 | M | 2 |
| H1275 | Golden Harvest | P | 30 | 2.2 | 34 | 18.0 | 2.3 | 41.1 | 18.9 | S | 2 |
| 201-1 | Soi | P | 32 | 2.0 | 35 | 18.0 | 2.2 | 41.7 | 20.8 | S | 2 |
| Ex. 293 | Soi | P | 33 | 2.4 | 36 | 13.6 | 2.2 | 40.8 | 19.7 | R | 2 |
| TC137 | Schettler | P | 21 | 2.3 | 36 | 16.3 | 2.8 | 39.6 | 19.7 | R | 3 |
| D180 | Schettler | B | 30 | 2.3 | 40 | 16.1 | 2.6 | 40.2 | 18.0 | R | 2 |
| SRF205 | SRF | P | 30 | 2.6 | 43 | 16.5 | 2.1 | 39.8 | 20.5 | R | 3 |
| 1123 | Stamer Brand | P | 21 | 2.7 | 37 | 17.7 | 2.4 | 40.6 | 19.1 | R | 2 |
| 1129 | Stamer Brand | P | 26 | 2.6 | 35 | 18.0 | 2.4 | 41.9 | 20.0 | S | 2 |
| 1800 | Stine | P | 24 | 2.6 | 38 | 16.9 | 2.7 | 39.4 | 21.2 | M | 3 |
| 2210 | Stine | P | 33 | 2.6 | 38 | 18.3 | 2.2 | 41.1 | 18.7 | R | 2 |
| 2220 | Stine | P | 32 | 2.6 | 39 | 16.9 | 2.3 | 40.1 | 18.6 | M | 2 |
| Wilsoy 82 | Willette | B | 31 | 2.6 | 39 | 15.5 | 2.1 | 40.4 | 19.0 | R | 4 |

¹P = pure line, B = blend. ²1 = excellent, 5 = very poor. ³Moisture-free. ⁴R = resistant, S = susceptible, M = mixture of R and S.

SUNFLOWER

The oilseed varieties are used for oil and protein-feed extraction. The nonoilseed varieties are used for nutmeats, salted whole seed, or birdfeed.

Row spacings in these trials were 30 inches, and plant populations averaged 20,000 for oilseed and 15,000 for nonoilseed varieties.

The head moisture columns in the tables show comparative moisture percentages among the hybrids at harvest time. Hybrids of low moisture percentages dried faster than those of high moisture percentages. However, damage from diseases and insects affect drying rate. Consequently, yield and other characteristics should be considered when making moisture comparisons among hybrids.

A major advantage of some hybrids over the old varieties is their ability to produce a normal yield despite a shortage of insect pollinators. However, this is artifact not true autogamy because the hybrids increase seed size to compensate for fewer seeds per head. Hybrids of 70 percent artifact autogamy suffered a 30 percent yield reduction when insect pollinators were excluded by bags; no yield reduction occurred with hybrids of 100 percent artifact autogamy (tables 36 and 37, last column). The larger seeds resulting from a shortage of insect pollinators are usually lower in oil percentage than normal-size seeds.

Companies with hybrids in these trials include: Agway Inc., Grandin, ND 58038; Arrowhead Inc., Watertown, SD 57201; Cargill Seed Division, Box 9300, Minneapolis, MN 55440; Dahlgren and Company, 1220 Sunflower St., Crookston, MN 56716; DeKalb-Pfizer Genetics, Box 8AA, Glyndon, MN 56547; Golden Harvest Seeds, Inc., Waterloo, NE 68069; Interstate Seed Company, Box 470, Fargo, ND 58107; Jacques Seed Co., Prescott, WI 54021; Keltgen Seed Company, Olivia, MN 56277;



Field day at Morris and agronomist R.G. Robinson talks about sunflower hybrids.

Kraig Seed & Supply, Inc., Sheldon, ND 58068; Northrup King Co., 1500 NE Jackson St., Minneapolis, MN 55413; PAG Seeds, Box 9480, Minneapolis, MN 55440; Peterson-Biddick Co., Box 190, Wadena, MN 56482; Pride Company, Glen Haven, WI 53810; Red River Commodities, Inc., Box 3022, Fargo, ND 58102; SeedTec International Inc., Box 5522, Fargo, ND 58105; Sigeo Research, Box 150, Breckenridge, MN 56520; Sokota Hybrid Producers, Brookings, SD 57006; Stauffer Seeds, 1323 23rd St., Fargo, ND 58103; TNT Sales Inc., Norcross, MN 56274.

Table 35. Yields of sunflower varieties in pounds per acre

| Variety and company | Crookston 1982 ¹ | Lamberton 1982 | Rosemount 1982 | Average 1982 | Crookston 1978-82 | Morris 1978-81 | Lamberton 1980-82 | Rosemount 1981-82 | Average 4 locations |
|---------------------------------|--------------------------------|-------------------|-------------------|-----------------|----------------------|-------------------|----------------------|----------------------|------------------------|
| Oilseed varieties | | | | | | | | | |
| 894, USDA | 30 | 2015 | 2296 | 1447 | 1594 | 2073 | 2112 | 2459 | 2060 |
| CMH 15, Agriculture Canada | 32 | 1718 | 2199 | 1316 | 1795 | 2211 | 1973 | 2591 | 2143 ² |
| A.H. 747, Arrowhead Inc. | 59 | 1649 | 2044 | 1251 | — | — | — | — | — |
| 205, Cargill | 9 | 1584 | 2306 | 1300 | 1740 | 2146 | 2086 | 2688 | 2165 |
| 206, Cargill | 40 | 1729 | 2544 | 1438 | 1994 | 2337 | 2051 | 2882 | 2316 ³ |
| 207, Cargill | 66 | 2202 | 3095 | 1788 | — | — | — | — | — |
| DO 164, Dahlgren | 9 | 2265 | 2268 | 1514 | 1472 | 1941 | 2133 | 2718 | 2066 ⁴ |
| DO 167, Dahlgren | 2 | 2248 | 2653 | 1634 | — | — | — | — | — |
| DO 704XL, Dahlgren | 29 | 2531 | 2801 | 1787 | 1738 | 2092 | 2114 | 3069 | 2253 |
| DO 705, Dahlgren | 98 | 2374 | 2749 | 1740 | 1888 | 2169 | 2216 | 2685 | 2240 ² |
| DO 844, Dahlgren | 7 | 2056 | 2366 | 1476 | 1580 | 1869 | 2145 | 2612 | 2052 |
| DKS-37, DeKalb | 6 | 2140 | 2124 | 1423 | 1672 | 2294 | 2056 | 2254 | 2069 ² |
| X2049, DeKalb | 70 | 1634 | 1852 | 1185 | — | — | — | — | — |
| X2211, DeKalb | 2 | 1823 | 2505 | 1443 | — | — | — | — | — |
| X2213, DeKalb | 2 | 1736 | 2352 | 1363 | — | — | — | — | — |
| X2214, DeKalb | 14 | 1592 | 2295 | 1300 | — | — | — | — | — |
| GH 10, Golden Harvest | 2 | 2025 | 2318 | 1448 | 1577 | 2140 | 1862 | 2434 | 2003 |
| Cenex 7101, Interstate | 2 | 1984 | 2495 | 1494 | 1490 | 1923 | 1887 | 2699 | 2000 ⁴ |
| IS 3000, Interstate | 19 | 2210 | 2782 | 1670 | — | — | — | — | — |
| IS 3001, Interstate | 14 | 2312 | 2479 | 1602 | — | — | — | — | — |
| IS 7111, Interstate | 2 | 2012 | 2150 | 1388 | — | — | — | — | — |
| IS 7775, Interstate | 8 | 2034 | 2624 | 1555 | 1639 | 2218 | 2000 | 2655 | 2131 |
| J-311 Brand, Jacques | 2 | 2013 | 2300 | 1438 | — | — | — | — | — |
| J-503 Brand, Jacques | 18 | 2102 | 2430 | 1517 | 1558 | 2395 | 2153 | 2907 | 2253 ² |
| KO-66, Keltgen | 14 | 2253 | 2415 | 1561 | — | — | — | — | — |
| Golden Glo Brand, Kraig | 17 | 2033 | 2290 | 1447 | 1534 | 2199 | 2139 | 2638 | 2128 ² |
| Sunbred 246, Northrup King | 6 | 2027 | 1868 | 1300 | — | — | — | — | — |
| Sunbred 254, Northrup King | 10 | 1612 | 2058 | 1227 | 1605 | 2242 | 1936 | 2482 | 2066 |
| Sunbred 265, Northrup King | 2 | 1752 | 2238 | 1331 | 1582 | 2378 | 1888 | 2261 | 2027 |
| Sunbred 275, Northrup King | 17 | 1814 | 1957 | 1263 | 1712 | 2204 | 1930 | 2329 | 2044 ² |
| PAG SF 101, PAG Seeds | 118 | 1508 | 2063 | 1230 | 1720 | 2224 | 1917 | 2281 | 2036 ⁴ |
| PAG SF 102, PAG Seeds | 85 | 1566 | 2232 | 1294 | 1896 | 2027 | 2073 | 2653 | 2162 ³ |
| Funk's G-6625, Peterson Biddick | 26 | 1771 | 2312 | 1370 | 1483 | 2399 | 1998 | 2594 | 2119 ⁵ |
| Funk's G-6627, Peterson Biddick | 36 | 2039 | 2789 | 1621 | — | — | — | — | — |
| Prairie Sun 2012, Pride | 87 | 1538 | 2398 | 1341 | — | — | — | — | — |
| Prairie Sun 2022, Pride | 2 | 1770 | 2199 | 1324 | — | — | — | — | — |
| Imperial 673, Red River Com. | 9 | 1861 | 1894 | 1255 | 1740 | 2362 | 1855 | 2451 | 2102 |
| EX SD-1, Red River Com. | 6 | 1518 | 1584 | 1036 | — | — | — | — | — |
| EX SD-5, Red River Com. | 2 | 1974 | 2544 | 1507 | — | — | — | — | — |
| SeedTec 307, SeedTec Int. | 30 | 1694 | 2076 | 1267 | — | — | — | — | — |
| SeedTec 315, SeedTec Int. | 177 | 2424 | 2107 | 1569 | 1863 | 2495 | 1976 | 2623 | 2239 ³ |
| SeedTec 316, SeedTec Int. | 146 | 2017 | 2258 | 1474 | — | — | — | — | — |
| SeedTec 327, SeedTec Int. | 2 | 1989 | 2230 | 1407 | 1401 | 2124 | 2027 | 2579 | 2033 ³ |
| SeedTec 349, SeedTec Int. | 123 | 2226 | 2165 | 1505 | 2114 | 2742 | 2129 | 2968 | 2488 ² |
| Sigco 448, Sigco Research | 46 | 1807 | 2896 | 1583 | 1398 | 2111 | 2073 | 2914 | 2124 |
| Sigco 449, Sigco Research | 2 | 2371 | 2616 | 1663 | 1631 | 2027 | 2130 | 2614 | 2101 |
| Sigco 454, Sigco Research | 11 | 1977 | 2570 | 1519 | 1499 | 1991 | 2204 | 2881 | 2144 ⁴ |
| Sigco 460, Sigco Research | 14 | 1593 | 1768 | 1125 | — | — | — | — | — |
| Sigco 472, Sigco Research | 5 | 2213 | 2135 | 1451 | 1530 | 2135 | 2178 | 2394 | 2059 ³ |
| Sigco 488, Sigco Research | 878 | 1898 | 2445 | 1740 | — | — | — | — | — |
| Sokota 2057, Sokota Hybrid | 2 | 2157 | 2311 | 1490 | — | — | — | — | — |
| Sokota 4000, Sokota Hybrid | 22 | 1818 | 2136 | 1325 | 1730 | 2119 | 2003 | 2607 | 2115 ³ |
| Sokota 5000, Sokota Hybrid | 4 | 1585 | 2036 | 1208 | 1655 | 2255 | 1767 | 2349 | 2007 ² |
| Sokota 6000, Sokota Hybrid | 21 | 1846 | 2293 | 1387 | 1472 | 2014 | 2056 | 2392 | 1984 ² |
| 1888, Stauffer Seeds | 20 | 1633 | 2310 | 1321 | — | — | — | — | — |
| 3101, Stauffer Seeds | 4 | 2203 | 2052 | 1420 | 1437 | 2090 | 2096 | 2121 | 1936 ² |
| TNT 534B, TNT Sales | 74 | 1928 | 1987 | 1330 | — | — | — | — | — |
| TNT 634B, TNT Sales | 42 | 1664 | 2020 | 1242 | — | — | — | — | — |
| Peredovik | — | — | 1813 | — | — | — | — | 2426 | — |
| Sputnik | — | — | 2604 | — | — | — | — | 2868 | — |
| LSD 5% | 80 | 422 | 456 | 209 | 201 | 213 | 296 | 350 | 136 |

Table 35 (continued). Yields of sunflower varieties in pounds per acre

| Variety and company | Crookston 1982 ¹ | Lamberton 1982 | Rosemount 1982 | Average 1982 | Crookston 1978-82 | Morris 1978-81 | Lamberton 1980-82 | Rosemount 1981-82 | Average 4 locations |
|-----------------------------|--------------------------------|-------------------|-------------------|-----------------|----------------------|-------------------|----------------------|----------------------|------------------------|
| Nonoilseed varieties | | | | | | | | | |
| 924, USDA | 10 | 1854 | 2260 | 1375 | 1694 | 2110 | 2026 | 2373 | 2051 |
| Royal Hybrid 621, Agway | 2 | 2143 | 2850 | 1665 | — | — | — | — | — |
| Royal Hybrid 2121, Agway | 6 | 2155 | 2697 | 1619 | 1602 | 1864 | 2147 | 2902 | 2129 ³ |
| Royal Hybrid 2141, Agway | 2 | 2540 | 2894 | 1812 | 1674 | 1974 | 2720 | 3116 | 2371 ² |
| D131, Dahlgren | 4 | 2010 | 2726 | 1580 | 1998 | 2550 | 2320 | 3056 | 2481 ² |
| D135, Dahlgren | 38 | 1787 | 2295 | 1373 | 1572 | 2039 | 2163 | 2511 | 2071 ³ |
| D716, Dahlgren | 94 | 2282 | 2543 | 1640 | 1917 | 2177 | 2235 | 2578 | 2227 ² |
| IS 8001, Interstate | 31 | 1991 | 2334 | 1452 | — | — | — | — | — |
| Sheyenne 043, Kraig | 2 | 2223 | 2841 | 1689 | — | — | — | — | — |
| Sigco 934, Sigco Research | 3 | 1769 | 2248 | 1340 | 1680 | 2062 | 1884 | 2276 | 1976 ² |
| Sigco 944, Sigco Research | 3 | 1826 | 2631 | 1487 | — | — | — | — | — |
| Sigco 954, Sigco Research | 38 | 1770 | 2692 | 1500 | 1931 | 2030 | 2067 | 2683 | 2178 ² |
| Sigco 964, Sigco Research | 86 | 2134 | 2743 | 1654 | — | — | — | — | — |
| LSD 5% | 71 | 447 | 543 | 236 | 194 | 306 | 381 | 324 | 154 |

¹Midge was responsible for the low yields. ²1981-82. ³1980-82. ⁴1979-82. ⁵1979-80,82.

Table 36. Characteristics of oilseed sunflower varieties, four location average

| Variety and company | Oil (percent) ¹ | Weight 100 seeds (grams) ² | Planting to bloom (days) ³ | Lodging (percent) ⁴ | Height (inches) ⁵ | Head moisture (percent) ⁶ | Midge damage (percent) ⁷ | Artifact autogamy (percent) ⁸ |
|---|-------------------------------|---|---|-----------------------------------|---------------------------------|--|---|--|
| 894, USDA | 46 | 4.4 | 71 | 16 | 65 | 44 | 76 | 100 |
| CMH 15, Agriculture Canada ⁹ | 47 | 5.6 | 71 | 33 | 67 | 32 | 70 | 34 |
| A.H. 747, Arrowhead Inc. ¹⁰ | 50 | 4.5 | 74 | 25 | 68 | 53 | 69 | 100 |
| 205, Cargill | 48 | 5.1 | 70 | 29 | 61 | 35 | 76 | 85 |
| 206, Cargill ¹¹ | 47 | 5.3 | 72 | 24 | 66 | 45 | 58 | 70 |
| 207, Cargill ¹⁰ | 43 | 5.5 | 71 | 35 | 68 | 30 | 35 | 88 |
| DO 164, Dahlgren ¹² | 44 | 5.4 | 68 | 23 | 66 | 45 | 78 | 56 |
| DO 167, Dahlgren ¹⁰ | 45 | 5.7 | 68 | 5 | 64 | 32 | 74 | 58 |
| DO 704XL, Dahlgren | 45 | 5.8 | 69 | 27 | 65 | 46 | 70 | 61 |
| DO 705, Dahlgren ⁹ | 46 | 5.5 | 68 | 29 | 65 | 40 | 54 | 83 |
| DO 844, Dahlgren | 44 | 4.9 | 69 | 13 | 66 | 38 | 85 | 90 |
| DKS-37, DeKalb ⁹ | 48 | 4.5 | 72 | 19 | 65 | 51 | 61 | 70 |
| X2049, DeKalb ¹⁰ | 43 | 4.8 | 74 | 28 | 71 | 54 | 72 | 100 |
| X2211, DeKalb ¹⁰ | 48 | 5.5 | 73 | 14 | 66 | 51 | 77 | 85 |
| X2213, DeKalb ¹⁰ | 51 | 5.1 | 72 | 17 | 64 | 54 | 79 | 36 |
| X2214, DeKalb ¹⁰ | 48 | 5.1 | 73 | 36 | 63 | 47 | 74 | 50 |
| GH 10, Golden Harvest | 46 | 4.6 | 72 | 21 | 64 | 43 | 61 | 78 |
| Cenex 7101, Interstate ¹² | 46 | 4.7 | 70 | 41 | 67 | 40 | 79 | 49 |
| IS 3000, Interstate ¹⁰ | 52 | 6.2 | 69 | 9 | 64 | 39 | 5 | 1 |
| IS 3001, Interstate ¹⁰ | 50 | 5.7 | 71 | 4 | 64 | 40 | 33 | 40 |
| IS 7111, Interstate ¹⁰ | 48 | 5.8 | 69 | 5 | 65 | 39 | 58 | 46 |
| IS 7775 Select, Interstate | 45 | 4.9 | 71 | 24 | 70 | 52 | 76 | 91 |
| J-311 Brand, Jacques ¹⁰ | 46 | 4.9 | 71 | 17 | 66 | 44 | 76 | 87 |
| J-503 Brand, Jacques ⁹ | 44 | 4.8 | 72 | 28 | 67 | 52 | 70 | 80 |
| KO-66, Keltgen ¹⁰ | 45 | 5.5 | 70 | 25 | 67 | 51 | 72 | 65 |
| Golden Glo Brand, Kraig ⁹ | 44 | 4.8 | 72 | 26 | 68 | 52 | 72 | 78 |
| Sunbred 246, Northrup King ¹⁰ | 49 | 6.4 | 70 | 52 | 58 | 44 | 65 | 11 |
| Sunbred 254, Northrup King | 46 | 4.2 | 72 | 18 | 67 | 47 | 62 | 90 |
| Sunbred 265, Northrup King | 47 | 5.4 | 70 | 32 | 58 | 44 | 70 | 86 |
| Sunbred 275, Northrup King ⁹ | 45 | 4.4 | 74 | 20 | 72 | 56 | 72 | 98 |
| PAG SF 101, PAG Seeds ¹² | 47 | 4.4 | 71 | 18 | 61 | 40 | 67 | 100 |
| PAG SF 102, PAG Seeds ¹¹ | 47 | 4.8 | 72 | 28 | 66 | 39 | 68 | 77 |
| Funk's G-6625, Peterson Biddick ¹³ | 46 | 4.5 | 72 | 27 | 66 | 46 | 70 | 88 |
| Funk's G-6627, Peterson Biddick ¹⁰ | 44 | 5.0 | 72 | 25 | 67 | 51 | 71 | 64 |
| Prairie Sun 2012, Pride ¹⁰ | 46 | 5.6 | 75 | 34 | 72 | 51 | 68 | 97 |
| Prairie Sun 2022, Pride ¹⁰ | 47 | 5.9 | 70 | 20 | 60 | 41 | 76 | 98 |
| Imperial 673, Red River Com. | 49 | 5.6 | 72 | 22 | 64 | 57 | 61 | 46 |
| EX SD-1, Red River Com. ¹⁰ | 48 | 4.8 | 73 | 12 | 59 | 50 | 69 | 63 |
| EX SD-5, Red River Com. ¹⁰ | 47 | 5.7 | 69 | 25 | 64 | 44 | 70 | 13 |
| SeedTec 307, SeedTec Int. ¹⁰ | 45 | 4.7 | 72 | 22 | 67 | 46 | 66 | 95 |

Table 36 (continued). Characteristics of oilseed sunflower varieties, four location average

| Variety and company | Oil (percent) ¹ | Weight 100 seeds (grams) ² | Planting to bloom (days) ³ | Lodging (percent) ⁴ | Height (inches) ⁵ | Head moisture (percent) ⁶ | Midge damage (percent) ⁷ | Artifact autogamy (percent) ⁸ |
|--|----------------------------|---------------------------------------|---------------------------------------|--------------------------------|------------------------------|--------------------------------------|-------------------------------------|--|
| SeedTec 315, SeedTec Int. ¹¹ | 44 | 5.7 | 74 | 20 | 72 | 57 | 32 | 100 |
| SeedTec 316, SeedTec Int. ¹⁰ | 47 | 5.6 | 74 | 35 | 69 | 50 | 12 | 97 |
| SeedTec 327, SeedTec Int. ¹¹ | 45 | 4.8 | 72 | 19 | 68 | 49 | 77 | 77 |
| SeedTec 349, SeedTec Int. ⁹ | 45 | 6.4 | 76 | 15 | 75 | 65 | 43 | 100 |
| Sigco 448, Sigco Research | 50 | 4.9 | 72 | 34 | 65 | 46 | 69 | 64 |
| Sigco 449, Sigco Research | 44 | 4.9 | 70 | 21 | 69 | 43 | 81 | 75 |
| Sigco 454, Sigco Research ¹² | 45 | 5.1 | 72 | 25 | 69 | 53 | 70 | 79 |
| Sigco 460, Sigco Research ¹⁰ | 46 | 4.3 | 73 | 36 | 64 | 51 | 74 | 68 |
| Sigco 472, Sigco Research ¹¹ | 45 | 4.5 | 72 | 19 | 69 | 51 | 78 | 91 |
| Sigco 488, Sigco Research ¹⁰ | 43 | 6.4 | 79 | 32 | 81 | 68 | 11 | 100 |
| Sokota 2057, Sokota Hybrid ¹⁰ | 45 | 4.9 | 68 | 9 | 63 | 31 | 77 | 59 |
| Sokota 4000, Sokota Hybrid ¹¹ | 45 | 4.3 | 72 | 17 | 65 | 41 | 63 | 83 |
| Sokota 5000, Sokota Hybrid ⁹ | 45 | 4.4 | 72 | 16 | 65 | 42 | 63 | 58 |
| Sokota 6000, Sokota Hybrid ⁹ | 47 | 5.3 | 71 | 25 | 66 | 57 | 77 | 62 |
| 1888, Stauffer Seeds ¹⁰ | 46 | 4.9 | 72 | 14 | 65 | 44 | 67 | 46 |
| 3101, Stauffer Seeds ⁹ | 37 | 3.7 | 68 | 16 | 57 | 27 | 70 | 85 |
| TNT 534B, TNT Sales ¹⁰ | 44 | 4.9 | 73 | 22 | 66 | 51 | 73 | 84 |
| TNT 634B, TNT Sales ¹⁰ | 47 | 4.5 | 74 | 5 | 65 | 46 | 74 | 73 |
| Peredovik | 45 | 7.1 | 74 | 36 | 78 | 55 | — | 12 |
| Sputnik | 48 | 6.8 | 72 | 33 | 72 | 55 | — | 11 |
| LSD 5% | | | | | | 5 | | 14 |

¹Oven-dry. Crookston and Morris 1978-81; Lamberton 1978-82 and Rosemount 1978-82. ²Rosemount 1981-82. ³Crookston 1978-80; Morris 1978-81; Lamberton 1980, 82; Rosemount 1982. ⁴Trials in which lodging was severe. Crookston and Morris 1981; Rosemount 1980; Lamberton 1982. ⁵Crookston and Morris, 1980-81; Lamberton and Rosemount 1982. ⁶Crookston 1979, 81; Lamberton 1982; Rosemount 1979, 81-82. ⁷Damaged ray flowers and cupped heads. Crookston 1981-82; Morris 1981. ⁸100 times yield of self-pollinated plants (covered with bags) divided by yield of cross-pollinated plants (no bags). Rosemount 1978-82. ⁹1981-82. ¹⁰1982. ¹¹1980-82. ¹²1979-82. ¹³1979-80, 82.

Table 37. Characteristics of nonoilseed sunflower varieties, four location average

| Variety and company | Large seed (percent) ¹ | Test weight/ bushel (pounds) ² | Weight 100 seeds (grams) ² | Planting to bloom (days) ³ | Lodging (percent) ⁴ | Height (inches) ⁵ | Head moisture (percent) ⁶ | Midge damage (percent) ⁷ | Artifact autogamy (percent) ⁸ |
|---|-----------------------------------|---|---------------------------------------|---------------------------------------|--------------------------------|------------------------------|--------------------------------------|-------------------------------------|--|
| 924, USDA | 74 | 25.9 | 13.4 | 73 | 30 | 63 | 55 | 79 | 86 |
| Royal Hybrid 621, Agway ⁹ | 40 | 27.2 | 11.2 | 73 | 25 | 67 | 58 | 78 | 49 |
| Royal Hybrid 2121, Agway ¹⁰ | 41 | 27.4 | 12.3 | 72 | 31 | 64 | 60 | 80 | 71 |
| Royal Hybrid 2141, Agway ¹¹ | 39 | 28.0 | 11.8 | 72 | 18 | 67 | 60 | 83 | 52 |
| D131, Dahlgren ¹¹ | 33 | 26.8 | 11.6 | 72 | 19 | 63 | 60 | 57 | 61 |
| D135, Dahlgren ¹⁰ | 21 | 26.6 | 11.2 | 73 | 32 | 64 | 59 | 66 | 58 |
| D716, Dahlgren ¹¹ | 20 | 26.5 | 11.2 | 74 | 23 | 66 | 55 | 69 | 70 |
| IS 8001, Interstate ⁹ | 57 | 24.9 | 13.0 | 75 | 41 | 68 | 60 | 79 | 51 |
| Sheyenne 043, Kraig ⁹ | 31 | 25.5 | 11.1 | 75 | 1 | 63 | 59 | 69 | 45 |
| Sigco 934, Sigco Research ¹¹ | 46 | 26.0 | 12.3 | 72 | 26 | 65 | 58 | 80 | 73 |
| Sigco 944, Sigco Research ⁹ | 25 | 26.1 | 11.5 | 73 | 28 | 62 | 51 | 70 | 52 |
| Sigco 954, Sigco Research ¹¹ | 54 | 25.2 | 14.2 | 72 | 28 | 63 | 58 | 68 | 56 |
| Sigco 964, Sigco Research ⁹ | 50 | 25.4 | 12.5 | 71 | 23 | 59 | 48 | 53 | 47 |
| LSD 5% | | | | | | | 6 | | 15 |

¹Held on a 20/64 round-hole sieve. Crookston and Morris 1981; Lamberton and Rosemount 1981-82. ²Crookston and Morris 1981; Lamberton and Rosemount 1981-82. ³Morris 1981; Lamberton and Rosemount 1982. ⁴Trials in which lodging was severe. Crookston and Morris 1981; Rosemount 1980; Lamberton 1982. ⁵Crookston and Morris 1980-81; Lamberton and Rosemount 1982. ⁶Crookston 1979, 81; Lamberton 1982; Rosemount 1979, 81-82. ⁷Damaged ray flowers and cupped heads. Crookston 1981-82; Morris 1981. ⁸100 times yield of self-pollinated plants (covered with bags) divided by yield of cross-pollinated plants (no bags). Rosemount 1978-82. ⁹1982. ¹⁰1980-82. ¹¹1981-82.

TALL FESCUE

Tall fescue is a relatively new forage grass in Minnesota. It may be tried in mixtures with other grasses and legumes. It establishes rapidly, withstands trampling, tolerates summer drought, and produces fall season pasture when other grasses become dormant. This bunchgrass is subject to winter injury, but may persist and remain productive in areas with reliable snow cover.

Several European varieties were winterkilled or severely injured at Rosemount following the 1976-77 winter, when compared with the more winterhardy varieties of U.S. origin. The varieties have been evaluated in pure stands. Therefore, performance may be different when a variety is grown in mixtures with other grasses and legumes. Under these conditions, diseases are less serious, particularly when grazed or harvested frequently.

Table 38. Dry matter yields of tall fescue varieties expressed as percentage of Ky-31 at two locations and average for 1973-81

| Variety | Developer or owner ¹ | Grand Rapids | Rosemount | | Average | Winter injury ² Rosemount |
|-----------------------|---|--------------|-----------|-----|---------|---|
| No. of trial years | | 5 | 6 | 1 | | 1 |
| <i>Ky-31 ton/acre</i> | Ky, Agr. Exp. Sta. & USDA ^b | 3.9 | 4.8 | 2.0 | 4.2 | 6.9 |
| Aronde | J. Joorden, Vento-Berlick, Netherlands ^a | 100 | 99 | 92 | 99 | 2.8 |
| Clarine | I.N.R.A., Paris, France ^a | — | — | 99 | 99 | 1.7 |
| Fawn | Oregon Agr. Exp. Sta. ^{ce} | 78 | 79 | — | 78 | — |
| Festal | D.J. van der Have, Netherlands ^a | — | — | 83 | 83 | 3.3 |
| Forager | Farmers Forage Res. Coop. ^c | 100 | 89 | — | 92 | — |
| Kenhy | Ky. Agr. Exp. Sta., & USDA ^{df} | 102 | 102 | 99 | 102 | 7.0 |
| Ludelle | I.N.R.A., Paris, France ^a | — | — | 81 | 81 | 3.3 |
| Ludion | I.N.R.A., Paris, France ^a | — | — | 95 | 95 | 3.5 |
| Manade | Vilmorin-Andreux, France ^a | — | 77 | 91 | 81 | 3.3 |
| MO-96 | Mo. Agr. Exp. Sta. ^a | 77 | — | 85 | 80 | 3.5 |
| S-170 | Nat'l. Seed Dev. Org., Cambridge, U.K. ^a | — | 88 | — | 88 | 3.6 |
| LSD 5% | | 6 | 4 | 12 | 2 | |

¹1983 seed supplies and sources: a. not available or very limited, b. available from many sources, c. Cenex Coop. Inc., d. Land O'Lakes, Inc., e. Lincoln Seed and Feed Co., f. Werner Farm Seeds. ²1 = most damaged, 9 = least damaged, 1977.

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.

The varieties have been evaluated in pure stands. Therefore, performance may be different when a variety is grown in mixtures with other grasses and legumes.

Table 39. Dry matter yields of timothy varieties expressed as percentage of Itasca at three locations and average for 1965-78

| Variety | Developer or owner ¹ | Grand Rapids | Morris | Rosemount | Average |
|------------------------|---|--------------|--------|-----------|---------|
| No. of trial years | | 9 | 3 | 7 | |
| <u>Very early</u> | | | | | |
| Clair | Kentucky Agr. Exp. Sta. ^a | 101 | 101 | 102 | 101 |
| <u>Medium-early</u> | | | | | |
| Basho | Agr. Canada, Ottawa ^a | 89 | — | 99 | 95 |
| Champlain | New York Agr. Exp. Sta. ^a | 88 | — | 83 | 87 |
| Champ | Agr. Canada, Ottawa ^a | 94 | — | 101 | 96 |
| Timfor | Northrup King Co. ^f | 96 | — | 102 | 100 |
| Toro | Institute le Colture Foraggere, Milano, Italy ^{ch} | 98 | — | 98 | 98 |
| <u>Medium</u> | | | | | |
| Bounty | Agr. Canada, Ottawa ^a | — | — | 92 | 92 |
| Climax | Agr. Canada, Ottawa ^b | 92 | 100 | 97 | 95 |
| <i>Itasca ton/acre</i> | Minnesota Agr. Exp. Sta. ^c | 3.9 | 3.7 | 3.2 | 3.6 |
| Milton | Macdonald Coll., Quebec ^a | 97 | — | 97 | 97 |
| Pronto | Pride Seed Co. ^g | 97 | — | 97 | 97 |
| <u>Medium-late</u> | | | | | |
| Lorain | Ohio Agr. Exp. Sta. & USDA ^a | 92 | 91 | 99 | 96 |
| Verdant | Wisconsin Agr. Exp. Sta. & USDA ^{ei} | 94 | 87 | 98 | 94 |
| LSD 5% | | 4 | 10 | 5 | 2 |

¹1983 seed supplies and sources: a. not available or very limited, b. available from many sources, c. Field Seed Farms, d. Lincoln Seed and Feed Co., e. Northrup King Co., f. Payco Seeds, g. Pride Seed Co., h. Ziller Seed Farms Inc.

DURUM WHEAT

RECOMMENDED VARIETIES

Cando—Awned, midseason to late, semidwarf and good lodging resistance. Resistant to stem rust and susceptible to leaf rust. Medium yield and test weight with low seed weight. Satisfactory quality. Better adapted to Northern Minnesota. Released by North Dakota Agricultural Experiment Station in 1975.

Crosby—Awned, midseason, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield and test weight with high seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1973.

Rugby—Awned, midseason, medium height and fair lodging resistance. Resistant to stem and moderately susceptible to leaf rust. High yield, and medium test weight and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1973.

Vic—Awned, midseason, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield, test weight, and seed weight. Satisfactory quality. Superior quality for export market. Released by North Dakota Agricultural Experiment Station in 1979.

Ward—Awned, midseason, medium height, and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield and test weight with medium seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1972.

OTHER VARIETIES

Botno—Awned, early, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. High yield, test weight, and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1973.

Calvin—Awned, midseason to late, semidwarf with good lodging resistance. Resistant to stem rust and susceptible to leaf



Minnesota's newest wheat variety and its breeder, agronomist R.H. Busch. Marshall is named in memory of Ward H. Marshall, manager of the Minnesota Crop Improvement Association from 1944 until 1975.

rust. Low yield, medium test weight and low seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1978.

Edmore—Awned, midseason, medium height and fair lodging resistance. Resistant to stem rust and moderately susceptible to leaf rust. Medium yield and low test weight and seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1978.

Mindum—Awned, late, tall, and poor lodging resistance. Susceptible to leaf rust, stem rust, and lodging. Low yield and high test weight with medium seed weight. Satisfactory quality. A durum type selected from a bread wheat field. Released by Minnesota Agricultural Experiment Station in 1917.

Rolette—Awned, early, medium height and fair lodging resistance. Resistant to stem rust and susceptible to leaf rust. Medium yield and high test weight with high seed weight. Satisfactory quality. Released by North Dakota Agricultural Experiment Station in 1971.

Table 40. Characteristics of durum wheat varieties, 1980-82

| Variety | Heading (June) | Height (inches) | Lodging (score) ¹ | Rust reaction ² | | Weight/ 1000 seeds (grams) | Test weight/ bushel (pounds) | Yield/acre (bushels) | | | |
|---------|-------------------|--------------------|---------------------------------|----------------------------|------|-------------------------------------|---------------------------------------|----------------------|-----------|---------|---------|
| | | | | leaf | stem | | | Morris | Crookston | Stephen | Average |
| Cando | 28 | 28 | 1.4 | S | R | 37 | 59.5 | 47 | 44 | 56 | 49 |
| Crosby | 26 | 36 | 2.1 | MS | R | 40 | 60.0 | 55 | 49 | 58 | 54 |
| Rugby | 26 | 37 | 1.7 | MS | R | 39 | 59.8 | 52 | 52 | 56 | 53 |
| Vic | 27 | 37 | 2.2 | MS | R | 40 | 60.6 | 51 | 48 | 56 | 52 |
| Ward | 26 | 36 | 1.8 | MS | R | 39 | 60.4 | 54 | 47 | 55 | 52 |
| Botno | 24 | 35 | 1.8 | MS | R | 41 | 60.6 | 54 | 50 | 52 | 52 |
| Calvin | 27 | 26 | 1.1 | S | R | 38 | 59.5 | 43 | 43 | 49 | 45 |
| Edmore | 27 | 37 | 2.0 | MS | R | 38 | 58.3 | 47 | 46 | 52 | 49 |
| Mindum | 30 | 42 | 5.3 | S | S | 39 | 60.7 | 54 | 39 | 47 | 47 |
| Rolette | 23 | 36 | 2.1 | S | R | 41 | 61.3 | 51 | 46 | 51 | 49 |
| LSD 5% | | | | | | | | 7 | 9 | 10 | 5 |

¹1 = erect, 9 = flat. ²Reaction to prevalent races: R = resistant, MS = moderately susceptible, S = susceptible.

HARD RED SPRING WHEAT

RECOMMENDED VARIETIES

Butte—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1977. Awned, early to midseason, medium height. Resistant to stem rust. Tolerant of loose smut and ergot. Very high yield and test weight with medium protein percent. Satisfactory milling and baking characteristics. Because of

early heading, may be suitable for later seeding. Disadvantages—Susceptible to leaf rust and to black chaff. Moderately susceptible to tan spot and lodging. Very tough threshing and may be erratic in yield.

Era—Released by Minnesota Agricultural Experiment Station in 1970. Awned, late to midseason, semidwarf. Resistant to stem

and moderately resistant to leaf rust. Tolerant of loose smut and ergot. Medium lodging resistance. Very high yield and high test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption. Because of later maturity, less suitable for late seeding in southern Minnesota.

Len—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1979. Awned, midseason, semidwarf. Resistant to stem and moderately resistant to leaf rust. Moderately tolerant of loose smut and ergot. Good lodging resistance. High yield and test weight. Medium protein percent. Satisfactory milling and baking. Disadvantages—Moderately susceptible to shattering.

Marshall—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1982. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Resistant to stem and leaf rust. Tolerant of loose smut and moderately tolerant of ergot. Good lodging resistance. Very high yield and high test weight. Satisfactory milling. Disadvantages—Low to medium protein percent. Low bake absorption.

Olaf—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1973. Awned, midseason, semidwarf. Resistant to stem rust. Moderately tolerant of ergot. Good lodging resistance. High yield and test weight. Medium protein percent. Satisfactory milling. Disadvantages—Susceptible to tan spot. Moderately susceptible to loose smut, leaf rust and shattering. Tendency to have long and strong dough mixing requirements.

Solar—Released by Northrup King Co. in 1977. Seed sale regulated by U.S. Variety Protection Act. Awned, late to midseason, semidwarf, similar to Era. Resistant to stem and moderately resistant to leaf rust. Tolerant of loose smut and ergot. Medium lodging resistance. Very high yield and high test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption. Because of later maturity, less suitable for late seeding in southern Minnesota.

VARIETIES NOT ADEQUATELY TESTED

Centa—Released by South Dakota Agricultural Experiment Station in 1982. Awned, very early, medium height. Resistant to stem rust. Medium yield and very high test weight. Satisfactory milling and baking characteristics. Disadvantages—Susceptible to lodging and moderately susceptible to leaf rust and loose smut.

Oslo—Released by North American Plant Breeders in 1981. Seed sale regulated by U.S. Variety Protection Act. Awned, early to midseason, semidwarf. Moderately resistant to stem rust and moderately tolerant of ergot. Good lodging resistance. High yield and medium test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption. Moderately susceptible to leaf rust and loose smut.

PR2360—Released by Pioneer Hi-Bred in 1981. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Resistant to stem rust and moderately resistant to leaf rust. Medium lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption.

Walera—Released by Northrup King Co. in 1980. Seed sale regulated by U.S. Variety Protection Act. Awned, late to midseason, semidwarf. Resistant to stem and moderately resistant to leaf rust. Moderately resistant to loose smut and ergot. Medium lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Low protein percent and bake absorption.

OTHER VARIETIES

Aim—Released by Western Plant Breeders, Inc. in 1978. Seed sale regulated by U.S. Variety Protection Act. Awned, midseason, semidwarf. Moderately resistant to leaf rust and loose smut. Good lodging resistance. Medium yield and medium to low test weight. Disadvantages—Susceptible to stem rust and moderately susceptible to ergot and tan spot. Low protein percent and unsatisfactory milling and baking quality.

Alex—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1981. Awnless, midseason, medium height. Resistant to stem and leaf rust. High yield and test weight. Medium protein percent. Satisfactory milling and baking. Disadvantages—Moderately susceptible to lodging, ergot, and loose smut.

Angus—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1978. Awned, bronze chaff, midseason, semidwarf. Resistant to stem and leaf rust. Tolerant of ergot, tan spot, and moderately tolerant of loose smut. Good lodging resistance. Medium yield and high test weight. Medium protein percent. Satisfactory milling and baking. Disadvantages—Susceptible to bacterial leaf blight and moderately susceptible to shattering and black chaff.

Chris—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1965. Awnless, midseason, medium height. Resistant to stem rust but ranges from resistant to moderately susceptible to leaf rust. Tolerant of ergot and moderately tolerant of loose smut. High test weight and protein percent. Satisfactory milling and baking. Disadvantages—Susceptible to lodging. Low yield.

Coteau—Released by North Dakota Agricultural Experiment Station and USDA-ARS in 1978. Awned, midseason to late, medium height. Resistant to stem and leaf rust. High test weight. Very high protein percent. Satisfactory milling and baking. Disadvantages—Moderately susceptible to ergot, loose smut, and lodging. Low to medium yield.

Eureka—Released by South Dakota Agricultural Experiment Station in 1978. Awnless, midseason to early, medium height. Resistant to stem rust. Moderately tolerant of ergot and loose smut. Medium to high yield and test weight. High protein percent. Satisfactory milling and baking. Better adapted to west-central and southwest. Disadvantages—Susceptible to leaf rust. Moderately susceptible to tan spot and lodging.

James—Released by South Dakota Agricultural Experiment Station in 1979. Awned, early, medium height. Resistant to stem rust. High to medium yield. Medium test weight and protein percent. Satisfactory milling and baking. Because of early maturity, may be suitable for late seeding. Disadvantages—Moderately susceptible to leaf rust, loose smut, ergot, tan spot and lodging.

Kitt—Released by Minnesota Agricultural Experiment Station and USDA-ARS in 1975. Awned, late to midseason, semidwarf. Resistant to stem and leaf rust. Tolerant of tan spot and ergot. High yield and medium protein percent. Satisfactory milling and baking. Disadvantages—Low test weight, moderately susceptible to loose smut, shattering, and lodging.

Wared—Released by Washington Agricultural Experiment Station and USDA-ARS in 1974. Selected at the Minnesota Agricultural Experiment Station. Awned, late to midseason, semidwarf. Resistant to stem and moderately resistant to leaf rust. Tolerant of loose smut and ergot. Good lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Low to medium protein percent. Low bake absorption. Because of later maturity, less suitable for late seeding in southern Minnesota.

World Seeds 1809—Released by World Seeds, Inc. in 1970. Seed sale regulated by U.S. Variety Protection Act. Awnless, very early, semidwarf. Resistant to stem rust and tolerant of ergot. Good lodging resistance. Medium test weight and protein percent. Satisfactory milling and baking. Disadvantages—Susceptible to loose smut and tan spot. Moderately susceptible to leaf rust. Low to medium yield.

711—Released by Northrup King Co. in 1980. Seed sale regulated by U.S. Variety Protection Act. Awned, late to midseason, semidwarf. Resistant to stem rust. Moderately tolerant to loose smut. Good lodging resistance. High yield and test weight. Satisfactory milling. Disadvantages—Moderately susceptible to leaf rust, ergot, and tan spot. Low protein percent and bake absorption.

Table 41. Yield of hard red spring wheat varieties in bushels per acre, 1980-82

| Variety | Crookston | Stephen | Northern average | St. Paul ¹ | Morris ² | Lamberton ¹ | Waseca | Southern average ³ | State average ³ |
|------------------|-----------|-----------------|------------------|-----------------------|---------------------|------------------------|-----------------|-------------------------------|----------------------------|
| Butte | 50 | 50 | 50 | 54 | 54 | 57 | 52 | 55 | 52 |
| Era | 53 | 55 | 54 | 51 | 58 | 48 | 48 | 52 | 53 |
| Len | 49 | 48 | 49 | 49 | 51 | 50 | 49 | 50 | 49 |
| Marshall | 54 | 54 | 54 | 48 | 55 | 53 | — | 52 | 53 |
| Olaf | 46 | 48 | 48 | 49 | 53 | 50 | 49 | 51 | 49 |
| Solar | 58 | 57 | 57 | 49 | 59 | 44 | 49 | 50 | 54 |
| Aim | 47 | 44 | 44 | 47 | 48 | 47 | 47 ⁴ | 47 | 47 |
| Alex | 52 | 51 | 51 | 45 | 55 | 50 | — | 50 | 50 |
| Angus | 52 | 42 | 47 | 54 | 50 | 45 | 48 | 50 | 48 |
| Centa | 48 | — | — | 50 | 51 | — | — | — | — |
| Chris | 36 | 37 | 37 | 36 | 49 | 42 | — | 42 | 39 |
| Coteau | 43 | 46 | 44 | 41 | 52 | 43 | — | 45 | 45 |
| Eureka | 50 | 46 | 48 | 46 | 52 | 51 | 44 ⁴ | 50 | 49 |
| James | 49 | 49 | 49 | 48 | 51 | 49 | 50 | 50 | 49 |
| Kitt | 49 | 53 | 51 | 49 | 56 | 45 | 50 | 50 | 51 |
| Oslo | 52 | 50 ⁴ | 51 | 53 | 51 | — | — | — | 52 ⁴ |
| PR2360 | 52 | — | — | 48 | 53 | — | — | — | — |
| Walera | 53 | 53 ⁴ | 53 ⁴ | 52 | 55 | — | 48 ⁴ | — | 52 ⁴ |
| Wared | 51 | 51 | 51 | 46 | 55 | 42 | 48 | 48 | 49 |
| World Seeds 1809 | 45 | 36 | 41 | 48 | 45 | 44 | 45 | 45 | 43 |
| 711 | 53 | 48 | 51 | 51 | 53 | 48 | 51 | 51 | 51 |
| LSD 5% | 8 | 10 | 6 | 7 | 6 | | 5 | 5 | 4 |

¹1980, 1982. ²1980-81. ³Waseca not included. ⁴1981-82 data adjusted to 3-year average.

Table 42. Characteristics of hard red spring wheat varieties, 1980-82

| Variety | Heading (June) | Height (inches) | Lodging (score) ¹ | Rust reaction ² | | Weight/1000 seeds (grams) | Test weight/bushel (pounds) | Wheat protein (percent) ³ | Milling and baking quality |
|----------|----------------|-----------------|------------------------------|----------------------------|------|---------------------------|-----------------------------|--------------------------------------|----------------------------|
| | | | | leaf | stem | | | | |
| Butte | 21 | 34 | 3.8 | S | R | 33 | 61.5 | 14.3 | med.-high |
| Era | 27 | 31 | 2.6 | MR | R | 29 | 60.5 | 13.2 | low-med. |
| Len | 25 | 31 | 1.9 | MR | R | 35 | 60.1 | 14.8 | high-med. |
| Marshall | 25 | 30 | 1.6 | R | R | 31 | 60.4 | 13.7 | med.-low |
| Olaf | 25 | 31 | 2.1 | MS | R | 35 | 59.3 | 14.6 | med.-low |
| Solar | 27 | 31 | 2.4 | MR | R | 31 | 59.8 | 13.1 | low |
| Aim | 25 | 30 | 2.1 | MR | S | 25 | 58.8 | 13.1 | low |
| Alex | 25 | 37 | 3.6 | R | R | 33 | 61.1 | 14.9 | high-med. |
| Angus | 25 | 31 | 2.1 | R | R | 34 | 60.2 | 14.7 | med.-high |
| Centa | 19 | 34 | 4.2 | MS | R | 30 | 61.2 | 14.5 | high-med. |
| Chris | 25 | 38 | 5.2 | MR | R | 29 | 59.8 | 15.7 | v. high |
| Coteau | 26 | 36 | 3.3 | R | R | 31 | 59.8 | 15.9 | high |
| Eureka | 23 | 37 | 2.6 | S | MR | 32 | 59.3 | 15.1 | med.-high |
| James | 20 | 33 | 3.0 | MS | R | 32 | 59.2 | 14.5 | medium |
| Kitt | 27 | 30 | 2.5 | R | R | 32 | 57.8 | 14.6 | med.-high |
| Oslo | 20 | 30 | 1.6 | MS | MR | 32 | 58.4 | 13.4 | low-med. |
| PR2360 | 25 | 31 | 2.6 | MR | R | 29 | 60.0 | 13.4 | low-med. |
| Walera | 26 | 31 | 2.7 | MR | R | 30 | 59.3 | 13.2 | low-med. |
| Wared | 28 | 31 | 2.2 | MR | R | 29 | 59.8 | 13.6 | med.-low |
| WS 1809 | 20 | 27 | 2.0 | MS | R | 28 | 59.5 | 14.4 | medium |
| 711 | 24 | 31 | 1.9 | MS | R | 31 | 60.0 | 13.3 | low-med. |

¹1 = erect, 9 = flat. ²Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. ³14% moisture basis.

WINTER WHEAT

Cultural practices have an effect on winter survival of all winter wheats. Planting into a firm seedbed with some stubble remaining to retain snow cover can reduce winterkill.

RECOMMENDED VARIETIES

Minter—Awned, tall, winterhardy, and poor lodging resistance. Moderately susceptible to leaf and stem rust. Medium yield and high test weight. Satisfactory quality. Released by the Minnesota Agricultural Experiment Station and ARS-USDA in 1949.

Roughrider—Awned, tall, winterhardy, medium maturity and fair lodging resistance. Susceptible to leaf rust but resistant to stem rust. High to medium yield and high test weight. Released by the North Dakota Agricultural Experiment Station in 1975.

Winoka—Awned, tall, winterhardy, medium maturity and fair lodging resistance. Susceptible to leaf rust and moderately resistant to stem rust. Severe leaf necrosis in certain years. Medium yield and high test weight. Satisfactory quality. Reselection from Winalta by South Dakota Agricultural Experiment Station in 1968.

VARIETIES NOT ADEQUATELY TESTED

Brule—Awned, early, semdwarf with good lodging resistance. Winterhardiness is not satisfactory. Moderately susceptible to leaf rust and moderately resistant to stem rust. High yield and low test weight. Satisfactory quality. Released by Nebraska Agricultural Experiment Station and USDA-ARS in 1982. Seed sale regulated by U.S. Variety Protection Act.

Nell—Awned, early, medium height, and good lodging resistance. Medium winterhardiness. Susceptible to leaf rust and resistant to stem rust. Medium to high yield and high test weight.

Table 43. Characteristics of winter wheat varieties, 1980-82

| Variety | Heading (June) | Height (inches) | Winter survival (percent) | Lodging (score) ¹ | Rust reaction ² | | Test weight/bushel (pounds) | Yield/acre (bushels) | | | |
|------------|----------------|-----------------|---------------------------|------------------------------|----------------------------|------|-----------------------------|---------------------------------|-----------------|-----------------|-----------------|
| | | | | | leaf | stem | | St. Paul—Rosemount ³ | Morris | Crookston | Average |
| Minter | 12 | 42 | 80 | 4 | MS | MS | 62.0 | 54 | 40 | 35 | 42 |
| Roughrider | 10 | 38 | 83 | 2 | S | R | 61.3 | 54 | 41 | 41 | 44 |
| Winoka | 10 | 40 | 65 | 3 | S | MR | 61.6 | 49 | 38 | 39 | 41 |
| Brule | 8 | 33 | 52 | 1 | S-MS | MR | 58.7 | 61 ⁵ | 42 ⁵ | 46 ⁵ | 48 ⁵ |
| Eklund | 13 | 43 | 81 | 4 | S | S | 59.8 | 47 | 40 | 37 | 41 |
| Froid | 12 | 41 | 85 | 5 | S | MR | 60.5 | 50 | 45 | 39 | 44 |
| Gent | 4 | 36 | 61 | 3 | MR | R | 60.2 | 52 | 29 | 30 ⁴ | 36 ⁵ |
| Nell | 7 | 35 | 70 | 1 | S | R | 61.0 | 54 ⁵ | — | 39 ⁵ | — |
| Norstar | 13 | 42 | 84 | 2 | S | S | 61.2 | 48 | 46 | 46 | 47 |
| Rose | 9 | 35 | 78 | 1 | MR | R | 62.5 | 47 ⁵ | 45 ⁵ | 47 ⁵ | 46 |
| Sundance | 13 | 41 | 77 | 3 | S | S | 58.9 | 47 | 45 | 42 | 45 |
| LSD 5% | | | | | | | | NS | 7 | 7 | NS |

¹1 = erect, 9 = flat. ²Reaction to prevalent races: R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible. ³1980, 1982. ⁴Greater than 50% shattering in 1980. ⁵1981-82 data adjusted to a 3-year average.

Released by South Dakota Agricultural Experiment Station in 1981.

Rose—Awned, medium height, winterhardy, medium maturity and good lodging resistance. Moderately resistant to leaf rust and resistant to stem rust. High yield and test weight. Satisfactory quality. Released by South Dakota Agricultural Experiment Station in 1981.

OTHER VARIETIES

Eklund—Awnless, tall, late and poor lodging resistance. Susceptible to leaf and stem rust. Medium yield and test weight. Satisfactory quality. Seed was available in 1976. Seed sale regulated by U.S. Variety Protection Act.

Froid—Awned, tall, winterhardy, medium maturity, and poor lodging resistance. Moderately resistant to stem rust and susceptible to leaf rust. High yield and medium test weight. Satisfactory milling and baking characteristics. Released by Montana Agricultural Experiment Station in 1968.

Gent—Awned, early, medium height and fair lodging resistance. Winterhardiness lower than Minter and Winoka. Moderately resistant to leaf rust and resistant to stem rust. Low yield and medium test weight. Satisfactory quality. Developed at Hays, Kansas, but tested and released by South Dakota Agricultural Experiment Station in 1974.

Norstar—Awned, tall, winterhardy and fair lodging resistance. Susceptible to leaf and stem rust. High yield and test weight. Satisfactory quality. Licensed by Agriculture Canada in 1978.

Sundance—Awned, tall, winterhardy, and fair lodging resistance. Susceptible to leaf and stem rust. High yield and low test weight. Satisfactory quality. Licensed by Agriculture Canada in 1971.

WILD RICE

Cultivated wild rice is grown on 14,000 acres in Minnesota. Most wild rice is produced from varieties with nonshattering tendency, but some fields are still producing shattering types. No recommendations regarding specific varieties are made. Because of the likelihood of preharvest losses due to high winds, storms, blackbird damage, and killing frost before varietal maturity, growers should favor early to medium maturing varieties. All varieties shatter to some extent and are lodging and disease susceptible.

VARIETIES

Johnson—Tall, late maturity, and low to medium yield if the variety matures before frost. Seed made available by Algot Johnson in 1969.

K2—Medium height, early to medium maturity, and medium to high yield. Developed by Kosbau Bros. in 1972.

M3—Medium height, medium to late maturity, and high yield in our tests. Diverse in plant and panicle type. Developed by Manomin Development Co. in 1974.

Netum—Medium height, early maturity, and low to medium yield. Because of its earlier maturity, it frequently will produce higher yields than M3 and Johnson. Developed by Minnesota Agricultural Experiment Station and released in 1978.



This wild rice field has been drained. Soil conservationist D.D. Barron and agronomist E.A. Oelke are deciding when to harvest. Harvesting should start when at least 35 percent of the kernels are dark.

Table 44. Characteristics of wild rice varieties, 1980-82

| | Yield/acre (pounds) ¹ | | Heading (July) | Harvest (August) | Height (inches) |
|---------|----------------------------------|---------|-------------------|---------------------|--------------------|
| | 1982 ² | 1980-82 | | | |
| Johnson | 1367 | 1358 | 17 | 25 | 77 |
| K2 | 1593 | 1691 | 14 | 18 | 68 |
| M3 | 1681 | 1896 | 16 | 21 | 67 |
| Netum | 1580 | 1566 | 7 | 13 | 66 |
| LSD 5% | 98 | 104 | 2 | — | 5 |

¹Adjusted green weight of grain at 40% moisture.

²1982 data from fall plantings at Grand Rapids, Rosemount and Waskish and spring planting at Grand Rapids and Excelsior.

WINTER RYE

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

RECOMMENDED VARIETIES

Hancock—High yield, fair winterhardiness, medium late, medium height, and medium lodging resistance. Large seed of predominantly tan color and high test weight. Originated by Wisconsin Agricultural Experiment Station from crosses involving Von Lochow and Wisconsin synthetics of tan seed color. Released in 1979.



A. Schuhly, agronomy student from Germany, and Hancock rye. Hancock is the newest of the recommended rye varieties. Rymin and Puma are also recommended.

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

Rymin—High yield, fair winterhardiness, medium late, medium height. Good lodging resistance. Large 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

Animo—Medium yield, poor winterhardiness, late, medium height, and good lodging resistance. Large seed of green color and low test weight. Released by Cebeco-Handelsraad of the Netherlands. Licensed in Canada in 1979. Seed obtained from Minas Seed Co-operative Limited, Canning, N.S.

Aroostook—Low yield, good winterhardiness, very early, tall, and poor lodging resistance. Small seed of brown and tan color and low test weight. Selected from Balbo by USDA Soil Conservation Service in New York. Released by USDA, Cornell University, and Maine Department of Agriculture in 1981.

Musketeer—High yield, good winterhardiness, medium late, medium height, and poor lodging resistance. Large seed of green color and medium test weight. Originated by Agriculture Canada, Swift Current, from crosses of Harrach, Petkus, and Dakold. Licensed in 1980. Production of certified seed limited to Canada.

OTHER 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.

Von Lochow—Medium yield, fair to poor winterhardiness.

medium 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.

Table 45. Yields of winter rye varieties in bushels per acre

| Variety | Rosemount 1980-82 | Morris 1980-82 | Crookston 1980-82 | Grand Rapids 1980-82 | Becker 1982 | Average 13 trials |
|------------------------|----------------------|-------------------|----------------------|-------------------------|----------------|----------------------|
| Hancock | 70 | 52 | 53 | 48 | 35 | 54 |
| Puma | 58 | 46 | 52 | 40 | 34 | 48 |
| Rymin | 68 | 52 | 55 | 48 | 40 | 55 |
| Animo ¹ | 60 | 45 | 43 | 32 | 34 | 44 |
| Aroostook ¹ | 50 | 33 | 38 | 33 | 37 | 38 |
| Musketeer | 66 ² | 53 ¹ | 58 ¹ | 44 ¹ | 42 | 54 |
| LSD 5% | 4 | 4 | 5 | 4 | 6 | 2 |

¹1982. ²1981-82.

Table 46. Characteristics of winter rye varieties, 1980-82

| Variety | Winterkill (percent) | Heading (date) | Mature (July) ¹ | Lodging (score) ² | Height (inches) | Weight/ 100 seeds (grams) | Test weight/ bushel (pounds) |
|-----------|-------------------------|-------------------|-------------------------------|---------------------------------|--------------------|---------------------------------|------------------------------------|
| Hancock | 8 | 5-29 | 22 | 3.7 | 51 | 3.0 | 55.7 |
| Puma | 6 | 5-28 | 21 | 3.9 | 52 | 2.6 | 55.6 |
| Rymin | 6 | 5-28 | 21 | 3.5 | 50 | 3.0 | 56.1 |
| Animo | 30 | 6-4 | 25 | 2.8 | 50 | 3.0 | 54.0 |
| Aroostook | 6 | 5-22 | 17 | 4.6 | 54 | 2.2 | 54.5 |
| Musketeer | 7 | 5-28 | 22 | 4.1 | 51 | 2.9 | 55.5 |

¹Rosemount, Crookston, Grand Rapids. ²1 = erect, 9 = flat.



A. Schuhly, agronomy student from Germany, and Aroostook rye which lodged more than the other varieties in this dryland trial on sandy soil at Becker.

NOTES

NOTES

PLANTING RATE AND DATE

Rates are based on normal seedbeds and on use of normal size, good quality seed. Rates used will vary greatly depending on seed cost, desired stand, expected mortality, emerging ability, seed weight, seed germination, seedbed condition, depth of planting, and planting equipment.

| Crop | Bushel weight (pounds) ¹ | Rate/acre (pounds) | Rate (seeds) | Date |
|--------------------------------|---|--------------------|----------------|----------------------------|
| Barley | 48 | 85 | 28/square foot | Early spring |
| Corn | 56 | 17 | 24,000/acre | Late April or early May |
| Fieldbean Black turtle soup | 60 | 45 | 105,000/acre | May 20 to June 15 |
| Great northern | | 90 | 90,000/acre | |
| Kidney | | 90 | 80,000/acre | |
| Navy | | 45 | 105,000/acre | |
| Pink | | 50 | 90,000/acre | |
| Pinto | | 75 | 90,000/acre | |
| Small Red | | 75 | 100,000/acre | |
| Small White | | 35 | 105,000/acre | |
| Flax | 56 | 42 | 85/square foot | April 15 to May 15 |
| Forage Grasses (perennial) | If mixed with legume, sow at time indicated for the legume. | | | |
| Bromegrass alone | 14 | 16 | 50/square foot | Early spring or summer |
| in mixtures | | 10 | 31/square foot | |
| Orchardgrass in mixtures | 14 | 2 | 30/square foot | Early spring or summer |
| Reed canarygrass alone | 46 | 7 | 85/square foot | Early spring or summer |
| in mixtures | | 5 | 60/square foot | |
| Tall fescue in mixtures | 25 | 4 | 21/square foot | Early spring or summer |
| Timothy in mixtures | 45 | 3 | 85/square foot | Early spring or summer |
| Forage Legumes (perennial) | | | | |
| Alfalfa alone | 60 | 11 | 50/square foot | Early spring to August 10 |
| with grass | | 7 | 32/square foot | |
| Alsike clover in mixtures | 60 | 2 | 30/square foot | Early spring to August 10 |
| Birdsfoot trefoil alone | 60 | 7 | 60/square foot | Early spring or summer |
| with grass | | 4 | 34/square foot | |
| Ladino clover in mixtures | 60 | 1 | 18/square foot | Early spring to August 10 |
| Red clover alone | 60 | 9 | 50/square foot | Early spring to August 10 |
| with grass | | 5 | 30/square foot | |
| Oat | 32 | 80 | 28/square foot | Early spring |
| Rye | 56 | 60 | 25/square foot | September |
| Sorghum 18- to 40-inch rows | 56 | 10 | 150,000/acre | May 20 to June 5 for grain |
| 6- to 14-inch rows | | 15 | 5/square foot | |
| Soybean 6- to 8-inch rows | 60 | 80 | 3/foot of row | May 5 to May 25 |
| 20-inch rows | | 65 | 7/foot of row | |
| 30-inch rows | | 55 | 9/foot of row | |
| 40-inch rows | | 50 | 11/foot of row | |
| Sunflower Nonoilseed | 24 | 4 | 17,000/acre | May 1 to June 15 |
| Oilseed | 27 | 3 | 23,000/acre | |
| Wheat Durum | 60 | 90 | 25/square foot | Early spring |
| Hard red spring | | 80 | 28/square foot | Early spring |
| Winter | | 75 | 25/square foot | August 20 to September 20 |
| Other Crops | | | | |
| Adzuki | 60 | 30 | 105,000/acre | May 20 to June 10 |
| Annual canarygrass | 50 | 30 | 40/square foot | Early spring |
| Buckwheat | 48 | 50 | 17/square foot | June 15-July 20 |
| Fieldpea | 60 | 180 | 9/square foot | Early spring |
| With 1½ to 2 bushels of oat | | 70 | 4/square foot | |
| Fababean-medium size | 60 | 180 | 5/square foot | Early spring |
| With 2 bushels of oat | | 60 | 2/square foot | |
| Millet Foxtail | 48 | 15 | 75/square foot | June 15-July 15 |
| Proso | 56 | 20 | 30/square foot | June 15-July 15 |
| Mustard | 56 | 13 | 25/square foot | May |
| Rape Forage | 50 | 6 | 20/square foot | Early spring with oat |
| Oilseed | 50 | 8 | 25/square foot | May |
| Sudangrass 18- to 40-inch rows | 40 | 10 | 25/foot of row | May 20 to June 10 |
| 6- to 14-inch rows | | 20 | 20/square foot | |
| Sweetclover | 60 | 10 | 55/square foot | Early spring |
| Wild rice (wet) | 25 | 30 | 30,000/acre | Late fall |

¹U.S. legal if established. If not established, weight given is that most widely accepted in the United States.