

**Varietal Trials**  
of  
**Farm Crops**

H. K. Hayes, E. R. Ausemus,  
J. O. Culbertson, and J. W. Lambert

*Agricultural Experiment Station*

UNIVERSITY OF MINNESOTA

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# Varietal Trials of Farm Crops

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**A** LIST of recommended varieties of farm crops for Minnesota is drawn up annually at a meeting of workers in the Minnesota Agricultural Experiment Station, including subject-matter specialists in Agronomy, Plant Pathology, Agricultural Extension, Soils, and Agricultural Biochemistry at University Farm and representatives of the branch experiment stations at Waseca, Morris, Crookston, Grand Rapids, and Duluth. To be eligible for recommendation a variety must have been tested in experimental trials for at least three years. These comparative trials are conducted at the central and branch stations, in certain cases on farmers' fields, in cooperative trials conducted by the extension agronomists and county agents, for reaction to important diseases in specially conducted disease nurseries at the central station in cooperation with Plant Pathology, and in tests for quality made by Agricultural Biochemistry or in cooperation with the Northwest Crop Improvement Association. As far as possible new varieties of promise developed by other workers are included in the trials.

A list of recommended varieties of farm crops was published in Folder 22, Agricultural Extension Service, revised April, 1947. This folder includes a brief statement of the origin of each variety, a summary of desirable and undesirable characters, and special regions of adaptation in Minnesota.

The present summary includes comparative agronomic data on varieties under trial in field plots, a brief summary of disease reaction taken largely from Folder 22, and a brief history of varieties that were not included in Folder 22 which are grown in the 1947 trials for barley, flax, oats, rye, spring wheat, winter wheat, and soybeans. For a history and short summary of the characters of varieties included in the recommended list, consult Folder 22.

The project leaders in Agronomy who are responsible for the varietal improvement studies with various crops prepared the individual crop summaries. Cooperators from the Plant Pathology Division include E. C. Stakman, J. J. Christensen, M. B. Moore, and M. F. Kernkamp. Cooperators in Biochemistry include W. F. Geddes, R. A. Bottomley, and J. A. Schricker. Cooperators at the branch experiment stations include R. E. Hodgson at Waseca, A. W. Edson and R. O. Bridgford at Morris, T. M. McCall and O. C. Soine at Crookston, D. L. Dailey and C. H. Griffith at

Grand Rapids, and M. J. Thompson at Duluth. Varietal trials are conducted also in southwestern Minnesota in cooperation with various counties under the direction of R. G. Robinson and the project leaders at University Farm. Certain phases of varietal improvement studies with all crops are in cooperation with crops research workers of the United States Department of Agriculture.

## BARLEY

J. W. LAMBERT

### Yield Comparisons

Comparative average yield data are given in table 1 for 1943-47 at University Farm, Waseca, Morris, and Crookston; for 1943, 1945-47 at Grand Rapids; for 1943-45, 1947 at Duluth; and for 1946-47 in southwestern Minnesota.

Seed for the trials was treated with New Improved Ceresan. Only four or five varieties of barley have been carried consistently in field plot trials for a period of at least three years. Such varieties as Montcalm, Feebar, Wisconsin H76-3-1-1, and others have been tested only one year in field plot trials.

Tregal, a feed variety, on the five-year average yielded somewhat higher than the other varieties at most locations. Kindred, a malting variety, was a close second. Mars yielded slightly less than Kindred but somewhat more than Barbless. Peatland yielded well at Grand Rapids but was the lowest of the five varieties at Duluth. On the basis of two-year data in Redwood County, Tregal was the highest yielder, followed by Kindred.

### Other Agronomic Characters

Comparative data on agronomic characters are given in table 2. Averages for 1943-47 at the four stations, University Farm, Waseca, Morris, and Crookston, and for 1946-47 in southwestern Minnesota give a reliable picture of differences in date of heading, plant height in inches, and weight per bushel.

Mars was the earliest variety, heading on the average four days earlier than Barbless. Kindred averaged one day later than Mars, and Tregal three days later than Mars. Barbless was the tallest variety. Mars and Tregal were each four inches shorter than Barbless. Kindred was intermediate in height. Mars excelled in bushel weight, averaging almost two pounds per bushel heavier than the next heaviest variety, Kindred. Barbless had the lowest bushel weight.

Mars was outstanding in strength of straw. Kindred had the weakest straw. Barbless was only slightly better than Kindred in this respect. Tregal was intermediate in this respect.

### Disease Reaction

Barbless is moderately resistant to barley stripe, moderately susceptible

Table 1. Yield of Barley in Bushels per Acre in Field Plot Trials at University Farm, Waseca, Morris, and Crookston for 1943-47; at Grand Rapids for 1943 and 1945-47; at Duluth for 1943-45 and 1947; and in Southwestern Minnesota for 1946-47

Variety	1943-47				1943 and 1945-47, Grand Rapids	1943-45 and 1947, Duluth	1946-47, Southwestern Minnesota
	U. Farm	Waseca	Morris	Crookston			
Barbless .....	48.5	34.1	44.0	47.1	30.2	34.2	45.6
Mars .....	54.8	36.1	45.0	51.1	36.3	35.3	43.1
Kindred .....	51.3	41.8	48.8	53.4	34.0	36.9	47.6
Tregal .....	57.3	39.3	52.7	52.5	38.7	34.0	51.8
Peatland .....	.....	.....	.....	.....	34.7	29.6	.....

**Table 2. Averages for Date of Heading, Plant Height in Inches, and Weight per Bushel in Pounds at University Farm, Waseca, Morris, and Crookston, 1943-47, and for Plant Height in 1947 and Weight per Bushel in 1946-47 in Southwestern Minnesota**

Variety	1943-47, Four Stations			Southwestern Minnesota	
	Date Heading	Height	Weight per bu.	1947 Height	1946-47 Weight per bu.
		Inches	Pounds	Inches	Pounds
Barbless .....	June 29	35	44.2	28	45.8
Mars .....	June 25	31	47.4	28	49.7
Kindred .....	June 26	33	45.7	30	47.8
Tregal .....	June 28	31	44.9	27	47.3

to spot blotch, and susceptible to scab, loose smut, and stem and leaf rusts.

Mars is resistant to stem rust and moderately resistant to spot blotch, but is susceptible to scab, loose smut, and leaf rust.

Kindred is resistant to stem rust and moderately susceptible to spot blotch.

Tregal is resistant to loose smut and susceptible to stem and leaf rusts.

### Malting Quality

At present Barbless and Kindred are acceptable to American maltsters. Because of its small seeds and very low diastatic power, Mars is not a suitable variety for malting. Tregal is not acceptable for malting.

### New Varieties Not So Extensively Tested

The following new varieties have been tested in rod-row trials for two years and in field plot trials for one year in Minnesota. The information given is therefore for a relatively short period and is to be interpreted accordingly.

Montcalm was developed at MacDonald College, Quebec. It is six rowed, smooth awned, and has a blue aleurone. It has yielded relatively well during two years' testing in Minnesota. It has only fair strength of straw and matures at about the same time as or slightly earlier than Barbless. Under Canadian standards it is reported to have high malting quality. No large-

scale malting trials have been reported in the United States as yet. It is susceptible to stem and leaf rusts, loose smut, mildew, and spot blotch.

Feebar is a very early, high-yielding feed barley developed at the South Dakota Experiment Station. It has averaged two or three inches shorter than Mars. It is resistant to stem rust.

Wisconsin H76-3-1-1 is a high-yielding variety recently developed at the Wisconsin Agricultural Experiment Station. It is six rowed, smooth awned, and has a white aleurone. It has relatively strong straw and in preliminary malting trials has exhibited good malting quality. It is moderately resistant to stem rust. It is about the same in maturity as Barbless.

## FLAX

J. O. CULBERTSON

### Yield Comparisons

Average yields in bushels per acre are given in table 3 for the three-year period, 1945-47, at University Farm, Waseca, Morris, and Crookston, and for a two-year period, 1946-47, at Grand Rapids and southwestern Minnesota.

Dakota, Koto, and Redwing have yielded well at University Farm as an average for the past three years; Minerva has averaged about 1.5 bushels less; and the average yield of Crystal has been considerably less than all other varieties. This lower yield of

**Table 3. Yield of Flax in Field Plot Trials for the Three-Year Period, 1945-47, at Four Stations, and for the Two-Year Period, 1946-47, at Two Locations**

Variety	University Farm	Waseca	Morris	Crookston	Grand Rapids	Southwestern Minnesota
Bison	18.3	18.5	19.5	13.4	12.8	14.3
Redwing	20.9	19.1	20.5	10.1	13.4	16.7
Crystal	16.5	20.6	22.7	10.7	12.7	19.0
Koto	21.1	20.6	21.9	12.6	15.0	18.7
Dakota	21.2	26.0	23.8	13.2	16.7	18.7
Minerva	19.6	18.4	22.0	11.6	14.6	16.2
Royal	.....	.....	22.9	15.1	.....	.....
B5128	.....	.....	.....	14.1	.....	.....

Crystal is due in part to its susceptibility to late wilt at University Farm. Crystal, Koto, and Dakota have given the best yields at Waseca, with Redwing, Bison, and Minerva yielding somewhat less. At Morris, the highest average yield was produced by Dakota, followed closely by Royal, Crystal, Minerva, and Koto. Bison was lowest in average yield. Royal, B5128, Bison, and Dakota gave the best yields at Crookston, while Redwing and Crystal were poorest.

As an average for the two-year period 1946-47 at Grand Rapids, the highest-yielding varieties were Dakota, Koto, and Minerva. The best-yielding varieties in southwestern Minnesota for the same period were Crystal, Koto, and Dakota.

The varieties Royal and B5128 are not included in the list of varieties recommended for Minnesota. Both of these varieties produce oil of low dry-

ing quality. Royal has somewhat weak straw, and B5128 is susceptible to pasmo.

### Other Agronomic and Quality Characters

Data given in table 4 include date ripe, height of plant, weight per 1,000 seeds, oil content, and iodine number. These data are averages for the three-year period 1945-47 at four stations. The varieties Royal and B5128 were not grown in all the tests, and the data for these varieties have been adjusted so that they are comparable with those of the other varieties.

The average date of ripening of Redwing and Dakota, the two earliest varieties, is only five days earlier than Royal and B5128. Koto, Crystal, Bison, and Minerva fall between the extremes in maturity date.

The varieties are similar in plant height, the greatest difference between

**Table 4. Average Date Ripe, Height of Plant, Weight per Bushel, Oil Content, and Iodine Number for Flax Varieties Grown in Field Plots in 1945-47**

Variety	Date ripe	Height	Weight per 1,000 seeds	Oil content	Iodine number
	August	Inches	Grams	Per cent	
Bison	13	24	6.1	38.9	178
Redwing	10	23	4.5	37.3	186
Crystal	12	24	5.9	38.9	185
Koto	11	24	5.4	38.5	185
Dakota	10	22	5.9	37.5	185
Minerva	14	23	5.9	41.4	186
Royal*	15	24	5.6	39.0	177
B5128*	15	23	6.6	39.0	180

\* Not grown at all stations. Data for these varieties have been adjusted so that they are comparable with other varieties.

any two varieties being two inches. Dakota was shortest, while Bison, Crystal, Koto, and Royal were slightly taller.

The seed of Redwing is definitely smaller than that of the other varieties. All the other varieties shown in the table are classified as having medium-size seeds, although B5128 tends to have seed appreciably larger than that of Koto.

Minerva has outstanding oil content, with an average 2.5 per cent higher than Bison. Royal, B5128, and Crystal are about equal to Bison in oil content; Redwing and Dakota definitely lower; and Koto about the same as Bison.

Oil from the seed of Redwing, Minerva, Crystal, Koto, and Dakota has excellent drying quality, as indicated by the relatively high iodine number. Bison, B5128, and Royal are lower in oil quality than the other varieties tested.

### Disease Reaction

Bison is the most susceptible to rust of all the varieties, all others having some degree of resistance. Crystal and B5128 are immune to races of rust commonly found in the United States. Koto and Dakota are rust resistant, while Minerva and Royal are moderately resistant. Redwing is moderately susceptible.

All varieties tested have some resistance to wilt. Koto, Dakota, and Bison are highly resistant. Minerva and Redwing are moderately wilt resistant, while B5128 and Royal are somewhat more susceptible than Redwing. Crystal has been susceptible to late wilt at University Farm, but has not been seriously injured by wilt in other trials in Minnesota.

None of the varieties is resistant to pasmo, although there are variations in degree of susceptibility. Minerva and Crystal are moderately resistant; Redwing and B5128 are susceptible; all

the other varieties listed are moderately susceptible.

### New Varieties Not So Extensively Tested

Two selections from a cross of B5128 x Redson were grown in field plot yield trials for the first time in 1947. These have been given Minnesota numbers 217 and 218. Both varieties have yielded well in rod-row tests, and No. 218 had an excellent average yield in plot trials in 1947. Both varieties have high oil content and iodine number; they are highly resistant to rust and wilt, but moderately susceptible to pasmo.

## OATS

H. K. HAYES

### Yield Comparisons

Comparative average yield data are given in table 5 for 1945-47 at the central and branch stations; in 1946-47 in southwestern Minnesota; and in 1945-47 on sandy-soil trials (5 locations in 1945 and at 4 each in 1946-47 inclusive). The sandy-soil trials were made in Dakota, Meeker, and Stearns counties in 1945 and in Meeker and Stearns counties in 1946-47 inclusive.

Seed for the trials was treated with New Improved Ceresan. It is interesting to note that Vicland which is susceptible to *Helminthosporium victoriae*, which may cause reduction in stands, premature ripening, and lowering in yield, yielded less than the check variety Gopher at University Farm, Morris, Crookston, in southwestern Minnesota, and in trials on sandy soils, and about the same as Gopher at Waseca, Grand Rapids, and Duluth. In earlier years, however, Vicland was much superior in yield to Gopher in nearly all trials.

On the average, all of the new varieties, including Bonda, Mindo, Clin-

**Table 5. Yield of Oats in Bushels per Acre in Field Plot Trials at the Central and Branch Stations for 1945-47, in Southwestern Minnesota for 1946-47, and on Sandy Soil for 1945-47**

Variety	1945-47						1946-47, Southwestern Minnesota	1945-47, Sandy soil
	University Farm	Waseca	Morris	Crookston	Grand Rapids	Duluth		
Gopher .....	91.7	66.3	96.8	63.8	69.4	73.7	80.2	60.0
Vicland (or Tama) .....	87.6	65.6	84.1	58.9	67.6	73.0	67.0	54.8
Bonda .....	104.6	82.7	84.6	72.3	64.5	76.9	78.5	57.3
Mindo .....	105.5	77.9	89.5	68.4	74.1	80.1	78.4	.....
Andrew .....	106.1	79.0	88.5	79.7	75.6	79.0	.....	.....
Zephyr .....	108.2	83.0	100.0	76.9	74.7	84.0	.....	60.4
Clinton .....	104.8	79.9	92.6	72.5	78.3	82.8	87.9	60.4
Ajax .....	106.2	76.5	96.7	78.0	79.2	81.0	87.3	63.6
Bond x Rainbow No. 844 .....	.....	.....	.....	.....	.....	.....	.....	61.3
Minrus .....	.....	.....	.....	.....	.....	.....	.....	60.0

ton, Andrew, and Zephyr, which have Bond as one parent, and Ajax, the Canadian variety selected from the cross of Victory x Hajira, greatly exceeded Gopher in yielding ability. At Morris, during this three-year period, Gopher yielded more than all varieties except Zephyr, which led in yielding ability, and Ajax, which yielded about the same as Gopher. For the two-year period 1946-47 in southwestern Minnesota, Clinton and Ajax proved superior to other varieties. In the trials on

sandy soils yield differences were not very great.

### Other Agronomic Characters

Comparative data on agronomic characters are given in table 6.

Averages for 1945-47 at the four stations, University Farm, Waseca, Morris, and Crookston, give a reliable picture of differences in date of heading, plant height in inches, and weight per bushel. For date of heading, Mindo

**Table 6. Averages for Date Heading, Plant Height in Inches, and Weight per Bushel in Pounds at Four Stations, University Farm, Waseca, Morris, and Crookston, 1945-47; Weight per 200 Kernels in Grams and Hull Percentage at the Same Four Stations, 1945-46; Plant Height in 1947 and Weight per Bushel in 1946-47 in Southwestern Minnesota; and Plant Height and Weight per Bushel on Sandy Soil, 1945-47**

Variety	Four Stations						Southwestern Minnesota		Sandy Soil	
	1945-47			1945-46			1947 Height	1946-47 Weight per bu.	1945-47 Height	1945-47 Weight per bu.
	Date heading	Height Inches	Weight per bu. Pounds	Weight of 200 kernels Grams	Hull percent- age					
Gopher .....	7-1	36	32.9	4.4	26.9	34	36.1	.....	.....	
Vicland (or Tama) .....	7-1	34	32.8	4.5	29.7	28	33.7	27	33.6	
Bonda .....	7-1	41	37.3	5.9	27.0	38	38.3	35	38.8	
Mindo .....	6-28	35	35.6	5.0	27.4	31	36.5	.....	.....	
Andrew .....	6-28	37	35.0	5.5	23.8	34	.....	.....	.....	
Zephyr .....	7-2	40	35.1	6.5	28.2	36	.....	34	36.0	
Clinton .....	7-1	36	36.0	4.8	25.0	35	38.3	32	36.8	
Ajax .....	7-4	42	33.1	4.8	28.8	40	36.4	35	34.1	
Bond x Rainbow No. 844 .....	.....	.....	.....	.....	.....	.....	.....	32	38.6	
Minrus .....	.....	.....	.....	.....	.....	.....	.....	34	31.9	



and Andrew were three days earlier than Gopher, Vicland, Bonda, and Clinton, on the average, while the latter four varieties headed one day earlier than Zephyr and three days earlier than Ajax. Ajax, Bonda, and Zephyr were the tallest varieties by from 3 to 6 inches. Andrew, Clinton, and Mindo were relatively short, while Vicland averaged one inch shorter than Mindo. Bonda excelled in weight per bushel, averaging 37.3 pounds, followed in order by Clinton, Mindo, Zephyr, and Andrew, all of which were distinctly superior to Vicland, Gopher, or Ajax.

Weight of 200 kernels and hull percentages are given at the same four stations for 1945-46, inclusive. Zephyr and Bonda have large grains while most of the other varieties have larger grains than Gopher and Vicland. Clinton and Ajax more closely approach Gopher in grain size than any of the varieties.

Andrew and Clinton excel in having a low percentage of hull while Vicland, Ajax, and Zephyr are somewhat inferior in this respect.

In southwestern Minnesota, where Clinton excelled in yield for the two-year period under trial, it also gave as high weight per bushel as Bonda, which usually excels other varieties in this character.

While yields were not very widely different in the sandy-soil trials, all of the varieties were superior to Minrus in weight per bushel. Bonda again gave the highest bushel weight. Minrus, Ajax, Zephyr, and Bonda had the tallest straw, on the average.

All of the newer varieties of the trials have been somewhat superior to Gopher in standing ability. Clinton, Mindo, Bonda, and Andrew excel.

### Disease Reaction

Gopher is susceptible to stem rust, crown rust, and the smuts.

Vicland is susceptible to *Helminthosporium victoriae*, which may cause reduction in stands, premature ripening, and a lowering of yielding ability.

Bonda, Mindo, Clinton, Zephyr, and Minrus are resistant to a group of races of stem rust, including race 8, which has increased in prevalence in recent years. Andrew, Ajax, Vicland, and Bond x Rainbow No. 844 are resistant also to a group of stem-rust races but are susceptible to race 8.

All of the varieties, including Bonda, Mindo, Clinton, Zephyr, Andrew, and Bond x Rainbow No. 844, carry the Bond type of high resistance to many physiologic races of crown rust, while Ajax and Minrus are susceptible. All of these varieties are susceptible to certain races of crown rust, including race 45.

### New Varieties Not So Extensively Tested

Eaton, a new variety increased in Michigan from a cross of Bond x Iogold and selected at Ames, gave excellent yields in 1947. It is resistant to crown rust, stem rust, and the smuts, but is susceptible to race 8.

Benton, a Bond x D69 cross increased in Indiana, two unnamed Bond x D69 crosses C.I. 4285 and C.I. 4286, and Shelby, a Bond x Anthony cross from Iowa, were tested in 1947. All of these varieties gave relatively satisfactory yields. They are resistant to stem rust including race 8, crown rust, and the smuts.

Forvic, selected in Wisconsin from a cross of Forward x (Victoria x Richland), is susceptible to *Helminthosporium victoriae* and has not yielded well in Minnesota.

Three Canadian oat varieties have been tested in rod-row trials. They are Beaver, selected from a cross of Vanguard x Erban; Exeter, selected from a cross of Victory x Rusota; and Garry, selected from a cross of Victory x (Victoria x Hajira-Banner). Garry is

susceptible to *Helminthosporium victoriae* but resistant to all races of stem rust and carries the Victoria type of crown-rust resistance. Although Exeter and Beaver have given good yields they are not the equal of other available varieties in carrying resistance to crown rust and do not seem to have unusual promise for Minnesota.

## RYE

### H. K. HAYES

Three varieties of rye have been tested for many years. There has been little difference in winter injury. The following is a brief description of these varieties.

**DAKOLD.** Mixed seed color. Developed in North Dakota.

**EMERALD.** Relatively uniform in green seed color. Produced at University Farm by selection for pure seed color in self-pollinated lines and their combination.

**IMPERIAL.** Uniform colorless seed. Developed at the Wisconsin station.

Averages for many years are given for yield at five stations. In general, Imperial and Emerald are somewhat superior to Dakold in yield.

Table 7. Yield in Bushels per Acre in Five Station Trials

Location	No. years tested	Dakold	Emerald	Imperial
University Farm	10	39.2	39.0	41.8
Waseca	11	37.4	40.0	41.4
Morris	10	28.5	30.5	32.4
Grand Rapids	11	32.7	38.2	38.4
Duluth	8	18.2	22.9	23.2

## SPRING WHEAT

### E. R. AUSEMUS

#### Yield Comparisons

Comparative average yield data are given in table 8 for two different pe-

riods, 1943-47 and 1946-47 for the six experiment stations, and in 1946-47 for southwestern Minnesota.

Seed for the trials was treated with New Improved Ceresan. On the average, the recommended bread wheat varieties Mida, Pilot, and Rival gave higher yields than Newthatch, Cadet, or Regent. At Waseca, Rival and Mida excelled in yield and are probably more desirable for southern Minnesota, since Pilot is more susceptible to lodging. These two varieties, Mida and Rival, also have excelled in yield at Morris and Crookston.

Henry is an excellent yielding wheat, but has not been recommended because of its inferior milling and baking qualities.

During the two-year period, the three new hybrid varieties, Mida x Pilot, Minn. No. 2763, Mercury x Thatcher, Minn. No. 2773, and Hope x Timstein, Minn. No. 2776, yielded equal to Mida, Pilot, and Rival in these preliminary tests. Redman was one of the lower-yielding varieties in this group. Mida and Henry excelled in yield in the southwestern Minnesota tests.

Mindum and Stewart were the highest-yielding durums.

### Other Agronomic Characters

Comparative data on agronomic characters are given in table 9.

Averages for 1946-47 at the four stations, University Farm, Waseca, Morris, and Crookston, indicate the differences in date of heading, plant height in inches, and weight per bushel. For date of heading, Hope x Timstein, Minn. No. 2776, was earliest while Redman and Mercury x Thatcher, Minn. No. 2773, headed one day later. The other varieties were two to four days later than the earliest variety. Cadet and Mida x Pilot, Minn. No. 2763, were the latest varieties. Mida and Rival, Cadet, Henry, and Mida x Pilot, Minn. No. 2763, were the tallest

Table 8. Yield of Bread Wheats and Durums Grown in Field Plot Trials at Six Experiment Stations during Two Periods, 1943-47 and 1946-47, and in Southwestern Minnesota during 1946-47

Variety	University Farm		Waseca		Morris		Crockston	
	1943-47	1946-47	1943-47	1946-47	1943-47	1946-47	1943-47	1946-47
<b>Bread Wheats</b>								
Thatcher	29.6	31.7	19.2	22.8	29.6	29.8	28.4	29.3
Pilot	32.5	35.9	21.4	23.6	31.5	30.4	28.8	29.1
Rival	32.3	35.8	22.5	28.0	33.5	34.5	30.2	31.9
Regent	27.4	29.9	19.9	21.2	28.3	26.2	28.7	29.9
Mida	32.9	36.8	22.0	26.0	32.0	29.8	32.1	33.6
Newthatch	30.7	32.3	19.9	21.8	29.1	27.0	28.5	27.6
Cadet	30.1	32.0	20.8	23.8	29.4	29.9	28.8	29.2
Henry	34.9	39.4	24.0	28.7	34.1	35.0	34.4	36.2
Mida x Pilot		35.3		28.7		33.2		32.7
Mercury x Thatcher		35.1		29.2		34.2		33.7
Hope x Timstein		39.9		25.9		33.8		33.8
Redman		33.3				31.2		28.8
<b>Durums</b>								
Mindum	34.8	40.0			35.3	36.3	32.2	31.7
Carleton	32.0	37.7			31.2	30.0	32.7	30.7
Stewart	33.3	38.2			36.5	37.0	32.3	31.7

Variety	Grand Rapids		Duluth		Southwestern Minnesota
	1943-47	1946-47	1943-47	1946-47	1946-47
Thatcher	17.2	17.3	15.1	11.4	.....
Pilot					25.2
Rival	23.9	23.2	21.4	16.5	26.2
Mida	24.8	25.5	20.6	15.1	28.6
Henry		25.6		18.0	30.1
Hope x Timstein		25.2		16.1	.....

varieties. Hope x Timstein, Minn. No. 2776, Redman, and Newthatch were the shortest. Mida, Rival, Mercury x Thatcher, Minn. No. 2773, Mida x Pilot, Minn. No. 2763, and Hope x Timstein, Minn. No. 2776, excelled in weight per bushel.

Of the durums, Mindum was one day earlier than Carleton or Stewart. Stewart was taller by one inch than the other varieties and it excelled in weight per bushel.

**Quality**

All the recommended varieties of bread wheats are acceptable to the trade in milling and baking characters. The newer varieties tested for two years have appeared satisfactory in preliminary quality tests. Henry is clas-

Table 9. Averages for Date of Heading, Plant Height in Inches, and Weight per Bushel for Four Stations, University Farm, Waseca, Morris, and Crockston, in 1946-47

Variety	Date Heading	Height	Weight per Bu.
		Inches	Pounds
<b>Bread Wheats</b>			
Thatcher	6-30	36	58.4
Pilot	7-1	37	57.7
Rival	7-1	39	59.6
Regent	6-30	36	57.0
Mida	6-30	39	60.6
Newthatch	6-30	35	57.1
Cadet	7-2	38	56.7
Henry	6-30	38	59.4
Mida x Pilot (2763)	7-2	38	60.8
Mercury x Thatcher (2773)	6-29	37	59.3
Hope x Timstein (2776)	6-28	34	60.0
Redman	6-29	35	57.6
<b>Durums</b>			
Mindum	7-3	44	60.8
Carleton	7-4	44	60.6
Stewart	7-4	45	61.5

sified as undesirable in milling and baking characters.

The three durum varieties are accepted by the trade for the making of semolina products.

### Disease Reaction

All varieties of the bread wheats and the two durums, Carleton and Stewart, are moderately resistant to stem rust. Only one bread wheat variety, Hope x Timstein, Minn. No. 2776, and the three durums, Mindum, Carleton, and Stewart, were moderately resistant to leaf rust.

Mida is moderately susceptible to loose smut. Mida, Rival, Newthatch, Pilot, and Regent are moderately resistant to bunt. Carleton and Stewart are moderately susceptible to bunt.

All the varieties are susceptible to scab, although Rival and Mida appear to be somewhat less susceptible than the others. Spring wheat is often severely injured by scab, if wheat follows corn in the rotation in southern Minnesota.

### New Varieties Not Extensively Tested

Hope x Timstein, Minn. No. 2789, and Premier x Timstein, Minn. No. 2790, tested for the first time in 1947, have given excellent yields, are moderately resistant to stem and leaf rust, and appear satisfactory in milling and baking characters in preliminary trials.

## WINTER WHEAT

E. R. AUSEMUS

### Yield Comparisons

Comparative average yield data are given in table 10 for 1945-47 at University Farm and Waseca, and for 1945 and 1947 at Grand Rapids. There was a crop failure at Grand Rapids in 1946, due to winterkilling.

Seed for the trials was treated with New Improved Ceresan. Average yields

**Table 10. Summary of Yields in Bushels per Acre of Winter-Wheat Varieties Grown at University Farm, Waseca, and Grand Rapids in 1945-47**

Variety	University Farm	Waseca	Grand Rapids*
	1945-47	1945-47	1945 and 1947
Minturki .....	36.2	25.9	28.6
Marmin .....	38.9	23.6	28.5
Minter .....	37.8	26.1	37.9
Blackhawk .....	36.8	24.6	29.1

\* Crop failure in 1946, two-year average.

were higher at University Farm than at the other two stations. The new variety, Minter, yielded more than Minturki or Blackhawk at University Farm and was the highest-yielding variety at Waseca and Grand Rapids.

### Other Agronomic Characters

Comparative data on agronomic characters are given in table 11.

Averages for the two stations, University Farm and Waseca, in 1945-47, give a reliable index of differences in date of heading, plant height in inches, percentage of winter injury, and weight per bushel. Marmin was the earliest-heading variety, Minter and Minturki were a day or two later, and Blackhawk was the latest.

The average height of three of the varieties is the same, with Minter being two inches shorter. Minter had the least winter injury and Blackhawk the highest. Minter excelled in weight per bushel and Blackhawk was the lowest, although the test weight of all varieties was excellent.

**Table 11. Averages for Date of Heading, Height of Plant in Inches, Percentage of Winter Injury, and Weight per Bushel at University Farm and Waseca in 1945-47**

Variety	Date Heading	Height	Winter Injury	Weight per Bu.
		Inches	Per cent	Pounds
Minturki .....	6-20	40	14	61.0
Marmin .....	6-18	40	15	60.8
Minter .....	6-19	38	12	61.3
Blackhawk .....	6-22	40	23	60.7

### Disease Reaction

Minter and Blackhawk were moderately resistant to leaf rust, while Marmin and Minturki were susceptible. Minter was moderately resistant to stem rust, while the other three varieties, Minturki, Marmin, and Blackhawk, were susceptible.

### Quality

Minter and Blackhawk were superior to Marmin and Minturki in milling and baking characteristics. Minter had a whiter crumb color and a lower carotinoid pigment content than Minturki.

### New Varieties Not Extensively Tested

Twelve new hybrid varieties were tested in 1947. These are selections from crosses between Hope or H44 and their derivatives with Minturki, Minhardi, or Marmin. Each of these varieties has been moderately resistant to stem rust and in preliminary trials has been superior to Minturki and Marmin in milling and baking quality.

## SOYBEANS

J. W. LAMBERT

### Yield Comparisons

Comparative average yield data are given in table 12 for 1944-47 at University Farm, Waseca, and Morris and for 1946-47 at Crookston and southwestern Minnesota.

At University Farm the earlier varieties, Kabott, Flambeau, and Ottawa Mandarin, gave somewhat higher yields than the later varieties, such as Habaro and Wisconsin Manchu 606. At Waseca and Morris the later varieties were slightly superior. However, the differences in either case were not great.

Flambeau gave the highest yield at Crookston on the basis of two-year data. In southwestern Minnesota differences in yield were very small among the varieties tested.

The data reported here indicate that there is no great yield advantage in growing the later-maturing varieties. Quality of the beans is frequently better in the earlier varieties inasmuch as they are much more likely to mature fully before killing frosts.

### Other Agronomic Characters

Comparative data on agronomic characters are given in table 13. Only University Farm data are reported for maturity, lodging, and plant height. Seed size is reported for University Farm and Morris for 1946-47. Bushel-weight data are averages of Morris in 1946 and University Farm and Morris in 1947. Oil percentages are the averages of University Farm and Morris in 1944 and 1945.

At University Farm, Kabott averaged about a week earlier than Flambeau, which matured five days earlier than Ottawa Mandarin. Ottawa Mandarin matured about 10 days earlier

Table 12. Yield of Soybeans in Bushels per Acre in Field Plot Trials in 1944-47 at University Farm, Waseca, and Morris and in 1946-47 at Crookston and Southwestern Minnesota

Variety	1944-47			1946-47	
	University Farm	Waseca	Morris	Crookston	Southwestern Minnesota
Kabott .....	20.6	.....	18.2	9.9	.....
Flambeau .....	20.2	28.2	23.9	13.0	21.2
Ottawa Mandarin .....	20.9	28.6	21.0	11.6	19.6
Pridesoy .....	17.4	.....	21.6	.....	18.8
Ontario .....	18.3	.....	22.9	.....	19.8
Wisconsin Manchu 606 .....	16.6	30.2	22.9	.....	20.5
Habaro .....	16.2	30.4	21.6	.....	22.1

**Table 13. Averages for Date Mature, Lodging Score, and Plant Height in Inches at University Farm, 1944-47; for Weight per 100 Beans and Weight per Bushel at University Farm and Morris, 1946-47; and for Oil Content at University Farm and Morris, 1944-45**

Variety	University Farm, 1944-47			University Farm and Morris		
	Date mature	Lodging score*	Height	1946-47		1944-45
				Weight per 100 seeds	Weight per bu.†	Oil content
			Inches	Grams	Pounds	Percentage
Kabott .....	8-31	1.6	28	16.1	57.1	19.0
Flambeau .....	9-7	2.1	28	13.2	57.4	19.1
Ottawa Mandarin .....	9-12	1.0	27	16.2	57.5	18.3
Pridesoy .....	9-13	1.8	28	12.4	58.7	16.8
Ontario .....	9-19	2.0	28	15.9	57.3	19.2
Wisconsin Manchu 606 .....	9-22	2.6	31	13.9	58.1	19.0
Habaro .....	9-29	2.3	30	16.1	58.1	17.4

\* Score of 1, all plants erect; 5, all plants completely lodged.

† University Farm data for 1947 only.

than Wisconsin Manchu 606 and 17 days earlier than Habaro. Habaro is considered about as late a variety of soybeans as it is advisable to plant in Minnesota.

Ottawa Mandarin excelled in ability to withstand lodging while Wisconsin Manchu had considerable tendency to lodge. The other varieties were more or less intermediate.

Ottawa Mandarin may be criticized for its lack of height. Habaro and Wisconsin Manchu averaged three and four inches taller, respectively, than Ottawa Mandarin.

Kabott, Ottawa Mandarin, and Habaro are relatively large-seeded varieties. Flambeau and Wisconsin Manchu have medium-sized seeds. None of the varieties listed can be classified as very small seeded.

Differences in bushel weight were not great among the varieties. Pridesoy, the smallest-seeded variety, gave the highest bushel weight. There was, however, no consistent correlation between seed size and bushel weight.

In percentage of oil Ontario was highest, followed closely by Flambeau, Kabott, and Wisconsin Manchu 606. Pridesoy and Habaro were low in oil content. Ottawa Mandarin was intermediate.

### Other Varieties Not So Extensively Tested

The Richland variety is at present recommended in the southern and south central corn zones of Minnesota for hay production only. It is considered too late for consistent production of high-quality seed in Minnesota.

Earlyana is a variety of maturity similar to Habaro. It yields about the same as Habaro and lodges rather badly.

Hawkeye is a new variety recently developed cooperatively by the Iowa Agricultural Experiment Station and the United States Regional Soybean Laboratory. It is of about the same maturity as Richland and hence is considered too late for seed production in Minnesota.