

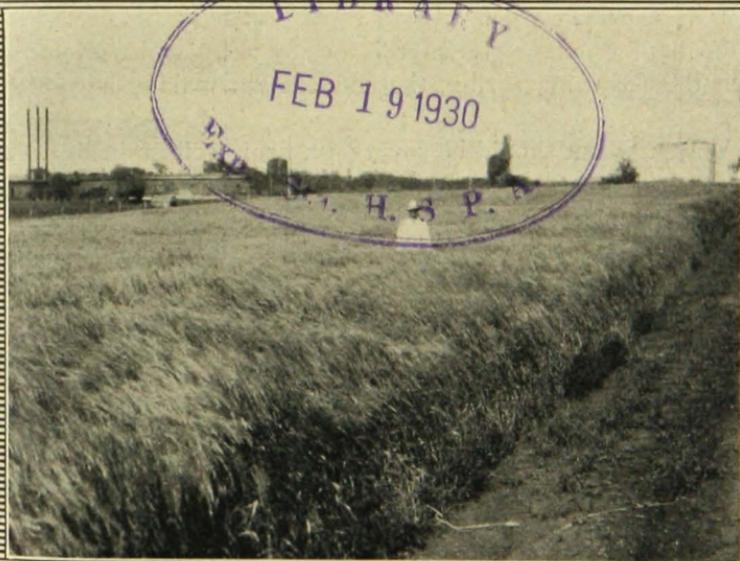
# WINTER WHEAT VARIETIES

## IMPORTANCE and CULTURE

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## CONCLUSIONS

Winter wheat is one of the most profitable cash grain crops for southern Minnesota. It will fit into most rotation plans and helps to distribute uniformly both man and horse labor.

The production of the Minturki variety has made winter wheat a relatively dependable crop, altho some winter injury must be expected when snow covering is light or sleet freezes to the bare ground. When this occurs oats or barley may be sown the following spring, the combination making a good feed crop.

Winter wheat should be sown on a firm, well drained seedbed at the rate of from 75 to 90 pounds per acre from September 1 to 10. Later seedings are more subject to winter injury and often yield less.

THE acreage of winter wheat in southern Minnesota has increased steadily since 1918, when Minturki was distributed. Its high yielding ability, winter-hardiness, and rust-resistance makes it a dependable cash crop. In the early days, southeastern Minnesota was the heart of the spring-wheat producing area. Rochester and Red Wing were the great wheat markets, with what were then considered enormous storage facilities.

### WHEAT AREA MOVES NORTHWARD

As settlers poured into the new state, spring wheat moved northward until the level plains of the Red River Valley were transformed into one great wheat field. Machinery for handling large acreages of wheat was developed and improved, and farmers on the smaller farms in the southern part of the state found it hard to grow wheat in competition with those on new, cheaper land to the north.

Farmers in southern Minnesota found that they could not profitably continue to put a large part of their farms to wheat year after year, for the soil lost its virgin fertility, weeds became troublesome, and stem rust caused frequent losses. These conditions forced farmers into more diversified lines. In the eastern counties, dairying has supplanted wheat as the main source of farm income, while in southwestern Minnesota corn, beef, and hogs have been most profitable. The marketing of farm crops through livestock keeps most of the fertility on the farm and is good management; but most farmers, especially those with considerable acreage, like to have a cash grain crop to sell in addition to their livestock.

### WINTER WHEAT ACREAGE EXPANDING

Spring wheat was formerly the most satisfactory cash grain crop, but stem rust and low yields made its production so uncertain that flax and corn rapidly replaced it. Winter wheat was tried, and in favorable years gave good returns, but losses from winter-killing were so frequent and so severe that southern Minnesota, for the four-year period 1913 to 1916, grew an average of only 56,250 acres per year. The next four years saw only a slight increase—to an average of 68,500 acres. From 1921 to 1924 the average increased to 108,250 acres, and in the next four years to 159,000 acres. This means that 2.8 times as much winter wheat was grown from 1925 to 1928 as from 1913 to 1916. Figures are from the United States Yearbook of Agriculture.

Winter wheat acreage is increasing in southern Minnesota for several good reasons. The crop fits well into a rotation and labor is distributed more evenly over the year. The new winter-hardy varieties provide a dependable cash crop and planting in the fall helps to control weeds.

### **IT FITS INTO THE ROTATION**

Farm managers in southern Minnesota usually plan to grow as much corn for silage and grain as they can conveniently care for and enough hay to feed their livestock. A good rotation, however, usually requires a small-grain crop on from one-third to one-half the acreage. Winter wheat is excellent in the rotation, doing well as a companion crop for clover, alfalfa, or grass, which may be seeded in the spring and dragged or rolled in, a practice that seems to be beneficial to the wheat. Wheat needs less moisture than oats and, as it is cut earlier, winter wheat is more favorable to the new seeding of hay or pasture.

### **IT MAY BE PASTURED**

Winter wheat is seeded in early September when harvest is over and silos generally are filled, but before corn is ready to husk. It does not interfere with other farm operations and gets the benefit of fall and spring rains. It may also be pastured lightly in late fall and early spring, when other feed is sometimes scarce. Sheep breeders find a lush field of winter wheat a good place to flush the ewes before breeding.

### **IT DISTRIBUTES LABOR**

Experienced wheat growers appreciate the close relation between early seeding of spring wheat and yield. There is always a rush to get the spring crops in and late snows or early rains often make the soil difficult to work. Winter wheat requires no care at this time and has all the benefit from early planting that is so important to any wheat crop. It matures earlier than most small grains. This lengthens the harvest season and distributes the peak load for men and horses during the rush of cutting and shocking.

### **IT CONTROLS WEEDS**

Winter wheat helps to control weeds because it is seeded in the fall. Fall plowing gives the foxtail, or pigeon grass, a set-back and prevents many other common weeds from seeding. The wheat begins to grow so early in the spring that most minor weeds are checked by

crowding and shade. The early harvest makes possible thoro early fall cultivation to control quack grass and thistles. If winter wheat is seeded down, the hay or pasture crop can get ahead of most fall-seeding weeds. The early harvest, too, sometimes enables the wheat to escape hard summer storms and epidemics of stem rust.

### IT PAYS

The deciding factor with most farmers in selecting the crops they will grow is, it pays. The farm manager must consider many factors in deciding what kind of grain to grow, but Table 1 may help him to decide between spring and winter wheat. The figures are taken from the United States Yearbook of Agriculture.

Table 1. Average Farm Value per Acre of Winter and Spring Wheat in Minnesota

Year	Winter wheat	Spring wheat
1913-16.....	\$18.11	\$12.54
1917-20.....	34.02	28.45
1921-24.....	18.86	15.82
1925-28.....	21.06	14.96
1913-28.....	23.01	17.94
1916, 1919, 1920, 1927.....	27.25	14.94

This shows that for sixteen years winter wheat has averaged 28.3 per cent greater returns per acre than spring wheat. There were sever epidemics of stem rust in 1916, 1919, 1920, and 1927. During these years winter wheat returned 82.4 per cent more per acre than spring wheat.

That winter wheat is a valuable cash crop is evident from a comparison of the average yield of winter wheat and the farm value per acre based on the December 1 price with that of other small grains and corn. The figures given in Table 2 emphasize the importance of winter wheat as a cash crop for southern Minnesota. The data were taken from United States Department of Agriculture yearbooks. The value was slightly higher for winter wheat than for flax and much higher than for other small grains. The value of corn was only slightly higher than that of winter wheat.

Table 2. Average Yields and Value per Acre Based on December 1 Price of Other Small-Grain Crops and of Corn in Comparison with Winter Wheat, 1918-27

Crop	Yield per acre	Acre value
	bu.	
Winter wheat .....	17.0	\$24.39
Flax .....	9.8	23.26
Spring wheat .....	13.4	18.69
Barley .....	26.5	16.37
Rye .....	16.9	16.00
Oats .....	34.3	13.86
Corn .....	35.5	24.63

## HARDY VARIETIES NEEDED

The advantages and disadvantages of winter wheat have been clearly recognized for a long time. Willet M. Hays, a pioneer in plant-breeding studies in the United States, was in charge of the Division of Agronomy at the University of Minnesota thirty years ago. He saw that winter wheat would be a desirable cash crop on the diversified farms of southern Minnesota if high-yielding varieties of good milling quality could be developed that would not winter-kill every time the season was unfavorable. He began the studies of winter wheat that resulted in the production of Minturki. The seed of Minturki was first distributed in a small way in 1918. It has now become the chief variety of winter wheat grown in Minnesota, being largely responsible for the increased acreage during the last eight years. The story of Minturki demonstrates how the modern trained plant breeder employs nature's laws to produce improved varieties of grain—better adapted to the use of producers and consumers alike.

## HOW MINTURKI WAS PRODUCED

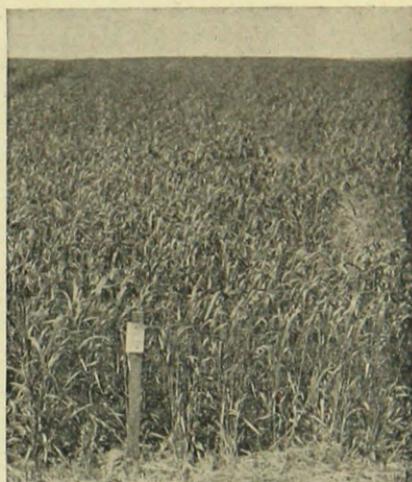
The first step in securing an improved variety of winter wheat for southern Minnesota was to see what the rest of the world had to offer. More than 200 introductions of winter wheat from foreign countries were tested, but not one had all the characteristics needed. The desired hardiness was found in Odessa, a Russian awnless variety which was late in maturity and low in yield. Turkey, another Russian variety, had desirable characters but lacked hardiness. It was awned, or bearded, a character thought undesirable at that time but which, it has since been discovered, is associated with yield.

Wheat varieties rarely cross of their own accord, so several hybrids of Odessa and Turkey were artificially produced by plant breeders. The progeny of these crosses were grown so that individual plants could be studied and selection continued for winter-hardiness. After years of field trials at University Farm and the branch stations, all those interested in the new wheat agreed that one selected strain was the best. It was named Minturki. This new variety combined the characters of high yield, hard seeds, early maturity, and awns from the Turkey parent with the winter-hardiness of Odessa.

The picture on page 1 shows an increase plot of Minturki winter wheat at the Southeast Experiment Station, Waseca. This is from seed grown on the farm and carefully rogued for ten years. During this time it has never yielded less than 25 bushels per acre.



Turkey



Odessa

Fig. 1. Comparative Winter Hardiness of Turkey and Odessa, the Parent Varieties of Minturki, University Farm, 1928

From extensive studies it has been learned that Minturki is more winter hardy than its Odessa parent.

### MINTURKI IS THE BEST VARIETY

The new wheat proved to be of excellent milling quality for winter wheat, and while not equal to the best Marquis, it has generally sold at prices equal or almost equal to the general run of spring wheat grown in southern Minnesota. A combination of characters was obtained in the new variety that resists black stem rust and lodging. It has been learned recently that Minturki is also resistant to bunt, or stinking smut. It is resistant but not immune to stem rust and in seasons of severe attack may be injured by it. It is the most rust-resistant winter wheat available in commercial quantities.

### IT EXCELS BOTH PARENTS

Minturki wheat was tested in rod rows at University Farm in 1916, 1917, and 1918 and at the Waseca station in 1918. The results, given below, demonstrate the superiority of the new variety to both parents.

Variety	Minn. No.	University Farm			Waseca	
		1916	1917	1918	1918	Av.
Turkey .....	529	27.5	39.0	5.3	20.2	23.0
Odessa .....	1471	32.9	36.1	24.8	30.6	31.1
Minturki .....	1507	38.7	47.5	20.9	32.5	34.9

In 1918 winter-killing was so severe that 90 per cent of the Turkey wheat plot was killed. This would be considered a total loss by a commercial grower. It yielded only 5.3 bushels per acre at University Farm compared with 20.9 bushels for the Minturki planted beside it. At Waseca, where the winter-killing was not severe, the Minturki yielded 60 per cent more than Turkey.

### PURE SEED IS AVAILABLE

Tests repeated year after year in rod rows and in larger plots demonstrated so clearly the value of Minturki that a small amount of seed was distributed to growers in 1918. Pure seed has been available from the experiment station and from certified fields since then. In the hands of commercial growers, Minturki has continued to show the high yield, winter-hardiness, disease resistance, and good quality that have made it so popular. It has been a big factor in encouraging the growing of winter wheat.

### KANRED ALSO YIELDS WELL

Kanred is another winter wheat that has become popular in some sections of the country in recent years. This variety, which was produced by the Kansas Experiment Station, is more hardy than most Turkey wheats, but is much more easily injured by freezing and thawing than Minturki. Comparative yields for seven years are given.

Variety	University Farm	Morris	Waseca	Grand average
	Av. 1921-27	Av. 1922-28	Av. 1922-28	
	bu.	bu.	bu.	bu.
Minturki.....	27.7	23.5	32.0	27.7
Kanred .....	22.2	20.7	33.7	25.5

Kanred has yielded as well as Minturki except in the occasional years when winter-killing is a big factor. Kanred is equal in milling quality but, as a rule, Minturki is more rust-resistant. Kanred is immune to some forms of stem rust, but susceptible to others. Minturki is resistant to most forms. On heavy, rich soil Minturki shows a much greater ability to stand erect until harvest time. A storm that may lay Kanred flat will usually not seriously affect Minturki.

### WINTER WHEAT CULTURE

#### Plant Early in September

Early seeding is an important factor in obtaining good yields of winter wheat. Seeding early and pasturing in the fall have given good results, tho it is unusual to plant before September 10. Average



Fig. 2. Heads of Turkey (left) and Odessa (right) Wheat and Heads and Grains of Minturki (center)  
Minturki was produced from a cross of Turkey and Odessa.

results from several years tests, given in Table 3, emphasize the importance of early seeding. Similar results were obtained at Waseca, except that the average winter-killing was less.

Table 3. Average Yields per Acre, Weight per Bushel, and Percentage of Winter Injury for Wheat Sown at Various Dates from September 1 to October 20  
Data from A. C. Army

Date sown	Av. yield	Av. weight	Av. winter-
	per acre	per bushel	killing
	bu.	lb.	per cent
September 1.....	25.3	60.5	15.6
September 10.....	23.9	60.5	19.4
September 20.....	23.5	60.4	21.8
September 30.....	21.9	59.7	41.3
October 10.....	15.0	58.7	56.6
October 20.....	9.9	....	66.0

Well drained soil is essential for best results. If water stands and freezes on winter wheat, the crop usually will be completely smothered. The seedbed should be well prepared and firm. Stubble may be plowed shallow and well disked and dragged to pack it down. Some growers obtain excellent results by using a one-horse drill between rows of standing silage corn. The corn stubble offers some protection during the winter and aids by holding snow.

#### Sow 75 to 90 Pounds per Acre

The rate of seeding apparently may vary considerably with little direct effect on the yield. The customary seeding is from 75 to 90

pounds per acre. Three years results with Minturki at the Waseca station are shown below.

Rate of seeding per acre	1921	1922	1923	Average
lb.	lb.	lb.	lb.	lb.
75.....	16.8	42.9	22.6	27.4
90.....	16.8	43.0	23.9	27.9
105.....	17.4	39.3	19.6	25.4

### Spring Rolling Is Good Practice

Rolling or harrowing winter wheat in the spring seems to be generally beneficial. This makes it easy to put on grass, clover, or alfalfa, for which this grain is an excellent companion crop. Where severe injury has occurred, a satisfactory plan is to drill early oats or barley directly on the winter wheat. This will usually make a good crop of feed and save the expense of again preparing a seedbed.

The severe winter of 1927-28 greatly damaged winter wheat, alfalfa, and clover. This led some to think that the Minturki variety was "running out." Wheat kept free from mixtures does not run out, and the experiment stations of Minnesota have been unable to obtain anything more generally desirable than Minturki for southern Minnesota.

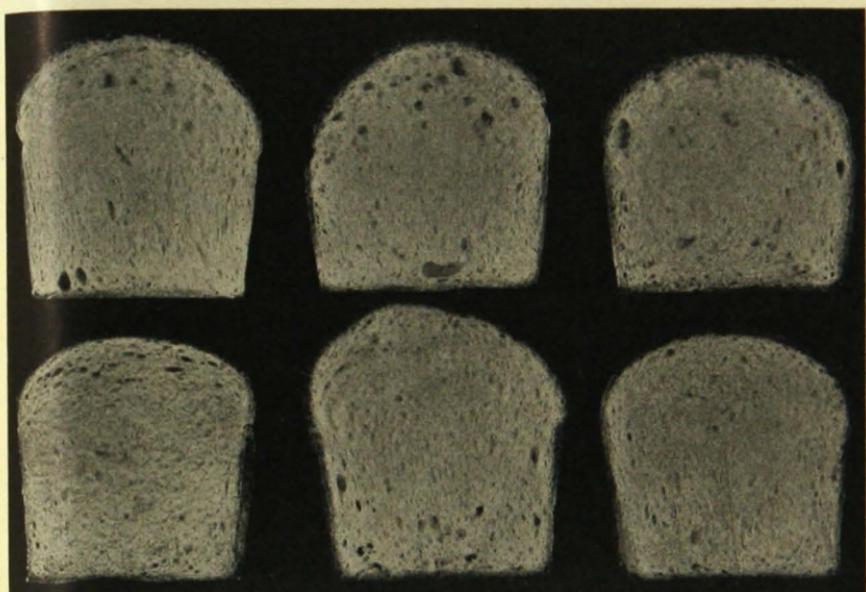


Fig. 3. Milling and Baking Studies Determine Quality

Upper row: Bread made from 1928 grain grown at Waseca. Left to right, Minturki, Minard, and Kanred.

Lower row: Left to right, bread made from Marquis grown at Waseca, from Minturki and Kanred grown at Morris