9-4-'09—30,000

Kansas State Agricultural College.

EXPERIMENT STATION.—Circular No. 3.

DEPARTMENT OF AGRONOMY.

A. M. TENEYCK, Agronomist in Charge.

Improved Seed Wheat.

BY

A. M. TENEYCK,
Professor of Agronomy.

THERE has been a great deal of interest developed during the last two or three years in better seed wheat for Kansas. Kansas is noted for her hard red winter wheat, the best flour-making wheat in the world. The "Turkey" wheat was introduced into this state some twenty-five years ago from Russia. Several large importations of Russian wheat have been made since that time, but there have been none of very recent date in large quantities. During the last ten years the United States Department of Agriculture, through the efforts of M. A. Carlton, cerealist, has investigated the growing of wheat in Russia and other European countries, and has secured a large number of samples of some of the best varieties adapted for growing in this country. During the past seven or eight years several hundred varieties or samples of wheat secured from all parts of the world have been tested in trial plots by the Experiment Station at Manhattan, Fort Hays and McPherson. Of the hundreds of samples of wheat tested in this state comparatively few have proven superior both in yield and quality of grain.

A TEST OF VARIETIES OF HARD WHEAT.

Eighty-two varieties or different samples of wheat were grown in the trial plots at the Manhattan Station last season. In table I are given the 1909 yields and the average yields for two, three and five years of the better producing varieties of hard red winter wheat which have been tested three years or longer.

TABLE I.—A COMPARISON OF VARIETIES OF HARD RED WINTER WHEAT.

Tested at the State Experiment Station at Manhattan, Kan. Arranged in order of average yield for three years.

Record No.	NAME OF VARIETY.	Seed from—	Date received.	Yield per acre, bushels.			
				1909.	Average for two years, 1908 and 1909.	Average for three years, 1907 to 1909.	Average for five years, 1905 to 1909.
383	Kharkof, U. S. No. 7786	Fort Hays Branch Station	1903	52.81	46.27	47.39	44.11
373	Defiance	Iowa Seed Company	1903	54.98	47.57	47.22	46.26
839	Hard Red Winter	Botany Department Kansas Experiment Station	1903(1)	52.61	45.36	46.31	45.32
366	Bearded Fife	Nebraska Experiment Station	1903	54.04	45.75	44.93	45.07
368	Malakoff	Ratekin Seed Company	1903	52.52	44.37	44.93	44.46
570	Turkey Red, U. S. No. 1558	McPherson Branch Station	1904	50.94	43.19	44.79	45.34
829	Roumanian, U. S. No. 1656	McPherson Branch Station	1905	51.92	44.38	44.59	.....
574	Crimean, U. S. No. 1437	McPherson Branch Station	1904	56.62	45.93	44.55	43.04
380	Turkey Red	Nebraska Experiment Station	1903	49.05	44.88	44.43	42.68
369	Minnesota, No. 529	Minnesota Experiment Station	1903	48.82	43.96	43.36	42.97
846	"Old Crimean"	S. O. Thompson, McPherson, Kan.	1905(2)	49.89	43.49	42.76	.....
1014	Burger	J. J. Burger, Reserve, Kan.	1906	49.98	42.10	42.72	.....
838	Padui, U. S. No. 1582	Fort Hays Branch Station	1905	48.25	42.63	42.65	.....
821	Hungarian, U. S. No. 2034	McPherson Branch Station	1905	47.33	42.58	41.55	.....
576	Weisenburg, U. S. No. 1563	McPherson Branch Station	1904	47.70	42.50	41.53	41.71
835	Bacska, U. S. No. 1562	Fort Hays Branch Station	1905	46.48	41.15	40.94	.....
573	Kharkof, U. S. No. 1442	McPherson Branch Station	1904	49.71	40.08	40.84	42.03
385	Ghirka, U. S. No. 5637	Fort Hays Branch Station	1903	52.81	40.39	39.70	38.28
907	Botany, No. 415	Botany Department Kansas Experiment Station	1905	51.55	44.20	39.13	.....

1. Seed of Turkey wheat secured from Iowa in 1900, probably had been imported several years previous.
2. Grown in McPherson county since 1897, originally from Crimea, Russia.

NOTE.—All of these varieties are the bearded, white chaff, hard red winter or Turkey type of wheat, except No. 385, "Ghirka." This is a beardless, white chaff, hard red wheat.

It will be observed that of these nineteen varieties eighteen are the hard red bearded type of wheat commonly known as "Turkey." The Ghirka is the only exception; this is a beardless wheat, having a hard red grain similar to that of the Turkey. This variety has been greatly improved in quality by selection and is gradually improving in yield, equaling the Kharkof in 1909.

PROMISING NEW VARIETIES TESTED IN 1909.

In 1907 the Kansas legislature authorized the State Experiment Station to investigate the wheat of foreign countries, with a view of importing seed wheat. Such investigations were made by Burkett and Roberts* in Europe and Siberia and by TenEyck in Alberta, Canada. The report of these investigators was adverse to importing large quantities of foreign grown seed wheat. They recommended the importation of small quantities of the choicer varieties for testing, and the selection of the best of these for propagation, to secure sufficient quantity of seed for distribution. A number of such varieties were secured and planted at Manhattan, Fort Hays and McPherson. Twenty-six of these varieties of Russian wheat were planted at Manhattan in the fall of 1908. Six of these entirely winter-killed. A few of the varieties gave excellent results in the single trial. The yields in 1909 of several of the best producing varieties are as follows: Banatka, 55.26; Champanka, 53.06; White Awnless, 52.27; Ozucka, 51.14; Russian No. 1208, 50.97; Byelokolasska, 50.67; Egyptian, 50.26, bushels per acre, respectively.

Six samples of wheat from Alberta, Canada, were planted at Manhattan. The three best producing varieties gave an average yield last season of 55.11 bushels per acre. A sample of Turkey wheat from Montana, just south of the province of Alberta, made a yield of 50.81 bushels per acre, while a sample of "Old Turkey," secured from S. A. Renner, Rush Center, Kan., yielded 52.19 bushels per acre. This wheat is also of superior grade and quality. Mr. Renner has grown this Turkey wheat in Rush county for more than twenty years.

A TEST OF VARIETIES OF SOFT WHEAT.

While the "hard red winter" is the type of wheat generally adapted for growing throughout central, western and northern Kansas, in the eastern part of the state, and especially in

* See Press Bulletins Nos. 157, 164 and 171.

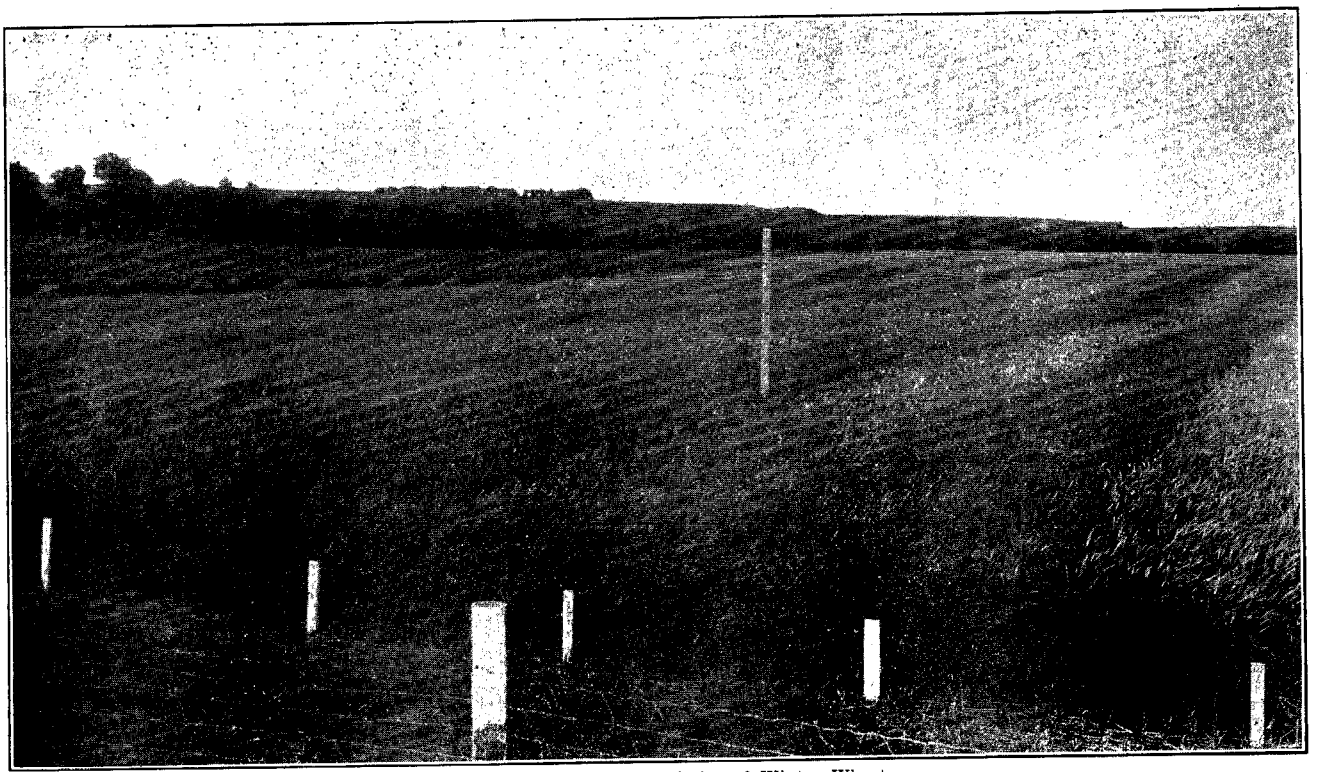

PLATE I.—Variety Trial; varieties of Winter Wheat.

the southeastern counties, the soft red winter wheat succeeds as well or often better than the hard red winter wheat. In some of the eastern counties of the state the hard and soft types of wheat may produce equally well, but in these counties the hard wheat is usually better adapted to the upland and the soft wheat to the bottom land and more fertile soil. In the wetter, warmer climate of southeastern Kansas hard wheat rapidly deteriorates in quality, becoming soft. A good grade of soft wheat may be produced under such conditions and it will usually lodge less than hard wheat. Soft wheat becomes harder when grown in the counties further west, but does not become a true hard wheat, and is hence not adapted for these western counties. There is no grade or market for a wheat which is neither "hard" nor "soft." There is a growing demand for improved seed of soft red winter wheat in eastern Kansas and in the states south and east of Kansas. A few varieties of soft wheat have been grown each year at Manhattan and at McPherson, in comparison with the hard wheat. In 1905 the Agronomy department began a more extensive test with varieties of soft wheat, securing from various sources a number of varieties. The comparative yield and other data for a number of the better producing varieties tested for three years or more are given in table II

Wheat described in table II as "semi-hard" may become softer when grown under more favorable conditions. This test was made on upland. Seed for distribution was grown on bottom land in 1909. The yields of the several varieties on the bottom land are as follows: Zimmerman, 33.7; Fulcaster, 32.9; Fultz, 32.0; Currell, 29.9; Sibley's New Golden, 29.8; Kentucky B347, 29.7; Mediterranean, 20.5; Niger, 29.0; Oregon Red, 28.2; Poole, 27.8, bushels per acre, respectively.

It will be observed from the above data that Fultz, Currell, Fulcaster and Mediterranean are among the best producing varieties. The Zimmerman, though an excellent producing wheat some years, is variable; because of its very early maturing character it is apt to be injured by late frost in the spring. This is a standard variety and very commonly grown in eastern Kansas, and is better adapted for growing in the northern than in the southern counties of the state. Arctic Jr. and Kentucky B347 are among the better producing varieties, but the grain is white and has no local market or grade in this

TABLE II.—COMPARISON OF YIELDS OF SOFT WHEAT VARIETIES.

Tested at the State Experiment Station, Manhattan, Kan. Arranged in order of average yields for three years.

Record No.	Name of Variety.	Type.	Where from.	Date received.	Yield per acre, bushels.			
					1909.	Average for two years, 1908 and 1909.	Average for three years, 1907 to 1909.	Average for four years, 1906 to 1909.
1023	Prosperity	Soft red—, bdls. w.c	Ike W. Crumly, Colby, Kan.	1906	42.97	37.33	39.67	.....
852	German Emperor	Semi-hard red, bd. w.c.	Oklahoma Experiment Station	1905	39.35	37.76	38.61	.....
831	Diehl's Mediterranean, U. S. No. 1395-2	Soft red, bd. b.c	McPherson Branch Station	1905	33.77	36.28	38.16	39 92
1021	Arctic Jr	Soft white—, bd. w.c.	Ike W. Crumly, Colby, Kan.	1906	37.96	35.21	37 06	.....
1020	Amber	Semi-hard red, bd. b.c	Ike W. Crumly, Colby, Kan.	1906	37.79	35.92	36.75	.....
850	New Red Wonder	Semi-hard red, bd. w.c.	Oklahoma Experiment Station	1905	34.01	34.36	36.59	.....
817	Mediterranean	Soft red, bd. w.c.	Tennessee Experiment Station	1905	42.92	35.23	35.91	37.35
809	Kentucky B, No. 347	Very soft white, bdls. b.c.	Kentucky Experiment Station	1905	37.42	31.32	35.71	38.97
815	Fulcaster	Soft red+, bd. w.c.	Tennessee Experiment Station	1905	42.01	35.18	35.01	36.79
816	Poole	Soft red—, bdls. b.c.	Tennessee Experiment Station	1905	42.02	34.76	34.95	37.75
367	Fultz	Soft red, bdls. w.c	Barteldes Seed Co	1903	40.15	33.59	34.55	38.69
818	Niger	Soft red, bd. w.c.	Tennessee Experiment Station	1905	36.30	33.06	34.28	34.93
813	Dawson's Golden Chaff	Soft red, bd. w.c	Kentucky Experiment Station	1905	32.23	31.71	34.13	37.06
577	Currell	Soft red—, bdls, b.c.	McPherson Branch Station	1904	43.40	34.15	33.15	37.48
853	Sibley's New Golden	Soft red, bd. w.c.	Oklahoma Experiment Station	1905	21.15	25.21	31.45	.....
847	Red Russian	Semi-hard red, bdls. b.c	Oklahoma Experiment Station	1905	29.15	28.29	31.29	.....
1022	Iron Clad	Semi-hard red, bd. w.c.	Ike W. Crumly, Colby, Kan.	1906	30.80	29.84	30.78	.....
819	Red May	Soft red, bdls, b.c.	Tennessee Experiment Station	1905	32.66	28 41	30.74	33.84
377	Zimmerman	Soft red+, bdls. w.c	Fielding & Sons	1903	43.30	32.28	30.00	32.39
848	Oregon Red	Soft red, bdls. w.c	Oklahoma Experiment Station	1905	34.02	31.31	.....	.....
380	Turkey (check)	Hard red, bd. w.c.	Nebraska Experiment Station	1903	34.44	37.58	39.56	41.30

—, indicates wheat is quite soft.
+, indicates a tendency to hardness.
bdls., indicates beardless.
bd., indicates bearded.
w.c., indicates white chaff.
b.c., indicates brown chaff.

state. Millers and grain dealers will buy it only as mixed wheat at a reduced price.

PROPAGATION AND DISTRIBUTION OF SEED WHEAT.

In order that the testing of varieties of wheat or other grains by the Experiment Station shall become of permanent value to farmers, seed selection, propagation and the distribution of the improved seed has been a special feature of the work of the Agronomy department. Some varieties of wheat are superior to others in hardiness, quality and productiveness. The tests at the Experiment Station have been verified by the reports received from farmers who have planted the College-bred seed. A farmer is well repaid for planting the purer seed of one of these better producing varieties.

During the four years preceding 1909 the Experiment Station, through the Agronomy department, distributed 3995 bushels of improved seed wheat among 638 farmers in 90 counties of this state. A small quantity of seed has been distributed in Oklahoma and other states. The Fort Hays Branch Experiment Station during the last five years has distributed 3980 bushels to 563 purchasers, mainly in the western counties of the state. The McPherson Cooperative Station has also distributed small quantities of good seed wheat. The crops from this better wheat have been largely saved for seed and planted again by the growers and their neighbors, and it is a safe estimate that 200,000 acres of this improved wheat were grown in this state last season, and two or three million acres of this wheat may and doubtless will be planted in the fall of 1909.

The distribution of this improved seed has already increased the average yield of wheat in several counties, and it is not only possible but probable that several million bushels will be added to our Kansas wheat crop in 1910 through better seed alone, and there should be a corresponding improvement in the grade or quality of the grain.

WHEAT SOLD BY AGRONOMY DEPARTMENT, FALL OF 1909.

HARD WHEAT.

KHARKOF, No, 382—300 bushels. A hard red winter wheat of the bearded Turkey type. One of the best producing varieties and an excellent milling wheat, as shown by the tests at this Station and by several trials by millers on a large scale. This variety is well adapted for growing through the central

and western part of the state — the hard wheat belt. It succeeds well also in eastern Kansas wherever hard wheat is adapted to growing.

PLATE II.—A field of Kharkof Wheat.

TURKEY RED, No. 380—400 bushels. Similar to Kharkof; perhaps a trifle harder and darker in color, especially in eastern Kansas, where Kharkof is apt to be lighter in color and softer, containing some yellow berry.

TURKEY RED, No. 570—50 bushels. Similar to Turkey No. 380, having a little smaller berry, but of good quality.

MALAKOFF—22 bushels. Similar to Turkey No. 570. Recommended for eastern and northern Kansas.

BEARDED FIFE and DEFIANCE — 40 bushels. These varieties, are similar, being the Turkey type of wheat and very excellent yielders at the Station and in eastern Kansas, but not so well adapted for growing in the counties further west. Berries fully as hard as the Kharkof when grown in the eastern counties, but more inclined to yellow berry in the wheat belt counties, and not good varieties for resisting drouth.

CRIMEAN, No. 1125—90 bushels. Similar to Kharkof, but lodges less in wet seasons and gives a better quality of grain. This variety is well adapted to south-central Kansas, as shown by the tests at McPherson. The wheat is of more recent importation than the Kharkof, and may prove superior to the Kharkof in the warmer, wetter climates.

HARD RED WINTER, No. 839 — 20 bushels. This variety of wheat is of the Turkey type, and has been grown at this Station since 1900. The sample came from Iowa, and was doubtless from an early Russian importation. This variety has been given careful selection at this Station and has been improved in productiveness and in quality of grain. No better grade of wheat is produced on the Station farm than this hard red winter. This variety has not succeeded so well at Fort Hays and cannot be recommended for the western part of the state, but should give good results in the central and northern counties.

GHIRKA—100 bushels. This is the only variety of beardless hard red winter wheat which has proven worthy of continued trial and propagation. The Agronomy department has improved this wheat by selection and its yield has gradually increased, being equal to that of the Kharkof last season. The wheat is not fully pure, but contains about two per cent. of bearded heads—evidently a cross, which is very difficult to breed out. The grain is somewhat smaller than the Kharkof, but of good color and quality. This variety has the advantage of being beardless, and can be recommended for trial throughout the hard wheat belt, and especially for the south-central part of the state, since it gives equally good results at the McPherson Station.

SOFT WHEAT.

ZIMMERMAN—30 bushels. A soft or semi-soft red, beardless wheat. One of the earliest maturing varieties and a fairly good producer, but somewhat uncertain since it is more apt to be injured by late frosts in the spring than other later maturing varieties. On this account the variety is not recommended for the southern part of the state, but succeeds well in the northern and the northeastern counties, where it is quite extensively grown. The Zimmerman is an old standard variety.

FULTZ—125 bushels. A soft red, beardless wheat. An old

standard variety, more generally grown perhaps throughout the soft wheat belt than any other variety. This is the red Fultz; our strain is not fully pure, containing about two per cent. of bearded heads, which appear to be a cross, since we have not been able to eliminate the mixture by selection. Otherwise this is an excellent strain of Fultz wheat and produces well at this Station. It may be recommended for growing in the eastern and southeastern parts of the state.

CURRELL—20 bushels. Soft red, beardless wheat, but with brown chaff. Quality of grain similar to that of the Fultz variety. Appears to be well adapted for growing in the southern part of the state.

FULCASTER—140 bushels. A soft red, bearded wheat. A good producer and generally adapted for growing in the soft wheat belt. Quality of grain similar to that of the Fultz. Does not shatter—a fault which is characteristic of many other bearded varieties of soft wheat.

MEDITERRANEAN—20 bushels. A soft red, bearded wheat. Grain somewhat larger but similar to the Fulcaster. A good producer, but shatters some when fully ripe.

We have a few bushels each of other varieties; namely, Oregon Red, Sibley's New Golden, Niger, and Kentucky B No. 347. For description see table 11.

The above varieties of wheat sold at $2 per bushel for graded seed, sacked, f. o. b. Manhattan. The wheat crop at the Fort Hays Branch Station was entirely destroyed by hail. Parties desiring to purchase College-bred seed wheat are referred to growers who have previously secured seed from the Experiment Station. A list may be secured by addressing the Agronomy department, Manhattan, Kan.

SEED WHEAT FOR SALE BY GROWERS.

Press Bulletin No. 172, published last winter, gave information regarding the work of the College and Experiment Station in testing and distributing good seed wheat.

A systematic effort has been made to locate and list the growers of good wheat who have seed wheat for sale this fall. Prof. C. S. Knight, assistant in the Agronomy department, made a trip through a number of the wheat counties of the state about harvest time. Visiting many of the farmers who are growing College-bred wheat he made a personal inspection

of their fields, noting mixture with other grain, with other varieties of wheat, and other general characteristics of the crop. The department also sent out several hundred blank forms asking for reports from growers who had secured seed from this Station or from the Fort Hays Branch Station. In this way nearly one hundred growers have been listed who have College-bred seed wheat for sale. The whole amount listed aggregated 88,000 bushels of fairly pure seed wheat. Attention should here be again called to the fact that pure wheat cannot be grown on ground that has volunteer wheat of different variety upon it.

A large number who replied to our letter or who were visited by Professor Knight stated that they would use their entire crop for seed, or that their surplus seed wheat had already been spoken for by neighbors. Thus hundreds of thousands of bushels of this improved wheat will likely be seeded this fall, in addition to that listed for sale. This list is now published and will be sent to all who request it.

REPORT FROM GROWERS.

This department has recorded the name and address of each purchaser of seed wheat, and for the past three seasons blank forms have been sent to nearly all of the growers at about harvest time, with the request that they report results. Among several hundred replies very few unfavorable reports have been received. The reports are mainly on Kharkof and Turkey Red wheat, and are often very favorable. The College-bred wheat has been reported in several cases as giving fifty per cent. greater yield than the common or average wheat grown in the neighborhood. Many report an increase in yield of five to ten bushels per acre as compared with other ordinary wheat grown in the same field.

A careful analysis of these reports leaves no doubt that the Kharkof and Turkey Red wheat distributed by this Station is superior to much of the "scrub" wheat or average common "Turkey" which is now being grown in the state. As compared with other varieties the College wheat is reported as being more vigorous, healthier, a better drouth resister, maturing earlier and lodging less than the average wheat which has received no selection or breeding. The grain produced is also reported as of good weight and quality, many reporting the crop of 1909 as weighing over sixty pounds per bushel.

By its more vigorous growth the Kharkof and Improved Turkey wheat may resist attacks of the Hessian fly to a somewhat greater extent than the average scrub wheat. As a rule, however, no particular advantage is claimed for the wheat on this point. On the whole, therefore, considering the trials at the Experiment Station and the reports of growers, there is no question but that the seed wheat distributed by this Station has been improved in productiveness, hardiness and in quality of grain, and where hard red winter wheat is adapted for growing the College-bred varieties will succeed better than the wheat which has not been so carefully selected, tested and graded. The difference is in the breeding and selection as well as in the variety. This work in breeding has just begun. Several improved and pedigreed strains have been produced in the last two or three years and are now being propagated, and will be ready for distribution in the next two or three years. This wheat will be better than anything distributed up to the present time.

Approved.
ED. H. WEBSTER, *Director*.
MANHATTAN, KAN., September 1, 1909.

Approved.
ED. H. WEBSTER,
Per E. R., September 9, 1909.