

Agricultural Experiment Station
OF THE
University of Tennessee

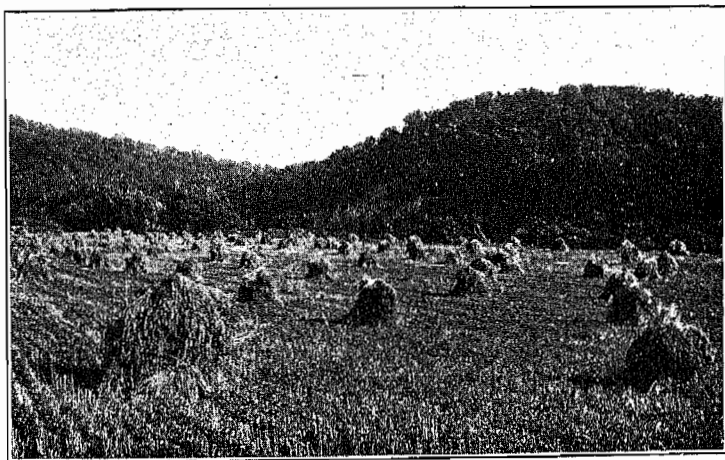
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THE SMALL GRAINS IN TENNESSEE

By

C. A. MOOERS



SCENE ON UNIVERSITY FARM

KNOXVILLE, TENNESSEE

The Agricultural Experiment Station

OF THE UNIVERSITY OF TENNESSEE

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The Experiment Station building, containing the offices and laboratories, and the plant house and part of the Horticultural Department, are located on the University campus, 15 minutes' walk from the Custom House in Knoxville. The experiment farm, the barns, stables, dairy building, etc., are located one mile west of the University on the Kingston Pike. The fruit farm is adjacent to the Industrial School and is easily reached by the Lonsdale car line. Farmers are cordially invited to visit the buildings and experimental grounds.

Bulletins of this Station will be sent, upon application, free of charge, to any farmer in the State.

THE SMALL GRAINS IN TENNESSEE

WHEAT

At the present time wheat is the staple winter cereal of Tennessee, and is grown not only for grain but also for pasture. Wheat is preferred because it is a money crop which is easily disposed of, because of its certainty and its adaptability to the ordinary uplands, and also because of its fitness as a nurse crop for clover and grass.

VARIETIES

Within the last fifteen years more than sixty varieties have been tried by the Station. Throughout this period Fulcaster has been consistently a leading variety, and it is therefore taken as the standard of comparison in the tables. Table I gives a summary of the trials made from 1900 to 1904, inclusive, and Table II gives a summary of the trials made since that time. From these tables a list of the best varieties—those which came within 6 per cent of yielding as much in either series as Fulcaster—has been prepared, as follows:

- Fulcaster
- Kansas Mortgage Lifter
- Deitz Longberry
- Fultz
- Valley
- Improved Poole
- Poole
- Currell's Prolific
- Red Russian
- Harvest King
- Red Prolific

Although any one of this select number can be regarded as a suitable variety for average Tennessee conditions, Kansas Mortgage Lifter and Fulcaster are the leaders, not only in yield, but also in quality of grain.

TABLE I—*Variety trials of wheat, 1900 to 1904, inclusive*

Average yield of Fulcaster for the five years; 35 bushels per acre

Fulcaster in comparison with—	Number of years tested	Number of years in favor of Fulcaster	Average yield per acre in favor of Fulcaster
			Bu.
American Bronze -----	4	3	7.0
Beardless Fulcaster -----	4	3	6.2
Blue Ridge -----	5	4	4.6
Blue Straw Fultz -----	5	5	6.5
Buck Woods Hybrid -----	5	4	6.8
California Red -----	4	2	3.2
Currell's Prolific -----	5	3	2.2
Dawson's Golden Chaff -----	4	3	9.6
Deitz Amber -----	5	3	0.2
Democrat -----	4	3	7.3
Diamond Grit -----	4	4	6.8
Early Pearl -----	5	5	11.2
Early Genesee Giant -----	5	5	8.1
Early Red Clawson -----	4	3	5.7
Early Ripe -----	5	3	6.2
Eclipse -----	4	4	12.0
Egyptian -----	5	4	3.2
Forty Fold -----	5	3	2.7
Fultz -----	5	3	0.1
Gold Coin -----	4	4	5.7
Harvest King -----	5	3	1.9
Hopper -----	4	3	5.2
Improved Fulcaster -----	4	3	-0.3
Improved Poole -----	4	2	1.0
Kansas Mortgage Lifter -----	5	2	-1.2
Lancaster -----	3	3	4.8
Mealey -----	5	5	5.2
Mediterranean -----	5	2	0.4
New Columbia -----	5	5	11.4
New Monarch -----	4	3	8.8
Niger -----	5	4	0.3
Perfection -----	5	3	3.0
Poole -----	5	4	0.8
Red Cross -----	4	3	4.8
Red May -----	5	3	4.1
Red Prolific -----	5	4	2.0
Red Russian -----	5	3	1.0
Rice -----	5	5	9.9
Rural New Yorker -----	5	3	3.4
Turkey Red -----	4	4	8.2
Valley -----	5	3	0.5
Velvet Chaff -----	5	3	5.6
White Golden Cross -----	4	4	4.7
White Winter No. 6 -----	4	4	9.5
Winter King -----	4	4	9.7
4281 -----	3	3	6.4
5342 -----	3	3	8.6

TABLE II—*Variety trials of wheat, 1906 to 1914, inclusive**
Average yield of Fulcaster, 27.2 bushels per acre

Fulcaster in comparison with—	Number of years tested	Number of years in favor of Fulcaster	Average yield per acre in favor of Fulcaster
			Bu.
Abundance -----	2	2	12.1
Acme -----	4	1	1.2
Auburn -----	2	2	5.5
Blue Straw Fultz -----	2	2	6.9
Crimean -----	5	5	4.6
Currell's Prolific -----	4	2	2.2
Deitz Amber -----	3	3	4.2
Deitz Longberry -----	5	2	0.1
Early Genesee Giant -----	2	2	13.6
Early May -----	6	5	3.4
Fife -----	2	2	12.6
Fish Head -----	2	2	18.0
Fultz -----	5	3	0.8
Fultz-Mediterranean -----	8	4	1.8
Iron Clad -----	2	2	2.3
Kansas Mortgage Lifter -----	2	1	0.5
Mediterranean -----	3	3	1.3
Niger -----	2	2	4.5
Onigara -----	5	4	5.7
Poole -----	9	6	0.9
Prosperity -----	3	3	12.0
Red Wonder -----	2	1	3.9
Swamp -----	5	5	7.4

*Thanks are due to the Office of Cereal Investigations, U. S. Department of Agriculture, for furnishing the seed of many of the varieties.

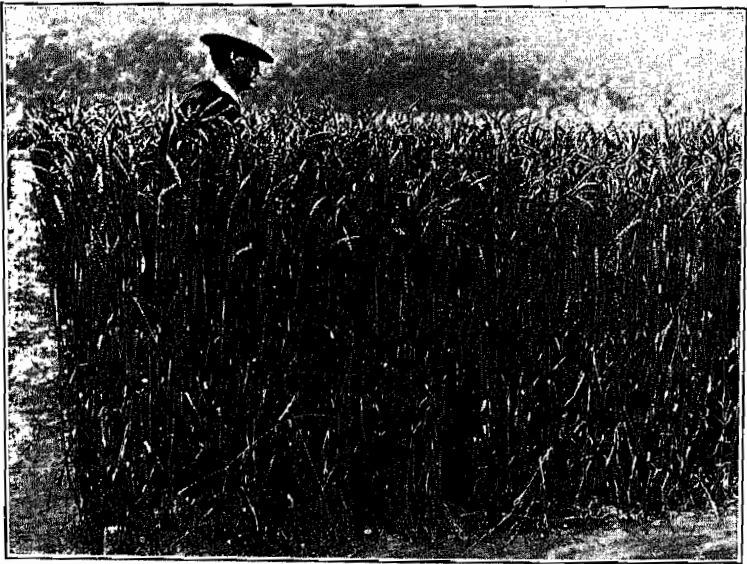
Of the beardless varieties Fultz and Poole are of special merit.

The Fultz-Mediterranean variety is not included among the highest yielders, for on ordinary and even rich uplands a number of other varieties have surpassed it. It deserves special mention, however, because on extra rich land where the other varieties lodge it is apt to stand up, in which event it easily outyields them. Fultz-Mediterranean grows appreciably shorter and produces a thicker and stronger straw than either Fulcaster or Poole. The head is beardless and compact, but the grain is of only fair quality. For some years it has been extensively grown in Maury County under the names of "Economy," "New Columbia," etc.

The Early May is another variety which is of interest. Like the Fultz-Mediterranean, it is adapted to extra rich land because it is not apt to lodge. It is several days earlier than any of the other varieties, is beardless, and produces grain of extra quality, but in the Station trials has not yielded so well as Fultz-Mediterranean.

IMPROVEMENT OF VARIETIES BY SELECTION

That many varieties of small grain and of other crops consist of a collection of well-defined or fixed strains, which may differ widely among themselves in productiveness, hardiness, etc., is now well known. Within recent years special attention has been given by agronomists to the improvement of certain crops through the selection of promising individuals, the seed of each individual being saved and grown separately so that the one best adapted to local conditions might be discovered. On the other hand, some varieties, especially those of recent origin or those which have been kept free from other varieties,



"BEST" POOLE

which are easily introduced in threshing, appear to be made up either of single strains or of strains so closely related that little improvement can be effected by selection.

EXPERIMENTAL RESULTS

Among the leading varieties of wheat mentioned on page 11, Poole was found by the writer to be especially susceptible of separation into distinct strains, a number of which were gotten in 1905 and 1906 and were afterwards included in the variety trials. Individual selections of Fulcaster were also used in the variety trials for several years.

Selections were made on an entirely different basis by Soule and Vanatter at this Station.* Their original plan included selections from each of two varieties of large, medium, and small heads and of a comparison, as a source of seed, of both large and small grains from the original varieties without regard to size of heads. This work was begun in 1900 and was continued by Soule and Vanatter until 1904. On taking charge of the agronomy work in 1905 the writer continued this study, using Poole and Fulcaster varieties and limiting the selections to those most apt to produce noticeable differences. The procedure, which was the same for each variety, was as follows:

1. A number of the largest heads were selected each year. These were hand-threshed, and the largest grains, separated by sieving, were used for seed. The first year, the selection was made from the general crop, but afterwards from the plot of the "Best", as this selection came to be known.

2. In a similar manner a selection was made of the smallest heads and the smallest grains, which were planted to themselves from year to year. These strains are called the "Poorest."

3. The original varieties were continued from year to year for comparison and are designated in the table as "Common" Poole and "Common" Fulcaster. The comparative yields of these selections in a five-year trial, from 1908 to 1912, inclusive, are given in Table III, which also contains the yields of two of the best pure strains from Poole.

*Bul. Vol. XIV, No. 2 (1901).

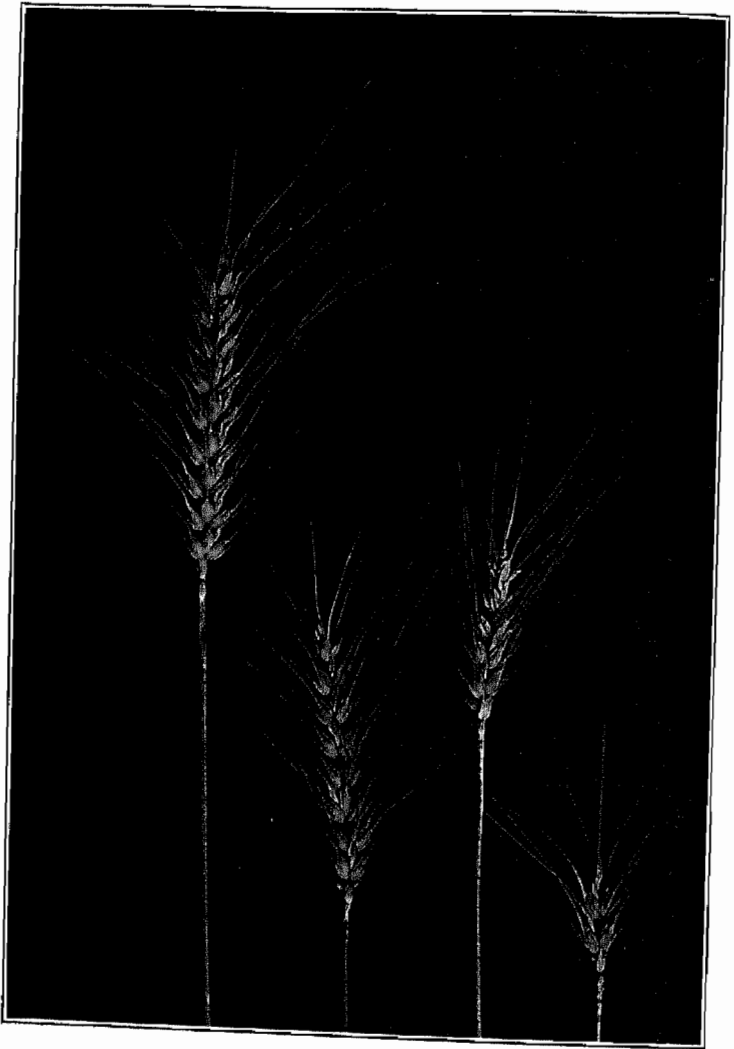
TABLE III—*Yields of various selections of both Poole and Fulcaster wheat*

Variety	Selection	Year of harvest	Yield per acre	
			Grain	Straw
			Bu.	Ton
Poole	"Best"	1908	27.2	1.15
"	"	1909	31.0	1.75
"	"	1910	20.1	1.26
"	"	1911	19.0	0.82
"	"	1912	30.0	1.87
Average			25.5	1.27
Poole	"Poorest"	1908	26.8	1.43
"	"	1909	25.1	1.94
"	"	1910	17.8	1.29
"	"	1911	14.8	0.73
"	"	1912	28.3	1.39
Average			22.6	1.36
Poole	"Common"	1908	25.5	1.46
"	"	1909	29.6	1.82
"	"	1910	16.7	1.09
"	"	1911	14.7	0.66
"	"	1912	28.1	1.63
Average			22.9	1.33
Poole	105	1908	27.5	1.27
"	"	1909	30.7	1.70
"	"	1910	19.1	1.30
"	"	1911	16.5	0.68
"	"	1912	32.5	1.50
Average			25.3	1.29
Poole	134	1908	21.6	1.00
"	"	1909	32.4	2.02
"	"	1910	16.5	1.11
"	"	1911	15.5	0.69
"	"	1912	30.6	1.48
Average			23.3	1.26

TABLE III—*Yields of various selections of both Poole and Fulcaster wheat (continued)*

Variety	Selection	Year of harvest	Yield per acre	
			Straw	Grain
			Bu.	Ton
Fulcaster	"Best"	1908	28.3	1.45
"	"	1909	22.7	1.49
"	"	1910	24.1	1.61
"	"	1911	18.1	0.94
"	"	1912	30.2	1.63
Average			24.7	1.42
Fulcaster	"Poorest"	1908	29.1	1.47
"	"	1909	23.5	1.71
"	"	1910	22.2	1.45
"	"	1911	17.8	0.84
"	"	1912	28.3	1.59
Average			24.2	1.41
Fulcaster	"Common"	1908	28.7	1.66
"	"	1909	23.5	1.70
"	"	1910	23.4	1.56
"	"	1911	16.2	0.82
"	"	1912	28.1	1.63
Average			24.0	1.47

The results showed that Poole wheat could be separated into strains or varieties which had different yielding capacities. The continued selection of the largest and best heads resulted in a variety which yielded highest and was markedly different in general appearance from the variety obtained by selection of the most inferior heads. The heads of the former were uniformly long, rather "droopy," inclined to be pointed, and were dark green in color when immature. The heads of the latter were of medium size, straight, with a rather square top, and light green in color when immature. Among the pure strains one was found that resembled this selection very closely. Considering the extreme methods followed, the two sorts ran very close together in yield. Selection No. 105 had the general appearance of the "Best" but was more uniform in appearance, and grew slightly shorter than any of the others.



FULCASTER WHEAT, SHOWING TYPICAL LARGE, MEDIUM AND SMALL
HEADS USED IN SEED SELECTION

The results with the Fulcaster variety show that no difference in yield was obtained by either method of seed selection. That is, the continued selection of the largest grains from the largest heads did not result in any special improvement, and the continued selection of the smallest grains from the smallest heads did not lower the yield. At the end of the experiments the two selections as seen growing in the field were practically identical in appearance. Also efforts to separate out strains by individual plant selections were without result. In short, the Fulcaster variety used in these experiments must have been a pure strain which was not capable of being changed by any of the methods used.



CHARACTERISTIC TYPES FOUND IN POOLE WHEAT

DATE OF SEEDING

The Hessian fly makes the early seeding of wheat hazardous. From the 10th to the 20th of October, when the first frosts are apt to occur, can be recommended for the latitude of Knoxville.

WINTER BARLEY

Winter barley has been grown for a number of years at the Station farm and has proved superior in several respects to other small grains. Barley makes the heaviest fall and winter pasture, matures the earliest in the spring, is the least liable to lodge of all the cereals,

and on rich land far outyields wheat, its nearest competitor. Also it is nearly as hardy and as sure a crop as wheat. Barley has, therefore, a distinct place in Tennessee agriculture, especially on the better class of soils and where improved methods of farming are followed.

VARIETIES

This Station has found only two varieties that proved to be strictly leaders. These are Tennessee, which has been grown in this State for many years, and Union, which was obtained from Canada about fifteen years ago. Both the varieties are bearded and are very much alike in general appearance, but Union grows shorter, is about three days earlier than Tennessee, and makes a somewhat quicker growth in the fall. They have been grown side by side for comparison for several years and Table IV gives the yields obtained.

TABLE IV—*Union versus Tennessee winter barley*

Crop of—	No. of plots averaged for each variety	Yield per acre			
		Union		Tennessee	
		Grain	Straw	Grain	Straw
		Bu.	Ton	Bu.	Ton
1906	3	53.8	1.76	52.5	2.23
1908	4	45.3	1.34	44.6	1.54
1910	5	34.0	1.20	32.9	1.54
1911	2	44.5	1.25	44.5	1.54
1912	1	27.6	0.69	30.2	0.88
	Average	41.0	1.25	40.9	1.55

The results of Table IV show very little difference between the two varieties in grain production, but indicate that Tennessee produces more straw than Union. In the date-of-seeding experiments, however, Union was found to excel Tennessee in the late seedings, in at least one instance, making a fair yield when Tennessee was a complete failure. This difference is seen in the following results; which give the average yield both of early and of late seedings of each variety in trials lasting six years:

Yield of grain per acre		
	Tennessee Bu.	Union Bu.
Average yield when sown between Sept. 9 and Oct. 7 -----	44.8	45.1
Average yield when sown between Oct. 15 and Nov. 5 -----	33.0	35.6

NEW WINTER BEARDLESS BARLEY

In addition to the two winter barleys mentioned, a third may now be included, and this is the new winter beardless barley originated at the Station by the crossing of Tennessee winter on a spring beardless barley. In the spring of 1909 several hundred crosses were made between these two barleys. Since then the number retained has been reduced to less than ten, and one of the most promising is now being distributed for trial throughout the State. The new barley has a head like that of common spring barley, but has apparently all of the hardi-



TENNESSEE EXPERIMENT STATION NO. 50

A winter beardless barley bred at the Station. A cross between Tennessee winter and a spring beardless barley

ness of the Tennessee winter variety, and promises to yield equally as well as the latter. The name of the new barley is "Tennessee Experiment Station No. 50."

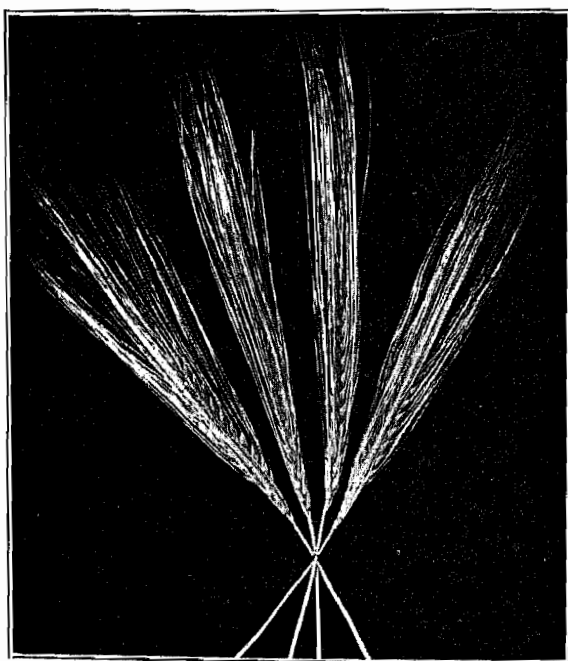
DATE OF SEEDING

Date-of-seeding experiments were conducted each year for six years with both Union and Tennessee varieties. The first seeding was made about the middle of September and a seeding was made every two weeks, as a rule, until early November. The results may be summarized for the six years as follows:

Yield of grain per acre

Seedings from Sept. 17 to Sept. 29-----	50.9 Bu.
Seedings from Oct. 3 to Oct. 7 -----	47.9 Bu.
Seedings from Oct. 14 to Oct. 19 -----	38.2 Bu.

Seeding the latter half of September is, therefore, recommended as highly advisable. There was evidently a marked falling off in yield when seeding was done after the first week in October. These dates must of course be modified somewhat to suit other parts of the State.



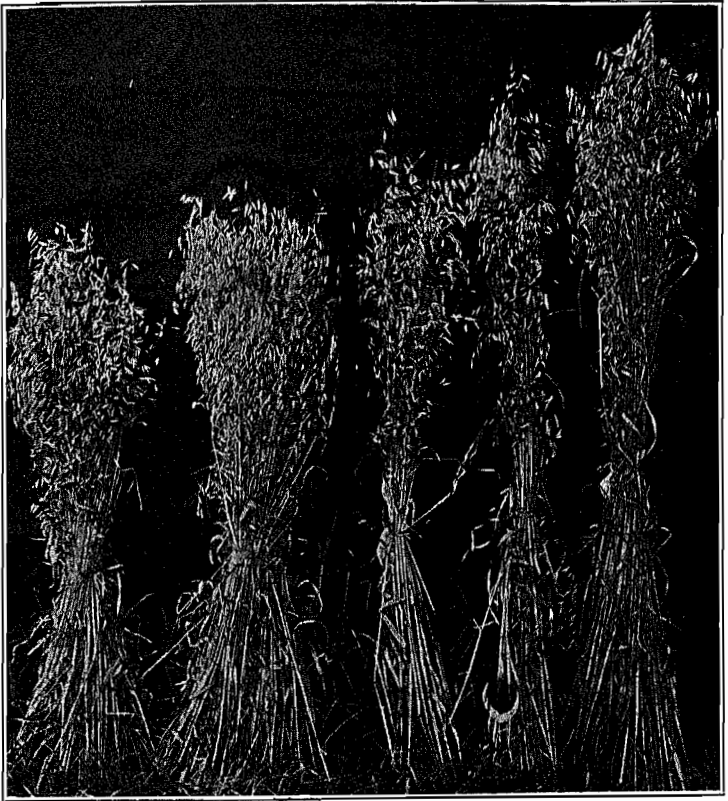
TENNESSEE WINTER BARLEY

CLOVER AND BARLEY

Early September has proved to be an excellent time for the seeding of red clover, and since this is a favorable time for barley the two may be advantageously sown together. In fact, this has become the common practice at the Station farm, and the results have been so satisfactory that it is recommended for trial on the better class of soils. A light seeding of barley, say a bushel or a bushel and a half, favors the clover. In the absence of volunteer clover 12 pounds of red clover seed per acre or 8 pounds of alsike is advised.

SPRING BARLEY

Spring barley has proved to be inferior to spring oats and much less productive than winter barley. Spring barley may, however, be used as a nurse crop for a spring seeding of clover and grass, good stands of which are especially desired. This preference is given to spring barley as a nurse crop because it makes a quick early growth which is both short and thin but at the same time hinders the development of weeds.



CHARACTERISTIC VARIATIONS FOUND IN CULBERSON OATS

The short-strawed oat at the left shows the original of Tennessee Experiment Station No. 1

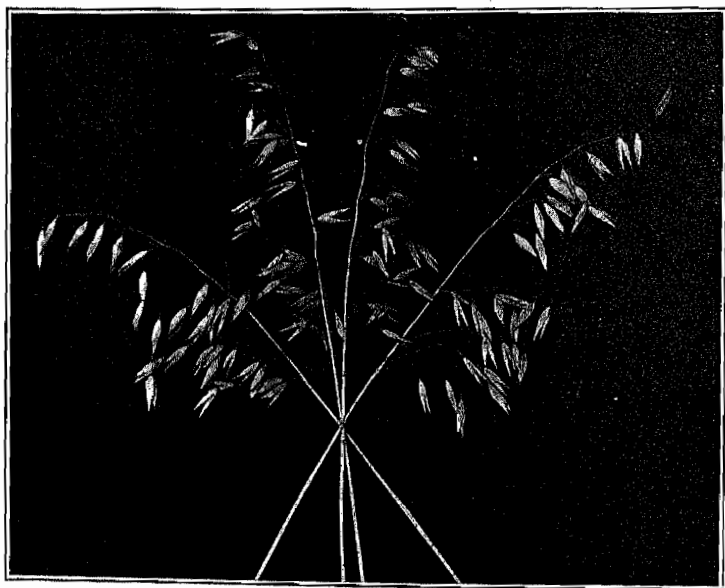
WINTER OATS

Winter oats are grown extensively in the Highland Rim section of Middle Tennessee and to some extent in other parts of the State. This crop is distinctly less hardy than either winter wheat or barley, suf-

fering more than either from both severe cold and attacks of insects. Winter oats are generally much more productive than spring oats and are recommended in preference to them whenever an early seeding can be made. At the Station farm, plant lice have done great damage to winter oats and are a most serious menace to the future development of the crop.

VARIETIES

In the states further south such varieties as Appler, Red Rust Proof and Fulgrum can be grown to advantage, but in this State they are uncertain, passing safely through some winters but not through others. The standard winter oat in this State is the Grey or Winter



TENNESSEE EXPERIMENT STATION NO. 1

Turf. This variety is uniform in type but is late in maturing and grows extra tall, producing a large amount of straw in proportion to grain. The Culberson winter oat, which appears to have come from Texas, has been grown here to a limited extent for a number of years. Seed was obtained by the Station about fifteen years ago, and the variety was soon found to be both early and hardy, but made up of a mixture of widely different strains, from which fixed strains were easily gotten by selection. One of the best of these selections is called "Tennessee Experiment Station No. 1." It matures about two weeks earlier than Winter Turf, is fully as good a grain producer, and has a shorter and stiffer straw, so that it is especially well suited to the better class of soils.

DATE OF SEEDING

Date-of-seeding experiments were made each year for five years. The first date was usually early in September and a seeding was planned to be made every two weeks until early November. Owing to variations in the season and the conditions of the ground regular dates were not found possible. The results obtained in the five years, however, may be summarized as follows:

	Yield of grain per acre
Seedings from Sept. 6 to Sept. 29	48.1 Bu.
Seedings from Oct. 1 to Oct. 19	40.5 Bu.
Seedings from Nov. 3 to Nov. 5	8.4 Bu.

September seeding has, therefore, given appreciably better results than were obtained the first half of October.

CLOVER AND OATS

Clover and oats may be sown together early in September to much advantage, the same as clover and barley. Culberson oats and clover mature together especially well and make an excellent mixture for hay.

SPRING OATS

Spring oats outyield spring barley (see Table VIII), but are inferior to winter oats, which, when planted at the proper season, far outyield them, as is shown in Table VII. Spring oats, however, are generally preferred after corn, which matures so late in the season and leaves the soil so dry as to make uncertain the successful seeding of the winter oat.

Burt oats have been used very successfully at the Station farm as a nurse crop for Kentucky blue grass when sown in the fall. The oats and grass seed are sown at the same time, the former binding the soil and protecting the grass, which is kept from freezing out during the winter. The oats are apt to be killed by midwinter but serve the purpose mentioned, and the grass has full chance to grow in the spring.

TABLE V—*Variety trials of spring oats—Burt versus Red Rust Proof*

Year	Yield per acre			
	Burt		Red Rust Proof	
	Grain	Straw	Grain	Straw
	Bu.	Ton	Bu.	Ton
1908	27.3	0.66	20.7	0.51
1909	20.2	0.54	23.3	0.67
1910	45.6	0.93	32.7	0.79
1911	14.9	0.37	12.8	0.31
1912	47.7	0.83	45.2	0.91
1913	22.5	0.43	10.7	0.30
Six-years av.	29.7	0.63	24.2	0.58

TABLE VI—*Variety trials of spring oats—Burt versus Kherson, or 60-Day Russian*

Year	Yield per acre			
	Burt		Kherson	
	Grain	Straw	Grain	Straw
	Bu.	Ton	Bu.	Ton
1906	31.8	0.71	26.7	1.00
1908	27.3	0.66	29.5	0.60
1909	20.2	0.54	26.4	0.71
1910	45.6	0.93	43.2	0.92
1911	14.9	0.37	12.6	0.29
1912	47.7	0.83	44.3	0.79
Six-years av.	31.3	0.67	30.5	0.72

TABLE VII—*Spring oats versus winter oats*

Year	Yield per acre					
	Spring oats				Winter oats	
	Red Rust Proof		Burt		Culberson	
	Grain	Straw	Grain	Straw	Grain	Straw
	Bu.	Ton	Bu.	Ton	Bu.	Ton
1902	47.2	1.39	61.3	1.02	68.0	1.69
1903	27.3	0.73	25.0	0.63	65.4	2.57
1911	12.8	0.31	14.9	0.37	21.1	0.59
1912	45.2	0.91	47.7	0.83	50.8	0.66
1913	10.7	0.30	22.5	0.43	35.9	0.56
1914	8.1	0.31	9.4	0.29	44.6	0.84
Average	25.2	0.66	30.1	0.60	47.6	1.15

TABLE VIII—*Spring oats versus spring barley*

Year	Yield per acre			
	Spring oats (Burt)		Spring barley (Beardless)	
	Grain	Straw	Grain	Straw
	Bu.	Ton	Bu.	Ton
1906	31.8	0.71	29.2	0.60
1907	35.1	0.86	14.1	0.61
1908	25.0	0.60	11.2	0.37
1909	20.2	0.54	9.8	0.51
Average	28.0	0.68	16.1	0.52
Pounds of grain per acre	896.0		772.8	

VARIETIES

The Burt oat has been the standard spring variety in Middle Tennessee for a number of years, and has now practically superseded all other varieties in the rest of the State. It is the earliest of all spring varieties, and to this fact must be attributed its chief advantage, for it will make a fair yield when the later kinds are cut down for lack of the one more rain necessary to their success. The difference between Burt and Red Rust Proof, which at one time was widely grown, is shown in Table V. The only rivals of the Burt that have been found by the Station are Kherson and Sixty-Day Russian. These two varieties are so similar that the writer can make no distinction between them. They mature only slightly later than Burt and have



SPRING OATS IN EXPERIMENTAL PLOTS

yielded nearly as well, as Table VI shows. None of these varieties can be used safely as winter oats, both Burt and Kherson being killed by only moderately cold weather.

DATE OF SEEDING

Spring oats should be sown early, but can be sown too early as well as too late. Date-of-seeding experiments to compare the yields from late February and early March seeding with the middle-of-March seeding have been made for five years. In four of the five years the yields have been in favor of the later date, but the difference has been small. The dates of the early plantings have varied from February 20 to March 4, and the average yield per acre was 25.6 bushels. The late plantings varied from March 12 to 17, and the average yield was 27.2 bushels. The larger yields which followed the middle-of-March seedings are attributed to the better stands which were obtained from those seedings.

TABLE IX—*Comparative yields of winter wheat, barley and oats*

Year of harvest	Kind of soil	Yield per acre					
		Winter wheat (Fulcaster)		Winter barley (Union)		Winter oats (Culberson, chiefly)	
		Grain	Straw	Grain	Straw	Grain	Straw
		Bu.	Ton	Bu.	Ton	Bu.	Ton
1906	Rich bottom land	30.7	1.82	54.8	1.75	49.8	2.11
1908	Rich bottom land	27.5	1.55	53.8	1.44	49.0	1.55
1910	Rich bottom land	24.7	1.92	36.5	1.28	27.8	0.56
1911	Fertile upland	18.1	0.94	44.4	1.25	21.1	0.59
1912	Fertile upland	28.9	1.62	28.9	0.79	50.8	0.66
1913	Fertile upland	25.0	1.78	37.0	0.95	35.9	0.56
1914	Fertile upland	26.1	1.22	44.6	1.51	44.6	0.84
Average		25.9	1.55	42.9	1.28	39.9	0.98
Pounds of grain per acre		1554.0		2059.2		1276.8	

Table IX has been prepared to show the comparative yields from a seven-years trial of the three winter cereals, wheat, barley and oats. The results were obtained at the Experiment Station farm at Knoxville, on land that is considerably above the average in fertility. Barley easily came first, with 2059 pounds of grain per acre, on the average, wheat was next best, with 1554 pounds of grain per acre, on the average, and oats came last, with a yield of only 1279 pounds. Barley was not found, however, to lead in trials on very poor land, the results there being in favor of wheat, which is more hardy and a better forager under unfavorable conditions than barley.

WINTER RYE

Rye is an excellent winter cover crop both to prevent the loss of soil from rains and to furnish pasture and green feed for stock. For soiling purposes it is the earliest of the cereals. As a grain producer it has not proved on the Station farm to be equal to wheat. In a five-years trial the average yield of wheat was 1842 pounds, but of rye only 1299 pounds. The yield of straw was in favor of the rye, being 2.25 tons per acre as compared with 2.02 tons for the wheat.

No variety trials of sufficient value to be reported at this time have been made by the Station, but this is a matter worth further investigation.

The date of seeding of rye varies with the fertility of the soil and the objects in view. For pasture purposes it may well be sown in September and for grain about the middle of October, or the same as wheat. Rye can be sown successfully somewhat later than wheat, November seedings seldom being frozen out.