

# Oat Variety and Cultural Tests in Oklahoma, 1925-1947



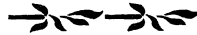
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OKLAHOMA AGRICULTURAL EXPERIMENT STATION

in cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE

Stillwater, Oklahoma



## **More Information About an Important Oklahoma Feed Crop.**

This bulletin reports oat variety and cultural tests made at the Oklahoma Agricultural Experiment Station, Stillwater, and the U. S. Field Station, Lawton, through 1947. Recommendations based on the results of these tests are published for general distribution in Okla. Agri. Exp. Sta. Bulletin No. B-322, "Better Oats for Oklahoma."

Oat testing in Oklahoma since 1946 has been greatly expanded, with tests grown at a score of locations in the State each year. This expanded program of testing is described in Bulletin B-322, which also includes general recommendations concerning the most productive methods of oat-growing in Oklahoma.

**OKLAHOMA AGRICULTURAL EXPERIMENT STATION**

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**UNITED STATES DEPARTMENT OF AGRICULTURE**

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# Oat Variety and Cultural Tests in Oklahoma, 1925-1947

By A. M. SCHLEHUBER, W. M. OSBORN, and T. H. JOHNSTON\*

Oats constitute one of the most important feed crops grown in Oklahoma. During the 10-year period 1938-1947 there was an annual production of 26,771,000 bushels on 1,339,000 acres (See Table I). During this period the oat acreage has fluctuated from a low of 1,045,000 in 1945 to 1,537,000 acres in 1940. The highest average yield per acre was made in 1947 with 23.5 bushels. The highest production was 35,351,000 bushels in 1940 with an average yield of 23.0 bushels per acre. Since 1900, the highest total production was in 1919 and 1920 with 45,762,000 and 45,780,000 bushels, respectively. The highest average yield per acre (34.0 bushels) was made in 1902 and again in 1910.

Oat production in Oklahoma by counties for the 6-year period 1939-1944 is shown in Figure 1. Northeastern Oklahoma (Crop Reporting District III) leads in oat production, with Craig and Rogers the two leading counties. Other important oat-producing counties are Canadian, Garfield, Payne, Mayes, and Kiowa. Highest yields per acre are produced in North Central Oklahoma (Crop Reporting District II). Alfalfa County with 27.0 bushels produced the highest yield per acre, followed by Grant and Woods (23.5 bushels), and Garfield (23.1 bushels).

## VARIETY TESTS

### Fall-Sown Oats

#### STILLWATER.

YIELDS.—Annual and average grain yields per acre of 27 fall-sown oat varieties grown in field plot tests near Stillwater during all or part of the period 1933-1947 are shown in Table II. Since only Arkansas 160 was grown for the entire period, each of the other varieties has been compared with it. Yields, expressed in percent of Arkansas 160 for the same years, ranged from 115.2 percent for

\* This publication reports cooperative investigations of the Oklahoma Agricultural Experiment Station and the Division of Cereal Crops and Diseases and the Division of Soils, Fertilizers, and Irrigation, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture. The authors are, respectively: Agronomist, Division of Cereal Crops and Diseases, and Oklahoma Agricultural Experiment Station; Agronomist, Division of Soils, Fertilizers, and Irrigation; and Assistant Agronomist, Oklahoma Agricultural Experiment Station. Acknowledgement is made to C. B. Cross, formerly Associate Agronomist, Oklahoma Agricultural Experiment Station, who conducted the oat variety tests at Stillwater from 1931 to 1945.

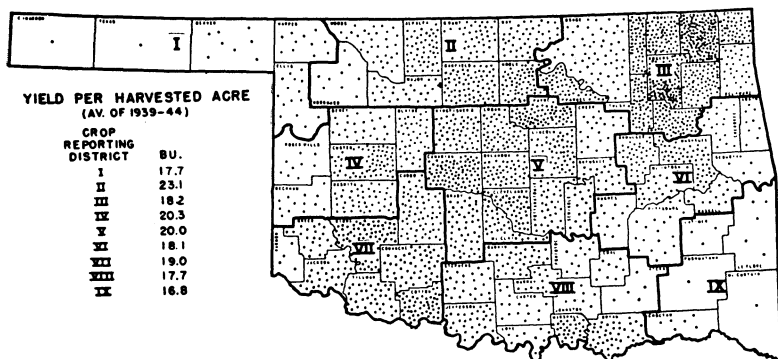


Fig. 1.—Distribution of Oat Production in Oklahoma.  
(1939-1944 average. Each dot represents 10,000 bushels.)

Winter Fulghum C. I. 2500\* for an 11-year period to 24.6 percent for Columbia for four years. Wintok ranked third with 104.3 percent for a period of seven years, and Traveler C. I. 4206 was fifth with 100.3 percent for a 3-year period. Two strains of Winter Fulghum, C. I. 2498 and C. I. 2499, ranked second and fourth, respectively. The yield of Winter Turf was only 72.8 percent of Arkansas 160 for 13 years. As would be expected, the commonly grown spring-sown varieties Columbia, Kanota and Red Rust-proof were among the lowest yielding varieties from fall seeding.

When compared for the four years that all three varieties were grown, Arkansas 160, Wintok and Winter Fulghum C. I. 2500 yielded 40.4, 39.4 and 38.4 bushels, respectively. For a comparable 5-year period (1941, 1943, 1945, 1946, 1947) Forkedeer produced 56.6 bushels as compared with yields of 51.6, 51.4, 43.9 and 34.0, respectively, for Tennex, Wintok, Stanton Strain 1 and Kanota. As shown in Table II, Forkedeer had the highest yield for the three-year period 1945-1947 with 69.1 bushels and was followed quite closely by Traveler and Arkansas 160 with 67.6 and 67.3 respectively. Tennex, Wintok, Fulwin and Stanton Strain 1 ranked behind Arkansas 160 in the order named.

HEIGHT, DATE RIPE, AND TEST WEIGHT.—The average height, date ripe, and test weight for 11 fall-sown oat varieties are presented in Table III. These varieties ranged in height from 45 inches for Forkedeer and Tennex to 35 inches for Fultex and Victorgrain. Kanota was the earliest maturing variety and ripened 8 days ahead of Nortex, Red Rustproof and Stanton Strain 1. Kanota had the highest test weight with 35.5 pounds and was followed

\* C. I. refers to the accession number of the Division of Cereal Crops and Diseases.

TABLE I.—Acreage, Yield and Production of Oats in Oklahoma, 1938-1947.\*

Year	Acreage harvested (Thousand acres)	Yield per acre (Bus.)	Production (Thousand bushels)
1938	1,463	21.0	30,723
1939	1,360	17.8	24,208
1940	1,537	23.0	35,351
1941	1,400	18.5	25,900
1942	1,260	19.0	23,940
1943	1,273	18.0	22,914
1944	1,451	19.0	27,569
1945	1,045	19.0	19,854
1946	1,180	21.0	24,780
1947**	1,416	23.5	33,276
Average	1,339	20.0	26,771
1936-45** Average	1,370	19.3	26,572

\* Data from Agricultural Statistics Division, Bureau of Agricultural Economics, U. S. Department of Agriculture, Oklahoma City, Oklahoma.

\*\* From Crop Production: Annual Summary, 1947. Crop Reporting Board, Bureau of Agricultural Economics, U. S. Department of Agriculture, Washington, D. C.

closely by Frazier with 35.3. Nortex and Red Rustproof were lowest in test weight with 32.1 pounds. All four of the varieties recommended for fall seeding in Oklahoma—namely, Forkeddeer, Stanton Strain 1, Tennex and Wintok—had fairly high test weights and were early to medium in maturity.

WINTER SURVIVAL.—The average winter survival of seven varieties of fall-sown oats is shown in Table IV. These data include the average survival for these seven varieties grown at 12 locations in Oklahoma in the crop year 1946-47, and the weighted survival in percent of Winter Turf for a large number of tests throughout the fall-sown oat region of the United States. In both cases Wintok had the highest winter survival, and it is therefore recognized as being the most winterhardy. Winter Fulghum C. I. 2500, Tennex and Forkeddeer have shown fairly high winter survival. Traveler, Letoria and Stanton Strain 1 have been somewhat less winterhardy. There is good agreement between the relative survival of the varieties in the Oklahoma tests and in the other tests, with the possible exception of Traveler. The survival of Traveler was somewhat higher than that for Letoria and Stanton Strain 1 in the Oklahoma tests but this variety had a lower relative survival than Letoria and Stanton Strain 1 for the average of a large number of tests throughout the fall-sown oat region.





TABLE II. (Cont'd.)

Variety	C. I. No.	1944	1945	1946	1947 <sup>3</sup>	5-Yr. Av. 1941, 1943 1945-47	3-Yr. Av. 1945-47	No. of Years Grown	Av. Yield for Yrs. Grown	Percent of Ark. 160 (same yrs.)
Arkansas 160	2502	82.4	75.2	65.4	61.4	53.7	67.3	14	49.7	100.0
Winter Fulghum	2500				64.4			11	49.4	115.2
Lee	2042	75.6	60.3	51.4				13	44.0	90.2
Culberson	273	75.8	56.2	52.9				13	43.9	90.1
Winter Turf	-----	50.3(2)	45.4	37.8				13	35.5	72.8
Winter Fulghum	2499							6	41.1	101.0
Ferguson 71	844							6	37.3	91.9
Hatchett	838							6	34.2	84.2
Burt Ga. 25-3	2684							4	27.5	72.3
Nortex <sup>5</sup>	2382	74.5	71.8	53.9	29.6	38.1	51.8	11	47.1	87.3
Custis	2041	79.4(3)	49.6					10	42.9	90.1
Winter Fulghum	2498							3	44.5	106.0
Red Rustproof* (Appler)	1815	68.7	65.8	57.0	0.0 <sup>6</sup>		40.9	5	51.7	79.5
Coker (B1-20-93-94-2)	2910							4	45.0	95.4
Wintok	3424		68.3(3)	59.6	61.3	51.4	63.1	7	55.0	104.3
Forkedeer	3170	85.6	73.7	69.2	64.3	56.6	69.1	7	53.3	97.0
Tennex	3169	77.3	64.6	62.8	66.7	51.6	64.7	7	48.5	88.3
Fulwin	3168		63.2	56.5	58.7		59.5	5	44.1	83.0
Stanton Strain 1	3655	90.2	77.3	80.0	0.0 <sup>6</sup>	43.9	52.6	6	51.6	88.3
Victorgrain	3692	68.2	77.9	75.7	0.0 <sup>6</sup>	45.2	51.2	6	49.0	83.8
Kanota	839	68.4	67.7	59.3	0.0 <sup>6</sup>	34.0	42.3	6	39.7	67.9
Ohio Winter	-----	78.6	54.9					3	56.7	90.9
Frazier	2381	81.3	75.2	53.5	0.0 <sup>6</sup>		42.9	4	52.5	73.8
Fultex	3531	62.6	72.0	67.1	0.0 <sup>6</sup>		46.4	4	50.4	70.9
Coker Fulghum 3	3666	67.6	69.2		0.0 <sup>6</sup>			3	45.6	62.5
Columbia	2820	11.8	58.3	0.0 <sup>4</sup>	0.0 <sup>6</sup>		19.4	4	17.5	24.6
Traveler	4206		71.1	83.4	48.2		67.6	3	67.6	100.3

<sup>1</sup> Annual yield is average of 4 replications except as indicated by number in parenthesis, (3) or (2).

<sup>2</sup> All varieties were seeded late and completely winterkilled in 1942.

<sup>3</sup> Grown on the Perkins farm, 9 miles south of Stillwater. All others grown on the Oklahoma Agricultural Experiment Station farm at Stillwater.

<sup>4</sup> Completely winterkilled.

<sup>5</sup> New Nortex C. I. 3422 in 1947.

<sup>6</sup> Not harvested because of low winter survival.

\* Also known as Appler, and frequently called Texas Red.



**Fig. 2.—Part of an Oat Classification Nursery Grown at Stillwater, 1946-47.**  
Front row of stakes represents varieties seeded in the fall and shows complete winterkilling of some varieties; rear row, same varieties spring seeded.

TABLE III.—Average Height, Date Ripe, and Test Weight for 11 Fall-sown Oat Varieties Grown in Field Plots at Stillwater, Oklahoma.

Variety	C. I. No.	Height 1945-46	Date Ripe 1944-46	Test Weight 1944-46
		In.		Lb.
Kanota	839	41	5-26	35.5
Victorgrain	3692	35	5-30	34.4
Tennex	3169	45	6-1	33.0
Nortex	2382	41	6-3	32.1
Fultex	3531	35	6-1	34.8
Arkansas 160	2502	44	6-1	34.4
Wintok	3424	39	*	33.7
Frazier	2381	40	5-28	35.3
Stanton (Strain 1)	3855	40	6-3	34.3
Red Rustproof**	1815	41	6-3	32.1
Forkedeer	3170	45	5-31	34.1

\* Wintok matured three days earlier than Tennex for the three-year period 1945-47.

\*\* See footnote (\*), Table II, for other names for this variety.

TABLE IV.—Winter Survival of Seven Varieties of Fall-sown Oats.

Variety	C. I. No.	Average survival*	Weighted survival**
Wintok	3424	93.0	114.8
Winter Fulghum	2500	89.9	103.3***
Tennex	3169	87.0	108.4
Forkedeer	3170	82.1	103.4
Traveler	4206	72.3	90.7
Letoria	3392	67.4	99.9
Stanton Strain 1	3855	65.1	98.0

\* Average of 12 locations in Oklahoma during the crop year 1946-47. Taken from Okla. Agri. Exp. Sta. Mimeo. Cir. M-166. 1947.

\*\* Percent of Winter Turf. Taken from *Jour. Amer. Soc. Agron.* 34:651-658. 1942. and 39:1027-1035. 1947.

\*\*\* C. I. 2499.

TABLE V.—Protein Content of Whole Oat Grains of Six Fall-sown Oat Varieties Grown at Stillwater and Cherokee, Oklahoma, in 1946 and 1947.

(Percent)

Variety	C. I. No.	STILLWATER		CHEROKEE		Av.
		1946	1947	1946	1947	
Arkansas 160	2502	13.73	13.61	14.51	9.39	12.81
Forkedeer	3170	13.44	11.71	13.55	10.28	12.25
Traveler	4206	13.85	11.53	12.25	9.69	11.83
Wintok	3424	13.14	10.64	13.44	9.57	11.70
Tennex	3169	10.94	11.06	10.88	9.16	10.51
Fulwin	3168	9.81	11.06	12.01	9.10	10.50
Average		12.49	11.60	12.77	9.53	11.60

**PROTEIN CONTENT.**—The protein content of whole oat grains of six fall-sown oat varieties grown at Stillwater and Cherokee, Oklahoma, in 1946 and 1947 is presented in Table V. Arkansas 160 with 12.81 percent had the highest average protein content and was consistently high with the exception of the 1947 test at Cherokee in which the protein content of all varieties was quite low. In contrast, Fulwin was consistently quite low in protein and averaged 10.50 percent. It may be noted that although the average protein content for all varieties at Stillwater in 1946 was nearly equal to the average for the 1946 Cherokee test, the average for the 1947 test was over 2.0 percent greater at Stillwater than at Cherokee.

#### LAWTON

The experimental work of the U. S. Field Station near Lawton, Oklahoma, has included variety testing of fall- and spring-sown oats, methods of production, and tests on rates and dates of seeding. Most of this work has been done in cooperation with the Division of Cereal Crops and Diseases, U. S. Department of Agriculture.

**WINTER SURVIVAL.**—During the period 1930-1947 inclusive, 23 varieties of oats were sown in the fall. Many of these were varieties usually sown in the spring. It is only within comparatively recent years that adapted varieties and selections possessing actual winter-hardiness have been available. None of the varieties was grown in 1934. In 1938 prospects for maximum yields of all the varieties were good until the crop was destroyed by hail May 6.

All varieties grown in 1930, 1933, and 1935 were winterkilled when minimum temperatures of  $-4^{\circ}$  and  $-8^{\circ}$  F. occurred in January, 1930,  $0^{\circ}$ ,  $-2^{\circ}$ ,  $-1^{\circ}$  in February, 1933, and  $2^{\circ}$  and  $3^{\circ}$  in January, 1935. Critical freezes were recorded in 1942, with minimum temperatures of  $1^{\circ}$  in January and  $6^{\circ}$  in March and of  $1^{\circ}$  in January, 1943. Five varieties were winterkilled in each of these years. Freeze injury also occurred in January, 1947, when minimum temperatures of  $-1^{\circ}$  and  $-9^{\circ}$  were recorded; but for the most part there was a good snow cover that year, and consequently even the less winterhardy varieties survived with but little freeze injury.

**YIELDS.**—The results of the fall-sown variety tests at Lawton are shown in Table VI. High yields were produced in the years 1931, 1932, 1941 and 1944 through 1947. In 1936, winter injury and a spring drought reduced the yields to a range of 10.4 to 19.9 bushels per acre.

Eight varieties yielded less than Winter Fulghum C. I. 2498 when compared for the same years grown. Winter Turf C. I. 3296, a late-maturing oat formerly regarded as one of the most winter-

hardy varieties, was sharply reduced in yield by army worms in 1937. Coker 33-47 and Coker 32-1, an early maturing selection, out-yielded Winter Fulghum C. I. 2498 by only 4.2 and 2.8 percent for 11 years. When comparing the high average yields of New Nortex and Ferguson 922, both usually sown in the spring, with such winterhardy varieties as Tennex and Fulwin, it should be pointed out that the yields of the latter two varieties were considerably lowered in 1941 and 1945 by a heavy crown rust infection which caused only a slight damage to New Nortex and Ferguson 922 due to late infection. In 1947 Ferguson 922 was damaged by winterkilling. Fultex, the rust resistant, stiff-strawed combine type, yielded 10.3 percent more than Winter Fulghum C. I. 2498 for seven years. During this same seven-year period the average yield of Fultex was 0.5 bushel and 1.6 bushels per acre better than Fulwin and Tennex, respectively. Wintok, one of the most winterhardy varieties available, yielded almost 2.5 percent less than Winter Fulghum C. I. 2498 for six comparable years. Fulwin x Lee-Victoria (a dark-seeded strain), Letoria, and Stanton Strain 1, each grown for three years, were high yielders. All are resistant to crown rust and have stiff straw, but are less winterhardy than Tennex, Fulwin, and Wintok.

AGRONOMIC DATA.—Agronomic data on 11 varieties of fall-sown oats are shown in Table VII. Heaviest test weights were produced by Fulwin x Lee-Victoria, Stanton Strain 1, and Fultex. Shortest straws were produced by Fultex and New Nortex. Five varieties—Fulwin x Lee-Victoria, Stanton Strain 1, Fultex, New Nortex, and Letoria—lodged from only a trace to 2 percent, compared to 40, 50, and 60 percent for such varieties as Wintok, Tennex, and Fulwin. Crown (leaf) rust was much less severe on New Nortex, Stanton Strain 1, and Letoria than on such varieties as Wintok, Tennex, and Fulwin. Least amount of freeze injury occurred in Wintok, Tennex, and Fulwin, and the most in Fultex and New Nortex.

#### COMPARATIVE GRAIN YIELDS AT STILLWATER AND LAWTON

Grain yields of six fall-sown oat varieties grown uniformly at Stillwater and Lawton for the 3-year period 1945-1947 are compared in Table VIII. In general, the varieties possessing the most winterhardiness were relatively high yielders at Stillwater but relatively low at Lawton. Wintok, the most winterhardy variety, ranked second in yield at Stillwater but was sixth at Lawton. Tennex, which is also quite winterhardy, was the high-yielding variety at Stillwater but ranked fifth at Lawton. Wintok produced 63.1 bushels as compared with 51.8 for Nortex at Stillwater, but at Lawton Nortex yielded 88.9 bushels whereas the yield for Wintok was only 51.1 bushels. Stanton Strain 1, which is only moderately



TABLE VI. (Cont'd.)

Variety	C. I. No.	1942	1943	1944	1945	1946	1947	No. of Years Grown	Av. Yield	Percent of Winter Fulghum C. I. 2498† (same yrs.)
Winter Fulghum	2498	41.4	16.4		58.3	81.5		14	36.1	100.0
Nortex	2382	0	0	58.3	90.2	85.1		15	37.3	98.5
Winter Turf	3296	0						11	18.9	59.6
Custis	2041							7	22.4	91.3
Coker 33-47	3176	34.4	29.9	66.5	63.1	84.1	56.8	11	48.3	104.2
Coker 32-1	3026	44.0	31.7	67.1	63.4	77.6	48.5	11	47.7	102.8
Fulgrain Coker 33-19	3253	24.8						6	35.7	88.7
Lee	2042	0						8	19.8	65.8
New Nortex	3422	0	0	69.6	88.4	84.9	91.4	9	55.7	112.4
Fulwin	3168	55.3	33.8	82.5	45.1	81.7	62.0	9	53.9	108.7
Tennex	3169	56.3	31.1	79.0	46.9	82.4	54.8	9	53.5	107.9
Ferguson 922	2150	††	0	65.5	88.2	83.9	66.5	8	57.4	113.5
Texas Red Rustproof** 1415-12		0	0					5	32.6	84.3
Fultex	3531	35.4	0	67.3	82.2	69.4	81.5	7	59.3	110.3
Winter Fulghum	2500	49.7	37.9	63.3	43.7		49.4	6	47.9	97.5
Wintok	3424	39.7	34.4	75.6	37.5	67.5	48.3	6	50.5	97.6
Fulwin x Lee-Victoria	4383				86.4	87.8	85.3	3	86.5	137.2
Letoria	3392				79.4	80.4	86.7	3	82.2	130.3
Stanton Strain 1	3855				85.3	73.3	80.1	3	79.6	126.2
Traveler	4206					83.9	79.9	2	81.9	125.1
Lelina	3404						75.6	1	75.6	153.0
DeSoto	3923						67.3	1	67.3	136.2
Lega	3379						66.1	1	66.1	133.8

\* Crop not grown in 1934 and destroyed by hail in 1938.

† Yields of Winter Fulghum C. I. 2500 substituted for Winter Fulghum C. I. 2498 in 1944 and 1947.

†† No emergence.

\*\* See footnote (\*), Table II, for other names for this variety.

TABLE VII.—Agronomic Data on 11 Fall-sown Oat Varieties Grown at Lawton, During the Period 1942-47

Variety	C. I. No.	Test Weight		Date Ripe		Height		Lodging	Crown (leaf) Rust		Freeze Injury
		6-year av. <sup>1</sup>	3-year av. <sup>2</sup>	6-year av. <sup>1</sup>	3-year av. <sup>2</sup>	5-year av. <sup>3</sup>	2-year av. <sup>4</sup>	3-year av. <sup>2</sup>	6-year av. <sup>1</sup>	3-year av. <sup>2</sup>	6-year av. <sup>1</sup>
Wintok	3424	Lb. 33.0	Lb. 32.0	May 28	May 26	In. 32	In. 37	Pct. 63	Pct. 29	Pct. 53	Pct. 1
Tennex	3169	32.3	32.3	28	27	37	41	67	28	50	1
Coker 32-1	3026	32.3	32.0	23	19	31	37	40	29	53	5
Fulwin	3168	31.3	31.0	29	27	38	42	66	27	50	1
Winter Fulghum	2498 <sup>5</sup>	31.0	31.3	29	27	35	40	50	28	50	3
Coker 33-47	3176	30.5	30.3	29	30	36	41	38	29	53	22
Fulwin x Lee-Victoria	4383	----	35.0	--	27	--	37	2	--	12	--
Stanton Strain 1	3855	----	34.3	--	24	--	39	1	--	5	--
Fultex	3531	----	34.3	--	24	--	34	0	--	7	33
New Nortex	3422	----	33.0	--	27	--	36	2	--	3	36
Letoria	3392	----	32.3	--	28	--	38	tr.	--	5	--

<sup>1</sup> 1942-1947.<sup>2</sup> 1945-1947.<sup>3</sup> 1942-1946.<sup>4</sup> 1945 and 1946.<sup>5</sup> C. I. 2500 in 1944 and 1947.TABLE VIII.—Grain Yields of Six Fall-sown Oat Varieties Grown Uniformly at Stillwater and Lawton, Oklahoma, During the Period 1945-1947.  
(Bushels per acre)

Variety	C. I. No.	Stillwater				Lawton				Two-station Av.
		1945	1946	1947	Av.	1945	1946	1947	Av.	
Fultex	3531	72.0	67.1	0.0*	46.4	82.2	69.4	81.5	77.7	62.0
Fulwin	3168	63.2	56.5	58.7	59.5	45.1	81.7	62.0	62.9	61.2
Nortex	2382	71.8	53.9	29.6**	51.8	90.2	85.1	91.4**	88.9	70.3
Stanton Strain 1	3855	77.3	80.6	0.0*	52.6	85.3	73.3	80.1	79.6	66.1
Tennex	3169	64.6	62.8	66.7	64.7	46.9	82.4	54.8	61.4	63.0
Wintok	3424	68.3	59.6	61.3	63.1	37.5	67.5	48.3	51.1	57.1

\* Not harvested because of extremely low winter survival.

\*\* New Nortex C. I. 3422 was substituted for Nortex in 1947.



winterhardy, produced only 52.6 bushels at Stillwater and ranked fourth; but at Lawton this variety ranked second with 79.6 bushels.

### Spring-Sown Oats

#### STILLWATER

**YIELDS.**—The annual and average grain yields per acre of 32 spring-sown oat varieties grown in field plot tests near Stillwater during all or part of the period 1931-1947 are shown in Table IX. The relative yield of each variety is given in percent of Kanota for the same years, and average yields for the years 1945-1947 inclusive are shown for 11 varieties so that direct comparison can be made. Of these latter 11 varieties, Neosho was the highest yielder for the three-year period with 46.6 bushels. Kanota ranked second with 44.9 bushels, but was followed closely by Frazier with 44.8 bushels. Tama produced 41.7 bushels to rank fifth, and Osage was sixth with a yield of 41.1. Columbia ranked tenth and Fultex eleventh with yields of 36.1 and 34.5, respectively. Of the 11 varieties compared for this period, Neosho, the highest yielding variety, produced an average of 12.1 bushels more than Fultex, the lowest yielder.

For the three years that Ventura was grown (1944, 1946 and 1947) it averaged 50.2 bushels, or 2.4 bushels more than Frazier, which ranked second for these same years. Fultex, with a yield of 37.4 bushels, again was the lowest yielder, and Columbia yielded only slightly more with 38.2. Osage produced 44.1 bushels, or 6.1 bushels less than Ventura for the same years.

**HEIGHT, DATE RIPE, AND TEST WEIGHT.**—Height, date ripe, and test weight for 11 spring-sown oat varieties grown at Stillwater are presented in Table X. Test weights range from 31.3 pounds for Neosho to 28.0 for Tama for an average of three years. Extra Early, Frazier and Kanota, three varieties of quite similar characteristics, had test weights of 30.8, 30.5 and 30.3 pounds, respectively. Each had an average date ripe of June 17, and all three were earlier than any of the other varieties tested. Neosho, Osage, Ventura and Victorgrain ripened just one day later, whereas Tama and Red Rustproof (Texas Red) were the two latest varieties with an average date ripe of June 20. Victorgrain was the shortest variety with an average height of 28 inches as compared to 29 inches for Osage and Ventura and 30 inches for Neosho and several other varieties. Columbia was the tallest variety with an average of 36 inches.

**PROTEIN CONTENT.**—Protein content of grain samples of five spring-sown oat varieties grown at Stillwater and Cherokee, Oklahoma, in 1946 and 1947 are presented in Table XI. Neosho with 13.85 percent had the highest average protein content when consid-



TABLE IX. (Cont'd.)

Variety or Selection	C. I. No.	1942	1943	1944	1945	1946	1947 <sup>3</sup>	Av. 3-Yr. 1945-47	No. of Years Grown	Av. Yield for Years Grown	Percent of Kanota (same yrs.)
Kanota	839	44.6	33.0	26.3	24.3	63.6	46.8	44.9	16	39.2	100.0
Frazier	2381	46.8	28.6	27.7	18.6	63.4	52.4	44.8	16	39.1	99.6
Extra Early	-----	49.5	31.0	26.6	23.6	58.6	44.4	42.2	16	38.5	98.0
Nortex <sup>2</sup>	2382	30.6		18.8	4.3	61.6	54.8	40.2	15	35.2	88.8
Red Rustproof*	1815	27.2		12.1	5.9	60.0	53.8	39.9	15	34.4	86.9
Iogold	2329	9.1		9.0					11	24.8	63.5
Fulghum H. C. 713	3228								9	38.2	94.4
Nicholson Fulghum	-----								7	37.1	92.4
Coker Fulghum	-----								5	36.9	93.8
Ferguson 922	2150	30.6	23.8	15.2	2.0				13	32.0	85.2
Hasting's 100 Bu.	2462	29.1	29.6	12.4					12	35.4	91.4
Columbia	2820	41.9	29.3	23.5	17.0	48.2	43.0	36.1	14	38.1	94.8
Coker Fulghum 3	3666	48.4	27.1	28.8					10	37.7	97.9
Norton Strain 3	2909								7	37.6	93.8
Fulghum H. C. 726	3227								6	40.2	94.3
Coker B1-30-21-105- 2-157-22	-----								6	39.3	92.2
Ferguson 71	844								4	35.8	83.0
Burt Ga. 25-3	2684								4	35.4	82.0
Coker B1-20-93-94-2	2910								6	31.2	77.0
Arkansas 160	2502								3	28.8	64.1
Coker Fulghum 4	-----	47.4	30.7						7	41.0	106.1
Stanton Strain 1	3855	22.0			12.7		47.3		4	25.4	72.9
Wintok	3424	24.8		14.8			46.7		4	24.4	68.5
Fulwin	3168	45.3		23.5	17.2	37.7			5	27.4	74.4
Fulgrain Strain 4	3693	39.5		23.7	17.8				4	30.7	102.1
Winter Fulghum	2500	14.5		17.9					3	14.4	44.9
Osage	3991			26.4	17.2	58.4	47.6	41.1	4	37.4	92.9
Victorgrain	3692			27.5	18.3	44.0	56.6	39.6	4	36.6	90.9
Fultex	3531			22.4	13.7	39.9	49.8	34.5	4	31.5	78.1
Ventura	3989			32.4		67.5	50.6		3	50.2	110.1
Neosho	4141				24.1	73.1	42.7	46.6	3	46.6	103.9
Tama	3502				23.6	51.1	50.3	41.7	3	41.7	92.8

Oat Variety and Cultural Tests in Oklahoma

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<sup>1</sup> Grain yields were not taken in 1935.<sup>2</sup> New Nortex C. I. 3422 in 1947.<sup>3</sup> Grown on the Perkins farm, 9 miles south of Stillwater. All others grown on the Oklahoma Agricultural Experiment Station farm at Stillwater.

\* See footnote (\*), Table II, for other names for this variety.

TABLE X.—Average Height, Date Ripe, and Test Weight for 11 Spring-sown Oat Varieties Grown at Stillwater.

Variety	C. I. No.	Height 1946 and 1947		Date Ripe 1946 and 1947		Test Weight 1945 and 1947	
		In.	In.	In.	Lb.		
Neosho	4141	30	18		31.3		
Extra Early	-----	33	17		30.8		
Frazier	2381	33	17		30.5		
Kanota	839	32	17		30.3		
Osage	3991	29	18		30.1		
Ventura	3989	29	18		30.0		
Columbia	2820	36	19		30.0		
Victorgrain	3692	28	18		29.8		
Red Rust- proof*	1815	30	20		28.7		
Nortex**	2382	30	19		28.5		
Tama	3502	30	20		28.0		

\* See footnote (\*), Table II, for other names for this variety.

\*\* New Nortex C. I. 3422 in 1947.

ering both years and both locations. It was consistently higher than Ventura, which averaged 12.28 percent. The highest individual protein content recorded was 15.34 percent for Columbia grown at Cherokee in 1946. The lowest, 10.40 percent, was likewise for Columbia for the sample grown at Stillwater in 1947. The average protein content for all of the samples grown at Cherokee was somewhat higher than for the samples grown at Stillwater. Neosho was consistently high in protein content, whereas there was considerable variation in protein content of the other varieties.

TABLE XI.—Protein Content of Whole Oat Grains of Five Spring-sown Oat Varieties Grown at Stillwater and Cherokee, Oklahoma, in 1946 and 1947.

(Percent)						
Variety	C. I. No.	Stillwater		Cherokee		Av.
		1946	1947	1946	1947	
Neosho	4141	13.44	14.45	13.02	14.39	13.85
Osage	3991	12.54	14.40	14.09	11.72	13.19
Kanota	839	11.59	11.65	14.21	13.38	12.71
Columbia	2820	10.82	10.40	15.34	13.38	12.49
Ventura	3989	13.08	11.83	12.43	11.77	12.28
Average		12.29	12.55	13.82	12.93	12.92

## LAWTON

Red oat varieties, usually sown in the spring, are well adapted to southwestern Oklahoma, which is a part of the red-oat region. Because of their ability to withstand heat at critical stages of growth, spring-sown Fulghum and its derivatives have been widely grown for many years. Later-maturing varieties frequently are prematurely ripened by hot, dry weather, resulting in shriveled grain of light bushel weight. They also are more subject to reduction in yield by stem rust than are earlier-maturing varieties.

**YIELDS.**—The yields of 13 varieties, recognized as primarily adapted to spring seeding, grown at the U. S. Field Station near Lawton during the period 1925 to 1947 are compared in Table XII. Several additional varieties were grown at brief intervals, but are not included in the table because yields were not obtained over a period sufficiently long to warrant comparison. Three varieties of winter oats—Stanton Strain 1, Letoria and Tennex—were included in the spring-sown variety test for 1944 to 1947, and results for these three years are shown to provide some indication on the reaction of these varieties when sown approximately four months later than the fall seeding date. Ferguson 922, a strain of Texas Red Rustproof and similar in appearance and productivity, was used as the standard or check because it can be compared with all other varieties for the same years.

Burt x Sixty-Day and Brunker had the lowest average yields for the 12-year period they were grown, each of them producing approximately 78 percent as much as the standard. These two varieties are not grown commercially in southwestern Oklahoma. Over a period of 14 years a local strain of Fulghum averaged 10 percent less than the standard. This local strain averaged 1.4 bushels per acre more than Fulghum C. I. 708 for nine years. Frazier, grown for 11 years, produced 18 percent less than the check.

In the mid-season red oat group including Ferguson 922, Nortex and New Nortex, the average yields of Ferguson 922 and New Nortex were practically identical but Nortex yielded about 5 percent less than the check. However, over the 5-year period 1939-1945 in which Nortex and New Nortex can be compared for the same years, the yields were practically identical, being 31.2 and 31.5 bushels, respectively. Fulghum C. I. 708 was grown for nine years and yielded about 7 percent below Ferguson 922. Columbia, the latest maturing variety in the group of early-maturing red oats, yielded about 14 percent less than the check for a 6-year average. Red Rustproof (Texas Red), another variety in the early-maturing red oat group, yielded practically the same as the check for seven years. Fultex, a red oat variety, for six years produced 3.5 percent



TABLE XII. (Cont'd.)

Variety	C. I. No.	1939	1940	1941	1944	1945	1947	3-Yr. Av. 1944, '45, '47	No. of Years Grown	Av. Yield for Years Grown	Pct. of Check <sup>2</sup> (same years)
Ferguson 922	2150	11.4	54.2	27.0	41.6	32.3	38.6	37.5	18	31.4	100.0
Kanota	839	12.5	34.9	18.0	36.6	30.0	*		17	27.7	89.3
Brunker	2054								12	23.6	78.6
Burt x Sixty-Day	727								12	23.4	77.9
Fulghum (Local Strain)		15.4	33.9	13.9					14	28.9	90.0
Nortex	2382	10.7	48.6	24.8	38.7	32.1			14	31.1	94.6
Frazier	2381		34.0	20.0					11	28.1	82.4
Fulghum	708	13.7	37.5	22.9					9	29.3	92.6
Texas Red Rust- proof* Sel. 1415-12		14.3	55.1	22.3					7	27.1	99.3
Columbia	2820		40.4	20.5					6	25.6	85.7
Fultex	3531	17.2	42.1	33.1	38.9	41.7	39.3	40.0	6	35.4	103.5
New Nortex	3422	13.3	51.7	24.0	36.9	31.4	47.0	38.4	6	34.1	99.6
Fulton	3327	18.6	34.5	21.5	41.4	32.1	35.2	36.2	6	30.6	89.4
Letoria	3392				45.9	30.0	27.3	34.4	3	34.4	91.7
Stanton Strain 1	3855				45.2	28.9	25.5	33.2	3	33.2	88.5
Tennex	3169				43.4	23.2	24.2	30.3	3	30.3	80.7

<sup>1</sup> Not grown in 1934; yields for 1938 not included because of hail damage; killed by a late freeze in 1942 and by greenbugs in 1943 and 1946.

<sup>2</sup> Ferguson 922, C. I. 2150, a strain of Texas Red Rustproof and similar in appearance and productivity, was used as the check variety as a standard for making comparisons in yield between other varieties because it was the only variety grown throughout the entire period.

<sup>3</sup> Seeded, but very poor stand obtained.

\* See footnote (\*), Table II, for other names for this variety.

more than the check. This variety has attracted considerable interest and attention by reason of its yielding ability, its stiff straw, and its resistance to crown rust. It also lends itself well to combine harvesting. Fulton yielded 11 percent less than Ferguson 922. This compares well with Kanota, which also yielded 11 percent less than the check variety.

The three winter varieties—Letoria, Stanton Strain 1, and Tennes—that were included in the spring variety test for three years, 1945-47, yielded 8, 11, and 19 percent, respectively, below the check variety for the same period and produced less than half as much as from fall sowing.

#### COMPARISONS BETWEEN FALL- AND SPRING-SOWN OATS

There are numerous advantages in the growing of fall-sown oats in Oklahoma. Fall-sown oats mature earlier, retard erosion during winter months, provide winter and early spring pasture (especially when sown early), and often escape serious rust damage because of their early maturity. Many of these advantages are reflected either directly or indirectly in grain yield, as can be noted in data presented in Table XIII. In this table the average grain production for the three highest-yielding fall-sown varieties is compared with the average grain production for the three highest-yielding spring-sown varieties at Stillwater and at Lawton for the 5-year period 1943-1947. The fall-sown varieties exceeded the yield of

TABLE XIII.—Comparative Grain Yields\* of Fall-sown and Spring-sown Oats at Stillwater and Lawton, Oklahoma, for the Five-year Period, 1943-47. (Yields are averages for the three leading varieties each year.)

(Bushels per acre)

When Seeded	Year					5-year av.
	1943	1944	1945	1946	1947	
	<b>Stillwater</b>					
Fall	40.5	87.4	77.3	79.9	65.1	70.0
Spring	33.9	27.6	24.8	68.1	55.1	41.9
Difference	6.6	59.8	52.5	11.8	10.0	28.1
	<b>Lawton</b>					
Fall	35.4	79.0	88.9	85.9	87.8	75.4
Spring	0.0**	44.8	37.0	0.0***	51.4	26.6
Difference	35.4	34.2	51.9	85.9	36.4	48.8

\* Yields are averages of the three leading varieties each year.

\*\* Crop destroyed by spring freeze.

\*\*\* Crop destroyed by greenbugs.



the spring-sown varieties every year at both locations. At Stillwater the average difference ranged from 6.6 bushels in 1943 to 59.8 bushels in 1944, with a 5-year average of 28.1 bushels.

In southwestern Oklahoma, because of mild winters, somewhat higher average yields would be expected from fall-sown varieties and also a bigger yield difference between fall- and spring-sown varieties than at Stillwater. Results at Lawton confirm these expectations. The 5-year average yield of the fall-sown varieties was 75.4 bushels at Lawton and 70.0 bushels at Stillwater. The spring-sown varieties were killed by a spring freeze in 1943 and by greenbugs in 1946 at the Lawton station, whereas the fall-sown varieties yielded 35.4 and 85.9 bushels, respectively. The five-year average yield difference between fall- and spring-sown varieties at Lawton was 48.8 bushels.

A comparison of test weight, weight of 100 grains, and percentage of groats of fall- and spring-sown oat varieties grown at Stillwater and at Cherokee, Oklahoma, in 1946 is presented in Table

*TABLE XIV.—Comparison of Test Weight, Seed Size, and Percent Groats of Fall- and Spring-sown Oat Varieties Grown at Stillwater and Cherokee, Oklahoma, 1946.*

Variety	C. I. No.	Stillwater			Cherokee		
		Test Weight	Wt. 100 grains	Groats	Test Weight	Wt. 100 grains	Groats
		Lbs.	Grams	Pct.	Lbs.	Grams	Pct.
<b>Fall-sown Varieties</b>							
Wintok	3424	32.8	2.57	77.2	35.5	2.84	78.8
Tennex	3169	32.9	3.12	76.3	37.1	3.47	77.3
Fulwin	3168	32.4	2.97	75.6	36.8	3.63	76.2
Stanton							
Strain 1	3855	31.9	2.68	74.2	35.8	3.16	74.4
Forkedeer	3170	34.1	2.97	73.7	39.1	3.56	74.7
Traveler	4206	31.9	3.12	72.8	34.5	3.49	73.9
Victorgrain	3692	31.2	3.02	69.3	32.4	2.91	70.1
Winter Turf	1570	30.2	2.06	69.7	28.1	1.98	68.0
Average		32.2	2.81	73.6	35.0	3.13	74.2
<b>Spring-sown Varieties</b>							
Kanota	839	34.6	3.00	73.0	28.4	2.61	71.3
Neosho	4141	30.4	2.40	68.7	28.7	2.45	69.8
Ventura	3989	29.5	2.42	69.5	28.7	2.35	67.8
Osage	3991	30.0	2.24	68.2	28.7	2.25	67.7
Columbia	2820	29.1	2.01	69.1	28.3	1.99	70.2
Average		30.7	2.41	69.7	28.5	2.33	69.4

XIV. The average test weights, seed size (weight of 100 grains), and percent of groats of the fall-sown varieties exceeded the values of the spring-sown varieties at both locations. Some small-seeded varieties (Wintok, for example) have very thin hulls and consequently a high percentage of groats, thus increasing their feeding value.

## TESTS OF PRODUCTION PRACTICES

### Seedbed Preparation

An experiment on method of tillage and crop sequence was started at the Lawton station in 1917. Comparable yield data for spring-sown oats are available from 1923 to 1947 (Table XV). The average yield of the plowed plots was 32.7 bushels (including "on sod" which was also plowed) compared to 32.5 bushels for the average of the disked plots over a 23-year period. No yield differences were obtained, indicating that the method of tillage is not important so long as it will produce a good, well prepared, firm seedbed.

### Place in the Crop Rotation

#### STILLWATER

In much of the State, oats follow either corn or sorghum. At Stillwater a crop sequence of cowpeas, Darso sorghum, cotton, and oats has been followed for 26 years. The average yield of oats in this sequence was 36.0 bushels per acre as compared to 36.3 bushels for oats grown continuously, indicating no yield advantage for the oats in the rotation. The cowpeas do not provide enough nitrogen

TABLE XV.—Average Grain Yield of Spring-sown Oats Grown by Different Methods at Lawton, 1923-1947.  
(Bushels per acre)

Method of Tillage	Previous Crop	Rotation	23-year Av. yield*
Fall plowed	Cotton	4 years: Kafir, cowpeas, cotton, oats	34.1
Disked	Cotton	2 years: Cotton, oats	34.1
Fall plowed	Wheat	2 years: Wheat, oats	32.3
On Sod	Alfalfa	6 years: Corn, cotton, alfalfa 3 years, oats	31.7
Disked	Wheat	2 years: Wheat, oats	30.8
Average of plowed plots, including "on sod"			32.7
Average of disked plots			32.5

\* Crop destroyed by hail in 1938 and killed by greenbugs in 1942.

**TABLE XVI.**—Average Grain Yields of Fall-sown Oats Seeded at Different Rates and Dates; Stillwater, 1939-1941.  
(Bushels per acre)

Rate of Seeding	Date of Seeding						Average of all dates	Average net yield
	Aug. 15	Sept. 1	Sept. 15	Oct. 1	Oct. 15	Nov. 1		
1 Bu./A.	30.2	45.1	58.4	56.8	43.2	35.8	44.9	43.9
2 Bu./A.	36.9	56.4	64.3	64.7	51.7	39.6	52.3	50.3
3 Bu./A.	37.6	60.6	67.7	63.3	53.1	42.9	54.2	51.2
4 Bu./A.	38.7	58.5	63.5	63.6	59.7	44.6	54.8	50.8
Av. of all rates	35.9	55.2	63.5	62.1	52.0	40.7		

VARIETY: Winter Fulghum C. I. 2500.

for the oats following the third year after the legume, but they do produce a beneficial effect on Darso and to some extent on cotton.

#### LAWTON

At the Lawton station a crop sequence and tillage experiment was started in 1917. Average results for a 23-year period are included in Table XV. As shown in the table, there were three 2-year rotations, one 4-year, and one 6-year. The 4-year rotation of kafir, cowpeas, cotton, and spring-sown oats produced a 23-year average of 34.1 bushels per acre, exactly the same as was produced in the 2-year rotation of cotton and oats. The lowest yield, 30.8 bushels, was produced from the 2-year rotation of oats on disked wheat land. In the 6-year rotation of oats, corn, cotton and three years of alfalfa, the oats being grown on alfalfa sod, quite satisfactory oat yields were produced, but poor yields of alfalfa and of the row crops resulted. This rotation is not well suited to southwestern Oklahoma inasmuch as it lacks flexibility, does not conserve moisture, and consequently, does not provide dependable and satisfactory crop yields on upland soils. The futility of growing corn and alfalfa on the upland soils in southwestern Oklahoma is well recognized. The 4-year rotation of kafir, cowpeas, cotton and oats with manure applied to the kafir (10 loads per acre), designed to produce grain for feed, forage, a legume, and a cash crop, involves good tillage practices and strives for the maintenance of soil fertility.

#### Rates and Dates of Seeding

##### FALL-SOWN OATS

STILLWATER.—Average grain yields of fall-sown oats seeded at different rates and dates at Stillwater for the three-year period of 1939-1941 are presented in Table XVI. The 2-, 3-, and 4-bushel rates produced from 6 to 7 bushels more oats per acre than the

**TABLE XVII.**—Average Grain Yields of Spring-sown Oats Seeded at Different Rates and Dates; Stillwater, 1931-1937.  
(Bushels per acre)

Rate of Seeding	Date of Seeding						Average of all dates	Average net yield
	Jan. 16	Feb. 1	Feb. 15	Mar. 1	Mar. 15	Apr. 1		
1 Bu./A.	27.2	33.1	37.7	39.8	33.1	12.2	30.5	29.5
2 Bu./A.	31.9	38.3	41.3	42.7	37.5	15.7	34.6	32.6
3 Bu./A.	37.4	40.5	40.3	43.7	37.2	16.1	35.4	32.4
4 Bu./A.	34.4	39.0	41.5	42.3	37.4	16.9	35.3	31.3
<b>Av. of all rates</b>	<b>32.1</b>	<b>37.7</b>	<b>40.2</b>	<b>42.1</b>	<b>36.3</b>	<b>15.2</b>		

VARIETY: Kanota.

1-bushel rate. Highest yields were obtained from the September 15 and October 1 seedings. The 3- and 4-bushel rates produced as much from the November 1 seeding as the 1-bushel rate on October 15. The 4-bushel rate produced as much from the October 15 seeding as the 1-bushel rate from the October 1 seeding.

#### SPRING-SOWN OATS

**STILLWATER.**—Average grain yields of spring-sown oats seeded at different rates and dates at Stillwater for the period 1931-1937 are presented in Table XVII. Average net yields showed a slight increase from the 2-, 3-, and 4-bushel rates over the 1-bushel rate, but the advantage is not nearly so pronounced as in the case of fall-sown oats. Best dates for spring seeding are between February 15 and March 1. Seeding later than March 15 resulted in a drastic reduction in yield.

**LAWTON.**—A rate-and-date-of-seeding test was conducted on the thin upland soil of the Lawton station with Fulghum spring oats each year from 1926 to 1940, inclusive, except 1934. Three rates, 6, 8, and 10 pecks per acre, were seeded at approximately 10-day intervals from January 25 to March 15, inclusive. Beginning in 1935 a 4-peck rate was added. For this 14-year period, it was possible to compare three rates and three dates for 12 years as shown in Table XVIII.

In the 14 years of the test, the earliest date of seeding, January 25 to February 2, could not be made because of unfavorable weather in six years; and in one year, 1933, the crop was killed by a spring freeze. The third date, February 15, had to be omitted in three of the 14 years, and the second (Feb. 5 to 11) and fourth dates (Feb.

25 to March 1) only once. The fifth date of seeding (March 10 to 15) was made every year.

The 4-peck rate usually permitted weeds to grow too freely and the average grain yields were less than from the other rates. There was no advantage in seeding more than 6 pecks per acre as shown by the average net yields which are practically identical for the 6-, 8-, and 10-peck rates. From the data in Table XVIII it can be noted that, on the average, the earlier seedings produced the greatest yields.

## VARIETAL DESCRIPTIONS

There is a great diversity of types and varieties of oats grown in this country. Adaptability of the variety to local conditions is a factor that often directly affects the yield and profitableness of the crop; hence the choice of a variety should receive careful consideration.

The oat plant is an annual grass belonging to the genus *Avena*. The two main cultivated groups grown in the United States are the common white or northern oat (*A. sativa*) and the red oat (*A. byzantina*).

Under average conditions, the oat plant produces from 3 to 5 hollow stems, or culms, varying from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch in diameter and from 2 to 5 feet in height. The roots are small, numerous, and fibrous, and often penetrate the soil to a depth of several feet. The leaves average about 10 inches in length and  $\frac{5}{8}$  of an inch in width. The grain is produced on small branches, in spikelets, varying in

TABLE XVIII.—Average Grain Yields of Spring-sown Oats Seeded at Different Rates and Dates for 12 Comparable Years\* at Lawton.  
(Bushels per acre)

Rate of Seeding	Date of Seeding			Av. all dates	Av. net yield
	Feb. 5 to Feb. 11	Feb. 25 to Mar. 1	Mar. 10 to Mar. 15		
6 pecks/A.	32.8	32.2	29.3	31.4	29.9
8 pecks/A.	33.0	32.1	30.6	31.9	29.9
10 pecks/A.	33.0	32.3	31.2	32.3	29.8
Av. all rates	33.0	32.2	30.4	31.9	29.9

VARIETY: Fulghum.

\* Data compared for the years 1926-28, 1930-33, 1935-37 and 1939.

number from 20 to 150 per panicle, or head. The hull varies in color from white, yellow, gray, and red to black, and may be awned or awnless. The kernel normally constitutes about 65 to 75 percent of the total weight of the whole grain, with the remaining 25 to 35 percent being hulls.\*

Before the advent of numerous foreign introductions and hybridization, the two main oat types, common white and red oats, were rather easily distinguishable. Red oats are characterized by the persistency of the upper grains to their rachillas (i. e., the "stem" between the "big" and "little" oat remains attached to the "little" oat) and by the presence of a "sucker-mouth" or basal scar at the base of the large oat. In common oats, the rachilla usually remains attached to the primary kernel (large oat) and the base of the kernel is more or less solidified. By crossing between the two species, many intermediate types have been developed. Many of the intermediate strains possess characteristics common to both species. In other strains, many or all the characters common to the two species are somewhat intermediate. Consequently the identification of oat varieties, or even of groups, by examining grain samples has become more and more difficult, and in some instances almost impossible. The most reliable method of identifying oat samples and of measuring their varietal purity is to grow them in the field along with known sources of seed. This method is presently followed at the Oklahoma Agricultural Experiment Station, all unknown samples being seeded both in the fall and again in the spring (Figure 2, page 10). This results in information on their relative winterhardiness as well as on the habit of early growth such as (1) spreading (winter type), (2) semi-spreading (semi-winter), or (3) erect (spring).

The following descriptions of oat varieties are given with the idea of increasing the acquaintance with them and are given from a practical agronomic viewpoint. All varieties described are either important commercially or are otherwise of special interest in Oklahoma. The listing of varieties is alphabetical.

#### ARKANSAS 160

Arkansas 160 (C. I. 2502) was selected from a nondescript lot of winter oats sometime around the middle twenties at the Arkansas Agricultural Experiment Station. The purpose of the selection was to develop a higher-yielding and more uniform oat of the Culberson type for commercial production in Arkansas. It is a midseason, grayish-white, common winter oat that is rather hardy and has a spreading habit of early growth.

\* Stanton, T. R., "Superior Germ Plasm in Oats." *U. S. D. A. Yearbook*. 1936:347-414. 1936.

**COLUMBIA**

Columbia (C. I. 2820) originated as an "off-type" plant in Fulghum in 1920 at the Missouri Experiment Station and often is termed "Burt-like" in appearance. It is tall and rather stiff-strawed with a small, gray seed of fair to good test weight. It has an erect habit of early growth. The variety was released to farmers in Missouri in 1930, and by 1940 it had become one of the leading spring oat varieties in the country. However, because of its medium to late maturity under Oklahoma conditions, it has not been a particularly promising variety in this state, especially in comparison to earlier maturing varieties such as Kanota. Columbia is very susceptible to leaf and stem rust but is resistant to Victoria blight.

**FORKEDEER**

Forkedeer (C. I. 3170) is a winterhardy red oat selected from a Fulghum type of winter oat (Selection C. I. 2499) at the Tennessee Experiment Station. It is a vigorous-growing, medium to tall variety that produces excellent yields in the absence of severe winters and heavy rust infection. Forkedeer is susceptible to the rusts and smuts but is resistant to Victoria blight.

**FRAZIER**

Frazier (C. I. 2381) is an early red oat of the Fulghum type selected from Red Rustproof. It was released to farmers in 1926 from the experiment station at Denton, Texas. In most plant and kernel characters it is similar to Kanota and Fulghum. It is classed as an early, vigorous, awned, plump-kerneled, short-strawed variety. Frazier is susceptible to the rusts, moderately resistant to smut, and resistant to Victoria blight. It has a semispreading to erect habit of early growth.

**FULTEX**

Fultex (C. I. 3531) is the result of a cross between Fulghum C. I. 708 x Victoria made at Arlington, Virginia, in 1930. The final selection was made at the Denton (Texas) Substation and was released to farmers in 1940 from that station. Fultex is early-maturing, short, stiff-strawed, and has a short, plump, red kernel with rather distinct yellowish stripes on the seed. It is resistant to smut and many races of crown rust; but, like numerous other strains with the Victoria parentage, it is susceptible to Victoria blight. It has a semispreading to erect habit of growth and is adapted to spring seeding in northern Texas and southern Oklahoma. It is frequently grown from fall seeding in those areas. At Lawton, Fultex has been the highest-yielding variety from spring seeding and has a good yield record from fall seeding. However, under Still-

water conditions and further north, Fultex is less productive than Kanota from spring seeding and lacks sufficient winterhardiness for fall seeding.

#### FULTON

Fulton (C. I. 3327) resulted from a cross between Fulghum x Markton made in 1926 at the Aberdeen (Idaho) Substation for the purpose of introducing the smut resistance of Markton into the Fulghum type. The final selection that resulted in Fulton was made at the Kansas Agricultural Experiment Station from where it was distributed in 1939. Fulton has a spreading panicle and a light red kernel that resembles white oats more than Kanota. It grows somewhat taller, may head from four to six days earlier, and sometimes ripens from one to three days earlier than Kanota. Fulton has a relatively weak straw. If planted early, it is subject to damage by late spring frosts. It is resistant to many races of smut and to Victoria blight, but is susceptible to leaf and stem rust. It has an erect habit of early growth.

#### FULWIN

Fulwin (C. I. 3168) originated as a selection from Winter Fulghum C. I. 2499 at the Tennessee Agricultural Experiment Station in 1930. It is a winterhardy red oat with erect, very long, open and spreading panicles. The culms are slightly hairy at the nodes and rather weak. It is a vigorous, tall variety with a winter or spreading habit of early growth. Fulwin is very susceptible to smut and rust but is resistant to Victoria blight.

#### KANOTA

Kanota (C. I. 839) is a red oat originating as a mass selection from Nicholson's Extra Early Red Rustproof. The manner in which Kanota came to be distributed is reported by Coffman *et al.*\* They state: "The Kansas Agricultural Experiment Station obtained some 20 to 30 lots of seed from many southern sources for seeding in the spring of 1916 in an attempt to find a more suitable variety than those then available. One of these was from the Robert Nicholson Seed Company, Dallas, Texas, designated as Nicholson Extra-Early Red Rustproof. This strain was outstandingly vigorous throughout the season and at harvest yielded at the rate of more than 100 bushels per acre, a very high yield for oats in Kansas at that time." It was first distributed as Kansas Fulghum but later as Kanota, partly because of uncertainty as to its identity with Fulghum but more especially to prevent the introduction of smut, known to be prevalent in oats in the South, which at that

\* Coffman, F. A., et al. "Improvement and distribution of spring-sown red oats." Jour. Amer. Soc. Agron., 37: 479-498. 1945.



time was not prevalent in Kansas. Its acceptance by Kansas farmers was immediate, and, as shown subsequently, the recognition of its value for spring seeding marked the beginning of an epoch in oat production in the United States.\*\* Kanota is early-maturing and produces fair to good yields and test weight. It is susceptible to rust and smut but resistant to Victoria blight. It possesses a semispreading to erect habit of growth and is not adapted to late spring seeding.

#### NEOSHO

Neosho (C. I. 4141) originated as a selection from a double cross, Fulghum-Markton x Victoria-Richland. The cross was made at the Aberdeen (Idaho) Substation but the final selection that resulted in Neosho was made at the Kansas Experiment Station. Neosho is classed as an early-maturing (light) red oat. In early growth it has exceptionally dark green, very erect-growing leaves. It makes a rapid initial growth in early spring but does not tiller (stool) as profusely as Kanota. It has exceptionally stiff straw, making it satisfactory for combining. The panicles are small, and the light red kernels are occasionally awned. Neosho is highly resistant to rust and smut but is susceptible to Victoria and halo blights.

#### NEW NORTEX

New Nortex (C. I. 3422) originated as a selection from Nortex which, in turn, was selected from Red Rustproof (Texas Red). After nine years of testing this strain was released in 1937 from the Denton (Texas) Substation and by 1940 it had become one of the leading varieties in Texas. It is a mid-season, heavy-hulled red oat that ripens more uniformly and is more uniform in plant type than either Nortex or Red Rustproof. It is resistant to Victoria blight and has some resistance to rust but is susceptible to smut. It has a semispreading habit of early growth.

#### OSAGE

Osage (C. I. 3991) originated from the  $F_8$  progeny of a Victoria-Richland x Fulton cross made at the Aberdeen (Idaho) Substation. The selection that resulted in Osage was made at the Kansas Experiment Station. In plant characters, Osage tillers exceptionally well, has short straw, and resembles Fulghum slightly in general appearance. The kernels are yellow to very light reddish yellow in color, somewhat long and slender, and are usually awnless. Osage has a stiffer straw than Kanota but not as stiff as the straw of Neosho. It is resistant to rust and smut but is susceptible to Victoria blight. It has an erect habit of early growth.

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\*\* *Ibid.*

**RED RUSTPROOF OR TEXAS RED**

Red Rustproof or Texas Red (C. I. 1815), also known as Appler, Red Texas, Texas Red Rustproof, and California Red, is grown under a variety of names. Some of the other named strains of Red Rustproof include Bancroft, Cook, Hastings Hundred Bushel, Patterson and many others. The original strain was apparently introduced from the Mediterranean Sea area where the climate is similar to much of the Southern oat area of the United States. It is a mid-season red oat with heavy hulls, numerous awns, generally low in test weight, and is often damaged by rust and hot weather. It has a semispreading habit of early growth.

**STANTON STRAIN 1**

Stanton Strain 1 (C. I. 3855) is the result of a cross between Lee x Victoria made in 1931 by U. S. D. A. workers at Arlington Farm, Va., and was distributed in the South in the fall of 1941. The variety is somewhat intermediate between common and red oats. It is semi-hardy, vigorous, heavy tillering, and has rather short, stiff straw. The kernels are short, plump, yellowish to yellowish-red, with relatively few awns. It has a semi-spreading habit of early growth and the leaves are light green in the seedling stage. Stanton Strain 1 is resistant to most races of crown rust and smut but is susceptible to Victoria blight.

**TENNEX**

Tennex (C. I. 3169) is a sister strain of Fulwin, having been originated from Winter Fulghum C. I. 2499 at the Tennessee Agricultural Experiment Station. It is similar to Fulwin in nearly all plant characters. Tennex differs from Fulwin in having darker green leaves in the seedling stage, in flowering somewhat earlier, and in having slightly smaller grains with stronger awns. As an average of numerous tests, its survival during winters has been approximately 6 percent less than that of Wintok. However, in years and in areas where winterkilling is not severe it is usually more productive than Wintok. In Southwestern Oklahoma it has been very productive in years when crown rust has not been serious, but it suffers badly in areas and in years when crown rust is heavy.

**TRAVELER**

Traveler (C. I. 4206), also known as Arkansas Traveler, is the result of a cross between Victoria x Custis (Custis is a cross between Winter Turf x Aurora) made at Fayetteville, Arkansas, in 1937. This variety was bred primarily for grazing and clipping purposes. It is a common winter oat that is apparently being grown quite widely in Arkansas and to a rather wide extent in eastern Oklahoma. Traveler is considerably less winterhardy than Wintok (it

survived about 21% less than Wintok in Oklahoma tests during the winter of 1946-47) but seems to have considerable capacity to yield in the absence of rigorous winters. It has a fairly stiff straw and the grain does not shatter easily. The grain is fairly large, but has a rather high percentage of hull and only a fair test weight. The variety is somewhat variable in plant characters and may need further purification. Traveler has resistance to many races of crown rust and smut but is susceptible to Victoria blight.

#### VENTURA

Ventura (C. I. 3989) is a sister selection of Osage produced from the cross Victoria-Richland x Fulton. Like Osage, it was selected in 1939 on the basis of observations made at Manhattan, Kansas; Ames, Iowa; Arlington, Va.; and Aberdeen, Idaho. It was named and released by the California Agricultural Experiment Station. Ventura tillers well, has short, stiff straw and resembles Fulghum somewhat in general appearance. Kernels are yellow to very light reddish yellow and are usually awnless. It has resistance to many races of crown rust and smut but is susceptible to Victoria blight. The variety has an outstanding yield record at Stillwater (10 percent above Kanota for three years of testing) as well as at Lawton in Southwestern Oklahoma where the testing period has been shorter. It has an erect habit of early growth.

#### VICTORGRAIN

Victorgrain (C. I. 3692) is the result of a cross between Victoria x Fulgrain made by Coker's Pedigreed Seed Company of Hartsville, South Carolina, in an effort to obtain resistance to crown rust and smut. It is an early red oat with rather short, stiff straw and has a semispreading to erect habit of early growth. At Stillwater it is about 10 percent less productive than Kanota and lacks sufficient winterhardiness for fall seeding. It is resistant to many races of crown rust and smut but is susceptible to Victoria blight.

#### WINTER FULGHUM

Winter Fulghum (C. I. 2500) resulted from selections made at the Arlington Experimental Farm in 1919 from Fulghum C. I. 699. Selection No. 699-2015 was later designated C. I. No. 2500. From seedings made in plant rows in the fall of 1919 it was noted in the spring of 1920 that this selection, along with several others, had a decided spreading or winter habit of growth. The leaves were narrower and of a darker green than those of the Fulghum parent. It is a medium to late maturing red oat. It has a high degree of winterhardiness, but is slightly less hardy than Wintok. It is susceptible to the rusts and smuts but is resistant to Victoria blight.

## WINTOK

Wintok\* (C. I. 3424), named from winter (oat) and Oklahoma, is the result of a cross made by U. S. D. A. workers in 1926 between Hairy Culberson C. I. 2505 and Winter Fulghum C. I. 2498 at the Arlington Experimental Farm. The fourth or fifth generation of the bulk unselected hybrid was sent to the Oklahoma Agricultural Experiment Station. Several strains of this cross selected by C. B. Cross proved to be very winterhardy; and one, No. I-32-1446, bulked in 1932, was later named Wintok and distributed by the Oklahoma Agricultural Experiment Station. It is a common (*Avena sativa*) oat with outstanding winterhardiness; in fact, it is generally conceded to be the most winterhardy oat variety in the United States. Consequently, it is usually more productive than less hardy varieties following rigorous winters. Wintok has a small, slightly gray seed, with good test weight, and a low percentage of hull. Because of this low percentage of hull, it is believed to have a higher feeding value, pound for pound, than varieties with a higher percentage of hull. In examining a sample of Wintok many people mistake the small size of seed for low test weight. It matures early from fall seeding; and in some instances, because of this earliness, it escapes serious damage from crown rust to which it is extremely susceptible. It is not recommended for areas where crown rust is serious or where winters are as mild as commonly experienced in the southern and eastern parts of Oklahoma. The variety is also susceptible to the smuts but is resistant to Victoria blight. It has a spreading or winter habit of growth. For a profitable grain crop, Wintok should not be seeded in the spring.

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\* Pronounced "wint'-oak."

## SUMMARY

This bulletin summarizes the oat varietal testing work conducted at Stillwater and Lawton during the period 1925-1947. Data are presented on grain yield, test weight, lodging, maturity, winterhardiness and other characters of importance in varietal adaption. Statements are made and data presented regarding production practices. In addition, descriptions of the common and important oat varieties are included.

On the basis of tests conducted to date, the following varieties are recommended for Oklahoma:

For fall sowing—Wintok, Tennex, Forkedeer, Traveler and Stanton Strain 1 (listed in order of winterhardiness).

For spring sowing—Kanota, Neosho, New Nortex and Red Rustproof (Texas Red) (listed alphabetically). Fultex is recommended for early spring seeding in southwestern Oklahoma.

In a comparison of fall- and spring-sown oats, it was shown that fall-sown oats produce considerably more grain.



# APPENDIX

## Climatic Factors at Lawton

During the 23 years, 1923-1947, covered by oat tests at the U. S. Field Station at Lawton reported in this bulletin, there were five years—1927, 1928, 1934, 1937 and 1939 in which the average maximum temperature in May was 85° F., or 5 degrees above normal. The average spring seasonal rainfall for the same five years was 2.65 inches below normal (Appendix Table I) and the average yield of oats from the five different rotations was only 23.5 bushels per acre, 7.1 bushels less than the average of all rotations for 23 years. When the average maximum temperature in May was 4.4 degrees below normal in 1924, 1929, 1931, 1935, and 1943, and the average spring seasonal rainfall for the same years was 2.54 inches above normal, the average yield of oats was 44.9 bushels per acre, 12.5 bushels above the 23-year average.

*APPENDIX TABLE I.—Annual and Seasonal Precipitation and Departures From Normal for the Crop Years 1923-1947 at the United States Field Station, Lawton, Okla.*

Year (July 1-June 30)	Annual Rainfall	Rainfall in	Departure	Rainfall in	Departure
		Sept.-May (Fall-sown oats seasonal)	from Normal Sept.-May	Feb.-May (Spring-sown oats seasonal)	from Normal Feb.-May
	In.	In.	In.	In.	In.
1922-23	27.45	20.73	-0.73	11.04	0.80
1923-24	35.41	29.01	7.55	9.51	-0.73
1924-25	18.62	12.43	-9.03	8.60	-1.64
1925-26	28.99	22.26	0.80	7.68	-2.56
1926-27	38.08	25.79	4.33	10.17	-0.07
1927-28	30.14	16.04	-5.42	7.02	-3.22
1928-29	29.17	23.74	2.28	16.17	5.93
1929-30	25.24	19.31	-2.15	10.28	0.04
1930-31	25.57	23.25	1.79	6.68	-3.56
1931-32	36.05	22.60	1.14	5.43	-4.81
1932-33	26.82	20.85	-0.61	12.99	2.75
1933-34	26.70	16.25	-5.21	8.09	-2.15
1934-35	24.75	21.29	-0.17	12.86	2.62
1935-36	20.41	14.93	-6.53	5.43	-4.81
1936-37	23.87	21.19	-0.27	8.07	-2.17
1937-38	37.21	29.47	8.01	17.60	7.36
1938-39	15.99	11.21	-10.25	4.62	-5.62
1939-40	18.68	11.86	-9.60	8.86	-1.38
1940-41	39.31	25.34	3.88	13.22	2.98
1941-42	36.06	26.66	5.20	8.46	-1.78
1942-43	39.77	31.26	9.80	18.67	8.43
1943-44	19.70	15.61	-5.85	8.52	-1.72
1944-45	35.68	24.55	3.09	10.92	0.68
1945-46	35.94	25.61	4.15	11.31	1.07
1946-47	31.09	25.19	3.73	13.84	3.60
Average	29.07	21.46		10.24	