

OKLAHOMA  
AGRICULTURAL EXPERIMENT STATION.

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Bulletin No. 28--June, 1897.

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EXPERIMENTS WITH WHEAT, 1896-7.

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SUMMARY.

The wheat was grown on medium upland prairie soil of average fertility. The land had been cultivated for six years; manured in spring of 1892. It produced a crop of oats in 1896; was plowed and harrowed in August; seeded at different dates with press drill, drill rows six inches apart. The plowing was all deeper than is usual; two-thirds of each plat was subsoiled. The land receives surface drainage from higher lying pasture.

In the variety test eighty-three plats, usually of one-fortieth of an acre, were sown, September 22d to 24th. There were sixty-four named varieties. The rate of seeding was four pecks per acre. The field was pastured to some extent during the winter and early spring. The plats were cut from June 18th to June 22d, the later cut plats being over ripe.

The eighty-three plats gave an average yield of 39.6 bushels per acre. Eight plats gave yields between 50 and 57; fourteen between 45 and 50; twenty-four between 40 and 45; fifteen between 35 and 40; twelve between 30 and 35, and eleven less

than 30 bushels per acre. The smallest yield was at rate of 19.5 bushels. In a number of cases the loss from shattered kernels or variation in the soil had more to do with yield than difference in variety.

In comparing results from sowing at different dates, the largest yields were from first sowing, September 15th, with nearly as large from sowing September 25th. Good yields were obtained from sowing October 5th, with a marked decrease after that date. From November sowings the yields were relatively very small. The first sowing was cut seven days earlier than any of the others when it was not fully ripe. The later sowings were cut ten days later than the first. The straw of the plats sown earliest and latest was erect when cut; that from the plats sown in October was more or less fallen.

The difference in yield between the subsoiled and unsubsoiled parts was slight. In general, the straw was taller on the subsoiled portions than on the unsubsoiled.

Rolling the soil before drilling the wheat gave a large increase in the yield from the early sown, a slight increase from the middle sown and a decrease from the late sown plats.

In general the best yields were from plats sown at the rate of six pecks per acre, but the largest yield from one plat was from sowing at rate of five pecks per acre. In some cases there was no great difference in yield whether three or eight pecks per acre were sown,

The effect of deep plowing and especially of subsoiling in enabling the soil to retain water from the late rains was well illustrated.

The harvesting was almost exactly one month later than in 1896. The varieties giving the largest yields were Fultz, Red Russian, Fulcaster, Mealy, Dietz Longberry, Sibley's New Golden, and Oregon Swamp, but it is probable other conditions more influenced the yield in many cases than did the variety.

The seed was all from the poor crop of 1896 grown on the farm. It was all of light weight, and was slightly mixed. Threshing such small plats increased this mixture, so that the Station cannot furnish pure seed of any variety. The admixture was not sufficient, however, to perceptibly affect the yield.

The weather conditions were unusually favorable throughout the growing season. Except in December and January the rains were fair in amount, or excessive, each month after the wheat was sown. There was neither extreme high or low temperature at any time while the wheat was growing. A study of Bulletin No. 24 with reference to the soil moisture at different times and under different conditions will be of value.

*Meteorological Table, 1896-7.*

MONTH.	TEMPERATURE.			RAINFALL.
	Mean Maximum	Mean Minimum	Mean	Inches
1896.				
July.....	90.1	69.9	80.0	5.85
August.....	96.6	68.8	82.7	1.64
September.....	85.5	58.6	72.1	2.54
October.....	73.0	45.4	59.2	2.88
November.....	57.9	35.3	46.4	1.56
December.....	56.8	29.9	43.2	.85
1897.				
January.....	43.8	23.6	34.2	.76
February.....	51.9	31.0	41.4	1.51
March.....	62.8	39.4	51.6	3.51
April.....	70.7	45.4	58.4	6.36
May.....	75.4	55.4	65.5	4.77
June.....	85.1	66.2	75.4	4.13

COMPARISON OF VARIETIES.

Eighty-three plats were sown with wheat bearing sixty-four different names. In many cases there was little difference between samples having different names. The land was apparently quite uniform in quality. It sloped gently to the south, receiving drainage water from a pasture to the north. It had been cultivated five years. In the spring of 1892 a coating of stable manure was applied. In 1895 it was in corn and teosinte; in 1896 in oats. The plats were long and narrow, generally 4.5 by 242 feet, with nine drill rows six inches apart. A good press drill was used. A space of two feet was left between the plats. This probably slightly increased the yield, although some of the highest yields were from plats twelve feet wide.

The land was plowed in August. The north third was plowed with riding plow, to depth of seven to eight inches; the middle third with the same plow followed with a subsoil plow loosening the soil to depth of fifteen to sixteen inches; the south third plowed and subsoiled with the "Secretary" disc plow to depth of fourteen to fifteen inches. There were rains August 22d and 26th. August 28th the land was harrowed. There were fair rains during the early part of September. September 22d the ground was harrowed and the wheat sown from September 22d to 24th.

The wheat was pastured to some extent during the latter part of the winter and the early spring. By the middle of May considerable rust was noted on many of the plats. Chinch bugs

appeared in moderate numbers. Most of the plats were fully headed by May 11th, the later ones by May 15th. There was relatively little difference in the time of ripening, not more than three days.

The plats were harvested June 18th, 19th, 21st and 22d. Harvesting would have begun four days earlier had not heavy rains made the ground too wet. Some grain was lost from shattering at the later cuttings. Plats fifty-three to seventy-six suffered most. The grain was threshed from June 28th to 30th. There was a slight loss in handling. The reported weight of straw includes that of the chaff. The plats were not divided in harvesting so that results of differences in plowing were not determined except by observation. The straw was taller on the subsoiled land.

The accompanying table gives results in detail. The yields of both grain and straw are unusually large. The average yield

*Variety Tests of Wheat, 1896-7.*

Number.	VARIETY.	YIELD PER ACRE.		Lbs. per Bushel.	Wt. 100 Av. Ker. Grams.	Lbs. Straw per 100 Lbs. Grain.	Height (in.).	Bearded or Smooth.	Color of Kernel.	Color of Chaff.
		Grain (bu.)	Straw (lbs)							
1	Fulcaster .....	40.7	4240	61.5	3.911	173	51	B	R	W
2	Fultz .....	47.7	5220	62.0	2.870	182	49	S	R	W
3	American Bronze .....	35.2	3770	61.0	3.052	179	53	S	R	W
4	Badger .....	32.3	4060	60.0	3.112	221	53	S	R	W
5	Big English .....	41.0	4620	61.5	2.940	188	53	S	R	B
6	Curril's Prolific .....	49.3	4680	61.5	3.139	158	51	S	R	B
7	Early Red Clawson .....	40.8	5380	59.5	3.333	220	54	S	R	B
8	Early Ripe .....	43.7	5580	60.0	3.013	213	53	B	R	W
9	Extra Early Oakley .....	40.8	4510	61.0	3.265	184	51	S	R	B
10	Ohio Early Ripe .....	36.7	3800	61.0	3.389	173	52	S	R	B
11	Fulcaster .....	44.7	4920	61.5	3.873	183	54	B	R	W
12	Fultz .....	46.5	5210	60.5	2.841	187	50	S	R	W
13	German Emperor .....	47.3	5600	60.0	2.997	197	53	S	R	B
14	Hickman .....	31.7	3420	61.5	3.342	180	50	S	R	W
15	Improved Rice .....	32.0	3280	61.5	3.585	171	53	S	R	W
16	Longberry .....	43.0	4940	60.0	3.127	191	52	S	R	W
17	Mealey .....	50.7	5480	58.5	2.785	180	51	S	R	W
18	Ontario Wonder .....	43.5	4710	60.5	3.390	181	56	S	R	W
19	Oregon .....	41.3	4680	59.5	2.988	190	54	S	R	B
20	Pool .....	38.5	4090	60.5	3.416	179	53	S	R	B
21	Fulcaster .....	44.3	4420	61.5	4.115	166	53	B	R	W
22	Fultz .....	47.0	4860	61.5	3.056	172	50	S	R	W
23	Saskatchewan .....	44.7	5120	60.5	3.067	191	52	S	R	B
24	Witter .....	38.3	4420	59.0	3.002	192	53	S	R	B
25	Willits .....	32.7	3680	58.5	3.135	188	50	S	W	W
26	Wyandotte Red .....	40.0	4120	60.5	3.355	172	50	S	R	B
27	Bearded Monarch .....	48.8	5630	60.5	3.179	192	53	B	R	W
28	Kansas Fulcaster .....	38.3	5500	59.5	2.857	239	51	B	R	W
29	Crate .....	46.5	5490	61.0	3.457	197	52	B	R	W
30	Velvet Chaff .....	39.0	4620	61.5	3.721	196	52	B	R	B
31	Fulcaster .....	50.5	5250	61.5	3.970	173	54	B	R	W
32	Fultz .....	57.0	6460	61.5	2.769	201	52	S	R	W
33	Diehl Mediterranean .....	47.0	5380	61.0	3.570	191	56	B	R	W

*Variety Tests of Wheat, 1896-7.—Continued.*

Number.	VARIETY.	YIELD PER ACRE.		Lbs. per Bushel.	Wt. 100 Av. Ker. Grams.	Lbs Straw per 100 Lbs. Grain.	Height (in.).	Bearded or Smooth.	Color of Kernel.	Color of Chaff.
		Grain (bu.)	Straw (lbs)							
34	Dietz Longberry.....	50.0	5520	62.0	3.691	184	56	B	R	B
35	Fulcaster, Ill., '95.....	55.9	5580	62.0	3.564	187	53	B	R	W
36	Golden Cross.....	44.3	5420	61.5	3.520	204	55	B	R	B
37	Hindoostan.....	46.3	5500	61.5	3.294	198	55	B	R	B
38	Hybrid Mediterranean.....	48.3	5700	60.0	3.762	197	56	B	R	W
39	Lebanon.....	43.7	5100	61.0	3.804	194	54	B	R	W
40	Lehigh.....	39.0	4780	60.0	3.789	204	54	S	R	B
41	Fulcaster.....	42.7	5640	60.0	4.156	220	52	B	R	W
42	Fultz.....	46.0	5680	61.0	3.159	206	50	S	R	W
43	Miami Valley.....	44.0	5280	59.5	2.956	200	55	B	R	W
44	Missouri Blue Stem.....	45.7	4860	61.0	3.694	177	55	B	R	B
45	New Michigan Amber.....	41.7	4220	60.5	3.301	169	55	S	R	B
46	Nigger.....	43.7	4660	60.5	3.539	178	54	B	R	B
47	Pickaway.....	46.0	5320	60.5	3.457	193	56	B	R	B
48	Rudy.....	42.7	4960	60.0	3.492	193	56	B	R	W
49	Sibley's New Golden.....	51.0	5460	61.0	3.706	178	55	B	R	W
50	Sibley's New Golden.....	42.0	4440	61.5	3.653	178	54	B	R	W
51	Fulcaster.....	35.7	3500	61.5	3.779	166	57	B	R	W
52	Fultz.....	37.5	4250	60.5	2.961	189	54	S	R	W
53	Early White Leader.....	39.6	4225	60.0	3.486	178	51	S	W	W
54	Theiss.....	36.3	3475	59.5	2.878	159	49	B	R	W
55	Reliable Minnesota.....	25.4	2825	56.0	2.127	185	50	B	R	W
56	Tuscan Island.....	40.4	3675	60.5	3.436	152	52	B	R	W
57	Valley.....	33.8	3425	59.5	2.771	169	57	B	R	W
58	Yuba.....	38.3	4375	60.5	3.517	209	57	B	R	B
59	Landreth.....	24.6	3625	58.5	2.997	246	59	S	W	W
60	Bail.....	23.3	2500	58.0	2.703	178	59	B	R	B
61	Fulcaster.....	32.9	3275	61.5	3.761	166	54	B	R	W
62	Fultz.....	45.8	4800	61.0	3.122	174	53	S	R	W
63	Early White Leader.....	21.3	3275	58.5	2.986	257	57	S	W	W
64	Martin's Amber.....	21.3	3175	59.0	2.761	249	59	S	W	W
65	Miller's Prolific.....	24.2	2700	59.5	3.089	186	56	S	R	B
66	Royal Australian.....	25.0	3450	60.0	3.105	230	57	S	W	B
67	Silver Chaff.....	20.8	4050	59.5	2.753	325	58	S	W	B
68	Johnson.....	30.0	4250	57.5	3.265	236	59	B	W	W
69	Rock Velvet.....	35.0	4900	59.0	3.156	233	57	B	R	B
70	Yellow Gypsy.....	30.8	4250	58.5	3.014	230	58	B	W	B
71	Fulcaster.....	33.5	3510	61.0	3.963	174	56	B	R	W
72	Fultz.....	19.5	2160	62.0	3.130	185	50	S	R	W
73	Democrat.....	40.0	3700	60.0	3.216	154	55	B	W	W
74	New Monarch.....	30.4	3270	59.5	3.029	179	55	S	R	B
75	Roberts.....	20.4	2525	59.5	3.223	206	53	B	W	B
76	Beal.....	32.1	2900	60.5	3.116	152	52	S	W	W
77	Kentucky Giant.....	32.8	3525	60.0	3.228	178	55	B	R	W
78	Oregon Swamp.....	50.0	4600	61.5	3.124	153	53	S	R	W
79	Buckeye.....	39.6	4025	60.5	3.237	169	55	B	R	B
80	Gold Coin.....	43.3	4750	60.0	3.333	182	54	B	W	B
81	Fulcaster.....	40.4	4125	61.5	3.784	146	52	B	R	W
82	Fultz.....	37.9	4825	62.0	3.099	180	51	S	R	W
83	Red Russian.....	51.3	4200	61.5	3.136	137	50	S	R	B

of grain for the eighty-three plats was 39.6 bushels per acre, although a few plats gave relatively small yields. It will not be wise to decide positively as to relative merit of the varieties from these yields. In one case two plats of the same variety, standing side by side, showed difference of eight bushels per acre in yield. As a means of better determining any difference in the soil, plats of Fultz and Fulcaster were sown, side by side,

at intervals of ten plats. In some cases there were striking differences in the yields of the same variety. Thus plat number seventy-two of Fultz gave less than half the average yield of the ten plats of this variety. There was a difference of over 13 bushels per acre in the yield of two plats of Fulcaster. It is noticeable that, with two exceptions, each plat of Fultz gave a larger yield than the adjoining plat of Fulcaster. As noted above the yields of plats fifty-three to seventy-six, inclusive, would have been somewhat larger if they could have been cut earlier.

With very few exceptions the weight per bushel was over 60 pounds.

TIME AND RATE OF SEEDING.

On soil adjoining, apparently of the same character and having had like treatment with that on which the variety tests were made, trials were conducted to determine the difference in

TABLE.—Time and Rate of Seeding Wheat.

Plat No.....	Date when drilled.	Seed per acre, pecks.	Yield per acre.		Pounds per bushel.	Weight of 100 kernels grams.	Pounds of straw for 100 pounds of grain.
			Grain, Bushels.	Straw, Pounds.			
1	September 15.....	4	41.5	3735	61.0	3.087	150
2	September 15.....	3	46.8	3810	62.0	3.317	136
3	September 15.....	4	50.0	4760	61.0	3.071	162
4	September 15.....	5	54.9	5390	60.5	3.288	164
5	September 15.....	6	52.5	5475	60.5	3.265	155
6	September 15.....	8	49.5	5625	61.0	2.948	190
7	September 25.....	4	44.0	5205	61.5	3.881	197
8	September 25.....	4	50.5	5670	60.5	3.739	187
9	October 5.....	4	34.6	3950	60.0	3.640	190
10	October 5.....	3	31.2	3375	60.0	3.463	180
11	October 5.....	4	35.6	3490	60.5	3.702	163
12	October 5.....	5	35.8	3525	61.0	3.794	164
13	October 5.....	6	43.6	4910	60.0	3.914	188
14	October 5.....	8	42.5	4800	61.5	3.763	188
15	October 15.....	4	32.0	4080	60.0	3.591	212
16	October 15.....	4	29.5	3750	60.0	3.436	212
17	October 26.....	4	13.8	2070	57.5	3.275	193
18	October 26.....	3	14.6	2480	56.0	3.053	263
19	October 26.....	4	16.9	1795	57.5	3.130	182
20	October 26.....	5	16.4	2625	58.5	3.256	182
21	October 26.....	6	20.8	2110	58.5	3.418	211
22	October 26.....	8	19.9	2110	59.5	3.347	177
23	November 5.....	4	8.6	1885	54.5	3.097	364
24	November 5.....	4	10.5	2370	53.5	3.088	376
25	November 16.....	4	9.1	1960	52.5	2.857	358
26	November 16.....	3	6.1	1515	51.0	2.868	439
27	November 16.....	4	6.2	1500	52.5	2.831	400
28	November 16.....	5	9.0	2235	54.0	2.912	414
29	November 16.....	6	10.2	2085	54.5	3.680	339
30	November 16.....	8	6.0	915	53.5	2.722	254

Plats 1-6 were cut June 11; Plats 7-16 were cut June 18; Plats 17-30 were cut June 21.

yields from sowing at different dates and also different quantities per acre. Six plats were sown on each of the following dates: September 15th, October 5th, 26th, November 25th, and two plats September 25th, October 15th and November 5th. The first plat in each sowing was harrowed just before the drilling was done. In the case of the others the land was both harrowed and rolled before drilling the seed. The table shows the results in detail.

Slightly larger yields were obtained from sowing September 25th than at any other date. Aside from this there was a steady decrease in yield from the earliest to the latest. No plat sown later than October 15th gave a satisfactory yield. The stand was poor in the case of the later sowings and weeds interfered with the growth of the wheat.

Comparing the four sowings at which different quantities were sown the highest average yield was from sowing six pecks per acre, with slight differences only whether four, five, six or eight pecks were sown. The yields from sowing three pecks per acre were considerably smaller.

In general rolling the land before seeding increased, but in the late sowings it decreased the yield.

EFFECT OF SUBSOILING.

The six plats sown September 15th were harvested in thirds to determine the effect of different methods of plowing. Slightly the largest average yield was obtained from the portion plowed and not subsoiled, the averages being: From plowing and subsoiling with disc plow, 48.1 bushels; from plowing and subsoil-

TABLE.—Method of Plowing.

	Seed per Acre—pks.	SUBSOILED						RIDING PLOW, 7 TO 8 IN.		
		DISC PLOW, 14-15 IN.			PERRINE, 15 TO 16 IN.			Bu Grain per Acre.	Height (in.).	Straw—lbs. per Acre.
		Bu. Grain per Acre.	Height (in.).	Straw—lbs. per Acre.	Bu. Grain per Acre.	Height (in.).	Straw—lbs. per Acre.			
Plat No. 1.....	4	39.0	47	3420	44.6	57	3930	40.9	53	3850
Plat No. 2.....	3	46.5	47	3220	45.0	57	4140	48.4	53	4120
Plat No. 3.....	4	48.7	52	4365	49.1	54	4905	52.1	52	5290
Plat No. 4.....	5	54.4	53	5130	52.1	54	5515	58.1	49	5490
Plat No. 5.....	6	48.4	48	4590	54.4	52	6050	54.8	51	5760
Plat No. 6.....	8	51.4	49	6010	46.9	52	5290	50.2	49	5580

ing with Perrine subsoiler, 48.7 bushels; from plowing without subsoiling, 50.7 bushels. The subsoiled ground was slightly lower and had much more moisture at the time of cutting. The table gives results in detail.

YIELD FROM PLAT IN CONTINUOUS WHEAT CULTURE.

For five years an acre plat has been in continuous wheat culture without manure. The land is poorer than that of most of the farm. It was attempted to drill four pecks on the plat but only 55 pounds were sown. The wheat was cut when over-ripe, because of wetness of the ground and some of the grain was lost. The yield, however, was less than was to have been expected. The table gives the yields for each year. The crop of 1895 was a failure.

Variety.	Year.	Bu. Grain.	Lbs. Straw.
Fultz .....	1893	10.6	1422
Curriil.....	1894	20.9	2077
Fultz .....	1895	.....	.....
Fultz .....	1896	6.9	1834
Fultz .....	1897	17.8	2263