

Ohio Agricultural Experiment Station.

BULLETIN 57.

WOOSTER, OHIO, DECEMBER, 1894.

➤ OATS ➤

1. COMPARISON OF VARIETIES, 1893.
 2. COMPARISON OF VARIETIES, 1894.
 3. PERCENTAGE OF HULL AND KERNEL.
 4. SHRINKAGE OF GRAIN AND STRAW.
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BULLETIN

OF THE

Ohio Agricultural Experiment Station.

NUMBER 57.

DECEMBER, 1894.

EXPERIMENTS WITH OATS.

BY J. FREMONT HICKMAN.

This Station has not published any of its work with oats since the spring of 1892. The results of the work done in 1892 were unavailable, for reasons given further on, therefore the experiments detailed and the data given in this bulletin include the work of only two years, 1893 and 1894. The several subjects treated will occur in the following order:

- (1.) Comparison of varieties, 1893.
- (2.) Comparison of varieties, 1894.
- (3.) Percentage of hull and kernel.
- (4.) Shrinkage in grain and straw.
- (5.) Distribution of seed.
- (6.) Methods of seeding.
- (7.) Some points regarding smut.

In addition to the above, experiments have been conducted each year with commercial manures; these, however, are published with similar work on corn and wheat, in a separate bulletin.

1. COMPARISON OF VARIETIES, 1893.

Owing to the almost incessant rains of April and to the unfinished condition of the drainage of the experiment plots, the seeding of the oats in the spring of 1893 was delayed until the eighth and ninth days of May. From such late seeding not even a fair crop of oats could be expected. This afforded an opportunity for testing the several varieties under adverse conditions, which, as is indicated by the following tables, has not been work entirely wasted.

In these tables the sixty-four sorts grown are divided into groups, each having some distinctive characteristic.

The first group embraces sixteen differently named sorts, having the open or spreading panicle, coarse, weak straw, and short, plump grain of

which the Welcome is the best known type. The second group comprises fourteen kinds, in which the head or panicle is more or less one-sided, and which are ordinarily termed side-oats. The Seizure is one of the best representatives of this class. A third group consists of eighteen varieties which are in general form similar to the Welcome class, except that the berry is longer and more pointed, and the straw generally a little stronger, but the grain lighter. We have chosen the Wideawake as the type of this class. In the fourth and last group are six sorts of black or mixed oats, having in the main the characteristics of the Welcome; in this group are included the Monarch, Rust Proof, and others of like kind.

The highest yield in the Welcome group is 39.8 bushels from the variety called Lincoln, which is followed closely by White Victoria and White Bonanza, each of which has given a yield slightly above 37 bushels per acre. The lowest in this group is 26 bushels from one of the twelve duplicate plots of Welcome; the average of this class is 30.3 bushels per acre, and the average of the Welcome duplicates in the group is 26.9 bushels. Leaving out these duplicate plots the group gives an average of 32.4 bushels to the acre.

The mixed group stands next highest in point of yield, and shows a variation in production running from 24.5 to 35.5 bushels to the acre.

The other two groups have averaged three days later in ripening, and show similar lower yields, as a result of late maturing. Some of these varieties, such as Seizure, Dakota Gray, Black Prolific and Prince Edward's Island, failed to properly mature; the result being a large number of heads, poorly filled with light grains, which blew over when threshed. These varieties suffered more than any others from the short season, followed by the extreme drouth of the maturing period.

The yields of this season (1893) cannot be taken as conclusive evidence of the fitness of any variety for the clay soils of Ohio. They simply indicate that certain varieties will do much better under the adverse conditions of late planting, excessive wet in the earlier and extreme drouth in the later oat season. In the Welcome group we have the following varieties yielding above thirty-three bushels: White Bonanza, White Wonder, Drogheda, Badger Queen, Improved American, Lincoln and American Banner.

In the side-oats group, only three varieties produced above thirty bushels, namely: Excelsior, White Swiss and Japan. This class has been in former years, with longer seasons and on a warmer, gravelly soil, the most productive group of the four. The typical variety of this class (Seizure), recognized as one of the best of its kind, gave the lowest yield of all the sixty-five varieties this year where it was sown late, yielding

only about fifteen bushels to the acre. The evidence that this low yield was due to late seeding is found by comparing the yields given above with those in Table VIII, under "methods of planting." These plots were put out at least five weeks earlier, and show yields ranging from 32 to 40 bushels more to the acre.

For more specific facts regarding the experiment of 1893, the reader is referred to Table I, in which will be found the yield of each individual variety both in grain and straw, the pounds in a measured bushel of each, the color of grain and the date of maturing:

OATS.—TABLE I—COMPARATIVE TEST OF VARIETIES FOR 1893.

Plot No.	Varieties.	Yield per acre.			Weigt per measured bushel	Color of grain.	Date of ripening.
		Grain.	Straw.	Increase + decrease —			
	<i>Welcome Group.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pnds.</i>		
1	Welcome	24.84	1,465	.....	33 0	White.	July 31
2	American Banner	35.15	1,635	+10.13	29 0	"	" 31
3	Improved American ..	35.78	1,455	+10.58	30.0	"	Aug. 3
4	Welcome	25.40	1,615	.....	33 0	"	July 31
5	Badger Queen.....	33.59	1,245	+7.65	32.7	"	" 31
6	Barley Oats.....	28.90	2,035	+2.43	31 2	"	" 31
7	Welcome	27.00	1,655	.....	33 0	"	" 31
8	Colonel.....	32.34	1,925	+5.54	30 5	"	" 31
9	Clydesdale.....	27.68	1,555	+1.08	29 0	"	" 31
10	Welcome	26.40	1,475	.....	33 0	"	" 31
11	Hargett's White.....	30.15	1,885	+4.38	41.2	"	" 28
12	Henderson's Clydesdale	28.28	1,295	+3.13	38.5	"	" 31
13	Welcome	24 53	1,495	.....	33 0	"	" 31
14	Centennial.....	28.28	1,335	+3.33	33.0	"	" 31
15	Race Horse	27.65	1,795	+2.28	38.5	"	" 31
16	Welcome	25 79	1,655	.....	33 0	"	" 31
17	White Belgian	30 78	1,695	+4.66	29.7	"	Aug. 4
18	White Bonanza	37.96	1,885	+11.51	36.0	"	July 31
19	Welcome	26 78	1,815	.....	33 0	"	" 31
20	White Wonder	37.03	1,855	+10.25	39.5	"	" 31
21	White Victoria	31.40	1,715	+4.62	35.5	"	" 31
22	Welcome	26 77	1,855	.....	33 0	"	" 31
23	Early Archangel	32.96	1,905	+4.91	40.0	"	" 31
24	Exelsior.....	31.09	2,265	+1.66	35.3	"	Aug. 2
25	Welcome	30.62	1,600	.....	33 0	"	July 31
26	Drogheda	33.12	2,000	+2.19	37.5	"	" 31
27	Lincoln	39 84	2,105	+8.60	30 5	"	" 31
28	Welcome	31.56	1,650	.....	33 0	"	" 31
29	White Swiss	31.71	1,985	+0.21	35.0	"	Aug. 3

OATS.—TABLE I—Continued.

Plot No.	Varieties.	Yield per acre.			Weight per measure bushel	Color of grain.	Date of ripening.
		Grain.	Straw.	Increase + decrease			
	<i>Seizure Group.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pnds.</i>		
30	Seizure.....	13.40	1,607	.....	29.0	White.	Aug. 3
31	Early Swedish.....	29.68	2,350	+16.08	34.5	"	" 3
32	Japan.....	35.46	2,185	+21.66	35.0	Black.	" 3
33	Seizure.....	14.00	1,927	.....	29.0	White.	" 3
34	Wilson's Prolific.....	35.31	2,050	+21.31	31.0	"	" 3
35	Dakota Gray.....	22.65	1,795	+8.65	27.0	Black.	" 3
36	Seizure.....	14.00	1,772	.....	29.0	White.	" 3
37	Prince Edward's Island.....	26.25	1,940	+11.84	31.0	"	" 3
38	Black Prolific.....	27.97	2,305	+13.15	29.0	Black.	" 3
39	Seizure.....	15.22	1,592	.....	29.0	White.	" 3
40	Golden Giant.....	17.25	1,430	+1.25	25.8	Yellow.	" 3
41	Giant Yellow French.....	18.20	1,557	+1.42	25.0	"	" 3
42	Seizure.....	17.57	1,577	.....	29.0	White.	" 3
43	Black Tartarian.....	23.59	1,605	+6.02	29.0	Black.	" 3
44	Egyptian.....	31.71	1,700	+14.14	37.0	White.	" 3
	<i>Wideawake Group.</i>						
45	Wideawake.....	25.90	1,350	.....	28.5	White.	Aug. 3
46	Black Norway.....	21.01	1,232	-8.36	29.7	Black.	" 6
47	Alabama.....	22.73	1,112	-7.11	31.7	Red.	" 3
48	Wideawake.....	30.31	1,170	.....	28.5	White.	" 3
49	Banner.....	26.09	1,265	-4.06	29.0	"	" 3
50	White California.....	21.64	1,487	-8.35	31.2	"	" 2
51	Wideawake.....	29.84	1,185	.....	28.5	"	" 3
52	Early Prize Cluster.....	29.22	1,385	-0.72	34.5	"	" 3
53	Scottish Chief.....	25.15	1,275	-4.89	34.2	"	" 3
54	Wideawake.....	30.15	1,115	.....	28.5	"	" 3
55	Currie's Prize Cluster.....	31.40	995	+1.67	34.0	"	" 3
56	Hopetown.....	16.73	1,265	-12.58	30.0	"	" 6
57	Wideawake.....	28.90	1,195	.....	28.5	"	" 3
58	Kansas Hybrid.....	38.59	1,125	+8.86	37.2	"	" 3
59	Pringle's Progress.....	25.46	985	-5.10	31.0	"	" 3
60	Wideawake.....	31.40	1,675	.....	28.5	"	" 3
61	Probsteier.....	27.65	1,475	-2.98	32.2	"	" 3
62	State of North Dakota.....	32.03	1,815	+2.17	31.5	"	" 3
63	Wideawake.....	29.09	1,085	.....	28.5	"	" 3
64	Welch.....	17.65	1,515	+11.15	29.0	"	" 8
65	Yankee Prolific.....	43.28	2,215	+14.78	30.0	"	" 3
66	Wideawake.....	28.20	1,018	.....	28.5	"	" 3
67	Potato Oats.....	23.20	1,157	-5.00	33.7	"	" 3
68	White Bedford.....	24.60	912	-3.60	39.0	"	July 31
69	Wideawake.....	28.20	1,497	.....	28.5	"	Aug. 3
70	Early Dakota.....	29.21	1,305	+0.24	30.2	"	" 3
71	White Canadian.....	30.46	1,305	+0.71	31.2	"	" 3
72	Wideawake.....	30.53	1,295	.....	28.5	"	" 3
73	Poland.....	34.21	1,405	+3.86	30.5	"	" 3
74	Early White Maine.....	30.46	1,285	+0.29	29.5	"	" 3
75	Wideawake.....	30.00	1,220	.....	28.5	"	" 3
76	New Baltic.....	33.75	1,120	+3.75	32.2	"	" 3
77	Pringle's American Triumph.....	27.96	1,125	-2.04	28.5	"	" 3

OATS.—TABLE I—Concluded.

Plot No.	Varieties.	Yield per acre.			Weigt' per measured bushel	Color of grain.	Date of ripening.
		Grain.	Straw.	Increase + decrease			
	<i>Wideawake Group—Conclud'd.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pnds.</i>		
78	Great Northern	30.78	1,255	+0.78	33.0	White.	Aug. 3
79	White Russian.....	26.56	1,430	-3.44	31.5	"	" 3
80	American Beauty	29.21	1,245	-0.79	31.0	"	" 3
81	White Schoenen.....	33.43	1,270	+3.43	31.5	"	" 3
82	White Superior Scotch.....	23.12	1,320	-6.88	38.0	"	July 31
	<i>Mixed Group.</i>						
83	Monarch	34.06	2,130	+9.53	32.5	Mixed.	July 28
84	Rust Proof.....	31.25	2,120	+6.72	30.5	Red.	" 28
85	Welcome	24.53	1,695	.....	33.0	White.	" 31
86	New Red Rust Proof.....	26.26	1,380	+1.23	28.5	Mixed.	" 31
87	Black Russian	28.43	1,310	+2.90	30.0	Black.	" 31
88	Welcome	26.04	1,430	.....	33.0	White.	" 31
89	Everitt's Negro Black.....	34.22	1,450	+8.18	33.0	Black.	" 31
90	Black Beauty ..	35.62	1,520	+9.58	32.5	"	" 31

2. COMPARISON OF VARIETIES, 1894.

The sowing of the oats in 1894 was done much more seasonably than in the previous year. A large part of the ground was plowed before the middle of March, and the oats were all in the ground by the evening of the 16th of April. Table II gives for 1894 similar data to those given in Table I for 1893.

The third column in each of these tables represents the increase or decrease in yields of each variety as compared with the neighboring plots of the variety used as a check or standard. In calculating this increase or decrease it is assumed that the variation in soil between neighboring check plots is progressive; for instance, the yield of plot 1 being 42.3, and plot 5 being 44.5, it is assumed that if plots 3, 4 and 5 had been sown with the same variety of oats the yields of these three intermediate plots would have been 42.86, 43.42 and 43.97 bushels respectively.

By this method of making comparison we find that of the other 20 varieties in the Welcome group, only three have produced more than the nearest Welcome plot, namely, Improved American, Badger Queen and Bonanza King.

Making further comparison of Tables I and II, we find the average yield of the Welcome group in 1893 was 30.38 bushels, the average of the

same number of varieties for 1894 in the same group, was 40.65 bushels. The average of the group without the Welcome duplicates in 1893 was 32.40 bushels, in 1894, 39.85. The Welcome duplicates in 1893 averaged 26.96 bushels per acre, and in 1894, 42.94 bushels.

In the Seizure group, we find about one-half of the varieties producing larger yields and the other half smaller returns than the standard of the group. In 1893 not a single variety did as poorly as the Seizure.

The average yield of this group for 1893 was 23.16 bushels, and for 1894, 44.05 bushels—almost double that of the previous year. The duplicate plots in 1893 gave an average yield of 15.02, and in 1894, an average of 44.46 bushels, almost treble the yield of the preceding year.

Like variations in yield are shown in the Wideawake group, but the differences are not so marked in the mixed group.

The average of the straw per acre in 1893 was as follows: Welcome group, 1,653 pounds; Seizure group, 1,830 pounds; Wideawake group, 1,266 pounds, and the mixed group, 1,629 pounds. In 1894 the average of the straw per acre in the several groups was as follows: Welcome, 1,684; Seizure, 1,779; Wideawake, 1,219, and the mixed, 1,034 pounds.

Pounds of straw per hundred pounds grain in 1893, Welcome, 170; Seizure, 246; Wideawake, 138, and the mixed group, 169 pounds. In 1894, Welcome group, 129 pounds to each one hundred pounds of grain; Seizure, 126; Wideawake, 105, and the mixed group, 89 pounds.

Since our system of grouping is dependent in part upon the manner of growth of each variety, it is not always possible to place new varieties in their proper group until after we have had them growing one year. This accounts for an occasional changing of a variety from one group to another.

OATS.—TABLE II—COMPARATIVE TEST OF VARIETIES FOR 1894.

Plot No.	Varieties.	Yield per acre.			Weg't per bushel	Color of grain.	Date of ripening.
		Grain.	Straw.	Increase + decrease			
	<i>Welcome Group.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pnds.</i>		
1	Welcome	42.3	1,845	.....	31.46	White.	July 20
2	American Banner.....	39.2	1,595	—3.65	29.50	"	" 22
3	Improved American.....	46.8	1,802	+3.40	30.00	"	" 22
4	Badger Queen.....	46.1	1,675	+2.05	34.25	"	" 22
5	Welcome	44.5	1,775	.....	31.46	"	" 20
6	Barley Oats.....	44.5	1,675	—0.62	32.05	"	" 19
7	Colonel.....	44.5	1,825	—1.24	32.75	"	" 20
8	Clydesdale.....	44.5	1,525	—1.87	31.25	"	" 20
9	Welcome	42.0	1,810	.....	31.46	"	" 20
10	Hargett's White.....	37.6	1,495	—4.10	37.50	"	" 18
11	Henderson's Clydesdale.....	40.1	1,615	—1.30	37.50	"	" 20
12	Centennial.....	40.0	1,620	—1.10	33.50	"	" 20
13	Welcome	40.8	1,745	.....	31.46	"	" 20
14	Race Horse.....	26.4	1,895	—14.70	38.00	"	" 20
15	White Belgian.....	40.8	1,495	—0.75	31.75	"	" 21
16	White Bonanza.....	40.8	1,795	—1.12	37.50	"	" 18
17	Welcome	42.3	1,745	.....	31.46	"	" 20
18	White Wonder.....	38.8	1,710	—4.12	39.00	"	" 18
19	White Victoria.....	43.1	1,705	—0.45	33.50	"	" 20
20	Early Archangel.....	37.6	1,645	—6.57	37.00	"	" 20
21	Welcome	44.8	1,815	.....	31.46	"	" 20
22	Drogheda.....	36.8	1,520	—7.77	34.75	"	" 18
23	Lincoln	33.2	1,485	—11.15	32.50	"	" 26
24	Heavy Weight.....	39.2	2,045	—4.92	31.00	"	" 26
25	Welcome	43.9	1,595	.....	31.46	"	" 20
26	Pride of America.....	32.5	1,310	—11.40	34.50	"	" 20
27	Bonanza King.....	44.5	1,725	+0.60	31.00	"	" 24
	<i>Seizure Group.</i>						
28	Seizure	43.2	1,915	.....	26.00	White.	July 26
29	Excelsior	44.2	1,735	+0.82	35.25	"	" 24
30	White Swiss.....	46.2	1,772	+2.65	35.00	"	" 24
31	Early Swedish.....	49.1	1,875	+5.37	36.25	"	" 24
32	Seizure	43.9	1,945	.....	26.00	"	" 26
33	Japan	49.8	1,708	+5.60	35.50	Black.	" 28
34	Wilson's Prolific.....	46.6	1,807	+2.10	34.25	White.	" 28
35	Dakota Gray.....	41.8	1,812	—3.00	32.25	Black.	" 28
36	Seizure.....	45.1	1,905	.....	26.00	White.	" 26
37	Prince Edward's Island.....	46.9	1,800	+1.62	31.25	"	" 28
38	Black Prolific.....	44.8	1,415	—0.65	29.50	Black.	" 28
39	Golden Giant.....	38.3	1,625	—7.32	29.25	Yellow.	" 28
40	Seizure	45.8	1,835	.....	26.00	White	" 26
41	Giant Yellow French.....	36.9	1,470	—8.52	28.25	Yellow.	" 28
42	Black Tartarian.....	38.6	1,665	—6.45	29.75	Black.	" 28
43	Egyptian	44.8	1,815	+0.13	37.25	White.	" 27
44	Seizure	44.3	1,982	.....	26.00	"	" 26
45	Black Norway.....	41.7	1,865	—2.60	31.00	Black.	" 28
46	Mammoth Cluster.....	45.0	1,860	+0.70	31.00	"	" 28

OATS.—TABLE II—Concluded.

Plot No.	Varieties.	Yield per acre.			We'g't per bushel	Color of grain.	Date of ripen- ing.
		Grain.	Straw. Pounds.	Increase + decrease —			
	<i>Wideawake Group.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Bushels.</i>	<i>Pnds.</i>		
47	Wideawake	45.1	1,605	.....	30.00	White.	July 23
48	Alabama	50.3	1,590	+5.50	31.50	"	" 23
49	Banner	43.6	1,605	-0.30	29.00	"	" 24
50	White California.....	45.9	1,580	+2.60	31.25	"	" 23
51	Wideawake	42.7	1,485	.....	30.00	"	" 23
52	Early Prize Cluster.....	40.8	1,295	-1.22	32.75	"	" 23
53	Scottish Chief.....	39.0	1,300	-2.35	33.00	"	" 23
54	Currie's Prize Cluster.....	40.9	1,490	+0.22	32.50	"	" 23
55	Wideawake	40.0	1,370	.....	30.00	"	" 23
56	Hopetown	29.4	1,350	-10.25	31.50	"	" 26
57	Kansas Hybrid.....	41.1	1,185	+1.80	31.00	"	" 21
58	Bolton	37.0	1,115	-1.95	28.50	"	" 25
59	Wideawake	38.6	1,210	.....	30.00	"	" 23
60	Probsteier	44.5	1,375	+5.87	30.25	"	" 23
61	State of North Dakota.....	39.5	1,135	+0.85	29.50	"	" 23
62	Weich	22.7	975	-15.97	33.00	"	" 23
63	Wideawake	38.7	1,010	.....	30.00	"	" 23
64	Yankee Prolific.....	32.3	1,315	-5.97	28.75	"	" 28
65	Potato Oats.....	37.0	1,355	-0.85	30.00	"	" 23
66	White Bedford.....	32.3	865	-5.12	35.50	"	" 20
67	Wideawake	37.0	1,305	.....	30.00	"	" 23
68	Early Dakota.....	34.5	1,195	-2.57	30.50	"	" 23
69	Green Mountain.....	33.9	1,115	-3.25	28.50	"	" 25
70	Poland	31.0	1,155	-6.22	30.50	"	" 24
71	Wideawake.....	37.3	1,155	.....	30.00	"	" 23
72	Early White Maine.....	28.5	1,135	-8.27	29.50	"	" 23
73	New Baltic	30.6	820	-5.65	29.50	"	" 23
74	White Superior Scotch.....	23.2	807	-12.52	34.75	"	" 19
75	Wideawake.....	35.2	1,125	.....	30.00	"	" 23
76	Great Northern.....	28.9	975	-6.37	30.25	"	" 23
77	White Russian	30.8	1,415	-4.55	29.00	"	" 26
78	American Beauty.....	33.2	985	-2.22	30.00	"	" 24
79	Wideawake	35.5	1,115	.....	30.00	"	" 23
80	White Schoenen.....	26.1	915	-9.40	29.00	"	" 23
	<i>Mixed Group.</i>						
81	Calgary Gray.....	38.6	1,165	+3.30	32.00	Black	July 23
82	Black Prolific.....	44.8	1,415	+9.50	29.50	"	" 28
83	Monarch	35.3	1,020	.....	32.25	Mix.	" 24
84	Australian Giant.....	34.5	1,295	-0.80	29.25	"	" 27
85	Rust Proof	35.5	715	+0.20	31.25	Red	" 24
86	Black Russian.....	32.6	905	-2.90	30.00	Black	" 24
87	Monarch	35.5	965	.....	32.25	Mix.	" 24
88	Dyer's Negro Black.....	33.3	1,035	-2.20	30.50	Black	" 23
89	Black Beauty.....	34.5	945	-1.00	31.25	"	" 23
90	New Red Rust Proof.....	30.1	885	-5.40	31.00	Mix.	" 23

Table III gives the yield of each variety, and the average yield for four years of the several varieties that have been grown on the Station grounds during the season of 1890 and since that time. This table discloses the following facts:

The Improved American gave the highest yield of any of the Welcome group in 1894, and the same variety has produced on an average nearly four bushels more per acre than any other in that group.

The Japan variety has given the highest yield of any of the Seizure group in 1894, and has as high an average yield as any other member of the group.

The Kansas Hybrid stands as high in the average as any in the Wide-awake group, but the Alabama has given the highest yield during the season of 1894, not only in this particular group, but the highest, considering all varieties in the test.

Japan and Early Swedish, belonging to the Seizure group, gave yields almost equal to the Alabama.

Taking the oats by classes we find that the Seizure class gives for the series of years an average of 37.8 bushels; the Welcome, 35.1; the Wide-awake, 34.5; and the mixed group, 34.1 bushels per acre.

Table IV gives the weight per measured bushel of all the varieties given in Table III for each year of the four in which they were under test. The average weight per measured bushel for the several classes is as follows: Welcome, 32.7; Seizure, 30.7; Wideawake, 30.7, and the mixed class, 30.0 pounds per bushel. For more specific data see Table IV.

OATS.—TABLE III—AVERAGE YIELD FOR FOUR YEARS, 1890-94.

Variety.	Yield in bushels per acre.				
	1890.	1891.	1893.	1894.	Average
<i>Welcome Group.</i>					
Welcome	18.7	46.2	24.8	42.3	33.0
Improved American.....	33.7	56.2	35.7	46.8	43.1
Badger Queen.....	19.0	45.3	33.6	46.1	35.9
Barley Oats.....	21.2	51.8	28.9	44.5	36.6
Colonel.....	29.6	50.9	32.3	44.5	39.3
Clydesdale.....	17.1	46.2	27.6	44.5	33.8
Hargett's White.....	16.5	43.4	30.1	37.6	31.9
Henderson's Clydesdale.....	16.2	40.3	28.2	40.1	31.2
Centennial.....	20.6	46.2	28.2	40.0	33.7
Race Horse.....	26.8	39.0	27.6	26.4	29.9
White Belgian.....	29.3	46.2	30.7	40.8	36.7
White Bonanza.....	15.0	42.5	37.9	40.8	34.0
White Victoria.....	27.5	49.3	31.4	43.1	37.8
Average of group.....					35.1

OATS.—TABLE III—Concluded.

Variety.	Yield in bushels per acre.				
	1890.	1891.	1893.	1894.	Average
<i>Seizure Group.</i>					
Seizure	17.6	56.1	14.8	44.4	33.2
Early Swedish	27.1	56.2	29.6	49.1	40.5
Japan	20.9	56.2	35.4	49.8	40.6
Wilson's Prolific	18.4	51.5	35.3	46.6	37.9
Dakota Gray.....	33.4	60.3	22.6	41.8	39.5
Prince Edward's Island	24.0	63.1	26.2	46.9	40.0
Black Prolific.....	20.6	61.2	27.9	44.8	38.6
Golden Giant	24.3	57.5	17.2	38.3	34.3
Giant Yellow French.....	26.2	57.8	18.2	36.9	34.8
Black Tartarian.....	32.8	61.8	23.5	28.6	36.7
Egyptian	28.1	54.3	31.7	44.8	39.7
Average of group.....					37.8
<i>Wideawake Group.</i>					
Wideawake	31.8	51.8	29.6	38.9	38.0
Alabama	31.2	46.8	22.7	50.3	37.7
Banner	20.4	51.2	26.1	16.0	28.4
White California.....	29.6	53.7	21.6	45.9	37.7
Early Prize Cluster.....	26.2	47.5	29.2	40.8	35.9
Scottish Chief.....	29.3	53.1	25.1	39.0	36.6
Currie's Prize Cluster.....	17.5	48.1	31.4	40.9	34.4
Hopetown	20.3	36.5	16.7	29.4	25.7
Kansas Hybrid.....	30.6	48.7	38.5	41.1	39.7
Probsteier	29.3	53.1	27.6	44.5	38.6
State of North Dakota	33.1	52.5	32.0	39.5	39.2
Welch.....	23.1	38.1	17.6	22.7	25.3
Yankee Prolific	26.5	41.8	43.2	32.3	35.9
Potato Oats.....	28.9	39.3	23.2	37.0	32.1
Early Dakota.....	32.3	51.8	29.2	34.5	36.9
White Russian.....	27.1	41.8	26.5	30.8	31.5
White Schoenen.....	27.8	45.0	33.4	26.1	33.0
Average of group.....					34.5
<i>Mixed Group.</i>					
Monarch	32.1	50.0	34.0	35.3	37.8
Black Russian	25.3	44.0	28.4	32.6	32.5
Rust Proof.....	21.7	57.8	31.2	35.5	36.5
New Red Rust Proof	25.9	37.1	26.2	30.1	29.8
Average of group.....					34.1

OATS.—TABLE IV—WEIGHT PER BUSHEL FOR FOUR YEARS, 1890-94.

Varieties.	Weight per bushel in pounds.				
	1890.	1891.	1893.	1894.	Average
<i>Welcome Group.</i>					
Welcome	29.2	33.0	33.0	31.4	31.6
Improved American.....	29.0	30.0	30.0	30.0	29.7
Badger Queen.....	27.0	35.0	32.7	34.2	32.2
Barley Oats	25.7	32.0	31.2	32.0	30.2
Colonel.....	29.5	30.0	30.5	32.7	30.7
Clydesdale.....	28.2	37.0	29.0	31.2	31.3
Hargett's White.....	37.7	38.0	41.2	37.5	38.6
Henderson's Clydesdale.....	28.7	32.0	38.5	37.5	34.2
Centennial.....	32.7	31.0	33.0	33.5	32.5
Race Horse	33.7	32.0	38.5	38.0	35.5
White Belgian.....	30.0	29.0	29.7	31.7	30.1
White Bonanza.....	30.7	37.0	36.0	37.5	35.3
White Victoria.....	30.5	34.0	35.5	33.5	33.4
Average of group.....					32.7
<i>Seizure Group.</i>					
Seizure	27.2	29.0	26.0	29.0	27.8
Early Swedish.....	34.5	33.0	34.5	36.2	34.5
Japan.....	35.2	32.0	35.0	35.5	34.4
Wilson's Prolific.....	27.7	31.0	31.0	34.2	30.9
Dakota Gray.....	24.7	28.0	27.0	32.2	27.9
Prince Edward's Island.....	29.2	31.0	31.0	31.2	30.6
Black Prolific.....	31.0	31.0	29.0	29.5	30.1
Golden Giant.....	28.0	28.0	25.8	29.2	27.7
Giant Yellow French.....	27.0	29.0	25.0	28.2	27.3
Black Tartarian.....	30.0	29.0	29.0	29.7	29.4
Egyptian	37.5	35.0	37.0	37.2	36.7
Average of group.....					30.7
<i>Wideawake Group.</i>					
Wideawake	27.5	29.0	28.5	30.0	28.7
Alabama	29.7	31.0	31.7	31.5	30.9
Banner.....	30.5	28.0	29.0	29.0	29.1
White California.....	30.5	29.0	31.2	31.2	30.5
Early Prize Cluster.....	31.3	31.0	34.5	32.7	32.4
Scottish Chief.....	32.7	32.0	34.2	33.0	32.9
Carrie's Prize Cluster.....	35.3	32.0	34.0	32.5	33.4
Hopetown	27.7	31.0	30.0	31.5	30.0
Kansas Hybrid.....	30.2	32.0	37.2	31.2	32.6
Probsteier	29.7	30.0	32.2	30.2	30.5
State of North Dakota.....	29.0	31.0	31.5	29.5	30.2
Weich.....	32.2	31.0	29.0	33.0	31.3
Yankee Prolific.....	30.7	30.0	30.0	28.7	29.8
Potato Oats.....	30.3	29.0	33.7	30.0	30.7
Early Dakota.....	30.7	31.0	30.2	30.5	30.6
White Russian.....	29.5	28.0	31.5	29.0	29.5
White Schoonen.....	27.5	31.0	31.5	29.0	29.7
Average of group.....					30.7

OATS.—TABLE IV—Concluded.

Varieties.	Weight per bushel in pounds.				
	1890.	1891.	1893.	1894.	Average
<i>Mixed Group.</i>					
Monarch	31.5	31.0	32.5	32.2	31.8
Black Russian.....	30.0	31.0	30.0	30.0	30.2
Rust Proof.....	29.2	30.0	30.5	31.2	30.2
New Red Rust Proof.....	27.5	25.0	28.5	31.0	28.0
Average of group.....					30.0

3. PERCENTAGE OF HULL AND KERNEL.

Frequently the question is asked, "does not the oats that weighs heaviest to the measured bushel have a smaller proportion of hull than the lighter oats?" This question can only be solved by a careful investigation. This work was begun on the crop of 1894. Five grammes of each variety were counted and hulled, the hulls and kernels were each weighed separately, and from the weights thus gotten the percentages were calculated; these are given in Table V. The careful observer will notice that in nearly every case the total percentage falls from one-half to one per cent. below the even one hundred. The uniformity of these results seems to indicate that the percentages given, while not absolutely correct, must certainly be within one per cent. of the truth, and this is certainly within a reasonable limit. Scanning Table V, we find the widest variation in percentage of kernel is between Race Horse, which has 75.4 per cent., and Green Mountain, which has but 64.2 per cent., or a difference of 11.2 per cent.

Taking the Welcome group, and dividing it into three divisions, it is found that the average weight per measured bushel of the six heaviest varieties is 37.75 pounds; the average per cent. of kernels in these six is 71.2. In the eight varieties, the weight per measured bushels of which ranges between 32 and 35 pounds, the average is found to be 33.5 pounds and the average per cent. of kernels is 70.2. The other thirteen varieties range from 29.5 to 31.7 pounds per measured bushel, and average 31.1 pounds; the per cent. of kernel is found to average 67.6.

These figures seem to indicate that the heavier the oats, the larger the percentage of kernel and the smaller the percentage of hull; but if we examine the Seizure group on a similar plan, we get a different result, as

follows: Four varieties, averaging over 36 pounds to the bushel, give an average of 68 per cent. of kernel; three varieties, averaging 33.8 pounds per bushel, give an average of 67 per cent. of kernel, and seven varieties, averaging 30 pounds to the bushel, give an average of 69 per cent. of kernel. Again, if we take some individual varieties of extremely light weight, we find that the percentage of kernel is much higher than it is in some of those that weigh much more to the measured bushel. We can only infer from the work thus far that weight per measured bushel is not necessarily a safe guide to follow in order to secure a large percentage of kernel.

OATS.—TABLE V—PERCENTAGE OF HULL AND KERNEL OF GRAIN AND SHRINKAGE OF GRAIN.

Varieties.	No. of grains in five gr'ms.	Hull.	Kernel.	Weight in September.	Weight in March.
<i>Welcome Group.</i>					
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Welcome	237	33.0	67.0	102.5	102.0
American Banner	218	34.0	66.0	57.0	57.0
Improved American	212	32.5	67.5		
Badger Queen	230	26.9	73.1	54.5	53.5
Barley Oats	242	27.2	72.8	47.0	46.5
Colonel	241	28.4	71.6	52.5	52.5
Clyde-dale	249	29.8	70.2	61.0	59.5
Hargett's White	189	30.5	69.2	49.0	48.0
Henderson's Clydesdale	210	30.3	69.0	46.0	46.0
Centennial	233	29.4	70.3	46.0	45.5
Race Horse	221	24.6	75.4	45.0	45.0
White Belgian	218	29.4	69.6	50.0	50.0
White Bonanza	218	28.2	71.5	61.5	61.5
White Wonder	186	31.1	68.1	60.0	60.0
White Victoria	218	29.4	70.4	102.0	102.0
Early Archangel	225	24.9	74.2	107.0	107.0
Drogheda	198	30.2	69.2	107.5	107.0
Lincoln	200	32.6	66.4	129.0	127.5
Heavy Weight	235	33.0	66.2		
Pride of America	197	31.2	68.2		
Bonanza King	238	28.0	71.1		
Average of group	219	29.7	69.8		
<i>Seizure Group.</i>					
Seizure	238			28.0	26.5
Excelsior	233	31.4	67.6	101.0	101.0
White Swiss	226	31.7	67.3		
Early Swedish	233	32.0	67.2	96.5	96.0
Japan	235	29.7	69.3	115.0	113.0
Wilson's Prolific	221	31.0	68.2	114.5	113.5
Dakota Gray	235	31.8	67.2	74.0	72.0
Prince Edward's Island	238	32.3	66.7		
Black Prolific	258	29.6	69.4	91.0	89.0

OATS.—TABLE V—Concluded.

Varieties.	No. of grains in five gr'ms.	Hull.	Kernel.	Weight in September.	Weight in March.
<i>Seizure Group—Concluded.</i>					
		<i>Per cent.</i>	<i>Per cent</i>	<i>Pounds.</i>	<i>Pounds.</i>
Golden Giant.....	233	28.8	70.7	.....	.....
Giant Yellow French.....	239	28.0	71.8	.....	.....
Black Tartarian.....	234	32.5	67.5	77.0	76.0
Egyptian.....	196	31.0	68.0	.....	.....
Black Norway.....	248	26.1	73.4	68.0	68.0
Mammoth Cluster.....	242	32.6	66.6	.....	.....
Average of group.....	234	30.6	68.6	.....	.....
<i>Wideawake Group.</i>					
Wideawake.....	227	30.4	69.6	112.0	111.5
Alabama.....	248	28.6	71.4	73.5	72.5
Banner.....	232	32.6	66.4	85.0	84.0
White California.....	250	30.2	68.9	70.0	68.5
Early Prize Cluster.....	243	28.6	70.8	47.5	46.5
Scottish Chief.....	237	30.2	68.8	41.0	40.0
Currie's Prize Cluster.....	233	28.6	70.4	51.0	51.0
Hopetown.....	214	28.4	71.0	27.5	26.0
Kansas Hybrid.....	247	30.3	68.8	62.5	62.0
Bel on.....	219	34.0	65.2	.....	.....
Probsteier.....	250	29.5	70.0	45.0	45.0
State of North Dakota.....	252	30.8	68.7	52.0	51.5
Welch.....	234	26.6	72.6	.....	.....
Yankee Prolific.....	253	31.2	69.0	70.0	69.5
Potato Oats.....	241	31.6	67.6	75.0	75.0
White Bedford.....	187	33.0	66.2	79.5	79.5
Early Dakota.....	262	28.5	71.2	95.0	95.0
Green Mountain.....	205	35.2	64.2	.....	.....
Poland.....	240	32.0	68.0	111.0	110.5
Early White Maine.....	234	31.9	67.6	99.0	96.0
New Baltic.....	219	32.0	66.3	109.0	109.0
White Superior Scotch.....	187	33.0	66.3	75.0	75.0
Great Northern.....	215	30.1	69.1	100.0	100.0
White Russian.....	242	32.6	66.6	.....	.....
American Beauty.....	214	32.6	66.6	95.0	95.0
White Schoenen.....	219	33.0	66.5	108.5	108.5
Average of group.....	231	30.9	68.3	.....	.....
<i>Mixed Group.</i>					
Calgary Gray.....	269	25.6	73.9	.....	.....
Black Prolific.....	258	29.6	69.3	.....	.....
Monarch.....	255	25.8	73.5	110.5	110.5
Rust Proof.....	262	26.8	72.6	101.5	101.5
Black Russian.....	253	27.4	71.9	92.5	92.5
Everitt's Negro Black.....	261	25.3	74.0	111.0	111.0
Black Beauty.....	259	29.8	69.7	115.5	115.5
New Red Rust Proof.....	236	27.4	72.6	85.5	85.5
Average of group.....	250	27.2	72.2	.....	.....

4. SHRINKAGE IN GRAIN AND STRAW.

In September, 1893, sixty-five varieties of oats were cleaned and put into an empty room. Each sack bore a tag giving the name of the variety and also the number of pounds in the sack. The room was kept quite warm all winter, the temperature seldom, if ever, falling below fifty degrees. About the middle of March these sacks were weighed again, and the weights when put in and when taken out are given in Table V. The shrinkage was remarkably low, being less than one per cent. A number of the varieties were interfered with by mice; these were not weighed a second time, which accounts for the omission of the weights in the table.

Soon after threshing, the oats straw was packed into bales weighing from 90 to 140 pounds each; these were stored on an ordinary barn floor, and taken out, weighed and sold about the fifteenth of March. Three different lots were weighed with the following results: The first lot weighed when put in, 5,175 pounds, when taken out, 4,865 pounds; loss, 310 pounds, or 6 per cent.; the second lot when put in weighed 4,955 pounds, when taken out, 4,675 pounds, a loss of 280 pounds, or 5.7 per cent.; the third lot weighed when put in, 2,735 pounds, when taken out, 2,590 pounds, a shrinkage of 145 pounds, or 5.3 per cent.; making an average shrinkage on the three lots of 5.7 per cent.

5. DISTRIBUTION OF SEED.

On account of the removal of the Station in 1892, no experiments were made that year with different quantities of seed per acre. In the spring of 1893 a series of plots were prepared and put in, in the best possible condition, but owing to the lack of uniformity in drainage, the results from the duplicate plots showed plainly that the test was wholly unreliable.

In the spring of 1894 a block of twenty-four plots was put in; twelve of these were sown with the Welcome variety, and twelve with the Seizure. The results obtained at the thresher are given in Table VI, except from the ten, eleven and twelve-peck rates of seeding with the Welcome oats; these are not given because of the irregularities in soil, due to imperfect drainage, which vitiated the results.

The yields given in this table show practically the same results as a like experiment conducted on the warmer, gravelly soils of the Olentangy bottom at Columbus. Better returns are given from the six and seven-peck rate of seeding than from the higher or lower rate. The weight of the product per measured bushel is higher, with a single exception, from the six and seven-peck rate than from any other.

OATS.—TABLE VI—DISTRIBUTION OF SEED, 1894.

Seizure.				Welcome.			
Seed per acre.	Grain per acre.	Weight per measured bushel.	Straw per acre.	Seed per acre.	Grain per acre.	Weight per measured bushel.	Straw per acre.
	<i>Bushels.</i>	<i>Pounds.</i>	<i>Pounds.</i>		<i>Bushels.</i>	<i>Pounds.</i>	<i>Pounds.</i>
3 pecks.....	27.2	30.5	1,930	3 pecks ...	20.1	31.5	1,030
4 "	27.8	30.5	1,810	4 " ...	22.5	32.5	880
5 "	27.5	30.7	1,900	5 " ...	22.6	32.2	975
3 "	27.8	30.5	1,850	3 " ...	21.5	31.5	1,010
6 "	29.0	31.5	1,780	6 " ...	23.1	33.2	1,060
7 "	31.2	31.2	1,940	7 " ...	24.0	33.2	930
3 "	27.5	30.5	1,920	3 " ...	22.1	31.5	1,090
4 "	28.1	30.5	1,715	4 " ...	22.1	32.5	920
8 "	27.5	30.5	1,610	8 " ...	24.7	31.5	910
9 "	26.5	31.2	1,350	9 " ...	25.9	32.7	970
5 "	25.9	30.7	1,840	5 " ...	23.7	32.2	940
10 "	26.5	29.7	1,520				
11 "	28.4	30.2	1,390				
12 "	27.2	30.0	1,430				

The straw weights as given in all this work, are more or less deceptive. The table shows more straw from the lighter seeding than from the greater quantity, but I think this is nearly if not quite all due to the fact that there was a larger percentage of weeds in the sparingly seeded plots, whereas the ground was occupied with almost absolutely pure straw on the more densely seeded ones.

Table VII gives in condensed form the average results of five years' experiments in the distribution of seed. Four years of this work was conducted on the Columbus farm and the last one on the Wayne county farm. Previous work seemed to justify the conclusion that the range of oats seeding for the best returns was somewhere between the five and eight peck rate per acre; the experiment of the last year confirms that conclusion, and the average for a series of years gives further evidence, that well prepared ground, with well cleaned seed, will yield as good returns from six pecks of seed per acre as from five, seven or eight pecks, and that the quality of the grain will as a rule be as good as from the higher or lower rate of seeding.

OATS.—TABLE VII—DISTRIBUTION OF SEED. SUMMARY FOR FIVE YEARS.

Seed per acre.	Yield of grain per acre.					
	1888.	1889.	1890.	1891.	1894.	Average.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
4 pecks.....	57.7	58.7	13.2	41.5	25.1	39.2
5 "	60.3	64.7	17.4	43.3	27.4	42.6
6 "	63.5	64.7	15.1	45.1	26.0	42.9
7 "	54.8	64.7	15.4	46.5	27.6	41.8
8 "	49.6	65.0	16.5	46.3	26.1	40.7
9 "	44.8	60.0	15.3	42.7	26.2	38.0

6. METHOD OF PLANTING.

There is perhaps more diversity of opinion among farmers regarding the best method of planting oats than any other cereal, and when the uncertainty of the season is duly considered, it is after all largely a matter of the quickest way of getting the seed into the ground. A growing custom is to put the seed on the ground and harrow, cultivate, or disk it in. Apparently the results have been satisfactory, and further claim is made that this leaves a better chance for wheat, which follows in the regular rotation of corn, oats, wheat and grass. We have no carefully conducted experiments to prove or disprove this claim, but can testify that the custom does make it much more difficult to plow and prepare the ground for the wheat after the oats crop has been removed.

That the facts might be more definitely determined, an experiment was begun in a small way in 1891, the same work was continued in 1893, putting in eight plots, four each in the two ways. In 1894 the experiment was continued. The results of these three years were given in Table VIII, also the average product from the several duplications of the experiment. Thus far, the plowed land has given higher yields in every instance than where the ground was disked, the average advantage of the plowed land over that which was worked only on the surface having been five bushels per acre. This evidence is not conclusive, but surely is worthy of further work and study. If we are losing five bushels of oats for every acre put out in this haphazard way, the sooner we change our method the better.

It should be added that these experiments were made on clay soil,

OATS.—TABLE VIII—DIFFERENT METHODS OF SEEDING COMPARED.

Method of seeding.	Grain per acre in bushels.			Average.
	1891.	1893	1894.	
Plot 1. Plowed 6 to 7 inches deep	51.8	55.9	41.7	49.8
Plot 2. Disked 3 to 4 inches deep	46.8	49.0	40.0	45.1
Plot 3. Plowed 6 to 7 inches deep .....	.....	54.0	44.2	49.1
Plot 4. Disked 3 to 4 inches deep .....	.....	49.3	38.5	43.9
Plot 5. Plowed 6 to 7 inches deep .....	.....	56.4	.....	.....
Plot 6. Disked 3 to 4 inches deep .....	.....	47.3	41.4	44.3
Plot 7. Plowed 6 to 7 inches deep .....	.....	54.8	.....	.....
Plot 8. Disked 3 to 4 inches deep .....	.....	49.2	.....	.....
Drilled 1 inch deep	38.1	25.6	29.5	31.0
Drilled 2 inches deep	39.0	31.0	28.7	32.9
Drilled 3 inches deep	35.5	28.4	.....	31.3
Rolled before seeding	43.8	.....	25.4	34.6
Rolled after seeding	42.3	.....	22.0	32.1

Regarding the deep and shallow planting of oats, Table VIII shows, in two years out of three, better results from planting two inches deep than from deeper or more shallow planting. In addition to the better yields per acre, I am of the opinion that oats have stood up better when drilled in two inches and more deep than when they were sown broadcast, or when drilled in about one inch deep; this conclusion, however, can only be a tentative one, as the limited number of experiments will not justify a final decision.

Table VIII gives the result of two years' experiment in compacting the ground both before and after putting in the seed; the first year, 1891, shows that rolling the land either before or after seeding was a decided benefit on that soil and for that season, but the yields of 1894 give results exactly the opposite. The crop of 1891 was grown on the more sandy soil at Columbus, while that of 1894 was grown upon the clay soil of Wayne county. The variation in soil doubtless has had much to do with the outcome in this experiment, but this can only be positively settled by further work upon this particular point.

7. SOME POINTS REGARDING SMUT.

In our last oat bulletin, published in January, 1892, special attention was called to the loss in the oats crop, caused by the presence of smut. It was stated in that bulletin that cases were on record where the actual damage by smut had exceeded eighteen per cent.; since that bulletin was issued I have kept records each year with a few of our worst affected vari-

eties, and the results show much more startling percentages than that given above, one variety showing by actual count 34 per cent. of smutted heads.

These figures have been obtained by measuring ten feet on each of eight drill rows, counting the total number of stalks in each, and then counting the smutted heads in each row. The following table gives the percentage of smut in four varieties for four years:

OATS.—TABLE IX—PER CENT. SMUTTED HEADS IN OATS FOR FOUR YEARS.

Varieties.	1891.	1892.	1893.	1894.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Black Prolific.....	3.2	2.8	13.3	34.0
American Banner	7.3	4.5	9.7	13.9
Race Horse	5.7	3.9	8.4	19.1
Lincoln	6.4	6.0	12.0	29.0

In addition to the above, countings were made in 1894, showing the following percentages of smut: Seizure and White Wonder, less than 1; Welcome, 1.7; Wideawake, 2.6; Mammoth Russian, 5.9; Great Northern, 20.2; White Superior Scotch, 21.7.

The simplest and cheapest method of destroying the smut is by the Jensen or hot water treatment, given in detail in our bulletin of January, 1892, which is as follows:

This method consists in placing the seed grain in water warmed to about 120 degrees Fahrenheit (the temperature may be 10 or 15 degrees higher in cold weather), taking it out of this as soon as it is thoroughly warmed and placing it in a second bath, the temperature of which should be about 135 degrees. The object of using two baths is to prevent destruction of vitality in the seed, which would occur if the oats were placed in water warm enough to bring the mean temperature of the grain to the heat required to destroy the smut germs. It will be readily seen that if a bushel of oats at the temperature of the atmosphere is introduced into a tub of water heated to 140 degrees Fahrenheit, the oats first coming in contact with the water would be injured by the heat being too great, while the seed going in last would be immersed in water, the temperature of which might be too much reduced to destroy the smut.

A convenient way of conducting this work would be to have two vessels holding twelve to sixteen gallons of water, the temperature of one not exceeding 125 degrees Fahrenheit, the other not exceeding 135 degrees Fahrenheit. Take a basket holding about half a bushel (if this basket could be made of screen wire similar to that used for the fine riddles of a fanning mill, and provided with a cover, it would be the ideal, but in case such a one can not be secured an ordinary splint basket covered with cloth will

answer the purpose), fill with OATS and dip it into the cooler vessel, turning the basket alternately to right and left, raising and lowering it in the water, so that all the grains may be reached by the water, then immerse immediately in the second vessel in the same way, but keep it in the water from eight to ten minutes.

As soon as it is removed it should be dipped in cold water, or spread out and cold water thrown over it, otherwise the tendency will be to cook some of the grains at least to the extent of destroying vitality. The cooling process concluded, the seed may be left to dry, after which it is ready to be sown.

SUMMARY.

1. In the short, unfavorable season of 1893, the Welcome variety gave lower yields than any other of that class, while the group as a whole gave larger yields than any of the other three.

2. The Seizure oats was the lowest yielder in the whole list for 1893, where sown late, but the same variety sown four to five weeks earlier gave, the same season, as good returns as any other variety on the farm.

3. In 1894, only three varieties in the Welcome group gave higher yields than that variety, namely, Improved American, Badger Queen and Bonanza King.

4. The highest yields in the Seizure group for 1894 were from the following varieties: Japan, Early Swedish, White Swiss, Prince Edward's Island and Wilson's Prolific, the latter variety badly mixed.

5. The highest average yield was decidedly in favor of the Side-oats group.

6. In a series of tests covering four seasons, the varieties that have given the highest average yields are Improved American, Japan, Early Swedish, Prince Edward's Island, State of North Dakota, Colonel, Dakota Gray, Kansas Hybrid, Probsteier and Egyptian.

7. The average weight per measured bushel of all oats grown upon the farm during the last four years falls below the Standard of 32 pounds to the bushel. The highest average for any one variety has been 38.6 pounds, the lowest, 27.3.

8. From the investigations thus far made, it has not been found that oats of heavy weight necessarily have a smaller percentage of hull than those of lighter weight per measured bushel.

9. A single trial indicates that oats put away in good condition shrink but very little—in this instance less than one per cent.—and the straw under ordinary conditions shrinks about 6 per cent.

10. Experiments extending over three seasons on our clay soil show that the method of putting in oats without first plowing the ground may involve a loss of five bushels per acre as compared with sowing on land that has been plowed and well prepared.