

EXPERIMENT STATION,  
KANSAS STATE AGRICULTURAL COLLEGE,  
MANHATTAN, KANSAS.

---

BULLETIN NO. 13.—AUGUST, 1890.

---

DEPARTMENT OF AGRICULTURE.

C. C. GEORGESON, M. Sc.,  
PROFESSOR OF AGRICULTURE, AND SUPERINTENDENT OF FARM.

H. M. COTTRELL, M. Sc., ASSISTANT.  
WM. SHELTON, FOREMAN OF FARM.

---

EXPERIMENTS WITH OATS.

---

THE season has been a very unfavorable one to the oat crop, owing to the insufficient rainfall. The crop on the College farm has, in fact, been a partial failure. From March 25th, when seeding began, to July 5th, when most of the crop was ripe, the rainfall amounted to only 5.49 inches, very nearly equally distributed between April, May, and June. It is easy to prove that in this climate a much greater amount of water is required to develop a full crop.

The yields which have been obtained, as hereinafter detailed, are in consequence abnormally low, and should not be taken as typical of this section. They are typical of the season, not of the soil.

But even under the most favorable conditions, the yield of oats in Kansas is not phenomenally great. The high temperature and dry atmosphere, which are characteristic of this portion of the continent during the growing season of the crop, operate to stunt the growth and hasten maturity before the plant can reach the development which it attains in a moister and cooler climate. There is, therefore, all the more reason for instituting careful and far-reaching experiments with this crop in order to ascertain, if possible, by what methods and from what varieties we may expect to obtain the best re-

sults. With this end in view the following series of experiments were undertaken:

- I. METHODS OF SEEDING.
  - (a) Listing in plowed land.
  - (b) Listing in unplowed land.
  - (c) Drilling in plowed land.
  - (d) Drilling in unplowed land.
  - (e) Cultivated in, land plowed.
  - (f) Cultivated in, land unplowed.
  - (g) Broadcasted, land plowed.
  - (h) Plowed under.
- II. CHARACTER OF SEED.
  - (a) Light seed.
  - (b) Seed of common quality.
  - (c) Heavy seed.
- III. SINGLE VARIETY VS. A MIXTURE OF VARIETIES.
- IV. CULTIVATION VS. No CULTURE.
- V. HARVESTING AT DIFFERENT STAGES OF RIPENESS.
  - (a) Dough.
  - (b) Hard dough.
  - (c) Ripe.
- VI. OATS AS A HAY CROP.
  - (a) Oats only.
  - (b) Oats and sorghum.
  - (c) Oats and millet.
- VII. OATS GROWN AS SINGLE PLANTS.\*
- VIII. COMPARATIVE TEST OF 85 VARIETIES.

The field in which the series from I to VII inclusive were grown, was in corn during both 1888 and 1889, and was in good culture, though somewhat weedy. The stalks of the last year's corn crop were raked and burned in the field, and the ashes carefully spread evenly over the whole area. None of the land in this field or elsewhere where oats were sown had been fall-plowed. Except where otherwise noted, all the oat land was plowed, during March, to a depth of about 10 inches, and brought to a good tilth with the harrow. The soil is a dark clay-loam upland.

I.—METHODS OF SEEDING.

- (a.) *Listing in Plowed Land.*
- (b.) *Listing in Unplowed Land.*

So far as it has been tried at this Station, good results have accrued from the listing of wheat; and if wheat gives a more vigorous growth and a bet-

\* Not reported. Two hundred single plants of each of 80 varieties were planted, each plant having a space of 64 square inches. The objects were, to study their growth, and to note the quality of the grain compared with the grain of the same varieties grown under ordinary conditions; but the dry weather so affected the plants as to make a comparison unfair, and render the experiment all but worthless.

ter yield by this method of planting compared with the results from listing, why should not the same be true of oats? If planting in a furrow, with, as a consequence, a more uniform supply of moisture, is beneficial for one, it appears reasonable to suppose that the same treatment would be equally good for the other.

Again, the question of a hard vs. a loose seed-bed is discussed ever and anon, with advocates for both. The point is an important one from a practical standpoint. It is a double loss to the farmer to plow his land preparatory to seeding if the loosening of the soil is an injury instead of a benefit; for he loses not only the cost of the work, but sustains a loss in the diminished yield of the crop. With a view to ascertain on which side of these questions the profit lies, ten plats were listed with oats, the variety being the Red Winter oats. Five of these plats were listed on spring-plowed land, and the other five plats on unplowed land, *i.e.*, on the corn land as cleaned from the stalks. Each plat measured one-twentieth (1-20) of an acre, and they were so placed that two and two (one each of plowed and unplowed land) adjoined each other, while both alternated with the other series of plats on which methods of seeding were tested.

They were listed March 31, 1890. The implement used was a Buckeye one-horse drill with three hoes, 14 inches apart. A small listing-plow, made for the purpose, was attached in front of each hoe. The result was, that this home-made lister would plant the oats in three rows 14 inches apart and in furrows about 6 inches deep. The amount of seeds used on these plats corresponded to 2 1/3 bushels per acre (3.7 lbs. per plat). The plats were harvested July 5, with the following results:

LISTED OATS.

LAND PLOWED.						LAND NOT PLOWED.					
No. of plat.	Yield of plats.		Wgt. per struck bush'l.	Yield per acre.		No. of plat.	Yield of plats.		Wgt. per struck bush'l.	Yield per acre.	
	Grain.	Straw.		Grain.	Straw.		Grain.	Straw.		Grain.	Straw.
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>		<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>
1.....	39.5	40.5	34	24.68	810	2.....	34.0	36.0	37	21.25	720
6.....	37.5	47.5	37	23.34	950	7.....	49.5	50.5	38	30.93	1010
11.....	30.0	45.0	39	18.75	900	12.....	47.5	42.5	39	29.68	850
16.....	56.0	44.0	38	35.0	880	17.....	51.0	34.0	38	31.87	680
21.....	35.0	40.0	39	21.76	800	22.....	35.25	49.75	38.5	22.03	995
Aves..	39.6	43.4	.....	24.75	868	Aves..	43.45	42.45	.....	27.15	855
In favor of unplowed land.....						.....	3.85	.....	.....	2.40	

These averages give a yield of nearly two and one-half bushels per acre in favor of the land which had not been plowed before listing, but with slightly less straw than on the plowed ground. The several plats are, however, not agreed in the tale they tell, two of the plowed, Nos. 1 and 16, being ahead of the two corresponding plats, Nos. 2 and 17, of the unplowed

ground, and two others, Nos. 6 and 11, fall behind the corresponding plats, Nos. 7 and 12, while plots 21 and 22 are practically alike. The plats with consecutive numbers joined each other, and were as nearly alike in quality of soil as it was possible to make them. While it is not safe to draw positive conclusions from a single experiment, the results may be considered to indicate that on this soil it is a loss of labor to plow corn ground before the oats are listed.

(c.) *Drilling in Plowed Land.*

(d.) *Drilling in Unplowed Land.*

In continuation of the same experiment, oats were put on plowed and unplowed land with the drill, five plats of each, and each plat one-twentieth of an acre. The drill used was the Dowagiac roller drill.

DRILLED OATS.

LAND PLOWED.						LAND NOT PLOWED.					
No. of plat.	Yield of plats.		Wgt. per struck bush'l.	Yield per acre.		No. of plat.	Yield of plats.		Wgt. per struck bush'l.	Yield per acre.	
	Grain.	Straw.		Grain.	Straw.		Grain.	Straw.		Grain.	Straw.
	Lbs.	Lbs.	Lbs.	Bu.	Lbs.		Lbs.	Lbs.	Lbs.	Bu.	Lbs.
4.....	58.5	31.5	34	36.87	630	5.....	56.5	38.5	37	35.31	770
9.....	44.0	36.0	38	27.50	720	10.....	48.0	37.0	38	30.0	740
14.....	66.0	44.0	38	41.25	880	15.....	65.5	44.5	39	40.62	890
19.....	54.0	66.0	37	33.75	1320	20.....	49.0	41.0	38	30.62	820
24.....	44.25	55.75	38.5	27.65	1115	25.....	58.5	51.5	39	36.56	1030
Avg.	53.35	46.65	.....	33.50	933	Avg.	55.5	42.5	.....	34.52	850
In favor of unplowed land.....						.....	2.15	.....	.....	1.02	.....

Here again the yield of grain from the unplowed land is a trifle in excess of the yield from the plowed land, and as before, the weight of straw falls behind that on the plowed land. The difference in yield in the several plats is considerable, but it will be noticed that there is a reasonable agreement in the yields on adjoining plats, ( those having consecutive numbers.) The conclusion must be the same as that arrived at in the case of listed oats: There was an actual loss sustained by spring plowing this land, to the extent of the cost of the labor.

(e.) *Oats cultivated in, Land Plowed.*

(f.) *Oats cultivated in, Land not Plowed.*

Five plats were sown broadcast under each of the above methods with four (4) lbs. of seed per plat, and covered with a five-tooth cultivator. Each plat 1/20 acre.

The results are shown in the annexed table:

COVERED WITH CULTIVATOR.

LAND PLOWED.					LAND NOT PLOWED.						
No. of plat.	Yield of plats.		Wgt. per struck bush'l.	Yield per acre.		No. of plat.	Yield of plats.		Wgt. per struck bush'l.	Yield per acre.	
	Grain.	Straw.		Grain.	Straw.		Grain.	Straw.		Grain.	Straw.
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>		<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>
28.....	50.0	60.0	39	31.25	1200	26.....	59.0	51.0	39	36.37	1020
32.....	44.0	51.0	39	27.50	1020	30.....	46.5	58.5	40	29.06	1170
36.....	37.5	52.5	39	34.44	1050	34.....	45.5	49.5	34	28.43	990
40.....	29.5	34.5	35	18.44	690	38.....	49.0	51.0	37	30.60	1020
44.....	33.5	49.5	34	22.19	990	42.....	36.5	38.5	36	22.81	770
Avg.	39.3	49.5	.....	24.56	990	Avg.	47.3	49.7	.....	29.55	994
In favor of unplowed land.....						.....	8.0	0.2	.....	4.99	4

In this instance too, we find on comparing the average of each series of five plats, that there is a yield of nearly five bushels per acre in favor of the corn land which had not been plowed in the spring, but simply broadcasted, and the oats covered with a cultivator after the corn stalks had been raked and burned.

(g.) *Broadcasted and Harrowed in, Land Plowed.*

On the same date as the above, March 31, nine one-twentieth acre plats were broadcasted with four lbs. of oats per plat, and covered by harrowing and cross-harrowing in the usual manner. We could not try this on unplowed land, because the harrow could not cover the seed on the undisturbed soil. As it is, it may be considered a fair representation of the most common method of sowing oats. The following table gives the yields:

OATS BROADCASTED.

NO. OF PLAT.	YIELD OF PLATS.		Wgt. per struck bushel.	YIELD PER ACRE.	
	Grain.	Straw.		Grain.	Straw.
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>
3.....	56.5	33.5	36	35.31	670
8.....	57.5	42.5	37	35.93	850
13.....	37.0	28.0	38	23.12	560
18.....	51.5	38.5	38	32.18	770
27.....	51.0	49.0	38	31.87	980
31.....	50.5	44.5	37	31.56	890
35.....	42.5	42.5	34	26.56	850
39.....	41.5	48.5	36	25.93	970
43.....	35.0	50.0	34	21.87	1000
Averages,	47.33	41.9	.....	29.56	837

The fluctuation in the yield of the several plats from the average of 29.56 bushels per acre is very considerable, varying from 7.69 below to 6.37 above the average.

(h.) *Broadcasted and Plowed under.*

The following five plats were broadcasted with four lbs. of seed per plat, as in the other cases, and plowed under with an ordinary walking-plow, the furrows being run to the depth of two to three inches. The yield was as follows:

NO. OF PLAT.	YIELD OF PLATS.		Wgt. per struck bushel.	YIELD PER ACRE.	
	Grain.	Straw.		Grain.	Straw.
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>
29 .....	39.0	41.0	38	24.37	820
33 .....	37.0	38.0	38	23.12	760
37 .....	38.0	47.0	36	23.75	940
41 .....	32.0	48.0	36	20.00	960
45 .....	26.5	33.5	31	16.56	670
Averages,	34.5	41.5	.....	21.56	830

On June 7th the following notes were taken on all the plats: "The broadcasted and drilled plats on both plowed and unplowed land are about alike. The listed plats show a somewhat better growth and darker color. All the plats are poor. The plats covered with the cultivator on unplowed land have a poor stand, the plants have tillered but little, and they have a sickly pale color. The cultivated-in plats on plowed land and the broadcasted plats slightly better. On the plowed-under plats the plants are more vigorous, but they stand in rows corresponding with the furrows."

SUMMARY OF METHODS OF SEEDING.

The following table shows the average yield of the several plats under each method of seeding, in bushels per acre:

METHODS OF SEEDING.	LAND PLOWED.			LAND NOT PLOWED.		
	Grain per acre.	Straw per acre.	Straw per bu grain.	Grain per acre.	Straw per acre.	Straw per bu. grain.
	<i>Bu.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Bu.</i>	<i>Lbs.</i>	<i>Lbs.</i>
Listed .....	24.75	868	35	27.15	855	31.5
Drilled.....	33.50	933	28	34.52	850	24.6
Cultivated in .....	24.56	990	40.3	29.55	994	33.6
Broadcasted.....	29.56	737	24.9			
Plowed under.....	21.56	830	38.5			

Comparing first the results on the plowed and unplowed land, we find that in every case the land which had not been plowed gave the best yield. This was not expected, but the facts are incontrovertible. Counting the cost of plowing at \$1.25 per acre, and oats at 35 cents per bushel, there was an actual gain per acre by not plowing the land of \$2.09 in the case of listed oats, \$1.60 for drilled, and \$3 for those covered with cultivator. It proves that oats prefer a moderately firm bed. In a loose soil, other things being equal, they run more to straw, apparently at the expense of the grain.

While it would not be advisable to dispense with plowing in all cases, I think it safe to say that corn land cleared from trash can be put in oats without plowing with the assurance that at least the cost of that operation is saved, even if it does not give an actual increase in yield over plowed land.

In regard to the comparative value of the several methods of seeding, it will be seen by a glance at the first column in the last table that the best yield was obtained on the drilled plats, viz., at the rate of 33.5 bushels per acre, the broadcasted coming next with 29.5 bushels, then the listed and cultivated-in following closely upon each other with  $24\frac{3}{4}$  and  $24\frac{1}{2}$  bushels respectively, the lightest yield being from the plats covered with the plow, which average only  $21\frac{1}{2}$  bushels per acre.

That the drilled oats should out-yield the broadcasted is contrary to the results generally obtained in farm practice, and it is probably due, in part at least, to the peculiarities of the drill. The implement used is a Dowagiac roller drill. The rollers consist of heavy iron wheels 20 inches in diameter, with the periphery roof-shaped, which, as they revolve, press into the soil, leaving drills behind into which the seeds are dropped, and covered by scrapers which follow. The soil in which the seed roots is thus pressed firm, which is opposite to the workings of the ordinary hoe drill; and in view of the preference which oats have for a firm bed, this circumstance may be the cause of the favorable results obtained by the use of this drill. The rollers are  $7\frac{1}{2}$  inches apart. I am inclined to think that the results would be still better if they were only about half that distance apart, so that the same amount of seed could be distributed more evenly over the whole area.

## II.—LIGHT AND HEAVY SEED.

To throw light on the influence that the character of the seed has on the crop, three grades of Red Winter oats were selected, denominated according to their weight per bushel, as "light," "common," and "heavy." Five one-twentieth acre plats were devoted to each grade. The soil was the corn land, already described. It was plowed and rolled immediately before seeding, and on April 1st seeded broadcast at the rate of  $2\frac{1}{2}$  bushels per acre and covered by harrowing and cross-harrowing. As to the seed, the "common" quality was taken from the oats as they came from the thresher and weighed 28 lbs. to the struck bushel. The other two grades were obtained by running the "common" oats through a fanning-mill which separated them into five grades. Of these we used the lightest and the heaviest, which weighed respectively 19 lbs. and 32 lbs. to the struck bushel. By April 11th, ten days after seeding, there was a good stand on all the plats. On June 7th the following notes were taken: "All the plots are suffering seriously from the drouth; the plants are feeble, and have tillered much less than in ordinary seasons. Plants from heavy and common seed have headed out, but only about one-fourth the plants from 'light' seed have headed at this date."

The plats were harvested July 5th, and gave the following yields:

No. of plat	LIGHT.				No. of plat	COMMON.				No. of plat	HEAVY.						
	Yield of plats.		Weight per struck bushel	Yield per acre.		Yield of plats.		Weight per struck bushel	Yield per acre.		Yield of plats.		Weight per struck bushel	Yield per acre.			
	Grain.	Straw.		Grain.		Straw.	Grain.		Straw.		Grain.	Straw.		Grain.	Straw.	Grain.	Straw.
Lbs.	Lbs.	Lbs.	Bu.	Lbs.	Lbs.	Lbs.	Lbs.	Bu.	Lbs.	Lbs.	Lbs.	Bu.	Lbs.	Lbs.	Lbs.	Bu.	Lbs.
46...	23	27	34	12.5	540	47	45.75	59.25	34.5	28.6	1185	48	51.0	69.0	34	31.9	1380
49...	39	91	34	24.4	1820	50	27.5	32.5	35	17.2	650	51	43.5	51.5	35	27.2	1030
52...	34	36	32	21.2	720	53	31.0	64.0	35	19.3	1280	54	43.0	37.0	36	26.9	740
55...	35	90	35	21.8	1800	56	45.5	74.5	36	28.4	1490	57	43.5	56.5	35	27.2	1130
58...	42	78	34	26.2	1560	59	42.5	57.5	35	26.5	1150	60	58.5	91.5	35	36.5	1830
Avs.	34.6	64.4	...	21.6	1288	...	38.45	57.55	...	24.0	1151	...	47.9	61.1	...	30.0	1222

Comparing the averages, we have the following:

	YIELD PER ACRE.	
	Grain, bu.	Straw, lbs.
Light seed.....	21.6	1288
Common seed.....	24.0	1151
Heavy seed.....	30.0	1222

This showing is interesting, although it proves only what is already well known. The heaviest seed yielded six (6) bushels more per acre than the common seed oats taken (as is usually the case in practice) as they came from the thresher. On this basis the oat crop of Kansas could last year have been increased by 8,352,588 bushels if only selected heavy oats had been sown, worth at the average price of the crop (16 cents) \$1,336,413, or twice that sum at the present price of oats. Select seed pays, and pays well.

III.—SINGLE VARIETY vs. A MIXTURE OF VARIETIES.

It is often asserted that a single variety grown on a given area does not yield as well as does a mixture of several varieties, all other conditions being equal. The assertion is based on the theory that varieties differ in their needs and powers to assimilate the available nutrients from the soil, and that for this reason several varieties mixed together, with their roots feeding among each other, are supported better, and will make a larger growth on a given area than is the case with a single variety under the same conditions.

To test the soundness of this claim, an experiment was planned embracing 20 plats, each 1-20 acre in extent. Three varieties were chosen for the purpose, namely, the Red Winter, Badger Queen, and Virginia Winter, the seed of all three having been grown on the farm last year. The continued dry weather in early summer was very detrimental to the experiment, and

for this reason the results are not as valuable as they would have been under more favorable circumstances.

The plats were seeded April 1st, with the roller drill already described, using four pounds of seed to each plat. Four plats were given to each of the three varieties, four to a mixture of all three together, and four to a mixture of the Red Winter and Badger Queen. The plats were distributed among each other so as to equalize possible inequalities in the soil.

During their growth the Virginia Winter proved weaker and more susceptible to the drouth than the other two, and although it stooled prolifically, its yield was very light.

YIELD OF SINGLE VARIETIES.

No. of plat.....	RED WINTER.					VIRGINIA WINTER.					BADGER QUEEN.						
	Yield of plats.		Wgt. per struck bushel.	Yield per acre.		Yield of plats.		Wgt. per struck bushel.	Yield per acre.		Yield of plats.		Wgt. per struck bushel.	Yield per acre.			
	Grain.	Straw.		Grain.	Straw.	Grain.	Straw.		Grain.	Straw.	Grain.	Straw.					
	Lbs.	Lbs.	Bu.	Lbs.		Lbs.	Lbs.	Bu.	Lbs.		Lbs.	Lbs.	Bu.	Lbs.			
61...	54.0	81.0	36	33.7	1620	62	11.5	52.5	24	7.1	1050	63	33	87	40	20.6	1740
66...	55.5	79.5	35	34.7	1590	67	9.5	75.5	28	6.0	1510	68	46	79	41	28.7	1580
71...	49.5	65.5	35	30.9	1310	72	3.0	40.0	...	1.9	800	73	30	95	39	18.7	1900
76.	67.5	152.5	32	42.2	3050	77	13.0	92.0	24	8.1	1840	78	41	94	36	25.3	1880
Avs.	56.62	94.62	...	35.3	1892	...	9.2	65.0	...	5.7	1300	...	37.5	88.7	...	23.4	1775

YIELDS OF MIXED PLATS.

No. of plat.	RED WINTER AND BADGER QUEEN.					RED WINTER, VIRGINIA WINTER, AND BADGER QUEEN.					
	Yield of plats.		Wgt. of struck bushel.	Yield per acre.		No. of plat.	Yield of plats.		Wgt. of struck bushel.	Yield per acre.	
	Grain.	Straw.		Grain.	Straw.		Grain.	Straw.		Grain.	Straw.
	Lbs.	Lbs.	Lbs.	Bu.	Lbs.		Lbs.	Lbs.	Lbs.	Bu.	Lbs.
64.....	44.0	71.0	37	27.5	1420	65	37.0	88	36	23.4	1760
69.....	57.5	87.5	38	36.0	1750	70	48.5	101.5	37	30.3	2030
74.....	52.5	162.5	35	32.8	3250	75	47.5	132.5	33	29.7	2650
79.....	46.0	89.0	34	28.7	1780	80	51.5	133.5	33	32.2	2670
Avgs..	50.0	102.5	.....	31.20	2050	.....	46.12	113.9	.....	28.8	2278

AVERAGES OF VARIETIES GROWN SINGLY.

	YIELD PER ACRE.	
	Grain.	Straw.
	Bu.	Lbs.
Red Winter.....	35.3	1892
Virginia Winter.....	5.7	1300
Badger Queen.....	23.4	1775
Average of the three..	21.46	1655

AVERAGE OF RED WINTER AND BADGER QUEEN GROWN SINGLY.  
 Grain, bushels per acre. . . . . 29.33 | Straw, pounds per acre. . . . . 1833

Now, comparing the averages of the last two named varieties with the average of the same two varieties grown in mixed plats, Red Winter and Badger Queen, we find that there is a gain of nearly two bushels (1.87) per acre in favor of the mixed seed. In the same way we find that the average of all three varieties grown singly is less than twenty-one and a half bushels per acre (21.46), whereas the average of a mixture of the three is nearly twenty-nine bushels per acre (28.8), giving us a gain of six and one-third (6.34) bushels per acre in favor of the mixture.

These figures do not necessarily prove the correctness of the theory, but they point in that direction with sufficient emphasis to indicate that there is "something in it," which it may be profitable to investigate further.

IV.—CULTIVATION vs. NO CULTURE.

Twelve plats, each 1.20 acre, were devoted to this experiment. They were sown with the roller drill April 1st, at the rate of 2½ bushels seed per acre; the variety used was Red Winter oats. There were three series, in one of which the plats were harrowed, in another cultivated between the rows by hand, and in the third the ground was left undisturbed.

The yields were as follows:

No. of plat.....	HARROWED PLATS.					HOED PLATS.					NO CULTURE.						
	Yield of plats.		Weight per struck bushel.	Yield per acre.		No. of plat.....	Yield of plats.		Weight per struck bushel.	Yield per acre.		No. of plat.....	Yield of plats.		Weight per struck bushel.	Yield per acre.	
	Grain.....	Straw.....		Grain.....	Straw.....		Grain.....	Straw.....		Grain.....	Straw.....		Grain.....	Straw.....		Grain.....	Straw.....
81...	Lbs. 61.5	Lbs. 123.5	Lbs. 30	Bu. 38.4	Lbs. 2470	82	Lbs. 84.0	Lbs. 116.0	Lbs. 31	Bu. 52.5	Lbs. 2320	83	Lbs. 84.5	Lbs. 115.5	Lbs. 33	Bu. 52.8	Lbs. 2310
84...	63.5	208.5	32	39.7	4170	85	42.0	68.0	31	26.2	1360	86	34.5	65.5	31	21.5	1310
87...	35.5	34.5	32	22.2	690	88	30.5	34.5	32	19.0	690	89	31.5	48.5	31	19.7	970
90...	24.0	26.0	27	15.0	520	91	24.5	35.5	29	15.3	710	92	54.0	71.0	31	33.7	1420
Avs.	46.1	98.1	...	28.8	1962	...	45.2	63.5	...	28.2	1270	...	51.1	75.1	...	31.9	1502

In this case cultivation occasioned a slight loss; the plats which were not cultivated averaged 31.9 bushels per acre, while the harrowed and hoed. plats yielded respectively 28.8 and 28.2 bushels per acre. The loosening of the soil with hoe and harrow no doubt injured the roots near the surface.

V.—HARVESTING OATS AT DIFFERENT STAGES OF RIPENESS.

It is sometimes asserted that oats ought to be cut before they are fully ripe; the advocates of this practice maintaining that there is a loss rather than a gain in the yield between the dough stage and ripeness. Another argument in favor of early cutting, to which every practical farmer will

agree, is that oats cut before maturity are not so easily beaten out in handling. Fifteen plats were devoted to the investigation of this question. All were seeded in the manner already detailed in previous experiments. Of these plats five were harvested June 27th, when the grain was in the "dough," five more June 30th, when in the "hard dough," and the remaining five July 5th, when fully ripe.

Here are the yields:

No. of plat.....	HARVESTED IN DOUGH.					HARVESTED IN HARD DOUGH.					HARVESTED WHEN RIPE.								
	Yield of plats.		Weight per struck bushel.		Yield per acre.	No of plat.....	Yield of plats.		Weight per struck bushel.		Yield per acre.	No. of plat.....	Yield of plats.		Weight per struck bushel.		Yield per acre.		
	Grain.....	Straw.....	Grain.....	Straw.....	Grain.....		Grain.....	Straw.....	Grain.....	Straw.....	Grain.....		Straw.....	Grain.....	Straw.....	Grain.....	Straw.....		
	Lbs.	Lbs.	Lbs.	Bu.	Lbs.	Lbs.	Lbs.	Lbs.	Bu.	Lbs.	Lbs.	Lbs.	Lbs.	Bu.	Lbs.	Lbs.	Lbs.	Bu.	Lbs.
93..	48.5	61.5	31	30.3	1230	94	48.5	66.5	32	30.3	1330	95	44.0	30.6	33	27.5	720		
96..	47.5	62.5	32	29.7	1250	97	56.5	68.5	32	35.3	1370	98	59.5	60.5	33	37.2	1210		
99..	64.0	96.0	31	35.6	1260	100	63.0	77.0	32	39.4	1540	101	58.5	56.5	33	36.5	1130		
102..	57.0	63.0	32	35.6	1260	103	51.5	68.5	32	32.2	1370	104	54.0	41.0	33	33.7	820		
105..	44.0	56.0	32	27.5	1120	106	44.5	45.5	31	27.8	910	107	49.5	45.5	33	30.9	910		
A vs.	52.2	67.8	...	32.6	1356	...	52.8	65.2	...	33.0	1304	...	53.1	47.5	...	33.2	958		

Though the difference between the averages of these plats is but small, the data given us in these three tables furnish material for an interesting comparison of results. There is in the first place a slight but constant increase in the yield from the dough state to ripeness; the "dough" series yielding 32.6 bushels, "hard dough" 33 bushels, and the ripe series 33.2 bushels per acre. Thus there is no gain, but on the contrary a slight loss, by cutting them before they are ripe. On the other hand, there is a loss of weight in the straw with increased ripeness. This factor is of course subject to greater fluctuations than the grain, and in this case the figures giving the weight of straw may therefore not be of much value. It is evident that the more fully it is ripened, the less water does it contain, and it is equally evident that the straw will make better fodder if cut before the starch and other carbonaceous bodies in the culm change to woody fiber in the process of maturing. The facts obtained indicate that if the straw is depended on for feed the oats should be cut early; but if the grain alone is wanted they should be allowed to mature. This is emphasized by the increased weight per struck bushel of the ripe grain, as shown in the table.

VI.—OATS FOR FORAGE.

This experiment was undertaken with a view to obtain some definite data in regard to the amount of forage which may be obtained from oats on this soil, when these are sown thickly and harvested green, *i. e.*, soon after the formation of the seed. Twelve plats of one-twentieth acre each were measured off for this purpose. They were seeded April 5th, a rather late date

for the best results. Six plats were seeded with four (4) bushels per acre, and the remaining six plats with 23 bushels oats and half a bushel of either sorghum or millet. All the grain was broadcasted and harrowed in. After cutting, the crop was cured into hay and weighed when dry.

The results were as follows:

OAT PLATS.  
SEEDED WITH FOUR BUSHELS PER ACRE.

RED WINTER OATS.			VIRGINIA WINTER OATS.		
No. of plat.	Weight of hay per plat.	Weight of hay per acre.	No. of plat.	Weight of hay per plat.	Wgt. of hay per acre.
	<i>Lbs.</i>	<i>Lbs.</i>		<i>Lbs.</i>	<i>Lbs.</i>
3.....	160	3200	4	45	900
7.....	140	2800	8	65	1800
11.....	115	2300	12	30	600
Averages.....	138	2766	.....	46	933

OATS AND SORGHUM.  
SEEDED WITH 2½ BUSHELS OATS AND ½ BUSHEL SORGHUM PER ACRE.

No. of plat.	Weight of hay per plat.	Weight of hay per acre.	Remarks.
	<i>Lbs.</i>	<i>Lbs.</i>	
5.....	115	2300	} Red Winter oats and Early Amber sorghum. Virginia Winter oats and Early Amber sorghum.
9.....	145	2900	
13.....	40	800	
Averages.....	100	2000	

OATS AND MILLET.  
SEEDED WITH 2½ BUSHELS OATS AND ½ BUSHEL MILLET PER ACRE.

No. of plat.	Weight of hay per plat.	Weight of hay per acre.	Remarks.
	<i>Lbs.</i>	<i>Lbs.</i>	
6.....	125	2500	} Red Winter oats and millet. Virginia Winter oats and millet.
10.....	125	2500	
14.....	50	1000	
Averages.....	100	2000	

The Virginia Winter oats have been a failure in all experiments on the farm this season, and its yields are given here only on the principle that a failure may at times be as instructive as a success. This variety cannot stand drouth. Nor did the sorghum and the millet make a satisfactory growth in this experiment. They suffered from the drouth even more than the oats, and contributed but little to the weight of the crop. The Red Winter oats yielded (on plats 3, 7, and 11) one and one-third tons good hay per acre in three months from seeding, which is a very fair crop for this season.

VIII.—TEST OF VARIETIES.

The following list of varieties includes all grown on the farm the past season. With the exception of a few of which we obtained but a small quantity of seed, they were grown on plots of one-tenth acre each. Seeding began March 25th, and was finished on the 29th. All were sown with the roller drill already described; the high winds which prevailed at that time made it impossible to sow them broadcast. The leading facts about each variety are briefly set forth in the following descriptive notes. The names given in parenthesis after the name of the variety denote the source of the seed. All of these varieties were treated by the "Jensen method" as a preventive against the attacks of smut. That is, they were immersed in hot water at a temperature of 135°F. for eight minutes, and then dried in the air, before they were seeded. The result was very satisfactory. These varieties were practically free of smut, while oats not thus treated contained from 5 to 10 per cent. of smutted heads, and in a few instances, even a much higher per cent.

DESCRIPTIVE NOTES ON VARIETIES.

AMERICAN BANNER (McCullough).—Stools sparingly. Headed in 81 days and ripe in 98 days from sowing. Average height 2.4 ft. Straw medium to coarse; 49 lbs. to the bushel of grain; leaves broad. Heads open, average length 6.5 in., pedicels medium to long, spikelets 2-seeded, the larger seed often nearly enveloping the smaller one, occasionally awned.

*Yield per acre* 28.5 bu. Grain yellowish-white, medium in length, moderately plump; gave 57 per cent. kernel and 43 per cent. husk; 21.43 per cent. of crop was light oats. Weight per struck bushel 36 lbs.

AMERICAN BEAUTY (Dreer).—Stools lightly. Headed in 81 days and ripe in 100 days from sowing. Average height 2.5 ft. Straw medium to coarse; 59 lbs. to bushel of grain; leaves broad. Heads open, average length 7.5 in.; pedicels medium to long; spikelets 2 to 3 seeds, the third seed frequently enveloped by the other two, the larger grain in the spikelet frequently awned.

*Yield per acre* 28.5 bu. Grain yellowish-white, medium in size, somewhat slender; gave 70 per cent. kernel and 30 per cent. husk; 15.89 per cent. was light oats. Weight per struck bushel 33 lbs.

BADGER QUEEN (Northrup, Braslan & Goodwin Co.).—Growth upright; stools lightly. Headed in 77 days and ripe in 94 days from sowing. Average height 2.9 ft. Straw coarse; 60 lbs. to bushel of grain; leaves broad. Heads open, average length 10 in., pedicels long, 1 to 2 grains in a spikelet, frequently awned.

*Yield per acre* 1889, 15 bu., in 1890, 27.9 bu.; average 21.5 bu. Grain yellowish-white, short, heavy, and moderately plump; 62 per cent. kernel and 38 per cent. husk; light oats 3.3 per cent. of crop. Weight per struck bushel 41½ lbs. Identical with Welcome.

BALTIC (Johnson & Stokes).—Stools moderately. Headed in 84 days and ripe in 102 days from sowing. Average height 2.9 ft. Straw coarse; 66 lbs. to bushel of grain; leaves broad. Heads open, average length 8 in., pedicels medium to short, 2 grains in a spikelet, very rarely awned.

*Yield per acre* 26.9 bu. Grain yellowish-white, medium size, plump; gave 69 per cent. kernel and 31 per cent. husk; 9.46 per cent. of crop was light oats. Weight per struck bushel 37 lbs.

BLACK AMERICAN (Colorado).—Stools well. Headed in 78 days and ripe in 98 days from sowing. Average height 2.5 ft. Straw medium to fine; 56 lbs. to bushel of grain; leaves of medium width. Heads open, average length 7.2 in.; pedicels moderate length, 2 grains in a spikelet, rarely awned.

*Yield per acre* 38.5 bu. Grain light-brown to brownish-black, long and slender; 38 per cent. husk. Weight per struck bushel 32 lbs.,.

BELGIAN (Landreth).—Growth upright; stools lightly. Headed in 78 days and ripe in 94 days after sowing. Average height 2.7 ft. Straw coarse, leaves broad; 47 lbs. straw to bushel of grain. Heads open, average length 10.2 in.; pedicels long, 1 to 2 grains in a spikelet. Grains often awned.

*Yield per acre* 37.8 bu. Grain yellowish-white, short, heavy and plump; 30 per cent. husk; light oats 5.17 per cent. Weight of struck bushel 42 lbs. Identical with Welcome.

BLACK PROLIFIC (Salzer).—Stools profusely. Headed in 87 days and ripe in 104 days from sowing. Average height 2.6 ft. Straw medium to coarse; 117 lbs. straw to bushel of grain; leaves broad. Heads open, average length 7 in.; pedicels short; 2 grains in a spikelet, generally the larger grain is awned.

*Yield per acre* 18.3 bu. Grain yellowish brown, long and mostly slender; 40 per cent. husk; 32 per cent. light oats. Weight of struck bushel 32 lbs.

BLACK RUSSIAN (Plant Seed Co.). —Stools well. Headed in 73 days and ripe in 94 days after sowing. Average height 2.6 ft. Straw medium to coarse, 31 lbs. to bushel of grain; leaves broad. Head open, average length 8 in.. pedicels medium, 2 grains to a spikelet, awnless.

*Yield per acre* 42.2 bu. Grain brownish-black, long and slender; 23 per cent. husk; 9.01 per cent. light oats. Weight per struck bushel 39 lbs.

BLACK SWISS (Colorado).—Stools profusely. Headed in 93 days and ripe in 110 days from sowing. Average height 2.6 ft. Straw medium in size; 576 lbs. to bushel of grain; foliage very heavy and profuse. Heads open, average length 7.9 in.

*Yield per acre* 5.8 bu. Grain dark brown to black, occasionally red, long, slender, tapering and light, with 40 per cent. husk; 42.31 per cent of crop light oats. Weight per struck bushel 27 lbs. A very vigorous grower, but yield was cut short on account of late ripening.

BLACK TARTARIAN (Henderson & Co.).— Stools well. Headed in 78 days and ripe in 93 days from sowing. Average height 2.4 ft. Straw medium to coarse; 129 lbs. to bushel of grain; leaves broad. Heads open, average length 3 in., pedicels medium length. 2 grains in a spikelet, the smaller often enveloped by the larger, and both appearing as one grain, the larger grain generally awned.

*Yield per acre* 8.9 bu. Grain yellowish-brown to brownish-black, medium length, slender; 48 per cent. husk; 22.61 per cent. light oats. Weight struck bushel 35 lbs. Suffered from late planting.

BLUE GRAZING WINTER (College).—Stools very profusely; early foliage very profuse and spreading, covering the ground with a dense grassy mat. Headed out in 91 days and ripe in 108 days from sowing. Average height 2.4 ft. Straw slender; 112 lbs. to bushel of grain; leaves narrow, grass-like. Heads open, 7.8 in. long, pedicels medium in length, few on a head; 2 grains in a spikelet, the larger grain often awned.

*Yield per acre* 1889, 17 bu.; 1890, 19.9 bu.; average 18.5 bu. Grain red, occasionally brown, long and slender, with 22 per cent. husk; 23.91 per cent. of crop light oats. Weight of struck bushel 33 lbs. A light grain yielder but well adapted for pasturing.

BOARD OF TRADE (Colorado).—Stools sparingly. Headed in 80 days and ripened in 100 days from sowing. Average height 2.8 ft. Straw medium, 55 lbs. to bushel of grain; leaves of medium width. Heads open, average length 7.2 in. Pedicels short, 2 grains in a spikelet, the smaller one often enveloped by the larger, rarely awned.

*Yield per acre* 34.3 bu. Grain yellowish-white, medium size, slender; 27 per cent. husk; 10.95 per cent. light oats. Weight of struck bushel 36 lbs.

BROWN WINTER (College).—Stools well. Headed in 77 days and ripe in 98 days after sowing. Average height 2.5 ft. Straw medium to fine; 49 lbs. to bushel of grain; leaves of medium width. Open heads, average length 7 in., pedicels medium length, 2 grains in a spikelet, very rarely awned.

*Yield per acre* 1889, 33 bu., 1890 39.9 bu., average 36.5 bu. Grain, majority of kernels red, many brown, kernels medium length, and slender; 24 per cent. husk; 19.62 per cent. light oats. Weight per struck bushel 37 lbs.

BURT'S EXTRA EARLY RUST PROOF (College).—Stools profusely. Headed in 63 days and ripe in 88 days from sowing. Average height 2.4 ft. Straw fine; 42 lbs. to bushel of grain; leaves narrow. Heads open, average length 6 in., pedicels short, 2 grains in a spikelet, occasionally awned.

*Yield per acre* 1889, 24 bu., in 1890, 36.4; average, 30.2 bu. Grain light red, long and slender; 28 per cent. husk; 21.33 per cent. light oats. Weight per struck bushel 30.5 lbs. Earliest oats grown on College farm. Grains ripen very uneven; grains on upper part of head ripe while those below are in the milk.

CANADIAN TRIUMPH (Rennie).—Stools sparingly. Headed 79 days and ripe 98 days from sowing. Average height 2.8 ft. Straw coarse; 50 lbs. to bushel of grain; leaves medium to broad. Heads open, average length 8 in., pedicels moderately long, 2 grains in a spikelet, one grain enveloping the other, very rarely awned.

*Yield per acre* 24.2 bu. Grain yellowish-white, short, plump; 38 per cent. husk; 9.35 per cent. light oats. Weight per struck bushel 40.5 lbs. Identical with Welcome.

CENTENNIAL WHITE (Wilson).—Stools lightly. Headed in 78 days and ripe in 98 days from sowing. Average height 2.5 ft. Straw coarse; 46 lbs. to bushel of grain; leaves broad. Heads open, average length 9 in., pedicels medium length, 2 grains to a spikelet, frequently awned.

*Yield per acre* 26.6 bu. Grain yellowish-white, medium length, moderately plump and heavy; 38 per cent. husk; 7.32 per cent. of crop light oats. Weight per struck bushel 39.5 lbs.

COLONEL (Ohio). — Stools sparingly. Headed in 80 days and ripe in 98 days from sowing. Average height 2.9 ft. Straw medium to fine; 50 lbs. straw to bushel of grain; leaves of medium width. Heads open, average length 7.5 in.; pedicels short, 2 grains in a spikelet, the larger one frequently awned.

*Yield per acre* 32.2 bu. Grain yellowish-white, long and slender; 33 per cent. husk; 30.81 per cent. light oats. Weight of struck bushel 34 lbs.

CREAM EGYPTIAN (Ont. Exp. Farm).—Stools sparingly. Headed in 80 days and ripe in 93 days from sowing. Average height 2.7 ft. Straw medium to fine, 53 lbs. to bushel of grain; leaves medium. Heads open, average length 7.5 in., pedicels short, 2 grains in a spikelet, rarely awned.

*Yield per acre* 27.9 bu. Grain yellowish-white to gray, short, moderately plump; 36 per cent. husk; 10.42 per cent. light oats. Weights per struck bushel 33 lbs. Identical with Egyptian.

DAKOTA NORTHERN (Barnard).—Stools sparingly. Headed in 78 days and ripe in

91 days from sowing. Average height 3 ft. Straw coarse 47 lbs to bushel of grain; leaves broad. Heads open, average length 11.5 in.; pedicels long, 2 grains in a spikelet, occasionally awned.

*Yield per acre* 23.6 bu. Grain yellowish-white, long and moderately plump; 35 per cent. husk; 5.77 per cent. light oats. Weight per struck bushel 40 lbs.

EARLY ANGUS (Colorado).—Stools profusely. Headed in 89 days and ripe in 105 days from sowing. Straw medium to coarse, 243 lbs. to bushel of grain; leaves broad. Average height 3.1 ft. Heads open, average length 11 in.; pedicels medium length, 2 grains in a spikelet, the larger grain usually awned.

*Yield per acre* 5.3 bu. Grain yellowish-white, medium length, slender; 41 per cent. husk; 33.33 per cent. light oats. Weight of struck bushel 32 lbs.

EARLY BLOSSOM (Ont. Exp. Farm) .—Stools sparingly. Headed in 81 days and ripe in 98 days from sowing. Average height 2.3 ft. Straw coarse; 74 lbs. to bushel of grain; leaves broad. Heads open, average length 7.4 in.; pedicels short, 2 grains in a spikelet, rarely awned.

*Yield per acre* 17.5 bu. Grain yellowish-white, with green tint, short, plump; 35 per cent. husk; 21.62 per cent. light oats. Weight per struck bushel 83 lbs.

EARLY LACKAWANNA (Maule).—Stools moderately. Headed in 71 days and ripe in 91 days from sowing. Average height 3.3 ft. Straw coarse; 52 lbs. to bushel of grain; leaves broad. Heads open, average length 9.5 in.; pedicels long, 2 grains to a spikelet, very rarely awned.

*Yield per acre* 37.8 bu. Grain yellowish-white, of medium length, moderately plump; 37 per cent. husk; 9.17 per cent. light oats. Weight per struck bushel 40 lbs.

EARLY POLAND (Colorado) .—Stools well. Headed in 74 days and ripe in 91 days from seeding. Average height 2.9 ft. Straw coarse; 48 lbs. to bushel of grain; leaves broad. Heads open, average length 9 in.; pedicels long, 2 grains in a spikelet, rarely awned.

*Yield per acre* 26.9 bu. Grain yellowish-white, short, plump; 35 per cent. husk; 1.47 per cent. light oats. Weight per struck bushel 41½ lbs. Identical with Welcome.

EARLY SCOTCH (Marsh).—Stools moderately. Headed in 80 days and ripe in 94 days from sowing. Average height 2.5 ft. Straw medium to coarse; 110 lbs. to bushel of grain; leaves medium width. Heads open, average length 7.3 in.; pedicels medium to long, 2 grains in a spikelet, very rarely awned.

*Yield per acre* 15.9 bu. Grain yellowish-white, medium length, moderately plump; 41 per cent. husk; 22.37 per cent. light oats. Weight per struck bushel 38 lbs.

EGYPTIAN (Rennie).—Stools sparingly. Headed in 81 days and ripe in 96 days after sowing. Average height 2.5 ft. Straw medium to fine; 48 lbs. to bushel of grain; leaves medium to broad. Heads open, average length 7 in.; pedicels medium length, 2 grains in a spikelet, grain rarely awned.

*Yield per acre* 20.6 bu. Grain yellowish-white to gray, short, plump; 39 per cent. husk; 16.16 per cent. light oats. Weight per struck bushel 37 lbs. Identical with Cream Egyptian.

FLYING SCOTCHMAN (Ont. Exp. Farm) .—Stools sparingly. Headed in 77 days and ripe in 91 days after sowing. Average height 2.4 ft. Straw medium to coarse; 56 lbs. to bushel of grain; leaves of medium width. Heads open average length 6 in.; pedicels short; 2 grains in a spikelet, grains rarely awned.

*Yield per acre* 24.1 bu. Grain a light greenish-yellow, medium to short, plump, and with 40 per cent. husk; 16.40 per cent. light oats, Weight per struck bushel 35 lbs.

GIANT FRENCH (Vaughan).—Stools sparingly. Headed in 85 days and ripe in 101 days after sowing. Average height 2.3 ft. Straw coarse, leaves broad; straw 37 lbs to bushel of grain. Heads open, average length 8.2 in.; pedicels long, 2 grains in a spikelet, the larger one frequently awned.

*Yield per acre* 19.4 bu. Grain greenish-yellow, medium length, moderately plump, with 35 per cent. husk. Weight per struck bushel 30 lbs.

GOLD COIN (Mills).—Stools well. Headed in 82 days and ripe in 101 days after sowing. Average height 2.4 ft. Straw medium size; leaves medium; straw 54 lbs. to bushel of grain. Heads open, average length 7.5 in.; pedicels medium to long; 2 grains in a spikelet, the larger often enveloping the smaller, rarely awned, the larger grain then bearing the awn.

*Yield per acre* 20.8 bu. Grain yellowish-white, short and plump; 40 per cent. husk; 10.12 per cent. light oats. Weight per struck bushel 35 lbs. Identical with Welcome.

GOLDEN GIANT SIDE (Burpee).—Stools sparingly. Headed in 85 days and ripe in 101 days after sowing. Average height 2.7 ft. Straw moderately fine; leaves of medium width; 28 lbs. straw to bushel of grain. Heads open, average length 9.5 in.; pedicels medium length, arranged upon one side of head; 2 grains in a spikelet, the larger one being awned.

*Yield per acre* 14.1 bu. Grain greenish-yellow, medium length, moderately plump; with 30 per cent. husk; 22.58 per cent. light oats. Weight of struck bushel 32 lbs.

GOLDEN SHEAF (Colorado).—Stools lightly. Headed in 76 days and ripe in 91 days after sowing. Average height 2.3 ft. Straw slender; leaves narrow; 16 lbs. of straw to bushel of grain. Heads open, average length 6.5 in.; pedicels medium length, 2 grains in a spikelet, awnless.

*Yield per acre* 43.9 bu. Grain yellow, medium length, moderately plump; with 26 per cent. husk; 12.78 per cent. light oats. Weight of struck bushel 37 lbs.

HARGETT'S SEIZURE (Buist).—Stools lightly. Headed in 76 days and ripe in 91 days from sowing. Average height 2.5 ft. Straw coarse; leaves broad; 46 lbs. straw to bushel of grain. Heads open, average length 7 in.; pedicels medium in length; 1 grain in a spikelet, rarely awned.

*Yield per acre* 20.3 bu. Grains yellowish-white, medium length, moderately plump; with 40 per cent. husk; 8.54 per cent. of crop light oats. Weight of struck bushel 40 lbs. Identical with Welcome.

HENDERSON'S CLYDESDALE (Henderson & Co.).—Stools moderately. Headed in 72 days and ripe in 83 days from sowing. Average height 3 ft. Straw coarse; leaves medium width; 64 lbs. straw to bushel of grain. Heads open, average length 10 in; pedicels long, 2 grains in a spikelet, frequently awned.

*Yield per acre* 19.7 bu. Grain yellowish-white, medium length, plump, with 38 per cent. husk; 22.61 per cent. of crop light oats. Weight of struck bushel 35 lbs. Suffered severely from late planting. Identical with Welcome.

HOPETOWN (Henderson & Co.).—Stools profusely. Headed in 82 days and ripe in 98 days from sowing. Average height 2.2 ft. Straw coarse; leaves broad; 157 lbs. straw to bushel of grain. Heads open, 8.5 in. long.; pedicels medium length, 1 grain in a spikelet, frequently awned.

*Yield per acre* 4.7 bu. Grain whitish-yellow, short and moderately plump; 35 per cent. husk; 30 per cent. of crop light oats. Weight of struck bushel 33 lbs. This variety suffered severely from drouth.

IMPROVED AMERICAN (College).—Stools sparingly. Headed in 80 days and ripe in 94 days from sowing. Average height 2.6 ft. Straw medium; 42 lbs. to bushel

of grain: leaves of medium width. Heads open, average length 7 in.; pedicels medium length, spikelet 2-seeded, in rare cases 3-seeded, frequently awned.

*Yield per acre* 21.4 bu. Grain yellowish-white, medium to long, moderately plump; 35 per cent. husk; 14.46 per cent. light oats. Weight to struck bushel 33½ lbs. Identical with Welcome.

JAPAN (Barnard).—Stools very sparingly. Headed in 81 days and ripe in 100 days from sowing. Average height 2.9 ft. Straw medium; 81 lbs. to bushel of grain; leaves medium to broad. Heads closed, average length 8.5 in.; pedicels mostly on one side and short, 2 grains in a spikelet, occasionally awned.

*Yield per acre* 28.6 bu. Grain yellowish-white, medium length, tapering but moderately plump; 37 per cent. husk; 20.24 per cent. light oats. Weight per struck bushel 35½ lbs. Identical with Russian White and Yankee Prolific.

KANSAS HYBRID (Ohio).—Stools sparingly. Headed in 79 days and ripe in 100 days from sowing. Average height 2.7 ft. Straw medium to fine; 54 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 10 in.; pedicels medium length, 2 grains in a spikelet, occasionally awned.

*Yield per acre* 35 bu. Grain yellowish-white, long, tapering; 32 per cent. husk; 16.27 per cent. light oats. Weight per struck bushel 33 lbs.

MONARCH (Ohio).—Stools well. Headed in 71 days and ripe in 92 days from sowing. Average height 2.2 feet. Straw medium; 38 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 6.8 in.; pedicels medium to short, 2 grains in a spikelet, very rarely awned, from 1 to 3 fine hairs occasionally found at base of kernel.

*Yield per acre* 28.3 bu. Grain light brown to brownish-black, medium length, and tapering. Weight per struck bushel 38 lbs.

NEW BRUNSWICK (India). Stools well. Headed in 77 days and ripe in 92 days from seeding. Average height 2.4 ft. Straw medium to fine; 43 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 7.4 in.; pedicels medium length. base of grain generally capped with fine hairs, frequently awned, 2 grains to a spikelet.

*Yield per acre* 23.1 bu. Grain yellowish-white, medium length, tapering; 30 per cent. husk. Weight per struck bushel 32 lbs.

NEW DAKOTA GRAY (N. B. & G. Co.). Stools sparingly. Headed in 35 days and ripe in 99 days from sowing. Average height 2.2 ft. Straw coarse; 65 lbs. to bushel of grain; leaves broad. Heads closed, average length 7.3 in.; pedicels short, 2 grains in a spikelet, the larger one frequently enveloping the smaller, often awned.

*Yield per acre* 16.9 bu. Grain light brown to black, medium length, tapering; 40 per cent. husk; 36 per cent. light oats. Weight per struck bushel 33 lbs.

NEW SENECA CHIEF (Moorehouse & Cobb). Stools sparingly. Headed in 76 days and ripe in 97 days from sowing. Average height 2.3 ft. Straw medium to coarse; 33 lbs. to bushel of grain; leaves medium. Heads open, average length 6.4 in.; pedicels medium to long, 2 grains in a spikelet, base of kernel often hair-capped, frequently awned.

*Yield per acre* 28.1 bu. Grain yellowish-white, medium length, moderately plump; 35 per cent. husk; 21.67 per cent. light oats. Weight per struck bushel 36 lbs.

NEW SWEDISH (Price and Reed).—Stools sparingly. Headed in 82 days and ripe in 99 days from sowing. Average height 2.7 ft. Straw coarse; 45 lbs. to bushel of grain; leaves broad. Heads appear nearly closed, average length 7.2 in.; pedicels short, 2 grains in a spikelet, with fine hairs at base of grain, rarely awned.

*Yield per acre* 25.8 bu. Grain white, with yellow tinge, short and plump; 38 per cent. husk; 12.82 per cent. light oats. Weight per struck bushel 39 lbs.

NORTHWESTERN WHITE (McCullough).—Stools well. Headed in 79 days and ripe in 97 days from sowing. Average height 2.3 ft. Straw medium to coarse; 30 lbs. to bushel of grain; leaves narrow. Heads open, average length 7 in.; pedicels medium length, 2 grains in a spikelet, with fine hairs at base of kernel, occasionally awned.

*Yield per acre* 27.9 bu. Grain light yellowish-white, medium length and tapering; 30 per cent. husk; 17.08 per cent. light oats. Weight per struck bushel 34 lbs.

ONEGA (Ont. Exp. Farm).—Stools sparingly. Headed in 79 days and ripe in 94 days from sowing. Average height 2.4 ft. Straw fine; 67 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 7 in.; pedicels medium to long, 2 grains in a spikelet, base of grain hair-capped, larger grain awned.

*Yield per acre* 20.3 bu. Grain yellowish-white, slight red tint, medium size, tapering, but moderately plump; 38 per cent. husk; 22.91 per cent. light oats. Weight of struck bushel 31 lbs.

PEDIGREE RED RUST PROOF (College).—Stools profusely. Headed in 72 days and ripe in 94 days from sowing. Average height 2.3 ft. Straw medium to fine; 37 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 7.5 in.; pedicels medium to long, 2 and very rarely 3 grains in a spikelet, the larger grain occasionally awned.

*Yield per acre* 45.9 bu. Grain red, medium size, tapering and moderately plump, base hairy capped; 28 per cent. husk; 16.47 per cent. light oats. Weight per struck bushel 35 lbs. Identical with Red Georgia and Red Rust Proof.

PRINCE EDWARD'S ISLAND BLACK (Thorburn).—Stools sparingly. Headed in 87 days and ripe in 101 days from sowing. Average height 2.4 ft. Straw coarse; leaves medium to broad. Heads nearly closed, average length 7 in.; pedicels medium to short, 2 grains in a spikelet, the larger one generally awned.

*Yield per acre* 23.5 bu. Grain yellowish-brown, short to medium, tapering but moderately plump; 38 per cent. husk; 18.75 per cent. light oats. Weight per struck bushel 35 lbs.

PRINGLE'S AMERICAN TRIUMPH (Henderson & Co.)—Stools moderately. Headed in 75 days and ripe in 98 days from sowing. Average height 3.3 ft. Straw coarse, dense, heavy foliage; 216 lbs. to bushel of grain; leaves broad. Heads open, average length 6 in.; pedicels long, 1 and rarely 2 grains in a spikelet, frequently awned.

*Yield per acre* 21.3 bu. Grain yellowish white, medium, plump; 47 per cent. husk; 38.09 per cent. light oats. Weight per struck bushel 30 lbs.

PRINGLE'S PROGRESS (Maule).—Stools well. Headed in 71 days and ripe in 90 days from sowing. Average height 2.8 ft. Straw medium to coarse, 42 lbs. to bushel of grain; leaves medium to fine. Open heads, average length 8 in.; pedicels medium length, 2 grains in a spikelet, frequently awned.

*Yield per acre* 30.1 bu. Grain yellowish-white, long, moderately plump; 35 per cent. husk; 21.23 per cent. light oats. Weight per struck bushel 34 lbs.

PRIZE CLUSTER (Bouk).—Stools lightly. Headed in 78 days and ripe in 94 days after sowing. Average height 2.1 ft. Straw coarse, leaves broad; 52 lbs. straw to bushel of grain. Heads open, average length 7.4 in.; 2 grains in a spikelet, grains frequently awned.

*Yield per acre* 23.7 bu. Grain yellowish-white; heavy, medium length, moderately plump with 35 percent. husk; 6.42 percent. of crop light oats. Weight of struck bushel 38 lbs. Identical with Welcome.

PROBSTEIR (Henderson & Co.).—Stools well. Headed in 72 days and ripe in 91 days from sowing. Average height 3.2 ft. Straw coarse; 55 lbs. to bushel of grain; leaves broad. Heads open, average length 9 in.; pedicels medium length, 2 grains in a spikelet, frequently awned, base very rarely hair-capped.

*Yield per acre* 45 bu. Grain yellowish-white, medium, moderately plump, tapering; 32 per cent. of husk; 9.60 per cent. light oats. Weight per struck bushel 33 lbs.

PROLIFIC SIDE (Wilson).—Stools moderately. Headed in 79 days and ripe in 99 days from seeding. Average height 28 ft. Straw coarse; 60 lbs. to bushel of grain; leaves medium. Heads partially or nearly closed, average length 8 in.; pedicels me-

*Yield per acre* 23.8 bu. Grain yellowish-white, medium, tapering, but moderately plump; 37 per cent. husk; 33.33 per cent. light oats. Weight per struck bushel 33 lbs.

RACE HORSE (N. B. & G. Co.).—Stools lightly. Headed in 81 days and ripe in 100 days after sowing. Average height 2.5 ft. Straw coarse; leaves broad; 49 lbs. straw to bushel of grain. Heads open, average length 8 in.; pedicels medium length, 2 grains in a spikelet, the larger grain usually awned.

*Yield per acre* 25.5 bu. Grain yellowish-white with light-brown apex, long, slender, and light weight, with 45 per cent. husk; 24.32 per cent. of crop light oats. Weight of struck bushel 31 lbs. Identical with Welcome.

RED GEORGIA (Barteldes & Co.).—Stools profusely. Headed in 72 days and ripe in 94 days from sowing. Average height 2.3 ft. Straw fine; 29 lbs. to bushel of grain; leaves very narrow. Heads open, average length 7.1 in.; pedicels medium to long, 2 grains in a spikelet, one and frequently both awned.

*Yield per acre* 45 bu. Grain red, medium to long, tapering and moderately plump; 28 per cent. husk; 17.81 per cent. light oats. Weight per struck bushel 38 lbs. Identical with Red Rust Proof and Pedigree Red Rust Proof.

RED RUST PROOF (Barteldes & Co.).—Stools prolifically, early foliage abundant and spreading. Headed out in 72 days and ripe in 94 days after sowing. Average height 2 ft. Straw medium to fine; leaves narrow. fine; 41 lbs. straw to bushel of grain. Heads open, average length 6.5 in.; 2 grains in a spikelet, one and usually both awned.

*Yield per acre* 35 5 bu. Grain light-red, occasionally brown, long, slender, and fairly plump, with 30 per cent. husk; 11.16 per cent. of crop light oats. Weight of struck bushel 39 lbs. Same as Pedigree Red Rust Proof, Red Winter, and Red Georgia.

RED WINTER (College).—Stools profusely. Headed in 72 days and ripe in 94 days from sowing. Average height 2.3 ft. Straw fine; 63 lbs. to bushel of grain; leaves narrow. Heads open, average length 6.5 in.; pedicels long, 2 grains in a spikelet, rarely awned, but with base hairy-capped.

*Yield per acre* 27 bu. Grain red with many black grains, medium size, tapering, but moderately plump; 32 per cent. husk; 35.64 per cent. light oats. Weight per struck bushel 37 lbs. Identical with Red Rust Proof,

RENNIE'S PRIZE WHITE (Rennie).—Stools moderately. Headed in 75 days and ripe in 90 days. Average height 3.2 ft. Straw medium to coarse; 48 lbs. to bushel of grain; leaves narrow. Heads open, average length 9.4 in.; pedicels medium to long, 1 grain, rarely 2 grains in a spikelet, hair-capped at base, rarely awned.

*Yield per acre* 30.1 bu. Grain yellowish-white, short and plump; 38 per cent.

husk; 9.89 per cent. light oats. Weight per struck bushel 42 lbs. Identical with Welcome.

ROYAL VICTORIA (Vandercook).—Stools sparingly. Headed in 77 days and ripe in 94 days from sowing. Average height 2.6 ft. Straw coarse; 48 lbs. to bushel of grain; leaves broad. Heads open, average length 8.5 in.; pedicels medium to long, 1 and occasionally 2 grains in a spikelet, often the base hairy-capped, but rarely awned, the larger grain then bearing the awn.

*Yield per acre* 31.1 bu. Grain yellowish-white, short, plump; 33 per cent. husk; 7.14 per cent. light oats. Weight per struck bushel 41.5 lbs. Identical with Victoria Prize White and White Victoria.

RUSSIAN WHITE (Landreth).—Stools well. Headed in 85 days and ripe in 104 days. Average height 2.9 ft. Straw medium; 56 lbs. to bushel of grain; leaves medium to broad. Heads compact and nearly closed, average length 9.5 in.; pedicels short, 2 grains in a spikelet; pedicels largely on one side.

*Yield per acre* 35.3 bu. Grain yellowish-white, medium, and tapering; 31 per cent. husk; 26.15 per cent. light oats. Weight per struck bushel 32 lbs. Identical with Japan and Yankee Prolific.

SCOTTISH CHIEF (Everitt).—Stools well. Headed in 75 days and ripe in 90 days from sowing. Average height 3.1 ft. Straw medium; 48 lbs. to bushel of grain; leaves medium to fine. Heads open, average length 10 in.; pedicels long, 2 and often 1 grain in spikelet, the larger grain sometimes awned.

*Yield per acre* 31.1 bu. Grain yellowish-white, short to medium, plump; 33 per cent. husk; 10.03 per cent. light oats. Weight per struck bushel 36.5 lbs.

SOUTH CAROLINA BLACK (Colorado).—Stools profusely. Headed in 79 days and ripe in 90 days from seeding. Average height 2 ft. Straw medium to fine; 33 lbs. to bushel of grain; leaves narrow; foliage distinct from any other variety, being a yellowish green during growing season. Heads open, average length 6.5 in.; pedicels long, 2 grains in a spikelet, awnless.

*Yield per acre* 32.5 bu. Grain dark brown to black, medium size, tapering and moderately plump. Grain hulls badly in threshing; 25 per cent. husk; 12.98 per cent. light oats. Weight per struck bushel 37 lbs. Distinct from any other variety raised on College farm.

STATE OF NORTH DAKOTA (Ohio).—Stools profusely. Headed in 73 days and ripe in 91 days from sowing. Average height 3.1 ft. Straw fine; 52 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 9.3 in.; pedicels long, 2 grains in a spikelet, the larger grain rarely awned.

*Yield per acre* 36.9 bu. Grain yellowish-white, medium, abruptly pointed, slender; base of grain hairy-capped; 32 per cent. husk; 16.08 per cent. light oats. Weight per struck bushel 33 lbs.

SURPRISE (Landreth).—Stools well. Headed in 80 days and ripe in 96 days from sowing. Average height 3.4 ft., (tallest variety raised on farm.) Straw medium; 64 lbs. to bushel of grain; leaves medium to broad. Heads open, average length 8.4 in.; pedicels long, 2 grains in a spikelet, occasionally the larger grain is awned.

*Yield per acre* 35.5 bu. Grain yellowish-white, medium, tapering, but moderately plump; 32 per cent. husk; 14.69 per cent. light oats. Weight per struck bushel 32 lbs.

VIC'S AMERICAN BANNER (Bouk).—Stools moderately. Headed in 78 days and ripe in 98 days from sowing. Average height 3 ft. Straw medium to coarse; 52 lbs.

to bushel of grain; leaves medium to broad. Heads open, average length 9.1 in.; pedicels medium to long; 2 grains in a spikelet, the larger grain frequently awned.

*Yield per acre* 38.9 bu. Grain yellowish-white, medium, moderately plump; 32 per cent. husk; 14.68 per cent. light oats. Weight per struck bushel 33½ lbs. Identical with American Banner and Improved American.

VICTORIA PRIZE WHITE (Ont. Exp. Farm).—Stools sparingly. Headed in 77 days and ripe in 90 days. Average height 2.3 ft. Straw medium; 65 lbs. to bushel of grain; leaves medium. Heads open, average length 8 in.; pedicels long, 2 grains in a spikelet, frequently awned, base of grain frequently hairy-capped.

*Yield per acre* 21.5 bu. Grain yellowish-white, medium, plump; 41 per cent. husk; 14.59 per cent. light oats. Weight per struck bushel 38½ lbs. Identical with Royal Victoria, White Victoria.

VIRGINIA WINTER (Landreth).—Stools very profusely, early foliage very profuse and spreading. Headed out in 85 days and ripe in 105 days after sowing. Average height 2.5 ft. Straw slender, leaves narrow; 119 lbs. straw to bushel of grain. Heads open and small, average length 9.8 in.; 2 grains in a spikelet, the larger grain awned.

*Yield per acre*, 1889—15 bu.; 1890—16.4 bu., average 15.7 bu. Grains red, a few brown, long and moderately plump, with 33 per cent. husk; 43.53 per cent. of crop light oats. Weight of struck bushel 35 lbs. Growth very similar to Blue Grazing. Winter, but straw and leaves rather coarser, spikelets larger and fewer; dark-colored grains.

WATERLOO (Ont. Exp. Farm). - Stools profusely. Headed in 78 days and ripe in 90 days from sowing. Average height 2.3 ft. Straw medium to fine; 31 lbs. to bushel of grain; leaves narrow. Heads open, average length 6 in.; pedicels long, 2 grains in a spikelet, larger grain occasionally awned.

*Yield per acre* 31.7 bu. Grain yellowish-white, medium length, tapering and slender, base of grain often-hairy capped; 36 per cent. husk; 34.48 per cent. light oats. Weight per struck bushel 30 lbs.

WELCH (Ohio).—Stools moderately. Headed in 78 days and ripe in 96 days from sowing. Average height 2.4 ft. Straw medium to fine; 40 lbs. to bushel of grain; leaves medium width. Heads open, average length 8.7 in.; pedicels medium to short, 2 grains in a spikelet, larger grain frequently awned.

*Yield per acre* 40.3 bu. Grain yellowish-white, medium size, moderately plump; 35 per cent. husk; 16.10 per cent. light oats. Weight per struck bushel 33 lbs.

WELCOME (Landreth).—Stools lightly. Headed in 78 days and ripe in 94 days from sowing. Average height 2.7 ft. Straw coarse; leaves broad; 65 lbs. straw to bushel of grain. Heads open, average length 9 in.; pedicels long, 1 to 2 grains in a spikelet, grains often awned.

*Yield per acre* 26.1 bu. Grain yellowish-white, short, heavy, and moderately plump; with 40 per cent. husk; light oats 10.66 per cent. Weight of struck bushel 41½lbs.

WHITE AUSTRALIAN (Bond).— Stools well. Headed in 86 days and ripe in 98 days from sowing. Average height 2.5 ft. Straw medium to fine; 39 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 8 in.; pedicels medium to short, generally 2 grains in spikelet, awnless.

*Yield per acre* 25.6 bu. Grain light yellowish-white, medium, tapering; 37 per cent. husk; 26.66 per cent. light oats. Weight per struck bushel 33½ lbs.

WHITE BARLEY (McCullough).— Stools lightly. Headed in 81 days and ripe in

102 days from sowing. Average height 2.8 ft. Straw coarse; 102 lbs. to bushel of grain; leaves broad. Heads open, average length 7.4 in.; pedicels medium length grains occur singly in spikelet and are rarely awned.

*Yield per acre* 21.1 bu. Grain almost white, short, heavy and moderately plump, with 43 per cent. husk; light oats 18.75 per cent. Weight of struck bushel 38 lbs. Similar to Welcome.

WHITE BEDFORD (Farquhar).—Stools moderately. Headed in 77 days and ripe in 90 days from sowing. Average height 3.1 ft. Straw medium; 47 lbs. to bushel of grain; leaves broad. Heads open, average length 8 in.; pedicels long, 1 grain in a spikelet, occasionally 2, rarely awned.

*Yield per acre* 30.3 bu. Grain white, short, plump; 36 per cent. husk; 5.63 per cent. light oats. Weight per struck bushel 42½ lbs. Same as Welcome.

WHITE CALIFORNIA (Ohio).—Stools profusely. Headed in 77 days and ripe in 98 days from sowing. Average height 2.8 ft. Straw medium to fine, 48 lbs. to bushel of grain; leaves narrow, foliage abundant. Heads open, average length 7.3 in.; pedicels long, 2 grains in a spikelet, the larger often enveloping the smaller, and rarely awned.

*Yield per acre* 29.7 bu. Grain yellowish white, medium to long, tapering and slender; 45 per cent. husk; 14.27 per cent. light oats. Weight per struck bushel 33½ lbs.

WHITE CANADA (Thorburn).—Stools well. Headed in 69 days and ripe in 92 days from sowing. Average height 2.7 ft. Straw medium to fine; 33 lbs. to bushel of grain; leaves medium width. Heads open, average length 8 in.; pedicels long, 2 grains in a spikelet, occasionally awned, base sometimes capped with fine, short hairs.

*Yield per acre* 40.8 bu. Grain yellowish-white, medium to short, frequently abruptly pointed, plump; 40 per cent. husk; 25.62 per cent. light oats. Weight per struck bushel 35 lbs.

WHITE SOHONEN (Salzer).—Stools well, Headed in 78 days and ripe in 98 days from sowing. Average height 2.6 ft. Straw medium to fine; 41 lbs. to bushel of grain; leaves narrow, but foliage abundant. Heads open, average length 7 in.; pedicels medium to long, 2 grains in a spikelet, the larger grain frequently awned.

*Yield per acre* 36.2 bu. Grain yellowish-white, medium to long, base very rarely hairy-capped; 32 per cent. husk; 33.87 per cent. light oats. Weight per struck bushel 32 lbs.

WHITE SIDE (McCullough).—Stools profusely. Headed in 80 days and ripe in 96 days from sowing. Average height 2.7 ft. Straw fine; 47 lbs. to bushel of grain; leaves narrow. Heads closed, average length 7.7 in.; pedicels short and on one side, 2 grains to a spikelet, the larger grain rarely awned.

*Yield per acre* 32.6 bu. Grain yellowish-white, medium to long, tapering and plump; 45 per cent. husk; 52.22 per cent. light oats. Weight per struck bushel 36 lbs.

WHITE SWEDE (Barnard).—Stools well. Headed in 79 days and ripe in 96 days from sowing. Average height 2.6 ft. Straw fine; 33 lbs. to bushel of grain; leaves medium to narrow. Heads open, average length 6.9 in.; pedicels medium to long, 2 grains in a spikelet, the larger grain frequently awned.

*Yield per acre* 28.6 bu. Grain white, short to medium, moderately plump; 38 per cent. husk; 26.70 per cent. light oats. Weight per struck bushel 35 lbs.

WHITE VICTORIA (Ohio).—Stools sparingly. Headed in 79 days and ripe in 97 days from sowing. Average height 2.8 ft. Straw medium to coarse; 50 lbs. to

bushel of grain; leaves medium width. Heads open, average length 8.2 in.; pedicels long, 2 grains in a spikelet, occasionally larger grain awned, base of grain often hairy-capped.

*Yield per acre* 39.1 bu. Grain yellowish-white, medium, often abruptly pointed, plump; 35 per cent. husk. Weight per struck bushel 39 lbs. Identical with Royal Victoria and Victoria Prize White.

WHITE WONDER (Salzer).—Stools lightly. Headed in 78 days and ripe in 89 days from sowing. Average height 2.9 ft. Straw coarse; leaves broad; 50 lbs. straw to bushel of grain. Heads open, average length 8.9 in.; pedicels long, 1 to 2 grains in a spikelet, grains frequently awned.

*Yield per acre* 31.7 bu. Grain whitish-yellow, short, plump, and heavy, with 38 per cent, husk. Weight per struck bushel 40 lbs. Identical with Welcome.

WIDE AWAKE (Landreth).—Stools well. Headed in 78 days and ripe in 93 days from sowing. Average height 2.6 ft. Straw medium to fine; 53 lbs. to bushel of grain; leaves medium to coarse. Heads open, average length 7.5 in.; pedicels medium to long, 2 grains in a spikelet, generally awned.

*Yield per acre* 26.9 bu. Grain yellowish-white, medium, tapering, but moderately plump; 36 per cent, husk; 17.07 per cent, light oats. Weight per struck bushel 31 lbs.

WINTER (Johnson & Stokes).—Stools profusely; early foliage very profuse and spreading. Headed out in 86 days and ripe in 105 days after sowing. Average height 2.1 ft. Straw slender; 206 lbs. to bushel of grain; leaves narrow. Heads open, 7.5 in. long, 2 grains in a spikelet, the larger one awned.

*Yield per acre* 6.1 bu. Grains red, long, and moderately plump; 30 per cent. husk; 33 1/3 per cent. of crop light oats. Weight per struck bushel 34 lbs. Identical with Virginia Winter, but seems to be a weaker-growing strain.

YANKEE PROLIFIC (Ohio).—Stools moderately. Headed in 80 days and ripe in 100 days after seeding. Average height 2.8 ft. Straw medium to fine; 52 lbs. to bushel of grain; leaves medium to fine. Heads compact, nearly closed, average length 9.8 in.; pedicels short and mostly on one side, 2 grains in a spikelet.

*Yield per acre* 36.9 bu. Grain yellowish-white, medium, tapering, but moderately plump; 35 per cent. husk; 21.49 per cent. light oats. Weight of struck bushel 35 lbs. Identical with Russian White and Japan.

#### SYNONYMS.

Japan (Barnard), Russian White (Landreth), and Yankee Prolific (O. E. S.) are identical.

American Banner (McCullough), Improved American (College), and Vick's American Banner (Bouk) are identical.

Pedigree Red Rust Proof (College), Red Georgia (Barteldes), Red Rust Proof (Barteldes), and Red Winter (College) are the same. Red Georgia seems to be the purest and best strain.

Badger Queen (Northrup, Braslan & Goodwin Co.), Belgian (Landreth), Canadian Triumph (Rennie), Centennial White (Wilson), Early Poland (Colo. Exp. Sta.), Gold Coin (Mills), Hargett's Seizure (Buist), Henderson's Clydesdale (Henderson), Prize Cluster (Bouk), Race Horse (Northrup, Braslan & Goodwin Co.), Rennie's Prize White (Rennie), Welcome (Landreth), White Barley (McCullough), White Bedford (Farquhar), and White Wonder (Salzer) appear to be the same. The early growth, habits of tillering, character of straw, foliage, head and grain are alike in

all these varieties. The awns on the grains differ slightly, and in the yield of grain per acre there is a wide variation.

Royal Victoria (Vandercook), Victoria Prize White (Ont. Exp. Farm), and White Victoria (Ohio Exp. Sra.) are identical. The mature plants of these three varieties are identical with Badger Queen and Welcome. They differ from these only in the character of their early growth, which seems to be more vigorous than the Welcome, with heavier and darker foliage.

Cream Egyptian (Ont. Exp. Farm), and Egyptian (Rennie) are identical.

DATA CONCERNING VARIETIES OF OATS GROWN ON COLLEGE FARM, 1890.

VARIETIES.	YIELD PER ACRE.		WEIGHT STRUCK BUSHEL.		Per cent. husk in gram.	Per cent. light oats.	Headed, days from sowing.	Ripe, days from sowing.	Height mature plant, feet.	Length head, in.	Seed from —
	(rain, bushels.	Straw, tons.	Seed sown.	Crop raised.							
White Eureka	50.	1.28	...	...	36	...	81	99	2.8	8	Colo. Ex. Sta.
Pedigree Red Rust Proof	45.9	.86	29½	40	28	16.47	72	94	2.3	7.5	College.
Colorado Yellow	45	1.20	...	...	35	...	81	99	2.6	7.4	Colo. Ex. Sta.
Probstair	45	1.25	42	33	32	9.60	72	91	3.2	9	Henderson.
Red Georgia	45	.65	92	38	23	17.81	72	94	2.3	7.1	Barteldes.
Golden Sheaf	43.9	.36	36½	37	26	12.78	76	91	2.3	6.5	Colo. Ex. Sta.
Black Russian	42.2	.66	37½	39	23	9.01	73	94	2.6	8	Plant Seed Co.
White Canada	40.8	.67	32½	35	40	25.62	69	92	2.7	8	Thorburn.
Welch	40.3	.80	32	33	35	16.10	78	96	2.4	8.7	Ohio Ex. Sta.
Brown Winter	39.9	.96	25	37	24	19.62	77	98	2.5	7	College.
White Victoria	39.1	.97	38	39	35	...	79	97	2.8	8.2	Ohio Ex. Sta.
Vick's Am. Banner	38.9	1.02	36	33½	32	14.68	78	98	3	9.1	Bouk.
Black American	38.5	1.08	32	32	28	...	78	98	2.5	7.2	Colo. Ex. Sta.
Belgian	37.8	.89	43	42	30	5.17	78	94	2.7	10.2	Landreth.
Early Lackawanna	37.8	.99	39	40	37	9.17	71	91	3.3	9.5	Maule.
Alexander	37.5	.84	...	...	37	...	79	98	2.5	6.9	Colo. Ex. Sta.
State of North Dakota	36.9	.96	32	33	32	16.08	73	91	3.1	9.3	Ohio Ex. Sta.
Yankee Prolific	36.9	.96	30½	35	35	21.49	80	100	2.8	9.8	Ohio Ex. Sta.
Burt's Extra Early Rust Proof	36.4	.76	30	30½	28	21.33	63	88	2.4	6	College.
White Schonen	36.2	.74	36½	32	32	33.87	78	93	2.6	7	Salzer.
Red Rust Proof	35.5	.73	35	39	30	11.16	72	94	2	6.5	Barteldes.
Surprise	35.5	1.13	37½	32	32	14.69	80	96	3.4	8.4	Landreth.
Russian White	35.3	.98	35	32	31	26.15	85	104	2.9	9.5	Landreth.
Belgio-Russian	35	.88	...	...	36	...	80	97	2.4	7.1	Colo. Ex. Sta.
Kansas Hybrid	35	.94	30	33	32	16.27	79	100	2.7	10	Ohio Ex. Sta.
Board of Trade	34.3	.95	35	36	27	10.95	80	100	2.8	7.2	Colo. Ex. Sta.
White Side	32.6	.77	40	36	45	52.22	80	96	2.7	7.7	McCullough.
South Carolina Black	32.5	.58	36½	37	25	12.98	79	90	2	6.5	Colo. Ex. Sta.
Colonel	32.2	.81	32	34	33	30.81	80	98	2.9	7.5	Ohio Ex. Sta.
Waterloo	31.7	.49	...	30	36	34.48	78	90	2.3	6	Ont. Ex. Farm.
White Wonder	31.7	.80	40	40	38	11.76	78	89	2.9	8.5	Salzer.

DATA CONCERNING VARIETIES OF OATS—CONTINUED.

VARIETIES.	YIELD PER ACRE.		WEIGHT STRUCK BUSHEL.		Per cent. husk in grain.	Per cent. light oats.	Headed, days from sowing.	Ripe, days from sowing.	Height mature plant, feet.	Length head, in.	Seed from —
	Grain, bushels.	Straw, tons.	Seed sown.	Crop raised.							
Royal Victoria.....	31.1	.75	40	41½	33	7.14	77	94	2.6	8.5	Vandercook.
Scottish Chief.....	31.1	.75	34	36½	33	10.03	75	90	3.1	10	Everitt.
White Bedford.....	30.3	.71	42½	39	36	5.63	77	90	3.1	8	Farquhar.
Pringle's Progress....	30.1	.64	31½	34	35	21.23	71	90	2.8	8	Maule.
Rennie's Prize White..	30.1	.72	44½	42	38	9.89	75	90	3.2	9.4	Rennie.
White California.....	29.7	.72	33	33½	45	14.27	77	93	2.8	7.3	Ohio Ex. Sta.
Japan.....	28.6	1.16	37	35½	37	20.24	81	100	2.9	8.5	Barnard.
White Swede.....	28.6	.47	32½	35	38	26.70	79	96	2.6	6.9	Barnard.
American Banner....	28.5	.70	35	31	43	21.43	81	98	2.4	6.5	McCullough.
American Beauty.....	28.5	.84	25½	33½	30	15.89	81	100	2.5	7.5	Dreer.
Monarch.....	28.3	.54	31	38	30	6.02	71	92	2.2	6.8	Ohio Ex. Sta.
New Seneca Chief ...	28.1	.47	37	36	35	21.67	76	97	2.3	6.4	{ Morehouse & Cobb.
Badger Queen.....	27.9	.84	45½	41½	38	3.30	77	94	2.9	10	N. B. & G. Co.
Cream Egyptian.....	27.9	.75	....	33	36	10.42	80	93	2.7	7.5	Ont. Ex. Farm.
Northwestern White..	27.9	.42	35½	34	30	17.08	79	97	2.3	7	McCullough.
Red Winter.....	27	.86	32	37	32	35.64	72	94	2.3	6.5	College.
Baltic.....	26.9	.89	42	37	31	9.46	84	102	2.9	8	{ Johnson & Stokes.
Early Poland.....	26.9	.64	41	41½	35	1.47	74	91	2.9	9	Colo. Ex. Sta.
Wide Awake.....	26.9	.71	39	31	36	17.07	78	93	2.6	7.5	Landreth.
Centennial White....	26.6	.61	29½	38	37	7.32	78	98	2.5	9	Wilson.
Welcome.....	26.1	.65	42½	41½	40	10.66	78	94	2.7	9	Landreth.
New Swedish.....	25.8	.61	42	39	38	12.82	82	99	2.7	7.2	Price & Reed.
White Australian....	25.6	.51	34½	33½	37	26.66	86	98	2.5	8	Bond.
Race Horse.....	25.5	.63	35½	31	45	24.32	81	100	2.5	8	N. B. & G. Co.
Canadian Triumph...	24.2	.61	48	40½	38	9.35	79	98	2.8	8	Rennie.
Flying Scotchman...	24.1	.68	....	35	40	16.40	77	91	2.4	6	Ont. Ex. Farm.
Prolific Side.....	23.8	.72	28½	33	37	33.33	79	99	2.8	8	Wilson.
Prize Cluster.....	23.7	.62	38	38	35	6.42	78	94	2.1	7.4	Bouk.
Dakota Northern....	23.7	.55	45	40	35	5.77	78	91	3	11.5	Barnard.
Prince Edward's Isl'd } Black.....	23.5	.50	41	35	38	18.75	87	101	2.4	7	Thorburn.
New Brunswick.....	23.1	.50	29½	32	30	....	77	92	2.4	7.4	Ind. Ex. Sta.

DATA CONCERNING VARIETIES OF OATS—CONCLUDED.

VARIETIES.	YIELD PER ACRE.		WEIGHT STRUCK BUSHEL.		Per cent. husk in grain.	Per cent. light oats.	Headed days from sowing.	Ripe days from sowing.	Length mature plant, feet.	Length head, in.	Seed from—
	(rain bushels.	straw, tons.	Seed raised.	(top raised.							
Victoria Prize White..	21.5	.69	....	38½	41	14.59	77	90	2.3	8	Ont. Ex. Farm.
Improved American .	21.4	.45	25	33½	35	14.46	80	94	2.6	7	College.
Pringle's Am. Triumph.	21.3	2.31	31½	30	47	38.09	75	98	3.3	6	Henderson.
White Barley.....	21.1	1.08	41	38	43	18.75	81	102	2.8	7.4	McCullough.
Gold Coin.....	20.8	.56	28	35	40	10.12	82	101	2.4	7.5	Mills.
Egyptian.....	20.6	.49	44	37	39	16.16	81	96	2.5	7	Rennie.
Hargett's Seizure. ...	20.3	.47	40	40	40	8.54	76	91	2.5	7	Buist.
Onega.....	20.3	.68	....	31	38	22.91	79	94	2.4	7	Ont. Ex. Farm.
Early Yellow.....	20	1.04	....	....	42	....	92	110	1.9	6.5	Colo. Ex. Sta.
Hend's'n's Clydesdale	19.7	.63	48	35	38	22.61	72	83	3	10	Henderson.
Giant French.....	19.4	.36	30	30	35	....	85	101	2.3	8.2	Vaughan.
Black Prolific.....	18.3	1.07	37	32	40	32.00	87	104	2.6	7	Salzer.
Early Blossom.....	17.5	.65	...	33	35	21.62	81	98	2.3	7.4	Ont. Ex. Farm.
Blue Grazing Winter.	16.9	.95	23½	33	22	23.91	91	108	2.4	7.8	College.
New Dakota Gray....	16.9	.55	27	33	40	36.00	85	99	2.2	7.3	N. B. & G. Co.
Virginia Winter..	16.4	.98	39	35	33	43.53	85	105	2.5	9.8	Landreth.
Early Scotch.....	15.9	.89	37	38	41	22.37	80	94	2.5	7.3	Marsh.
Golden Giant Side. .	14.1	.20	27	32	30	22.58	85	101	2.7	9.5	Burpee.
Black Tartarian.....	8.9	.57	39	33	48	22.81	78	93	2.4	8	Henderson.
Winter.....	6.1	.63	38½	34	30	33.33	86	105	2.1	7.5	{ Johnson & Stokes.
Black Swiss.....	5.8	1.57	39½	27	40	42.31	93	110	2.6	7.9	Colo. Ex. Sta.
Early Angus .....	5.3	.64	39½	32	41	33.33	89	105	3.1	11	Colo. Ex. Sta.
Hopetown. ....	4.7	.37	44	33	35	30.00	82	98	2.2	8.5	Henderson.

Seed received from the following sources, as indicated in the table:

- |  |   |
|--|---|
| W. W. Barnard & Co, Chicago, Ill.                | J. M. McCullough's Sons, Cincinnati, O.             |
| F. Barteldes & Co., Lawrence, Kas.               | F. B. Mills, Thorn Hill, N. Y.                      |
| C. S. Bond, Worthington, Minn.                   | Morehouse & Cobb, Rochester, N. Y.                  |
| Jas. W. Bouk, Greenwood, Neb.                    | Northrup, Braslan & Goodwin Co., Minneapolis, Minn. |
| Robert Burst, jr., Philadelphia, Pa.             | Ohio Experiment Station, Columbus, O.               |
| W. Atlee Burpee & Co., Philadelphia, Pa.         | Ontario Experiment Farm, Ottawa, Canada.            |
| Colorado Experiment Station, Fort Collins, Colo. | Plant Seed Co., St. Louis, Mo.                      |
| College, Kansas Experiment Station.              | Price & Reed, Albany, N. Y.                         |
| Henry A. Dreer, Philadelphia, Pa.                | Wm. Rennie, Toronto, Canada.                        |
| J. A. Everitt & Co., Indianapolis, Ind.          | John A. Salzer, LaCrosse, Wis.                      |
| R and J. Farquhar & Co., Boston, Mass.           | J. M. Thorburn & Co., New York.                     |
| Indiana Experiment Station, Lafayette, Ind.      | J. D. Vandercook, Austin, Ill.                      |
| Peter Henderson & Co., New York.                 | J. C. Vaughan, Chicago, Ill.                        |
| Johnson & Stokes, Philadelphia, Pa.              | Samuel Wilson, Mechanicsville, Pa.                  |
| David Landreth & Sons, Philadelphia, Pa.         |   |
| Wm. Henry Maule, Philadelphia, Pa.               |   |