EXPERIMENT STATION

OF THE

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DEPARTMENT OF AGRICULTURE.

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EXPERIMENTS WITH OATS—1891.

The season has again been unfavorable to the oat crop. In 1890 we had to report a short crop on account of a lack of rain. In 1891 the crop is again unsatisfactory, but from the opposite cause, namely, too much rain. The yield was, indeed, considerably better than that of the preceding year, but from the stand-point of the experimenter, the frequent and heavy rainfalls made the conditions unfavorable for the best results. The storms which occurred during the growing season caused many of the plats to lodge, the growth of straw being heavy, as there was at no time any lack of moisture, and as a consequence the grain did not fill out as it should have done. But it was especially during harvest that the crop suffered from the wet. Having no storage room in which to keep so many plats separate from each other, we were obliged to thresh them as taken from the field; and the many and hard rains which occurred during July and August delayed the threshing, and necessitated the handling of the sheaves in order to dry them, which in turn caused a loss of grain, even with the most careful handling. Not a few plats were rejected from the experiments altogether owing to causes of this nature, all of which, of course, goes to vitiate the final results. There was, however, a certain uniformity in these unfavor-

able conditions, so that they affected most of the experiments alike, and therefore probably did not alter the comparability of results to any serious extent. With this brief preliminary explanation, the results are submitted.

The line of experiments is essentially the same as that of last year, and reported in Bulletin NO. 13, though somewhat more extended this year. Unless otherwise noticed, each experiment is repeated on five plats, and no two plats under the same experiment are placed side by side. They are all so arranged that those which are compared together are placed under the same conditions as regards slope, character of soil, and other contingencies. In all cases the conclusions are based upon the average result of all plats under similar treatment. The plats are in most cases one-twentieth of an acre in extent; they are laid out with accuracy, and defined by a stake driven at each corner. Plats in the same series are separated by alleys two feet wide, and adjoining series are separated by a drive-way 12 feet wide, which is cropped in the same grain as the plats. The seed is in every instance weighed out to each plat separately, and care is taken to have the work done in the same manner; and, in short, to have all the conditions alike, except in the one particular, the influence of which is sought to be learned.

The following experiments were undertaken:

I. OATS ON FALL-PLOWED, SPRING PLOWED AND NOT PLOWED LAND.

II. METHODS OF SEEDING.

- (a) *Broadcast and rolled.*
- (b) *Broadcast not not rolled.*
- (c) *Shoe drill with press wheels.*
- (d) *Shoe drill without press wheels.*
- (e) *Hoe drill with press wheels.*
- (f) *Hoe drill without press wheels.*
- (g) *Cross-drilled.*
- (h) *Roller drill.*
- (i) *Listed.*
- (j) *Disc harrow.*
- (k) *Plowed under.*
- (I) *Drilled one-half, broadcast one-half.*

III. GRADING OATS FOR SEED.

IV. VARIETIES OF OATS FOR HAY.

V. SINGLE VARIETY *vs.* A MIXTURE OF VARIETIES.

VI. SEED FROM OATS CUT AT DIFFERENT STAGES OF MATURITY.

VII. QUANTITY OF OATS TO SOW PER ACRE.

VIII. TIME TO HARVEST OATS.

IX. SALT ON OATS AS A FERTILIZER.

X. TREATING OATS WITH HOT WATER FOR SMUT

XI. TEST OF VARIETIES.

I. FALL-PLOWED, SPRING PLOWED AND NOT-PLOWED LAND.

Five plats of each of the above methods of treatment, or 15 plats in all, were devoted to this experiment. The fall-plowed plats were plowed October 29, 1890, the spring-plowed ones on April 7th following. The land was corn in 1890. All plats were harrowed with the smoothing harrow before they were seeded. They were seeded April 7th with Pedigree Red Rust-Proof oats raised on the farm in the previous year, at the rate of four pounds per plat, or 2½ bushels per acre. All plats were seeded with shoe drill with press wheels. By the 20th of April it became apparent that the oats on the plats not plowed had not germinated well. There were many hard spots, where the stand was thin; nor were the plants on these plats as thrifty as those on the fall- and spring-plowed plats. By May 23d this difference became still more noticeable. The oats on the unplowed plats were short, stunted, and yellow, whereas those on all the plowed plats were green, vigorous, and of good height.

This difference is attributed in large measure to the fact that the unplowed land was not so well drained as the plowed land, and the uncommon rainfall rendered the former too wet and cold. The results were, as might have been anticipated under the circumstances, not in favor of the unplowed land.

The averages of the five plats of each group are as follows, in yields per acre:

	Bushels.	*Tons straw.*
Fall-plowed land	59.47	1.48
Spring-plowed land	67.81	1.55
Not-plowed land	52.72	1.45

In 1890, a test of seeding on plowed and unplowed land gave results which slightly favored the unplowed land. These contrary results may possibly be owing to differences in the seasons. The season of 1890 was very dry, and the plowed land lost moisture more rapidly than the land not plowed, with the result that the oats on the latter were better supplied with moisture and yielded better. It proves how difficult it is to adapt the operations to suit the season.

II. METHODS OF SEEDING.

Sixty plats were devoted to these experiments, and the oats put into the soil in 12 different ways. The following figures show the average of each group of five plats in bushels of grain and tons of straw per acre:

Methods.	Bushels.	Tons straw.
(*a*) Broadcast and rolled	50.96	1.39
(*b*) Broadcast and not rolled	43.56	1.35
In favor of roller	7.40	.04
(*c*) Shoe drill with press wheels	51.73	1.35
(*d*) Shoe drill without press wheels	50.64	1.37
In favor of press wheels	1.09	.02
(*e*) Hoe drill with press wheels	49.47	1.58
(*f*) Hoe drill without press wheels	45.99	1.25
In favor of press wheels	3.48	.33
(*g*) Cross-drilled, hoe drill	48.45	1.45
(*h*) Drilled with roller drill	43.84	1.07
(*i*) Listed	33.90	.86
(*j*) Broadcasted, covered with disc harrow	50.99	1.36
(*k*) Broadcasted, plowed under	40.75	1.26
(*l*) Drilled one-half, broadcast one-half	49.43	1.33

Groups *e, f, h* and *i* were sown March 23, and all the remaining groups one week later, March 30 and 31. All plats were seeded at the rate of 2½ bushels per acre, except the listed plats, which received one-fourth less seed, to avoid crowding the plants in the rows.

Some of the methods require a little explanation. The cross-drilled plats had half the seed drilled in one way and the other half the other way, the object being by this means to distribute the seed better and not crowd the plants so much in the drill.

The roller drill is the same implement mentioned in Bulletins Nos. 13 and 20. Its use did not excel other methods of seeding in yield this year, as was the case the year before with both oats and wheat.

The listed oats were put in with a home-made lister, also described in previous Bulletins. Small listing plows are fitted to every other hoe on a small drill, the intervening hoes being removed. Thus arranged, this "lister" drops the seed in small furrows, 14 inches apart and about six inches deep. As might have been expected, this method of seeding did not, in this wet season, produce as good yields as surface seeding. Listing of small grain would seem to be advantageous only in dry seasons, when surface crops suffer from the absence of moisture. In this instance the water stood in the lister furrows, on several occasions, to the evident injury of the crop.

No explanation is needed for groups *j* and *k*, which were broadcasted, and seed covered with the disc harrow and plowed under, respectively.

In group *l* half the seed was sown broadcast over the plats, and the other half was drilled in. The method has nothing to recommend it.

III. GRADING THE SEED OATS.

In 1890 we obtained a very marked increase in the yield by grading the seed oats. Three grades were made. One, designated "common" grade, consisted of the oats as they came from the thresher, in which condition they are ordinarily used by farmers. This grade was run through the fanning mill, and separated into "light" and "heavy" grades. The "light" grade consisted of the small oats and the lighter seeds blown out by the fan, the "heavy" grade being the heaviest and plumpest kernels which the screens could separate from the quantity run through.

Thus graded, the yield in 1890 gave the following result:

	Bushels per acre
Light seed	21.6
Common seed	24.0
Heavy seed	30.0

The same experiment was repeated last year on a larger scale than the year before, but for some reason with very different results. The average of all plats seeded with the three grades of seed in 1891 were as follows:

	Bushels per acre
Light seed	50.63
Common seed	45.27
Heavy seed	46.44

Viewed in the light of the previous season's experience, this result is, to say the least, anomalous. It apparently puts a premium on the light seed. It is however susceptible of a different interpretation, which, whether or not it is the correct view of the case, will account for the difference in the yields. As already stated, the seed was weighed out to each plat in equal amounts. Of the small and light seed, there must consequently be a greater number of kernels to a given weight than of the larger and heavier seed. Taking this fact in connection with the character of the two seasons, some light is thrown on the yield. The year 1890 was so dry that the entire crop was stunted. Under such conditions the lightest and feeblest kernels would naturally go under first, and either fail altogether to germinate, or at best make but feeble plants and a light crop. The past season furnished, on the contrary, an abundance of moisture. It is safe to assume that the failures to germinate even among the very light kernels were but few, and, once started, plants from the light seed, in common with those from the heavier grades, had every opportunity to make a good growth, which they did. The explanation of the better yield from the light seed then lies in the simple fact that there were more plants to the plat than of the heavier grades. This, too, argues that in experiments of this kind it would be more accurate to measure the seed than to weigh it.

IV. VARIETIES OF OATS FOR HAY.

Several varieties were tested with a view to learn their relative value for hay. These varieties, with the exception of the Belgian, were selected be-

cause they tiller profusely; and have medium-sized, leafy stalks, qualities which recommend them for this use. The Belgian was selected as a representative of the type of oats having upright growth, with coarse stalks, and which tiller but sparingly. For want of room, only one plat was devoted to each kind, and all plats were sown at the rate of four bushels per acre. They were cut July 1st to 3d, when the most of the seed was in the milk. The results are given in tons of hay per acre in the order of yield:

Varieties.	*Tons per acre.*
Blue-Grazing Winter	4.85
Black Prolific	4.40
Winter	4.16
White California	4.00
Waterloo	3.95
Black Swiss	3.84
Virginia Winter	3.75
South Carolina Black	3.75
White Side	3.55
State of North Dakota	3.55
Black American	3.45
Belgian	3.25
Pedigree Red Rust-Proof	3.10

V. SINGLE VARIETY *vs.* A MIXTURE OF VARIETIES.

For the second time this experiment has been a partial failure. In 1890 it failed on account of the drouth, and the past season the plats were so damaged by the excessive rain that one-third of the whole number had to be thrown out.

The experiment was repeated the past season because, from the results of 1890, there seemed to be sufficient grounds for the correctness of the theory to warrant further trials. This was also true of the same experiment with wheat, where the mixtures yielded much better than single varieties.

The varieties used were Probsteir, Red Rust-Proof, and Black Russian. There were 36 plats seeded, at the usual rate of 2½ bushels per acre. Only 24 of them could be used in the calculation of the yield, and these were much damaged. The results are recorded for what they are worth:

First Mixture.	*Bushels per acre.*
Probsteir yielded	25.49
Red Rust-Proof yielded	33.48
Average	29.48
Probsteir and Red Rust-Proof, mixed, yielded	32.98
In favor of mixture	3.50
Second Mixture.	
Probsteir yielded	25.49
Black Russian yielded	31.14
Average	28.31
Probsteir and Black Russian, mixed, yielded	25.72
Loss by mixture	2.59

Third Mixture.	*Bushels per acre.*
Red Rust-Proof yielded	33.48
Black Russian yielded	31.14
Average	32.31
Red Rust-Proof and Black Russian, mixed, yielded	31.35
Loss by mixture	.96

VI. EFFECTS OF THE DEGREE OF MATURITY OF SEED OATS.

In 1890 a series of oat plats were cut at different stages of ripeness, designated respectively as "dough," "hard dough," and "ripe." Each of these grades of seed was again sown the past season, with a view to ascertain what effect, if any, the degree of maturity of the seed oats had upon the crop. Fifteen plats were devoted to the experiment. The land was fall plowed, harrowed just before seeding, sown broadcast, and covered with disc harrow and rolled.

Two of the plats were so badly damaged by rain that they were thrown out when the crop was threshed and weighed, and all suffered from the same cause.

Here are the yields:

	Bushels per acre.
Seed oats, cut in dough	38.99
Seed oats, cut in hard dough	28.68
Seed oats, cut when ripe	26.66

There was no perceptible difference in the time these grades matured. All plats were harvested July 17th, equally ripe. The above figures would indicate that seed oats should be harvested in the dough for the best results.

VII. QUANTITY OF OATS TO SOW PER ACRE.

The usual custom in this part of the country is to sow two and one-half (2½) bushels of oats to the acre. Whether more or less would be still better, is a much disputed question. Doubtless much depends on the season. As far as the result of the past season's experiment may be taken as a guide, it would seem to be preferable to sow more rather than less. Thirty-six plats were used for this purpose. They had been fall plowed, and on April 7 and 8 were seeded to Red Winter oats, with a shoe drill having press wheels. This experiment was, on the whole, successful, only one plat being thrown out on account of damage by rain.

The amount of seed per acre, and average yield per acre for each series of plats, are as follows:

	Bushels per acre.
1 bushel yielded	31.25
1½ bushels yielded	34.19
2 bushels yielded	43.26
2½ bushels yielded	45.12
3 bushels yielded	44.84
3½ bushels yielded	45.50
4 bushels yielded	46.25

It will be seen that, after the 2½ bushels seed per acre has been reached, the slight increase in yield by thicker seeding does not equal the increase in the seed. In other words, the increase in yield does not cover the outlay for seed. On the other hand, with less seed than 2 1/2 bushels, there is a decided falling-off in the yield. The popular practice can, therefore, not be far out of the way.

VIII. TIME TO HARVEST OATS.

Fifteen plats were used, of which number one was rejected on account of injury by rain. They were seeded to Red Winter oats, sown broadcast, and covered with disc harrow and roller. They were in all respects treated alike until harvest, when the three series were cut in "dough," "hard dough," and "ripe," respectively.

Here are the averages:

	Bushels per acre.
Plats cut in dough yielded	32.50
Plats cut in hard dough yielded	31.25
Plats when ripe yielded	27.73

The rejected plat belonged to the "ripe" series, which may affect the average for that group. The result is the reverse of last year, when there was a slight increase in yield from the dough state until ripeness.

IX. SALT AS A FERTILIZER FOR OATS.

There is a popular notion afloat to the effect that salt is, and of right ought to be, a fertilizer for small grain. Like the ever-blooming question of wheat turning to chess, it comes to the surface ever and anon for fresh discussion. Salt does not contain any of the essential elements of plant food, and therefore cannot be a direct fertilizer to agricultural plants. Occasionally a dressing of salt will, under certain conditions, stimulate a crop indirectly by its action on elements in the soil. It may thus aid in liberating lime and potash, and render these substances available for plant food, but numerous experiments, both in this country and in Europe, have proved that it cannot be depended on to do this. In the majority of cases where farmers use salt as a fertilizer, it exerts apparently no influence at all for or against the growth of the crop; and it proves to be positively injurious about as often as it has beneficial effects. It is well known that it is poisonous to plants when applied beyond certain amounts. Anyone can convince himself of this by noticing how it destroys the grass where brine is emptied, or the freezing mixture emptied from the ice-cream freezer in summer. For this reason salt is often used to kill weeds on pavements where there is not sufficient traffic to keep them down.

In the experiment in question, a series of ten plats were laid out. They were seeded with oats at the rate of 2½ bushels to the acre, sown broadcast, and covered with the disc harrow. Salt was sown on every other plat at the

rate of 150 pounds to the acre, which may be considered a rather light dressing. The result was as follows:

	Bushels per acre.
Salted plats yielded	26.87
Nothing plats	28.62

Here then was a slight loss apparently due to the use of the salt. In the First Annual Report of this Station, Professor Shelton records the use of salt on two wheat plats at the rate of 300 pounds to the acre, which had the result that it increased the crop compared with two adjoining plats not treated to salt. He also applied salt to oats in 1889, with an apparent increase in yield of 2.9 bushels per acre. But he adds: "Even if this increase is to be credited to the salt, which may well be questioned, the transaction was a most unprofitable one, considering the values involved."

X. OATS TREATED WITH HOT WATER TO PREVENT SMUT.

This comparatively new method of treatment for the prevention of smut is not yet so fully understood nor so generally practiced as it should be, and this experiment was undertaken, not indeed to prove that hot water will kill the smut germs on the seed, as that has already been proven, but rather to aid in popularizing the use of this preventive. The subject has already been treated in detail in Bulletins 12, 15, 21 and 22 of this Station, and will not, therefore, be expatiated on here, further than to give an outline of our method of treatment. The seed was immersed for 10 minutes, by the watch, in water having a temperature of 133° F. Immersion for that length of time, at that temperature, has been found to kill the smut without injuring the seed. The water was heated by steam, injected through a pipe which connected with the boiler in the engine-room. A thermometer was constantly kept in the water, so there was no guess-work about the temperature. And this, by the way, requires a reliable thermometer. The ordinary cheap instruments are not to be depended on for this purpose, and should not be used unless they have been compared with a standard instrument and the variation noted. To obtain the best results, it is important to have the right temperature, for it has been found that a lower temperature does not kill all the smut, and the experiments also indicate that if the seed is kept for 10 minutes in water at a higher temperature than 133° F., some of the seed is liable to be injured.

To aid in maintaining the water at a uniform temperature, we use two tubs, standing side by side, both filled with hot water. If only one tub is used, it will be found that the water is cooled several degrees by the immersion of each basket or sack of seed, and it will thus be difficult to maintain a uniform temperature. But by using two tubs, and immersing the seed first in number one for a moment, until the grain is heated to nearly the required temperature, it can be transferred to number two and kept there the required length of time without materially changing the temperature of that tub. By means of a stop-cock on the steam pipe, the steam can

be turned on at any moment, as may be required to maintain the heat of the water.

While steam is a very convenient means of heating the water, it is not at all necessary. An ordinary wash-boiler on a stove will answer every purpose, and a few dipperfuls transferred from the boiler to the tubs, as occasion may demand, will be amply sufficient to keep up the required temperature. For immersion the seed can be placed in any porous receptacle which will freely admit the water. Here at the Station we use for that purpose cylindrical baskets, made of wire gauze secured to an iron frame; but a gunny sack might answer the same purpose, or any basket of wickerwork, the main qualification being that it is open enough not to hinder the passage of water, and still close enough to retain the grain.

After treatment the grain should be dried enough to sow it, and the sooner it gets into the ground the better. By scattering it in a thin layer on the barn floor, or on a loft, or even on a canvas out-of-doors, if the weather is dry, it will soon dry sufficiently to prevent the grains from adhering together and admit of its being sown. Under no circumstances should it be piled up wet and left until it germinates or molds. The loss from smut is very much greater than is usually supposed; and this treatment is so inexpensive, and withal so effective, that there is no excuse for any farmer having smut in his oats. The trouble will be richly rewarded by the increased yield.

Ten plats were devoted to the experiment in question, five of which were sown with Red Winter oats, treated as described above, and the other five sown with the same kind, not treated. A careful count at harvest time revealed the fact that the plats on which the seed had not been treated contained 15 per cent. of smutted heads, while the crop from the treated seed had none.

The crop was as follows:

	Bushels per acre.
Treated seed oats yielded	37.56
Not treated seed oats yielded	29.69
In favor of treatment	7.87

Here, then, is a reward of nearly eight bushels for the trouble of dipping the seed required for one acre in water at a certain temperature for 10 minutes.

On this basis, a farmer who has 100 acres in oats will get an increase in his crop of nearly 800 bushels for the trouble of treating 250 bushels of seed, which can readily be done by a couple of men in two days at an outlay that need not exceed $5 for labor and fuel. Nor is the increase shown in this experiment at all an extreme case. Very often the per cent of smutted heads in a field will reach 20 or even 30 per cent., all of which can be saved.

But aside from the mere prevention of smut, the hot-water treatment appears to act as a stimulant to the crop which is not wholly accounted for. That is, in the majority of cases, the treated seed yields more than the untreated seed does, even though the smutted heads in the latter are replaced by

sound ones. This phenomenon is mentioned by nearly every experimenter in this method. It is so in the present case. If 15 per cent., the amount of smutted heads in the untreated plats, are added to the 29.69 bushels, the rate yielded by these plats, the yield will still be found to fall about 2½ bushels short of the rate of yield on the treated plats. This is a virtue not ascribed to any other fungicide, and is worthy of consideration.

XI. TEST OF VARIETIES.

The list of varieties grown last year, which may be found in the subjoined table, is the same as that described in Bulletin 13 of the previous year. Detailed descriptions may be found there, and are, therefore, not repeated now. It had been hoped that, by repeating the test, a comparison of data with those collected in 1890 would aid in selecting the varieties best suited to this region, but the unfavorable season rendered the test all but worthless. Nearly all varieties were blown down by storms before the grain filled out, and after harvest they all shelled badly in the process of hauling them. The yields are, therefore, of but little value in a comparison of merits. The table explains itself.

VARITIES OF OATS.

VARIETY.	*When headed.*	*Height of plants at time of heading, in feet.*	*When ripe.*	*Length of head, in inches.*	*Yield of plat—grain, in pounds.*	*Stooling—av. number of stalks per plant.*
Badger Queen	June 22	4.2	July 12	9.0	.....	8.50
Belgian	" 22	4.2	" 12	11.0	19½	8.14
Canadian Triumph	" 19	3.7	" 12	10.5	22	7.41
Centennial White	" 19	3.7	" 12	10.0	21½	7. 4
Early Poland	" 22	4.2	" 12	12.0	19	7.05
Gold Coin	" 30	4.3	" 16	10.0	8½	9.48
Hargett's Seizure	" 22	4.0	" 12	10.5	19	7.75
Henderson's Clydesdale	" 19	3.6	" 12	10 5	16	7.88
Prize Cluster	" 19	3.6	" 12	10.0	30½	8.72
Race Horse	" 22	3.7	" 14	9.5	35½	9.40
Rennie's Prize White	" 19	3.7	" 13	10.5	28½	6.62
Welcome (Kas.)	" 19	3.6	" 13	11.0	24	9.14
Welcome (So. Dak.)	" 19	3.6	" 13	11.0	21	7.44
White Barley	" 19	3.7	" 13	11 5	17½	7.47
White Bedford	" 25	3.8	" 13	12.0	15½	7.47
White Wonder	" 19	3.5	" 13	9.5	16	8 79
Royal Victoria	" 22	3.6	" 12	9.5	18	7.43
Victoria Prize White	" 22	3.7	" 12	10.0	41½	7.26
White Victoria (Kas.)	" 20	3.6	" 12	10.5	24½	7.77
White Victoria (So. Dak.)	" 20	3.5	" 12	10.0	31½	7.72
Cream Egyptian	" 25	3.8	" 14	10.0	25½	8.70
Egyptian	" 25	3.8	" 14	9 5	23	9.15
Japan	" 23	3.5	" 14	10.0	26	9 42
Russian White	" 25	3.6	" 18	9.0	40½	8.71
Yankee Prolific	" 19	3.5	" 14	11 0	64½	9.62
American Banner	" 22	3.5	" 13	9.5	68	9 47
Improved American	" 22	3.6	" 13	10 0	45	8.51
Vick's American Banner	" 22	3.6	" 13	9 5	46½	8.33
Pedigree Red Rust-Proof	" 15	3.5	" 14	9.5	45	11.31
Red Georgia	" 13	3.4	" 14	9.0	68	12.25
Red Rust-Proof	" 13	3.5	" 14	9.5	73½	13.76
Red Winter	" 13	3.6	" 14	11 0	58	14 34
American Beauty	" 22	3.7	" 16	10.0	47½	10.04
Baltic	" 23	3.8	" 14	9.5	35½	10.07
Black American	" 19	3.6	" 16	9.5	41	14.34
Black Prolific	" 25	3.8	" 20	10.0	23	6 29
Black Russian (Kas.)	" 15	3.5	" 14	11.0	16	8.62
Black Russian (So. Dak.)	" 19	3.4	" 15	9 0	23	9.58
Black Swiss	" 30	3 8	" 22	8.5	32	10.11
Black Tartarian	" 25	3.8	" 17	9.0	41	6.18

VARIETIES OF OATS—CONCLUDED.

VARIETY.	When headed.	Height of plants at time of heading, in feet.	When ripe.	Length of head, in inches.	Yield of plat—grain, in pounds.	Stooling—av. number of stalks per plant.
Blue Grazing Winter	June 19	3.6	July 17	9.0	43½	18.40
Board of Trade	" 22	3.6	" 14	10 0	81	7.51
Brown Winter	" 19	3.6	" 15	9 0	74	13.33
Burt's Extra Early Rust-Proof	" 1	3.5	" 8	9.0	113	13.09
Colonel	" 22	3 6	" 14	8 0	58½	8.61
Dakota Northern	" 19	3.7	" 12	9 0	41	7.36
Early Angus	" 30	3.9	" 22	11.0	9	11.86
Early Blossom	" 25	3.7	" 17	10.5	18½	6.16
Early Lackawanna	" 19	3.7	" 13	10.0	43	7.19
Early Scotch	" 25	4.0	" 16	11.0	30	11.72
Flying Scotchman	" 20	4.0	" 14	9.5	22	9.11
Giant French	" 30	3.9	" 20	11.0	28	10.43
Golden Giant Side	" 30	3.9	" 20	11.0	33½	9.85
Golden Sheaf (Kas.)	" 22	3.8	" 14	11.0	45½	12.24
Golden Sheaf (Colo.)	" 22	3.8	" 14	9.0	28½	10.77
Hopetown	July 2	3.8	" 17	10.5	8½	10.36
Kansas Hybrid	June 25	4.1	" 14	9.0	43½	11.52
Monarch	" 19	3.7	" 15	10 1	40	11.01
New Brunswick	" 22	4.3	" 14	9.0	30½	9.01
New Dakota Gray	" 25	3.9	" 18	10.0	13	6.61
New Seneca Chief	" 22	3.9	" 17	10.0	43	7.08
New Swedish	" 25	4.0	" 17	10 5	34	6.40
Northwestern White	" 22	3 9	" 14	9.5	44½	9.31
Onega	" 23	3 9	" 15	10.5	46	8.76
Prince Edward's Island Black (Kas.)	" 30	4 0	" 20	9.0	25½	7.06
Prince Edward's Island Black (Ill.)	" 30	4.0	" 20	9.0	28	6.55
Prince Edward's Island Black (Thor.)	" 30	4.0	" 20	9.0	23	6.78
Pringle's American Triumph	" 25	4.1	" 16	9.0	33½	7.38
Pringle's Progress	" 15	3.6	" 15	11.0	75	8.37
Probsteir (Kas.)	" 22	4.0	" 16	9.5	52½	8.45
Probsteir (Ill.)	" 25	4.1	" 16	9.0	34	7.90
Prolific Side	" 25	4.0	" 16	9.0	49	8.27
Scottish Chief	" 22	3.8	" 14	9.5	42	8 46
South Carolina Black	" 15	3.3	" 20	10.5	26	9 29
State of North Dakota	" 22	3.9	" 14	10.5	52½	13.10
Surprise	" 25	3.8	" 15	10.0	34½	11.40
Virginia Winter	" 19	3.6	" 15	11.0	41½	.....
Waterloo	" 19	3.7	" 14	10.0	97½	12.14
Welch	" 23	4.0	" 17	8.5	78½	9.90
White Australian	" 30	4.0	" 22	9.5	59	10.92
White California	" 22	4.1	" 14	10.5	69½	11.45
White Canada (Kas.)	" 15	3.6	" 15	11.0	90	10.42
White Canada (Ill.)	" 25	4.3	" 15	10.0	59½	7.86
White Schonen	" 25	4.0	" 16	10.5	65½	8.87
White Side	" 25	3.9	" 17	10.0	89	9.53
White Swede	" 23	3.9	" 17	11.0	77	7.56
Wide Awake	" 22	4.0	" 16	11.0	86	6.18
Winter	July 3	3.2	" 22	9.5	11	11.95
Alexander	June 25	4.2	" 15	10.0	40	7.38
Belgio-Russian	" 25	4.1	" 16	9.0	31½	7.43
Colorado Yellow	" 25	4.0	" 16	9.0	25	7.87
Early Yellow	July 6	3.2	" 16	9.5	.....	11.30
White Eureka	June 25	4.0	" 16	10.0	.....	8.79

It should be noted that the number of stalks per plant, as recorded in the last column of the table, was obtained as the average figures of a careful count of the stalks found on from 150 to 200 plants, all grown as single plants, with an area for each plant of 64 square inches. This being considerable more than the average space allotted to an oat plant as the crop is ordinarily grown, it may be taken for granted that the plants stooled more than is usual in field culture, though the difference is probably not great. As to the size of the plats devoted to the varieties named in the table, the first six named are 7/100 acre in extent, and the remainder 8/125 acre in area.