

EXPERIMENT STATION
OF THE
KANSAS STATE AGRICULTURAL COLLEGE,
MANHATTAN.

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DEPARTMENT OF AGRICULTURE.

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EXPERIMENTS WITH WHEAT.

THE entire wheat crop on the College farm has been under experiment the past year, as hereinafter detailed. As for several years past, the Zimmerman wheat has been the leading variety, and it has been used in all experiments in which the variety is not otherwise noted. The average yield of this wheat on the plats under the various modes of treatment is 31.84 bushels per acre: but in the plats devoted to comparative tests of varieties it yielded at the rate of 34.65 bushels per acre. The year was a favorable one for the wheat crop. The rainfall was abundant; the winter was mild, so there was practically no winter-killing, and the crop here on the College farm did not suffer seriously from insect pests. Chinch-bugs were conspicuous only by their absence, and though the Hessian fly was found in a few cases in the spring and early summer, it did not do any appreciable damage to the winter wheat; but a few small samples of spring wheat were killed by it. But though the yield was fairly good, it was not so large as it would have been had not the frequent and severe storms during May and June beaten the wheat down. Much of it fell soon after heading out, and in consequence did not fill out as well as it would have done had it remained standing. Other portions stood up till the grain was grown, and did not suffer material loss in yield. As a rule the wheat on the richest ground

gave the poorest yield, because here the straw was more abundant and fell sooner than on poorer soil.

The following lines of experiment were carried out:

- I. METHODS OF SEEDING WHEAT.
- II. EFFECTS OF CHARACTER OF SEED WHEAT.
- III. EFFECT OF TOP DRESSING WHEAT WITH PLASTER, AND OF HARROWING WHEAT IN SPRING.
- IV. SINGLE VARIETIES VS. A MIXTURE OF VARIETIES.
- V. EFFECTS OF PASTURING WHEAT.
- VI. CONTINUOUS WHEAT-GROWING ON THE SAME LAND.
- VII. ROTATION EXPERIMENTS.
- VIII. TEST OF VARIETIES.

In the first-named five lines of these experiments the plats were one-twentieth acre in extent, measuring 33 by 66 feet; and with but few exceptions not less than five plats were subjected to the same treatment, and the conclusions are based on the average yield of the five. Plats thus similarly treated are not placed by the side of each other, but as far as the formation of the land will permit they are placed alongside of and in alternation with the plats whose treatment or non-treatment they are to be compared with. The plats are laid out with chain and compass, and a stake driven at each corner. No two plats touch each other; a space of two feet in width separates them along the sides; and at the ends a turning-row of 12 feet in width separates adjoining series. All plats having the same questions to answer are, as far as possible, placed on ground alike in quality and contour. Owing, however, to the rolling nature of the farm, this principle cannot be strictly adhered to in all cases. There is but trifling variation in regard to fertility on the small areas thus under similar treatment, but the plats cannot always be on absolutely the same level, which, of course, in such cases is a drawback to the work. The land is not stimulated with manure.

This class of experiments, and in fact nearly all field experiments, will yield the most satisfactory results on land that has been moderately and evenly exhausted. The object is not to raise large crops, (if it were it would be an easy matter to produce heavier yields than any here recorded), but to get results which, when compared with each other, shall show the value, or lack of value, of the treatment in question. The farmers of Kansas are blessed with a soil of rare native fertility, in proof of which see the yield of our acre of continuous wheat for eleven years in succession without the use of fertilizers of any kind. With judicious cropping the present generation need not inquire for the price of artificial fertilizers, nor need they, with judicious cropping, to deteriorate the land materially for their children. The acre above mentioned is not, however, to be taken as a sample of judicious cropping. Nor is this the place to explain what is meant by this term, further than to say that it comprehends some system of rotation in conjunction with stock raising, by which the manure made on the farm

is returned to the land. In the opinion of the writer, the field experiments at this Station, which at the present time will give the most practical returns to the farmer, should be planned with a view to show how to make the most out of the present conditions with the materials at hand. The question to be answered is not if this or that fertilizer will give the best returns, but the problem rather stands thus: Given a generous, fertile soil, a precarious rainfall, and (in most cases) limited means with which to operate, how shall I manage my crops to get the best returns for the labor expended? What fodder stuffs and other crops can I grow to best advantage, and what rotations will, all things considered, give me the most profit without deteriorating my land?

Such are some of the questions that are likely to come uppermost in the mind of the cultivator at the present time, and the experiments here recorded have been planned with a view to aid in answering them as far as the growing of wheat is concerned.

I. METHODS OF SEEDING WHEAT.

Experiments were made in the following methods of seeding:

1. *Broadcasted.*
2. *By Shoe drill with press wheels.*
3. *By Shoe drill without press wheels.*
4. *By Hoe drill.*
5. *By Roller drill.*
6. *Listed.*
7. *Cross-drilled.*

Each of these methods was repeated on five plats alternating with each other and so arranged as to eliminate, as far as possible, any error due to inequalities in the soil. The land is a clay loam. It was under experiment in oat-growing in 1890, and has never been manured nor received any other renovating treatment than simple tillage. It was plowed soon after the oats were harvested in 1890 and harrowed at intervals of a couple of weeks until seeding time. All plats were seeded September 16th, at the rate of one and one-quarter bushels per acre, except the listed plats, which were seeded as noted hereafter.

Broadcasted.

| No. of Plat. | Rate of Yield per Acre. | | Weight of struck bushel. |
|---------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 1..... | 27.16 | 1.68 | 62 |
| 8..... | 29.16 | 1.83 | 61 |
| 15..... | 38.33 | 2.10 | 62 |
| 22..... | 40.10 | 3.67 | 60 |
| 29..... | 29.16 | 1.13 | 60 |
| Average | 32.78 | 2.08 | |

The discrepancy in yield of the several plats is largely due to the varying amounts which were down, a condition over which we had no control.

By Shoe Drill with Press Wheels.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 2..... | 32.83 | 1.82 | 62 |
| 9..... | 34.33 | 2.20 | 60 |
| 16..... | 34.00 | 2.73 | 60 |
| 23..... | 31.00 | 2.27 | 60 |
| 30..... | 27.36 | 1.13 | 61 |
| Average..... | 31.90 | 2.03 | |

By Shoe Drill with no Press Wheels.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 3..... | 33.66 | 1.79 | 61 |
| 10..... | 38.00 | 2.76 | 60 |
| 17..... | 33.66 | 2.34 | 61 |
| 24..... | 27.50 | 1.67 | 60 |
| 31..... | 26.33 | 1.61 | 60 |
| Average..... | 31.83 | 2.03 | |

By Hoe Drill.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 4..... | 31.16 | 1.87 | 61 |
| 11..... | 37.00 | 2.59 | 61 |
| 18..... | 34.50 | 2.38 | 62 |
| 25..... | 27.66 | 1.57 | 61 |
| 32..... | 29.00 | 1.73 | 61 |
| Average..... | 31.86 | 2.03 | |

The drill used in these three series was a Richmond Champion fitted both with shoes and hoes, which could be put on and used at pleasure, and likewise press wheels. From the averages it appears that in this wet season and on this heavy soil it made no difference which attachment was used. On a lighter soil it is well known that press wheels have some advantage, and that the shoe drill does not loosen the soil quite as much about the seed

as the hoe drill does. The heavy rains, too, tended to compact the soil, and thus to counteract what slight effect these several modes of seeding might have on the soil.

By Roller Drill.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 5..... | 27.50 | 1.88 | 61 |
| 12..... | 34.66 | 2.11 | 63 |
| 19..... | 39.50 | 2.77 | 63 |
| 26..... | 34.50 | 2.37 | 61 |
| 33..... | 26.66 | 1.70 | 61 |
| Average..... | 32.56 | 2.16 | |

Listed.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 6..... | 31.16 | 1.80 | 61 |
| 13..... | 29.33 | 1.57 | 60 |
| 20..... | 31.16 | 1.52 | 60 |
| 27..... | 28.66 | 1.64 | 61 |
| 34..... | 27.50 | 1.18 | 61 |
| Average..... | 29.36 | 1.54 | |

This result is not in harmony with the experience of last year, when it was found that, the listed ground yielded five bushels more per acre than the drilled ground. Ample explanation of the discrepancy may, however, be found in the season. This year the plants growing in the lister furrows were actually water-logged at times for short periods, while during the drouth of last year the plants in the lister furrows gained an advantage from a better supply of moisture than the drilled wheat had. This year, while the surface-planted wheat had no lack of moisture, the listed wheat had too much. The lister used is the same one described in Bulletin No, 11, of last year. Small lister-plows were made by a blacksmith and fitted to a drill from which every other hoe was removed, leaving the rows fourteen inches apart. At this distance the grain would stand too thick if seeded at the usual rate of one and one-quarter bushels per acre. Plats 6 and 27 were seeded at the rate of three pecks per acre, and plats 13, 20 and 34 at the rate of one bushel per acre.

Cross-Drilled.

| No. of Plat. | Rate of Yield per Acre. | | Weight of stack bushel. |
|--------------|-------------------------|--------------|-------------------------|
| | Grain, bushels. | Straw, tons. | |
| 7..... | 28.83 | 1.94 | 61 |
| 14..... | 37.65 | 2.47 | 62 |
| 21..... | 36.00 | 2.42 | 61 |
| 28..... | 26.66 | 1.40 | 61.5 |
| 35..... | 26.30 | 1.46 | 61 |
| Average..... | 31.09 | 1.94 | |

The grain was seeded with the Richmond Champion drill, half the grain being drilled in in one direction and the other half at right angles to it, at the rate of a bushel and a peck per acre. It is claimed that this method permits of a more perfect distribution of the seed.

Summary of Averages.

| Method of Seeding. | Rate of Yield per Acre. | |
|-------------------------------------|-------------------------|--------------|
| | Grain, bushels. | Straw, tons. |
| Broadcasted..... | 32.79 | 2.08 |
| Shoe drill with press wheel..... | 31.90 | 2.03 |
| Shoe drill with no press wheel..... | 31.83 | 2.03 |
| Hoe drill..... | 31.86 | 2.03 |
| Roller drill..... | 32.56 | 2.16 |
| Listed..... | 29.36 | 1.54 |
| Cross-drilled..... | 31.09 | 1.94 |

The practically identical results from the use of the shoe and hoe drill have already been commented on, and so has the result of listing. The cross-drilled plats average even somewhat less than the plats drilled only one way. While this falling off may be accidental, the result in this case does not warrant the inference that there is any gain by cross-drilling. The stand was uniformly good and even, and the plats were not so badly down as was the case with many others. Broadcasting gave the best yield of all, followed closely by the plats seeded with the roller drill. The broadcasted plats had a good stand, though not so even as the stand on the drilled plats.

It is worthy of note that these same two methods of seeding, namely, the roller drill and broadcasting, gave also the best results in last year's oat experiments. The plats then seeded with the roller drill averaged thirty-three and a half bushels per acre, and the broadcasted twenty-nine and a half (See Bulletin 13, p. 58), while the other methods fell below these. This would indicate that these two old-fashioned methods are, after all, among the best. The roller machine firms the soil in the drill and covers the seed with loose earth by means of a scraper which follows each roller.

II. EFFECTS OF CHARACTER OF SEED.

Eighteen plats were devoted to testing the influence that the quality of the seed has upon the yield, fifteen being seeded with three grades, denominated "light," "common," and "heavy," and three with selected seed as indicated in the table. The plats adjoined the preceding series and were tested in all respects in the same manner. They were seeded September 17, 1890, and harvested June 27-29, 1891.

The "common" seed was the wheat as it came from the thresher, simply cleaned from chaff and straw. It weighed 63 pounds per struck bushel.

The "light" seed was taken from the screenings obtained by running the common seed through the fanning mill and consisted chiefly of small with some shriveled and cracked seed. It weighed 58 1/2 pounds to the struck bushel.

The "heavy" seed consisted of the best grade that could be gotten by running the common seed through the fanning mill. It weighed 64 1/2 lbs. to the struck bushel.

Light Seed.

| No. OF PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 36..... | 29.83 | 1.51 | 61 |
| 39..... | 26.83 | 1.90 | 62 |
| 42..... | 36.50 | 1.36 | 61 |
| 45..... | 38.00 | 2.56 | 61 |
| 48..... | 32.33 | 2.48 | 62 |
| Average..... | 32.69 | 1.96 | |

Common Seed.

| No. OF PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 37..... | 32.00 | 2.24 | 62 |
| 40..... | 30.65 | 1.63 | 61 |
| 43..... | 36.00 | 2.42 | 62 |
| 46..... | 35.66 | 2.13 | 63 |
| 49..... | 34.00 | 2.03 | 62 |
| Average..... | 33.66 | 2.09 | |

Heavy Seed.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 38..... | 32.33 | 2.03 | 61 |
| 41..... | 36.67 | 2.30 | 62 |
| 44..... | 36.67 | 2.60 | 63 |
| 47..... | 34.17 | 2.73 | 61 |
| 50..... | 34.83 | 2.66 | 62 |
| Average..... | 34.93 | 2.46 | |

Seed from Selected Heads.

The heads were selected from the main crop before threshing, the largest and fullest being chosen in all cases. Only seed enough for two plats was thus obtained.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 51..... | 34.50 | 2.22 | 63 |
| 53..... | 34.33 | 2.77 | 61 |
| Average..... | 34.42 | 2.49 | |

Seed Cut in Milk.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 52..... | 26.33 | 1.86 | 61½ |

These figures speak for themselves. Taking the "common" seed as the standard, which may fairly represent the character of the seed usually sown by our farmers, it will be seen that this experiment shows a gain in the yield by the use of better seed, whether obtained by grading it with a fanning mill or by selecting choice heads and taking the seed from them. And on the contrary a loss is entailed by the use of seed cut too early, or light and inferior seed. Had the season been unfavorable to the wheat crop, the differences would doubtless have been much more pronounced. Under the favoring conditions of the present year, the weaker plants from the light seed were stimulated into a good growth to such an extent, in fact, that inspection of the plats before harvest gave no evidence as to which series would give the best returns.

The importance of using good seed was also demonstrated last year in the case of oats, when the heavy seed yielded some six bushels more per acre

than the common seed. It should also be noticed that the crop from the best seed weighs more to the struck bushel than is the case with the crop from the light seed. Although it has not been demonstrated by experiments extending through a sufficiently long series of years, there seems to be no reasonable doubt that a crop raised from select seed will, when used for seed again, if the practice of selection is kept up, maintain the good characters of any given variety of wheat better than inferior or even common seed. Natural laws point in that direction, and it has been shown to be so over and over again in the case of vegetables. If our farmers would use only selected grain for seed year after year, we should hear less about this or that kind "running out," losing prestige, and necessitating a change of seed. It is true there are other factors to consider in the problem of maintaining or of improving the standard of excellence in any given variety of grain. The soil, culture, climate, all influence the result; but whatever the conditions, there are few, if any, farm operations that will give better returns for the labor expended than to select and grade the seed grain with the best of care. The laws of seed-breeding are as inexorable as are the laws of stock-breeding, and all admit that in the operations of the latter "like produces like," and that to improve we must "breed from the best."

III. EFFECT OF TOP-DRESSING WHEAT WITH PLASTER, AND OF HARROWING WHEAT IN SPRING.

The plats in this series were originally intended to receive quite a different treatment from that given above. The plan was to protect against winter-killing and the effects of drouth by mulching some with straw and top-dressing others with manure in the early part of the winter, and still others to be harrowed, some in the fall and some in the spring, with a view to learn how far these different modes of treatment might affect the yield. But this plan had to be abandoned on account of the very mild and wet winter, which rendered it impracticable, if not impossible, to carry it out as originally intended. The plats were seeded with Zimmerman wheat September 18, 1890, at the rate of one and one-quarter bushel to the acre.

The land plaster was sown broadcast April 15th, at the rate of 400 pounds per acre. It was obtained from Blue Rapids, Kansas, and cost there \$2 per ton.

The harrowing took place April 21, 1891, when the wheat was eight to ten inches high. Like the preceding, all plats were beaten down by the heavy storms before harvest.

The averages obtained were as follows:

| | YIELD PER ACRE. | |
|-------------------|-----------------|--------------|
| | Grain, bushels. | Straw, tons. |
| No treatment..... | 32.72 | 2.11 |
| Plastered..... | 32.91 | 2.23 |
| Harrowed..... | 29.69 | 2.01 |

The trifling increase in yield of the plastered plats, both in grain and straw, does not pay for the plaster and the trouble of putting it on. While it did not operate injuriously to the crop, it has certainly no marked effect, on the yield of wheat. This agrees with the results of trials elsewhere, especially in Michigan, where, some years ago, land plaster was freely used for all crops.

Spring harrowing, on the other hand, was in this case a decided disadvantage to the crop, as is indicated by a yield of three bushels less than was produced by either of the others. Harrowing wheat may have its uses in certain cases, where the land has become hide-bound by forming a hard crust, which prevents alike air and moisture from penetrating into the soil; but it is believed that the occasions are few where any real benefit accrues from this treatment. A certain amount of damage to the wheat plants is unavoidable, by dislodging or tearing them up more or less completely. If harrowing is resorted to at all it should be done early in the spring, about the time the wheat begins to grow, in order to give it a chance to recover from this damage by tillering.

IV. SINGLE VARIETIES vs. A MIXTURE OF VARIETIES.

The following interesting experiment was carried out, but for want of land it has the defect that only one plat was devoted to each trial, and the results are consequently not based on averages, as in all the preceding cases. The plats were seeded with a shoe drill with press wheels, at the rate of 1 1/4 bushels per acre.

| VARIETY. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|-------------------------------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| Zimmerman..... | 35.00 | 2.40 | 63 |
| Buckeye..... | 41.83 | 3.05 | 62 |
| Red May..... | 43.50 | 2.80 | 62 |
| Zimmerman and Buckeye..... | 43.00 | 2.71 | 61 |
| Zimmerman and Red May..... | 43.00 | 2.58 | 61 |
| Buckeye and Red May..... | 47.00 | 3.19 | 62 |
| Zimmerman, Buckeye and Red May..... | 39.33 | 2.32 | 60 |

If the theory is correct that a mixture of varieties tends to give better yields than can be had from the same varieties grown singly, then the yield of any two or more varieties mixed together should exceed the average yield of these varieties when grown alone. It will be seen that this is the case in all but one instance, and then it is very close. Thus the average of Zimmerman and Buckeye grown singly is 38.41 bushels per acre, but grown together the yield is 43 bushels. The average of Zimmerman and Red May grown singly is 39.25 bushels, but the mixture of the two yields 43 bushels. The average of Buckeye and Red May grown singly is 42.66

bushels, while the mixture of the two is 47 bushels; and lastly, the average of all three grown singly is 40.11, while the yield of the mixture of the three is but 39.33 bushels.

The reader may remember that in the oat bulletin of last year (No. 13) something of the same nature was indicated in regard to oats, but owing to the drouth of that year one of the varieties employed in the test proved to be so nearly worthless as to materially vitiate the experiment. The above results are, however, sufficiently encouraging to make the experiment worthy of repetition on a larger scale. If we can increase the yield from four to five bushels per acre by growing a mixture of two or three of our best varieties instead of growing any one of these singly, then that will evidently be the proper practice to follow. The most plausible explanation of this apparent anomaly is based on the supposition that owing to slight differences in habit of root-growth, several varieties mixed together will distribute their root mass more uniformly and through a larger volume of soil than would be the case with any single variety, and hence a more complete absorption of the available nourishment, which again reacts in an increased yield. It is also possible that varieties may vary in the amount they absorb of the several elements of plant food.

V. EFFECTS OF PASTURING WHEAT.

Fifteen plats were seeded September 15th, with shoe drill having press wheels, at the rate of 1 1/4 bushels per acre. The fall-pastured plats were fenced each by itself and grazed close to the ground in the latter part of October, and again in November. Those pastured in spring were fed off in the beginning of April. A dairy cow was put upon each plat, and all pastured at the same time.

Pastured in Fall.

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels, | Straw, tons. | |
| 86..... | 26.67 | 1.20 | 62 |
| 89..... | 19.00 | .93 | 61 |
| 92..... | 24.83 | 1.36 | 61 |
| 95..... | 24.50 | .94 | 62 |
| 98..... | 30.00 | 1.33 | 61 |
| Average..... | 25.00 | 1.15 | |

Pastured in Spring.

| No. of Plat. | Rate of Yield per Acre. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels, | Straw, tons. | |
| 87..... | 27.67 | 1.27 | 61 |
| 90..... | 24.17 | 1.04 | 61½ |
| 93..... | 18.17 | .81 | 61 |
| 96..... | 27.17 | 1.49 | 62 |
| 99..... | 28.50 | 1.45 | 61 |
| Average..... | 25.13 | 1.21 | |

Not Pastured.

| No. of Plat. | Rate of Yield per Acre. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels, | Straw, tons. | |
| 88..... | 25.00 | .95 | 61 |
| 91..... | 24.33 | 1.02 | 62 |
| 94..... | 24.33 | .77 | 62 |
| 97..... | 28.00 | 1.26 | 62 |
| 100..... | 31.17 | 2.07 | 61 |
| Average..... | 26.57 | 1.21 | |

There was in this case a gain of one and one-half bushels per acre by not pasturing. Whether the feed obtained by pasturing will equal the value represented by this difference in yield, cannot be determined on so small a scale. This pasturing of wheat is an important practical question. Many farmers place no small dependence on the feed that their wheat fields furnish in fall and spring, and cattle will occasionally even run on the wheat all winter. If there is a loss in the yield of wheat by utilizing this feed, as the above tends to show, the consideration involved is the relative cost of feed and price of wheat. Again, if pasturing does inflict injury to the crop, the extent of this injury is certain to vary much in different cases. On a wet and clayey soil the cattle are likely to do greater harm by puddling the surface and thus retarding the growth, than by browsing off the tops, whereas a dry soil may not suffer at all from this cause. It is a subject worthy of further investigation.

VI. WHEAT CONTINUOUSLY.

In 1880 a measured acre was set aside for continuous culture in wheat, the crop to be grown year after year without manure or renovating treatment of any kind, the object being to test the ability of the soil to produce this rather exhaustive crop under these conditions. The acre is an upland,

medium-heavy loam, with a pronounced slope toward the east, and it is not by any means a sample of the best soil in Kansas. The general method followed has been to plow it from two to four weeks after harvest, and harrow it once in about ten days or two weeks until seeded. The time of seeding has varied with the season, but has usually occurred before or about the middle of September, when 1 1/4 bushel has been drilled in. The crop of the present season was seeded September 13, 1890, and harvested June 22, 1891. It yielded 30.75 bushels of wheat and 3,435 pounds of straw, giving nearly 111 pounds of straw for every bushel of wheat. The following table shows the result of the eleven years cropping:

| YEAR. | VARIETY. | YIELD. | | | REMARKS. |
|-------------------------------|-----------------|----------|-------------|-----------------------------|-----------------|
| | | Bushels. | Straw, lbs. | Lbs. straw to bushel wheat. | |
| 1880-1... | Early May | 9.00 | | | Crop estimated. |
| 1881-2... | " " | 47.00 | 7,845 | 167 | |
| 1882-3... | " " | 28.19 | 3,281 | 112 | |
| 1883-4... | Zimmerman | 37.00 | 4,525 | 122 | |
| 1884-5... | " | 12.30 | 2,238 | 181 | |
| 1885-6... | " | | | | Winter-killed. |
| 1886-7... | " | | | | |
| 1887-8... | " | 30.31 | 3,766 | 124 | |
| 1888-9... | " | 37.00 | 3,619 | 98 | |
| 1889-90.. | " | 22.90 | 1,841 | 82 | |
| 1890-91.. | " | 30.75 | 3,435 | 111 | |
| Produce of eleven years | | 254.45 | 30,550 | | |
| Yearly average | | 23.13 | 2,777 | 120 | |

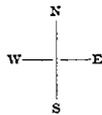
This year's crop has raised the yearly average for the period by three pecks above what it was last year. Considering that this piece of land has not been manured in any form since this experiment was begun, nor received any other treatment to increase the fertility than such as every farmer can and ought to give his land, namely, good culture, this experiment speaks well for the staying qualities of Kansas soil.

VII. ROTATION EXPERIMENTS .

In the fall of 1889, and again in 1890, two series of rotation experiments were started, with wheat as the basis, with a view to ascertain what system of cropping will yield the best returns, all things considered. The rotations are ten in number, and are explained on the accompanying plan. Each rotation is repeated five times on five 1/10 acre plats, none of which adjoin each other, and the conclusions will be based on the average yield of these five plats. As yet these rotations show but little. This is only the second crop that has been taken from the first-established series, plats 1-25, and it

is the first crop from the second series, plats 26-50, which are devoted to three, four, five, and six-year rotations:

| No. of PLAT. | YIELD PER ACRE. | | | | TREATMENT. |
|--------------|-----------------|--------------|-------------|--------------|--|
| | 1890. | | 1891. | | |
| | Grain, bus. | Straw, tons. | Grain, bus. | Straw, tons. | |
| 1..... | 40.8 | 1.35 | 30.58 | 2.76 | { Wheat continuously, with } 20 tons manure per acre. |
| 2..... | 27.3 | 1.13 | 31.25 | 2.39 | Wheat cont'sly, no manure. |
| 3..... | | | 36.83 | 2.77 | Fallow in 1890. |
| 4..... | 24.6 | 1.81 | | | Corn in 1891. |
| 5..... | | | 32.08 | 2.34 | Oats in 1890. |
| 6..... | 35.6 | 1.50 | 31.00 | 2.29 | Same as plat 1. |
| 7..... | 28.6 | 1.42 | 29.17 | 2.02 | Same as plat 2. |
| 8..... | | | 19.63 | 1.67 | Fallow in 1890. |
| 9..... | | | 33.17 | 2.05 | Corn in 1890. |
| 10..... | 30.6 | 1.23 | | | Oats in 1891. |
| 11..... | 36.4 | 1.51 | 31.17 | 2.19 | Same as plat 1. |
| 12..... | 33.2 | 1.22 | 28.33 | 1.70 | Same as plat 2. |
| 13..... | | | 31.58 | 2.33 | Fallow in 1890. |
| 14..... | 39.2 | 1.44 | | | Corn in 1891. |
| 15..... | | | 29.25 | 2.33 | Oats in 1890. |
| 16..... | 40.5 | 1.18 | 28.41 | 2.20 | Same as plat 1. |
| 17..... | 36.5 | 1.44 | 29.92 | 2.13 | Same as plat 2. |
| 18..... | | | 25.33 | 2.34 | Fallow in 1890. |
| 19..... | | | 29.33 | 1.92 | Corn in 1890. |
| 20..... | 43.8 | 2.03 | | | Oats in 1891. |
| 21..... | 46.1 | 2.09 | 27.42 | 2.10 | Same as plat 1. |
| 22..... | 41.4 | 1.95 | 29.50 | 2.19 | Same as plat 2. |
| 23..... | | | 21.42 | 1.95 | Fallow in 1890. |
| 24..... | 43.3 | 2.00 | | | Corn in 1891. |
| 25..... | | | 29.17 | 2.65 | Oats in 1890. |



PLAN OF ROTATION

| K | J | H | G | F | K | J | H | G | F | K | J | H |
|-------|-------|-------|----------------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|
| 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 |
| grass | grass | wheat | wheat | corn | oats | grass | oats | crims'n clover | wheat | roots | oats | roots |
| grass | wheat | corn | corn | oats | grass | grass | wheat | wheat | corn | oats | grass | oats |
| wheat | corn | roots | oats | wheat | grass | wheat | corn | corn | oats | grass | grass | wheat |
| corn | oats | oats | crims'n clover | corn | wheat | corn | roots | oats | wheat | grass | wheat | corn |
| roots | grass | wheat | wheat | oats | corn | oats | oats | crims'n clover | corn | wheat | corn | roots |
| oats | wheat | corn | corn | wheat | roots | grass | wheat | wheat | oats | corn | oats | oats |
| grass | corn | roots | oats | corn | oats | grass | corn | corn | wheat | roots | grass | wheat |
| grass | oats | oats | crims'n clover | oats | grass | wheat | roots | oats | corn | oats | grass | corn |
| wheat | grass | wheat | wheat | wheat | grass | corn | oats | crims'n clover | oats | grass | wheat | roots |
| corn | grass | corn | corn | corn | wheat | oats | wheat | wheat | wheat | grass | corn | oats |
| roots | wheat | roots | oats | oats | corn | grass | corn | corn | corn | wheat | oats | wheat |
| oats | corn | oats | crims'n clover | wheat | roots | grass | roots | oats | oats | corn | grass | corn |

ALLEY 12

| E | D | C | B | A | E | D | C | B | A | E | D | C | |
|-------|-------|---------------|------------------------------------|---|---------------|-------|---------------|------------------------------------|---|-------|-------|---------------|-------|
| 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | |
| oats | wheat | summ'r fallow | | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | |
| wheat | corn | wheat | | | oats | wheat | wheat | | | wheat | corn | wheat | |
| oats | wheat | summ'r fallow | Wheat continuously without manure. | Wheat continuously with two tons barn-yard manure yearly. | wheat | corn | summ'r fallow | Wheat continuously without manure. | Wheat continuously with two tons barn-yard manure yearly. | oats | wheat | summ'r fallow | |
| wheat | corn | wheat | | | oats | wheat | wheat | | | oats | wheat | corn | wheat |
| oats | wheat | summ'r fallow | | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | |
| wheat | corn | wheat | | | oats | wheat | wheat | | | wheat | corn | wheat | |
| oats | wheat | summ'r fallow | | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | |
| wheat | corn | wheat | | | oats | wheat | wheat | | | wheat | corn | wheat | |
| oats | wheat | summ'r fallow | | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | |
| wheat | corn | wheat | | | oats | wheat | wheat | | | wheat | corn | wheat | |
| oats | wheat | summ'r fallow | | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | |
| wheat | corn | wheat | | | oats | wheat | wheat | | | wheat | corn | wheat | |
| oats | wheat | summ'r fallow | wheat | corn | summ'r fallow | oats | wheat | summ'r fallow | | | | | |
| wheat | corn | wheat | oats | wheat | wheat | wheat | corn | wheat | | | | | |
| oats | wheat | summ'r fallow | wheat | corn | summ'r fallow | oats | wheat | summ'r fallow | | | | | |
| wheat | corn | wheat | oats | wheat | wheat | wheat | corn | wheat | | | | | |
| oats | wheat | summ'r fallow | wheat | corn | summ'r fallow | oats | wheat | summ'r fallow | | | | | |

EXPERIMENT, FIELD NO. 4.

Size of plats,
147 ft. x 29.93 ft.—one-tenth acre.

| G | F | K | J | H | G | F | K | J | H | G | F | |
|----------------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|----------------|-------|------|
| 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | |
| oats | oats | corn | corn | corn | corn | corn | wheat | wheat | wheat | wheat | wheat | 1891 |
| crims'n clover | wheat | roots | oats | roots | oats | oats | corn | corn | corn | corn | corn | 1892 |
| wheat | corn | oats | grass | oats | crims'n clover | wheat | roots | oats | roots | oats | oats | 1893 |
| corn | oats | grass | grass | wheat | wheat | corn | oats | grass | oats | crims'n clover | wheat | 1894 |
| oats | wheat | grass | wheat | corn | corn | oats | grass | grass | wheat | wheat | corn | 1895 |
| crims'n clover | corn | wheat | corn | roots | oats | wheat | grass | wheat | corn | corn | oats | 1896 |
| wheat | oats | corn | oats | oats | crims'n clover | corn | wheat | corn | roots | oats | wheat | 1897 |
| corn | wheat | roots | grass | wheat | wheat | oats | corn | oats | oats | crims'n clover | corn | 1898 |
| oats | corn | oats | grass | corn | corn | wheat | roots | grass | wheat | wheat | oats | 1899 |
| crims'n clover | oats | grass | wheat | roots | oats | corn | oats | grass | corn | corn | wheat | 1900 |
| wheat | wheat | grass | corn | oats | crims'n clover | oats | grass | wheat | roots | oats | corn | 1901 |
| corn | corn | wheat | oats | wheat | wheat | wheat | grass | corn | oats | crims'n clover | oats | 1902 |

FEET WIDE.

| B | A | E | D | C | B | A | E | D | C | B | A | | |
|------------------------------------|--|---------------|-------|---------------|------------------------------------|--|-------|-------|---------------|------------------------------------|---|------|------|
| 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | | |
| Wheat continuously without manure. | Wheat continuously with two tons of manure yearly. | wheat | corn | summ'r fallow | Wheat continuously without manure. | Wheat continuously with two tons of manure yearly. | oats | wheat | summ'r fallow | Wheat continuously without manure. | Wheat continuously with two tons manure yearly. | | 1890 |
| | | oats | wheat | wheat | | | oats | corn | wheat | | | 1891 | |
| | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | | | 1892 | |
| | | oats | wheat | wheat | | | wheat | corn | wheat | | | 1893 | |
| | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | | | 1894 | |
| | | oats | wheat | wheat | | | wheat | corn | wheat | | | 1895 | |
| | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | | | 1896 | |
| | | oats | wheat | wheat | | | wheat | corn | wheat | | | 1897 | |
| | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | | | 1898 | |
| | | oats | wheat | wheat | | | wheat | corn | wheat | | | 1899 | |
| | | wheat | corn | summ'r fallow | | | oats | wheat | summ'r fallow | | | 1900 | |
| | | oats | wheat | wheat | | | wheat | corn | wheat | | | 1901 | |
| wheat | corn | summ'r fallow | oats | wheat | summ'r fallow | 1902 | | | | | | | |

Last year the manured plats averaged five bushels more per acre than the unmanured. This year the yield of the plats manured yearly with twenty tons of stable manure per acre is 29.71 bushels per acre, and those that grow wheat continuously without manure give almost exactly the same, 29.63 bushels. This falling-off in the manured plats this year is due mainly to the wet season, which caused first a heavy growth of straw, and later, soon after the wheat headed out, the frequent storms caused it to lodge badly, with the inevitable result, that the heads did not fill out.

Plats 26-50 were cropped in this rotation for the first time this year, and there is therefore but little to note about them. Those which were in wheat were seeded with the Currell. The yield was as follows:

| No. of PLAT. | RATE OF YIELD PER ACRE. | | Weight of struck bushel. |
|--------------|-------------------------|--------------|--------------------------|
| | Grain, bushels. | Straw, tons. | |
| 26 | 42.17 | 2.91 | 59 |
| 27 | 40.00 | 2.90 | 57 |
| 28 | 41.54 | 2.88 | 61 |
| 29 | 43.67 | 3.04 | 60 |
| 30 | 42.83 | 3.31 | 64 |
| 41 | 42.67 | 3.09 | 58 |
| 47 | 41.42 | 3.33 | 60 |
| 48 | 37.67 | 2.84 | 60 |

VIII. TEST OF VARIETIES.

We are indebted to the Ohio Experiment Station for a donation of a large number of varieties of wheat, and also to the Experiment Station of Maryland for a few. These, together with some donations from other sources and kinds already on the farm, made up a total of 240 varieties which have been tested at the Station the past year. In the case of about a hundred varieties, seed was obtained in sufficient quantity to sow areas varying from 1/20 to 1/40 acre in extent. These plats were all of the same length, 600 feet, but varied in the number of rows of wheat on each. It was believed that this arrangement would give a fairer comparative test of all varieties than it would be possible to give so many kinds when seeded on small, square plats. Moreover, it admitted of a degree of accuracy in the distribution of the seed which would not have been possible on small plats, where frequent turning would have been necessary. The drill used was a small force-feed machine, reconstructed for the purpose. The wet season produced a heavy growth of straw, which in many instances lodged and made the harvest very troublesome.

Besides these plats, all varieties were grown as single rows (one variety to each row), side by side, separated only by the eight-inch space between the hoes of the drill. This plan was adopted for several reasons. One of

these was that in the majority of cases we had only about half a pint of seed of each kind, and a comparative test of so many kinds, each on one plat but a few yards square, would have been of doubtful value, owing to the inevitable variation in the soil. But sown in rows side by side, one variety in each drill-spout, they were all placed under the conditions prevailing in ordinary field culture as regards space, and all had as nearly equal advantages or disadvantages in the matter of soil as it is possible to obtain in a field test. It also afforded an excellent opportunity for comparison and study of the varieties. The main objection to this plan is the trouble of harvesting the crop.

Description of Varieties.

[NOTE.—We have made arrangements by which we shall be able to supply fairly good photographs of the heads of the varieties here described, at cost, to all who may desire them. The price will be about \$2.50, postpaid, for the entire set of 240 varieties.]

The brief descriptions which follow are intended to give only the salient points of each kind as they have been brought out by the growth of the past season, nor has any attempt been made to verify synonyms, it being desirable to study them at least one more season. In other States, and under the influence of differences in climate and soil, certain data here given may not be applicable, especially as regards date of ripening, length of straw and of head, number of grains in a spikelet, and to some extent the character of the straw.

THE CURRELL. This very promising variety deserves a special notice. It has now been grown on the farm for three years, and each year been so entirely satisfactory that it has been decided to adopt it as the standard variety hereafter. It is very hardy, tillers well, and is a vigorous grower. While growing it is of a dark green color. It ripens medium early.

Last year it was ripe June 13th, and this year June 26th. The straw is thick and strong, and although it lodged in places this year, it stands up better than a majority of the varieties tested. Height about 4 feet; heads smooth, rather short and slender; chaff light brown; grains in spikelet, 3, dark amber, and plump.

Yield in 1889, 39.23 bushels per acre; in 1890, 37.50; and in 1891 the average rate of yield of 12 plats was 41.42 bushels per acre.

ALABAMA, (O.) This variety sown on edge of field and severely injured in the fall by insects from adjoining grass. Plants in spring small, but growth healthy. Growth very slow throughout the season.

Ripe, July 1. Height 3.5 feet; straw medium in size; heads open, bearded, medium to long, round, and tapering at tip; chaff white; grains in spikelet, 2-3, dark amber, medium to small, considerably shrunken.

Yield, 13.01 bushels per acre.

AMERICAN, (O.) Plants small in spring, but growth healthy; grew slowly until headed out.

Ripe, July 1. Height 4 feet; straw medium in size; heads open, bearded, tapering but slightly at tip, long, and flat; chaff white; grains in spikelet, 2, sometimes 3; grains dark amber, medium to large, full and plump.

Yield, 14.47 bushels per acre.

ANDREWS No. 4, (O.) Growth fall and spring thrifty.

Ripe, July 1. Height 4.2 feet; length of head, 2.5 inches; straw medium to coarse; heads bearded, short and square, compact; chaff brown; grains in spikelet, 2; grains light amber, medium to large, short and plump.

Yield, 50.31 bushels per acre.

ARMSTRONG, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium; heads smooth, sometimes short beards on tip; spikelets long, round to flat; chaff white; grains in spikelet, 2; grains light amber, medium, short and plump.

Yield, 29.68 bushels per acre.

ARNOLD'S HYBRID, (Ks.) *Ripe*, June 26. Height 4 feet; straw medium in size; heads smooth, round, moderately compact; chaff white; grains in spikelet, 3, dark amber color, medium, short, and plump.

Yield, 38.05 bushels per acre; weight per bushel, 60 pounds. Yield in 1889, 26.18 bushels; 1890, 23.16 bushels. Average yield in three years, 29.13 bushels per acre.

ASHBURN, (O.) *Ripe*, June 27. Height 4.2 feet; straw small to medium; heads smooth, compact, round, tapering; chaff white; grains in spikelet, 2-3, usually 3, light amber color, medium to small, moderately plump.

Yield, 46.83 bushels per acre.

AUSTRALIAN, (O.) *Ripe*, July 1. Straw medium in size; heads bearded, flat, very open; chaff bronze; grains in spikelet, 3, amber color, medium to large, slightly shrunken.

Yield, 22.54 bushels per acre.

BADGER, (Ks.) *Ripe*, June 26. Height 4.2 feet; straw medium to large; heads smooth, round, moderately compact; chaff white; grains in spikelet, 3, dark amber color, medium to small, short but moderately plump.

Yield, 39.73 bushels per acre; weight per bushel, 58 pounds. Yield in 1889, 20.33 bushels; 1890, 25.16 bushels. Average yield in three years, 28.41 bushels per acre.

BAILEY, (Thor. and R. N-Y.) *Ripe*, July 1. Height 4.3 feet; straw medium to coarse, dark colored; heads bearded, flat, moderately compact; chaff light brown; grains in spikelet, 3, light amber color, medium to large, considerably shrunken.

Yield, 14.86 bushels per acre.

BALTIMORE, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to slender; heads smooth, round, compact, tapering; chaff white; grains in spikelet, 3, light to dark amber color, medium to small, moderately plump.

Yield, 40.84 bushels per acre.

BEAL, (Thor. and R. N-Y.) Plants short in spring. Growth until harvest vigorous.

Ripe, July 1. Height 4.3 feet; straw large and strong. A severe wind and rain storm, June 27, blew most of the varieties down, but Beal stood erect while those on each side were laid flat. Heads bearded, square, compact; chaff white; grains in spikelet, 3, sometimes 4, light to dark amber color, medium to large, moderately plump.

Yield, 25.92 bushels per acre.

BEARDED KING, (O.) *Ripe*, June 29. Height 4.3 feet; heads bearded, open, flat; chaff white; grains in spikelet, 3, red color, medium to large, short, and moderately plump.

Yield, 14 bushels per acre.

BEARDED MONARCH, (O.) *Ripe*, June 29. Height 4.1 feet; straw medium in size; heads bearded, compact, square; chaff light brown color; grains in spikelet, 2, red to dark amber, medium to small, irregular, short, and plump.

Yield, 44.42 bushels per acre; weight per bushel, 57 pounds.

BENNET, (O.) *Ripe*, July 2. Height 4.4 feet; straw medium size; heads short, bearded, flat; chaff white; rains in spikelet, 2, sometimes 3, amber color, medium to large, plump, and well filled.

Yield, 31.64 bushels per acre.

BIG ENGLISH, (O.) *Ripe*, July 1. Height 4.3 feet; straw medium in size; heads smooth, short, round, and usually tapering; chaff white to brown; grains in spikelet, 2, red color, medium to small, short, and plump.

Yield, 30.55 bushels per acre; weight per bushel, 57 pounds.

BIG FRAME, (O.) Early foliage, light green.

Ripe, June 26. Height 3.8 feet; straw medium to slender; heads smooth, short, round to flat, tapering at tip, compact; chaff white; grains in spikelet, 2, amber color, medium, slightly shrunken.

Yield, 30.68 bushels per acre.

BIG MAY, (O.) *Ripe*, June 27. Height 4.5 feet; straw medium to large; heads smooth, flat, rather open, tip pointed; chaff white; grains in spikelet, 3, light amber color, medium, well filled, plump.

Yield, 39.78 bushels per acre.

BIRD-PROOF. What few plants lived through the winter did not mature.

BISSELL, (O.) *Ripe*, June 27. Height 4.2 feet; straw medium in size; heads bearded, round to flat, open, tapering; chaff white; grains in spikelet, 2, red, medium, moderately plump, fairly long.

BLUE STEM, (O.) *Ripe*, July 3. Height 4.3 feet; straw medium to coarse; heads smooth, long, round; chaff dirty brown; grains in spikelet, 2, light amber, small, and considerably shrunken.

Yield, 21.13 bushels per acre.

BODINE, (O.) *Ripe*, July 1. Height 4.5 feet; straw coarse; heads smooth, open, long, flat, tapering at tip; chaff white; grains in spikelet, 2, light amber, medium to small, fairly plump.

Yield, 42.27 bushels per acre.

BORDEAUX, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium in size; heads smooth, short, round to flat, open, tapering; chaff white; grains in spikelet, 2, amber color, medium, moderately plump.

Yield, 31.36 bushels per acre.

BOYER, (O.) *Ripe*, June 28. Height 4.3 feet; straw medium to slender; heads bearded, flat, rather open, sharply pointed; chaff brown; grains in spikelet, 2, red color, large to medium, long, moderately plump.

Yield, 50.08 bushels per acre.

BRADY LAKE, (O.) *Ripe*, June 21. Height 4.1 feet; straw coarse; heads bearded, short and square, compact; chaff brown; grains in spikelet, 3, amber color, medium, plump.

Yield, 22.69 bushels per acre.

BUCKEYE, (Md.) and (Ks.) *Ripe*, June 29. Height 4.4 feet; straw medium in size, strong; heads smooth, round, rather open; chaff brown; grains in spikelet, 2, dark amber color, medium, slightly shrunken. Two plats grown.

Yield (Md.) 42.21, (Ks.) 45.15 bushels per acre. Average, 43.68 bushels for the present year. Yield in 1889, 25.03 bushels; 1890, 30.17 bushels per acre. Average of Kansas-grown seed for three years, 33.44 bushels per acre.

BULLARD'S VELVET CHAFF, (O.) *Ripe*, June 27. Height 4.4 feet; straw medium to large; heads smooth, round to flat, tapering; chaff white, thickly covered with silvery hairs, producing a velvet-like appearance; grains in spikelet, 2, red color, medium to small, short, and plump.

Yield, 23.86 bushels per acre.

CALIFORNIA BLUE STEM, (O.) *Ripe*, June 29. Height 4.5 feet; straw medium; heads bearded, flat, thick, open; chaff brown; grains in spikelet, 3, dark amber color, large to medium, long, and well filled.

Yield, 46.31 bushels per acre.

CANADA CLUB, (O.) *Ripe*, July 1. Height 3.9 feet; straw medium to large; heads bearded, short, square, taper but slightly, compact; chaff white; grains in spikelet, 3, very light amber color, small, short, and plump.

Yield, 14.28 bushels per acre.

CANADIAN EXPRESS, (O.) *Ripe*, June 29. Height 4.3 feet; straw coarse; heads smooth, long, open, flat, and thick, tip pointed; chaff white; grains in spikelet, 2-3, spikelets large and coarse; grains red, small to medium, shrunken.

Yield, 35.36 bushels per acre.

CANADIAN WONDER, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to coarse; heads bearded, round to flat, open; chaff white; grains in spikelet, 3, spikelets large and coarse; grains light amber, medium to large, moderately short, and plump.

Yield, 42.48 bushels per acre.

CENTENNIAL, (O.) *Ripe*, July 1. Height 4.5 feet; straw medium to coarse; heads smooth, round, compact; chaff white; grains in spikelet, 2, amber color, medium, plump.

Yield, 39.37 bushels per acre.

CHAMPION, (O.) *Ripe*, June 29. Height 4.1 feet; straw medium to slender; heads bearded, short, square, compact; chaff white; grains in spikelet, 3, light amber, short, and plump.

Yield, 20.47 bushels per acre.

CHAMPION AMBER, (O.) *Ripe*, June 29. Height 4 feet; straw medium; heads smooth, short, compact, tip sharply pointed; chaff white; grains in spikelet, 2; spikelets large; grain red, medium to small, considerably shrunken.

Yield, 30.83 bushels per acre.

CLAWSON, (O.) *Ripe*, June 25. Height 4.3 feet; straw medium to coarse; heads smooth, long, open, sharply pointed; chaff brown; grains in spikelet, 3, very light amber color, medium, moderately plump.

Yield, 28.42 bushels per acre.

CRATE, (O.) *Ripe*, June 29. Height 4 feet; straw medium to slender; heads bearded, medium length, open, flat, and sharply pointed; chaff white; grains in spikelet, 2, red, medium, well filled.

Yield, 32.20 bushels per acre; weight per bushel, 62.5 pounds.

CRAWFORD COUNTY, (O.) *Ripe*, June 29. Height 4.2 feet; straw medium; heads smooth, open, nearly as large at tip as at base, round to flat; chaff white; grains in spikelet 3, red, medium to small, moderately plump.

Yield, 29.84 bushels per acre.

CURRELL. Described at the head of the list.

CURRELL'S PROLIFIC, (O.) Appears to be identical with Currell, (Kas.)

DALLAS, (O.) *Ripe*, June 29. Height 4 feet; straw medium in size; heads bearded, long, nearly square, rather open; chaff brown; grains in spikelet, 2, red, medium, moderately long, slightly shrunken.

Yield, 40.49 bushels per acre.

DAVIS, (O.) *Ripe*, July 1. Height 4.1 feet; straw medium in size; heads smooth, round to flat, slightly tapering, moderately compact; chaff white; grains in spikelet, 2, dark amber, medium, well filled.

Yield, 38.99 bushels per acre.

DEISMAN No. 1, (O.) *Ripe*, July 1. Height 4.3 feet; straw medium to

coarse; heads smooth, round, tapering, rather open; chaff white; grains in spikelet, 2, dark amber, medium, long, and somewhat shrunken.

Yield, 18.64 bushels per acre.

DEISMAN No. 2, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium to coarse; heads smooth, round, open, slightly tapering; chaff white; grains in spikelet, 2, light amber color, medium, short, and very plump.

Yield, 25.80 bushels per acre.

DEITZ, (O. and Md.) *Ripe*, June 29. Height 4.2-4.1 feet; straw medium to large; heads bearded, short, flat, tapering, rather open; chaff white; grains in spikelet, 2, red, medium to large, plump. Two plats grown, one seeded with Ohio Experiment Station seed, the other with Maryland Experiment Station seed.

Yield, (O.) 41.17, (Md.) 40.06 bushels per acre. Average, 40.61 bushels for the present, year.

DEMOCRAT, (O.) *Ripe*, June 29. Height 3.1 feet; straw medium to slender; heads bearded, flat, open, tapering; chaff white; grains in spikelet, 2, light. amber color, medium, well filled, plump.

Yield, 44.27 bushels per acre; weight per bushel, 61.25 pounds.

DIEHL, (O.) *Ripe*, June 29. Height 3.9 feet; straw medium size; heads smooth, short, round to flat, tapering, moderately compact; chaff white; grains in spikelet, 2, light amber color, small and short, but plump.

Yield 17.90 bushels per acre.

DIEHL-EGYPTIAN, (O.) *Ripe*, June 27. Height 3.9 ; straw medium in size; heads smooth, medium length, round to flat, tapering, moderately compact; chaff white; grains in spikelet, 3, dark amber color, medium to small, short, and plump.

Yield, 46.17 bushels per acre.

DIEHL-MEDITERRANEAN (O.) and (Md.) *Ripe*, June 29. Height 4 feet; straw medium to large; heads bearded, short, square, compact; chaff brown; grains in spikelet, 2, dark amber color, large, and fairly plump. Two plats grown; one seeded with Ohio Experiment Station seed, the other with Maryland seed.

Yield, (O.) 37.85, (Md.) 38.07 bushels per acre. Average, 37.96 bushels per acre for the present year.

EARLY MAY, (O.) *Ripe*, June 29. Height 4.2 feet; straw slender to medium ; heads smooth, short, round, tapering, rather open; chaff white; grains in spikelet, 2, a dark amber, medium, short, and moderately plump.

EARLY RICE, (O.) *Ripe*, June 26. Height 4.4 feet; straw medium to slender; heads smooth, round to flat, tapering, moderately compact; chaff white; grains in spikelet, 2, red, medium, short, and plump.

Yield, 22.93 bushels per acre.

EARLY RIPE, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium in size; heads smooth, square to rounded, rather open, tapering but slightly; chaff brown; grains in spikelet, 2.

EARNHARDT, (O.) *Ripe*, June 27. Height 4.1 feet; straw medium to slender; heads smooth, short, round, tapering, moderately compact; chaff white; grains in spikelet, 3, light amber, medium, short, and plump.

Yield, 8.74 bushels per acre.

EBERSOLE. *Ripe*, June 29. Height 4.3 feet; straw medium to slender; heads bearded, long, rounded, tapering at tip, open; chaff white; grains in spikelet, 3, medium to large, red, of good length, moderately plump.

Yield, 26.12 bushels per acre; weight per bushel, 61.5 pounds.

EGYPTIAN, (O.) *Ripe*, June 29. Height 4.5 feet; straw medium in size; heads bearded, flat, moderately compact; chaff white; grains in spikelet, 3, amber to red, medium, of moderate length, and fairly plump.

Yield, 40.50 bushels per acre; weight per bushel, 60 pounds.

EMPORIUM, (O.) *Ripe*, June 29. Height 4.3 feet; straw coarse; heads smooth, long, flat to rounded, open, tapering; chaff white; grains in spikelet, 2, dark amber, medium to small, short, moderately plump.

Yield, 44.61 bushels per acre.

EXTRA EARLY OAKLEY, (O.) and (Ks.) *Ripe*, June 26. Height 4.2 feet; straw medium in size; heads smooth, long, round, tapering, moderately compact; chaff white; grains in spikelet, 2-3, dark amber to dark red, medium to small, short, and plump. Two plats grown; seed of one from Ohio Experiment Station and the other home-grown.

Yield, (O.) 36.79 bushels, (Ks.) 42.72 bushels; average, 39.75 bushels for the present year; weight per bushel, (O.) 62 pounds, (Ks.) 61 1/2 pounds; yield in 1889, 31.83 bushels, and in 1890, 31.10 bushels; average of Kansas-grown seed for three years, 35.21 bushels.

FARQUHAR, (O.) *Ripe*, June 26. Height 4.1 feet; straw medium in size; heads smooth, short, sharply pointed, moderately compact; chaff velvet dark brown, covered with silvery hairs; grains in spikelet, 2, very dark amber to dark red, medium to large, somewhat short, and plump.

Yield, 34.97 bushels per acre; weight per bushel, 59.5 pounds.

FENTON, (O.) *Ripe*, June 27. Height 4 feet; straw medium in size; heads smooth, flat, tapering, rather open; chaff light brown; grains in spikelet, 2, sometimes 3; light amber to white color, medium, short, and plump.

Yield, 30.20 bushels per acre.

FINLEY, (O.) and (Md.) *Ripe*, June 26. Height 4 feet; straw medium to coarse; heads smooth, long, flat, sharply pointed, rather open; chaff white; grains in spikelet, 3-2, red to dark red color, medium to small, short, and plump. Two plats grown; seed of one from Ohio Experiment Station, and the other from Maryland Experiment Station.

Yield, (O.) 36.08, (Md.) 39.73 bushels per acre; average yield, 37.40 bushels; weight per bushel, 61 pounds.

FLOUR BALL: winter-killed.

FOUNTAIN, (O.) *Ripe*, June 29. Height 3.9 feet; straw very slender, but of good strength; heads smooth, long, open; chaff brown; grains in spikelet, 2, red, small, short, and plump.

Yield 25.94 bushels per acre.

FRENCH IMPERIAL, (O.) *Ripe*, July 1. Height 3.8 feet; straw very slender; heads smooth, slender, round, tapering, open; chaff brown; grains in spikelet, 2, red, small to medium, short, and moderately plump.

Yield, 20.03 bushels per acre.

FRENCH PRAIRIE (O.) *Ripe*, June 27. Height 3.8 feet; straw medium in size; heads smooth, short, flat, rounded, moderately compact; chaff white; grains in spikelet, 2, red, medium, fairly well filled, of moderate length.

Yield 36.97 bushels per acre.

FULCASTER, (O.) and (Md.) *Ripe*, June 27. Height 4 feet; straw medium to coarse; heads bearded, flat, thick, moderately compact; spikelets large, grains in spikelet, 3, dark red, medium to large, short, and plump. Two plats grown; seed of one from Ohio Experiment Station, the other from Maryland Experiment Station.

Yield, (O.) 43.97, (Md.) 36.01 bushels per acre; average, 39.99 bushels; weight per bushel, (O.) 62 pounds; (Md.) 63 pounds.

FULTZ, (O.) *Ripe*, June 27. Height 4.1 feet; straw medium in size; heads smooth, long, round, tapering, rather open; chaff white; grains in spikelet, 3, red to dark red, medium, short, and plump.

Yield, 41.61 bushels per acre; weight per bushel, 61 pounds.

FULTZ CLAWSON, (O.) *Ripe*, July 1. Height 4.1 feet; straw coarse; heads smooth, rather open, round, flattened, tapering at tip; chaff white; grains in spikelet, 2, red to dark red, medium, comparatively short, moderately plump.

Yield, 21.17 bushels per acre.

GENEVA, (O.) *Ripe*, June 29. Height 4.1 feet; straw medium to slender; heads bearded, flat to rounded tip, tapering, rather open; chaff white; grains in spikelet, 2, red, medium to small, moderately plump, fairly good length.

Yield 40.43 bushels per acre; weight per bushel, 63 pounds.

GERMAN AMBER, (O.) *Ripe*, June 29. Height 4 feet; straw medium in size; heads smooth, short, rounded, tapering, moderately compact; chaff white; grains in spikelet, 2, red, medium, short, and plump.

Yield, 25.59 bushels per acre.

GERMAN EMPEROR, (O.) and (Ks.) *Ripe*, June 29. Height 4.2 feet and 4.1 feet; straw medium in size; heads smooth, medium length, slightly

tapering, compact; chaff brown; grains in spikelet, 2, dark red, medium, short, and moderately plump. Two plats grown.

Yield, (O.) 42.27, (Ks.) 26.78 bushels per acre; weight per bushel, (O.) 62, (Ks.) 61.25 pounds.

GYPSEY, (O.) *Ripe*, July 2. Height, 4.2 feet; straw slender; heads bearded, open, flat, sharply pointed; chaff white to light brown; grains in spikelet, 2, dark red color, medium to small, short, and moderately plump.

Yield 32.31 bushels per acre.

GOLD DUST, (O.) *Ripe*, July 2. Height 4.1 feet; straw medium to coarse; heads smooth, long, flat, open; chaff white; grains in spikelet, 2, red color, medium, short, and plump.

Yield, 19.17 bushels per acre.

GOLD MEDAL, (O.) *Ripe*, July 1. Height 4.2 feet; straw coarse; heads smooth, long, flat to rounded, open; chaff white; grains in spikelet, 2, light amber color, medium to small, short, and plump.

Yield, 29.12 bushels per acre.

GOLDEN CROSS, (O.) *Ripe*, July 2. Height 4.2 feet; straw medium to coarse; heads bearded, short, square, very compact; chaff brown; grains in spikelet, 2, light red color, medium to large, short, and plump.

Yield, 29.81 bushels per acre; weight per bushel, 61 pounds.

GOLDEN DROP, (Ks.) *Ripe*, June 29. Height 4.3 feet; straw medium to slender; heads smooth, short, moderately compact, tapering; chaff brown; grains in spikelet, 2, amber color, medium, short, and plump.

Yield 30.10 bushels per acre; weight per bushel, 61 pounds; yield in 1889, 19.16; 1890, 24.83 bushels per acre; average in three years, 24.69 bushels.

GOLDEN PREMIUM, (O.) *Ripe*, July 1. Height 4.3 feet; straw medium to coarse; heads smooth, round, tapering, medium length, rather open; chaff white; grains in spikelet, 2, light amber or golden, medium, short, and plump.

Yield, 40.31 bushels per acre.

GOLDEN PROLIFIC, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium to coarse; heads smooth, flat, tapering, rather open; chaff brown; grains in spikelet, 3-2, light amber or golden, medium, short, and plump.

Yield, 36.60 bushels per acre; weight per bushel, 60 pounds.

GOLDEN PROLIFIC IMPROVED. Same as Golden Prolific.

GRANAWALT, (O.) *Ripe*, June 27. Height 4.4 feet; straw medium to coarse; heads smooth, flat, pointed, open; chaff velvet-white, covered with silvery hairs; grains in spikelet, 2, red, medium to small, short, and plump.

Yield, 39.06 bushels per acre.

GRECIAN, (O.) *Ripe*, June 30. Height 4.4 feet; straw medium to coarse;

heads smooth, rounded, pointed, moderately compact; chaff white; grains in spikelet, 2, light amber, medium, short, and plump.

Yield, 23.48 bushels per acre.

HALF BEARD, (O.) Ripe, June 27. Height 4.4 feet; straw medium to coarse; heads bearded, flat, thick, pointed, open; chaff white; grains in spikelet, 2-3, dark red, medium, short, and plump.

Yield 41.02 bushels per acre.

HECKMAN, (O.) Ripe June 26. Height 4.2 feet; straw medium in size; heads smooth, flat, pointed, rather open; chaff white; grains in spikelet, 2, dark red, medium to small, short, and moderately plump.

Yield, 20.54 bushels per acre.

HEIGHT'S PROLIFIC, (O.) Ripe June 27. Height 4.1 feet; straw medium in size; heads smooth, round, tapering, moderately compact; chaff white; grains in spikelet, 2, dark red, medium, short, and plump.

Yield, 47.38 bushels per acre.

HICKS, (O.) Ripe, June 27. Height 4.1 feet; straw medium in size; heads smooth, short, flat, sharply pointed, open; chaff white; grains in spikelet, 3, red, medium to small, short, and plump.

Yield, 38.37 bushels per acre; weight per bushel, 61.5 pounds.

HIGH GRADE, (O.) and (Md.) Ripe, July 1. Height 4.2 feet; straw medium to coarse; heads smooth, round to flat, tapering, moderately compact; chaff white; grains in spikelet, 2, red, medium, good length, and moderately plump. Two plats grown; seed of one from Ohio Experiment Station, the other from Maryland Experiment. Station.

Yield, (O.) 40.43, (Md.) 34.09 bushels per acre; average, 37.26 bushels; weight per bushel, (O.) 60.5, (Md.) 61 pounds.

HINDOSTAN, (O.) Ripe, July 1. Height 4.3 feet; straw medium to slender; heads bearded, flat, thick, tapering, open; chaff brown; grains in spikelet, 2, red, medium, considerably shrunken.

Yield, 37.85 bushels per acre; weight per bushel, 62.5 pounds.

HOLBORNE WONDER, (England.) Very few seeds were planted, and these were mostly winter-killed.

HUNDRED FOLD, (England.) Small amount was planted. This was considerably winter-killed, and the plants were small and weak.

HUNGARIAN, (O.) and (Md.) Ripe, June 29. Height 4.3 feet; straw medium to slender; heads bearded, flat, thick, pointed, moderately compact; chaff white; grains in spikelet, 2, red, short, and considerably shrunken. Two plats grown.

Yield, (O.) 37.62, (Md.) 40.73 bushels per acre; average, 39.17 bushels; weight per bushel, (O.) 63.5, (Md.) 63 pounds.

HYBRID No. 9, (O.) Ripe, June 29. Height 4.3 feet; straw medium to

slender; heads smooth, short, round, tapering, moderately compact; chaff white; grains in spikelet, 2, red color, short, and fairly plump.

Yield, 37.79 bushels per acre.

HYBRID MEDITERRANEAN, (Ks.) *Ripe*, July 2. Height 4.2 feet; straw coarse; heads bearded, medium to short, square, compact; chaff brown; grains in spikelet, 3, light red color, good size, fairly plump.

Yield, 42.05 bushels per acre; weight per bushel, 62 pounds. Yield in 1889, 25.66 bushels; in 1890, 13.70 bushels. Average yield in three years, 27.14 bushels per acre.

HYBRID DATTEL, (U.S. Department of Agriculture.) Plants badly winter-killed; all dead in damp places. Living plants, in spring, small and stunted, growth irregular and weak.

Ripe, July 3. Height, 3.5 feet; straw coarse, very thick, good strength; heads smooth, slightly tapering, rounded, moderately compact; chaff dirty white or light brown; grains in spikelet, 2, red color, very irregular in size, a few large and plump, but mostly small and badly shrunken.

Yield, 4.07 bushels per acre.

HYBRID LAMED, (U. S. Department of Agriculture.) Badly winter-killed; all dead in damp places. Living plants, in spring, small and stunted, growth irregular and weak.

Ripe, July 3. Height 3.8 feet; straw coarse, thick, and strong; heads smooth, medium to very long, round, very open; chaff brown; spikelets large; grains in spikelet, 3-2, dark red color, small and badly shrunken.

Yield, 3.32 bushels per acre.

IMPROVED FIFE, (O.) *Ripe*, June 27. Height 4.2 feet; straw slender; heads smooth, flat, tapering, moderately compact; chaff white; grains in spikelet, 2, red, medium size, rather slender.

Yield, 16.38 bushels per acre.

IMPROVED RICE, (O.) and (Md.) *Ripe*, June 26. Height 4.5 feet; straw medium in size ; heads smooth, rounded to flat, tapering, compact; chaff white; grains in spikelet, 2, dark red, medium in size, fairly plump. Two plats grown.

Yield, (O.) 33.05, (Md.) 30.10 bushels per acre; weight per bushel, (O.) 62, (Md.) 59 pounds.

JACQUES, (O.) *Ripe*, June 29. Height 4.2 feet; straw medium to coarse; heads smooth, short, square, blunt tip, very compact; chaff white; grains in spikelet, 3, grains white, very small, fairly plump.

Yield, 18.85 bushels per acre.

JENNINGS, (O.) *Ripe*, June 27. Height 4.4 feet; straw medium in size; heads bearded, short, nearly as broad at tip as at base, moderately compact; chaff white; grains in spikelet, 2, white to light amber, large, fairly plump.

Yield, 46.53 bushels per acre.

JOHNSON, (Thor. and R. N-Y.) *Ripe*, July 2. Height 4.4 feet; straw coarse; heads bearded, long, flat, thick, abruptly pointed, compact; chaff white; grains in spikelet, 3, white or very light amber, large, fairly plump.

Yield, 18.48 bushels per acre.

KENTUCKY WHITE, (O.) *Ripe*, July 1. Height 4.4 feet; straw medium; heads smooth, round to flat, tapering, moderately compact; chaff white; grains in spikelet, 2, occasionally 3, light red, small, and slender.

Yield, 33.13 bushels per acre.

KNAPP, (O.) *Ripe*, July 1. Height 4.4 feet; straw medium to coarse; heads smooth, rounded, tapering, open; chaff light brown; grains in spikelet, 2, light. red, good size, fairly plump.

Yield, 31.19 bushels per acre.

LANCASTER, (O.) *Ripe*, July 1. Height 4.4 feet; straw coarse to slender; heads bearded, rounded, open, slightly tapering; chaff brown; grains in spikelet, 3, red to dark red, medium to large, good length, but slightly shrunken.

Yield, 38.33 bushels per acre.

LANDEETH, (O.) *Ripe*, July 1. Height 4.5 feet; straw coarse; heads smooth, flat, sharp pointed, rather open; chaff white; grains in spikelet, 2, white wheat, grain light. amber to golden, medium, short, and plump.

Yield, 17.54 bushels per acre.

LEBANON, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium in size; heads bearded, flat, sharply pointed, moderately compact; chaff white; grains in spikelet, 3, dark red, medium, short, and moderately plump.

Yield, 39.55 bushels per acre, weight per bushel, 62.5 pounds.

LEHIGH No. 6, (Md.) *Ripe*, June 29. Height 4.3 feet; straw medium to slender; heads bearded, flat, thick, tapering, open; chaff brown; grains in spikelet, 2, dark red, medium, fair length, moderately plump.

Yield, 36.89 bushels per acre; weight per bushel, 61.5 pounds.

LEHIGH, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to slender; heads bearded, flat, thick, tapering, open; chaff brown; grains in spikelet, 2, red, medium. long, and well filled.

Yield, 35.41 bushels per acre; weight per bushel, 60 pounds.

LINCOLN, (O.) *Ripe*, July 1. Height 4.2 feet; straw medium to coarse; heads smooth, sharply pointed, open; chaff brown; grains in spikelet, 2; spikelets large, white; grain light amber, short, and plump.

Yield, 10.55 bushels per acre.

LITTLE RED, (O.) *Ripe*, July 2. Height 4 feet; straw medium to coarse; heads smooth, short, flat, thick, abruptly pointed, compact; chaff white; grains in spikelet, 2; grains light amber, medium to small, short, and plump.

Yield, 45.35 bushels per acre.

LONGBERRY, (O.) *Ripe* June 29. Height 4.5 feet; straw medium to

coarse; heads smooth, long, rounded, tapering, moderately compact; chaff white; grains in spikelet, 2, red, medium to small, short, and plump.

Yield, 35.76 bushels per acre; weight per bushel, 61 pounds.

LOST NATION, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium in size; heads smooth, rounded, tapering, compact; chaff white; grains in spikelet, 2, red, medium to small, short, and plump.

Yield, 31.15 bushels per acre.

MAMMOTH, (O.) *Ripe*, July 1. Height 4.6 feet; straw medium in size; heads bearded, square, rounded, moderately compact; chaff white; grains in spikelet, 2, red, long, fairly plump.

Yield, 24.60 bushels per acre.

MAMMOTH RED, (O.) *Ripe*, July 1. Height 4.4 feet; straw medium to coarse; heads smooth, flat, sharply pointed, open; chaff brown; grains in spikelet, 2, red, long, and slender.

Yield, 21.73 bushels per acre.

MANITOBA, (O.) *Ripe*, June 29. Height 4.2 feet; straw slender; heads smooth, long, round, open; chaff brown; grains in spikelet, 2-3, red, small, and shrunken.

Yield, 36.57 bushels per acre.

MARTIN'S AMBER, (O.) and (Md.) *Ripe*, July 2. Height 4.3 feet; straw medium in size; heads smooth, flat., thick, sharply pointed, rather open; chaff white; grains in spikelet, 2; spikelets coarse; grains white to light amber, long, and rather slender. Two plats grown.

Yield, (O.) 25.77, (Md.) 32.78 bushels per acre; weight per bushel, (O.) 60, (Md.) 69 pounds. Average, 30.77 bushels.

MCCRACKEN, (O.) *Ripe*, June 26. Height 4.2 feet; straw medium to slender; heads smooth, long, rounded, tapering towards both tip and base, moderately compact; chaff white; grains in spikelet, 3, dark red, short, and plump.

Yield, 41.24 bushels per acre.

NCCREGAN, (Ks.) *Ripe*, June 27. Height 4.3 feet; straw medium to slender; heads smooth, flat, broad, open; chaff white; grains in spikelet, 3; spikelets large; grains red, short, plump to slender.

Yield, 33.20 bushels per acre; weight per bushel, 59 pounds.

MCGHEE'S RED, (O.) *Ripe*, June 27. Height 4.3 feet; straw medium in size; heads smooth, medium length, flat, thick, sharply pointed, moderately compact; chaff brown; grains in spikelet, 2, dark red, long, fairly plump.

Yield, 40.99 bushels per acre.

MCGHEE'S WHITE, (O.) *Ripe*, July 2. Height 4.3 feet; straw medium in size; heads smooth, medium length, flat, thick, sharply pointed, moder-

ately compact; chaff brown; grains in spikelet, 2, white to light amber, short, and plump.

Yield, 31.93 bushels per acre.

MCPHERSON, (O.) *Ripe*, June 29. Height 4 feet; straw medium in size; heads smooth, flat, thick, sharply pointed, open; chaff white; grains in spikelet, 3, spikelets coarse; grains red, long, fairly plump.

Yield, 33.09 bushels per acre.

McQUAY, (O.) *Ripe*, June 29. Height 4.2 feet; straw medium to coarse; heads smooth, rounded to flat, tapering, open; chaff white; grains in spikelet, 2, very dark red, short, and plump.

Yield, 37.78 bushels per acre; weight per bushel, 63 pounds.

MEALY, (O.) and (Md.) *Ripe*, June 27. Height. 4.2 and 4.3 feet; straw medium in size; heads smooth, long, round, flattened, abruptly pointed, open; chaff velvet-white, covered with silvery hairs; grains in spikelet, 3, spikelets coarse; grains dark red, short, and fairly plump. Two plats grown. *Yield*, (O.) 36.01 (Md.) 32.98 bushels per acre; average, 34.49 bushels; weight, per bushel, (O.) 53, (Md.) 53 pounds.

MEDITERRANEAN, (O.) *Ripe*, June 29. Height. 4.4 feet; straw medium to slender; heads bearded, square to rounded, tapering, rather open; chaff red; grains in spikelet, 2, dark red, medium to large, long kernels, moderately plump.

Yield, 27.89 bushels per acre; weight per bushel, 61 pounds.

MEDITERRANEAN, RED CHAFF, (O.) *Ripe*, June 29. Height 4.2 feet; straw medium to coarse; heads smooth, flat, thick, sharply pointed, open; chaff brown; grains in spikelet, 2, dark red, medium, short, and plump.

Yield, 35.23 bushels per acre.

MENNONITE, (O.) *Ripe*, June 29. Height 4 feet; straw slender, rather weak; heads bearded, short, flat, thick, tapering, open; chaff white; grains in spikelet, 2, red, medium to small, short, and plump.

Yield, 12.06 bushels per acre.

MICHIGAN AMBER, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to coarse; heads smooth, square, slightly tapering, loose; chaff brown; grains in spikelet, 2-3, dark amber color, medium, good length, moderately plump.

Yield, 34.82 bushels per acre; weight per bushel, 61 pounds.

MICHIGAN BRONZE, (O.) *Ripe*, July 2. Height 4.4 feet; straw coarse; heads bearded, square, abruptly pointed, compact; chaff brown; grains in spikelet, 2, red color, medium to large, short, and plump.

Yield, 29.68 bushels per acre.

MICHIGAN WHITE, (O.) *Ripe*, July 2. Height 4.3 feet; straw coarse; heads smooth, flattened, thick, abruptly pointed, compact; chaff brown; grains in spikelet, 3, dark red, medium, short, and moderately plump.

Yield, 48.43 bushels per acre.

MICHIGAN WICK, (O.) *Ripe*, July 2. Height 4.5 feet; straw medium in size; heads long, bearded, square to flat, slightly tapering, loose; chaff white; grains in spikelet, 2, white; grain light amber color, medium to small, long, and slender.

Yield, 28.88 bushels per acre.

MILLER, (Md.) *Ripe*, June 29. Height 4.3 feet; straw medium to slender; heads smooth, flat, thick, slightly tapering, loose; chaff brown; grains in spikelet, 2-3, spikelets coarse; grains red, very irregular in size, large to small.

Yield, 43.99 bushels per acre; weight per bushel, 59.5 pounds.

MILLER'S PROLIFIC, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium to coarse; heads smooth, very short, square, small at base, larger at tip, very compact; chaff white; grains in spikelet, 3; heads badly blighted; grain white, small, short and plump.

Yield, 27.89 bushels per acre; weight per bushel, 57 pounds.

MINNESOTA HARD FIFE, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium in size; heads smooth, flat, sharply pointed, rather loose; chaff brown; grains in spikelet, 3, red, medium to small, short, and plump.

Yield, 29.78 bushels per acre.

MISSOURI, (O.) *Ripe*, June 27. Height 4.2 feet; straw slender; heads smooth, long, rounded, tapering, moderately compact; chaff white; grains in spikelet, 3, dark red, irregular in size, mostly large, and plump.

Yield, 32.91 bushels per acre.

MISSOURI BLUE STEM, (O.) *Ripe*, July 2. Height 4.3 feet; straw medium to coarse; heads bearded, square, abruptly pointed, very compact; chaff brown; grains in spikelet, 2, red, medium to large, short and plump.

Yield, 39.75 bushels per acre; weight per bushel, 60 pounds.

MOON, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to slender; heads smooth, flat, sharply pointed, loose; chaff white; grains in spikelet, 2, white, medium length, plump.

Yield, 10.36 bushels per acre.

NAME LOST, (3rd.) *Ripe*, July 2. Height 4.4 feet; straw medium to coarse; head long, bearded, flat, thick, tapering slightly, loose; chaff white; grains in spikelet, 2, dark red, medium to large, moderately long, and fairly plump.

Yield, 44.66 bushels per acre; weight per bushel, 62 pounds.

NEBRASKA, (O.) *Ripe*, July 2. Height 4.5 feet; straw medium in size; heads bearded, nearly square, flattened, tapering slightly, rather loose; chaff velvet brown, covered with silvery hairs; grains in spikelet, 2, light red, medium length, plump.

Yield, 31.22 bushels per acre.

NEW AUSTRALIAN, (Md.) *Ripe*, July 2. Height 4.2 feet; straw medium to coarse; heads bearded, square, abruptly pointed, moderately compact; chaff white; grains in spikelet, 3, dark red, long and plump.

Yield, 33.93 bushels per acre; weight per bushel, 62 pounds.

NEW MONARCH, (O.) and (Md.) *Ripe*, July 2. Height 4.3 feet; straw medium to coarse; heads smooth, square to flat, slightly tapering, moderately compact; chaff white; grains in spikelet, 2, red, short, fairly plump. Two plats grown.

Yield, (O.) 43.90, (Md.) 32.94 bushels per acre; average, 38.42 bushels.

NEW YORK FLINT, (O.) *Ripe*, July 2. Height 3.9 feet; straw medium in size; heads smooth, rounded, tapering, loose; chaff white; grains in spikelet, 3, light red, medium, short, and plump.

Yield, 27.05 bushels per acre.

NIGGER, (O.) and (Ks.) *Ripe*, June 21. Height 4.1 feet; straw medium in size; heads long, bearded, flat, thick, tapering but little, loose; chaff white, grains in spikelet, 2, dark red, medium to large, fairly plump.

Two plats grown; seed of one from Ohio Experiment Station, the other home-grown.

Yield, (O.) 40.01, (Ks.) 39.79 bushels per acre; average, 39.90 bushels; weight per bushel, (O.) 60.5, (Ks.) 61 pounds. *Yield* in 1889, 22.71, in 1890, 24.64 bushels per acre; average for three years, 29.08 bushels.

OAKLEY, (O.) *Ripe*, June 27. Height 3.8 feet; straw medium in size; heads smooth, flat, tapering slightly, very loose; chaff white; grains in spikelet, 2, light red, short, and plump.

Yield, 35.69 bushels per acre.

OHIO AMBER, (O.) All plants were winter-killed.

OHIO SWAMP, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium in size; heads long, bearded, square, tapering but slightly, loose; chaff brown; grains in spikelet, 3, dark red, medium to large, good length, moderately plump.

Yield, 12.5 bushels per acre.

O. K., (O.) *Ripe*, June 29. Height 3.9 feet; straw slender; heads bearded, flat, sharply pointed, loose; chaff white; grains in spikelet, 3, red, moderately long, fairly plump.

Yield, 15.83 bushels per acre.

ONTARIO, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium to coarse; heads smooth, short, sharp beards on tip of spikelets, flat, abruptly pointed, loose; chaff white; grains in spikelet, 2, spikelets coarse; grains light red, large, short and plump.

Yield, 18.04 bushels per acre.

ONTARIO WONDER, (O.) and (Ks.) *Ripe*, June 27. Height 4.3 feet; straw medium to coarse; heads smooth, slender, tapering, loose; chaff white;

grains in spikelet, 2, red, medium in length, somewhat shrunken. Two plats grown; seed of one from Ohio Experiment Station, the other home-grown.

Yield, (O.) 36.54, (KS.) 34.41 bushels per acre; average, 35.47 bushels for the present year. Yield in 1889, 19.13, in 1890, 17.50 bushels per acre. Average yield in three years, 24.03 bushels.

OREGON, (O.) *Ripe*, June 27. Height 4 feet; straw medium to coarse; heads smooth, square to rounded, tapering, moderately compact; chaff white; grains in spikelet, 2, red, long, somewhat shrunken.

Yield, 36.03 bushels per acre; weight per bushel, 60 pounds.

OREGON CLUB, (O.) *Ripe*, June 29. Height 4.4 feet; straw slender; heads smooth, slender, tapering, moderately compact; chaff brown; grains in spikelet, 2, sometimes 3, red, irregular, some shrunken.

Yield, 34.27 bushels per acre.

OSTERY, (O.) *Ripe*, July 2. Height 4.3 feet; straw medium to coarse; heads smooth, short, flat, sharply pointed, loose; chaff white; grains in spikelet, 2, red, medium, long, fairly plump.

Yield, 15.74 bushels per acre.

PALESTINE, (O.) *Ripe*, July 2. Height 4.4 feet; straw medium to slender; heads smooth, flat, thick, sharp pointed, loose; chaff white; grains in spikelet, 2, red, long, fairly plump.

Yield, 34.58 bushels per acre.

PATAGONIA TRIGO, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to coarse; heads smooth, flat, thick, sharp pointed, loose; chaff brown; grains in spikelet, 3, red, long and plump.

Yield, 43.99 bushels per acre; weight per bushel, 61 pounds.

PEARL, (Carter, England.) Small quantity planted; plants badly winter-killed.

PENQUITE'S VELVET CHAFF, (Md.) *Ripe*, June 27. Height 4.1 feet; straw medium to coarse; heads bearded, short, flat, tapering, moderately compact; chaff velvet-brown, covered with silvery hairs; grains in spikelet, 2, dark red, short, plump.

Yield, 41.34 bushels per acre; weight per bushel, 62 pounds.

POOLE, (O.) and (Md.) *Ripe*, July 2. Height 4 feet and 3.9 feet; straw coarse; heads smooth, flat, thick, slightly tapering, loose; chaff brown; grains in spikelet, 2, rarely 3, red, long, fairly plump. Two plats grown.

Yield, (O.) 45.76, (Ma.) 40.57 bushels per acre; average, 43.16 bushels; weight per bushel, (O.) 61, (Md.) 58 pounds.

PORTER, (O.) *Ripe*, June 27. Height 4.1 feet; straw medium in size; heads smooth, flat to square, tapering, moderately compact; chaff white; grains in spikelet, 2, red, short, somewhat shrunken.

Yield, 14.77 bushels per acre.

POWERS, (O.) *Ripe*, June 27. Height 4.1 feet; straw medium in size:

heads smooth, flat, broad, sharply pointed, moderately compact; chaff white; grains in spikelet, 2, light red, long, slightly shrunken.

Yield, 45.84 bushels per acre.

PRIDE OF THE MARKET, (Carter, England.) Small quantity planted. Plants small and weak, and considerably winter-killed.

PRINCE OF WALES, (Carter, England.) Small quantity planted. Plants small and weak, and considerably winter-killed.

PURE GOLD, (O.) *Ripe*, July 1. Heights 4.3 feet; straw coarse; heads smooth, square, rounded, slightly tapering, moderately compact; chaff white; grains in spikelet, 2, light red, irregular, mostly shrunken.

Yield, 15.59 bushels per acre.

PURPLE STRAW, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium to coarse; heads bearded, long, slightly tapering, loose; chaff brown; grains in spikelet, 2-3, dark red, long, fairly plump.

Yield, 42.12 bushels per acre.

PURPLE STRAW, RED, (Ks.) *Ripe*, June 27. Height 4.1 feet; straw medium to slender; heads smooth, short, flat, sharply pointed, loose; chaff white; grains in spikelet, 2, red, short and fairly plump.

Yield, 33.16 bushels per acre; weight per bushel, 61 pounds. Yield in 1889, 20.13, in 1890, 4.33 bushels per acre. Average yield in three years, 19.21 bushels.

RAUB'S BLACK PROLIFIC, (O.) *Ripe*, June 29. Height 3.9 feet; straw medium to coarse; heads bearded, square, very compact; chaff brown; grains in spikelet, 2, light red, medium size, fairly plump.

Yield, 32.93 bushels per acre.

RED AMBER, (O.) *Ripe* June 29. Height 4.5 feet; straw medium to slender; heads bearded, long, flat, tapering slightly, loose; chaff brown; grains in spikelet, 3, red, long, moderately plump.

Yield, 33.43 bushels per acre.

RED BRAZILIAN, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium in size; one-half the crop had smooth heads, the other half bearded, long, flat, tapering, loose. The variety is probably impure. Grains in spikelet, 2-3; uniform in regard to shape and size of heads. Some heads have brown chaff and some white. Part of brown-chaff heads are bearded, and part smooth, and the same with White-chaff heads. Grains red, long, rather slender.

Yield, 42.67 bushels per acre; weight per bushel, 60 pounds.

RED CROSS, (Pratt.) *Ripe*, June 29. Height 4.2 feet; straw medium to coarse; heads bearded, square, very compact, tapering slightly; chaff brown; grains in spikelet, 3-2, red, large and plump.

Yield, 41.34 bushels per acre; weight per bushel, 58 pounds.

RED FULTZ, (O.) *Ripe*, June 27. Height 4.4 feet; straw medium in

size; heads smooth, long, flat, broad, sharply pointed, loose; chaff brown; grains in spikelet, 3, red, long, moderately plump, rough.

Yield, 46.04 bushels per acre; weight per bushel, 57 pounds.

RED FULTZ, (Md.) and (Ks.) *Ripe*, June 27. Heights 4.3 and 4 feet; straw medium in size; heads rounded, tapering, moderately compact to loose; chaff white; grains in spikelet, 2-3, red, medium length, plump, smooth.

Yield, (Md.) 46.65, (Ks.) 45.54 bushels per acre; weight per bushel, (Md.) 60, (Ks.) 61 pounds.

RED LINE, (O.) *Ripe*, July 2. Height 4.4 feet; straw medium in size; heads smooth, flat, broad, tapering, loose; chaff brown; grains in spikelet, 3, red, long and plump.

Yield, 18.66 bushels per acre.

RED MAY, (Ks.) The foliage of Red May (O.) is very light green, almost yellow, similar to that of Zimmerman. The foliage of Red May (Ks.) is very dark green. This difference was noticeable from early spring until the plants were ripe.

Ripe, June 27. Height 4 feet; straw medium to slender; heads smooth, round, tapering, rather loose; chaff white; grains in spikelet, 3, dark red, short and plump.

Yield, 48.19 bushels per acre; weight per bushel, 60 pounds. Yield in 1889, 31.50, in 1890, 29.70 bushels per acre. Average in three years, 36.46 bushels.

RED ODESSA, (O.) *Ripe*, July 1. Height 4.3 feet; straw medium to coarse; heads long, bearded, square, tapering to sharp point, loose; chaff brown; grains in spikelet, 3, red, long, moderately plump.

Yield, 28.77 bushels per acre.

RED RUSSIAN, (O.) and (Md.) *Ripe*, July 2. Heights 4.4 and 4.3 feet; straw medium to coarse; heads smooth, flat, tapering slightly, loose; chaff brown; grains in spikelet, 3, spikelets coarse; grains red, short, plump and smooth.

Yield, (O.) 39.13, (Md.) 41.78 bushels per acre; weight per bushel, (O.) 60.5, (Md.) 60 pounds.

RED RUSSIAN, (Ks.) *Ripe*, July 2. Height 4.3 feet; straw medium to coarse; heads, some smooth, others bearded, flat, long, tapering slightly; chaff on part of heads white, on others brown; grains in spikelet, 3, spikelets coarse; grains red, short, plump and smooth.

Yield, 40.46 bushels per acre; weight per bushel, 60 pounds; yield in 1889, 32, in 1890, 17.33 bushels per acre; average in three years, 29.93 bushels.

RED SEA, (O.) *Ripe*, July 2. Height 4 feet; straw medium in size; heads bearded, square, slightly tapering, abruptly pointed, rather loose; chaff brown; grains in spikelet, 3, red, long, plump.

Yield, 15.29 bushels per acre.

RELIABLE, (O.) and (Ks.) *Ripe*, June 29. Heights 4.1 and 4.2 feet; straw medium to coarse; heads bearded, flat, tapering, loose; chaff white; grains in spikelet, 3, red, short and plump. Two plats grown; seed of one from Ohio Experiment Station, the other home-grown.

Yield, (O.) 45.10, (Ks.) 42.44 bushels per acre; average, 43.77 bushels for the present year. Yield in 1889, 27.66, in 1890, 24 bushels per acre. Average in the three years, 34.36 bushels.

RIO GRANDE, (O.) *Ripe*, June 27. Height 4.3 feet; straw slender; heads smooth, flat to square, tapering, moderately compact; chaff white; grains in spikelet, 2, red, medium to large, plump.

Yield, 26.73 bushels per acre.

ROBERTS, (Thor. and R. N-Y.) *Ripe*, June 29. Height 4.2 feet; straw medium in size; heads mostly bearded, a few smooth, medium size, square, tapering slightly, rather loose; chaff red; grains in spikelet, 2-3, red, large and plump.

Yield, 41.14 bushels per acre.

ROCKY MOUNTAIN, (O.) *Ripe*, June 29. Height 4.1 feet; straw medium to coarse; heads smooth, long, flat, and thick, sharply pointed, rather loose; chaff brown; grains in spikelet, 3-2; grains white, medium in size, fairly plump.

Yield, 38.91 bushels per acre; weight per bushel, 60 pounds.

ROGER'S RED, (O.) *Ripe*, June 29. Height 4 feet; straw medium in size; heads smooth, short, flat, and thick, sharply pointed; chaff white; grains in spikelet, 2, short, and plump.

Yield, 26.54 bushels per acre.

ROSCOE, (O.) *Ripe*, June 29. Height 3.6 feet; straw medium in size; heads smooth, short, square, tapering slightly, very compact; chaff dirty brown; grains in spikelet, 3, white, short, fairly plump.

Yield, 25.71 bushels per acre.

ROYAL AUSTRALIAN, (O.) *Ripe*, June 29. Height 4 feet; straw medium to coarse; heads smooth, long, flat sharply pointed, rather loose; chaff brown; grains in spikelet, 3-2, white, long and rather slender.

Yield, 31.49 bushels per acre; weight per bushel, 58 pounds.

RUSSIAN, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium in size; heads bearded, long, flat and thick, tapering, rather loose; chaff white; grains in spikelet, 3, dark red, medium in size, plump.

Yield, 15.86 bushels per acre.

RUSSIAN No. 2, (O.) *Ripe*, June 27. Height 4 feet; straw slender; heads smooth, short, square to flat, tapering, moderately compact; chaff white; grains in spikelet, 2, white, short, plump to shrunken.

Yield, 16.18 bushels per acre.

RUSSIAN MAY, (O.) *Ripe*, June 27. Height 4.4 feet; straw slender; heads smooth, occasionally short beards on tip, square to flat, tapering, mod-

erately compact; chaff white; grains in spikelet, 2, red, short, plump to slender.

Yield, 31.15 bushels per acre.

RUMSEY, (O.) *Ripe*, June 26. Height 4.2 feet; straw medium to slender; heads smooth, medium to long, round, tapering, moderately compact; chaff white; grains in spikelet, 3, red, short and plump.

Yield, 47.75 bushels per acre; weight per bushel, 61 pounds.

RURAL No. 5, (O.) *Ripe*, July 2. Height 4.6 feet; straw medium to slender; heads smooth, long, flat, tapering slightly, loose; chaff brown; grains in spikelet, 3, spikelets coarse; grains white, medium in length, fairly plump.

Yield, 34.55 bushels per acre.

SANDORMIKA, (O.) *Ripe*. July 2. Height 4 feet; straw medium to slender; heads smooth, flat to square, tapering, loose; chaff brown; grains in spikelet, 3, white, short and plump.

Yield, 29.75 bushels per acre.

SCOTT, (O.) *Ripe*, June 29. Height 4.5 feet; straw medium to slender; heads bearded, long, tapering, slightly, flat to square, loose; chaff brown; grains in spikelet, 2, occasionally 3, red, large and plump.

Yield, 41.07 bushels per acre.

SENECA CHIEF, (O.) and (Md.) *Ripe*, June 29. Heights 4.4 and 4.3 feet; straw coarse; heads bearded, square, tapering slightly, very compact; chaff brown; grains in spikelet, 2-3, light red, large, and fairly plump. Two plats grown.

Yield, (O.) 35.37, (Md.) 37.15 bushels per acre; average, 36.26 bushels; weight per bushel, (O.) 58.5, (Md.) 59 pounds.

SHERIFF, (O.) *Ripe*, June 29. Height 4.4 feet; straw medium to coarse; heads smooth, or with short beards on tip, long, tapering slightly, flat to square, loose; chaff white; grains in spikelet, 3, spikelets coarse; grains red, short, and plump.

Yield, 32.29 bushels per acre; weight per bushel, 58 pounds.

SHUMAKER'S CLAWSON, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium to slender; heads smooth, flat, and thick, abruptly pointed, loose; chaff brown; grains in spikelet, 2, spikelets coarse; grains white, medium in size, moderately plump.

Yield, 13.34 bushels per acre.

SIBERIAN, (O.) *Ripe*, July 1. Height 4.5 feet; straw medium to slender; heads smooth, long, round, tapering, loose; chaff white; grains in spikelet, 3, red, short, slender, irregular.

Yield, 15.05 bushels per acre.

SIBLEY'S HYBRID, (O.) *Ripe*, July 2. Height 4.4 feet; straw coarse;

heads bearded, square, tapering slightly, very compact; chaff brown; grains in spikelet, 2, red, very irregular in size.

Yield 7.1 bushels per acre.

SIBLEY'S NEW GOLDEN, (O.) *Ripe*, June 29. Height 4.3 feet; straw medium ; heads long, bearded, square, tapering, rather loose; chaff brown; grains in spikelet, 2 to 3, red, medium length, slender.

Yield, 45.09 bushels per acre; weight per bushel, 60 pounds.

SILVER CHAFF Same as Silver Chaff Smooth.

SILVER CHAFF SMOOTH, (O.) *Ripe*, July 2. Height 4.2 feet; straw coarse; heads smooth, flat to round, tapering, loose; chaff white; grains in spikelet, 2, occasionally 3, white, medium length, fairly plump.

Yield, 27.43 bushels per acre.

SILVER CHAFF BEARDED, (O.) *Ripe*, June 29. Height 4.2 feet; straw medium ; heads long bearded, long, flat, sharply pointed, loose; chaff white; grains in spikelet, 3, spikelets coarse; grains red, short, moderately plump.

Yield, 22.02 bushels per acre.

SMALL, FRAME, (O.) *Ripe*, June 29. Height 4 feet; straw slender; spring foliage very light green, similar to that of Zimmerman; heads smooth, short, round, tapering, compact; chaff white; grains in spikelet, 2-3, red, short. and plump, rather irregular.

Yield, 12.02 bushels per acre.

SMITH'S IMPROVED, (O.) *Ripe*, June 29. Height 4.2 feet; straw coarse and weak; heads bearded, flat, slightly tapering, sharp pointed, loose; chaff brown; grains in spikelet, 2, white, medium length, rather slender.

Yield, 17.59 bushels per acre.

SMOOTH SCOTT, (O.) *Ripe*, June 27. Height 4.2 feet; straw medium to slender; heads smooth, flat to square, slightly tapering, loose; chaff white; grains in spikelet, 2, red, long, slender and somewhat shrunken.

Yield, 15.74 bushels per acre.

SOULES, (O.) *Ripe*, June 27. Height 4.2 feet; straw medium; heads smooth, flat to square, slightly tapering, sharply pointed, rather loose; chaff white; grains in spikelet, 3, mostly white, some red, medium in size, plump.

Yield, 18.84 bushels per acre.

SOUTHERN AMBER, (O.) *Ripe*, June 27. Height 4.2 feet; straw medium to slender; heads smooth, flat and thick, slightly tapering, loose; chaff white; grains in spikelet, 2, red, short, somewhat shrunken.

Yield 13.82 bushels per acre.

STEWART, (Thor. and R.N.-Y.) *Ripe*, June 29. Height 4 feet; straw coarse; two types of heads--one smooth, square, with blunt tips, compact; chaff white; grains in spikelet, 3; the other type, heads long bearded, long, square, sharply pointed, loose; chaff brown; grains in spikelet, 3, light red, medium in length, fairly plump. Seed probably impure.

Yield, 6.12 bushels per acre.

STRAYER'S EGYPTIAN, (Md.) *Ripe*, June 27. Height 4.2 feet; straw coarse; heads long bearded, flat and thick, slightly tapering, sharply pointed, loose; chaff white; grains in spikelet 3, dark red, long, large and plump.

Yield, 47.96 bushels per acre; weight per bushel, 60 pounds.

STRAYER'S LONGBERRY, (Md.) *Ripe*, June 27. Height 4.3 feet; straw medium in size; heads long bearded, long, slightly tapering, sharply pointed, loose; chaff white; grains in spikelet, 3, red, long, and fairly plump, slightly irregular in size.

Yield, 41.56 bushels per acre; weight per bushel, 61 pounds.

STRAYER'S ROUMANIA, (Md.) *Ripe*, July 2. Height of straw 4.3 feet; straw coarse; heads smooth, flat to square, tapering slightly, very loose; chaff brown; grains in spikelet, 2 to 3, red, long, large and plump.

Yield, 42.13 bushels per acre; weight per bushel, 62.5 pounds.

SURPRISE, (O.) *Ripe* June 29. Height 4.1 feet; straw coarse; heads smooth, square, bluntly pointed, compact; chaff white; grains in spikelet, 3, white, medium in length, plump.

Yield, 35.70 bushels per acre; weight per bushel, 57.5 pounds.

TAPPAHANNOCK, (O.) *Ripe*, June 29. Height 3.8 feet; straw medium; heads, smooth, square, tapering slightly, sharply pointed, rather loose; chaff white; grains in spikelet, 2, red, short, somewhat shrunken.

TASMANIAN RED, (O.), (Md.), and (Ks.) *Ripe*, June 29. Heights 3.9, 4, and 3.9 feet; straw slender to medium; heads bearded, square, tapering, rather loose; chaff brown; grains in spikelet, 2, dark red, long, and fairly plump.

Yield, (O.) 43.11, (Md.) 38.69, (Ks.) 40.68 bushels per acre; average, 40.62 bushels for the present year; yield in 1889, 27.84, 1890, 29.33 bushels per acre; average in three years, 32.59 bushels.

TENNESSEE AMBER, (O.) *Ripe*, June 29. Height 3.7 feet; straw medium to coarse; heads smooth, flat to square, tapering, loose; chaff white; grains in spikelet, 2, red, short and plump.

THEISS, (O.) *Ripe*, June 29. Height 3.8 feet; straw slender to medium; heads long, bearded, flat to square, tapering, sharply pointed, loose; chaff white; grains in spikelet, 2, red, medium in length, slender.

Yield, 25.98 bushels per acre; weight per bushel, 57 pounds.

TRAVIS, (O.) *Ripe*, July 1. Height 4 feet; straw coarse; heads smooth, long, square, tapering, moderately compact; chaff white; grains in spikelet, 2, light red, medium in size, plump.

Yield 17.49 bushels per acre.

TREADWELL, (O.) *Ripe*, July 1. Height 3.8 feet; straw medium; heads smooth, flat, tapering, sharply pointed, loose; chaff white; grains in spikelet, 2, light red, irregular in length, fairly plump.

Yield, 12.92 bushels per acre.

TRITICUM, (O.) *Ripe*, July 2. Height 3.8 feet; straw slender; heads bearded, square, tapering, moderately compact; chaff brown; grains in spikelet, 2, dark red, long, and fairly plump.

Yield, 16.82 bushels per acre.

TUSCAN AMBER, (O.) *Ripe*, June 29. Height 3.8 feet; straw slender; heads bearded, flat, slightly tapering, blunt point, loose; chaff brown; grains in spikelet, 2, dark red, medium to large, fairly plump.

Yield, 16.92 bushels per acre.

TURKEY, (Steck.) *Ripe*, June 29. Height 4 feet; seed put in October 6th (the date of receipt) ; straw medium to slender; heads long, bearded, square, tapering, rather loose; chaff white; grains in spikelet, 2, red, medium to small, shrunken, very hard.

Yield 14.94 bushels per acre.

TUSCAN ISLAND, (O.), (Md.), and (Ks.) *Ripe*, June 29. Height 3.7 feet ; straw medium ; heads long, bearded, flat, and thick, slightly tapering, blunt point, loose; chaff white; grains in spikelet; 2, grains dark red, long and plump.

Yield, (O.) 41.30, (Md.) 33.64, (KS.) 43.96 bushels per acre ; average, 39.63 bushels for the present year; yield in 1889, 30.83, 1890, 19 bushels per acre: average in three years, 29.82 bushels.

VALLEY, (O.) *Ripe*, July 1. Height 3.6 feet; straw medium; heads bearded, tapering, sharp pointed, flat, loose; chaff white; grains in spikelet, 3-2, red, medium in size, fairly plump.

Yield, 41.83 bushels per acre; weight per bushel, 60 pounds.

VELVET CHAFF, (O.) and (Md.) *Ripe*, June 29. Height 3.5 feet; straw medium; heads bearded, flat, thick, tapering slightly, sharply pointed, rather loose; chaff velvet, covered with silvery hair, brown; grains in spikelet, 2, grains red, medium to large, somewhat shrunken. Two plats grown.

Yield, (O.) 39.96, (Md.) 30.64 bushels per acre; average, 35.30 bushels.

WALKER, (O.) *Ripe*, June 27. Height 3.4 feet; straw slender; heads smooth, flat, tapering, sharply pointed, loose; chaff white; grains in spikelet, 2, red, short and fairly plump.

Yield, 23.66 bushels per acre.

WASHINGTON (O.) *Ripe*, June 27. Height 3.9 feet; straw coarse; heads smooth, square to flat, slightly tapering, sharply pointed, rather loose; chaff white; grains in spikelet, 2, white, long, plump.

Yield, 36.86 bushels per acre.

WASHINGTON GLASS, (O.) *Ripe*, June 29. Height 3.7 feet; straw medium in size; heads smooth, square to flat, sharply pointed, moderately compact; chaff white, grains in spikelet, 2, light red, medium to large, fairly plump.

Yield, 33.35 bushels per acre.

WAYNE COUNTY SELECT, (O.) *Ripe*, June 29. Height 3.9 feet; straw medium in size; heads bearded, short, square, abruptly pointed, very compact; chaff white; grains in spikelet, 2, white, short and plump.

Yield, 43.80 bushels per acre.

WHITE BLUE STEM, (O.) *Ripe*, June 29. Height 4.1 feet; straw medium in size; heads bearded, flat, thick, sharply pointed, loose; chaff white; grains in spikelet, 3, red, short and plump.

Yield, 43.59 bushels per acre.

WHITE CHAFF, (O.) *Ripe*, July 1. Height 4 feet; straw coarse; heads smooth, flat, tapering, sharply pointed, loose; chaff white; grains in spikelet, 3, rarely 2, light red, long, fairly plump.

Yield, 16.47 bushels per acre.

WHITE ELDORADO, (O.) *Ripe*, June 29. Height 3.9 feet; straw coarse; heads smooth, long, flat, and thick, tapering slightly, loose; chaff brown; grains in spikelet, 3, white, medium to large, fairly plump.

Yield, 20.50 bushels per acre.

WHITE FULTZ, (O.) *Ripe*, June 29. Height 4.2 feet; straw coarse; heads smooth, flat, thick, slightly tapering, sharply pointed, loose; chaff white; grains in spikelet, 3, white, medium in size, fairly plump.

Yield, 22.15 bushels per acre.

WHITE MOUNTAIN, (O.) *Ripe*, July 1. Height 4 feet; straw coarse; heads smooth, long, square, slightly tapering, moderately compact; chaff white; grains in spikelet, 3, white, large, plump.

Yield, 32.91 bushels per acre.

WHITE ROGERS, (O.) *Ripe*, July 1. Height 4 feet; straw coarse; heads smooth, flat, and thick, tapering, sharply pointed, loose; chaff white; grains in spikelet, 2-3, light red, medium in size, plump.

Yield, 28.78 bushels per acre.

WHITE ROSE, (O.) *Ripe*, June 29. Height 3.7 feet; straw medium in size; heads smooth, flat, tapering, loose; chaff white; grains in spikelet, 3, white, long, fairly plump.

Yield, 20.68 bushels per acre.

WHITE TRACK, (Md.) *Ripe*, June 29. Height 3.9 feet; straw coarse; heads smooth, flat, tapering slightly, sharply pointed, loose; chaff white; grains in spikelet, 3, spikelets coarse; grains dark red, short and plump.

Yield, 34.63 bushels per acre; weight per bushel, 59 pounds.

WHITE VELVET, (O.) *Ripe*, June 29. Height 4.2 feet; straw coarse; heads bearded, flat and thick, slightly tapering, loose; chaff white, velvet, covered with silvery hairs; grains in spikelet, 2, red, medium to large, fairly plump.

Yield, 33.65 bushels per acre.

WILD GOOSE, (O.) *Ripe*, July 2. Height 4.1 feet; straw medium

heads smooth, flat, tapering, sharply pointed, loose; chaff white; grains in spikelet, 3, red, short, plump.

Yield, 35.62 bushels per acre.

WILLETS, (Thor. and R. N-Y.) *Ripe*, July 2. Height 3.5 feet; straw coarse; heads smooth, short, square, nearly as large at tip as at base, very compact; chaff white; grains in spikelet, 3, light red, medium to long, fairly plump.

Yield, 28.59 bushels per acre.

WINTER GREEN, (O.) *Ripe*, June 27. Height 3.8 feet; straw slender; heads smooth, round, tapering towards both ends, sharply pointed, rather loose; chaff white; was in spikelet, 2, light red, medium in length, plump.

Yield, 31.91 bushels per acre.

WINTER PEARL, (O.) *Ripe*, June 29. Height. 4.1 feet; straw medium to slender; heads smooth, flat, tapering slightly, abruptly pointed, rather loose; chaff brown; grains in spikelet, 2-3, white, medium to long, fairly plump.

Yield, 32.64 bushels per acre.

WILTER, (O.) *Ripe*, June 29. Height 4.1 feet; straw slender to medium; heads smooth, flat and thick, sharply pointed, loose; chaff brown; grains in spikelet, 2, red, medium in size, fairly plump.

Yield, 35.30 bushels per acre; weight per bushel, 59 pounds.

WYANDOTTE RED, (O.) and (Md.) *Ripe*, June 27. Heights 4 and 3.8 feet ; straw medium to coarse; heads smooth, nearly square, tapering, rather loose; chaff white; grains in spikelet, 2-3, red, medium to short, plump.

Yield, (O.) 42.33, (Md.) 34.40 bushels per acre; average, 38.36 bushels.

WYSOR, (O.) *Ripe*, July 2. Height 4.2 feet; poor stand, plants in spring small, growth spreading; straw coarse to mediums heads smooth, round, sharply pointed, loose; chaff white; grains in spikelet, 2, red, long, badly shrunken.

Yield, 16.22 bushels per acre.

YELLOW ALABAMA, (Hackney.) *Ripe*, June 27. Height 3.3 feet; straw slender; heads smooth, flat, tapering sharply pointed, rather loose; chaff white; grains in spikelet, 2, red, short, plump to slender.

Yield, 33.60 bushels per acre ; weight per bushel, 60 pounds.

YELLOW BLUE STEM (O.) *Ripe*, July 2. Height 4 feet; straw medium in size; heads long, nearly square, tapering slightly, loose; chaff white; grains in spikelet, 2, red, long, slender.

Yield, 23.75 bushels per acre.

YELLOW MISSOURI, (O.) *Ripe*, June 29. Height 3.9 feet; straw medium to slender; heads smooth, round, tapering, sharply pointed, loose; chaff brown; grains in spikelet, 2, white, medium to *large*, shrunken.

Yield, 16.22 bushels per acre.

YORK WHITE CHAFF, (O.) *Ripe*, July 2. Height 3.9 feet; straw medium to coarse; heads smooth, long, flat and thick, slightly tapering, loose; chaff white; grains in spikelet, 3, light red, medium to large, fairly plump. Yield, 18.26 bushels per *acre*.

ZIMMERMAN, (Ks.) *Ripe*, June 27. Height 3.5 feet, straw slender; heads smooth, short, round, tapering, rather loose; chaff white; grains in spikelet, 2, red, medium in size, plump.

Yield, 34.65 bushels per acre; weight per bushel, 61 pounds. Yield in 1889, 31.54, in 1890, 34.33 bushels per acre. Average in three years, 33.51 bushels.