BULLETIN

OF THE

Ohio Agricultural Experiment Station.

NUMBER 78. APRIL, 1897.

CORN.

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EXPLANATION AND INTRODUCTION.

The results of two years' work done at Columbus, together with four years' work at Wooster, constitute the data from which the following report is made up. To some a part of the matter included in the following pages may read like ancient history and seem to be of no further importance, but after working the data at hand all carefully over I am of the opinion that the work done on the subject in hand within the last six years is of more value to the farmers of the state, reported in its present form, than it could have been had each year's work been reported upon separately. It was not, however, the intention, when the field work was done, to hold the reports any longer than seemed absolutely necessary, and this has not been done. The removal of the Station has perhaps interfered more in this department with the office work than with the field work. The latter has been continued almost without interruption, the notes and data have been carefully recorded and filed, to be put into shape for publication when time permitted. The time for getting together the work on corn has been longer deferred than any other division of the Station's work, and it has been left, not because it was less important, but for the reason that there seemed to be a less urgent demand for it than for the results of some other experiments, and for the further reason that with the great amount of extra work on hand, such as laying out roads, drives, tile drains, location of buildings and looking after these and other needed improvements, together with numerous duties of a miscellaneous character, something had to be left undone, and the assumption was that the corn work could be completed later more easily and better than some other things. With this explanation I will take up the subject under two general headings, as follows:

I. Cultural investigations.

II. Comparison of varieties.

I. CULTURAL INVESTIGATIONS.

Under this head the subject will be treated under the following subdivisions:

1. Deep and shallow plowing.
2. Distribution of seed.
3. Meteorological conditions.
4. Seed from different parts of the ear.
5. Methods of cultivation.
6. Effect of detasseling.
7. Maturing in shock, vs. on the stalk.

1. DEEP VS. SHALLOW PLOWING.

Only a single experiment has been made at this Station in deep plowing as compared with the more shallow plowing. This experiment was conducted in 1893. Early in April that year three plots, of a very stiff, timothy sod, were plowed for the purpose of making the test. The plots were adjacent to each other; the outside plots were plowed seven inches deep, and the middle one but three inches. The after preparation and cultivation were alike in every particular. The experiment is so limited that it is of but little value, but it is published with the hope that it will be possible to add a more extended list of duplicates later on. The figures show such a striking similarity that no effect can be ascribed to the difference in treatment. It should be added that this experiment was conducted on a clay soil.

CORN—TABLE I—DEEP VS. SHALLOW PLOWING.

		Yield per acre.
Plot No. 1.	Plowed seven inches deep	42.66 bushels.
Plot No. 2.	Plowed three inches deep	43.10 bushels.
Plot No. 3.	Plowed seven inches deep	43.07 bushels.

2. DISTRIBUTION OF SEED.

From the number of questions asked at farmers' institutes and elsewhere it is evident that an experiment upon drilling vs. hill planting of corn is one in which general interest is taken. This experiment was conducted during three years, while the Station was located at Columbus, and the general results from that very short series indicated that better yields were secured from an average stand of one stalk every 12 inches, and it apparently made very little difference whether the corn was grown with one stalk every 12 inches, two every 24, three every 36 or four every 48.

Since the Station's removal to Wayne county the experiment has been continued. It has been conducted on this farm four years, but the

season of 1893 gave such a small crop, and such irregular yields from duplicate plots, that it was thought best to eliminate the work of that year. Table II gives the results of the last three years' work in this experiment. The first column indicates the number of plots grown each year at different distances, and the results shown in the table are the yields from single plots or the average of two plots. Some differences in yield are indicated, but the results are shown to better advantage in Table III, which shows the average yields of the three years. In this average one grain every 12 inches or two grains every 24 show better returns than three grains placed every 36 inches or four grains every 48 inches.

Table III further shows that one grain every 18 inches is insufficient seeding to secure a maximum crop, though it does give the largest per cent of ears. The seeding of four grains every 42 inches is apparently too thick to give the best results, as it shows a higher per cent of nubbins than the plots where the distribution of seed averaged greater distances apart.

CORN—TABLE II.—THICK AND THIN SEEDING.

Distribution of seed.	No. of plot.	Yield per acre.		Percent. of ears.	Percent. of nubs.
		Grain.	Stalk.		
1894.		*Bushels.*	*Pounds.*	*Per cent.*	*Per cent.*
One grain every 12 inches	2	44.21	2,144	51	49
" " " 18 "	2	39.12	1,936	65	35
Two grains " 24 "	2	41.19	2,017	40	60
Three " " 36 "	1	39.60	1,851	46	54
Four " " 42 "	1	38.38	1,961	34	66
Four " " 48 "	1	39.90	1,758	42	58
1895.					
One grain every 12 inches	2	52.97	2,821	63	37
" " " 18 "	2	40.45	1,989	72	28
Two grains " 24 "	2	54.94	2,526	65	35
Three " " 36 "	1	45.01	2,278	55	45
Four " " 42 "	1	48.35	2,560	49	51
Four " " 48 "	1	50.46	2,625	56	44
1896.					
One grain every 12 inches	2	43.45	2,689	95	5
" " " 18 "	2	30.30	2,763	94	6
Two grains " 24 "	2	42.72	2,707	93	7
Three " " 36 "	2	42.39	2,375	93	7
Four " " 42 "	2	41.68	2,161	89	11
Four " " 48 "	2	38.19	2,157	90	10

CORN—TABLE III.—AVERAGE YIELDS FOR THREE YEARS FROM DIFFERENT DISTRIBUTION OF SEED.

Distribution of seed.	1894.	1895.	1896.	Avg.	Aver'ge percent of ear.	Aver'ge percent of nubbins.	Average stover.
	Bu.	*Bu.*	*Bu.*	*Bu.*			*Pounds.*
One grain every 12 inches.....	44.21	52.97	43.45	46.88	69	31	25.51
" " " 18 "	39.12	40.45	30.30	36.62	77	23	22.29
Two grains " 24 "	41.19	54.94	42.72	46.28	66	34	24.16
Three " " 36 "	39.60	45.01	42.39	42.33	65	35	21.68
Four " " 42 "	38.38	48.35	41.68	42.10	57	43	22.27
Four " " 48 "	39.90	50.46	38.19	42 85	63	37	21.80

3. METEOROLOGICAL CONDITIONS.

Two important factors in the growing of any crop are heat and moisture. This report would be incomplete without definite information on these lines. To this end I include in Tables IV and V data not only for the five months of the corn seasons of the years included in this report, but for all years that enter into any of the statistics herein given, covering the average temperature and average rainfall for the five corn growing months for the nine years closing with August, 1896.

CORN—TABLE IV.—MEAN TEMPERATURE AT THE STATION FOR THE FIVE MONTHS OF THE CORN SEASON FOR NINE YEARS.

Month.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	Av. 9 years.
	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
April	46.3	50.7	52.6	52.0	50.0	50,1	50.5	49.5	54.6	50.7
May	60.1	60 6	59.3	57.0	60.0	57.6	57.5	59.4	64.5	59.5
June	71.1	67.1	73.4	71.0	73.0	69.3	67.9	69.9	65.6	69.8
July.....	72.8	73.0	72 9	69.0	73.0	72.0	71.4	68.6	70.2	71.4
August.....	70.9	68.8	68.5	70.0	71.0	67.9	69.2	70.9	68.5	79.5

CORN—TABLE V.—RAINFALL ON STATION FARM DURING THE FIVE MONTHS OF THE CORN SEASON FOR NINE YEARS.

Month.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	Av. 9 years.
	In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
April	2.39	1.11	4.08	2.02	2.63	5.66	1.74	1.69	3.34	2.74
May	6.67	3.46	4.69	2.87	4 63	6.28	4 41	1.38	3.41	4.20
June	2.43	2.08	5.43	3.83	6.73	2.51	2.23	4.20	3.98	3.71
July	4.72	2.85	1.41	4.41	3.13	1.38	1.38	2.19	8.05	3.28
August	5.85	2.07	2.71	1.84	6.15	1.53	0 76	2.30	1.96	2.79
Total	22.06	11.57	18.32	14.97	23.27	17.36	10.52	11.76	20.74	16.72

4. SEED FROM DIFFERENT PARTS OF THE EAR.

Beginning with the season of 1888, the Station has conducted an experiment in growing corn on separate plots with seed from different parts of the ear, dividing it into three classes, by selecting each year grains from the butts, from the middles and from the tips.

It should be borne in mind that the seed used in this experiment has been grown continuously from the several parts of the ear, each year preserving seed from the butts of ears grown from the butt grains the year previous, middles from middles and tips from tips, in like manner, for nine consecutive seasons. Custom and earlier teaching had led me to believe that at the end of three or four years at most the continued use of either butt or tip grains would show a decreased yield, and possibly not only an inferior quantity of corn but a larger per cent of nubbins, and finally, inside of ten years, an extinction of the variety. Nine of the possible ten years have passed, and the table showing a summary of each year's work fails to even indicate the expected diminution in yield or the deterioration from planting butt and tip grains.

In the first five years this experiment was carried on at Columbus and for the later four years on the Station farm at Wooster. The cultivation and management given this work have been practically the same throughout. There has been no variation in the tillage of the several plots and no difference in time of cutting or husking; in short, the conditions have been made as nearly alike as possible in each season's work. During the first three years no record was kept of the number of barren stalks. The results are given in Table VI.

CORN—TABLE VI.—SEEDS FROM DIFFERENT PARTS OF THE EAR—YIELD PER ACRE CORRECTED TO A FULL STAND—SUMMARY OF NINE YEARS' EXPERIMENT.

Year.	Seed from.	No. of plots	Barren stalks.	Grain.				Total weight of stalks.
				Total.	Ears.	Nubbins.	Average weight of ears.	
			No.	*Bush.*	*Per cent.*	*Per cent.*	*Pounds.*	*Pounds.*
1888	Butts		.....	80.2	82	18	.....	2,953
	Middles		.....	80.8	83	17	.....	3,006
	Tips	3	.....	76.5	81	19	.....	3,184
1889	Butts		.....	77.1	86	14	.....	4,047
	Middles		.....	77.0	91	9	.....	4,087
	Tips		.....	77.7	89	11	.....	4,287
1890	Butts	2	.....	52.9	59	41	.....	2,905
	Middles	2	.....	45.4	43	57	.....	2,784
	Tips	1	.....	51.6	57	43	.....	3,285
1891	Butts	4	45	71.13	75	25	.....	4,080
	Middles	4	47	71.73	76	24	.....	3,822
	Tips	4	75	68.07	71	29	.....	3,892
1892	Butts	3	22	78.18	64	36	.....	4,283
	Middles	3	20	81.64	63	37	.....	4,282
	Tips	3	25	84.32	67	33	.....	4,228
1893	Butts	3	162	27.13	38	62	.....	1,466
	Middles	3	203	28.36	35	65	.....	1,623
	Tips	3	225	27.80	38	62	.....	1,590
1894	Butts	3	112	43.44	51	49	.....	2,106
	Middles	3	132	43.85	47	53	.....	2,396
	Tips	3	104	46.62	52	48	.....	1,886
1895	Butts	2	227	39.83	51	49	0.2905	1,905
	Middles	2	172	40.74	54	46	0.2971	2,330
	Tips	2	168	41.09	54	46	0.2996	2,335
1896	Butts	2	27	59.83	87	13	0.2181	1,890
	Middles	2	26	63.93	87	13	0.2389	2,000
	Tips	2	18	54.50	78	22	0.1987	2,080
Avr. for 9 years.	Butts	23	99	58.86	66	34	.....	2,848
	Middles	23	100	59.27	64	36	.....	2,925
	Tips	22	102	58.70	65	35	.....	2,974

The percentage of ears and nubbins may be regarded, not as absolutely correct, but only approximately so, for the reason that division was made on sight and not by measuring or weighing. The sorting was all done by the same man, so that it may be regarded as reasonably and practically fair. At time of harvesting, the last two seasons, we counted the entire number of ears and nubbins, and from the total weight calculated the average size of the ears and nubbins together, and have placed these figures in the table; only a very slight variation is noticeable in the average weight for 1895, but a greater difference is shown in the weight for 1896.

Attention has frequently been called to the fact that an experiment for a single season, standing alone, is of little value. Taking the figures in this table as being reliable, the further conclusion may be justly drawn that the results from a given experiment for a single season may be and often are misleading. To illustrate: It is only necessary to observe that if the results of the first year had been taken as final the conclusion could only have been that the tip grains gave a decidedly lower yield per acre than either the butt or middle grains of the ear. Taking again the experiment of 1889 alone the figures justify the conclusion that butt, middle and tip grains produce equally good crops. Following on down we find that the experiments of 1888 and 1891 agree in showing similar variations with further evidence against the grains from the tip of the ear. But dropping down one year further and singling out the results of that season we draw the opposite conclusion, that the tip grains are after all the best, for we have more bushels of corn per acre, a higher per cent. of ears, and therefore less nubbins than from either the butt or middle grains. Similar conclusions would be drawn at the close of the seasons of 1894 and 1895, and the further important point that in these last two seasons the number of barren stalks has been less from seed from the tips than from the other divisions of the ear.

At the end of the eighth season I carefully computed the results of all the experiments conducted at this Station along this line, and found that in yield for the eight consecutive seasons, the average stood as follows: 58.74 bushels from the butt grains; 58.69 bushels from the middle grains and 59.21 bushels from the tip grains used as seed; a variation in average yield of about one-half bushel per acre in favor of seed from the tip of the ear. The ninth consecutive trial has changed in a slight degree the final outcome, giving the average yield in bushels per acre as follows: 58.86 bushels from the butt grains; 59.27 from the middle and 58.70 from the tip grains. Barren stalks, 99 from butts; 100 from middle and 102 from tip grains out of a possible 960. The per cent. of ears, in the same order as above, stood 66, 64 and 65 per cent. respectively, and the average weight of stalks per acre from the nine years' trial shows a variation of only a little over one hundred pounds. The table further shows that this experiment has been duplicated twenty-three times in the case of the butt and middle grains and twenty-two times with the tip grains. Further, it should be remembered that the seed was the ninth generation, giving every opportunity for degeneration.

During the several seasons over which this experiment was conducted, observations were repeatedly made to detect differences in growth or variations in time of maturing, but no certain or continued differences were noticeable. If they existed at all it was in a manner similar to other variations given in the table, and not constant or of a permanent character.

While this experiment demonstrates that the grains from one part of an ear of corn are apparently as good as those from any other part for seed purposes, and that the crop produced from continuous seeding does not deteriorate, there is after all one fatal objection to using the grains from the several parts of the ear indiscriminately. This objection exists in the fact that with modern planting machinery it is not possible so to regulate the feed as to secure an even distribution of the seed and a uniform stand of corn from grains of uneven size.

The best results are reached only by selecting that part of the ear bearing grains most uniform in size, which naturally leads to the discarding of the butt and tip grains and the use of the middle grains, not because of their greater vitality, not because they reproduce their kind with more certainty or greater accuracy, nor that they pollenize more perfectly, but because seed and labor are saved as a result of more regular and uniform work in planting.

5. SURFACE VS. DEEP CULTIVATION.

During five of the last six years an experiment has been conducted in deep and surface cultivation of corn. Within that time various implements have been patented and placed upon the market, with a view to perfecting the system of shallow or surface cultivation. During these six years the Station has tested three of these cultivators, namely: the "Reindeer," the "Nicholas Roggy" and the "Tower Brothers' Surface Cultivator." Each of these has been some improvement on its predecessor, and all are decidedly capable of doing more perfect work than the old cultivator. All are good tools of their kind, but it seems that it would be possible to improve on even the best of them and make a more perfect cultivator. In these experiments we have used for deep cultivation either a one- or two-horse, iron double-shovel, working the ground from three to five inches deep, perhaps averaging about four inches. This has naturally left the ground very much ridged, with furrows between the rows, leaving always, after the first cultivation, more surface exposed than on the plots adjoining that were cultivated or stirred just as little as possible with the tool in use. This condition would favor the more rapid evaporation of moisture from the deeply cultivated plots, and the mere stirring of the surface on the other plots had, or seemed to have, the opposite effect, i.e., producing conditions favoring the retention of moisture because of the smaller surface exposed.

The results are summarized in Table VII:

CORN—TABLE VII—DEEP VS. SHALLOW CULTIVATION.

Year.	Cultivation.	Implement used.	Depth of cultivation.	No. of duplicate plots.	Average yield per acre.		Barr'n stalks.	Wt. of ears.
					Grain.	Stover		
			In.	*No.*	*Bush.*	*Lbs.*	*No.*	*Lbs.*
1891	Deep.....	Double shovel.....	.....	3	77.4	3,250	.....	.....
	Shallow..	Spring-tooth cultivator..	.....	3	86.5	3,376	.....	.....
*1891	Deep.	Double shovel.....	.....	3	76.8	3,073	.....	.....
	Shallow..	Spring-tooth cultivator..	.....	3	85.0	3,216	.....	.....
1892	Deep.....	Double shovel.....	4	4	73.8	3,235	35	.....
	Shallow..	Spring-tooth cultivator..	1½	4	77.1	3,332	34	.....
1895	Deep.....	Double shovel.....	4	3	59.5	3,582	78	0.4268
	Shallow..	Spring-tooth cultivator..	1½	3	61.6	3,928	78	0.4693
1896	Deep.....	Double shovel.....	4	2	58 5	3,792	20	0.4267
	Shallow..	Spring-tooth cultivator..	1½	2	66.0	4,462	29	0.4813
Average from deep cultivation, four years..			.....	15	69.2	3,388	.....	.....
Average from shallow cultivation, four yrs.			.....	15	75.4	3,662	.....	.....

*Duplicate series.

Many good corn growers produce good crops by the old methods of deep stirring and look upon surface cultivation as a mere fad. When Ohio soils were virgin and teeming with vegetable matter and plant food, deep tillage with root pruning may have been the proper method; but theory and practice, each modified by the other, teach a new lesson in the closing years of the present century. While theory gives the reason, practice demonstrates the correctness of that reason. By referring to Table VII, we find that the difference in yield from the two methods of cultivation has been greater some seasons than others, but in all seasons of the test thus far the greater crops have grown from the shallower tillage. It should be mentioned here that the experiments of 1891 and 1892 were conducted on an alluvial and gravelly soil, on the bottom lands of the Olentangy river, near Columbus, while the later experiments of 1895 and 1896 were made on the thin clay soil of northeastern Ohio, soils as different in characteristics as it would be possible to find within the state.

This experiment was duplicated in 1893, but the corn failing to mature was all cut and put into the silo. It was not expected that the fodder in the two methods of cultivation would show marked differences, and while the variation has been small, the yield has been slightly heavier from the plats receiving the shallow cultivation.

The variation in the number of barren stalks has been very small—not sufficient to even suggest that method of cultivation has anything to do with perfecting the number of ears.

It should be noted that the table gives only a summary of the four years' tests. Each year the averages of a series of plots are given in both deep and surface tillage, and the final summary gives the general average, covering the four years and including the equivalent of fifteen duplications of this experiment, all giving substantially the same evidence, the final average showing about six bushels increase per acre from surface cultivation.

Six bushels is, when considered in connection with the number of acres of corn grown in the state, a large increase; according to the state crop reports the area in corn in Ohio since 1890 has averaged more than 2,500,000 acres each year. According to the best information I have been able to gather, more than half these acres have been cultivated with deep working implements. It is therefore safe to estimate that the corn crop of the state of Ohio might have been increased two bushels to each acre, an aggregate of five million bushels each year; estimating this increased yield at the lowest price, eighteen cents per bushel, would make the average increased value of the corn nine hundred thousand dollars for each of the last six years. The experiments of the four years have not given any evidence against shallow cultivation, nor any in favor of the deeper tillage, consequently it is urged that it is worthy of trial; and it is my belief that it will apply quite as well to one part of the state as to another and to one soil as well as to another.

A trial on a small scale can do no harm and may demonstrate to the more skeptical that it is the modern way to produce best results. In the same connection it is well to consider that shallow cultivation means fewer weeds to contend with and less exertion expended in tillage.*

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*Experiments made by this Station in 1888 and 1889, seemed to favor comparative deep cultivation; but in these tests the implements used for shallow culture were less perfect than those since employed.

Since 1888 comparative tests in the deep and shallow cultivation of corn have been made by a large number of experiment stations. In Bulletin 33, of the Mississippi Experiment Station, dated March, 1895, the following statement is made:

"We have examined the records of 116 such tests [in deep and shallow culture of corn] made at thirteen different stations, and find that sixty-one tests of deep cultivation gave an average yield of 64.9 bushels per acre, while fifty-five tests of shallow cultivation gave an average yield of 74.7 bushels, a difference of 9.8 bushels per acre, or more than 15 per cent. in favor of shallow cultivation."

In the following table we have grouped these tests and others since reported and summarized in the *Experiment Station Record*, considering the tests of a single year by each station as a single experiment, and classifying them according as their results were interpreted as favoring shallow culture, as inconclusive, or as favoring deep culture:

6. THE EFFECT OF DETASSELING CORN.

The Experiment Station of Cornell University conducted an experiment in 1890, showing very decided beneficial results from removing the tassels from a part of the growing corn; their calculations showing about fifty per cent. gain from the rows from which the tassels were removed, over the alternate rows on which the tassels were allowed to remain.

This remarkable showing caused a similar experiment to be undertaken at the Ohio Station in 1891. 32 rows of corn, running over quite uniform land, were selected, upon which to make this trial. On August 1st the tassels were pulled from each alternate row. At cutting time four rows, having the tassels removed, were cut and shocked together; then four rows from which the tassels had not been removed were shocked together; continuing this throughout the 32 rows selected we had, when done, four shock-rows of each. When husked, the corn from each shock-row was weighed separately, the unmerchantable being separated from the merchantable corn, and the yield of each was calculated separately. The results are set forth in Table VIII, and show that the average unmerchantable corn from the four plots from which the tassels had been

EXPERIMENTS IN DEEP AND SHALLOW CULTIVATION OF CORN.

Stations.	Latest bulletin (B) or report (R) quoted.	Total No. of experiments.	Results.		
			No. favoring shallow culture.	No. inconclusive	No. favoring deep culture
Alabama	C. B. 3, Jan., 1889	3	3		
Georgia	B. 20, Feb., 1893	3		2	1
Illinois	B. 31, Mar., 1894	5	5		
Indiana	B. 43, Mar., 1893	5	3	1	1
Kansas	B. 56, Dec., 1895	3	1		2
Maryland	B. 25, Mar., 1894	2	2		
Minnesota	R. — —— 1894	3	2	1	
Mississippi	B. 33, Mar., 1895	2	1		1
Missouri	B. 32, Oct., 1895	2	2		
Ohio	B. 78, Apr., 1897	7	5		2
Oklahoma	B. 10, Apr., 1894	1		1	
Pennsylvania	R. — —— 1891	1			1
South Carolina	R. — —— 1889	2		2	
South Dakota	R. — —— 1889	1	1		
Utah	R. — —— 1893	1	1		
Wisconsin	R. — —— 1894	4	1		3
Totals		45	27	7	11

Judging from this table, the weight of evidence is decidedly in favor of shallow culture, and it seems probable that it would be still more conclusive, were all the conditions known. For instance, in the Wisconsin experiments and some others, the "deep" culture was only three inches deep; but this would hardly be considered very deep cultivation. In this connection it should be noted that studies of the root growth of corn, made by the Illinois Experiment Station, indicate that a plow running four inches deep may cut off 50 per cent. more roots than one running only three inches deep.

removed amounted to 26 per cent., while the average unmerchantable corn from the other four rows was 21 per cent. The calculations also show a yield of one bushel less per acre where the tassels had been removed. These results were so far from agreeing with the results at the Cornell Experiment Station that it was deemed best to repeat the experiment the following season. The negative results of 1891 made it seem possible that the time of pulling the tassels might be the important factor. To obviate this, in the second test the tassels were removed from sufficient corn to make three shock rows on the 17th of July, just as the tassels were coming out. Again on the 27th, tassels were removed from enough to make three other shock rows. On both dates every alternate row of corn was left with tassels undisturbed. At cutting and husking times the same plan was followed as in the previous year, and from the results given in the table it does not appear that the time of removing the tassels has had any material effect upon the yield of corn. The yields all agree in giving evidence of a reduced crop where the tassels were removed, averaging in the experiment of 1892 three bushels per acre.

The theory upon which this experiment is based is that the energy that naturally goes to the maturing of the tassel and production of pollen may be diverted to the use of the grain by removing the tassels. In these experiments, however, the practice does not bear out the theory, hence the theory must be at fault.

In addition to the reduced yield it cost at the least calculation one dollar and a half per acre to remove the tassels.*

*Ten Experiment Stations have published experiments in detasseling corn, the results of which are summarized below; the table giving the number of tests in which an increase, decrease or no effect was observed.

Station.	Total number of tests.	Effect.		
		Crop increased.	No effect.	Crop decreased.
Cornell University	4	3	1	.....
Delaware	2	2	.....	.....
Georgia	1	.....	1	.....
Illinois	2	.....	1	1
Kansas	3	1	1	1
Maryland	1	.....	.....	1
Nebraska	2	.....	.....	2
Ohio	2	.....	1	1
South Carolina	1	1	.....	.....
Utah	2	.....	.....	2
Totals	20	7	5	8

CORN—TABLE VIII—EFFECT OF DETASSELING CORN; 1891 AND 1892.

Yield of grain in bushels per acre

Condition.	Merchantable.	Unmerchantable.	Total.
1891—No. 1, Tops left on	38.5	9.7	48.2
" 2, " pulled out August 1	34.7	11.6	46.3
" 3, " left on	35.1	9.3	44.4
" 4, " pulled out August 1	32.4	12.7	45.1
" 5, " left on	36.0	12.0	48.0
" 6, " pulled out August 1	34.0	14.4	48.5
" 7, " left on	35.4	12.4	47.8
" 8, " pulled out	32.0	12.6	44.6
Average for tops left on	36.2	10.8	47.0
Average for tops pulled out	33.2	12.8	46.0
1892—No. 1, Tops pulled out July 17	.....	.....	77.8
" 2, " left on	.....	.....	81.4
" 3, " pulled out July 17	.....	.....	77.3
" 4, " left on	.....	.....	79.0
" 5, " pulled out July 17	.....	.....	77.0
" 6, " left on	.....	.....	80.9
" 7, " pulled out July 27	.....	.....	79.4
" 8, " left on	.....	.....	82.7
" 9, " pulled out July 27	.....	.....	78.7
" 10, " left on	.....	.....	82.5
" 11, " pulled out July 27	.....	.....	76.8
" 12, " left on	.....	.....	78.3
Average from plots with tops pulled out	.....	.....	77.8
Average from plots with tops left on	.....	.....	80.9

7. METHODS OF HARVESTING.

During the season of 1889 a piece of standing corn, quite uniform in stand and in general appearance, was selected and divided into three parts. The first of these was cut and put into shocks of the usual size, eight hills square; the second piece was topped, while the third remained undisturbed to mature upon the stalk. This corn was all harvested at the same time, with the following actual yields: the standing corn produced at the rate of 80 bushels to the acre; the topped corn at the rate of 75.9 bushels; while the shocked corn produced 65.1 bushels. These results were so much in favor of the standing corn that the experiment was repeated a year later, and instead of using a single plot of each for comparison, three plots of each, or three duplicate tests were made. The average results were in opposition to those of the season before. The standing plots averaged 64.5 bushels per acre; the topped plots 65.3 bushels and the shocked plots 72. 6 bushels per acre. In addition to the experiments conducted at the Station, three farmers in different parts of the state conducted similar experiments. The results in two of these duplications were in favor of the standing corn, while the third one gave the largest product where the corn was shocked (see Bulletin No. 1, Volume IV). Up to this time the results were so conflicting that the only explanation that seemed plausible was, that the variation must be due to difference in soil or difference in degree of ripeness at time of cutting. In order to guard against local conditions of soil and possible variations of variety of corn, it was thought best to duplicate the work in different parts of the state and with different varieties of corn. Four kinds were selected, no two of which would mature at the same time; these were sent in 1891 into ten counties of the state, to men who it was thought would carry out the experiment and make careful weighings of results and accurate reports of work done. These gentlemen took an unusual interest, and I believe in every instance conducted the experiment and reported it with more than ordinary care.

The results, as reported, are given in Table IX, also the kind of soil upon which each test was made, the county in which it was conducted and by whom, together with such other data as have seemed of sufficient interest to be included in this report. Full credit is due each one taking part in this work, for the faithful effort to make it satisfactory and the results reliable.

CORN—TABLE IX—SHOCKED VS. STANDING.

Experimenter.	County.	Kind of soil.	Variety.	Date of planting.	Date of cutting.	Days from planting to cutting.	Yield per acre.		Sound corn.	
							Cut.	St'ding.	Cut.	St'g.
						Number	*Bushels.*	*Bushels.*	*Per cent.*	*Per cent.*
D. H. Wilder	Trumbull	Clay loam	White Cap				65.13	61.80		
J. F. Leyde	Carroll	Sandy loam	Hess' White	May 15	Sep. 22	130	33.00	36.14	65	65
"	"	"	Leaming	" 15	" 22	130	40.00	41.28	80	80
"	"	"	Clarage	" 15	" 22	130	38.14	39.14	85	85
M. N. Taylor	"	Upland gravelly loam	Hess' White	" 14	" 24	133	48 00	60.42	77	75
"	"	"	Leaming	" 14	" 24	133	56.92	57.15	80	80
"	"	"	Clarage	" 14	" 24	133	43.00	49.18	85	80
Henry Bentley	Columbiana	Clay loam	Leaming	" 8	" 26	141	49.45	48.14	30	30
W. H. Meeker	Trumbull	Gravelly	Hess' White	" 28	Oct. 3	128	45.25	44.22	30	40
"	"	"	Leaming	" 28	" 3	128	33.60	34.97	45	50
"	"	"	Clarage	" 28	" 3	128	47.31	45.80	75	80
F. L. Corbett	Wayne	Light clay generally	"	" 16	" 9	146	68.89	62.00	87	80
F. L. Balmot	Stark	Sandy loam	Hess' White	" 14	Sep. 15	124	67.81	70.50	90	80
"	"	"	Leaming	" 20	" 15	118	63.12	64.45	95	95
"	"	"	Clarage	" 20	" 15	118	65.80	66.47	95	95
"	"	"	F. Favorite	" 14	" 15	124	73.85	80.57	25	30
E. F. Cranz	Summit	Light, sandy loam	Hess' White	" 11	Oct. 3	145	73.28	66.00	90	71
"	"	"	Leaming	" 11	" 3	145	83.14	72.42	88	78
"	"	"	Clarage	" 11	" 3	145	65.71	72.85	86	90
"	"	"	F. Favorite	" 11	" 3	145	58.42	64.85	14	8
M. B. Cowles	Ashtabula	Sandy	Hess' White	" 27	" 12	138	55.78	40.07	90	71
"	"	"	Leaming	" 27	" 12	138	69.85	61.57	83	75
"	"	"	Clarage	" 27	" 12	138	49.57	40.42	85	81
E. McCann	Muskingum	Limestone, hill land	Hess' White	" 25	" 5	133	44.00	46.57	80	80
"	"	"	Leaming	" 25	" 5	133	45.28	48.00	85	85

CORN—TABLE IX—Concluded.

Experimenter.	County.	Kind of soil.	Variety.	Date of planting.	Date of cutting.	Days from planting to cutting.	Yield per acre.		Sound corn.	
							Cut.	St'ding.	Cut.	St'g.
						Number	*Bushels.*	*Bushels.*	*Per cent.*	*Per cent.*
E. McCann	Muskingum	Limestone, hill land	Clarage	May 25	Oct. 5	133	40.85	38 42	85	85
"	"	"	F. Favorite	" 25	" 5	133	40.14	46.57	00	00
M. E. Eidenmiller	Miami	Sandy loam over gravel	Hess' White	" 10	Sep. 22	135	47.85	46.85	95	95
"	"	"	Leaming	" 10	" 22	135	51.28	39.14	95	98
"	"	"	Clarage	" 10	" 22	135	37.85	31.71	95	100
"	"	"	F. Favorite	" 10	" 22	135	28.71	25.71	10	10
Summary of Table IX			Hess' White				51.75	51.35	73	70
			Leaming				54.78	51.90	76	74
			Clarage				50.79	49.52	86	88
			F. Favorite				50.28	54.42	12	11

In the general summary of Table IX, it is shown that the average yield of Hess' White, when cut and shocked, was 51.75 bushels, against 51.35 bushels when left standing. The detailed results show that in four of the eight comparative tests with this variety the yield was greater from the shocked corn, and in four it was greater from the standing corn.

The nine trials with Leaming gave average yields of 54.78 bushels from the shocked corn and 51.90 bushels from the standing corn. In four of these trials the yield was greater from the shocked, and in five from the standing corn.

The nine trials with Clarage gave average yields of 50.79 bushels from the shocked and 49.52 bushels from the standing corn. In five of these trials the yield was greater from the shocked, and in four from the standing corn.

The four trials of Farmer's Favorite show average yields of 50.28 bushels from the shocked and 54.42 bushels from the standing corn. In one of these tests the yield was greater from the shocked, and in three from the standing corn.

The average percentage of sound corn in the Hess' White variety was 73 from the shocked corn and 70 from the standing corn. Four experimenters found the percentage of sound corn larger in the shocked corn, three found it equal and one found it smaller.

In the Leaming, one experimenter found the percentage of sound corn larger in the shocks, five found it equal and three found it smaller; the average results indicating 76 percent. in the shocks against 74 percent. in the standing corn.

In the Clarage, one experimenter found more sound corn in the shocks, three found the percentage equal and five found it smaller; the average being 86 for the shocked corn against 88 for the standing corn.

In the Farmer's Favorite, one experimenter found more sound corn in the shocks, one found less and one an equal quantity, while one reports no sound corn in either case. The results indicate an almost total failure to mature in this variety.

To the casual reader the results of these tests are apparently negative, but the above comparison of the average percent. of sound corn in the cut and uncut, brings out a point worthy of notice and to my mind furnishes the key to the situation. In the comparison of the four varieties it is noted that all except the Clarage have in the average an equal or smaller percent. of sound corn when husked from the stalk than when husked from the shock, while the Clarage shows a higher average percent. of dry corn when husked from the stalk than when husked from the shock. The explanation is that in the case of the Farmer's Favorite the corn does not dry out in either case, while some of the Leam-

ing and Hess' White has continued to grow when left standing until frost nipped it, which resulted in leaving it immature. The Clarage, an earlier maturing kind, has been so far advanced at cutting time that the part left standing has not been injured by frost and the corn not shocked has dried out better than that which was cut. By referring to Table IX it will be readily seen that the Clarage corn has ripened in all the counties where it has been tried, as shown by its uniformly high percentage of sound corn. The Leaming and Hess' White have matured in some places and failed in others, while the Farmer's Favorite has failed to mature at all points where tried.

From a careful study of all the work done along this line, with all possible evidence included that seems to help solve the problem, it is apparently just to conclude that, in the case of corn sufficiently matured at cutting time, the difference in yield of grain per acre between that cut and that left to mature standing will be very slight.

With varieties that are not sufficiently matured at cutting time, the experiments thus far indicate that unless they are very green more sound corn will be secured from cutting and shocking than from allowing the corn to remain on the stalk to take chances.

Incidentally, the experiment brings out the fact that the variety known as Farmer's Favorite requires a longer season to mature than our climate affords. Leaming and Hess' White are not to be depended upon north of the 40th parallel, while the Clarage may be grown safely anywhere within the state.

In addition to the co-operative experiment conducted in 1891, the Station has continued the work each year (except 1892), on a small scale, the results of which are given in Table X. The figures of the several duplications agree fairly well, and the average results demonstrate that it is hardly possible to secure, for two years in succession, a like increase or decrease from the same method of harvesting, and we can only reach a similar conclusion from the average of the series of tests, in which we have 55 20 bushels average crop from the shocked corn and 54.45 bushels from the standing.

CORN—TABLE X—SHOCKED VS. STANDING.

Plot No.	1891.		1893.		1894.		1895.	
	Shocked.	Standing.	Shocked.	Standing.	Shocked.	Standing.	Shocked.	Standing.
1	82.85		52.29		14.03		67.18	
2		83.33		39.44		15.94		63.75
3	84.97		56.77		12.61			
4		86.49		54.77		15.04		
5	87.96		55.32					
6		98.37		51.78				
7	86.40							
8		91.25						
Average	85.54	89.86	54.79	48.69	13.32	15.49	67.18	63.75

Average for four years, shocked, 55.20 bushels.
" " " standing, 54.45 "

II. COMPARATIVE TEST OF VARIETIES.

1. COMPARISON OF VARIETIES AT THE STATION.

As explained in the first part of this bulletin, the work herein reported covers a series of years, including two years' work at Columbus and three at Wooster. The data collected are so great in the aggregate that it is thought best not to publish each year's results, section by section, but to condense the work of the five years into a single table, giving what seem to be the more important points brought out by the series of investigations. To compile such a table is a difficult task. It is especially so where one undertakes to include all points that may be of future interest, and at the same time make such comparisons as will be of value to the reader. This statement will be better understood when the fact is made known that many varieties of corn which it has been thought necessary to include in the test from year to year are not to be found on the market more than two or three seasons in succession. Seedsmen, as a rule, prefer to introduce new varieties, or old ones under new names, not because these so-called new varieties are better for the grower, but because the new name gives liberty to extol its wonderful productiveness and as a result increase its sales. Had it been possible to secure the seed of the same varieties for a series of years, and had the published statements of some seedsmen been correct in every particular, our table would have been much more easily compiled and would have given more interesting results.

Seventy-six differently named sorts are included in the five-year series, but only 5 out of the 76 have been included in each of the five years. Only 10 have been included four years, 23 for three years, and the others but one and two years. Table XI gives in condensed form the class to which each variety belongs, the number of years it has been grown, the average number of bushels produced at time of husking, the average percentage of shrinkage, the average yield per acre after deducting shrinkage, the average weight of a measured bushel, the average weight of cobs in a bushel of ears, the number of years the variety has ripened and the number it has failed to mature, and the average weight of fodder per acre.

CORN—TABLE XI.—COMPARISON OF VARIETIES.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Large Yellow Dent.	*No.*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
Big Buckeye	3	1	61.30	50.08	20	53	170	12.2	3,731
Clarage	3	3	46.91	41.90	11	55	201	9.5	2,553
Chester Co. Mammoth	2	0	68.47	56.11	20	54	130	11.4	4,644
Clarage	2	2	52.33	47.92	8	55	173	8.4	2,860
Cloud's Early	2	0	73.11	57.94	29	46	156	12.8	6,266
Clarage	2	2	52.33	47.92	8	55	173	8.4	2,860
Golden Beauty	4	0	74.11	60.00	22	50	177	11.7	4 449
Clarage	4		53.24	48.14	10	54	193	9.3	2,711
Leaming	5	3	61.36	51.93	15	54	191	11.5	2,858
Clarage	5	5	53.27	47.06	12	54	193	10.3	2,741
Murdock's Favorite	3	3	42.90	38.90	11	55	233	10.2	1,889
Clarage	3	3	53.89	46.81	14	54	206	11.4	2,663
Farmer's Favorite	2	0	93.99	74.89	22	49	127	16.2	5,952
Clarage	2	2	71.20	66.20	7	55	173	10.5	3,320
Riley's Favorite	4	1	54.01	45.10	17	51	210	16.0	3,436
Clarage	4	4	49.03	42.94	13	54	194	11.3	2,563

CORN—TABLE XI.—COMPARISON OF VARIETIES—Continued.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Large Yellow Dent—Cont'd.	*No.*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
Early Mastodon	3	0	58.47	46.37	22	50	199	9.8	3,909
Clarage	3	3	47.57	43.02	11	53	198	9.4	2,463
Pennsylvania's Early	3	0	73.33	55.58	26	50	149	12.3	3,726
Clarage	3	3	53.89	46.81	14	54	206	11.4	2,663
Capital	2	0	57.07	46.95	20	52	205	12.3	3,179
Clarage	2	2	53.32	49.60	7	52	168	9.0	2,724
Hughes	2	0	62.61	52.59	23	51	223	14.5	4,514
Clarage	2	2	52.33	47.92	8	55	173	8.4	2,860
Dr. Woodhull	4	0	57.70	41.08	28	53	178	15.5	3,895
Clarage	4	4	48.54	42.10	13	55	199	9.7	2,631
Waterloo Early	2	0	49.46	37.00	25	51	208	12.1	2,603
Clarage	2	2	44.74	36.28	18	55	225	11.9	2,401
Early Eclipse	3	0	53.30	39.15	26	51	180	10.4	4,151
Clarage	3	3	44.74	36.28	18	55	225	11.9	2,401

CORN—TABLE XI.—COMPARISON OF VARIETIES—Continued.

Class and variety.	Years matured.	Years tested.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Large Yellow Dent—Concl'd.	*No.*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
Bristol 100-day	2	2	52.37	37.53	28	53	185	15.5	2,910
Clarage	2	2	44.74	36.28	18	55	225	11.9	2,401
Early California	1	1	76.15	73.11	4	54	176	11.7	3,404
Clarage	1	1	72.21	67.88	6	53	168	10.4	3,185
Mammoth Cuban	1	1	77.87	73.49	8	52	152	11.4	2,848
Thompson's Golden	1	1	87.04	71.38	18	50	134	11.9	3,527
Burpee's Golden Beauty	1	0	98.89	81 59	17	55	128	11.8	5,744
Iowa Gold Mine	1	1	40.66	29.69	27	52	226	9.6	2,376
J. P. Moore	1	0	81.22	51.99	36	42	110	15.3	6,014
Champion Yellow	1	0	54.04	34.39	36	48	172	12.0	2,727
Golden Dent	1	0	38.92	35.81	8	52	252	11.9	5,100
Clarage	1	1	70.24	64.52	8	57	178	9.9	3,456
Medium Yellow Dent.									
Queen of the Prairie	2	2	56.30	55.04	2	56	219	9.4	2,464
Clarage	2	2	71.22	66.20	7	55	113	10.5	3,320
Early Butler	4	4	38.15	34.23	10	54	269	9.3	1,867
Clarage	4	4	49.03	42.94	13	54	194	11.3	2,563

CORN—TABLE XI.—COMPARISON OF VARIETIES—Continued.

Class and variety.	Years matured.	Years tested.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Med. Yellow Dent—Cont'd.	*No.*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
King of the Earlies	3	3	42.22	39.29	8	54	285	9.1	2,102
Pride of the North	3	3	40.39	37.29	9	55	273	9.2	2,116
Clarage	3	3	53.24	45.69	15	55	209	10.7	2,753
Mortgage Lifter	3	2	45.99	34.63	23	51	223	11.8	3,101
Clarage	3	3	41.30	34.63	15	54	206	9.9	2,355
Sterling	2	1	35.22	24.05	32	49	234	14.4	3,096
Stewart's California	2.	0	38.69	29.79	23	49	257	12.7	2,966
Clarage	2	2	35.25	30.59	13	53	213	8.8	2,102
McGinnis	1	1	27.42	20.84	24	52	240	12.9	1,351
Clarage	1	1	34.43	31.33	9	52	168	6.9	2,264
Early Colossal	1	1	38.66	30.16	22	52	240	14.4	2,856
Salger's Earliest	1	1	33.28	29.13	13	54	250	9.6	1,385
Clarage	1	1	36.08	29.85	17	55	258	11.8	1,940
Maumee Valley	1	1	26.85	20.95	22	55	282	12.6	2,150
Golden Seal	1	1	27.56	21.23	23	53	268	12.7	2,142
Clarage	1	1	53.40	42.72	20	55	192	12.3	2,863

CORN—TABLE XI.—COMPARISON OF VARIETIES—Continued.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shringage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Medium Yellow Dent-Concl'd	*No.*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
Southern Queen	1	0	37.38	27.67	26	52	210	14.2	3,204
Early Golden Cable	1	0	36.13	25.42	30	49	236	10.0	3,830
Clarage	1	1	53.40	42.72	20	55	192	12.3	2,863
Small Yellow Dent.									
Extra Early Huron Dent	3	3	36.31	32.64	11	54	320	11.0	1,820
Clarage	3	3	41.30	34.63	15	54	206	9.9	2,355
Golden Prolific	2	1	40.87	35.26	13	54	283	10.5	2,272
Clarage	2	2	35.25	30.59	13	53	213	8.8	2,102
Queen of the North	1	1	31.99	28.80	10	52	332	9.3	1,476
Clarage	1	1	34.43	31.33	9	52	168	6.9	2,264
Large White Dent.									
Mammoth White Surprise	5	0	69.29	47.89	32	44	158	13.4	5,180
Clarage	5	5	53.27	47.06	12	54	193	10.3	2,741
White Giant Normandy	2	0	70.69	50.30	32	47	154	16.5	6,518
Clarage	2	2	54.14	48.86	11	54	213	11.0	2,562

CORN—TABLE XI.—COMPARISON OF VARIETIES—Continued.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Large White Dent—Cont'd.	*No.*	*No.*	*Bu.*	*Percent.*	*Pds.*	*Bu.*	*No.*	*Pds.*	*Pds.*
Red Cob	2	0	105.04	90.17	14	52	144	12.2	4,756
Clarage	2	2	71.22	66.20	7	55	173	10.5	3,320
St. Charles White	3	0	60.14	37.54	31	47	167	14.2	6,613
Clarage	3	3	53.89	46.81	14	54	206	11.4	2,663
Hess' White	5	3	55.40	48.23	18	53	195	11.9	3,087
Clarage	5	5	53.27	47.06	12	54	193	10.3	2,741
Maryland White	2	2	87.85	73.97	16	52	136	11.7	4,958
Clarage	2	2	71.22	66.20	7	55	173	10.5	3,320
Mammoth White	4	0	60.83	44.56	28	49	196	13.6	3,562
Clarage	4	4	48.54	42.10	13	55	199	9.6	2,631
Early White Dawn	3	2	49.54	40.75	20	52	229	10.5	2,246
Clarage	3	3	52.69	46.19	12	55	179	9.5	2,861
Hickory King	2	2	59.30	46.16	24	50	202	19.5	5,384
Clarage	2	2	61.82	53.62	14	56	185	10.6	3,159

CORN—TABLE XI.—COMPARISON OF VARIETIES—Continued.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Large White Dent—Cont'd.	*No.*	.	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
Champion White Pearl	2	0	36.90	26.11	29	49	249	14 8	2,541
Clarage	2	2	43.91	37.02	14	53	180	8.9	2,563
Champaign Co. Prolific	2	0	38.74	28.46	26	51	244	13.2	2,668
Clarage	2	2	35.25	30.59	13	53	213	8.8	2,102
Dungan's White Prolific	3	0	49.54	33.31	32	51	219	15.4	3,892
Clarage	3	3	41.30	34.63	15	54	206	9.9	2,355
Early Giant White	2	0	43.67	33.10	25	52	219	12.1	1 851
Premium White	2	2	54.54	38.20	29	52	171	13.8	3,782
Forsythe's White	2	0	63.45	39.75	36	48	157	15.3	5,184
Clarage	2	2	44.74	36.28	18	55	225	11.9	2,401
Nebraska White Prize	1	0	76 32	64.12	16	52	150	11.7	3,780
Rustler White	1	1	70 52	66.39	6	52	194	11.9	3,336
Mosby's Prolific	1	0	55.65	40.07	28	45	198	13.6	2,700
Clarage	1	1	72.21	67.88	6	53	168	10.4	3,185
White Kansas King	1	1	83.38	67.54	19	53	148	7.7	7,267
Blount's Prolific	1	0	59 78	52.61	12	58	198	10.3	3,237
Clarage	1	1	70.24	64.52	8	57	178	9.9	3,456

CORN—TABLE XI.—COMPARISON OF VARIETIES—Concluded.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Large White Dent—Conc'ld.	*No*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
Piasa Queen	1	0	43.54	27.00	38	46	182	14.5	4,444
Clarage	1	1	36.08	29.85	17	55	258	11.8	1,940
Peach Blossom	1	0	37.90	24.26	36	46	212	15.3	2,682
Clarage	1	1	34.43	31.33	9	52	168	6.9	2,264
Medium White Dent.									
Wisconsin Ey. White Dent	5	5	45.00	37.49	14	52	242	11.4	1,913
Clarage	5	5	53.27	47.06	12	54	193	10.3	2,741
Old Cabin Home	3	0	55.16	38.64	33	44	209	11.5	5,266
Clarage	3	3	53.89	46.81	14	54	206	11.4	2,663
Minnesota King	2	2	27.26	23.63	14	55	267	13.8	5,599
Clarage	2	2	44.74	36.28	18	55	225	11.9	2,401
White Cap	2	2	41.01	32 13	22	51	234	12.6	1,824
Clarage	2	2	44.74	36.28	18	55	225	11.9	2,401
Early Dakota	1	1	45.50	44.59	4	54	248	9.5	2,882
Clarage	1	1	72.21	67.88	6	53	168	10.4	3,185

CORN—TABLE XI—COMPARISON OF VARIETIES—Concluded.

Class and variety.	Years tested.	Years matured.	Grain.					Cobs per bushel (dry).	Stover per acre.
			Yield per acre.		Shrinkage in drying.	Weight per shelled bushel.	Ears in 100 pounds.		
			From field.	Air dried.					
Medium White Dent—Con'd.	*No*	*No.*	*Bu.*	*Bu.*	*Percent.*	*Pds.*	*No.*	*Pds.*	*Pds.*
C. C. Funk	1	1	29.88	23.91	20	51	276	12.3	2,172
Clarage	1	1	53.40	42.72	20	55	192	12.3	2,863
Small White Dent.									
White Prolific	2	0	37.31	28.73	22	51	261	12.6	2,104
Clarage	2	2	35.25	30.59	13	53	213	8.8	2,102
Dakota Dent	1	1	39.01	38.23	2	56	272	10 7	3,255
Clarage	1	1	72.21	67.88	6	53	168	10.4	3,185
Ivory Dent	1	0	29.87	22.71	24	48	332	12.9	2,727
Modoc	1	0	23.00	11.50	50	42	246	22.4	3,066
Piasa King	1	0	29.47	15.33	48	42	272	18.8	2,940
Clarage	1	1	34.43	31.33	9	52	168	6.9	2,264
Early Adams	1	1	24.12	20.75	14	55	336	13.0	1,488
Clarage	1	1	53.40	42.72	20	55	192	12.3	2,863

The two general divisions of this table are decided by the color of the grain, namely yellow and white. Each of these is arbitrarily divided into three subdivisions, according to the size of ear, which was determined more by sight than by actual weight. In making comparisons I have used the Clarage variety in all cases as the standard, for the reason that it is perhaps the one best adapted to this soil and climate, and for the further reason that it has been grown in each of the five seasons in duplication through all the work, and has matured in every instance. In making these comparisons the average data for the given variety are found for the years in which it was grown, then the average data are found for the Clarage for the same years. The variety we wish to compare is placed first in the table and is followed by the standard of comparison (Clarage.) Where two or more sorts appear in the table in succession they have been grown the same season or seasons, and may be compared with one another and all compared with the Clarage which follows.

Using this method of comparison, in the large yellow dent class we find that the Big Buckeye, Chester Co. Mammoth, Cloud's Early, Golden Beauty, Farmer's Favorite, Early Mastodon, Penn. Early, Hughes, Waterloo Early, and Early Eclipse have yielded from one to twelve bushels more per acre than the Clarage during the same years, but not one of them has matured except the Big Buckeye, and it but one year out of three. The percentage of shrinkage is greater in the varieties producing the highest yields, the measured bushel is lighter and the weight of cobs from one to four pounds greater for each one hundred pounds of corn and cob.

Bristol 100-Day corn is the only variety in the class that has produced more bushels per acre than the Clarage and matured every year tried. Leaming has given higher yields than the Clarage but failed to mature three years out of five. Riley's Favorite has also produced higher yields but failed to mature one year out of four; Murdock's Favorite has matured every year it was planted, but the average yield falls below the Clarage; Capital and Woodhull varieties have both produced less corn than Clarage and neither has matured in a single season.

The above comparisons leave out of consideration the varieties under test for a single year.

Taking up the medium yellow dent class, we find that if we include the single year test with those grown for two, three or four years, our standard, the Clarage, gives a higher yield than any of this class except the Early Colossal, and the difference in this case is so small that it is scarcely appreciable. Of the fourteen varieties included in this class, three have failed to mature at all. One (the Sterling) has ripened one year out of three and another (the Mortgage Lifter) two years out of three.

In the small yellow dent class, but three sorts are included. One of these failed to mature one year out of two but the other two will ripen in our shortest seasons in this latitude. The average yield of the Golden

Prolific is slightly above that of the Clarage, but the estimate includes one season in which the former failed to mature.

In the large white dent class the following varieties have given higher yields than the Clarage: Mammoth White Surprise, White Giant Normandy, Red Cob, Hess' White, Maryland White Dent, Mammoth White, Premium White, Forsythe's Favorite and White Kansas King; but only three of these nine have matured, namely: Maryland White, Premium White and White Kansas King. These three have yielded from two to seven bushels more per acre than the Clarage. Hess' White, included in the above list, matured three years out of five, but two of these three were on river bottom land at Columbus.

The following varieties yielded from one to eleven bushels less than Clarage and did not mature: St. Charles White, Champion White Pearl, Champaign County Prolific, Dungan's White Prolific, Early Giant White and Forsythe's Favorite. In this comparison the single year tests are again omitted.

Considering the medium white dent class, we find that the Clarage has produced from four to twenty-one bushels more per acre than the several varieties included in that class, though all but a single variety (Old Cabin Home) have matured each season.

Six varieties are included in the small white dent class, but only one of these has been under test more than one year; three out of the other five failed to mature in the one year test.

General remarks: It should be noted that in all the comparisons above made, reference is made, not to the number of bushels of corn produced at harvest time, but to the air-dried corn. It is of further interest to know that the weighings to determine shrinkage, weight of cobs, weight of corn per measured bushel and of air-dried corn were taken at a date during the five years that would average about April 1st, or five months after husking. At that time nearly all the varieties were reasonably well cured, excepting where shrinkage exceeded 38 percent. In all cases where the shrinkage was more than 22 per cent. the grains were more or less movable on the cob, and could not be regarded as first-class corn on the market or elsewhere. A few varieties, in which the percent. of shrinkage fell below 22, would not have been accepted on the market as merchantable. In this list the following were plainly marked instances: Big Buckeye, Chester County Mammoth, Cloud's Early, Golden Beauty, Farmer's Favorite and Early Mastodon.

A number of the varieties have been brought from the west, some from the north, some from the south and others from the east. Among these are the following: Iowa Gold Mine, Mortgage Lifter and Champaign County Prolific from the west; Minnesota King, Wisconsin Early White and Early Dakota from the north and northwest; J. P. Moore and Southern Queen from the south, and Chester County Mammoth, Cloud's Early, Golden Beauty and St. Charles' White from the east. A reference

to these varieties in the table discloses the fact that a large share of them have failed to mature; others showed such a high percentage of shrinkage as to class them among the unmerchantable sorts; only those brought from the north and northwest have produced corn of satisfactory quality and these have fallen so far below our native varieties in yield that the Ohio farmer would be the loser if he were to adopt any one of them in place of some of our native grown sorts. These experiments, coupled with the results from eastern and western grown seed, indicate that it is unsafe to plant largely of any variety that has not been previously tested on a small scale on a similar soil, having about the same latitude. These two factors, soil and latitude, are much more to be considered in selecting a variety of corn than would be necessary with either wheat or oats; in fact, few other crops require the same precautions in regard to latitude. This point has been brought forward very forcibly by comparing results from experiments conducted on river bottom land at Columbus with those obtained on our gravelly, clay land at Wooster. A few varieties that could be relied upon to mature there are very uncertain here, maturing some years, under favorable conditions, and failing to produce sound corn in less favorable seasons.

Regarding color: There seems to be a prevailing opinion among corn growers that color has much to do with productiveness, some holding that they can grow more yellow corn than white, others believing that the white varieties are more productive than the yellow. This, I think, is clearly a matter of opinion and possibly prejudice, though locality may have much to do with it. Adaptability to soil and climate have much more to do with large yields than color of the grain. It may be possible that there are more good white varieties than yellow, while the opposite may be true. It may be that yellow corn averages higher in food value than white or *vice versa*. On these points our experiments at present are silent.

There remains one very important question which this series of tests cannot answer, namely: the possibility of acclimating the several varieties, the seed of which we have been from year to year importing from other states. This is a point more difficult of solution for the reason that but a single variety can be grown in one field at a time on account of danger of mixing.

GRAIN AND COB IN THE BUSHEL.

Attention is called to the weight of grain and cob per dried bushel as shown in Table XI. In only a few cases does the dry grain weigh as much as fifty-six pounds to the shelled bushel, and the average weight of the cobs is less than twelve pounds. The average weight of the Clarage is fifty-four and one fourth pounds of grain and ten and one-fourth pounds of cob to the bushel, or less than sixty-five pounds to the bushel of dry ear corn. Arranged by classes, the average weights are as shown in Table XII:

CORN—TABLE XII—WEIGHT OF GRAIN AND COB PER BUSHEL.

Class.	Weight of grain.	Weight of cob.	Total grain and cob.
	Pounds.	*Pounds.*	*Pounds.*
Large yellow dent	51.2	12.3	63.5
Medium yellow dent	52.6	11.5	64.1
Small yellow dent	53.3	10.2	63.5
Large white dent	50.0	13.3	63.3
Medium white dent	51.7	11.8	63.5
Small white dent	52.5	12.3	64.8
Average of 74 varieties	51.3	12.2	63.5

In the above table the Clarage is included in the medium yellow dent class, and the Modoc and Piasa King are excluded altogether because of their immaturity.

While Table XII shows that the legal weights of fifty-six pounds for shelled corn and sixty-eight pounds for ear corn per bushel are higher than the spring weights will justify, Table XI shows, on the other hand, that the usual estimate of seventy pounds for the autumn weight of the bushel of ear corn may be too low, as in several instances 100 pounds of ears, put away in the fall, failed to shell a bushel of grain in the spring.

In the general average of these tests the Clarage lost nearly 12½ per cent of its weight in drying.

2. CO-OPERATIVE TEST WITH VARIETIES BY FARMERS IN DIFFERENT SECTIONS OF THE STATE.

For the purpose of investigating more thoroughly the adaptability of different varieties to different soils and climatic conditions, a number of farmers, living in different sections of the state, were invited to co-operate in testing a number of varieties.

The gentlemen whose names appear in Table XIII kindly agreed to assist, and at the close of the season each of them made a report that indicated careful work and an interest in it. A number of them carried the investigation a second year, giving reports quite as instructive as from the first season's work. Twelve differently named sorts of corn were distributed pretty well over the state, covering seventeen counties. Table XIII includes the main points of all the reports received, indicating the kind of soil, the name of the grower, the county in which he was located, the varieties of corn tried, the number of days from planting to cutting, whether the corn ripened or not and the yield per acre.

Where the number of days from planting to cutting is omitted from the table the corn was not cut. From this table we find the shortest

period in which the several varieties have matured to be as follows: Clarage, 115 days, Leaming, 117, Early Mastodon, 118, Big Buckeye, Hughes and Golden Beauty, each 125, Chester Co. Mammoth, 136, Farmer's Favorite and Cloud's Early, each 141, Early White Dawn, 114. Most of these, however, on different soils the same season have required a greater number of days to ripen.

CORN—TABLE XIII—CO-OPERATIVE TEST OF VARIETIES BY FARMERS.

Year.	Experimenter.	County.	Kind of soil.	Variety.	Days from planting to cutting.	Mature (M.) Green (G.)	Yield per acre.
					Number.		*Bushels.*
1892	Hiram Batterson.....	Williams	Black loam.	Leaming.....	115	G	34.28
				Clarage	115	M	39.28
				Early White Dawn.....	115	M	41.42
				Big Buckeye.....	115	G	35.71
1893	Hiram Batterson.....	Williams	Black loam.....	Leaming	117	G	85.28
				Early Mastodon.....	117	G	88.71
				Early White Dawn.....	117	M	81.14
				Big Buckeye.....	117	G	83.85
1893	J. M. Warrick.....	Williams	Clay.....	Mammoth Surprise.....	155	G	.....
				Hess' White.....	155	G	.....
				Golden Beauty.....	155	G	.....
				Cloud's Yellow.....	155	G	....
1892	J. J. Copeland.....	Williams	Clay.....	Hughes.....	91	G	. ...
				Leaming..	91	G	.....
				Early White Dawn.....	91	G	.....
				Big Buckeye.....	91	G	.....
1893	J. J. Copeland.....	Williams	Clay.....	Clarage	130	M	50.14
				Early Mastodon.....	130	G	46.28
				Leaming	130	G	57.85
				Dungan's Prolific.....	130	G	50.00
1892	J. L. Saum.....	Paulding.....	Black loam.....	Cloud's Yellow..	.....	G	. ...
				Leaming	.....	M	....
				Mammoth White.....	.....	G	.....
				Chester Co. Mammoth	.....	G	.....
				Hess' White	.....	M	21.71
1893	J. L. Saum.....	Paulding	Black loam.....	Early Mastodon.....	125	G	45.85
				Waterloo	121	G	48.14
				Lotten.....	105	M	46.42

CORN—TABLE XIII—Continued.

Year.	Experimenter.	County.	Kind of soil.	Variety.	Days from planting to cutting.	Mature (M.) Green (G.)	Yield per acre.
					Number.		*Bushels.*
1893	J. L. Saum	Paulding	Black loam	Mortgage Lifter	121	G	52.14
				White Clarage	105	M	49.85
				Dungan's Prolific	125	G	46.71
				Mammoth Surprise	126	G	29.85
				Big Buckeye	125	G	54.42
1892	Wm. Neise	Putnam	Black clay	Hess' White	105	G	73.28
				Leaming	105	G	95.21
				Mammoth White	105	G	71.85
				Chester Co. Mammoth	105	G	64.90
1893	John Begg	Putnam	Black loam	Leaming	118	M	61.14
				Farmer's Favorite	125	G	50.85
				Mammoth Surprise	139	G	50.14
				Golden Beauty	139	G	45.71
1892	W. A. Henry	Hardin	Clay	Leaming	122	M	.....
				Big Buckeye	122	G	.....
				Farmer's Favorite	122	G	.....
				Hughes	122	G	.....
1892	J. Messersmuth	Ottawa	Black loam	Big Buckeye	122	G	.....
				Golden Beauty	122	G	.....
				Clarage	122	G	.....
				Early White Dawn	122	G	.....
1892	J. J. Andrews	Huron	Clay	Leaming	.....	M	55.00
				Hughes	.....	G	.....
				Golden Beauty	.....	G	.....
				Farmer's Favorite	.....	G	.....

CORN—TABLE XIII—Continued.

Year.	Experimenter.	County.	Kind of soil.	Variety.	Days from planting to cutting.	Mature (M.) Green (G.)	Yield per acre.
					Number.		*Bushels.*
1892...	H. O. Reed.....	Portage.....	Sandy loam.....	Cloud's Yellow.....	104	G	.....
				Farmer's Favorite.....	104	G	.....
				Clarage	104	G	.....
				Hughes.....	104	G	.....
1892...	H. M. Newkirk.....	Wayne.....	Gravelly.....	Early White Dawn.....	114	M	63.14
				Golden Beauty	114	G	60.00
				Clarage	114	M	52.85
				Hess' White.....	114	M	66.28
1892...	Wm. C. Baker	Tuscarawas	Sandy loam.....	Big Buckeye	129	G	.....
				Clarage	129	M	.....
				Mammoth Surprise.....	129	G	.....
				Hughes.....	129	G	80.00
1892...	Dr. Wm. Carlisle.....	Knox.....	Clay	Big Buckeye.....	122	G	87.14
				Golden Beauty.....	122	G	83.57
				Hughes.....	122	G	81.14
				Early White Dawn.....	122	M	73.71
1893...	Dr. Wm. Carlisle.....	Knox.....	Clay	Early White Dawn.....	118	M	41.00
				Leaming	118	M	41.43
				Early Mastodon.....	118	M	43.43
				Hess' White.....	118	M	41.43
1892...	Samuel Coleman.....	Belmont	Sandy loam.....	Leaming	154	M	81.96
				Hughes.....	154	M	59.42
				Golden Beauty.....	154	G	74.85
				Farmer's Favorite.....	154	G	74.91

CORN—TABLE XIII—Continued.

Year.	Experimenter.	County.	Kind of soil.	Variety.	Days from planting to cutting.	Mature (M.) Green (G.)	Yield per acre.
					Number.		*Bushels.*
1892	W. C. Amspoker	Muskingum.	Clay	Cloud's Yellow	162	G	
				Hess' White	131	M	53.85
				Leaming	136	M	70 85
				Chester Co. Mammoth	136	M	43.42
				Clarage.	136	M	53.35
				Mammoth White.	131	M	52.57
1892	W. T. Schneider	Perry.	Clay	Farmer's Favorite	125	G	20.51
				Early White Dawn	125	M	12.41
				Hughes	125	M	20.19
				Golden Beauty	125	M	15.47
1892	J. F. Cunningham	Perry.	Clay	Clarage	145	M	38.85
				Big Buckeye.	145	M	37.85
				Mammoth White	145	M	26.00
				Hess' White	145	M	34.57
1892	Ebenezer Milroy	Logan	Black loam	Leaming.	127	M	50.57
				Hughes	127	M	57.00
				Hess' White	127	M	44.58
				Big Buckeye	127	M	61.14
1893	Daniel Baker	Clarke	Black upland	Cloud's Yellow		G	43.43
				Early Mastodon		G	35.00
				Chester Co. Mammoth		G	37.93
				Leaming		M	40.35
1892	Chris. Rechel	Highland.	Clay loam	Hughes		G	
				Big Buckeye		G	
1893	Chris. Rechel	Highland.	Clay loam	Big Buckeye	125	M	27.14
				Leaming	117	M	24.43

CORN—TABLE XIII—Concluded.

Year.	Experiment.	County.	Kind of soil.	Variety.	Days from planting to cutting.	Mature, (M.) Green, (G.)	Yield per acre.
					Number.		*Bushels.*
1893	Chris. Rechel.....	Highland	Clay loam.....	Early White Dawn.....	123	M	.....
				Cloud's Early.....	117	G	21.30
1892	S. M. Roudebush.....	Clermont	White Clay.....	Farmer's Favorite	141	M	25.71
				Clarage	141	M	30.00
				Cloud's Early.....	141	M	45.71
				Hughes	141	M	37.14
1892	W. P. Price.....	Clermont	Beech Loam.....	Chester Co. Mammoth	122	G	100.71
				Hess' White.....	122	M	96.14
				Leaming	122	M	88.95
				Mammoth White Dent	122	M	98.28
1893	W. P. Price.....	Clermont.	Beech Loam	Leaming	.....	M	.....
				Chester Co. Mammoth	.....	G	.....
				Early Mastodon	.....	M	.....
				Cloud's Early...	.....	M	.....

CORN SMUT.

BY A. D. SELBY AND J. F. HICKMAN.

The disease of corn leaves, shoots, ears, tassels, and aërial rootlets (brace roots) which shows itself finally by boils or pockets of dark spore masses, is very common. It is called "smut" quite generally. Renewed attention has recently been given to corn smut. Brefeld[1] in Europe and Hitchcock[2] and Arthur[3] in the United States have written upon it, and a bulletin is promised by Dr. Arthur. Brief notes only will be offered here.

CAUSE OF CORN SMUT.

The smut in corn is a fungous disease, caused by a minute, parasitic plant, which grows in the parts where smut boils are afterwards formed. This plant is the corn smut fungus, (*Ustilago zeæ* (Beckm.) Unger.)[4] The smut masses are chiefly the spores of the fungus. These spores serve to spread the smut disease. The spores found in these boils are capable of germinating after they have been kept a long time. If kept dry, they will germinate after many years. It appears that they may pass through the intestines of animals that feed upon the spores and still many of them be capable of growing. There is a further fact brought out by Brefeld and others: Secondary, yeast-like spores, (conidia) are formed when the spores from the corn germinate in nutrient solutions or in decaying organic matter, such as manure and rotting plants.

Experiments made in the laboratory by Europeans show that seedling plants may be infected by smut fungi only when the seedlings are very young and tender. That after the plants are older the germ tubes of the smut spores cannot penetrate the plant tissues. It has since been proven that the infection of wheat, oats and barley by smut takes place only with the seedling plants and when these are very young. It was believed for a time that the same was true of corn, but this has since been proven incorrect. While it is apparently true that the smut attacks the seedling corn plant just as it does the young oat and wheat plants, *it does not affect the young seedlings alone* nor chiefly. Brefeld[5] has infected all young parts of growing corn plants by conidia produced in liquid cultures. The evidence that this takes place in the corn fields through the secondary spores developed in manure or decayed vegetable matter seems satisfactory. In Brefeld's experiments, the smut boils appeared in from 3 to 6 weeks after artificial infection with the spores and at the point infected. It may be accepted, then, *that corn smut is produced wherever infection occurs and that this may be in any young, growing portion of the corn plant, where spores fall upon it.*

(1) Untersuchungen aus dem Gesammtgebiete der Mykologie. XI, 1895.
(2) Bulletin Kansas Experiment Station, 92, 1896.
(3) Botanical Gazette, XXIII., 44, 1897.
(4) Arthur, loc. cit. p. 45.
(5) loc. cit. pp. 52–81.

CONDITIONS AFFECTING AMOUNT OF SMUT.

From what precedes, it is inferred that such conditions as promote or in any way affect the development of the secondary smut spores will have some influence upon the amount of smut. By experiments on manured and unmanured plots, this has been shown. The manured areas had much more smut than the unmanured. Any decayed vegetable matter may furnish a nidus for this spore development. Sod ground or manured land may be expected to show more smut than corn stubble, contrary as this may at first appear to some previous teachings. That this is true in practice has been noted by careful observers. The Hon. H. H. Wickham relates that some bottom land on his farm near Athens, O., more or less subject to overflow, has been continuously in corn for more than sixty years. The amount of smut in the corn on this field is annually less than in rotation with grass near by, where sod land is planted in corn. Proximity to barn-yards and the like will have the same result as manuring the land.

More smut is found in dry seasons than in wet seasons; the same appears to hold as to situations. A case of unusual smut development was observed in 1895, in Wayne county. July 29, application was made to the Station to learn the cause of injury to corn, supposed to be due to an insect—the common stink bug. The Botanist made examination August 12, and found a case of wholesale smut infection. This was in a 20-acre field of late planted corn. There were fantastic forms of top, various forms of smut growth upon the leaves, and dwarfed and stunted plants of many sizes—a sight not soon to be forgotten. From twenty-five to forty-five percent. of the plants, in portions of the field, were affected. The loss was in this instance, very considerable.

The results of counts, 1895, in two fields of Clarage corn are given in table XII:

CORN—TABLE XIV—AMOUNT OF SMUT IN CORN AT STATION, OCTOBER 1, 1895.

Location of area and variety.	Total number stalks counted.	Total number smutted stalks	*Parts affected with smut.					
			Blades.	Tassels.	Ears.		Stem.	Date.
					Total loss.	Partial loss.		
‡Field A, Clarage....	2,218	83	.. ..	2	10	1	9	Oct 1, '95
‡Field A, Clarage....	805	40	.....	.....	5	.....	35	"
Field C.....	1,980	98	.....	1	12	.....	85	"
Totals.....	5,003	221	.....	3	27	1	190	
Percentages.....	.....	4.42	.....	.....	0.54	.....	3.8	

*In smut distribution the major injury determined the column in which a plant was noted.
‡Smut collected in spots.

This shows what may be called a moderate amount of smut. Four and one-half percent. of stalks were smutted in these fields and one-half of one percent. of the ears were a total loss. The loss of grain on this basis, for 1895, in the entire state, amounts to $125,000.

SEED TREATMENT AND CORN SMUT.

From what has just been stated, it will not be expected that treatment of the seed corn will have much, if any, influence upon the amount of smut in the crop.

May 15, 1895, seed of Clarage corn, for ordinary field culture and of Red Cob Ensilage, for silage purposes, was treated for fifteen minutes in a solution of copper sulfate in the proportion of one pound of the salt to one gallon of water. The corn was then washed with fresh water, and dried for planting. The Clarage was planted May 15, in a field of that variety, upon sod ground (Field A), with plenty of cut worms and web worms. The ensilage variety was drilled upon the 16th, in corn stubble, alongside untreated seed. No difference in time of germination between treated and untreated seed was observable in either case, nor in the subsequent development of the ensilage corn, but in consequence of the effect (?) of the copper sulfate, the treated Clarage in sod ground gave a slightly better stand than the untreated. There was an apparent slight protection from the insects. The results were as follows : *

Field	Variety.	No. rows counted.	Treatment of seed.	Total stalks	Stalks smutted.	Percent. sm't-ted.	Distribution of smut	Date of counting.
A	Clarage ...	6	Untreated.	607	34	5.60	On ears, 2; tassel,21; miscellaneous, 10....	Aug. 14
A	"	6	Cop. sul...	480	27	5.63	On ear, 1; root, 2; blades,2 ; tassels,14	" 14
B	Red cob ensilage.	3	Untreated.	4,464	35	0.78	On root, 2; miscellaneous, 33.....	" 30
B	Red cob ensilage.	3	Cop. sul...	4,209	59	1.40	On root, 2; blades, 6; tassel, 1.....	" 30

A small plot was planted in 1896, repeating the same seed treatment. The results were similar.

PREVENTION OF CORN SMUT.

The foregoing will indicate what may be done. To treat the seed corn appears to be of no use. To avoid conditions favorable to the spread of the smut will sometimes be possible. Freshly manured land

*The field was replanted after the insect injuries.

affords the proper nidus for the yeast-spores of the smut. The same appears to be true with respect to sod ground. We cannot, from present knowledge, prevent the smut except, possibly, by some method which is more expensive than the losses from smut justify. Thorough spraying with fungicides will probably prevent most of the smut, but the cost of such treatment excludes its use. The most promising method, especially upon highly manured lands, such as are planted to sweet corn, etc., is to cut out and burn the smut boils before these are ruptured. This practice could, of course, have slight immediate effect. Its usefulness must depend upon reducing the liability of infection on the next corn crop. It would be much better to let the smut boils drop upon the ground in the field than to carry them with the fodder and thus introduce the spores into the manure which is to be applied upon succeeding crops.

SUMMARY.

CULTURAL TESTS.

1. A single experiment in deep and shallow plowing for corn failed to show that one has any advantage over the other.

2. From three years' experiments on clay soil the average results indicate that better yields are obtained from planting one grain every 12 inches and 2 grains every 24 inches than by placing 3 grains every 36 inches or 4 grains every 48 inches or 4 grains every 42 inches, the rows being about three and one-half feet apart.

3. The highest percent. of sound corn is secured by planting one grain every 18 inches, but the reduced yield per acre does not justify the wide separation of stalks.

4. Repeated experiments show that neither the yield of corn per acre nor the quality of the grain is materially affected by growing the crop from either the butt, middle or tip grains of the ear.

5. The only valid objection to the use of the entire ear for seed is the irregular size of the grains, which give an irregular stand of corn because machine planting does not control the number of grains deposited except where the grains are of uniform size.

6. In a series of experiments; shallow or surface cultivation has given better results than deep tillage, the average increase for surface cultivation being six bushels per acre.

7. Detasseling of one-half the corn has, in all experiments conducted at this Station, resulted in a diminished yield.

8. From all the experiments conducted at the Station together with those carried out by farmers in different sections of the State, it is apparently just to conclude that in the case of corn sufficiently matured at cutting time, the difference in yield of grain per acre between that cut and shocked and that left standing will be very slight.

9. With varieties that are not sufficiently matured at cutting time experiments thus far indicate that, unless they are very green, more

sound corn will be secured from cutting and shocking than from allowing the corn to remain on the stalk.

VARIETIES.

1. From the large yellow dent class only two sorts can be recommended for Ohio soils north of the 40th parallel, namely: Bristol 100-Day and Murdock's Favorite. The Leaming may mature as far north as the 41st parallel but is uncertain. For the 40th parallel and south, Big Buckeye, Leaming and Riley's Favorite. In southern Ohio, on gravelly and comparatively fertile lands, some of the large varieties, such as Chester Co. Mammoth, Cloud's Early, Golden Beauty and Early Mastodon are worthy of trial. These however are not adapted to nine-tenths of the State.

2. North of the 40th parallel the following varieties from the medium yellow dent class are worthy of consideration and trial, namely: Clarage, Queen of the Prairie, King of the Earlies, Mortgage Lifter and Pride of the North.

3. The varieties included in the small yellow dent class are not recommended, except for the northern part of the State, where other varieties would fail to mature. Of this class the Early Huron Dent requires the shortest season.

4. From the large white dent class the following varieties are worthy of trial in southern Ohio: Early White Dawn, Hickory King, Hess' White and Maryland White Dent. For northern Ohio the Maryland White Dent and Rustler White, and the Early White Dawn as far north as the 41st parallel.

5. From the medium and small white dent class, White Cap and White Prolific may be selected for northern Ohio; but neither sort is recommended where the Clarage (a yellow variety) will mature.

6. Changing from a standard local variety to something new and untried is not recommended, except in a small way. It is better to try a small area in a new variety the first year and depend on the old and tried kind, rather than to risk all in the untried.

7. Seed brought any considerable distance from any direction is likely to produce immature and an undesirable quality of corn.

8. Color and productiveness do not appear to bear any relation to each other in corn.

SMUT.

Treatment of seed corn to destroy smut germs does not seem practicable. Gathering and burning the smut boils before they rupture is recommended as a helpful preventive measure. To avoid conditions favorable to smut is advisable.