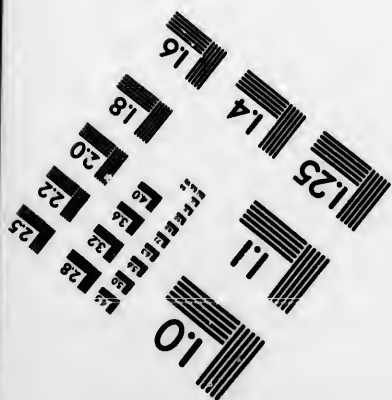
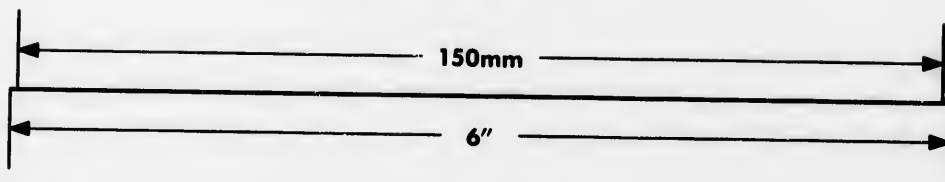
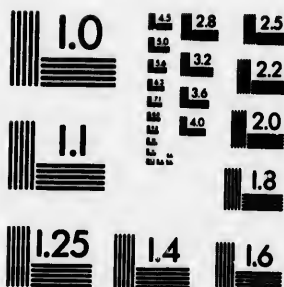
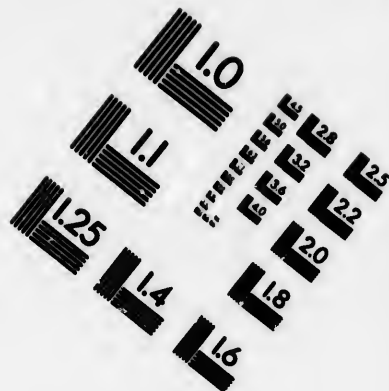
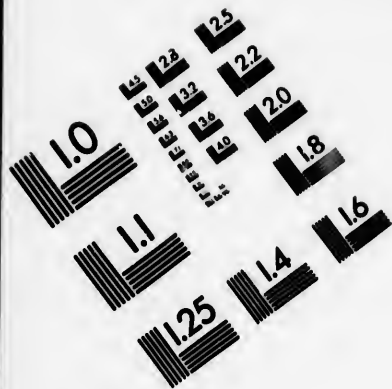


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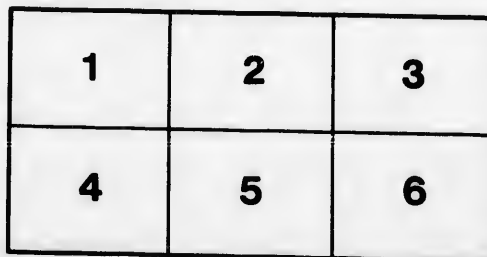
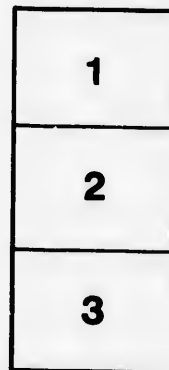
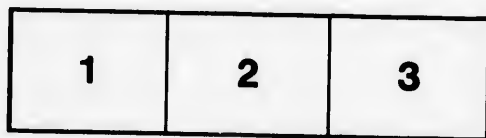
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BULLETIN 108.

AUGUST, 1898.

Ontario Agricultural College and Experimental Farm

EXPERIMENTS

WITH

WINTER WHEAT

By C. A. ZAVITZ, B.S.A., EXPERIMENTALIST.

PUBLISHED BY
THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.

TORONTO:
WARWICK BRO'S & RUTTER, GOVERNMENT PRINTERS
1898.

THE ONTARIO AGRICULTURAL COLLEGE
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BULLETIN 108.

EXPERIMENTS WITH WINTER WHEAT.

By C. A. Zavitz, B.S.A, Experimentalist.

A good deal of attention has been given to the testing of winter wheat in the Experimental Department of the Ontario Agricultural College. Varieties obtained from the United States, England, Scotland, Germany, France and Russia have been carefully tested along with those secured from the wheat-growing sections of Canada. Besides testing the varieties, there have been experiments conducted in different dates of seeding, methods of soil preparation, methods of seeding, selection of grain for seed, quantities of seed per acre, application of fertilizers, treatment of smut-infested seed, the yield and quality of wheat cut at different stages of maturity, and the value of seed from wheat cut at different stages of maturity. These experiments have occupied over twelve hundred plots within the last nine years. This bulletin gives a summary report of the principal experiments conducted under these heads in 1898, and the average results of some of the experiments conducted for several years in succession.

FIELD CONDITIONS.

The two hundred and three plots used for the experiments with winter wheat in 1898 were situated in the southern portion of the large experimental field which lies at the rear of the main College building. The land used for one of the experiments had a gentle slope towards the south, and that used for the other experiments was comparatively level. No manure had been applied to the land since the spring of 1896, when it received a dressing of twenty tons of farm-yard manure per acre. Commercial fertilizers had not been used for at least ten years. The land produced a crop of spring grain in 1895, a crop of roots in

1896, and a crop for green manuring in 1897, which was plowed under during the first week in August of that year. No other plowing was done, but the land was well stirred on the surface up to the time of sowing the winter wheat. The land was very carefully measured and divided into plots which were made exactly uniform in size and shape for the separate experiments. The smallest plots were each $\frac{1}{100}$ of an acre in size, and were used for the smut-infested grain which had been treated in different ways; and the largest plots were each $\frac{1}{2}$ of an acre in size, and were used for the different preparations of soil for winter wheat. The yields per acre have been determined from the actual yields of the plots.

CONDITIONS OF SEASON AND GROWTH.

The seeding of nearly all the experiments took place during the last week of August and the first week of September. The amount of rain-fall at the College in September was very light, there being a total of only $\frac{1}{10}$ of an inch during the month. The germination of the seed was good, but the growth was slow throughout September, but was better in October. Nearly all the wheat wintered well, and made a good steady growth during the spring and early summer. On the 8th of June last there was a heavy rain accompanied by strong wind, which caused many of the weak strawed varieties to lodge badly. Another storm occurred on June the 13th which gave the wheat a second test for strength of straw, thus helping to furnish an excellent object lesson for about thirty thousand farmers who visited the College during that month. Many of the weak strawed varieties were also badly lodged in 1894. In order to ascertain the effect produced by the lodging of the crops, definite determinations were made each year by cutting both lodged and standing grain of the same variety and from equal areas. Four determinations were made in 1894 and five in 1898. Providing the plants which lodged were equal in every respect to those which did not lodge, the results of the tests go to show that the loss to the grain through lodging was 43 per cent. in yield and 9.9 per cent. in weight per measured bushel. The lodged grain had more than twice as much rust as that which was standing. These results show the importance of growing those varieties of winter wheat which possess stiff straw.

VARIETIES TESTED.

Ninety-two varieties of winter wheat have been under test this season. The plots were situated side by side, and were separated from each other by paths three feet wide. All the plots were sown by hand at the rate of two bushels per acre. The varieties were sown on September 3rd, with the exception of Nos. 54 and 57, which were sown on September 4th, and No. 64 which was sown three days later. The ripening of the varieties took place between the 14th and the 21st of July, which was about eight days earlier than in 1896 and four days later than in 1895. The crops were all harvested separately, and threshed with a Little Giant separator remodelled for the purpose.

TABLE
years, and
period:

1890...
1891...
1892...
1893...
1894...
1895...
1896...
1897...
1898...

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TABLE 1.—Number of varieties tested and reported on within the past nine years, and also the average yields for each of these years and for the whole period:

Years.	Number of varieties grown each year.	Average weight of grain per measured bushel.	Average yield of	
			Straw per acre.	Grain per acre. (bus. 60 lbs.)
		lbs.	tons.	bus.
1890.....	15	60 0	2.4	30.9
1891.....	23	63.3	2.0	52.9
1892.....	44	60.5	3.2	42.6
1893.....	52	58.4	2.1	29.9
1894.....	80	60.8	4.0	46.7
1895.....	102	60.4	1.2	26.1
1896.....	81	63.5	2.6	42.1
1897.....	91	55 0	3.8	41 8
1898.....	92	63 0	3.4	42.9
Average 9 years.....		60.2	2.7	39.5

The ninety-two varieties tested in 1898 gave an average of 3.4 tons of straw, and 42.9 bushels of grain per acre, and an average weight of grain per measured bushel of exactly 63 lbs. The yield of grain, therefore, is about three and a half bushels per acre more than the average yield of the past nine years. The quality of the grain is excellent in 1898, as it weighs 2½ lbs per measured bushel more than the average of all the varieties grown since 1890. It will be observed that in the nine years there is a variation from 26.1 to 52.9 bushels in average yield of grain per acre; from 1.2 to 4.0 tons in average yield of straw per acre, and from 55.0 to 63.3 pounds in average weight of grain per measured bushel. For some of the reasons of these variations, reference can be made to the bulletins and reports previously issued. From a careful study of the foregoing table and the previous winter wheat bulletins, the reader will readily understand that it is of great importance to have these experiments extend over a period of several years, in order to have the varieties subjected to various climatic conditions. We wish to emphasize the fact that the average results of five years' experimental work should be of much greater value than the results obtained from experiments of only one year.

TABLE 2.—Characteristics and yields of forty-eight varieties of winter wheat grown for five years in succession.

VARIETIES. Arranged in order of their average yield of grain per acre as given in the last column of the table.	Hulls bearded or bald.	Grain red or white.	Results for 1898.			Average results for 5 years.						
			Per cent. of crop lodged.	Weight per measured bushel.	Yield of grain per acre (bu. 60 lbs.).	Date of maturity.	Height of crop.	Per cent. of crop lodged.	Per cent. of rust.	Weight per measured bushel.	Yield per acre.	
											Straw.	Grain (bu. 60 lbs.).
			lb.	bu.	July	ins.	lb.	tons	bu.			
1. Dawson's Golden Chaff...	Ba	W	65	61.6	49.2	18	47.6	17	26	59.7	38.4	52.6
2. Early Genesee Giant.....	Be	W	45	61.5	43.2	19	49.7	19	30	59.8	38.4	48.7
3. Egyptian.....	Be	R	80	62.4	42.5	19	47.9	42	13	60.0	35.5	46.6
4. Imperial Amber.....	Be	R	50	62.7	47.7	18	48.7	42	12	59.8	38.8	48.5
5. Early Red Clawson.....	Ba	R	78	59.2	39.9	18	47.2	41	29	58.9	38.3	48.5
6. Reliable.....	Be	R	75	62.9	43.8	19	48.8	44	10	61.2	38.7	48.0
7. Golden Drop.....	Ba	R	85	61.8	38.5	18	47.5	39	25	61.2	35.3	46.9
8. Russian Amber.....	Be	R	50	62.4	41.5	19	47.5	39	12	60.9	35.4	46.7
9. Egyptian Amber.....	Be	R	40	63.9	47.8	18	48.7	41	9	61.4	37.7	45.3
10. American Bronze.....	Ba	R	20	62.6	42.3	19	49.5	4	36	60.1	33.1	44.3
11. Poole.....	Ba	R	10	63.8	44.1	18	47.1	33	13	60.9	33.2	44.7
12. Tasmania Red.....	Be	R	75	63.4	38.9	18	45.8	58	15	61.6	33.4	44.4
13. Early Ripe.....	Ba	R	40	63.1	41.9	18	48.1	33	17	61.2	33.3	43.8
14. Tuscan Island.....	Be	R	40	63.4	45.5	17	48.8	45	24	60.6	33.1	42.6
15. Rudy.....	Be	R	25	63.7	47.1	17	46.9	42	19	60.6	32.9	42.6
16. Red May.....	Ba	R	25	65.0	45.8	18	47.1	29	12	62.2	33.1	42.5
17. Arnold's Hybrid.....	Be	W	25	65.1	45.8	17	47.7	26	12	61.8	33.1	42.4
18. Bulgarian.....	Be	W	45	62.1	40.3	20	49.7	26	19	60.2	33.0	42.3
19. Pride of Genesee.....	Be	R	15	64.6	46.1	19	49.9	30	15	60.8	32.9	42.1
20. Emporium.....	Ba	R	25	63.6	42.1	20	50.7	35	9	59.8	33.5	41.9
21. Siberian.....	Ba	R	40	64.1	38.6	20	48.1	37	13	61.8	33.2	41.5
22. Stewart's Champion.....	Ba	W	45	61.0	36.6	20	50.3	18	22	59.0	33.0	41.4
23. Red Velvet Chaff.....	Ba	R	45	61.6	34.6	19	47.9	30	29	58.8	33.4	41.3
24. Zimmerman.....	Ba	R	15	64.4	46.7	18	46.8	22	14	61.4	32.8	41.2
25. Standard.....	Ba	W	60	60.3	38.1	20	46.8	20	25	58.5	32.9	41.1
26. Geneva.....	Be	R	30	64.8	37.7	17	46.2	40	10	62.4	32.8	41.0
27. Bissell.....	Be	R	35	64.8	39.4	17	46.0	46	9	61.6	33.0	40.8
28. New Columbia.....	Ba	R	12	63.8	39.4	17	46.5	20	15	59.4	33.0	40.6
29. McPherson.....	Ba	R	10	65.5	41.9	16	47.4	27	13	62.1	33.0	40.3
30. Bonnell or Landreth.....	Ba	W	55	59.9	35.3	20	49.3	24	24	58.4	33.1	40.2
31. Golden Tankard.....	Be	R	35	64.0	42.6	17	49.2	42	20	60.8	33.7	39.8
32. Longberry Red.....	Be	R	92	61.8	38.3	19	47.7	63	10	60.8	33.5	39.8
33. Golden Cross or Volunteer.....	Be	R	50	61.5	35.5	21	48.8	75	24	59.5	33.3	39.5
34. Andrew's No. 4.....	Be	R	20	66.0	41.5	20	50.0	26	23	60.1	33.2	39.3
35. Kentucky Giant.....	Be	R	60	63.1	41.3	20	48.0	41	15	60.0	33.0	39.8
36. Hindostan.....	Be	R	65	64.0	45.1	20	48.7	42	28	61.1	33.1	37.7
37. Soules.....	Ba	W	45	60.5	34.0	19	49.2	18	23	57.8	32.9	37.5
38. Simcoe Red.....	Be	R	5	63.1	41.9	17	49.6	16	19	59.2	32.8	37.5
39. Treadwell.....	Ba	W	35	62.5	41.9	19	49.1	15	16	60.1	32.6	37.3
40. Jones' Winter Fife.....	Ba	R	75	59.9	30.1	19	47.3	33	19	58.7	32.7	37.0
41. Currell.....	Ba	R	35	64.6	48.1	17	47.2	36	18	61.3	33.0	37.0
42. Turkish Red.....	Be	R	45	64.6	48.8	18	42.4	44	10	61.5	32.5	36.8
43. Fenquit's Velvet Chaff.....	Be	R	20	64.8	37.4	18	47.0	17	29	61.7	32.7	36.1
44. Velvet Chaff.....	Be	R	45	63.1	32.7	17	44.8	14	22	62.5	32.4	36.0
45. Surprise.....	Ba	W	60	58.9	31.7	20	49.9	20	24	57.3	32.5	35.6
46. Early White Leader.....	Ba	W	75	58.4	32.4	22	46.7	21	26	56.1	32.4	35.8
47. Jones' Square Head.....	Ba	W	80	60.8	37.3	19	47.6	21	27	57.9	32.4	35.2
48. Bullard's Velvet Chaff.....	Ba	R	75	62.0	37.8	21	48.6	24	25	60.4	32.6	31.9

TABLE 3.—

Arranged in order of grain per given in of

49. Gold Cross
50. Silver King
51. White Cloud
52. Pedigree
53. Oregon
54. Foxy Fife
55. Zereba
56. Early A
57. Longberry
58. Harvest
59. Johnson
60. Red W
61. Red C
62. Mac G
63. Bearded
64. Diamond
65. Prize T
66. Buda P
67. Nonpar
68. Oh's St
69. Queen M
70. White C
71. Michig
72. Eastman
73. World's
74. Bailey
75. Diamond
76. Wacoan
77. Russian
78. French
79. Canada
80. Hunter's
81. White E
82. Mealy
83. Beattie's
84. Roberts
85. Early O
86. Long A
87. German
88. Silver B
89. Pride of
90. Amherst
91. Murray
92. Kalina

Table 2 contains information of great value, as the results for 1898 are given and also the average results of each variety for a period of five years. Although Table 3 gives results for only one year, the contents are both interesting and valuable as presenting the records of so many new varieties. Some of these have been grown for two, three, and even four years, but for the sake of a proper comparison of the whole number upon a uniform basis, the results for only one year are here presented.

One of the principal advantages of giving the results of so many varieties as are given in Tables 1 and 2, is to enable any farmer to compare the varieties which are new to him with those he has been familiar with for several years. It also enables him to select varieties that will likely be adapted to the conditions of his own particular soil. For heavy rich soils which usually produce a large growth of crop which is apt to lodge badly, those varieties possessing short stiff straw should be selected; while for light weak soils, those varieties with long heavy straw would likely give the best satisfaction. Generally speaking, the white wheats possess stiffer straw and yield more grain per acre than the red wheats, but the latter produce grain which weighs about one pound per measured bushel more than that produced by the white varieties. The hard, flinty, red wheats produce a strong flour which is comparatively dark in color, while the white wheats produce a beautiful white flour which is sometimes lacking in strength. Millers frequently mix the red wheat of Manitoba with the white wheat of Ontario in order to get a flour having a proper combination of both color and strength. The very hard wheats, such as are principally grown in the Canadian North-west and in the North-western States of the American Union, are nearly all red in color, while the softer wheats are represented by varieties of both the red and the white classes.

About twenty five acres of winter wheat are grown annually in the Farm Department of the Ontario Agricultural College. During the past three years the Dawson's Golden Chaff and the Early Genesee Giant varieties have been used for this purpose. The average yield produced from these two varieties when grown in the large fields for three years in succession has been about thirty-six bushels per acre.

SELECTION OF SEED.

From a test made in our experimental grounds with two varieties of winter wheat in 1897 and again in 1898, we found that large plump seed produced a yield of 63.5 bushels per acre more than that produced from small plump seed, and 8½ bushels per acre more than that produced from shrunken seed; and also that seed grain which had been broken by the threshing machine gave a yield of only 1.5 as much as that grown from the large plump seed. In this experiment, the yield of straw and the weight per measured bushel of the grain produced was also greatly influenced by the different selections of seed which were sown.

DIFFERENT DATES OF SEEDING.

For six years in succession winter wheat has been sown on three or more different dates. This experiment has been conducted in duplicate each year and

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in one or two instances it was carried on in triplicate. The summary results of all these tests are here presented in tabulated form.

TABLE 4.—Results of sowing winter wheat on three different dates :

Dates.	Weight of grain per measured bushel.		Yield per Acre.			
			Straw.		Grain.	
	1898.	Average 6 yrs.	1898.	Average 6 yrs.	1898.	Average 6 yrs.
Sept. 2-3	63.4	58.3	3.6	3.1	44.8	39.5
Sept. 9-11	63.7	58.5	2.8	2.9	44.8	38.9
Sept. 17-20	63.9	57.1	3.0	2.4	46.4	33.5

Winter wheat was also sown on August 25th-26th in 1893, 1897 and 1898, and on September 26th, 27th in 1896, 1897 1898. The results of all these experiments go to show that we get best results from sowing winter wheat during the last week in August or the first week in September, and that it is not usually safe to sow later than about the 10th of September.

DIFFERENT QUANTITIES OF SEED PER ACRE.

An experiment which has been conducted for five years in succession, by sowing different quantities of seed of each of two varieties of winter wheat, shows that one and one-half bushels of seed per acre produced an average of two and three-fifth bushels of grain per acre more than when one bushel of seed was used. The results were quite similar from using either one and one-half or two bushels of seed per acre.

METHOD OF SEEDING.

In each of the past five years an experiment has been conducted in duplicate by sowing winter wheat broadcast and with a grain drill. The results from sowing the same quantities of seed by the two methods are very similar, there being only a difference of one five-hundredth part of a bushel per acre in the average yields. It should be understood that the land was in a good state of cultivation when the seeding took place in every case.

PREPARING SOIL FOR WINTER WHEAT.

In the spring of 1896 twelve plots, each one rod wide by six rods long were staked off for an experiment in different treatments of soil, preparatory to

the growing of winter wheat. The experiment was conducted in duplicate, there being six plots in each set. The land had been plowed in the autumn of 1895 and received surface cultivation in the spring of 1896. Four plots in each were sown in the latter part of May with crops to be plowed under later in the season. These crops were peas, buckwheat, rape and crimson clover. The other two plots in each set were worked as a bare summer fallow throughout the season. About the first of August, each of the green crops were plowed under, and the land was then worked on the surface during the month of August. Farm yard manure at the rate of twenty tons per acre was applied to one of the summer fallow plots in each set. On the 25th of August winter wheat was sown on each of the twelve plots. This experiment was repeated in the following year by using twelve plots similar in size to those of the first set, but differently located. The winter wheat seeding in 1897 took place on the 29th of August.

TABLE 5. Results from preparing land in different ways for winter wheat:

Soil preparation 1896 and 1897.	Average results for two years (4 tests).				
	Height of crop.	Percent- age of crop lodged.	Weight of grain per measured bushel.	Yield per acre.	
				Straw.	Grain (bu. 60 lbs.)
20 tons farm yard manure per acre on bare summer fallow	52.4	45.0	60.8	3.4	40.4
Peas plowed under	51.7	31.3	60.8	2.7	37.0
Bare summer fallow	52.3	40.0	60.7	2.6	35.0
Rape plowed under	50.7	30.8	60.4	2.4	33.7
Crimson clover plowed under	50.7	22.5	60.5	2.3	31.2
Buckwheat plowed under	50.5	17.5	60.4	2.0	29.9

The amounts of seed used for the green manure crops were as follows: Peas $2\frac{1}{2}$ bushels per acre, rape 4 pounds, buckwheat 1 bushel, and crimson clover 12 pounds. Land which was treated as a bare fallow throughout the summer and afterwards received farm yard manure at the rate of twenty tons per acre, previous to the sowing of winter wheat, gave the largest yield of grain per acre in the experiment of each year. It should, however, be remembered that this was decidedly the most expensive of the six treatments. Where green crops were plowed under the labor was not great, but the seed required to produce these crops would of course add a little to the cost. The good results from using peas as a crop for green manuring are quite noticeable in this experiment.

The twelve plots used in this experiment in 1897 were cropped again in 1898, six with winter wheat and six with spring wheat, in order to ascertain the influence of the different soil preparations upon the crop of the second year. The average results show that the manured fallow gave the largest yield of grain, and that the land where the buckwheat had been plowed under gave the smallest yield in 1898. These experiments will likely be continued for several years in succession in order to get as full information as possible upon the subject.

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EFFECT OF CUTTING AT DIFFERENT STAGES OF MATURITY.

For this experiment, five plots each of two varieties of winter wheat were sown at the same time in the autumn of 1893. In the summer of 1894 one plot of each variety was cut at five different times. The period between each two cuttings was one week in length. The third cutting was made when the wheat was in that condition of ripeness in which it is usually cut throughout Ontario. It will therefore be understood that the wheat was quite green at the time of the first cutting, and that it was very ripe at the time of the last cutting. This experiment has been repeated in each of the years 1895, 1896, 1897, and 1898. The varieties used in each of the five years were the Dawson's Golden Chaff and the Early Genesee Giant. The average results of the ten tests, covering a period of five years, show that the largest yield of grain per acre was produced from the fourth cutting, the heaviest weighing grain per measured bushel from the third cutting, and that the best quality of straw and the heaviest yield of straw per acre were produced from the first cutting.

In order to find out the influence of cutting wheat at different stages of maturity upon the quality of the grain for seed purposes, samples were taken from the crop produced from each of the cuttings previously mentioned and these samples were carefully sown upon separate plots. In the average results of these tests made with two varieties in each of the past four years it is found that the heaviest weight of grain per measured bushel and the largest yields of grain and of straw per acre were produced from the last cutting.

TREATMENT FOR STINKING SMUT.

On a good many Ontario farms the winter wheat is badly infested with what is known as the stinking smut which is also sometimes called hard smut, bunt, or smut balls. This disease produces a very unpleasant odor, and besides reducing the yield of wheat per acre, it frequently lessens the market value of the grain fully 25 per cent, and in some case renders it practically useless for the production of flour. This disease can be so easily and so effectually treated that there is no reason why any farmer cannot practically rid his wheat fields from this trouble in a very short time. An experiment in treating seed wheat for the prevention of smut has been conducted on our experimental grounds during each of three years with very gratifying results. Badly infested seed wheat not treated for smut, produced a crop containing an average of 170 smut balls per pound of grain; while that treated with potassium sulphide produced an average of 12 balls of smut; and that treated with either copper sulphate or hot water an average of less than 1 ball of smut per pound of grain. The treatment with copper sulphate was made by immersing the seed for five minutes in a solution of one pound of copper sulphate dissolved in one gallon of water. The hot water treatment consisted in immersing the seed for fifteen minutes in hot water at a temperature of 132 degrees F. For this treatment the water should not go below 130 and not above 135 degrees. Every farmer in smut-infested districts should treat sufficient seed to insure the harvesting of clean grain for seed next year.

CO-OPERATIVE EXPERIMENTS WITH WINTER WHEAT.

From among the varieties of winter wheat which have been tested in the Experimental Department of the College, nineteen of the most successful kinds have been selected and distributed over Ontario within the past six years. These have been sent out in sets of from three to five varieties in each set. Fourteen thousand four hundred and eighty-five packages of winter wheat have been distributed during the past six years, and comparative tests have been made upon fully thirty-eight hundred Ontario farms. This system of co-operative experimental work was established by the ex-students of the Agricultural College, but, through repeated requests from other farmers, an invitation is extended to all interested persons to join in the work. The results have, on the whole, been very gratifying, and the numerous experimenters have become much interested in the different experiments undertaken. For detailed results of these experiments, the reader is referred to the reports of the Ontario Agricultural and Experimental Union, which are published annually.

From among the conclusions given in the report of last year regarding these co-operative experiments with winter wheat for 1897, the three following are quoted as being of interest in connection with the results given in this bulletin :

1. "In average yield of winter wheat per acre, the Dawson's Golden Chaff stood highest among eleven varieties tested over Ontario in 1893, nine varieties in 1894, 1895 and 1896, and seven varieties in 1897."
2. "Three varieties of winter wheat have been tested over Ontario for four years in succession with the following yields of grain per acre: Dawson's Golden Chaff, thirty-two and a half bushels; Early Red Clawson, twenty-nine and one-eighth bushels; and Early Genesee Giant, twenty-nine and one-twentieth bushels."
3. "Dawson's Golden Chaff was the most popular variety with the experimenters in each of the past four years."

The Dawson's Golden Chaff is an Ontario variety, and it has certainly made a good record for itself at the Agricultural College and throughout Ontario. We sent some of this variety to a few of the agricultural colleges of the United States and have received reports this year already from two of these institutions. The assistant director at the Pennsylvania Agricultural College writes as follows: "By the enclosed report you will see that Dawson's Golden Chaff, the variety of wheat received from your station two years ago, has come out ahead this year." The "enclosed report" referred to gives the results of thirty-two varieties tested in 1898. From this report we also quote the following: "Dawson's Golden Chaff and Gold Coin are the only ones that promise to be better than the old and standard varieties." The results of the experiment with different varieties of winter wheat conducted at the Michigan Agricultural College are reported by the Agriculturist in the following language: We have just finished the threshing of some of our variety tests of winter wheat, the more promising of which resulted as follows: Dawson's Golden Chaff, 42 bushels per acre; Russian, 31; Ourrell, 28; Rudy, 28; and Chaplin, 26.

CONCLUSIONS.

1. The average results of winter wheat growing on the experimental plots for nine years in succession are as follows: weight of grain per measured bushel, 60.2 pounds; yield of straw per acre, 2.7 tons; and yield of grain per acre, 39.5 bushels.
2. Dawson's Golden Chaff has given the largest average yield of grain per acre among seventy varieties of winter wheat grown at the Ontario Agricultural College for five years; also among eleven leading varieties tested over Ontario in 1893, nine varieties in 1894, in 1895, and in 1896, and seven varieties in 1897.
3. The Early Genesee Giant variety of winter wheat is a close rival of the Dawson's Golden Chaff variety in the small plots in the experimental department and in the large fields in the farm department of the Agricultural College, and also in the co-operative experiments conducted throughout Ontario.
4. Winter wheat which did not lodge until cut, produced a crop more than double the value of that which became lodged before it was ripe.
5. In five years' experiments with varieties of winter wheat, the American Bronze, Dawson's Golden Chaff, and Early Genesee Giant varieties possessed the stiffest straw of all the large yielders of grain.
6. Large plump kernels of winter wheat gave much better results than those which were small plump, shrunken, or broken.
7. In the average of six years' experiments in sowing winter wheat at different dates, it was found that when the wheat was sown later than September 9th, the crop was usually much poorer than when the seeding took place on or before that date.
8. As a crop, to use as [a green manure to plow under in preparation for winter wheat, peas have given the best, and buckwheat has given the poorest results.
9. In an experiment in cutting winter wheat at different stages of maturity for several years in succession, it was found that the largest yield of grain and the best quality of seed were produced from the crop which was allowed to fully ripen before cutting.
10. Winter wheat, badly infested with "stinking smut" has been very effectually treated in three different years by the use of either copper sulphate or hot water as briefly described in this bulletin.

DISTRIBUTION OF SEED FOR TESTING PURPOSES.

The following three sets of winter wheat varieties will be sent free, by mail in one-half pound lots of each variety, to farmers applying for them, who will carefully test the three kinds in the set which they choose, and will report the results after harvest next year. The seed will be sent out in the order in which the applications are received as long as the supply lasts :

Set 1.

Dawson's Golden Chaff.
Early Genesee Giant.
Early Red Clawson.

Set 2.

Dawson's Golden Chaff.
Imperial Amber.
Golden Drop.

Set 3.

Dawson's Golden Chaff.
Bearded Winter Fife.
Stewart's Champion.

Each person wishing one of these sets should apply as early as possible, mentioning which set he desires ; and the grain, with instructions for testing, and the blank form on which to report, will be furnished free of cost to his address, until the supply of grain for distribution is exhausted.

All communications should be addressed to O. A. Zavits, Agricultural College, Guelph, Ontario.

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THE ONTARIO PROVINCIAL FAT STOCK AND DAIRY SHOW
to be held in the CITY OF BRANTFORD, on Wednesday, Thursday
and Friday, NOVEMBER 30, and DECEMBER 1 and 2, 1898. Over
\$4,000 in cash prizes are offered in the LIVE STOCK and DAIRY
DEPARTMENTS. Prize lists and entry forms may be had by applying
to F. W. HODSON, Sec.-Treas., Parliament Buildings, Toronto.

