

# Ohio Agricultural Experiment Station.

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## BULLETIN 118.

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WOOSTER, OHIO, JUNE, 1900.

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### FIELD EXPERIMENTS WITH WHEAT.

COMPARISON OF VARIETIES.  
THICK AND THIN SEEDING.  
EARLY AND LATE SEEDING.  
DETERIORATION OF SEED.  
SPRING WHEAT.

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# BULLETIN

OF THE

## Ohio Agricultural Experiment Station.

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NUMBER 118.

JUNE, 1900.

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### FIELD EXPERIMENTS WITH WHEAT.

BY J. FREMONT HICKMAN.

#### INTRODUCTION.

The investigations reported in detail upon the following pages cover the work of three full seasons, and will include the yearly comparison of a list of varieties for the seasons of 1897, '98 and '99, together with some cultural investigations for each of the years. The work very naturally divides itself into two general parts. I, Comparison of varieties and II, Cultural investigations.

#### COMPARATIVE TESTS OF VARIETIES OF WHEAT.

Since the Station began its work at the present permanent location these variety tests have been made in one field, which is divided into five sections, each section giving room for ninety tenth-acre plots. This is known as "Variety Field" and the five sections permit a five-year rotation, which has been strictly followed, beginning with the fall of 1893. This rotation consists of corn, oats, wheat, clover and timothy, in the order named. These variety tests are based upon uniform conditions of drainage, cultivation, seeding, harvesting and threshing. The drainage was amply provided for early in the work, by laying a tile drain on one side of every plot, at a uniform depth of two and one-half feet. The plowing, harrowing and other cultivation of the ground is made uniform by working crosswise of the plots. This leaves the work at the close of any day with as much work completed upon one plot as upon any other.

Commercial manures have never been used, but a top dressing of yard manure is applied across the plots with a manure spreader, before

seeding to wheat; this gives but one application of manure in five years. This fact, together with the figures given in the several tables, is sufficient evidence that crops grown in the Station's variety tests are not grown on land above the average in fertility, neither are they given special fertilizers nor other special advantages.

While it has not always been possible to drill, or plant, all of these ninety plots within two days, as a rule they are gotten in within thirty-six hours. The different varieties are harvested as they are ripe and usually all are threshed within a very few days after they are sufficiently dry. Necessarily all the varieties must be threshed as they are hauled separately from the fields, to avoid mixing. Storing in the barn is quite out of the question, and constant vigilance is required to keep wagons, barn floor, thresher, fanning mill and sacks in condition to avoid mixing of the different sorts.

As before stated, each section gives room for ninety plots, but as a rule, only sixty of these are used for the different sorts, for the reason that every third plot is sown to a standard variety of wheat (Penquite's Velvet Chaff). The varieties under test are compared with the mean yield of the plots of Velvet Chaff between which they lie. The difference between this mean and the yield of the sort under consideration indicates whether it has produced more or less than the sort used as a standard. It is by this method of calculation that the second column in Table I is obtained.

Table I also gives yield per acre of the several sorts grown in comparative test for the season of 1899, comparative average yield, date of ripening, color of grain, weight per measured bushel and whether they belong to the smooth or bearded class.

WHEAT: TABLE I — COMPARATIVE YIELD OF VARIETIES IN 1899.

Variety.	Yield per acre 1899.	Increase (+) Decrease (-)	Comparative average yield.	Date of ripening 1899.	Color of Grain.	Bearded or Smooth.	Weight per measured bushel.
	Bushels.	Bushels.	Bushels.				Pounds
American Bronze .....	16.50	-1.38	19.94	June 28	Red	Smooth	59.0
Bearded Monarch .....	20.66	+0.33	21.26	" 26	Red	Bearded	60.0
Bearded Winter Fife.....	18.75	-1.20	.....	" 27	White	Bearded	59.5
Buda Pesth .....	17.66	-2.98	.....	" 30	Red	Bearded	58.5
Currell's Prolific .....	24.16	+5.01	22.29	" 26	Red	Smooth	60.2
Dawson's Golden Chaff..	21.83	+3.02	.....	" 26	White	Smooth	58.2
Deitz .....	19.33	+0.89	20.54	" 28	Red	Bearded	58.0
Democrat .....	25.83	+5.95	20.84	" 28	White	Bearded	59.9
Diamond Grit .....	16.75	-4.05	.....	" 28	Red	Bearded	60.2
Early Arcadian .....	16.83	-3.35	.....	" 29	White	Smooth	57.0
Early Genesee Giant.....	19.58	-1.33	.....	" 26	Red	Bearded	58.7
Early Red Clawson.....	15.83	-2.53	18.90	" 28	Red	Smooth	58.5
Early Ripe .....	26.41	+7.58	23.47	" 28	Red	Smooth	59.5
Early White Leader.....	15.91	-2.23	18.24	" 26	White	Smooth	57.0

WHEAT: TABLE I—COMPARATIVE YIELD OF VARIETIES IN 1899—Concluded.

Variety.	Yield per acre 1899.	Increase (+) Decrease (-)	Compar- ative average yield.	Date of ripening 1899.	Color of Grain.	Bearded or Smooth.	Weight per meas- ured bushel.
	Bushels.	Bushels.	Bushels.				Pounds
Egyptian .....	23.33	+5.50	21.87	" 26	Red	Bearded	57.2
Forty-Fold .....	24.16	+5.77	.....	" 28	White	Smooth	55.2
Fulcaster .....	21.75	+1.56	20.30	" 27	Red	Bearded	60.0
Fultz .....	23.00	+2.78	20.39	" 27	Red	Smooth	60.0
Fultz-Mediterranean .....	28.16	+5.25	.....	" 26	Red	Smooth	60.5
Giant Square Head.....	18.00	+0.83	.....	" 28	White	Bearded	55.5
Gold Coin .....	18.08	-3.11	.....	" 28	White	Smooth	59.0
Gypsy .....	25.53	+5.56	22.96	" 26	Red	Bearded	60.2
Harvest King .....	16.16	-1.28	.....	" 28	Red	Smooth	57.7
Harvest Queen .....	23.66	+2.16	.....	" 28	White	Smooth	57.5
Hickman .....	17.00	-1.05	19.06	" 26	Red	Smooth	60.0
Hindustan .....	15.50	-1.11	19.08	" 28	Red	Bearded	58.0
Improved Fulcaster .....	22.41	+2.68	.....	" 28	Red	Bearded	61.0
Improved Poole .....	25.83	+8.55	.....	" 26	Red	Smooth	57.5
International No. 6.....	23.66	+4.27	.....	" 29	White	Smooth	55.7
Jones' Longberry No. 1..	19.91	+1.98	.....	" 26	White	Bearded	59.2
Jones' Square Head.....	12.83	-4.53	17.14	" 29	White	Smooth	58.2
Jones' Winter Fife.....	14.08	-3.47	17.71	" 27	Red	Smooth	58.2
Lebanon .....	21.66	+3.27	20.85	" 28	Red	Bearded	58.2
Lehigh .....	16.00	+0.33	19.86	" 28	Red	Bearded	57.5
Long Amber .....	14.16	-4.97	.....	" 29	Red	Smooth	58.2
Martin's Amber .....	18.25	-0.36	19.18	" 26	White	Smooth	59.5
Mealy .....	29.91	+9.52	24.50	" 27	Red	Smooth	58.0
Mediterranean .....	18.33	+2.67	22.67	" 28	Red	Bearded	59.5
Missouri Blue Stem.....	18.50	-1.24	19.03	" 29	Red	Bearded	60.0
New Columbia .....	21.41	+2.14	.....	" 23	Red	Smooth	56.5
New Longberry .....	21.33	+2.79	.....	" 28	Red	Bearded	59.5
New Monarch .....	25.16	+5.83	21.72	" 27	Red	Smooth	59.7
New Soules .....	25.83	+5.66	.....	" 28	White	Smooth	56.5
Nigger .....	20.16	+3.09	22.93	" 26	Red	Bearded	56.2
Nixon .....	24.83	+6.08	.....	" 26	Red	Smooth	61.0
Perfection .....	23.66	+3.30	.....	" 26	White	Smooth	60.0
Poole .....	21.00	+3.95	24.00	" 26	Red	Smooth	57.5
Pride of Genesee.....	14.50	-3.52	.....	" 27	Red	Bearded	58.5
Red Cross .....	19.16	+1.04	.....	" 26	Red	Smooth	58.5
Red Russian .....	31.58	+11.31	23.86	" 28	Red	Smooth	59.5
Red Wonder .....	19.16	+1.41	.....	" 26	Red	Bearded	61.5
Royal Australian .....	17.66	-0.59	18.13	" 26	White	Smooth	58.0
Rural New Yorker No. 6.	23.25	+2.98	.....	" 30	Red	Smooth	56.7
Rudy .....	12.83	-4.50	19.83	" 26	Red	Bearded	58.5
Rochester Red .....	16.16	-3.16	.....	" 27	Red	Bearded	58.0
Sibley's New Golden.....	21.33	-3.78	18.98	" 28	Red	Bearded	58.2
Silver Chaff .....	18.08	-0.89	18.36	" 26	White	Smooth	58.5
Smith's Rust Proof.....	17.83	-0.78	.....	" 25	White	Smooth	59.0
Stanley .....	19.16	+1.33	.....	" 28	White	Bearded	55.5
Turkish Red .....	20.50	+1.17	.....	" 30	Red	Bearded	59.7
Valley .....	20.83	+2.75	21.27	" 26	Red	Bearded	58.0
Velvet Chaff .....	18.49	.....	20.00	" 24	Red	Bearded	59.6
White Golden Cross.....	26.16	+6.61	.....	" 28	White	Bearded	56.5
Yellow Gypsy .....	21.83	+2.86	18.78	" 26	Red	Bearded	59.5

The average yield of the 30 plots of Velvet Chaff for the past seven years has been 20 bushels per acre. The yields given in the fourth column of the above table are to be compared with this average.

WHEAT: TABLE II — COMPARING YIELDS OF EACH VARIETY WITH THOSE OF A STANDARD SORT THROUGH A SERIES OF YEARS.

Name of variety.	Yields in bushels per acre.							Seven years' average
	1893	1894	1895	1896	1897	1898	1899	
American Bronze .....	20.50	19.20	11.46	7.50	24.00	23.66	16.50	17.55
Velvet Chaff .....	20.87	17.00	8.54	7.50	22.33	28.25	17.16	17.38
Bearded Monarch .....	23.91	22.20	8.20	9.62	29.66	27.16	20.33	20.15
Velvet Chaff .....	25.00	17.20	10.76	11.50	22.66	26.33	20.66	19.16
Buda Pesth .....							17.56	
Velvet Chaff .....							21.08	
Currell's Prolific .....	30.25	16.20	10.54	11.12	37.83	34.33	24.16	23.49
Velvet Chaff .....	25.64	18.50	12.50	10.50	31.16	29.25	19.75	21.04
Dawson's Golden Chaff .....						25.16	21.83	23.50
Velvet Chaff .....						26.50	19.50	23.00
Deitz .....	34.50	16.90	8.87	8.33	25.50	31.50	19.33	20.70
Velvet Chaff .....	30.91	13.00	10.91	9.20	25.16	32.25	18.50	19.99
Democrat .....	34.83	15.00	9.33	9.00	27.25	28.50	25.83	21.39
Velvet Chaff .....	30.91	13.00	10.91	9.20	25.16	32.25	19.50	20.13
Diamond Grit .....						20.58	16.75	18.67
Velvet Chaff .....						24.00	20.41	22.21
Early Arcadian .....						19.58	16.83	18.21
Velvet Chaff .....						26.00	20.41	23.21
Early Genesee Giant .....		19.60	12.25	6.25	19.41	24.75	19.58	16.97
Velvet Chaff .....		18.30	9.20	7.33	20.66	26.08	18.25	16.64
Early Red Clawson .....	23.33	14.00	8.37	7.96	25.33	25.08	15.83	17.41
Velvet Chaff .....	23.75	18.40	8.79	10.33	25.66	28.41	18.66	19.14
Early Ripe .....	31.15	19.70	10.00	14.00	28.50	29.66	26.41	22.77
Velvet Chaff .....	26.41	18.50	11.41	10.66	25.50	26.16	17.91	19.51
Early White Leader .....	20.16	18.80	13.12	6.00	21.83	24.08	15.91	17.13
Velvet Chaff .....	20.75	17.80	10.37	8.20	21.50	28.25	18.25	17.87
Egyptian .....	33.41	14.70	12.25	10.62	25.16	32.00	23.33	21.64
Velvet Chaff .....	27.25	15.40	11.37	8.41	26.33	33.16	14.83	19.39
Forty-fold .....				8.91	32.83	29.91	24.16	23.95
Velvet Chaff .....				9.33	33.33	35.25	18.00	23.98
Fulcaster .....	27.00	14.50	9.41	9.16	30.58	29.33	21.75	20.25
Velvet Chaff .....	25.64	17.20	11.54	11.75	33.00	27.83	19.75	20.96
Fultz .....	21.91	24.10	12.71	7.21	33.83	33.16	23.05	22.28
Velvet Chaff .....	26.66	22.00	14.04	12.00	30.66	29.41	20.16	22.13
Fultz-Mediterranean .....							28.16	
Velvet Chaff .....							22.83	
Geneva .....	32.25	28.40	13.08	11.00	31.50	29.83		24.34
Velvet Chaff .....	29.33	21.60	13.66	10.25	33.33	31.08		23.21

TABLE II — *Continued.*

Name of variety.	Yields in bushels per acre.							Seven years' average
	1893	1894	1895	1896	1897	1898	1899	
Giant Square Head.....						30.00	18.00	24.00
Velvet Chaff .....						29.25	17.50	23.38
Gold Coin.....			12.79	4.50	20.33	22.75	18.08	15.69
Velvet Chaff .....			12.37	7.33	22.16	24.00	21.58	17.49
Gypsy .....	27.50	18.50	14.62	12.08	28.75	30.25	25.58	22.47
Velvet Chaff .....	25.50	16.50	10.76	12.29	25.66	30.08	21.08	20.27
Harvest King .....						23.16	16.16	19.66
Velvet Chaff .....						24.16	16.75	20.46
Harvest Queen .....							23.66	.....
Velvet Chaff .....							23.00	.....
Hickman .....	19.41	19.80	9.25	7.75	26.83	24.50	17.00	19.22
Velvet Chaff .....	22.25	17.30	9.37	10.29	25.06	28.41	17.75	18.72
Hindustan .....	30.66	8.80	8.08	7.50	30.66	28.25	15.50	18.49
Velvet Chaff .....	27.33	12.40	13.91	12.45	27.08	25.75	15.66	19.23
Improved Fulcaster .....						29.00	22.41	25.71
Velvet Chaff .....						27.91	19.50	23.71
Improved Poole .....			11.62	12.00	30.75	36.00	25.83	23.24
Velvet Chaff .....			10.91	10.12	25.33	30.16	17.50	18.80
International No. 6.....				10.33	34.00	27.66	23.66	23.91
Velvet Chaff .....				8.58	30.00	24.25	19.50	20.58
Jones' Longberry No. 1.....							19.91	.....
Velvet Chaff .....							19.75	.....
Jones' Square Head.....	18.91	11.80	10.50	5.58	23.33	23.00	12.83	15.14
Velvet Chaff .....	20.75	16.90	8.54	7.50	22.23	29.25	17.16	17.49
Jones' Winter Fife.....	20.75	15.80	11.08	7.25	21.66	22.00	14.08	16.09
Velvet Chaff .....	25.50	18.40	10.62	10.91	26.16	29.25	17.75	19.80
Lebanon .....	33.83	14.20	8.50	9.33	22.50	33.66	21.66	20.53
Velvet Chaff .....	29.41	14.40	11.66	9.62	24.75	31.33	18.33	19.93
Lehigh .....	29.16	10.00	8.91	10.33	30.91	28.66	16.00	19.14
Velvet Chaff .....	31.33	15.60	13.45	12.00	28.66	24.50	15.66	20.17
Long Amber .....			10.46	6.20	18.91	20.50	14.16	14.05
Velvet Chaff .....			10.58	8.33	21.83	24.75	17.91	16.68
Martin's Amber .....	29.41	18.80	12.08	8.66	28.66	28.75	18.25	19.93
Velvet Chaff .....	26.41	17.80	11.54	11.75	23.00	27.83	18.25	20.94
Mealy .....	30.58	33.10	16.54	11.75	36.33	30.00	29.91	26.89
Velvet Chaff .....	29.16	21.60	13.66	10.25	31.66	32.83	20.50	22.81
Mediterranean .....	31.25	15.20	13.29	12.66	32.00	30.33	18.33	21.86
Velvet Chaff .....	31.33	15.60	13.45	12.00	28.66	24.50	15.66	20.17

TABLE II — *Continued.*

Name of variety.	Yields in bushels per acre.							Seven years' average
	1893	1894	1895	1896	1897	1898	1899	
Missouri Blue Stem.....	27.47	14.60	7.58	7.29	24.83	28.00	18.50	18.32
Velvet Chaff .....	25.00	18.50	10.76	11.50	25.50	26.16	20.66	19.73
New Columbia .....		32.20	12.96	6.25	30.50	34.75	21.41	23.01
Velvet Chaff .....		21.60	11.41	10.96	32.00	31.58	19.16	21.12
New Longberry .....	25.75	10.00	10.25	10.00	29.41	33.00	21.33	19.96
Velvet Chaff .....	25.64	22.10	12.50	10.50	31.16	29.25	17.33	21.21
New Monarch .....	30.41	22.20	14.16	11.33	33.66	24.75	25.16	23.10
Velvet Chaff .....	24.08	22.10	13.45	10.16	32.25	29.41	20.33	21.68
New Soules .....				11.04	34.50	31.33	25.83	25.68
Velvet Chaff .....				11.16	31.33	32.83	20.50	23.96
Nigger .....	33.91	29.20	8.04	9.29	32.41	34.00	20.16	23.86
Velvet Chaff .....	29.75	20.40	9.96	9.20	29.58	31.08	16.83	20.97
Nixon .....						19.50	24.83	22.17
Velvet Chaff .....						24.16	19.75	21.96
Perfection .....			11.58	8.33	27.00	25.16	23.66	19.15
Velvet Chaff .....			12.37	7.33	22.16	24.75	21.58	17.64
Poole .....	35.00	29.20	11.00	12.58	28.75	33.83	21.00	24.48
Velvet Chaff .....	27.25	19.30	10.91	10.12	25.33	30.16	16.83	19.90
Pride of Genesee.....			8.71	8.00	22.00	21.00	14.50	14.84
Velvet Chaff .....			9.20	7.33	20.66	26.08	17.91	16.24
Red Cross .....						23.00	19.16	21.08
Velvet Chaff .....						26.50	19.50	23.00
Red Russian .....	30.00	25.60	13.96	12.16	37.75	32.66	31.58	26.24
Velvet Chaff .....	26.66	22.00	13.96	11.16	31.33	32.33	20.16	22.51
Red Wonder .....						26.00	19.16	22.58
Velvet Chaff .....						24.16	16.75	20.46
Rochester Red .....		14.50	11.79	7.37	24.41	23.50	16.16	16.29
Velvet Chaff .....		16.30	11.41	10.33	22.66	26.33	18.60	17.62
Royal Australian .....	25.50	9.90	11.29	9.08	30.33	21.50	17.66	17.89
Velvet Chaff .....	25.50	16.50	10.76	12.29	27.83	25.75	18.25	19.55
Rudy .....	34.91	13.70	7.04	10.75	27.83	30.75	12.83	19.69
Velvet Chaff .....	27.25	15.40	11.37	8.41	26.33	33.16	14.83	19.54
Rural New Yorker No. 6..							23.25	.....
Velvet Chaff .....							20.33	.....
Sibley's New Golden.....	31.00	11.50	9.50	10.25	29.50	27.33	21.33	20.06
Velvet Chaff .....	30.00	14.00	11.91	11.35	27.08	25.75	18.50	19.80
Silver Chaff .....	26.66	14.20	10.54	8.83	29.33	27.00	18.08	19.23
Velvet Chaff .....	26.41	17.80	12.04	10.16	31.50	31.91	19.33	21.31



TABLE II — *Concluded.*

Name of variety.	Yield in bushels per acre.							Seven years' average
	1893	1894	1895	1896	1897	1898	1899	
Smith's Rust Proof.....			12.79	7.66	33.83	26.66	17.83	19.75
Velvet Chaff .....			12.37	10.16	31.50	31.91	19.33	21.05
Stanley .....						26.50	19.16	22.83
Velvet Chaff .....						29.25	18.00	23.63
Theiss .....	21.41	15.20	9.37	7.33	28.33	25.33		17.83
Velvet Chaff .....	25.75	15.50	10.76	12.29	27.83	30.08		20.37
Turkish Red .....							20.50	
Velvet Chaff .....							17.33	
Tuscan Island .....	32.91	22.50	9.91	12.54	35.50	32.75		24.35
Velvet Chaff .....	29.33	21.60	13.66	10.25	33.33	31.58		23.29
Valley .....	33.33	13.40	11.75	8.75	22.50	35.33	20.83	20.84
Velvet Chaff .....	29.41	14.40	11.66	9.62	24.75	31.33	18.33	19.93
White Golden Cross.....			12.83	7.12	30.50	29.33	26.16	21.19
Velvet Chaff .....			11.41	10.96	32.00	35.25	19.16	21.76
Winter Fife, Bearded.....						26.50	18.75	22.63
Velvet Chaff .....						26.00	19.50	22.75
Wisconsin Triumph.....	23.08	23.60	12.21	8.00	35.16			20.41
Velvet Chaff .....	25.70	22.00	13.46	10.66	32.25			20.81
Yellow Gypsy .....	20.83	18.20	7.96	6.00	25.00	24.66	21.83	17.78
Velvet Chaff .....	23.75	18.40	8.79	10.66	25.66	30.08	17.91	19.32

Table II gives the yields of each sort grown in comparative test on the Station grounds for the three years, 1897 to 1899 both inclusive. It also includes the yields of many of the older sorts grown from 1893 to 1899, both inclusive, together with a column giving average yield of each sort for the number of years included, and the average of the standard sort grown next to it for the same years.

In considering the results in this table it should be borne clearly in mind that Penquite's Velvet Chaff is the one used as a standard and the variety next preceding the Velvet Chaff is the one with which the comparison is to be made.

Making this direct comparison with the varieties grown the full seven years we find but two averaging more than four bushels per acre more than the Velvet Chaff, namely, Poole and Mealy. The Red Russian makes a close third, yielding an average of 3.73 bushels per acre more than the standard. The following five sorts have yielded an average of two to three bushels per acre more than the standard: Nigger, Early Ripe, Currell's Prolific, Gypsy and Egyptian. The Mediterranean, New

Monarch and Democrat have given an average yield of from one to two bushels more per acre than the standard variety.

The following named sorts have given average yields from one-half to one bushel greater per acre than the standard sort: Bearded Monarch, Valley, Deitz, Lebanon and Hickman.

One sort, Jones' Winter Fife, has given an average yield of almost three bushels and three-fourths less per acre than the standard sort; Theiss has averaged 2.54 bushels less per acre; Silver Chaff has averaged 2.08 bushels less per acre than Velvet Chaff. The following sorts have given yields from one to one and four-fifths bushel less per acre than the one used as a standard; Royal Australian, Early Red Clawson, Yellow Gypsy, Missouri Blue Stem, New Longberry, Lehigh and Martin's Amber.

Of those yielding an average of one bushel and less per acre less than Velvet Chaff the following may be mentioned: Fulcaster, Hindostan and Early White Leader.

Three sorts found in the table, namely: Theiss, Geneva and Tuscan Island, were in the comparative test for the six years 1893 to 1898 inclusive. The first of these averaged about two and one-half bushels less per acre than the Velvet Chaff, while the other two averaged about one bushel more per acre than the Velvet Chaff. These three sorts were dropped from the list on account of weakness in straw, a fault that the practical wheat grower cannot afford to overlook.

Three new sorts were introduced into our list in 1894, namely: New Columbia, Early Genessee Giant and Rochester Red. The first of these is one of our earliest ripening sorts and has given an average yield of almost two bushels more per acre than the Velvet Chaff. The Early Genessee Giant has averaged about one-third of a bushel more, and the Rochester Red one and one-third bushel less per acre than the Velvet Chaff.

In the fall of 1895 to our list were added the following: Improved Poole, Pride of Genessee, Long Amber, Perfection, Gold Coin, White Golden Cross and Smith's Rust-Proof. The first three of these seven are red wheats and the other four are white sorts. Of these the most promising is the Improved Poole. It has averaged nearly four and a half bushels more per acre, for the five years grown, than the Velvet Chaff. The only other sort among the seven that has given a higher average yield than the Velvet Chaff is the Perfection, with an average of one and one-half bushel more per acre than the Velvet Chaff.

Three new sorts, all white, were introduced into our tests in 1896, namely: Forty-Fold, International No. 6 and New Soules. The first of these has proven equal to the Velvet Chaff in yield, while the second has averaged three bushels and a third per acre more than the Velvet Chaff, and the third has averaged about one and three-fourths bushel more per acre than the Velvet Chaff. Other sorts included in this extended table

have been grown but one or two years in the comparative tests, but we do not regard it as usually safe to attempt to make comparisons until the varieties have grown side by side for several years, unless some decided fault, such as extreme lateness, or weakness of straw, shall at once become apparent.

#### SPECIAL MENTION OF SOME OF THE NEWER SORTS OF WHEAT.

One of the most promising sorts grown in our comparative tests for a series of years is the Mealy. Seed of this variety was first received from the Agricultural Department at Washington, D. C. in the fall of 1890. I know of no other wheat that lies as close to the ground as this one does during the late fall and winter. It has a very stiff straw, which shows a peculiar bluish tinge for several weeks previous to maturing. The chaff has a velvet covering and is without beards. The berry is only of medium size, but red and flinty. It does not shatter easily and has the reputation of being less subject to the fly than some other varieties. The writer does not think there is such a thing as a fly-proof wheat, but concludes that some varieties may be less subject to the attacks of the fly than others. With the variety under consideration I regard its manner of growth in the fall as an obstacle in the way of the fly. As indicated above, its tendency is to produce leaves rather than stalks, and these leaves lie close to the ground instead of taking an upright position. Again, the inclination of the stalk to grow stronger may mean that in the earlier stages of growth it is correspondingly harder to work upon than are some other softer-strawed varieties. Observations on the Station farm, last year, pointed quite conclusively to the fact that while the Mealy wheat was not free from the fly and its destructive work, yet a much smaller percent of this variety was broken down than of the Poole, Valley, Fultz and Velvet Chaff that were grown upon different parts of the Station farm. The Mealy wheat, as far as can be told from general characteristics, has the qualifications of a good milling wheat and has been so pronounced by some millers competent to judge. The greatest objection found to it is its large percentage of small grains. In other words, more of it would run into the screen box than from most other varieties. The writer has not experienced any reduction in price when offering this wheat for sale on account of the small grains. Millers, as a rule, do not object to the small berry if it has other good qualities. Again, by careful selection, it may be possible to breed out this real or apparent fault.

With a view to confirming the observation that the Mealy was less injured by the fly than other varieties, a circular letter was sent to a number of persons who had secured seed of this variety last fall from the Station. The circular read as follows:

"During the fall of 1899 we sold you some Mealy wheat. I write to ask whether you are having any trouble with the fly in this particular variety, and if you have other varieties on your farm, or in the same

neighborhood, I wish to inquire if the fly is doing greater damage to other varieties than it is to the Mealy? I will be glad to have you give me a prompt answer on these particular points." Signed by the writer.

The answers received to the above are quite interesting, and so far as they bear upon the point being considered they are inserted, as follows:

"The Mealy wheat is a good stand, did not freeze out any. I examined it to-day and find it has not been injured any by the fly. The other wheat is next to it in same field and I find that the fly has taken about half or more of it. A neighbor has wheat adjoining, with fence between, and the fly has reduced it to less than a half crop, and if the fly continues to work on it another week almost all will be taken. The Mealy wheat seems to be fly proof and many passers-by give it the credit of being the best field of wheat in this section. My foreman thinks the wheat will make twenty-eight bushels per acre, if nothing injures it before time to harvest."

(Signed) T. G. STENCE,  
Ashland, Ohio.

"I find the Mealy not so much damaged by the fly as the Poole, on my place. The Mealy has done fairly well so far."

(Signed) J. G. BILDERBACK,  
Ankenytown,  
Knox Co., O.

"In reply to your letter regarding Mealy wheat, will say that the seed was sown Sept. 9th and made a rank growth, with no damage by fly in the fall. The injury since spring is slight, not 50 percent as much when compared with Poole sown in adjoining fields on my farm. The last sown on potato ground on Sept. 25th. This last seeding does not promise more than five bushels per acre, the fly eating nearly all up last fall.

"The Mealy promises 20 to 25 bushels per acre and it was considerably injured on account of not being protected by snow in winter and by drought since.

(Signed) E. R. LEEDY,  
New Pittsburg,  
Wayne Co., O.

"In answer to yours of recent date, making inquiry as to how the Mealy wheat is behaving, I have to say that it has plainly stood the ravages of the Hessian fly better than Poole wheat growing beside it, but it is not fly-proof. The big freezes of May 5th and 11th did not affect it as much as they did the Poole. It was sowed on creek bottom land, a sandy, rich loam."

(Signed) A. JOHNSTON,  
Paint Valley,  
Holmes Co., O.

"Your letter of inquiry about the Mealy wheat received. We have been growing the Valley wheat for a number of years. Last fall we secured Mealy wheat from the Station. The ground was in most excellent condition and wheat was sown about Sept. 26 or 28. Have seen no difference in regard to its escaping the fly, or killing out, from other varieties in our neighborhood. There was very

little fly in our wheat last fall and very little now. Many fields were undoubtedly destroyed by the fly but I think more were destroyed by weather conditions."

(Signed) SAMUEL BARNETT,  
Urbana, Champaign Co.,  
Ohio.

"The hard winter and fly combined almost finished the wheat crop by the last of May. We had sown about 18 acres to Velvet Chaff and Mealy. We think that the Mealy from some reason looked 50 percent better than the other when all was plowed up about the 30th of May, 1900.

(Signed) E. W. PEGG,  
Clintonville,  
Franklin Co., O.

"Sowed Mealy wheat Sept. 15th on fallow ground; the remaining part of the field was sown on the same date with Poole. Both came up and looked fine. About the first of November the Poole began to show signs of fly. Upon examining I found the fly in the Poole but could not find any in the Mealy. I also examined my Mealy and also a field belonging to a neighbor, to-day, and found plenty of fly in the first and second joints. I think the effect of the fly nearly as bad on the Mealy as on my other varieties, but have formed the opinion that if the spring had not been so favorable for the fly the Mealy would have excelled the other varieties, as the fly did not injure it in the fall."

(Signed) L. Z. HINER,  
New Pittsburg,  
Wayne, Co., O.

"I sowed the Mealy wheat September 22d. I also sowed some Rural New Yorker on the same day. On Sept. 28th sowed some Poole. The fly has been very destructive this year both in fall and spring, some fields being totally destroyed. The Rural New Yorker was almost entirely destroyed by the fly, the Poole was damaged badly and the Mealy much less than either of the others. If the season from spring until harvest had been favorable I would have had a fair crop of Mealy; as it is will have about a half a crop."

(Signed) W. S. BARKER,  
Millwood,  
Knox Co., O.

Basing an opinion upon the foregoing it is reasonable to suppose that the Mealy wheat will soon bear the same reputation for being less susceptible to the attacks of fly as do the Mediterranean, Clawson and some others. Judging from the above letters it is fair to conclude that where two or three varieties are grown in large areas the Hessian fly may select one as more preferable to work upon and do greater damage to it than to the others.

Considering the opinions and testimony given in the above letters we may conclude that the Mealy wheat is not fly-proof, but that this variety of wheat, all things considered, is not likely to be injured as much as many other varieties.

New Columbia: This variety was introduced into our list for comparative test in 1894. It is a stiff strawed variety, with a red berry and

smooth head. It is one of the earliest maturing sorts in the whole list. Its average yield has been about two bushels per acre more than the Velvet Chaff.

Improved Poole: This variety has been grown on the Station grounds for five years. It would be difficult to discover a characteristic in this wheat not found in the old Poole; it has, however, a higher average yield when compared with the Velvet Chaff than the old Poole wheat, and is therefore entitled to special notice. It is probably the result of careful seed selection.

Perfection: This variety was grown here first in 1895 and has been in the comparative test five years. It is a good, strong strawed variety, with a smooth head and a white, plump berry. It has not been a remarkable yielder, but has averaged during these five years about one and a half bushels more per acre than the standard variety grown next to it. It would come under the category of soft wheats.

Gold Coin: This variety has been grown here for the same five years as the Perfection. It is a smooth, white wheat, with a fair straw, but in the comparative tests has averaged almost two bushels less per acre than the Velvet Chaff.

International No. 6: This is a strong growing, white grained, smooth headed wheat. It has been grown in the comparative tests four years and is one of the most promising white varieties on our present list. It is open to the same objection that most of the white wheats are being too soft in the grain.

Dawson's Golden Chaff: This is also a white grained variety, with a good, stiff straw and smooth heads. It was sent to this Station from Guelph, Ontario. It has not, however, gained the reputation in this country that it has so well earned in the more northern climate. Its average yield for the two years grown in our comparative tests is about one-half bushel more per acre than Velvet Chaff.

Harvest King: This variety has been grown here but two years. It has many, if not all of the characteristics of the Poole wheat, and is possibly only an old variety under a larger name.

Rural New Yorker No. 6: This is a good, strong strawed variety, with red grain and a smooth head, and with a single season's trial gives fair promise.

Fultz-Mediterranean: One of the most recently introduced varieties. Its originator lays claim to having made a cross between the old Fultz and the Mediterranean wheats, hence the name. It is a red, smooth wheat and for the single season made a very excellent showing.

There are several other more or less promising new varieties given in Table II, the details concerning which will be readily found by referring to Tables I and II.

Table III gives comparison of yields by difference between the several varieties in the table and the standard variety between which

they have been grown each year after they were introduced into the comparative test. In calculating this increase or decrease it is assumed that the variation in soil between neighboring check plots is progressive; for instance, if the yield of Plot one is 29 bushels and Plot 5 is 25 bushels it is assumed that if Plots 2, 3 and 4 had been sown with the same variety the yields of these three intermediate plots would be 28, 27 and 26 bushels respectively.

WHEAT: TABLE III—COMPARISON OF VARIETIES BY INCREASE OR DECREASE FROM THE YIELD OF A GIVEN STANDARD VARIETY.

Name of variety.	1893	1894	1895	1896	1897	1898	1899	Average increase (+) decrease (-)
American Bronze	-0.18	+2.00	+2.31	-0.23	+1.94	-4.92	-1.38	-0.07
Bearded Monarch	-0.25	-4.16	-1.24	-1.10	+6.05	+0.89	+0.33	+0.07
Currell's Prolific	+4.15	-1.84	-1.80	+0.74	+6.44	+4.20	+5.01	+2.41
Dawson's Golden Chaff						-1.81	+3.02	+0.60
Deitz	+1.59	+3.57	-2.37	-1.13	-1.39	-0.44	-0.89	-0.15
Democrat	+4.42	+1.33	-2.24	-0.73	-1.31	-1.58	+5.95	+0.83
Diamond Grit						-4.08	-4.05	-4.06
Early Arcadian						-5.75	-3.35	-4.55
Early Genesee Giant		+1.10	+2.66	-3.21	-1.53	-2.05	-1.33	-0.73
Early Red Clawson	+3.54	-3.62	-0.80	-2.34	+1.69	-2.63	-2.53	-0.96
Early Ripe	+5.68	+2.10	-0.97	+4.78	+2.94	+2.19	+7.58	+3.47
Early White Leader	-1.25	-0.30	+3.14	-2.83	-0.61	-3.44	-2.23	-1.07
Egyptian	+6.16	-0.03	+0.69	+1.41	-0.12	-0.55	+5.50	+1.87
Forty-Fold				-0.96	-0.06	-3.95	+5.77	+0.20
Fulcaster	+1.46	-2.24	-1.87	-2.77	-0.70	+2.19	+1.56	-0.34
Fultz	-3.35	+2.04	-1.13	-3.01	+2.64	+2.78	+2.78	+0.39
Geneva	+3.87	+7.84	+2.60	+0.72	-0.58	-2.64		+1.97
Giant Square Head						+4.00	+0.83	+2.41
Gold Coin			+0.42	+5.46	-1.83	-1.50	-3.11	-0.11
Golden Cross	+2.61		+1.64	-3.29	-1.95	-4.69	+6.61	+0.15
Golden Prolific	+2.86	-2.48	-0.20					
Gypsy	+5.34	+1.53	+3.43	+0.88	+2.36	+1.62	+5.56	+2.97
Hard Wheat		+2.72	-2.29	-1.87	-5.08			-1.63
Harvest King						-1.78	-1.28	-1.53
Hickman		+3.26	-0.53	-2.74	+1.01	-4.19	-1.05	-0.71
Hindustan	+1.55	-4.68	-5.67	-2.47	+3.06	+2.92	-1.11	-0.91
Improved Fulcaster						+1.73	+2.68	+2.20
Improved Poole			+1.03	+2.20	+4.01	+5.54	+8.55	+4.26
International No. 6				-1.28	+4.44	+3.33	+4.27	+2.96
Jones' Square Head	-2.43	-5.14	+1.27	-3.05	-0.29	-5.91	-4.53	-2.87
Jones' Winter Fife	+0.14	-1.17	+1.16	-2.52	-3.23	-6.97	-3.47	-2.29
Lebanon	+5.14	+0.74	-2.66	-0.01	-2.53	+2.03	+3.27	+0.85
Lehigh	+0.94	-4.54	-4.69	-0.36	+2.78	+3.75	+0.33	-0.25
Long Amber			-0.52	-2.02	-3.53	-4.69	-4.97	-3.15
Martin's Amber	+4.22	-3.17	-0.38	-2.56	-3.84	-0.44	-0.36	-0.93
Mealy	+4.53	+11.06	+2.78	+1.20	+4.75	-2.41	+9.52	+4.49
Mediterranean	+3.84	-0.60	+0.74	-3.13	+2.44	+5.92	+2.67	+1.67
Missouri Blue Stem	+2.89	-3.40	-2.52	-3.82	+0.27	+1.79	-1.24	-0.87
New Columbia		+10.84	+0.80	-4.47	-2.39	+1.95	+2.14	+1.48
New Longberry	-0.05	-8.27	-2.57	-0.55	-2.12	+3.70	+2.79	-1.01
New Michigan Amber	+3.28	-0.30	-2.57					+0.13
New Monarch	+4.83	+2.50	+1.02	+0.73	+1.77	-4.60	+5.83	+1.73
New Soules				+0.19	+3.06	-1.33	+5.66	+1.87

WHEAT: TABLE III—Concluded.

Name of variety.	1893	1894	1895	1896	1897	1898	1899	Average increase (+) decrease (-)
Nigger .....	+5.56	+9.18	-2.18	+0.05	+1.58	+3.23	+3.09	+2.93
Nixon .....	.....	.....	.....	.....	.....	-5.34	+6.08	+0.37
Perfection .....	.....	.....	-0.59	+0.78	+3.34	+0.66	+3.30	+1.50
Poole .....	+5.75	+9.20	-0.06	+1.36	+3.09	+2.67	+3.95	+3.70
Pride of Genesee.....	.....	.....	-0.95	-1.51	+0.95	-4.64	-3.52	-1.93
Red Beauty .....	.....	.....	+1.37	-1.24	-0.97	.....	.....	-0.28
Red Cross .....	.....	.....	.....	.....	.....	-2.72	+1.04	-0.84
Red Russian .....	+3.87	+3.70	-0.02	+1.39	+6.64	+0.17	+11.31	+3.87
Red Wonder .....	.....	.....	.....	.....	.....	+1.84	+1.41	+1.62
Reliable Minnesota .....	.....	.....	-1.55	-1.96	-5.29	.....	.....	-2.93
Rochester Red .....	.....	-2.14	+0.60	-2.94	-0.25	-3.52	-3.16	-1.90
Royal Australian .....	+1.31	-6.86	+0.27	-3.03	+0.77	-4.94	-0.59	-1.87
Rudy .....	+6.83	-1.36	-4.42	+1.94	+2.02	-1.41	-4.50	-0.13
Sibley's New Golden.....	+0.70	-1.43	-3.74	+0.31	+1.37	-0.58	-3.78	-1.02
Silver Chaff .....	+2.03	-3.20	-1.33	-1.86	-2.67	+3.55	-0.89	-0.62
Stanley .....	.....	.....	.....	.....	.....	+0.50	+1.33	+0.91
Surprise .....	+6.23	-0.20	-0.96	-0.67	-0.58	.....	.....	+0.60
Theiss .....	-1.47	-1.82	-1.60	+0.34	+1.22	-1.86	.....	-0.86
Tuscan Island .....	+3.70	-0.70	-3.00	+2.06	+2.72	+0.76	.....	+0.92
Valley .....	+6.08	-0.52	+0.34	-0.73	-2.40	+3.39	+2.75	+1.27
Winter Fife, Bearded.....	.....	.....	.....	.....	.....	-0.13	-1.20	-0.66
Yellow Gypsy .....	-1.42	-0.74	-1.02	-4.94	-0.61	-4.11	+2.86	-1.43

The last column in this table shows at a glance whether any given variety has given an average yield below or above the standard sort for the whole number of years the variety under consideration has been in the comparative test at Wooster. This is a comprehensive table, giving at a glance the relative yield of any given variety which has been included in the comparative tests. To illustrate, suppose it is desired to know how the Democrat wheat has produced? Turning to Table III; and looking in the last column, we find by this method of calculation the average yield of this variety for a series of seven years is .91 of a bushel less per acre than that of the Velvet Chaff. Suppose we wish to know the standing of the Poole wheat? We find that its yield has been higher every year but one, in the seven years of the test, than the Velvet Chaff; and that the average yield above the Velvet Chaff has been 3.70 bushels per acre.



WHEAT: TABLE IV—COMPARISON OF WEIGHTS PER MEASURED BUSHEL FOR 7 YEARS.

Name of variety.	1893	1894	1895	1896	1897	1898	1899	Seven years' average
American Bronze	60.0	60.7	58.1	54.5	59.0	58.5	59.0	58.3
Bearded Monarch	61.0	60.2	59.0	58.2	59.0	58.5	60.0	59.4
Buda Pesth							58.5	
Currell's Prolific	61.0	59.2	58.6	54.0	60.0	60.0	60.2	59.0
Dawson's Golden Chaff						57.0	58.2	57.6
Deitz	62.7	58.7	58.6	54.0	62.0	60.0	58.0	59.1
Democrat	62.7	56.5	57.5	52.5	61.0	60.0	59.0	58.4
Diamond Grit						60.0	60.2	60.1
Early Arcadian						56.5	57.0	56.7
Early Genesee Giant		60.2	59.0	51.0	57.5	58.5	58.7	57.4
Early Red Clawson	59.5	53.0	57.3	53.0	58.0	58.0	58.5	57.4
Early Ripe	62.7	58.7	59.2	56.0	59.0	59.0	59.5	59.1
Early White Leader	59.0	57.2	56.8	53.0	57.5	55.5	57.0	56.5
Egyptian	62.5	58.5	58.3	54.5	60.0	61.0	57.2	58.8
Forty-Fold				54.0	57.0	58.5	55.2	56.1
Fulcaster	63.2	59.2	59.5	55.5	60.5	60.0	60.0	59.7
Fultz	62.0	60.0	58.7	53.0	60.0	60.0	60.0	59.1
Fultz-Mediterranean							60.5	
Geneva	64.5	62.2	61.0	57.0	57.5	60.5		60.4
Giant Square Head						59.5	55.5	57.5
Gold Coin			58.0	51.5	57.5	59.0	59.0	57.0
Gypsy	63.5	59.0	60.0	57.5	60.5	58.5	60.2	59.8
Harvest King						56.5	57.7	57.1
Harvest Queen							57.5	
Hickman	62.5	60.2	59.4	56.0	61.0	59.5	60.0	59.8
Hindostan	64.0	57.2	58.0	53.5	61.5	61.0	58.0	59.0
Improved Fulcaster						61.0	61.0	61.0
Improved Poole			59.0	53.2	60.0	61.0	57.5	58.1
International No. 6			59.0	56.5	59.0	57.5	55.7	57.5
Jones' Longberry No. 1							59.2	
Jones' Square Head	59.0	58.0	56.5	51.2	55.0	57.0	58.2	56.4
Jones' Winter Fife	59.2	59.0	57.6	53.2	57.0	58.0	58.2	57.4
Lebanon	63.5	58.7	58.0	53.2	60.0	61.0	58.2	58.9
Lehigh	62.2	57.0	58.0	55.2	61.0	60.2	57.5	58.7
Long Amber			58.0	51.5	59.7	59.0	58.2	57.2
Martin's Amber	63.0	58.0	59.1	55.5	60.0	60.0	59.5	59.3
Mealy	60.5	58.5	57.2	53.0	58.5	58.0	58.0	57.6
Mediterranean	63.2	57.2	58.0	57.0	61.0	59.5	59.5	59.3
Missouri Blue Stem	62.5	60.0	59.3	54.2	58.0	59.5	60.0	59.0
New Columbia		59.5	58.0	52.0	58.5	60.0	56.5	57.4
New Longberry	62.5	56.0	57.6	55.0	61.0	59.5	59.5	58.7
New Monarch	61.5	58.5	58.5	55.0	59.5	58.0	59.7	58.6
New Soules				55.0	58.5	57.5	56.5	56.8
Nigger	69.0	58.7	59.0	56.2	61.0	60.5	56.2	59.2
Nixon						60.0	61.0	60.5
Perfection			58.0	55.0	60.5	59.5	60.0	58.6
Poole	62.5	58.7	58.2	54.2	59.0	61.0	57.5	58.7
Pride of Genesee			56.0	51.0	60.0	59.5	58.5	57.0
Red Cross						57.5	58.5	58.0
Red Russian	62.2	60.0	58.0	56.2	59.0	60.0	59.5	59.2
Red Wonder						60.0	61.5	60.7
Rochester Red		58.2	59.2	55.0	58.5	58.0	58.0	57.8
Royal Australian	59.5	57.0	57.4	54.2	59.0	58.5	58.0	57.6
Rudy	63.5	56.7	58.3	56.0	60.0	60.0	58.5	59.0
Rural New Yorker No. 6							56.7	
Sibley's New Golden	62.5	56.5	59.0	54.3	61.0	60.5	58.2	58.8
Silver Chaff	61.0	57.5	57.4	52.0	59.0	58.5	58.5	57.7
Smith's Rust Proof			59.0	53.0	56.0	58.0	59.0	57.0

WHEAT: TABLE IV—Concluded

Name of variety.	1893	1894	1895	1896	1897	1898	1899	Seven years' average
Stanley .....						60.0	55.5	57.7
Theiss .....	63.0	60.5	60.0	57.0	61.0	61.5	.....	60.5
Turkish Red .....							59.7	.....
Tuscan Island .....	62.0	59.5	59.3	57.0	61.0	60.5	.....	59.8
Valley .....	63.7	58.5	58.5	53.0	62.0	61.0	58.0	59.1
Velvet Chaff .....	61.0	59.5	59.0	55.0	61.5	59.5	59.6	59.3
White Golden Cross .....			58.0	58.0	58.0	59.5	56.5	58.0
Winter Fife, Bearded .....						59.0	59.5	59.2
Yellow Gypsy .....	62.2	59.5	58.0	51.2	59.5	59.0	59.5	58.4

Table IV gives the weight per measured bushel of most sorts grown for each of the seven years, from 1893 to 1899 inclusive, including the weights of the more recently added sorts and the average weight of each sort for the period grown in the comparative test. One of the most striking points brought out in this table is the fact that not a single sort that has been carried throughout the seven years has given an average weight per bushel equal to sixty pounds. Another point worthy of special emphasis is that as a rule higher yields per acre give correspondingly higher weights per measured bushel. In 1893 the average yield per acre was approximately 27 bushels, and the average weight per bushel for the year, as figured from Table IV, was about 62 pounds. The highest average yield per acre was in the season of 1898, when the average was almost 28 bushels, weighing about 59½ pounds per bushel.

The crop of 1895 averaged about 11 bushels per acre and gave an average weight of 58 1-3 pounds per measured bushel. The crop of 1896 averaged less than 10 bushels per acre and averaged less than 54½ pounds per bushel. The crop of 1899 averaged about 20 bushels per acre, but weighed only about 57 pounds per bushel. The low yields in some of the earlier years were due to varying conditions and causes, special mention of which was made in Bulletin 82, page 217. The light weight of the wheat in 1899 was perhaps due as much to the injury done by the Hessian fly as to any other cause. Gypsy and Hickman have given the highest average weights, coming within two-tenths of a pound of standard. Fulcaster, Velvet Chaff and Mediterranean are among those giving highest weights per measured bushel. Some of those averaging lowest are as follows: Jones' Square Head, Early White Leader, Jones' Winter Fife, Early Red Clawson, Royal Australian, Mealy and Silver Chaff. In making the above comparisons those sorts not covering the full seven years have been left out of consideration.

WHEAT: TABLE V—COMPARISON OF DATES OF RIPENING WITH RANGE, FOR 7 YEARS.

Name of variety.	1893	1894	1895	1896	1897	1898	1899	Range.
American Bronze	July 13	July 11	July 8	July 4	July 8	July 4	June 28	June 26—July 11
Bearded Monarch	11	11	6	2	8	1	26	" 26—" 11
Buda Pesth							30	
Currell's Prolific	11	9	7	3	8	1	26	" 26—" 11
Dawson's Golden Chaff						3	26	" 26—" 3
Deitz	10	10	10	3	8	1	28	" 28—" 10
Democrat	10	10	10	3	8	4	28	" 28—" 10
Diamond Grit						4	28	" 28—" 4
Early Arcadian						3	29	" 29—" 3
Early Genesee Giant		11	8	3	10	4	26	" 26—" 11
Early Red Clawson	10	12	8	2	8	1	28	" 28—" 12
Early Ripe	10	11	8	1	8	1	26	" 26—" 11
Early White Leader	12	11	8	4	10	4	26	" 26—" 12
Egyptian	8	10	10	3	8	1	26	" 26—" 10
Forty-Fold				June	8	2	28	" 28—" 8
Fulcaster	10	12	9	29	8	1	27	" 27—" 12
Fultz	10	10	5	July 1	8	1	27	" 27—" 10
Fultz-Mediterranean				June			26	
Geneva	8	7	10	26	8	1		" 26—" 11
Gold Coin				July 5	8	8	28	" 28—" 8
Gypsy	11	8	8	2	8	2	26	" 26—" 11
Hard Wheat		11	10	4	10			July 4-11
Harvest King						1	28	June 28-July 1
Harvest Queen							28	
Hickman	11	10	8	1	8	1	26	" 26—" 11
Hindustan	10	10	10	3	9	1	28	" 28—" 10
Improved Fulcaster						2	28	" 28—" 2
Improved Poole			12	1	8	1	26	" 26—" 12
International No. 6				1	9	3	29	" 29—" 9
Jones' Longberry No. 1							26	
Jones' Square Head	11	11	8	4	8	4	29	" 29—" 11
Jones' Winter Fife	11	10	8	4	8	2	27	" 27—" 11
Lebanon	10	10	10	3	9	1	28	" 28—" 12
Lehigh	10	10	10	3	9	2	28	" 28—" 12
Long Amber			6	4	8	4	29	" 29—" 8
Martin's Amber	11	12	9	3	8	4	26	" 26—" 12
Mealy	10	7	6	1	8	1	27	" 27—" 10
Mediterranean	10	10	10	1	8	1	28	" 28—" 10
Missouri Blue Stem	10	10	6	2	8	1	29	" 29—" 10
New Columbia		7	6	1	8	2	23	" 23—" 7
New Longberry	10	11	8	3	8	2	28	" 28—" 11
New Monarch	11	10	10	2	8	1	27	" 27—" 11
New Soules				2	8	2	28	" 28—" 8
Nigger	8	7	12	1	8	1	26	" 26—" 12
Nixon						1	26	" 26—" 1
Perfection			5	1	8	2	26	" 26—" 11
Poole	8	7	12	1	8	1	26	" 26—" 12
Pride of Genesee			6	3	8	4	27	" 27—" 8
Red Beauty			6	3	8			July 3-10
Red Cross						1	26	June 26-July 1
Red Russian	10	7	8	2	8	1	28	" 28—" 10
Red Wonder						3	26	" 26—" 3
Reliable Minnesota			10	4	10			July 4-10
Rochester Red		12	8	2	8	3	27	June 27-July 12
Royal Australian	11	12	6	2	8	2	26	" 26—" 12
Rudy	8	10	12	3	8	1	26	" 26—" 12
Rural New Yorker							30	
Sibley's New Golden	10	10	8	3	9	1	28	" 28—" 12

TABLE V—Concluded.

Name of variety.	1893	1894	1895	1896	1897	1898	1899	Range.
	July	July	July	July	July	July	June	June -July
Silver Chaff .....	11	12	9	3	8	4	26	" 26- " 12
Stanley .....						6	28	" 28- " 6
Theiss .....	10	10	6	2	10	1	.....	July 1-10
Turkish Red .....							30	.....
Tuscan Island .....	10	7	8	1	8	1	.....	" 1-10
Valley .....	8	10	10	3	9	1	26	June 26-July 10
				June				
Velvet Chaff .....	7	7	5	27	6	1	24	" 24- " 7
White Golden Cross.....		8	10	27	8	2	28	" 27- " 10
Winter Fife, Bearded.....				July	.....	2	27	" 27- " 2
Yellow Gypsy .....	9	11	8	2	8	2	26	" 26- " 11

Table V gives the dates of ripening for the various sorts from 1893 to 1899 inclusive. It also gives, in the eighth column, the extreme dates or range in time of ripening. The table shows clearly that the wheat generally ripened much earlier in 1899 than in any previous year of the seven included in the comparison. All the sorts ripened and were cut within the month of June. With the exception of a few sorts which ripened in June of 1896, and the exceptional year above noted, all sorts have ripened after the 30th of June since the beginning of the comparative tests on Wayne county soil.

The extreme range reaches in several instances sixteen days, or a little more than two weeks' variation in time of ripening. Leaving out of consideration the extremely early season of 1899 the range would be reduced to about twelve days.

WHEAT: TABLE VI—COMPARISON OF 12 VARIETIES OVER 14 YEARS.

Variety.	Part I, 7 years at Columbus.							7 years' average
	1886	1887	1888	1889	1890	1891	1892	
Valley .....	45.80	34.90	33.60	44.50	36.10	39.50	32.20	38.09
Egyptian .....	41.70	28.00	32.20	46.10	34.00	37.20	31.30	35.79
Nigger .....	51.00	24.60	32.00	40.60	31.70	31.60	30.00	34.50
Royal Australian .....	49.30	38.80	18.10	45.60	32.60	24.50	27.50	33.70
Poole .....	61.20	25.50	17.50	43.60	29.60	35.90	30.00	34.76
Penquite's Velvet .....	43.05	37.40	26.60	41.30	35.20	27.90	25.40	33.84
Silver Chaff.....	45.20	30.00	31.40	37.80	29.50	30.10	25.40	32.77
Democrat .....	40.40	24.50	25.00	45.30	30.40	38.10	29.50	33.31
Martin's Amber .....	36.70	21.40	28.20	47.80	29.10	28.80	25.10	31.01
Fultz .....	38.40	.....	23.10	30.10	34.20	35.60	30.40	31.94
Theiss .....	46.20	29.50	36.80	37.80	25.40	30.50	23.30	32.79
Mediterranean .....	38.70	22.30	28.20	36.80	29.30	34.50	28.30	31.16

WHEAT: TABLE VI — COMPARISON OF 12 VARIETIES GROWN 7 YEARS AT COLUMBUS AND 7 YEARS AT WOOSTER.

Variety.	Part II, 7 years at Wooster.							
	1893	1894	1895	1896	1897	1898	1899	7 years' average
Valley .....	33.33	13.40	11.75	08.75	22.50	35.33	20.83	20.84
Egyptian .....	33.41	14.70	12.25	10.62	25.16	32.00	23.33	21.64
Nigger .....	33.91	29.20	08.04	09.29	32.41	34.00	20.16	23.86
Royal Australian .....	25.50	09.90	11.29	09.08	30.33	21.50	17.66	17.89
Poole .....	35.00	29.20	11.00	12.58	28.75	33.83	21.00	24.48
Penquite's Velvet .....	28.10	17.80	11.40	09.80	27.32	28.54	18.49	20.21
Silver Chaff (Smooth) .....	26.66	14.20	10.54	08.83	29.33	27.00	18.08	19.23
Democrat .....	34.83	15.00	09.33	09.00	27.25	28.50	28.83	21.39
Martin's Amber .....	29.41	13.80	12.08	08.66	28.66	28.75	18.25	19.93
Fultz .....	21.91	24.10	12.71	07.21	33.83	33.16	23.05	22.28
Theiss .....	21.41	15.20	09.37	07.33	28.33	25.33	.....	17.83
Mediterranean .....	31.25	15.20	13.29	12.66	32.00	30.33	18.33	21.86

In Table VI we have in Parts I and II a comparison of twelve varieties, covering two periods of seven years each; making, when combined, a comparative test of these twelve varieties for a total period of 14 years. The first seven years' test, from 1886 to 1892 inclusive, was conducted at Columbus on first and second bottom land, such as was capable of producing a fair crop of wheat every year without the use of commercial fertilizers or yard manure; while the land upon which the experiments have been continued at Wooster is of a cold, clayey nature, and as indicated on a previous page, does not have special fertilizers nor special attention over and above that given in the average practice of the farmers of Wayne county.

Taking up Part I we see that the Valley wheat has given an average yield of almost two bushels and a half more per acre than any other sort on the Columbus land. The Egyptian stands second in point of yield, reaching an average of almost thirty-six bushels per acre. Poole stands third and Nigger fourth in point of average yield.

Part II, giving yields and averages for Wayne county, places Poole in the lead, with Nigger a close second, giving an average yield of only 0.62 bushels less per acre than the Poole; Fultz stands third, Mediterranean fourth, Egyptian fifth, Democrat sixth, and Valley seventh in point of comparative productiveness.

Taking our bearings from this table we must conclude that the Valley wheat is much better adapted to gravelly soils than any other sorts included in the table. Turning to the second part the same thing may be said of Poole wheat in its adaptation to the clay uplands.

The Nigger is possibly better adapted to either condition of soil than any other one sort in the list of twelve under consideration.

The mean average yield per acre of the twelve sorts for the seven years grown at Columbus is 33.6 bushels, and that for the seven years grown at Wooster is 20.95 bushels.

WHEAT: TABLE VII—VARIETIES IN COMPARATIVE TEST AT STRONGSVILLE, 1898.

Pl't No.	Variety.	Yield per acre.		Increase (+) or decrease (-) per acre.	St'w to bu. of gr'n	Weig't per bushel	Bearded or smooth.	White or red.
		Grain	Straw					
1	Velvet Chaff .....	Bush'ls 14.00	Lbs. 1250	.....	89	59.0	Bearded	Red
2	Valley .....	13.58	1275	-2.45	94	57.5	Bearded	"
3	Poole .....	18.00	1480	-0.05	82	59.2	Smooth	"
4	Velvet Chaff .....	20.08	1755	.....	87	59.7	Bearded	"
5	Rudy .....	14.58	1095	-5.28	75	59.0	Bearded	"
6	Fultz .....	19.25	1475	-0.37	76	59.5	Smooth	"
7	Velvet Chaff .....	19.42	1635	.....	84	60.0	Bearded	"
8	Mealy .....	17.17	1510	-1.40	88	56.7	Smooth	"
9	Improved Poole .....	16.17	1230	-1.55	76	58.5	Smooth	"
10	Velvet Chaff .....	16.87	1338	.....	79	60.0	Bearded	"
11	Dawson's Golden Chaff...	14.79	1203	-2.35	81	57.2	Smooth	White
12	Jones' Winter Fife.....	14.67	1210	-2.73	82	56.5	Smooth	Red
13	Velvet Chaff .....	17.67	1440	.....	81	59.5	Bearded	"
14	Lehigh .....	17.58	1515	-0.09	86	59.5	Bearded	"

Table VII gives data furnished by a comparative test of ten varieties grown at the Northeastern Substation, at Strongsville, Cuyahoga Co., during the season of 1898.

Without a single exception the nine sorts have given yields below the (Penquite's) Velvet Chaff, the one used as a standard, Rudy falling 5.28 bushels below, Jones' Winter Fife 2.73 bushels, Dawson's Golden Chaff 2.35 and Valley 2.45 bushels below the standard sort. The Mealy and Improved Poole each fall about one and a half bushels below the yield of the standard sort, while Poole, Fultz and Lehigh are but one-third of a bushel and less below the standard in production in this single trial.

The Velvet Chaff not only gave higher yields than the other sorts but gave also wheat averaging a higher weight per measured bushel than any other sort in this comparative test.

The soil upon which this test was made is described as a cold, heavy, white clay, generally regarded as thin land.

## II. CULTURAL INVESTIGATIONS.

The work under this heading is largely a continuation of investigations previously conducted and partially reported upon in former publications. This division of the bulletin will consider the following topics: Thick and thin seeding; early and late seeding; deterioration of seed; germination of old *vs.* new seed.

## THICK AND THIN SEEDING.

This test was taken up at the present location in the fall of 1893 and has been kept up continuously ever since; this gives six years of consecutive work on this problem. We have used two sorts of wheat each year except the first; one sort (the Valley) has been used continuously; the Rudy was used for three years and the Poole for two years in place of the Rudy. The results of each year's test in the main agree, consequently the average results are similar and agree in showing that the best average yields have been produced from the heavier seeding, namely, at the rate of nine and ten pecks per acre. Tables VIII and IX give the data in detail, including the weight per measured bushel of grain produced from the heavier and lighter seeding. This table indicates that the more thickly the wheat stood on the ground the higher was the weight per measured bushel and consequently the better the quality of the berry. Throughout this series of experiments we have commonly found the better quality of grain where the amount of seed required to produce the maximum crop has been used; and where land was not occupied with wheat to its full capacity of production, the product has been of inferior quality. Similar results were reached, whether the wheat was grown upon rich, gravelly, alluvial soil, or upon a clay soil much inferior in natural productiveness.

WHEAT: TABLE VIII — THICK AND THIN SEEDING.

*Yield in bushels per acre.*

Year.	Pecks of seed per acre:—							
	3	4	5	6	7	8	9	10
VALLEY WHEAT.								
1894 .....	5.00	6.20	8.30	6.80	8.20	10.85	10.50	12.50
1895 .....	6.20	6.87	7.29	6.78	8.04	9.49	.....	.....
1896 .....	6.49	7.95	8.83	7.33	8.00	8.66	.....	.....
1897 .....	18.58	17.79	18.03	20.33	19.41	20.25	20.08	18.58
1898 .....	12.91	12.33	15.41	17.04	17.75	21.59	21.54	22.79
1899 .....	23.16	19.62	21.29	23.33	22.76	23.24	26.16	24.33
Average .....	12.06	11.79	13.19	13.60	14.03	15.68	.....	.....
RUDY WHEAT.								
1895 .....	2.33	3.33	3.74	5.12	5.50	5.12	.....	5.25
1896 .....	6.33	6.49	5.03	7.25	8.83	10.16	10.33	10.66
1897 .....	16.95	22.24	21.87	22.53	24.24	26.37	24.41	29.33
Average .....	8.53	10.69	10.21	11.63	12.86	13.88	.....	15.03
POOLE WHEAT.								
1898 .....	16.33	18.54	20.50	20.83	19.87	21.62	21.04	18.54
1899 .....	15.83	21.16	20.16	22.83	21.58	26.08	28.83	27.33
Average .....	16.08	19.85	20.33	21.83	20.72	23.85	24.93	22.93
Combined Average.	11.83	12.96	13.68	14.56	14.93	16.68	.....	.....

## WHEAT: TABLE IX — THICK AND THIN SEEDING.

*Weight per measured bushel.*

Year.	Pecks of seed per acre:—							
	3	4	5	6	7	8	9	10
VALLEY WHEAT.								
1894 .....	57	58	58	58	58	59	59	59
1895 .....	56	57	57	57	57	57	57	57
1896 .....	59	60	61	60	61	61	61	60
1897 .....	61	61	62	63	62	62	62	62
1898 .....	54	54	54	56	55	57	59	59
1899 .....	62	62	62	62	62	62	63	62
Average .....	58	59	59	59	59	60	60	60
RUDY WHEAT.								
1895 .....	56	55	57	57	56	57	58	58
1896 .....	53	53	54	55	55	55	56	56
1897 .....	62	62	62	62	62	63	62	63
Average .....	57	57	58	58	58	58	59	59
POOLE WHEAT.								
1898 .....	57	57	58	58	57	57	58	58
1899 .....	61	61	61	61	61	61	61	62
Average .....	59	59	59	59	59	59	59	60
Combined Average.	58.0	58.2	58.7	59.0	58.7	59.2	59.6	59.6

## EARLY AND LATE SEEDING.

In the fall of 1894 an experiment in early and late seeding was begun, with the expectation that it would be conducted from year to year until decisive results could be secured; but ground suitable for all our experiments has not always been available, hence it has been necessary to drop some work temporarily. This work has therefore been quite irregular, but we have the experiment of 1895, as published in Bulletin 82, page 227; the experiment of 1899, as given in Table X, and a similar experiment in the field almost ready to thresh. The two experiments completed agree in that both indicate that the best results are secured in this latitude from sowing from the 12th to the 20th of September. The third experiment, now in the field, from all appearances will give results in harmony with the above statement concerning time of sowing.



WHEAT: TABLE X—EARLY AND LATE SEEDING, 1899.

Kind of Wheat and Plot No.	Date of seeding	Date of ripening	Yield per acre	W't per bus.	Straw per acre
Valley, Plot No. 1.....	Aug. 31	June 24	Bus. 18.00	Lbs. 62.0	Lbs. 1,520
" " " 2.....	Sept. 7	" 24	18.33	61.7	1,840
" " " 3.....	" 14	" 24	25.50	62.2	2,510
" " " 4.....	" 21	" 26	23.50	62.2	2,210
" " " 5.....	" 28	" 26	22.83	62.5	1,950
" " " 6.....	Oct. 5	" 28	21.50	61.5	2,130
" " " 7.....	" 12	" 30	19.33	61.7	1,810
" " " 8.....	" 19	" 30	11.16	60:0	1,480

The time to sow wheat involves two questions: First, what is the proper time to sow to secure a stand of wheat that will best endure the winter? Second, what is the best time to sow to escape the ravages of the Hessian fly?

From an entomological standpoint wheat sown late enough will escape the fly, but this later sowing involves a question which to the practical farmer is a serious one, namely, by such late sowing will he secure stand enough to make a maximum crop? In the early and late seeding of the last two years we have had Hessian flies most abundantly and their work has been very damaging; the early sown wheat has given them every opportunity; yet our yields have been higher in every instance from the earlier than from the later seeding. My observation has been that the later seeding has failed to tiller sufficiently to make a fair crop, even when undisturbed by the fly, except where the land was naturally very fertile or had been made so by the application of yard manure or commercial fertilizers. Viewing the matter from this standpoint, if late seeding is to be practiced, higher soil feeding must go hand in hand with it. Again, if later seeding solves the problem of avoiding the Hessian fly, it will only do so when adopted by whole communities, for where many fields suffer from Hessian fly on account of early seeding others will naturally suffer on account of proximity to the infested fields. Whatever the plan of avoiding or destroying, coöperation will be the price of success.

#### DETERIORATION OF SEED

As noted in Bulletin 82, page 231, this experiment was begun in 1891. It was dropped in 1892, but again taken up in 1893 and has been kept up continuously ever since. Three grades of seed have been taken from each of three varieties; selected seed, second grade, and unscreened seed, taken just as it came from the thresher. The plan in theory was to grow from the first quality better wheat each year and from this better quality to secure greater yields. From the second grade and unscreened lots of seed it was expected to produce inferior yields and an inferior berry. The

results of each year's work are shown in Table XI; also the average yields per acre for seven years consecutively, and the weights per measured bushel from each grade of seed of the three kinds. The average results, as shown in the last column, are so uniform for each of the varieties used in the experiment that we must draw one of two conclusions: Either the quality of the seed does not influence materially the quantity and quality of the crop, or else the variation in quality of seed has not been sufficiently marked.

WHEAT: TABLE XI — YIELD FROM DIFFERENT GRADES OF SEED.

Variety.	Grade.	1893	1894	1895	1896	1897	1898	1899	Average
		Yield per acre in bushels.							
Velvet Chaff..	First.....	24.33	13.00	8.00	7.50	21.75	13.96	17.66	15.17
	Second.....	23.16	16.20	5.75	9.08	21.33	19.37	17.83	16.10
" " ..	Unscreened..	24.37	18.20	4.66	4.75	23.00	20.62	17.41	16.14
Deitz .....	First.....	25.70	17.90	4.50	11.37	24.08	12.54	22.66	16.96
	Second.....	23.74	19.00	5.83	10.33	21.00	15.37	25.33	17.23
" .....	Unscreened..	22.66	19.30	5.08	7.83	23.33	20.20	17.25	16.52
Hicks .....	First.....	23.74	18.70	5.33	7.00	22.50	10.54	24.00	15.97
	Second.....	23.79	16.90	4.33	7.83	20.41	16.54	21.66	15.92
" .....	Unscreened..	25.45	17.30	4.25	6.75	21.16	18.71	16.33	15.71
Weight per bushel in pounds.									
Velvet Chaff..	First.....	61.2	56.5	49.7	61.5	55.5	61.0	57.6	57.6
	Second.....	61.2	56.0	48.5	62.7	59.0	61.5	58.1	58.1
" " ..	Unscreened..	61.5	57.0	49.0	62.0	57.5	60.5	57.9	57.9
Deitz .....	First.....	61.0	57.0	54.0	62.0	55.0	61.2	58.4	58.4
	Second.....	60.5	58.5	50.5	61.5	54.0	60.7	57.6	57.6
" .....	Unscreened..	60.0	58.5	50.5	62.0	56.0	60.5	57.9	57.9
Hicks .....	First.....	60.0	58.0	52.5	61.0	53.0	60.2	57.4	57.4
	Second.....	61.0	58.0	52.0	62.0	54.5	59.0	57.7	57.7
" .....	Unscreened..	60.0	56.0	52.0	61.0	53.5	60.2	57.1	57.1

## COMPARATIVE GERMINATION OF OLD AND NEW WHEAT.

When some disaster overtakes the wheat crop, such as destruction by the Hessian fly, as in the present season, or growing in the shock on account of much rain, as in the harvest of 1896, the question arises with the man who has old wheat in the bin, "Shall I buy new seed or can I get as good results from the old wheat?" Table XII aims to answer the above query. In the fall of 1893 eighteen sorts of wheat were selected from the list because we had on hand old wheat of the same sorts. The old seed used was grain that had been harvested in 1892 under normal conditions and kept in a dry place without special care, throughout the year. One hundred grains of this old seed were planted and in the same ground one hundred grains of new wheat of the same kind. The table gives date of planting, number of grains germinated of both old and new seed, together with dates of sprouts coming through the ground. A

count of the number germinating in each case shows that nearly 88 percent of the old seed, and about 80½ percent of the new seed germinated. A similar experiment on a smaller scale, conducted in 1896, showed similar results.

In addition to these experiments we used old seed on entire fields in 1896 and a careful observer would not have been able to tell, when the crop was harvested, whether the seed used was old or new. In short, there was no apparent difference at any time during the year between fields sown with old and new wheat, where other conditions were alike.

WHEAT: TABLE XII — COMPARATIVE GERMINATION OF OLD AND NEW WHEATS, 1893.

	When planted	No. of gr'ns pl't'd	No. germinated		When up	When counted
			Old seed	New seed		
Mediterranean .....	Sept. 3rd.....	100	91	92	Sept. 9th	Sept. 12th
Lehigh .....	" 3rd.....	100	85	86	" 9th	" 12th
Hindustan .....	" 3rd.....	100	88	85	" 9th	" 12th
Velvet Chaff .....	" 3rd.....	100	84	87	" 9th	" 12th
Lebanon .....	" 3rd.....	100	92	86	" 9th	" 12th
Egyptian .....	" 3rd.....	100	96	94	" 9th	" 12th
Rudy .....	" 3rd.....	100	82	79	" 9th	" 12th
Poole .....	" 3rd.....	100	75	70	" 9th	" 12th
Currell's Prolific .....	" 4th.....	100	89	85	" 10th	" 14th
Silver Chaff .....	" 4th.....	100	94	72	" 10th	" 14th
Fulcaster .....	" 4th.....	100	91	80	" 10th	" 14th
Royal Australian .....	" 4th.....	100	84	67	" 10th	" 14th
Theiss .....	" 4th.....	100	82	68	" 10th	" 14th
Early Ripe .....	" 4th.....	100	86	78	" 10th	" 14th
Gypsy .....	" 4th.....	100	86	87	" 10th	" 14th
Missouri Blue Stem.....	" 4th.....	100	87	80	" 10th	" 14th
Martin's Amber .....	" 4th.....	100	91	79	" 10th	" 14th
Hicks .....	" 4th.....	100	98	74	" 10th	" 14th

## SPRING WHEAT.

In the spring of 1890, and again in the spring of 1891, the Station secured spring wheat seed and sowed it as early as possible on the rich, alluvial bottom land of the Olentangy river (State University Farm). In neither season did we grow enough wheat to replace the seed used, and what did grow was of a very inferior quality. The average wheat grower would have called it a very inferior grade of screenings.

In 1897 we sowed about one peck of "Marvel" spring wheat and one peck of "Okanagan." At harvest time we had but a few scattering heads and not more than two quarts of grain of each kind, which, like the above, was of very inferior quality. In the spring of 1900 the Department of Agriculture, at Washington, D. C., sent to this Station one peck of "Lamona" spring wheat and one peck of "Willman's Fife"; at the present writing neither of these sorts promises to produce as much grain as was sowed. We have necessarily written the word "failure" after every attempt to grow spring wheat. It is the opinion of the writer that spring

wheat could be grown by preparing the land in the fall and seeding if possible in March.

#### SUMMARY.

*Varieties.*—(1) In a series of tests including seven years, the following varieties have given the highest yields on this farm: Poole, Mealy, Red Russian and Early Ripe of the smooth varieties; Nigger, Currell's Prolific, Gypsy and Egyptian of the bearded varieties.

(2) So far as we have been able to determine there have been no new wheats introduced within any recent years that will produce better crops on good, rich, alluvial soil than the Valley. For the uplands we recommend the Poole, Mealy, Red Russian, Nigger and Improved Poole.

(3) The Station has been growing the Mealy wheat for ten years and we regard it one of the most promising varieties in our present list. The International No. 6 is one of the most promising white varieties in our list.

(4) So far as we have been able to learn no variety of wheat is fly-proof, but some sorts have the reputation of being less injured by the Hessian fly than others; of these the following may be mentioned: Mealy, Mediterranean, Fulcaster and Clawson.

(5) The range in date of ripening of different varieties of wheat usually does not exceed twelve days, but the exceptionally early ripening of all in the test of 1899 extended that range in many instances to sixteen days.

(6) In the single experiment conducted on the white clay land in Cuyahoga county, the Velvet Chaff wheat gave better results than any other of the ten under test.

*Cultural Investigations.*—(1) Higher average yields have been produced where the quantity of seed used reached 9 and 10 pecks per acre on moderately productive clay soil.

(2) Wheat grown upon ground sufficiently seeded to produce the highest yield per acre has given highest average weight per measured bushel. The lightest weight wheat has been grown where land was seeded more lightly.

(3) Better results have been secured by seeding in this latitude from the 12th to the 20th of September than by earlier or later seeding.

(4) Wheat one year old, if it has been kept in a suitable place and is of fair quality, will likely be as good to use for seed as new wheat.

(5) Spring wheat, with present condition of Ohio soils and climate, is not likely to prove successful. After repeated trials on rich, alluvial land and upon the thinner clay land our experiments have proved failures, both in quantity and quality of wheat produced.

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