

KENTUCKY
AGRICULTURAL EXPERIMENT STATION

OF THE
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BULLETIN NO. 69.

WHEAT.

- 1. Test of Varieties.**
- 2. Test of Fertilizers.**
- 3. Descriptions of Varieties.**
- 4. Treatment for Smut.**

LEXINGTON, KENTUCKY.
SEPTEMBER, 1897.

KENTUCKY
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ADDRESS:

KENTUCKY AGRICULTURAL EXPERIMENT STATION,
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WHEAT.

The subject is treated under the following heads :

1. Test of Varieties.
2. Test of Fertilizers.
3. Descriptions of Varieties.
4. Treatment for Smut.

The Soil.—The experiments were conducted on the Experiment Station grounds, the character of the soil of which has been described in previous bulletins.

The Season.—The season was a fair one for the wheat crop. The English sparrow, although carefully watched during the ripening season, undoubtedly diminished the yield, and impaired, at least to some extent, the accuracy of the results obtained.

The following table shows the rainfall per month, highest, lowest, and average temperature, and the amount of sunshine during the wheat season :

MONTHS, 1896--1897.	Per Cent. Sunshine.	Clouds.	Amount of Rainfall in Inches.	TEMPERATURE. Degrees.		
				Mean.	Highest.	Lowest.
September	35.0	65.0	4.25	67.4	95	36
October.....	56.0	44.0	1.27	54.4	77	30
November.....	37.0	63.0	4.30	47.6	72	14
December.....	32.0	68.0	2.56	38.4	63	13
January.....	31.0	69.0	2.59	29.9	67	-6
February.....	26.0	74.0	6.33	37.4	66	10
March.....	27.0	73.0	6.55	47.6	76	22
April	37.0	63.0	5.80	53.2	82	26
May.....	47.0	53.0	4.48	59.4	87	33
June.....	41.0	59.0	4.77	72.1	93	50

1. Test of Varieties.

Seventeen varieties were under test. Each variety was planted on $\frac{1}{15}$ acre plot, in drills seven inches apart. The amount of seed sown was at the rate of one and one-fourth bushels per acre. All plots were planted October 12, 1896, and harvested June 28, 1897.

A description of the varieties may be found on pages 87-95, and photographic cuts of the heads of each variety following page 92.

Here follows a table giving the yield of each variety and the weight of wheat per bushel.

Wheat, Yield of Varieties.

	NAME OF VARIETY.	Head B-- Beard- ed. S-- smooth head.	Yield per acre		Weight per bushel, lbs.
			Grain bushels.	Straw pounds	
1	Jones' Winter Fife.....	S.	23.	2070	59
2	American Bronze.....	S.	16.	2190	60
3	Early White Leader.....	S.	7.3	1215	52
4	Pride of Genesee.....	B.	21.8	2505	62
5	Oatka Chief.....	B.	25.3	3210	61
6	Long Amber.....	S.	20.0	2400
7	Jones Bearded.....	B.	15	1875	59½
8	Pride.....	B.	19.5	2205	60
9	Bearded Winter Fife.....	B.	30.5	3045	63
10	Early Arcadian.....	S.	27.4	3258	61
11	Pedigreed Early Genesee Giant.	B.	26.8	3120	63
12	Diamond Grit.....	B.	21.0	3240	63
13	White Golden Cross.....	B.	27.9	3445	62
14	Lancaster Red.....	B.	16.9	2213	62
15	Democrat.....	B.	21.3	3300	63
16	Gold Coin.....	S.	21.	2820	61
17	Dawson's Golden Chaff.....	S.	17.	2580

Milling Qualities.

In order to test the different varieties of wheat as to their milling qualities the several samples were submitted

to Mr. C. S. Brent who kindly gave his opinion of each as tabulated below :

Name of Wheat.	Milling Qualities.
1. Jones' Winter Fife -	Worthy of further trial. I think well of it.
2. American Bronze -	Well thought of.
3. Early White Leader -	Worthless.
4. Pride of Genesee -	Fair milling qualities.
5. Oatka Chief - -	Worthy of further test.
6. Long Amber - -	Reasonably good.
7. Jones' Bearded - -	I do not think very well of it.
8. Pride - - -	Fair milling qualities.
9. Bearded Winter Fife -	Worthy of special attention. I think highly of this wheat.
10. Early Arcadian -	One of the best.
11. Pedigreed Early Genesee Giant - - -	Fine wheat.
12. Diamond Grit . -	Not to be recommended.
13. White Golden Cross -	Good milling wheat.
14. Lancaster Red - -	Best milling wheat.
15. Democrat - - -	Think well of it.
16. Gold Coin - - -	Test it further.
17. Dawson's Golden Chaff -	Good milling wheat.

2. Test of Fertilizers.

This year, as heretofore, fertilizers had no appreciable effect on the yield of grain or straw—the kind of fertilizer used and the manner of applying it, were the same as in years previous, for which see Bulletin 57. The results of the year are of so little value when taken alone that it is thought best not to publish them herein.

3. Descriptions of the Varieties of Wheat.

BY H. GARMAN, ENTOMOLOGIST AND BOTANIST.

The following descriptions of the seventeen varieties tested on the Experiment farm in 1897 are drawn solely from samples of ripened wheat taken from the plots. The names applied are furnished me by those in charge of the experiments. It is not improbable, considering the confusion that exists in the names of varieties, that in at least one instance (Nos. 4 and 8) the same variety is described under two different names. The differences and resemblances will, however, be sufficiently evident from the descriptions and figures.

The majority of the varieties can be easily recognized. The most evident character is the presence or absence of a beard, but after separating the ten bearded varieties from the seven beardless ones, the varieties comprised under the two heads may be readily subdivided by the color of the spike or head, some being of an umber-brown color, while others are of the usual pale yellow. The color of the stem or culm is also in some cases a ready means of recognition, as is also the shape and average size of the spike. A very important character, which may easily be overlooked, sometimes separates varieties which are in other respects almost or quite the same. It is the presence of a very fine, whitish, velvety down or pubescence on the outer scales which cover the grain. Its presence can be best recognized by holding a spike up to the light and turning it from side to side. No. 1 of the beardless varieties is thus pubescent, while numbers 4, 8 and 9 of the bearded wheats possess the same character.

These are the characters upon which chief dependence is placed in the following synopsis and descriptions. It

is to be regretted that the character of the blade and the average number of heads produced from a stool by each variety cannot be included. The observations on red rust were made in the field, June 29. A few words of explanation may be added to make the descriptions more readily understood. A head or spike of wheat is made up of a central axis, which is a continuation of the stem, upon which are borne the flowers from which the seed is developed. The flowers grow in regularly placed clusters, one above another, in two rows, placed on opposite sides of the axis. A single complete cluster of flowers (See plate I. fig. 1.) is fan-shaped, the individual flowers diverging somewhat from each other. If the clusters forming a row are far apart, and lie close against the axis, the spike, as a whole is flattened. But when the clusters are crowded they overlap each other and stand out from the axis, in which case the two diameters may be alike, or what is commonly the shorter, may exceed the other. In several varieties the crowding of the clusters becomes gradually greater towards the upper end of the spike so that this extremity becomes oddly widened, as appears in No. 10, plate 3. Two or three lower clusters on each head of wheat are imperfect, consisting of a single flower which does not produce a seed. But farther up the number of flowers in a cluster is increased to five (See fig. 1, plate I.) although only three or four of the outermost produce seeds. In the mature head of wheat the two outer flowers of a complete cluster consist each of three scales and a seed. The outermost scale (empty glume) on each is provided with a small ridge or keel on the outside, and is in the beardless varieties rather blunt at the tip, while in the bearded wheats the tip is formed by a short bristle (Plate I. fig. 2). The scales next to these empty glumes are, in bearded wheats, provided with long bristles which constitute the

beard (Plate I. fig. 2, B), but in the beardless wheats these bristles are represented by a short claw-like process below, which increases toward the upper end of the spike to a length of a half inch or more. The bristle-bearing glumes enclose the seed on the outside, while the inner side of every seed is enclosed by a somewhat boat-shaped scale known as a palet (Plate I. fig. 2, C). The three scales enclosing one of the outer seeds of a cluster are shown separated from each other in figure 2, plate I.

Synopsis of the 17 Varieties.

Good descriptions and synopses of the varieties of wheat, based upon a critical examination and comparison, are greatly needed, and it is to be hoped that some one having access to all the literature will soon undertake the task of sifting out the spurious varieties and putting those well established in such shape that they can be recognized. The present synopsis covers a small part of the field, and is offered only as a convenience in connection with the descriptions which follow it.

Begin with paragraph 1. As long as your sample of wheat agrees with the characters given, go ahead taking one number after another until you reach a paragraph with dotted line leading out to the name of the variety.

But whenever you find a paragraph with which your wheat does not agree the number in parenthesis directs you down the line to a paragraph where your wheat will agree. Suppose you have in your hand a bearded wheat with spike tapering at upper end, the glumes downy (pubescent) and the seeds white: Read paragraph 1. You find your wheat does not agree. The number 14 in parenthesis says, "go down the line to paragraph 14 where your wheat does agree." Now read the next paragraph, 15. You will find your wheat does not agree and you are again sent down the line, to 18. Then read

19, with which it agrees, and you read the next paragraph, 20, to find yourself directed to 21, where the quest terminates, the dotted line leading to the name "Bearded winter fife."

1. (14) Beardless.
2. (7) Spike enlarging at upper end (nearly even in No. 3.)
3. (4) Spike and stem yellow - - - -
- - - - Early white leader (No. 3).
4. (3) Spike brown.
5. (6) Stem yellow - - - Early Arcadian (No. 10).
6. (5) Stem purplish - - - - Gold coin (No. 16).
7. (2) Spike tapering at upper end.
8. (9) Spike pubescent - Jones's winter fife (No. 1).
9. (8) Spike not pubescent.
10. (13) Spike and stem yellow.
11. (12) Seeds red - - - American bronze (No. 2).
12. (11) Seeds white - - - Long amber (No. 6).
13. (10) Spike brown, stem yellow - - -
- - - Dawson's golden chaff (No. 17).
14. (1) Bearded.
15. (18) Spike enlarged at upper end.
16. (17) Spike and stem yellow with reddish tinge. . . .
. . . . Oatka chief and Jones's bearded (Nos. 5 and 7).
17. (16) Spike umber-brown, stem purplish -
- - - Pedigreed giant and White golden cross
- - - (Nos. 11 and 13).
18. (15) Spike tapering at upper extremity.
19. (22) Spike pubescent.
20. (21) Seeds red - - - -
- - - Pride of Genesee and Pride (Nos. 4 and 8).
21. (20) Seeds white - Bearded winter fife (No. 9).
22. (19) Spike not pubescent.
23. (26) Seeds red.

24. (25) Spike yellow, stem purplish - - -
 - - - - - Diamond grit (No. 12).
 25. (24) Spike brown, stem purplish - - -
 - - - - - Lancaster red (No. 14).
 26. (23) Seeds white, spike and stem yellow -
 - - - - - Democrat (No. 15).

No. 1. Jones's Winter Fife.

Beardless. Seeds white*. Spike long and slender, tapering slightly towards the upper end, flattened. Average length of four spikes, 5.125 inches; greater diameter, 0.5 inch; lesser diameter, 0.375. Glumes covered with a fine whitish, velvety pubescence. Empty glumes, with very short, blunt prominences at tips. Flowering glumes with claw-like tips, which become gradually longer towards the upper end of the spike, where a few become straight, sharp bristles about 0.25 inch long. Color of spike and stem, pale yellow. Average number of seeds from a spike, 86.75. Average weight of seeds from a spike, 3.2875 grams.

Rust on stem and blade frequent.

No. 2. American Bronze.

Beardless. Seeds red. Spike very long and slender, the spikelets separated so that the axis of the spike can sometimes be seen between them, flattened, tapering towards both extremities. Average length of four spikes, 5.3125 inches; greater diameter, 0.625 inch; lesser diameter, 0.375 inch. Glumes not pubescent. Empty outer glumes with short, rounded tips, the keels on their backs more decided than in many other varieties.

*The terms white and red are used in these descriptions as they are by millers and seedmen. Strictly speaking, the white wheats are pale ochraceous, while red wheats, so-called, are generally of a light leather color.

Flowering glumes, with claw-like tips, which increase in length towards the upper end of the spike, where a few become bristles one-half inch long. Color of spike and stem, pale yellow. Average number of seeds from one spike, 56.5. Average weight of seeds from one spike, 2.4 grams.

This wheat bears a general resemblance to No. 1, but the spike is more slender and the glumes without pubescence. Rust frequent.

No. 3. Early White Leader.

Beardless. Seeds white. Spike long and slender, the spikelets becoming crowded at the upper end of the spike so that it is a little widened at the extremity. Average length of four spikes, 5.34 inches; greater diameter, 0.50 inch; lesser diameter at middle of spike, 0.37 inch, but widened to 0.50 inch at tip. Glumes not pubescent. Empty glumes with short, rounded tips. Flowering glumes with claw-like tips, a few at the extremity of the spike with the tips produced into short spines, as much as one-fourth inch long. Color of spike and stem pale yellow. Average number of seeds from one spike, 74.25. Average weight of seeds from one spike, 2.85 grams.

Closely resembles No. 2, but readily distinguished by its white seed and the slight enlargement of the tip of the spike. Rust very abundant.

No. 4. Pride of Genesee.

Heavily bearded. Seeds red. Spike long and slender, tapering to the upper end, flattened. Average length of four spikes, 5.81 inches; greater diameter, 0.62 inch; lesser diameter, 0.37 inch. Glumes pubescent. Empty glumes with a bristle at the tip varying from 0.25 to 0.62 inch in length. Flowering glumes with long bristles varying

from 1 inch long at the base to more than 4 inches on the upper half of the spike. Color of spike and stem pale yellow. Average number of seeds from one spike, 79.5. Average weight of seeds from one spike, 2.95 grams.

A very striking variety, to be recognized by its shaggy beard and pubescent glumes. Rust frequent.

No. 5. Oatka Chief.

Bearded. Seeds white. Spike short and thick, widened in one direction at the tip. Average length of four spikes, 4.44 inches; greater diameter, 0.50; lesser diameter, 0.37 inch, increasing to 0.50 inch at the tip. Glumes not pubescent. Empty glumes tipped with a short but decided bristle which reaches a length of about 0.25 inch at the upper end of the spike. Flowering glumes tipped with long bristles varying from 1.25 to 3.25 inches in length. General color of spike and stem yellow, but both with an evident reddish cast. Average number of seeds from a spike, 74. Average weight of seeds from one spike, 2.67 grams.

Rust rare.

No. 6. Long Amber.

Beardless. Seeds white. Spike long and slender, tapering to upper end, flattened. Average length of four spikes, 5.53 inches; greater diameter, 0.50; lesser diameter, 0.37 inch. Glumes not pubescent. Empty glumes with short rather blunt tips. Flowering glumes with short bristles, varying from 0.12 to 0.50 inch long, the latter being situated at the apex of the spike. Color of spike and stem pale yellow. Average number of seeds from a spike, 59.25. Average weight of seeds from one spike, 2.32 grams.

The spike of this wheat resembles No. 2 very closely and might be considered identical were it not for the color of the seeds. Rust frequent.

No. 7. Jones's Bearded.

Bearded. Seeds white, but darker in tint than some other varieties (Nos. 10 and 17, for example). Spike moderately stout, not flattened, enlarging at the upper end. Average length of four spikes, 4.53 inches; both diameters, 0.50 inch, but one of them enlarging to 0.62 inch near the tip. Glumes without pubescence. Empty glumes with tips produced into short bristles about 0.25 inch long. Flowering glumes armed with bristles from 1 to 3.87 inches long. General color of spike and stem yellow, but both glumes and stem with a reddish tinge. Average number of seeds from a spike, 85.75. Average weight of seeds from a spike, 3.04 grams.

This variety bears a close resemblance to Oatka chief (No. 5), having the same reddish tinge and the spike of the same general shape. About the only differences apparent in the samples before me are the greater coarseness of No. 7 and the slightly greater average size. The seed of No. 7 is a little less plump and averages darker in color. All these differences might, however, be due to differences in the soil in which the two samples grew or to differences in seed planted. The wheats grown under these two numbers are certainly very closely related, if they are not one and the same. Rust rare.

No. 8. Pride.

Heavily bearded. Seeds red. Spike long and slender, tapering gradually towards the tip, flattened. Average length of four spikes, 5.06 inches; greater diameter, 0.62 inch; lesser diameter, 0.37 inch. Glumes pubescent. Empty glumes with bristles ranging in length from 0.25 to 0.62 inch. Flowering glumes with bristles ranging from 1 to 3.25 inches in length. Color of spike and stem pale yellow. Average number of seeds from a spike, 70.5.

Average weight of seeds from one spike 2.65 grams.

Probably identical with No. 4. I can see no difference of importance between the two samples. Rust abundant.

No. 9. Bearded Winter Fife.

Bearded. Seeds white and plump. Spike rather small and slender, flattened, tapering to the upper extremity. Average length of four spikes, 4.80 inches; greater diameter, 0.50 inch; lesser diameter, 0.37 inch. Glumes finely pubescent. Empty outer glumes provided with short bristles ranging from about 0.12 to 0.37 inch in length, the longest being, as is common, at the upper end of the spike. Flowering glumes bearing bristles which gradually increase in length from the base to the upper end, ranging from 1 to 3.25 inches long. Color of spike and stem pale yellow. Average number of seeds from a spike, 61. Average weight of seeds from one spike, 2.57 grams.

Rust frequent.

No. 10. Early Arcadian.

Beardless. Seeds white, rather short, plump. Spike short, thick, enlarging towards the upper extremity. Average length of four spikes, 3.37 inches; greater diameter, 0.50 inch; lesser diameter, 0.37 inch at base, but increasing to 0.75 inch at upper end. Glumes not pubescent. Empty outer glumes with short, blunt tips. Flowering glumes with claw-like tips, these increasing in length towards the upper extremity of the spike, where a few are nearly 0.50 inch in length. Color of spike umber-brown, this color being confined, however, to the exposed parts of the glumes, the covered portions being pale yellow. Stem pale yellow. Average number of seeds from a spike, 65. Average weight of seeds from a spike, 2.5 grams.

Very distinct from any of those described above in the short, thick, club-like spikes, with brown glumes. Rust rare.

No. 11. Pedigreed Giant.

Strongly bearded, especially on the upper fourth of the spike. Seeds white. Spike short, thick, enlarging to the upper extremity, not flattened. Average length of four spikes, 3.18 inches; both diameters, 0.37 inch at base, one of them increasing to 0.62 inch at tip. Glumes not pubescent. Empty glumes with claw-like tips on the basal portion of the spike, these increasing in length towards the upper end, where some are nearly 0.25 inch in length. Flowering glumes with long bristles, varying from 0.37 inch in length at the base to 4 inches in length at the upper extremity of the spike. Color of spike umber-brown, of stem obscure lilac. Average number of seeds from a spike, 72.5. Average weight of seeds from a spike, 3.2 grams.

No rust.

No. 12. Diamond Grit.

Heavily bearded. Seeds red. Spike rather slight and short, tapering to the upper extremity. Average length of four spikes, 4.19 inches; both diameters about 0.37 inch. Glumes not pubescent. Empty outer glumes with a short acute bristle at tip. Flowering glumes varying in length from 1.25 inch to 3.50 inches. Color of spike pale yellow, of stem purplish. Average number of seeds from a spike, 60. Average weight of seeds from a spike, 2.2 grams.

Rust frequent.

No. 13. White Golden Cross.

Bearded. Seeds white. Spike short and thick, enlarging towards the upper extremity. Average length

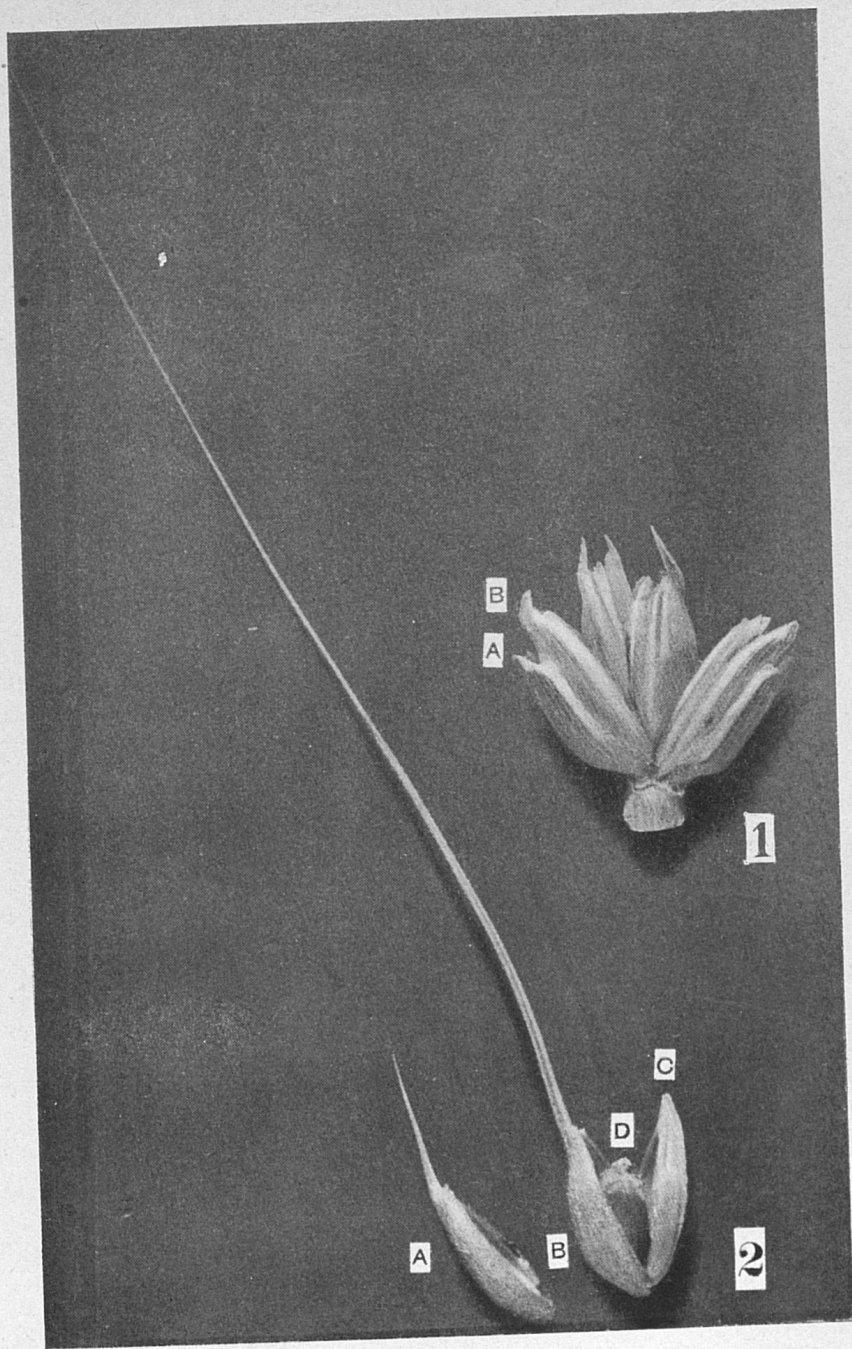


PLATE I.

FIG. 1. A complete flower cluster or spikelet of a beardless wheat (American bronze). A, empty outer glume; B, flowering glume. FIG. 2. A single flower of a bearded wheat (Pride of Genesee) with the parts separated. A, empty outer glume; B, bristle-bearing flowering glume; C, palea; D, seed.

Enlarged a little more than two diameters. Photographed by H. Garman

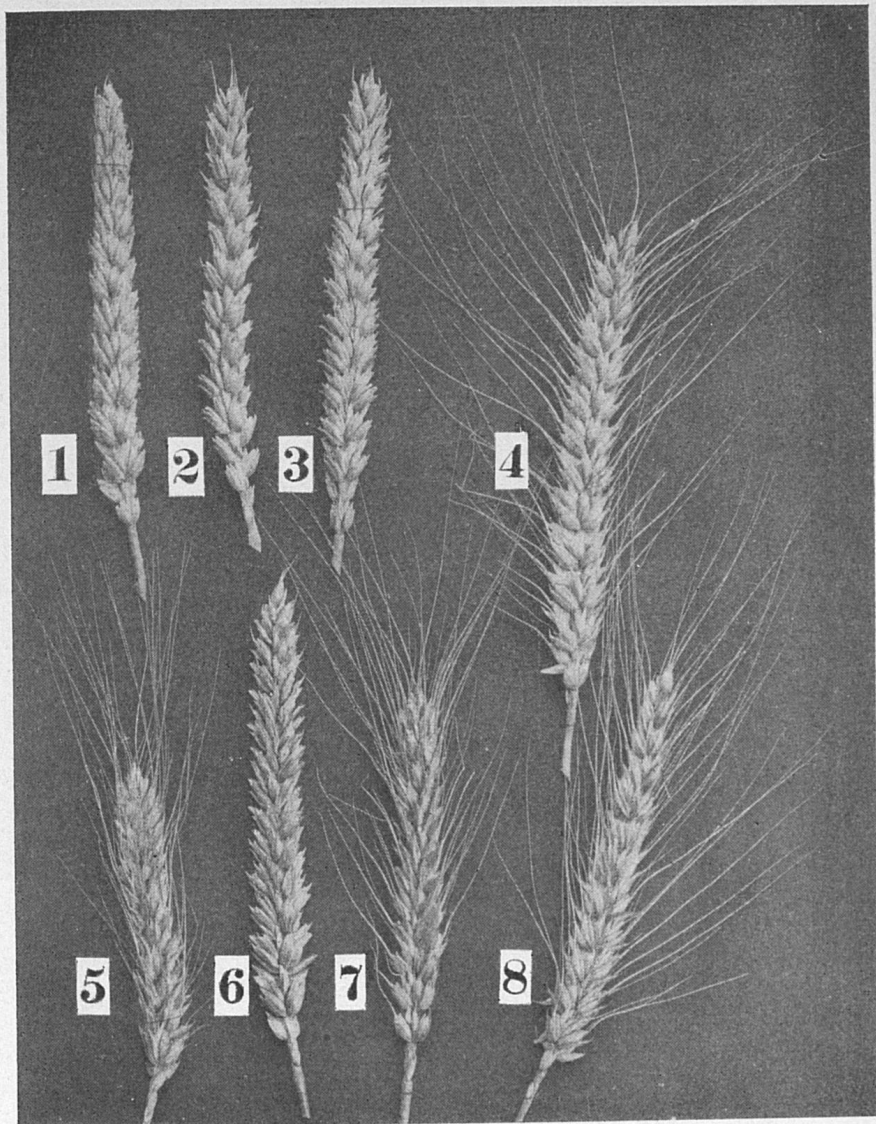


PLATE II.

1, Jones's winter fife; 2, American bronze; 3, Early white leader; 4, Pride of Genesee; 5, Oatka chief; 6, Long amber; 7, Jones's bearded; 8, Pride. Reduced to about one-half natural size. Photographed by H. Garman.

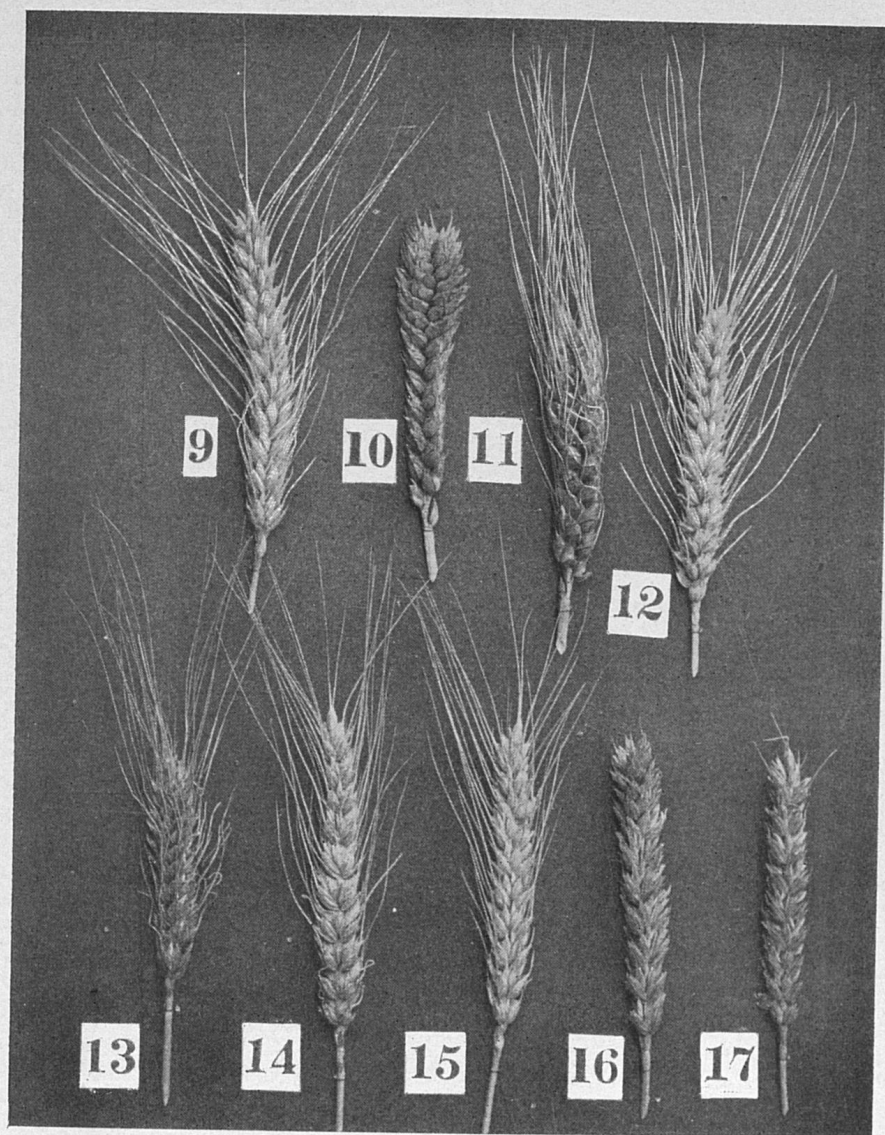


PLATE III.

9, Bearded winter fife; 10, Early arcadian; 11, Pedigreed giant; 12, Diamond grit; 13, White golden cross; 14, Lancaster red; 15, Democrat; 16, Gold coin; 17, Dawson's golden chaff. Reduced to about one-half natural size. Photographed by H. Garman.

of four spikes, 3.19 inches ; greater diameter, 0.50 inch ; lesser diameter, 0.37 inch at base, increasing to 0.62 inch at upper extremity. Glumes not pubescent. Empty outer glumes with short, acute spine at tip. Flowering glumes tipped with bristles, about one inch long at base and as much as four inches in length at the upper extremity of the spike. Color of spike umber-brown, of stem purplish. Average number of seeds from a spike, 63.5. Average weight of seeds from a spike, 2.85 grams.

Closely resembles Number 11 in every respect, but in the sample before me the length of spike averaging less. No rust.

No. 14. Lancaster Red.

Bearded. Seeds red. Spike small, slender, somewhat flattened, tapering to upper end. Average length of four spikes, 4.34 inches ; greater diameter, 0.50 inch ; lesser diameter, 0.37 inch. Glumes not pubescent. Spines on outer glumes short, straight, acute, becoming as much as 0.50 inch in length towards the apex of the spike. Bristles on flowering glumes ranging from 2.37 to 3.62 inches in length. Color of spike brown, of stem purplish. Average number of seeds from a spike, 49.25. Average weight of seeds from a spike, 1.95 gram.

The spike of this variety is very slight and small and tapers quite decidedly towards the tip. The glumes show a disposition to separate in the ripened head, so that the seed becomes visible. In the sample examined by me I find some spikes clothed with fine pubescence, while in every other respect they resemble closely the other spikes. It seems hardly probable that the same variety should vary to this extent, but it may be that the wheat from which the sample was grown was mixed. No rust.

No. 15. Democrat.

Strongly bearded. Seeds white. Spike rather slender, of medium length, flattened, tapering decidedly to the upper extremity. Average length of four spikes, 4.43 inches. Glumes without pubescence. The empty outer glumes with short, claw-like tips at the base of the spike and at its upper extremity with bristles nearly 0.25 inch in length. Flowering glumes with bristles ranging in length from one to three inches. Color of spike and stem pale yellow. Average number of seeds from spike, 15.75. Average weight of seeds from spike, 2 grams.

No rust.

No. 16. Gold Coin.

Beardless. Seeds white. Spike of medium size, enlarging a little to the upper extremity. Average length of four spikes, 4.06 inches; greater diameter, 0.50 inch; lesser diameter, 0.37 inch below, increasing a little above. Glumes not pubescent. Empty outer glumes everywhere with rather short, blunt tips. Flowering glumes with claw-like tips at base of spike which become gradually longer upward until at the upper end of the spike a few reach a length of one-half inch. Color of spike amber-brown, of stem purplish. Average number of seeds from a spike, 60. Average weight of seeds from a spike, 2.44 grams.

Rust rare.

No. 17. Dawson's Golden Chaff.

Beardless. Seeds white and plump. Spike rather small and slender, scarcely flattened, tapering to the upper extremity. Average length of four spikes, 3.81 inches; both diameters about 0.37 inch. Glumes not pubescent. Empty outer glumes with very short, blunt tips. Flowering glumes at base of spike with claw-like tips and at its apex with bristles which may in a few

cases reach a length of 0.62 inch. Color of spike umber-brown, of the stem pale yellow. Average number of seeds from a spike 43.75. Average weight of seeds from one spike, 1.82 gram.

The seeds of this variety are exceptionally plump and light in color. No rust.

4. Hot Water and Bluestone Solutions as Remedies for Smut in Wheat.

BY H. GARMAN, ENTOMOLOGIST AND BOTANIST.

It should be more generally known than it is that bluestone, when used in very strong solutions, destroys the vitality of a portion of the seeds soaked in it. This effect of the solutions is not apparent except by comparison with untreated seed, and hence the diminished yield is not likely to be recognized on the farm as the result of treatment. While this loss should be avoided if possible, it is more than offset by the increase in yield due to the prevention of smut, and hence in spite of its defect bluestone is recommended everywhere as an effective means of saving wheat from smut.

The common practice is to make up a solution by dissolving six pounds of bluestone in four gallons of hot water, then pouring this into a barrel and adding enough water to make 20 gallons. The seed wheat is dipped in this in loose bags, care being taken that every seed is wetted, then the surplus solution is drained out by resting the bag for a brief time on sticks placed across the top of the barrel, and finally the wheat is poured out on a floor and dusted with air-slaked lime.

If the wheat is to be sprinkled it is poured in a heap on a barn floor and the solution is applied with a watering can, the wheat being raked about at the same time

until all is wetted; when it is dusted with lime as before and spread out to dry.

Careful comparative tests of bluestone solutions and of hot water as preventives of smut show that hot water is quite as effective in checking the disease and has the advantage of not injuring the sound seed. When treating seed with hot water it is well to be provided with the following: A good Fahrenheit thermometer. A large kettle in which water can be heated. Three barrels.

The water in the kettle is kept near the boiling point, and the supply in it must be replenished as fast as it is used. In the first barrel keep ordinary water, and the other two should be about two-thirds full of water kept at a temperature of 131 degrees Fahrenheit.

First put a bag of wheat in the barrel of cool water and leave it until all the seeds are moist. It may be left for half an hour, or longer, but ordinarily two or three minutes is sufficient. Drain out the surplus cold water, then immerse for a minute or two in the second barrel, containing warm water. The object of this is to warm the wheat so that it will not cool the water in the third barrel. When warm, plunge quickly in the third barrel and leave it fifteen minutes. If the temperature shows a disposition to fall below 131 degrees, add a little hot water from the kettle till it reaches the 131 mark again. It should never be allowed to fall below 130 degrees, nor to go above 134 degrees Fahrenheit. With a good supply of hot water at hand it is very easy to regulate the temperature in the barrel, much easier than would be supposed by one who has not tried it. At the end of fifteen minutes the wheat is removed from the water and spread out to dry. But it must never be spread out on a floor upon which smutted wheat has lain. The convenience, cleanliness and cheapness of this method of preventing smut will certainly commend it to farmers, and I have no doubt but that it will displace the use of bluestone in course of time.