

South Dakota State University  
**Open PRAIRIE: Open Public Research Access Institutional  
Repository and Information Exchange**

---

Bulletins

South Dakota State University Agricultural  
Experiment Station

---

11-1-1913

## Some Varieties and Strains of Wheat, and their Yields in South Dakota

A.N. Hume

Manley Champlin

Follow this and additional works at: [http://openprairie.sdstate.edu/agexperimentsta\\_bulletins](http://openprairie.sdstate.edu/agexperimentsta_bulletins)

---

### Recommended Citation

Hume, A.N. and Champlin, Manley, "Some Varieties and Strains of Wheat, and their Yields in South Dakota" (1913). *Bulletins*. Paper 146.

[http://openprairie.sdstate.edu/agexperimentsta\\_bulletins/146](http://openprairie.sdstate.edu/agexperimentsta_bulletins/146)

This Bulletin is brought to you for free and open access by the South Dakota State University Agricultural Experiment Station at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Bulletins by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact [michael.biondo@sdstate.edu](mailto:michael.biondo@sdstate.edu).

BULLETIN No 146

NOVEMBER, 1913

---

# AGRICULTURAL EXPERIMENT STATION

In Co-operation with United States Department of Agriculture  
Bureau of Plant Industry

---

SOUTH DAKOTA  
STATE COLLEGE OF AGRICULTURE  
AND MECHANIC ARTS

---

AGRONOMY DEPARTMENT

---

Some Varieties and Strains of  
Wheat and their Yields in  
South Dakota

---

BROOKINGS, SOUTH DAKOTA

---

Bowen Publishing Co., Huron, S. D.

## GOVERNING BOARD.

---

Hon. A. E. Hitchcock, President ..... Mitchell, S. D.  
Hon. T. W. Dwight, Vice President ..... Sioux Falls, S. D.  
Hon. A. M. Anderson ..... Sturgis, S. D.  
Hon. August Frieberg ..... Eeresford, S. D.  
Hon. M. P. Beebe ..... Ipswich, S. D.

---

## STATION STAFF

---

T. W. Dwight ..... Regent Member  
A. M. Anderson ..... Regent Member  
Robert L. Slagle ..... President of College  
James W. Wilson ..... Director and Animal Husbandman  
N. E. Hansen..... Vice Director and Horticulturist  
James H. Shepard ..... Chemist  
C. Larsen ..... Dairy Husbandman  
A. N. Hume..... Agronomist and Superintendent of Sub-Stations  
J. G. Hutton..... Assistant Chief of Agronomy  
M. Champlin..... Assistant Agronomist and Collaborator  
Howard Loomis ..... Agronomy Analyst  
I. S. Oakland..... Assistant in Crops  
J. D. Morrison.... Crops, Detailed by U. S. Department of Agriculture  
J. M. Fuller..... Assistant and Dairy Bacteriologist  
D. E. Bailey ..... Dairy Analyst  
Howard W. Gregory ..... Assistant Dairyman  
C. L. Pier ..... Assistant Dairyman  
Guy E. Youngberg..... First Assistant in Chemistry  
R. A. Larson..... Secretary and Accountant  
E. I. Fjeld ..... Bulletin Clerk and Stenographer

## **SOME VARIETIES AND STRAINS OF WHEAT, AND THEIR YIELDS IN SOUTH DAKOTA**

—By—

A. N. Hume, Agronomist and Superintendent of Substations and Manley Champlin, Assistant Agronomist and Collaborator.

---

If anyone knows the characteristics of any kind of wheat that may be grown, he is usually interested in its yielding power. Conversely if anyone finds out that any kind of wheat is a good yielder, he wishes to know its name and characteristics.

It is the purpose of the present bulletin to classify and describe some of the wheats most commonly grown and inquired about in South Dakota. Having thus defined these varieties and strains of wheat, it is the purpose to summarize them according to their average yields. These latter have been determined by tests made at the several experiment-fields within the state.

### **Classification of Wheat Species**

All of the kinds of wheat produced in the world, are commonly divided into eight groups. These groups are based upon distinct differences. The differences between these eight general groups or species are easy for anybody to see who has opportunity to look at different kinds of wheat.

The common names followed by the botanical names of these eight species (sometimes called subspecies) of wheat are:

- |                  |                                   |
|------------------|-----------------------------------|
| 1. Einkorn       | <i>Triticum monococcum</i>        |
| 2. Polish wheat  | <i>Triticum polonicum</i>         |
| 3. Spelt         | <i>Triticum sativum spelta</i>    |
| 4. Emmer         | <i>Triticum sativum dicoccum</i>  |
| 5. Club wheat    | <i>T. sativum tenax compactum</i> |
| 6. Poulard wheat | <i>T. sativum tenax turgidum</i>  |
| 7. Durum wheat   | <i>T. sativum tenax durum</i>     |
| 8. Common wheat  | <i>T. sativum tenax vulgare</i>   |

It is likely that almost all people of South Dakota who are interested in wheat will recognize that most wheat growers of our state are concerned usually with the two last named species, viz. Durum wheat and Common wheat. In addition Emmer, sometimes erroneously called Spelt, is a common grain crop.

The present bulletin concerns itself, therefore, with (1) Common wheat, (2) Durum wheat, (3) Emmer.

### **CLASSIFICATION OF WHEAT VARIETIES FREQUENT IN SOUTH DAKOTA.**

The following outline will be largely self-explanatory. Each Roman numeral subtends the name of the kind or **species** of wheat, as explained above. Under the name of the species, marked with Arabic numerals, are the names of **varieties**. Under the variety names, marked with letters, are names of wheats that have been selected at various times from the varieties which they represent.

It may be worth recalling here that one may easily observe that species of wheat differ markedly from one another, that varieties differ from each other enough to be told apart by an experienced observer, but that selections all from the same variety, although differing, often in some one or more important particulars, perhaps yielding power, may not always be easily distinguished by their appearance. Such selections within one variety are called **strains**.

#### **Common Wheats of South Dakota.**

##### **I. COMMON WHEAT**

Common wheat is the term used to include the many ordinary varieties of bread wheat in nearly all parts of the wheat area of the world. They are distinguished by thin-walled stems, which are also hollow, at least nearly to the top, where they occasionally are filled with pith; the spindle to which the spikelets attach does not break easily into joints; the kernels are half covered by thin coverings of chaff, called glumes. Each tiny wheat flow-

er, and later each kernel, is subtended by a so-called flowering glume. If the wheat is bearded, the beard or awn is attached to this flowering glume. Sometimes two, often three, or as many as five wheat flowers are enclosed in a pair of so-called flowering glumes. Everything within a pair of empty glumes is a spikelet.

(1) Bearded Fife—Glumes white and smooth, flowering glume awned, berries dark red with narrow, incurving suture. Bearded Fife wheat is known commercially as Velvet Chaff, albeit the chaff or glumes are smooth. The name Velvet Chaff is a misnomer.

- (a) S. D. 67 C. I. 3081. Red Fife
- (b) S. D. 359. South Dakota Climax
- (c) Johnson's Fife
- (d) Golden Fife
- (e) S. D. 146. Early Java
- (f) S. D. 188 C. I. 2958. Minnesota 188.

(2) Beardless Fife—Glumes white, awnless and smooth, berries dark red, with sutures variable in shape and depth.

- (a) S. D. 172. C. I. 3025. Power's Fife
- (b) Saskatchewan Fife
- (c) Marble
- (d) Registered Red Fife
- (e) S. D. 335. C. I. 2989. Minnesota 66. Powers' Fife
- (f) S. D. 163. C. I. 2873 Minnesota 163.
- (g) S. D. 136 Minnesota 171. Rysting's Fife
- (h) S. D. 69. C. I. 1517. Ghirka.

(3) Beardless Bluestem—Glumes white, somewhat velvety and awnless, berries dark red with wide out-curving sutures.

- (a) S. D. 140. Pedigreed
- (b) S. D. 145. Okanogan
- (c) S. D. 195. C. I. 3082. Marvel
- (d) S. D. 74. C. I. 1505. Minnesota 51.
- (e) S. D. 169. C. I. 2874. Minnesota 169.
- (f) S. D. 196. Select. C. I. 3083.

(4) Crimean Wheat—Russian Wheat, bearded hard winter, glumes white, smooth, flowering glume awned, berries dark amber color, thick in proportion to length, sutures narrow, incurving.

- (a) Turkey
- (b) Kharkov

## II. DURUM WHEAT—(*Triticum sativum durum*)

Durum Wheat has a characteristic appearance which distinguishes it always from common wheat described above.

It has much more of the general appearance of barley, than has common wheat. This appearance is due largely to the exceedingly heavy beards or awns that invariably are attached to the flowering glumes.

The color of heads varies with different varieties from light yellow to nearly black. Kernels of Durum wheat are usually large and more glassy in appearance than those of Common wheat. These kernels also vary in color from light yellow to reddish yellow. In South Dakota, Durum wheat is always sown in the spring, though in the milder climates of the world there are strains of winter Durum wheat.

(1) Kubanka, glumes yellowish white, smooth, flowering glume awned, berries amber color, large, thick in proportion to their length, sutures narrow, incurving.

- (a) Kubanka S. D. 75, C. I. 1440
- (b) Kubanka S. D. 73, C. I. 1516
- (c) Kubanka S. D. 356, C. I. 1354
- (d) Kubanka S. D. 152, C. I. 1541

(2) Arnautka (Goose wheat) Glumes yellowish white, smooth, flowering glume awned, berries clear amber, large, long in proportion to thickness, suture narrow, incurving.

- (a) S. D. 148, C. I. 1494
- (b) S. D. 149, C. I. 1493
- (c) S. D. 150
- (d) S. D. 151, C. I. 1547

III. EMMER (*Triticum sativum dicoccum*)

The plants of this species are pithy or hollow, with an inner wall of pith; leaves sometimes rather broad, and usually velvety hairy; heads almost always bearded, very compact, and much flattened on the two-rowed sides. The appearance in the field is therefore quite different from that of spelt. The spikelets, however, look considerably like those of spelt, but differ principally in the presence always of a short pointed pedicel. This pedicel, which is really a portion of the rachis of the head, if attached at all to the spelt spikelets, is always very blunt and much thicker. Besides, the emmer spikelets are flattened on the inner side, and not arched as in spelt, so that they do not stand out from the rachis as the spelt spikelets do, but lie close to it and to each other, forming a solidly compact head. The spikelets are usually two-grained, one grain being located a little higher than the other. The outer chaff is boat-shaped, keeled, and toothed at the apex. The grain is somewhat similar to that of spelt, but is usually harder, more compressed at the sides, and redder in color.

(1) White Spring.

S. D. 293, C. I. 2975





### BEARDED FIFE WHEAT

Many selections have been made from this variety. Among them are Red Fife, South Dakota Climax, Johnson's Fife, Golden Fife, Early Java, and Minnesota 188. Glumes, white and smooth, flowering glume awned, berries dark red with narrow incurving suture. (Bearded Fife Wheat is known commercially as Velvet Chaff, albeit the chaff or glumes are smooth.)



### BEARDLESS FIFE WHEAT

Among the selections made from this variety are Powers' Fife Minnesota 66, Rysting's Fife Minnesota 171, Saskatchewan Fife, Marble, Registered Red Fife, Minnesota 163. Glumes white, awnless and smooth, berries dark red with sutures variable in shape and depth.



### BEARDLESS BLUESTEM WHEAT.

Commonly grown selections from this variety are Pedigreed, Okanogan, Marvel, Select, Minnesota 51, Minnesota 169. Glumes white, velvety and awnless, berries dark red with wide out-curving sutures.



Crop - Wheat  
 Variety - Turkey (Winter)  
 Strain - S. B. 144

### CRIMEAN WHEAT

Two of the hardiest strains of Crimean Wheat have already given promising yields in central and southern South Dakota. It is hoped that still harder selections may be found. Varieties now under observation are Turkey and Kharkov. Glumes white, smooth, flowering glume awned, berries dark amber color, thick in proportion to length, sutures narrow, in-curving.



Crop - Wheat

Variety - Marquis

Strain - S. D. 515

### MARQUIS WHEAT

This variety was originated by the Ottawa Experiment Station in Canada. It has short, compact, awnless heads with smooth white chaff. Berries are dark red in color, short and thick in shape, ripens early and has yielded well. Recently introduced from Canada.



### KUBANKA WHEAT.

This variety and the Arnautka are the usual durum wheats in South Dakota. The characteristic difference between the Kubanka and Arnautka is that the former has a shorter, thicker head than the latter.



Crop - Wheat (Durum)

Variety - Arnautka

Strain - S. D. 150

### ARNAUTKA WHEAT.

This is a common Durum wheat in South Dakota, although it is often mixed with other strains. It is characterized by longer, more slender heads, than the Kurbanka. Glumes yellowish white, smooth, heavily awned, berries clear amber colored, large, long in proportion to thickness, suture narrow, incurving.



### **EMMER.**

Emmer is botanically a species of wheat. It is often called spelt. The two should not be confused. There is such a grain as spelt, but it is not a common crop in our state. The variety White Spring, is the commonest emmer in South Dakota.



### **COMPARATIVE YIELDS OF WHEAT VARIETIES.**

The South Dakota Experiment Station, up to the time of preparing the present bulletin, has been empowered to make soil and crop tests at four regular station-fields within the state. These points are namely, Brookings, Highmore, Cottonwood and Eureka. These four points may be said to represent four different agricultural areas of the state. The production therefore, of the several varieties and strains of wheat has been determined and is here discussed for each of the areas separately.

It should be here understood that many wheats have been tested that are not reported by name in this bulletin. The plan of work has been to make trial of any wheat so long as it gives evidence of being excellent. When the record of any wheat shows that it is inferior, it is omitted from further test.

Thus only the records of several most excellent strains of wheat are reported in this bulletin.

#### **WHEAT YIELDS OF BROOKINGS AREA.**

Records are available of wheat yields at Brookings for the years 1905 to 1912, inclusive. A summary of these yields is put down in Table 1. In the main the yields put down in this table, are either averages of more than a single plot yield or were taken from plots, interspersed with "Check" plots—any abnormal yields being discarded. Mathematical chance for variation is obviously not calculated.

The yields given constitute results of a field test, and will indicate to South Dakota wheat growers the relative yielding capacity of the several wheats they are producing or may be likely to produce.

It may be noted that in the second and third columns of the table, certain numbers are given, under headings respectively, S. D. No. and C. I. No. The first indicates South Dakota number, and the latter Cereal Investigation number. These numbers are nothing more than a record book number given either by the South Dakota Experiment Station or by the United States Department of Agriculture, Office of Cereal Investigations.

These numbers are necessary to be kept as records, but should not confuse the reader.

**TABLE I.**

Average Yields in Bushels per Acre of Several Varieties and Strains of Wheat, at Brookings, Years, 1905-1912.

Name of Wheat	Variety or Species	S. D. No.	C. I. No.	Average Yield for Year Indicated									Average for all years
				1905	1906	1907	1908	1909	1910	1911	1912		
Arnautka .. .. .	Durum .. .. .	150		25.0	35.8	20.8	25.8	16.5	12.0	4.0	26.1	20.8	
Kubanka .. .. .	Durum .. .. .	75	1440	16.3	28.6	14.5	16.1	11.8	12.7	1.2	28.0	16.2	
Red Fife .. .. .	Bearded Fife .. .. .	67	3081	18.3	22.3	10.9	15.0	21.8	19.9	2.8	18.5	16.2	
Kubanka .. .. .	Durum .. .. .	152	1541	16.5	30.4	12.7	15.8	18.0	9.2	3.8	21.6	16.0	
Kubanka .. .. .	Durum .. .. .	73	1516	20.8	30.3	6.2	12.8	15.7	5.5	2.8	28.6	15.3	
Minnesota No. 171 .. .	Beardless Fife .. .. .	136		15.8	23.4	7.3	14.9	15.5	16.9	3.0	17.4	14.3	
Minnesota No. 169 .. .	Bluestem .. .. .	169		16.3	21.8	8.4	11.6	16.9	15.7	2.8	19.0	14.1	
Minnesota No. 51 .. .	Bluestem .. .. .	74		15.7	21.8	9.2	12.1	15.1	13.7	3.8	19.6	13.8	
Minnesota No. 66 .. .	Beardless Fife .. .. .	142		16.8	23.1	6.8	10.1	13.3	14.0	1.6	17.0	12.8	
Ghirka .. .. .	Beardless Fife .. .. .	69	1517	11.3	19.0	7.8	8.8	17.7	16.2	0.8	18.0	12.4	

It may be noted that in the above table, the names of the wheats tested were put down in order of average yield. The latter is to be found in the last column of the table.

The highest average yield in bushels per acre is that of Arnautka, namely 20.8 bushels. Not only did Arnautka produce the highest average yield for the eight years, it also yielded highest in each of four of the eight, and was within the four highest yielding wheats three out of the remaining four years. This amount of evidence does not absolutely demonstrate that Arnautka is, as an average, the highest yielding wheat in South Dakota. It is strong evidence, however, that Arnautka is likely to produce a most satisfactory comparative yield, under such conditions as obtain at Brookings.

It is desirable to emphasize in this connection that ability to produce high yields per acre is only one of the characteristics of a good wheat. The market may not distinguish between two similar wheats. South Dakota Bulletin 99 p. 111, states "On account of their large yield, two samples, one an unknown Arnautka and one a Wild Goose wheat, were run in 1905 samples. They have shown no particular superiority in any of the tests."

Indeed, so far as milling quality is concerned, the indications are from present data that Arnautka is not so good a wheat as Kubanka. It would also be very advantageous for South Dakota to establish a reputation as a producer of uniformly, first quality Durum wheat, and Kubanka is the most promising kind.

Quoting again from South Dakota Bulletin 99, p 109, "It is now evident that taking all in all, yield, hardiness, flour yield, protein, distribution and the quality of both bread and Macaroni, that Kubanka (5639) is to be recommended for more general use, while the inferior sorts should be relegated to the elevators as soon as sufficient seed of the 5639 can be obtained." This is the strain S. D. 75, C. I. 1440.

Referring again to the column of average yields and also to the yields for the separate years, it appears that as regards the next four varieties, these yields either do not vary sufficiently or in such a manner as to establish which one is certainly the highest yielder. It is

fairly established that they all rank higher than any of the five average yields below them.

Reasoning thus, it would appear that so far as yield per acre is concerned, the wheats included in Table 1, may be arranged in three groups:

First Group—Arnautka, in a class by itself.

Second Group—Kubanka (three strains) and Red Fife.

Third Group—Minnesota Numbers 171, 169, 51, 66, and Ghirka.

A little closer inspection of Table 1, and of these three groups makes it appear that all of the Durum wheats fall within the first two groups, and that both Bluestem wheats tested, fall into Group Three. Further, the Fife wheats, bearded and beardless, take intermediate positions so far as yield is concerned.

A regrouping of the wheats is thus suggested, according not only to yield, but also varietal difference. Such a grouping appears in the following table.

**TABLE II.**

Average Yields of All Wheats in Each of the Four Species or Varieties, Durum, Bearded Fife, Bluestem, Beardless Fife. Brookings, 1905-1912. Compiled from Table 1.

Species or Variety	Average yield of all strains tested in given year								Average of all strains all years
	1905	1906	1907	1908	1909	1910	1911	1912	
Durum .. . . . . .	19.6	31.3	13.5	17.6	15.5	9.8	2.9	26.0	17.0
Bearded Red Fife ..	18.3	22.3	10.9	15.0	21.8	19.9	2.8	18.5	16.2
Bluestem .. . . . . .	16.0	21.8	8.8	11.8	16.0	14.7	3.3	19.3	13.9
Beardless Fife .. . . .	14.6	21.8	7.3	11.2	15.5	15.7	1.8	17.4	13.1

14.4

An inspection of Table 2 makes it appear that the average yield of all Durum wheats tested at Brookings is higher than that of any other species or variety tested, being one bushel higher than that of the one strain tested of Bearded Red Fife.

The average yield of this one strain of **Bearded Red Fife** for all years tested, while lower by one bushel than that of **Durum** wheat, is decidedly higher than those of **Bluestem** and **Beardless Fife**.

The average yield of all **Bluestems** though only .8 bushels per acre higher than that of **Beardless Fifes**, was also slightly higher, seven out of eight, separate years.

This indicates that **Bluestem** may be expected to produce steadily a heavier yield than **Beardless Fife**, within the **Brookings** area.

### Summary of Wheat Variety Yield Tests— Brookings Area.

As a summary of the eight years of tests recorded in Table 1, the following statements are given:

(1) **Durum** wheat has produced the highest average yields in this area.

(2) **Bearded Red Fife** produced the largest yield of any among the common wheats.

(3) **Bluestem** ranks next.

(4) **Beardless Fife** has made the lowest yield per acre of any variety.

Recall here that the wheats reported in this bulletin are those remaining after inferior ones were discarded from the test plots in successive years.

(5) Thus the importance of selecting from wheats here reported, the most suitable variety is emphasized—and there is no decisive difference here indicated between strains within the same variety.

### Variety Yield Tests of Wheat—Highmore

The same general explanation of Table 2 may be made as was made for Table 1.

Table 2 summarizes yields from **Highmore** field for the eight years 1905-1912, inclusive.

**TABLE 2.**  
**Average Yields in Bushels Per Acre of Varieties and Strains of Wheat.**  
 (Highmore)

Name of Wheat	Species Variety	S. D. No.	C. I. No.	Average yield in bushels per acre in given year									Average for all years
				1905	1906	1907	1908	1909	1910	1911	1912		
Kubanka .....	Durum ..	73	1516	28.5	31.2	26.8	27.5	14.8	13.0	0.00	0.00	17.7	
Pererodka ..	Durum ..		1350	28.3	28.5	27.3	22.0	17.2	6.2	0.00	0.00	16.2	
Arnautka ..	Durum ..	150		36.7	23.8	23.8	26.0	14.2	5.0	0.00	0.00	16.2	
Kubanka ..	Durum ..	75	1440	23.2	26.7	28.7	22.7	17.0	8.0	0.00	0.00	15.8	
Beloturka ..	Durum ..	72	1513	35.8	22.8	24.2	27.8	12.5	2.0	0.00	0.00	15.6	
Kubanka ..	Durum ..	152	1541	26.7	25.5	21.7	22.5	10.7	8.3	0.00	0.00	14.4	
Red Fife .....	Bearded Fife .....	67	3081	25.5	20.3	18.7	11.0	17.5	6.8	0.00	0.00	12.5	
Minnesota No. 169 ...	Bluestem .....	169		23.1	17.3	16.1	14.7	17.2	10.0	0.00	0.00	12.3	
Minnesota No. 51 ....	Bluestem .....	74		22.8	17.0	16.0	16.3	15.8	9.5	0.00	0.00	12.2	
Okanogan ..	Bluestem .....	145		23.3	15.0	18.5	16.2	15.8	8.3	0.00	0.00	12.1	
Haynes Bluestem ....	Bluestem .....	140		24.8	16.2	16.7	13.6	16.2	7.7	0.00	0.00	11.9	
Minnesota No. 66 .....	Beardless Fife .....	142		20.5	14.8	12.5	16.1	16.5	10.3	0.00	0.00	11.3	
Minnesota No. 171 ...	Beardless Fife .....	136		15.8	18.2	13.2	11.0	16.8	9.8	0.00	0.00	10.6	
Ghirka ..	Beardless Fife .....	69	1517	9.7	22.0	15.0	4.8	17.7	6.2	0.00	0.00	9.4	

A casual inspection of Table 2 makes it appear immediately that the wheats tested fall into three groups with respect to yield. Within these groups no variety nor strain takes undisputed pre-eminence over the others in the same group. Even the highest yielding wheat, Kubanka (No. 73) while holding the highest average yield with 17.3 bushels per acre, so far as separate years are concerned was only highest in rank one year out of eight. It was next highest in only two of the remaining years.

The average results of the several tests of Table 3 are therefore grouped as follows, according to the three natural groups:

- (1) Durum wheats, (2) Bearded Fife, (3) Bluestems, (4) Beardless Fifes.

**TABLE 4.**

Average Yield of All Wheats in Each of the Four Species or Varieties, Durum, Bearded Fife, Bluestem and Beardless Fife. Highmore 1905-1912. Computed from Table 3.

Species or Variety	Average Yield per Acre of All Strains Tested in Given Year								Average all plots
	1905	1906	1907	1908	1909	1910	1911	1912	
Durums .. . . . . .	29.9	26.4	25.4	24.8	14.4	7.1	0.00	0.00	16.0
Bearded Red Fife ...	25.5	20.3	18.7	11.0	17.5	6.8	0.00	0.00	12.5
Bluestems .. . . . . .	23.5	16.4	16.8	15.2	16.3	8.8	0.00	0.00	12.1
Beardless Fife .. . . .	15.3	18.3	13.6	10.6	17.0	8.8	0.00	0.00	10.5

The above summary of tests is in agreement with the tests made upon Brookings area in respect that the yield of Durum wheats is decidedly higher than the yield of common wheats. Likewise at Highmore as at Brookings, Bearded Red Fife appears to lead common wheats in yielding capacity, Bluestem ranking next and Beardless Fife lowest.

At Highmore as at Brookings there is some notable difference between the total average yields of the different species and varieties—the differences between strains within the species, varietal groups are not decisive.

### Variety Tests at Eureka.

Wheat variety tests have been made at Eureka, McPherson County, during the four seasons since the Substation at that point has been established. Average yields are put down in the following table:

**Table 5.**

Average Yields in Bushels Per Acre of Several Varieties and Strains of Wheat—Eureka, Years 1909-1912.

Name of Wheat	Species or Variety	S. D. No.	C. I. No.	Average Yield, Bushels per Acre for Year Given				Average all Years
				1909	1910	1911	1912	
Kubanka.....	Durum.....	75	1440	22.5	10.7	0.00	0.00	8.3
Red Fife.....	Bearded Fife..	67	3081	12.5	3.8	0.00	1.5	4.5
Minnesota No. 169	Bluestem.....	169		10.1	2.3	0.00	5.2	4.4

Average yields from Eureka area are in accord with yields from Brookings and Highmore, in that the highest yielding wheat is apparently Durum, the second highest Bearded Red Fife, and the third highest of those tested Bluestem.

Seasonal conditions at Eureka have been decidedly unfavorable.

### TESTS AT COTTONWOOD

Seasonal conditions at Cottonwood Substation have been so unfavorable that wheat yields are not only few but also incomplete. No conclusions will be drawn until the variety tests have covered more seasons.

**Table 6.**

Average Yields in Bushels Per Acre of Several Varieties and Strains of Wheat—Cottonwood, Years 1909-1912.

Name of Wheat	Species or Variety	S. D. No.	C. I. No.	Average Yield, Bushels per acre for year given				Average all years
				1909	1910	1911	1912	
Kubanka.....	Durum.....	75	1440	4.0	1.3	0.0	1.4	1.7
Red Fife.....	Bearded Fife..	67	3081	3.8	2.3	0.0	7.0	3.3
Minnesota.....	Bluestem.....	169		2.1	1.8	0.0	4.0	2.0



## DISCUSSION OF WHEAT YIELD—TESTS AS APPLIED TO ENTIRE STATE.

Any kind of crop, wheat or other crop, which yields highest in one place, may or may not yield highest in another.

It does not follow necessarily, although it might well happen, that the highest yielding varieties of crops, for instance Highmore area, will be the highest in other areas. That is why it is desirable for the Experiment Station to make tests at many points.

It is of interest to compare results of wheat yield-tests, reported in this bulletin from the three areas, in which somewhat conclusive tests have been completed, such a comparison makes it evident that the order of yields of the wheats tested at the three places is generally consistent. Therefore, without assuming that relative values may be made mathematical, it is justifiable to arrange a combination of the average yields of the species and varieties of wheat. Such a combination makes a relative statement of the average yields of different species and varieties in the three areas in question. These areas, Brookings, Highmore, Eureka, taken together represent a considerable section of South Dakota.

**Table 7**

General Average Yields in Bushels Per Acre of Species and Varieties of Wheat Tested in Three Areas of South Dakota—Brookings, Highmore and Eureka. (Compiled from Tables 2, 4 and 6):

Wheat Species or Variety	Average of All Yields at Points Named			General Average
	Brookings	Highmore	Eureka	
Durum .. . . . . .	17.1	16.0	8.3	13.8
Bearded Fife . . . . .	16.1	12.5	4.5	11.0
Bluestem .. . . . . .	13.9	12.4	4.4	10.2
Beardless Fife . . . . .	13.1	10.5		

### Qualities of Wheat, Other Than Yielding Capacity.

The present bulletin is mainly a report of yield-tests of wheat.

It should not be forgotten, however, that high yield-

ing capacity is only one of several essential characteristics of any wheat. It might even be that any highest yielding wheat might be so inferior in other qualities as to be altogether undesirable.

There is, for instance, great difference in milling quality of wheats. As a general rule durum wheats have been considered as producing flour of inferior color. This amounted perhaps to a prejudice which in previous years has caused the market to quote durum wheat at a lower price than common wheat.

Moreover, the market prices for bearded fife wheat, have often been lower than those for bluestem on the same market.

Obviously, such differences in price per bushel, if continuous might be great enough to counteract any greater yields which might be secured by producing Durum wheat, or Bearded Fife, as compared with Bluestem.

Of recent years, however, and especially during the season just closed, market prices for durum, bearded-fife, and bluestem wheats have remained remarkably close together. If this state of the market continues, wheat growers will be wise to produce for sale the species or variety of wheat that yields highest in bushels per acre.

Kubanka, Durum wheat, is well worth consideration in this connection, for South Dakota conditions.

### **HISTORICAL.**

#### **Durum Wheat.**

“For more than thirty-five years, there have been occasional introductions into this country of the hardy, glassy wheats of the durum group, chiefly from Russia, but also from Algeria and Chile.

So far as the writer can determine, Russian Macaroni wheat was first introduced into this country in 1864 by this Department. (The United States Department of Agriculture). It was of the variety Arnautka and was purchased at Odessa, Russia.”

#### **Arnautka**

“**Arnautka** is properly the name of a special variety,

but is also often applied in a too general way. So far as the writer can determine, what is properly called Arnautka is a wheat having heads of a light red color, with a bluish bloom and very long reddish beards. The grains are very large and long, and when grown under favorable conditions are a clear yellow, extremely hard and vitreous. This and Gharnovka are the two varieties which have given Russia its reputation for macaroni wheats, although one or two other Russian sorts are probably even better for making that product." (B. P. I. Bul. No. 3).

"For example, it is well understood in South Russia that the excellent variety Arnautka gives the best results only when grown within a limited area bordering on the Azouv Sea." (B. P. I. Bul. No. 3).

### **Kubanka**

"It has medium or short heads that are white with occasionally a slight bluish bloom, and have rather long beards. The grain is large, yellowish white and very hard. The variety is much grown by the Kirghiz and Turghai people on the Siberian border, where it is absolutely impossible to grow ordinary wheats of any kind because of extreme drought, the rainfall being as low as 10 inches per annum. It is cultivated throughout the entire Volga River region from Kazaii to the Caspian Sea, and eastward into the Kirghiz steppes and Turkestan. It is the most popular bread wheat of the lower Volga region." (B. P. I. Bul. No. 3).

"So also the best Kubanka is found east of the Volga on the Siberian border." (B. P. I. Bul. 3).

Kubanka (S. D. 75) From U. S. Dept. Agr., B. P. I. (C. I. No. 1440) From East Russia, probably same as C. I. 1516.

Kubanka (S. D. 73) (C. I. 1516)

Two other similar strains are S. D. 356 and S. D. 152.

**Arnautka.** S. D. 150—Secured from Fargo, N. D. Other similar strains secured through the U. S. Dept. Agr., B. P. I. are S. D. 148, S. D. 149, and S. D. 151.

**Pererodka.**

“This is properly a special strain of the variety Kubanka supposed to have been evolved through the influences of soil and climate, particularly the former. The grain is darker colored originally than Kubanka, otherwise they are practically the same.” B. P. I. Bul. No. 3.

**Beloturka**

“The variety Beloturka is very similar to Kubanka, differing from it in having a longer, narrower head and longer grain which is not so thick. It is grown throughout the Volga region, but especially in southeast Russia. The name means White Turkish. The grain is bright yellow.” (B. P. I. Bul. No. 3).

**Bearded Red Fife**

The variety of wheat commonly produced in South Dakota under the name Bearded Red Fife was introduced from Iowa. The original strain S. D. 67, now in the hands of the South Dakota Station and reported in this Bulletin, was secured from Mr. G. F. Carroll, Miller, South Dakota.

As stated elsewhere, it has commonly been given the name Velvet Chaff by buyers, a name seeming to be a market classification, and without botanical significance.

S. D. Climax (S. D. 359) secured from John Carpenter in 1903, Hetland, South Dakota. Apparently same originally as S. D. 67.

Early Java (S. D. 146)—Secured from Iowa of Wallace's Farmer.

Minnesota No. 188—Secured from Minnesota Experiment Station.

Two other Bearded Fife strains are Johnson's Fife and Golden Fife.

**Fife Wheat**

(From “The Basis For the Improvement of American Wheats,” by M. A. Carleton, U. S. Dept. Agr., B. P. I. Bul. 24—1900).

“A most interesting example of improvements that are possible in the adoption of varieties best adapted to a particular region, is found in the Fife wheats of Cana-

da and the Northern States of the Plains. These varieties which have become the basis of the great wheat and flour production of the Northwest, originated, according to the Canadian Agriculturist of 1891, in the following manner.

Mr. David Fife of the township of Otonabee, Canada West, now Ontario, procured through a friend in Glasgow, Scotland, a quantity of wheat, which had been obtained from a cargo direct from Dantzic. As it came to hand just before spring seed time, and not knowing whether it was a fall or spring variety, Mr. Fife concluded to sow part of it in the spring and wait for the result. It proved to be a fall wheat as it never ripened, except three ears, which grew apparently from a single grain. These were preserved, and although sown the next year under very unfavorable circumstances, being quite late and in a shady place, it proved at harvest to be entirely free from rust when all wheat in the neighborhood was badly rusted. The produce of this was carefully preserved and from it sprang the variety of wheat known over Canada and the Northern States by the different names of Fife, Scotch and Glasgow.

Indications are rather strong that they are of Russian origin, judging from the description of the grain and source of the cargo, in connection with the present similarity of these wheats to Russian varieties."

The above possible origin of Fife wheat apparently applies to the variety designated in this bulletin as Beardless Fife.

Among the common strains are:

Power's Fife (S. D. 172) Secured from Federal Experiment Station, Belle Fourche, S. D. The original strain known as Power's Fife was distributed by J. B. Power, Power, N. D.

Ghirka (S. D. 69) Secured from Bureau of Plant Industry, United States Department of Agriculture. Introduced into the United States from Russia. Here placed because of its botanical similarity to other Beardless-Fife strains.

Three strains of Beardless Fife secured by South Dakota Station, from Minnesota Experiment Station are, Minnesota No. 66 (Power's Fife), Minnesota No. 163 and Minnesota No. 171.

"In 1878 D. L. Wellman, of Frazee City, Minnesota, received a sample package of Scotch Fife wheat from the Saskatchewan Valley, in Manitoba. This was sown in the spring of the following year, and as a result it was found that the seed was badly mixed. Removing all plants but those of the true Fife and propagating carefully from year to year, Mr. Wellman gradually bred upward a very pure strain of the Fife, which became known as Wellman's Fife." U. S. Dept. Agr., B. P. I. Bul. 24.

#### **Bluestem**

There is no definite record of the first introduction of Bluestem wheat into the Northwest, nor into South Dakota. Bluestem wheat is one of three varieties of common wheat, most frequently procured in South Dakota, and other parts of the Northwest. For greater definiteness the strains of this wheat under test at this Station might be designated Velvet Blue Stem.

"There are apparently four distinct varieties of so-called Blue Stem in the United States. The name Velvet Blue Stem is adopted here to designate the spring variety grown in this district." B. P. I. Bul. No. 24 (1909) by M. A. Carleton.

Relative to the several strains of this wheat grown by this Experiment Station and others, we find the following notes:

Minnesota 51 (S. D. 74) Secured by Minnesota Experiment Station from Brandon, Manitoba, and secured later therefrom by South Dakota Experiment Station.

Minnesota 169 (S. D. 169) A selection of Bluestem wheat made by Minnesota Experiment Station and received therefrom by South Dakota Experiment Station. The selection was a later one than Minnesota No. 51.

Marvel (S. D. 195) This Bluestem wheat was received by South Dakota Experiment Station from Williston Substation, North Dakota, in 1910. The strain had

been previously developed at the North Dakota Station. Bulletin No. 75 of that Station reports Marvel wheat having been secured from J. A. Salzer Seed Company in 1901.

Select Bluestem (S. D. 196) The same history attaches to this as to S. D. 195 as to its having come to South Dakota from the North Dakota Experiment Station.

Okanogan (S. D. 145) Secured by South Dakota Experiment Station from Washington State Experiment Station. An older name was Okanogan Valley Velvet Chaff, but the latter part of the old name has been discarded here, due to the strain not being what is here commonly called Velvet Chaff. This seems to be the same strain that was sent from South Dakota Station to North Dakota Station in 1892, and reported in North Dakota Bulletin No. 23.

Pedigreed (S. D. 140) Secured by South Dakota Experiment Station from North Dakota Station.

### **Hard Winter Wheat.**

Turkey. Relative to the introduction of the varieties Turkey and Kharkov, the following is quoted from Illinois Experiment Station Bulletin No. 121, written by one of the writers.

Turkey—"The above name would imply that the variety of wheat so called might have originated in Turkey; very frequently the name is given as Turkish Red. So far as is known, such was not the origin and the name Turkey Red is in reality a misnomer. It would be more accurate to call it Crimean wheat for it originally came from that part of southern Russia. It was introduced into Kansas by the Menmonites about thirty-five years ago. A number of later importations have been made from Russia. It is a very widely grown variety. If the variety is objectionable in any way it is in two respects, (1) that the straw is not so strong as that of some other varieties, and (2) the awns make it exceedingly unpleasant to handle. This Station nevertheless feels

justified in recommending the variety, inasmuch as it has been raised at the Urbana field seven successive years without any serious effect of lodging at any time. It would seem that as time goes on the strength of straw of this valuable variety might be improved by breeding."

Kharkov—"This is another of the Russian wheats, reported by Professor M. A. Carleton as 'received in 1901 through Dr. A. Boenicke, President of the Kharkov Agricultural Society, Kharkov, Russia.' It is described as 'a bearded, hard, red, winter wheat, similar to Turkish or Crimean, but coming from a region much farther north and therefore extremely hardy.' This is the variety that gave the highest yield at the DeKalb field in 1907."

---

### SUMMARY.

Wheat varieties on trial in South Dakota have ranked in yield as follows:

1. Kubanka and Arnautka Durum.
2. Bearded Fife.
3. Bluestem and Beardless Fife.

---

Due acknowledgement is here made of the services of I. S. Oakland, and H. M. Sanderson, assistants in the Agronomy Department and of J. D. Morrison, detailed by the United States Department of Agriculture.



### RAINFALL AT THE SEVERAL STATIONS

	Brookings								Cottonwood			Eureka				Highmore				
	1905	1906	1907	1908	1909	1910	1911	1912	1910	1911	1912	1909	1910	1911	1912	1908	1909	1910	1911	1912
Jan.	0.22	0.17	1.06	0.20	1.20	1.07	0.61	0.28	0.66	T	0.17	0.10	0.60	0.50	0.25	T	0.26	0.82	0.11	0.13
Feb.	1.00	0.02	0.28	1.80	1.57	0.40	0.53	0.24	0.97	0.15	0.05	0.45	1.70	0.73	0.40	0.53	0.34	0.19	0.39	0.11
Mch.	0.68	0.58	0.55	1.16	0.37	0.35	0.53	0.26	0.76	T	3.00	0.14	1.23	0.62	1.05	0.00	0.13	0.58	2.54	0.27
Apr.	1.01	1.40	1.67	2.10	1.16	2.34	1.62	3.36	1.06	0.85	3.32	0.50	0.82	2.24	1.29	1.35	0.30	1.40	0.32	1.05
May	6.14	3.51	2.36	6.46	4.85	0.87	1.90	6.98	2.54	1.10	1.18	2.65	0.42	0.97	3.37	2.68	4.72	0.94	2.31	2.20
June	6.09	4.89	5.65	6.35	2.29	1.85	3.78	2.09	1.30	0.64	0.95	3.35	3.80	1.29	1.50	5.78	1.69	3.74	0.09	1.31
July	0.98	1.86	3.77	4.69	2.44	1.68	3.32	2.52	1.11	0.59	2.42	2.21	0.53	0.43	2.19	2.49	1.81	0.85	2.69	1.44
Aug.	4.54	4.28	1.41	2.37	3.39	2.46	3.81	4.68	0.48	2.41	3.42	1.39	2.60	3.57	3.27	3.53	3.74	0.66	2.52	3.39
Sept.	2.16	5.13	1.28	3.89	1.67	0.96	3.08	1.61	0.82	3.59	1.30	1.25	3.65	1.15	1.43	0.62	1.70	0.89	3.06	0.71
Oct.	1.50	3.01	0.96	1.43	1.71	0.38	5.12	0.96	0.32	1.15	0.11	0.17	0.18	0.61	0.07	2.19	1.04	0.24	1.05	0.20
Nov.	2.45	0.89	0.10	1.30	0.65	0.17	0.23	0.00	0.53	0.20	T	0.60	T	0.88	T	1.39	0.71	0.40	0.35	0.00
Dec.	T	0.52	1.12	0.42	1.14	0.10	0.42	0.20	3.00	0.42	0.12	2.40	0.25	0.80	0.11	0.31	1.41	0.44	0.44	0.35
Total	22.77	26.26	20.21	32.17	22.44	12.63	24.95	23.18	12.65	11.10	16.04	15.21	15.78	13.79	14.93	20.87	17.85	9.05	15.87	12.06