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Small Grain

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South Dakota Agricultural College

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Andrew Ross
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SOUTH DAKOTA
AGRICULTURAL COLLEGE
AND
EXPERIMENT STATION
BROOKINGS, S. D.

Bulletin No. 21.

FEBRUARY, 1891.

DEPARTMENT OF AGRICULTURE,

SMALL GRAIN.

PRESS PRINT. BROOKINGS.

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Small Grain.

LUTHER FOSTER, AGRICULTURIST.

The Experiment plats were, this year, located on an upland portion of the farm [that had been under] cultivation four years. This ground produced wheat the first two seasons and a miscellaneous crop the third. The fourth and last crop grown was millet which served to free the field quite thoroughly from weeds.

The soil is a sandy loam, the same as all other upland portions of the farm and the whole piece of ground slopes gently to the north.

The field was laid out in plats of one-eighth acre each, this being the uniform size adopted for the general field experiments. The plats are separated by drives and alleys, respectively sixteen and four feet wide, all kept free from weeds by cultivation. The ground was plowed six inches deep in the fall and well pulverized with a harrow, just before seeding. The spring was unusually dry, no rain falling until the eighth of May. But little snow had fallen during the winter so the moisture at the time of seeding was not enough to germinate broadcast seeding and no grain thus put in, came up until after the May rains, early and late sowings making their appearance together. From the time growth began until the last days of June the atmospheric conditions for small grain were excellent, the plats all being in a vigorous and healthy condition. At that time there was an excess of moisture and a slight attack of rust resulted. This latter increased with the season and in some cases, proved a serious damage to the crop. The hot winds of July were, however, the main cause of shortage in the small grain crop. The blighting effect of the first of these winds showed principally in the bald varieties of wheat, the bearded being little damaged, most of them not at all. The later winds seemed to cook all small grain just as it found it, whatever the stage of development,

WHEAT.

VARIETY TESTS.—All varieties of wheat were put in the eleventh day of April, an **Watonna** broadcast seeder being used for planting. The seed was put on at the rate of six pecks per acre. All seed quantities were determined by weight as were also the yields.

The seed of several varieties, particularly the French Imperial and Ladoga being quite smutty, all were treated with a solution of blue vitriol (sulphate of copper) before seeding.

One pound of the vitriol was used to each gallon of water and just enough of the solution put on the grain to thoroughly wet it. This treatment proved effectual, not a single smutty kernel being found in the crop.

The following table is arranged for a convenient comparison of results:

WHEAT.

Name of Variety.	Sowed.	Per cent. gained by standing.	Average height in inches.	Average length of heads in inches.	Date of maturity.	Days to Mature.	Computed yield per acre.—Bushels.	Pounds per Bushel.	Bearded or Smooth.	REMARKS.
Lost Nation.....	April 11	214	40	3 1/2	Aug. 5	116	13.1	51.5	S	Considerably blighted.
Ladoga.....	" 11	10	35	3 1/2	July 31	111	87.3	57.3	B	Badly crinkled and slightly blighted.
Saxonka.....	" 11	106	35	3 1/2	Aug. 5	116	7.7	53.4	B	Badly rusted and some heads blighted.
Wellman's Saskachawan.....	" 11	43	37	3 1/2	" 15	116	9.3	57.7	S	Some rust and blight.
Silver Fife.....	" 11	175	30	3 1/2	" 15	116	7.8	55.4	B	Rust slight, blight bad.
Snowball.....	" 11	162	38	3 1/2	" 16	116	13.4	56.4	S	Few straws crinkled, many heads bilged.
Kubanka.....	" 11	134	40	3 1/2	" 16	116	15.7	56.2	B	No rust, little blight, crinkled slight but some lodged.
Blount's Hybrid No 15.....	" 11	66	32	3 1/2	" 7	118	9.3	54.4	S	Blighted most of all, half the heads damaged.
Russian Fife.....	" 11	22	37	3 1/2	" 5	116	12.6	50.1	S	Badly blighted, very slightly crinkled.
Blount's Hybrid No 17.....	" 11	113	42	3 1/2	" 5	116	13.9	59.1	B	Free from blight and rust, a few straws crinkled.
China Tea.....	" 11	120	44	3 1/2	" 5	116	13.3	58.9	B	No rust or blight and very slightly crinkled.
White Russian.....	" 11	104	35	3 1/2	" 7	118	9.2	54.9	S	Very badly blighted and some straws crinkled down.
Pure Scotch Fife.....	" 11	3	32	3 1/2	" 7	118	9.5	54.6	S	Somewhat rusted and very badly blighted.
Golden Drop.....	" 11	161	36	3 1/2	" 7	118	9.6	54.6	S	Badly blighted and some straws crinkled.
French Imperial.....	" 11	126	38	3 1/2	" 4	115	11.7	58.1	B	Blight very slightly, straws stout and free from rust.
Champlain.....	" 11	51	37	3 1/2	July 31	111	12.3	57.1	B	The most badly blighted of any bearded variety.
Velvet Chaff.....	" 11	113 1/2	46	3 1/2	Aug. 7	118	21.1	56.4	S	Least blight of the hard varieties, crinkled very slightly.

AND EXPERIMENT STATION.

The per cent. of stooling or tillering was obtained in the following manner. The average number of plants per square foot, when the grain was just up was compared with the average number of straws per square foot immediately after harvest. This average was, in both cases, found by throwing at random, in different parts of each plat, a frame one foot square and counting the number of plants or straws contained within. The average of these counts made on each plat was taken as the average result.

REMARKS ON VARIETIES.

LOST NATION.—This is an old variety of soft wheat, tillering remarkably well, which in this section of the Sioux Valley yields better than most hard wheats. In this market it is graded the same.

Lost Nation is a good companion for Blue Stem because it ripens a few days earlier and may be cut before the other is ready for harvesting. Like the Blue Stem, it shells some when fully ripe and must be cut early to prevent loss. The seed of this variety was furnished by Mr. Jno. Hughson of this county, who has grown it successfully for a number of years. It is not inclined to crinkle or lodge and withstands blight and rust as well as any of the smooth wheats, Blue Stem excepted.

LADOGA.—This wheat comes from Lake Ladoga north of St. Petersburg, Russia, or from a latitude equal to that of six hundred miles north of Winnipeg and is especially recommended for earliness and hardiness. In the plat test, this season, it ripened from five to seven days earlier than most of the other varieties, while in the field test of three acres, planted with seed furnished by the Secretary of Agriculture at Washington, it was ripe no sooner than Ocanagan Valley Blue Stem or Assiniboia Fife. The yield it will be seen was poor, the straw being weak and crinkling badly. However, it holds the grain excellently, even when over ripe, making no loss by shelling. The Ladoga has been carried in the variety tests for three seasons and, taken all in all, it is not a satisfactory wheat with us.

For notes on other prominent varieties see Bulletin No. 17 of March, 1890.

METHODS OF SEEDING.—The press drill used in the Station experiments makes the rows seven inches apart. It has been

claimed that grain drilled east and west gives better results than that drilled north and south, principally because less liable to fire. Experiments were this year begun to test the theory. The wheat used was Blue Stem, the quantity of seed five pecks per acre. Different plats were drilled east and west, north and south and both east and west and north and south, in the latter case putting on half the seed each way of crossing. The yield would seem to favor east and west planting, but this year's observations note no difference in general appearance. The yield of that drilled east and west was fourteen bushels, forty lbs. per acre, north and south eleven bushels, twelve lbs., and both ways twelve bushels, twenty four lbs.

CULTIVATION.—The numerous inquiries relative to the cultivation of wheat, brought about by the publication in our agricultural papers, of some remarkable results, led the Station to start an experiment in this line. A plat planted at the rate of two pecks per acre, in bands four inches wide and three and one half feet apart, was once hoed and three times cultivated. It yielded four bushels, eight lbs. per acre.

A second plat was drilled in rows twenty-eight inches apart. The cultivation and quantity of seed was the same as above. This yielded at the rate of four bushels, thirty-two lbs. per acre. In the first plat the planting was done by hand, while in the second a press drill was used making the usual narrow rows. The cultivated plats were not so badly rusted as those planted in the usual way but were longer in coming to maturity.

TOP DRESSING.—To counteract the effects of drouth plats were mulched with different materials. In every case the wheat was drilled in at the rate of five pecks per acre, the variety known as Blue Stem being used. Four plats side by side were selected, the first was left in the usual manner, the second was given a light covering of straw, the third well rotted manure and the fourth common salt, put on after the wheat was well started, at the rate of 128 pounds per acre. The dressing of straw and manure was put on immediately after the grain was sown.

The beneficial results of this work were not perceptible until near harvest time, when the dressed plats showed much less injury from rust and also a stronger growth. The yields per acre were as follows: Undressed, eleven bushels, twelve lbs; straw

dressed, fourteen bushels and fifty-six lbs; manure dressed, seventeen bushels and twenty pounds; salt dressed, sixteen bushels and sixteen lbs.

WINTER WHEATS.—The following varieties of winter wheat were planted August 19, 1889: Deihl Meditternean, Champion Amber, Clawson, Martins Amber, Surprise, Rogers' Amber, Currell's Prolific, Improved Rice, Fulcaster, Sibley's New Golden, The Mealy and Velvet Chaff. All varieties came up well and were in prime condition when winter set in. The plats being located on an open field were entirely without protection. An examination March 21st, 1890, showed the plants alive having stood the winter well. It had then been freezing and thawing for two weeks and the plants were not in the least heaved; the roots being firmly set.

A second observation was taken April 12th, when the change in the condition was marked, the outlook at this time being very discouraging. The small per cent. of wheat then alive kept its brown color and made but little growth until after the beginning of the spring rains.

In common with the spring wheats it was badly damaged by the rust and hot winds of July. The following kinds, in the order named showed least injury: Velvet Chaff, Clawson, Surprise, the Mealy and Fulcaster. These same kinds in the order named were also earliest. So small a per cent. of the grain lived that it seems not advisable to give results, the two best, Velvet Chaff and Clawson, yielding less than nine bushels per acre. Farmers here in growing winter wheat must usually contend with dry falls and dry windy springs. There seems to be no danger from winter killing. In the former case it is necessary to sow early, before the effects of the August rains are gone in order to secure germination. The use of the press drill may overcome this difficulty and make it possible to defer seeding until after the small grain crop is cared for. The dry windy weather of spring presents the greatest obstacle, and there is no remedy for it. If the winter supplies a fair amount of snow the moisture it furnishes will be sufficient to bridge over this perilous time, or if rains come early in April, the moisture will still be in time to give the plants the necessary start; but seasons similar to the past, snowless and rainless until the second week

in May, offer too severe a test for any variety of winter wheat yet tried by the Station.

WINTER RYE.—The Station has tested but two varieties of rye, a large kind known as Excelsior and the smaller common rye. The former grown by the side of the winter wheats the past season, continued green throughout the drouth and gave a yield of twenty-four bushels per acre. The latter or smaller variety, yielded twenty-three bushels per acre from a farm field of twelve acres. Two years ago a field of this rye grown on the College farm was pastured close, in the spring, by sheep and then yielded eighteen bushels per acre. It has been grown in the neighborhood for the last ten years without a failure. In this section of the State winter rye is an assured crop. Every farmer may profitably grow it for pasturage and grain combined. If wanted for fall pasture it should be sowed early in August. The grain, ground either alone or in mixture, makes excellent food for stock and its market price is not far below that of wheat.

OATS.

The oat plats were located adjoining those of the wheat, and in soil preparation and methods of seeding the two experiments were identical. All the plats were seeded at the rate of three bushels per acre except the following: White Wonder, two and a half bushels; White Shoneu and Black Prolific, two bushels each, and California Hay, one and one-half bushels.

Rust and hot winds did much damage especially to the late kinds. The following table is arranged for an easy comparison of the characteristics and results of the different varieties. The yields are all given by weight. It will be seen from the table that in almost every instance the yield would be greater by measurement.

OATS.

NAME OF VARIETY.	Sowed.		Per cent. retained by straw.	Average height in inches.	Average length of heads in inches.	Matured.	Days to mature.	Compared yield per acre.—bu.	Pounds per bushel.	CONDITION OF STRAW WHEN HARVESTED.
	April	July								
White Belgian.....	13	69	45	10 1/2	10 1/2	July	104	40.0	39.0	Lodged, badly rusted.
White Bonanza.....	13	109	48	10 1/2	10 1/2	July	103	45.4	36.0	Slightly lodged and rusted.
Pringle's Progress.....	13	127	45	10 1/2	10 1/2	July	104	45.4	35.8	Lodged some and badly rusted.
Golden Russian.....	13	70	48	10 1/2	10 1/2	July	105	43.4	37.0	Lodged and rusted.
Holstein.....	13	74	46	10	10	July	105	40.0	35.5	Considerably lodged and rusted.
Brunswick.....	13	44	45	10	10	July	102	44.0	36.0	Slightly lodged and badly rusted.
Wellcome.....	13	111	40	11	11	July	102	46.0	32.0	Very badly rusted and considerably lodged.
American Banner.....	13	79	47	10	10	July	104	46.0	32.0	Slightly lodged and rusted.
Egyptian.....	13	56	47	9	9	July	105	41.0	35.0	Lodged and rusted somewhat.
Hargett's.....	13	55	45	10	10	July	103	38.0	30.0	Rusted most of all and considerably lodged.
Black Russian.....	13	41	44	8	8	July	103	37.0	30.0	Rusted more and lodged less than the average.
Victoria.....	13	21	46	10	10	July	103	34.0	30.0	Half down and badly rusted.
Badger Queen.....	13	30	40	10	10	July	102	34.0	30.0	Lodged most of all, three-fourths down, badly rusted.
Race Horse.....	13	68	47	10	10	July	102	35.0	30.0	Considerably rusted and lodged.
Improved American.....	13	84	40	9 1/2	9 1/2	July	102	30.0	27.0	Very lodged and rusted.
Dakota Chief.....	13	27	46	11	11	July	102	32.0	27.0	Very badly rusted and considerably lodged.
Wide Awake.....	13	69	44	10 1/2	10 1/2	July	104	32.0	26.0	All straggling and but slightly rusted.
Improved Wolcome.....	13	30	45	10	10	July	102	30.0	25.0	Somewhat lodged and rusted.
Black Tartarian.....	14	87	48	9	9	Aug.	105	42.0	29.0	Not lodged at all but considerably rusted.
Dakota Gray.....	14	78	45	10	10	Aug.	103	30.0	26.0	All straggling straight but considerably rusted.
White Surprise.....	14	18	45	10	10	Aug.	106	30.0	25.0	Very slightly lodged and somewhat rusted.
White Wonder.....	21	.....	40	10	10	Aug.	105	30.0	25.0	Very badly rusted, but very little down.
White Schreier.....	21	.....	40	10	10	Aug.	106	30.0	25.0	Rusted and lodged less than the average.
Black Prolific.....	21	.....	40	10	10	Aug.	105	30.0	25.0	Considerably rusted and lodged.
California Hay.....	21	.....	40	11	11	July	99	33.0	27.0	Very badly rusted and slightly lodged.

*Grown on bottom farm in larger quantities

WHITE BONANZA.—This is one of the earliest varieties grown, maturing short, plump kernels which are covered with a light hull.

It is much like Welcome, Race Horse and others of the short, plump grain varieties. It will be seen from the table that its yield is slightly more than any other variety except the American Banner. This was due to its early maturity placing it beyond the blighting effects of rust and hot winds. In all respects it is one of the best kinds grown on the experiment grounds the past season.

AMERICAN BANNER is also an early variety, but little lodged, its straw being stiff and straight. It also showed as little injury from winds and rust as any other variety grown. The grain is white, large and full, with medium husk: one of the best varieties tested.

WIDE AWAKE is a variety worthy of special notice. It is believed to be identical with Clydesdale and is one of the few kinds, grown last season, whose straw was strong enough to stand until harvest without lodging. It also withstood the rust and winds as well as the best. This variety, it will be seen, was used in the ten acre field press drill and broadcast seeding test.

BLACK TARTARIAN AND DAKOTA GRAY stand first among all varieties for stout, stiff straw. Although considerably rusted and badly damaged by hot winds they both stood erect until harvested.

WHITE SURPRISE.—Closely following in respect to the above qualities, comes the White Surprise, but in rust it stood rather below the average.

BARLEY.

All of the barley plats were seeded at the rate of two bushels per acre with a broadcast seeder. The grain of most kinds is of very poor quality because of incomplete maturity when dried by the hot winds. As with the wheat and oats the early varieties were the best.

The following varieties were so near to maturity that the grain was but slightly injured by the hot blasts beginning July 26th: Four Rowed, White and Black Hulless and Manshury. All the rest were noted as green July 25th.

HULLESS BARLEYS.—The hulless barleys, as the name implies, are freed from the husk in threshing. The grains resemble wheat but are much larger. The stalk is short and thick with broad, coarse leaves and the grain is as heavy as wheat. The black is a six rowed barley with short, thick heads and the grain is dark in color, while the white barley is two rowed with long heads and grain a light amber in color. They are both fairly prolific and are worthy of a more extended trial.

PRESS DRILL VS. BROADCAST SEEDING.

A comparison of these two principal methods of seeding has been in progress for three seasons and in connection with it, a determination of the quantity of seed per acre required for the most profitable results. The implements used were a Havanna Press Drill and an Owatonna Broadcast Seeder. It is well known that grains grown side by side, on the same kind of soil, prepared and seeded in an identical manner, with the same quantity and quality of seed, will vary somewhat in results, but a conclusion as to the best may be reached when one method gives continually the less results or when the average of many plats by one method is greater than the average of an equal number of plats by the other method.

WHEAT.—The ground used is on the upland portion of the farm and had been thoroughly cultivated in corn the previous season, making it unusually free from weeds. The corn was cut off in September. In preparation the piece was not plowed, but in the spring before seeding, it was thoroughly worked with a disc harrow and then dragged. In both methods the routine of work was that usually followed by farmers. The field was divided into acre plats with the methods alternating on them, putting the same quantity of seed on plats that stood side by side. The wheat used was of the Blue Stem variety and the amount per acre ranged from four to eight pecks.

Below is a statement of comparative results:

WHEAT.

	Seed per acre—pks.		Per cent. gained by stooling.		Average length of straw—inches.		Average Length of Head—inches.		Yield per acre. —1890		Yield per acre— 1889.		Average of the two seasons.	
	bu.	lbs	bu.	lbs	bu.	lbs	bu.	lbs	bu.	lbs	bu.	lbs	bu.	lbs
Press Drilled	4	50	36 $\frac{1}{2}$	3 $\frac{1}{2}$	13	31	34	35	19	4				
Broadcast	5	55	34	3 $\frac{1}{2}$	9	53	33	48	16	23				
Press Drilled	4	52	36 $\frac{1}{2}$	3 $\frac{1}{2}$	12	39	35	27	18	58				
Broadcast*	5	50	35	3			33							
Press Drilled*	6	44	36 $\frac{1}{2}$	1			35	20						
Broadcast*	5	44	35	3			35							
Press Drilled	4	54	35	3	13	22	35	20	19	21				
Broadcast	5	58	34	3 $\frac{1}{2}$	10	14	27	33	18	54				

- Average yield of three press drilled plats: 13 bu; 7 lbs.
- Average yield of two broadcasted plats: 10 bu; 5 lbs.
- Average yield of press drilled plats, for two seasons: 19 bu; 11 lbs.
- Average yield of broadcasted plats, for two seasons: 17 bu; 13 lbs
- *Result lost in threshing.

The ground dried out as far down as it had been stirred, leaving the broadcast seeding without moisture for germination. The press drill put the seed below the layer of loose earth and firmed the covering so that it came up at once and was several inches high before that sown broadcast had started. Throughout the season the drilled plats kept this distance in advance of the broadcasted and ripened several days earlier. All were damaged in July, but the drilled grain being further along was injured least. With the press drill there was no gain from the increase of seed beyond one bushel per acre, while the broadcast shows a slight gain per acre from the extra amount of seed. The per cent. of tillering in both methods was the greatest from thin seeding.

●ATS.—The plats for this experiment were located on bottom land and contained one acre each. The ground was plowed the previous fall and given special preparation in the spring before seeding. Wide Awake oats were used for seed and were put into the ground the 19th and 20th days of April, the quantity per acre varying from two to three bushels. The same marked difference between the two methods was noted here, as in the wheat, the press drilled coming up first and keeping in advance of the other throughout the season. The annexed table gives the results:

OATS.

Name of Varieties.	Seed per acre—pks.	Per Cent. Gained by Stooling.	Average Length of Straw—Inches.	Average Length of Head—Inches.	Yield per acre.	
					bu.	lbs.
Press Drilled.....	8	25	15	10½	47	10
Broadcast.....	8	46	46	10½	34	1
Press Drilled.....	9	19	45	19	43	11
Broadcast.....	9	19	46	10	35	1
Press Drilled.....	10	0	44	10	41	29
Broadcast.....	10	18	45	10	39	24
Press Drilled.....	11	4	42	9½	40	1
Broadcast.....	11	6	44	10	46	9
Press Drilled.....	12	0	42	9½	45	1
Broadcast.....	12	9	43	10	40	29

Average yield of drilled plats per acre. 45 bu.; 10 lbs.

Average yield of broadcast plats per acre. 39 bu.; 5 lbs.

The past season's test confirms the conclusions of previous work.

1. With the press drill germination is secured however dry the season. With broadcast seeding surface moisture is necessary to insure growth.

2. Economy of seed by the drill method. Strong winds deepen the covering of the press drilled while they uncover the broadcasted.

3. In per cent. of tillering the broadcasted exceeds the press drilled.

4. Evenness of distribution, germination, growth and ripening are all points in favor of the press drill.

5. Economy in cost of implements, labor and horse power favors the broadcast method.

6. In the past season's work the press drilled grain matured earlier and consequently received less injury from rust and hot winds.

7. The experiment shows that for our dry seeding time the press drill is the better implement.