TEXAS AGRICULTURAL EXPERIMENT STATION

BULLETIN NO. 199 DECEMBER, 1916

PROGRESS REPORT, TEXAS SUBSTATION NO. 6, DENTON, TEXAS

1909-1914

POSTOFFICE:
COLLEGE STATION, BRAZOS COUNTY, TEXAS.

AUSTIN, TEXAS:
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BY

V. L. CORY, B. S.
SUPERINTENDENT

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*As of December 1, 1916.
**In cooperation with United States Department of Agriculture.

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PROGRESS REPORT TEXAS SUBSTATION NO. 6, DENTON, TEXAS, 1909-14.

By V. L. Cory, B. S., Superintendent.

This substation, which is in Denton county, known at first as the Denton Substation, and later, as at present, as Substation No. 6, was established in April, 1910. The site selected was a tract of land consisting of 101 acres, and was one and one-half miles southwest of the town of Denton. Active work was started in the fall of 1910 and continued for the crop years of 1911, 1912 and 1913. In October of 1913 a new site was secured for the substation. This change was made because the former site contained so many variations in soil type that reliable experiments could not be conducted, and, in addition, was not typical of the great small grain belt, the region principally served by this substation. The new farm is well suited to experiment work. The Substation is now located four miles northwest of Denton and three and one-half miles southeast of Krum. The farm consists of 203 acres, in a rectangle. While the land is rolling in places, considerable of it is quite level, having scarcely enough fall to drain well. One-half of the new farm is well adapted to use for field experiments.

Although severely handicapped by a very non-uniform soil until this year and by the recent move to the new location, this substation has been able to conduct a large amount of experiment work of certain kinds. This report deals with the early and more or less interrupted part of the substation's investigations,—being a report for the crop years 1910 to 1914, inclusive.

It must be realized that the results presented are fragmentary, since much of the work that is now under way must be continued for a number of years before any reliable conclusions may be drawn.

Because it was necessary to make as good use of the first farm as possible, it was necessary to confine the things undertaken very largely to a comparison of varieties of small grain. The work has usually been repeated two or three times each year. It has been conducted long enough to be of value. Experiments with corn, cotton, cowpeas, introduced clovers and grasses, and a large amount of wheat breeding by selection, are also under way, but because of irregularity of soil conditions during the early years of the substation's history, the results of these investigations are not as yet reliable.

METEOROLOGICAL RECORDS.

Accurate records of the temperature and the precipitation are available from the month of July, 1912, to date. In meteorological records averages and means are not of great value when covering a short period of two or three years, this time being too short to establish a reliable

normal. In Table I the rainfall by months is given and the monthly and yearly averages shown. These figures are presented here to show the conditions under which the experiments were conducted.

TABLE I.

Precipitation by Months. Years of 1912, 1913 and 1914.

Month.	Rainfall in Inches.			
	1912	1913	1914	Average.
January	.....	2.37	.39	1.38
February	.....	1.27	1.65	1.46
March	.....	1.93	1.84	1.89
April	.....	1.52	6.07	3.80
May	.....	4.11	4.25	4.18
June	.....	1.76	.52	1.14
July	.14	2.55	.94	1.21
August	9.00	0	12.30	7.10
September	.40	4.53	2.17	2.37
October	1.16	2.39	.41	1.32
November	.14	5.84	4.66	3.55
December	1.25	4.33	4.43	3.34
Totals	.....	32.60	39.63	32.74

The average annual rainfall of the two years, 1913 and 1914, is 36.12 inches, whereas with the inclusion of the six months of 1912 the sum of the monthly averages shows an annual rainfall of 32.74 inches, which is believed to be close to normal.

SMALL GRAIN.

The small grain variety and selection tests of all kinds have for their foundation the final testing of the varieties in field plats. Twenty-one varieties of winter wheat have been tested for three years and twelve of them have been tested four years. The results are set forth in Table II.

TABLE II.

Results With Wheat Varieties. 1911-1914.

T. S. No.	Variety.	Type.	Average Yield in Bushels.					
			1911	1912	1913	1914	3 Yrs.	4 Yrs.
580	Defiance	Hard Red	9.97	28.30	43.17	9.66	27.04	22.79
592	Bacska	Hard	10.63	25.47	37.67	11.66	24.93	21.35
599	German Emperor	Soft Beardless	13.20	22.13	38.28	14.00	24.60	21.65
615	Mediterranean	Soft Bearded	.....	23.22	33.62	16.78	24.54	.....
585	Turkey	Hard Red	13.47	17.50	44.55	10.85	24.30	21.61
613	Diehl Mediterranean	Soft Bearded	.....	21.25	36.10	13.33	23.56	.....
614	Mediterranean	Soft Bearded	.....	24.00	30.17	16.03	23.40	.....
583	Kharkoff	Hard Red	17.62	18.80	39.40	11.07	23.09	21.72
598	Poole	Soft Beardless	12.40	24.22	28.30	15.88	22.80	20.20
616	Miracle	Soft Bearded	11.08	19.92	34.83	15.52	22.76	20.34
587	Crimean	Hard Red	17.33	16.78	35.60	14.57	22.31	21.07
	Ulta	Hard Red	.....	12.33	50.35	4.10	22.26	.....
589	Burger	Hard Red	13.60	20.72	34.83	10.85	22.13	20.00
611	Rudy	Soft Bearded	.....	15.55	35.60	13.90	21.68	.....
618	Abundance	Soft Beardless	.....	15.50	35.97	13.43	21.63	.....
588	Eversole	Hard Red	14.67	14.95	38.75	10.82	21.50	19.79
617	Michigan Amber	Soft Beardless	.....	23.05	30.55	13.63	21.41	.....
594	Fulcaster	Soft Bearded	12.13	19.92	33.38	9.23	20.84	18.66
595	Ironclad	Soft Bearded	13.87	16.08	31.72	13.22	20.33	18.71
600	Oregon Red	Soft Beardless	.....	11.67	35.00	11.97	19.54	.....
	Dawson's G. C.	Soft Beardless	.....	7.00	30.88	11.55	16.47	.....

The foregoing table includes those varieties which have been grown for three or four years that are still being grown. Of the twenty-one varieties, eight are hard red, seven are soft bearded, and six are soft beardless.

A number of varieties of the Turkey type have been tested here in comparison with a large number of soft varieties. The Turkey type is a hard red wheat with small to medium heads, white chaff and light colored, rather small stems. These wheats are bearded, except for a few varieties. The results of the experiments show that Defiance and Bacska have been the leading varieties of the hard red group. The Durum wheats have not shown much value here. Spring wheat seems to have little value in this section. As a class the hard red wheats have yielded better than the others in every year except 1914.

While the hard wheats of the Turkey type have been more satisfactory than the soft wheats for the four years tested, the fact that they did not do so well in 1914 shows that they are not so well adapted for the extremely wet years. Such years are not common, and for the average they would seem to be better adapted to this section than other types. These wheats are better milling wheats than the soft varieties, including the Mediterranean. They are of the same type as those grown in Northwest Texas.

The standard of wheat in this section is Mediterranean, after which, in point of interest, comes Fulcaster. The Mediterranean type is a blue-stemmed, golden chass, semi-hard, soft red wheat, ranking well both in yield and in quality. While the hard red wheats are superior to Mediterranean in quality, it is doubtful if they should be grown east of here. In fact, unless we can secure better hard wheats than we now have, it is hardly advisable to attempt their use instead of the softer sorts, like Mediterranean. The Fulcaster type is a white chass, red wheat, inclined to have blue stems. It is classed as a soft wheat.

There is always some inquiry about beardless wheats, and such varieties are likely to be favored by grain growers. German Emperor, Poole and Red May seem to be the best of the beardless soft wheats. They often make larger yields than the bearded wheats, and usually are of a fair quality. They do not seem to stand the rains after harvest as well as do the bearded wheats. They are easily handled, but thresh out rather readily and may shatter if not handled right.

In addition to the varieties of wheat mentioned, tests have been conducted with spring wheats and with Durum or "Macaroni" wheats, both of which classes of wheats have made a very poor showing in our tests.

BARLEYS.

Thus far most of the barley varieties grown have been tested for both spring and fall seeding. From Tables III and IV it will be seen that better results were secured from the fall plantings in most cases. The hull-less and the hooded types of barley have given comparatively poor results. The White Smyrna and the Black Smyrna are early maturing two-row varieties, with a decided tendency to shortness

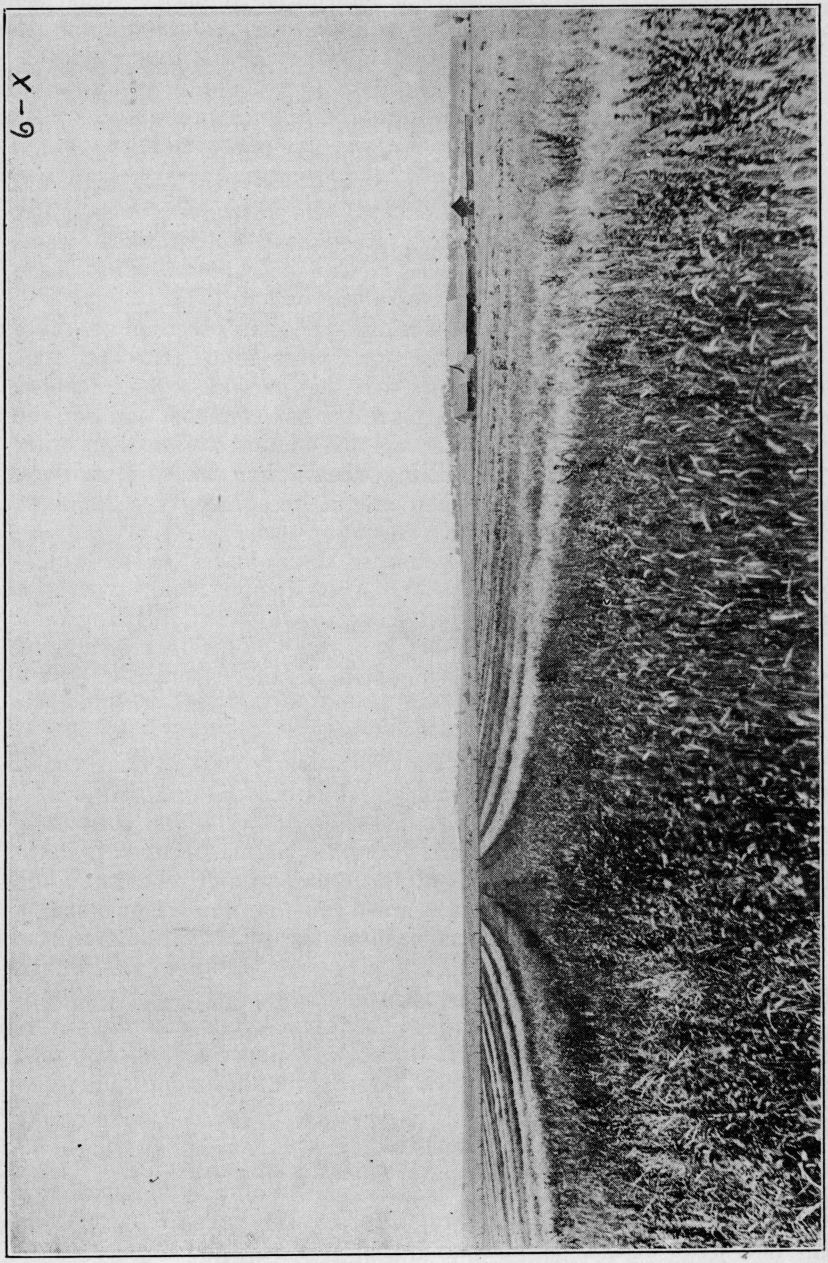

FIGURE I—SMALL GRAIN VARIETY TEST PLATS.

of growth, making their harvesting rather difficult in some years. Odessa, Stavropol, Caucasian, Yenidje, Manchuria, and Bonanza, are six-row varieties. The work in 1914 indicates that barley is not well adapted to wet conditions. Tennessee Winter is outstanding as the best variety of barley for this section.

It is believed that spring seeding of barleys should not be practiced in this section, except when the winter seeding has been killed. Then, it should be remembered, it is necessary to plant a spring variety. It is of importance to use a variety that has proved to be especially adapted for winter seeding, such as the Tennessee Winter.

TABLE III.

Variety Test of Barley for Fall Seeding.

T. S. No.	Variety.	Yield in Bushels to the Acre.				Average	No. Yrs. averaged.
		1911	1912	1913	1914		
643	Tennessee Winter	.....	45.39	35.00	15.92	32.10	3
642	Black Smyrna	.....	36.75	31.88	12.02	26.88	3
639	Odessa	.....	35.50	38.98	0	24.83	3
637	Stavropol	15.00	34.44	36.23	0	21.42	4
641	White Smyrna	.....	32.00	33.29	*	32.65	2
638	Caucasian	15.33	26.54	38.65	0	20.13	4
640	Yenidje	.....	20.33	34.04	0	18.12	3
644	Hooded	.....	8.52	25.10	0	11.21	3
	Yearly average of varieties tested	15.17	29.93	34.15	3.99		

*Not planted in 1914.

TABLE IV.

Variety Test of Barley for Spring Seeding.

T. S. No.	Variety.	Yield in Bushels to the Acre.				Average	No. Yrs. Averaged.
		1911	1912	1913	1914		
641	White Smyrna	17.00	22.81	33.58	0	18.22	4
642	Black Smyrna	16.67	22.56	27.60	0	16.63	4
639	Odessa	14.67	21.88	28.88	0	16.36	4
	Manchuria	13.00	18.27	31.48	0	15.69	4
	Bonanza	14.83	11.56	26.10	0	13.12	4
644	Hooded	.....	16.77	19.33	0	12.03	3
	Yearly average of varieties tested	15.23	19.48	27.83	0		

A consideration of the figures presented for the 1912 and 1913 yield of Odessa, Black Smyrna, White Smyrna and Hooded shows the loss in yield resulting from spring seeding was 6.08 bushels, as compared to fall seeding.

OATS.

In point of bushels yielded and ease of production, the best small grain crop now grown in this section is oats. The field plat tests thus far made here have been confined to a limited number of varieties, some of which were planted in the fall, as well as the spring.

TABLE V.

Variety Test of Oats for Fall Seeding.

T. S. No.	Variety.	Yield in Bushels to the Acre.				Average 1912–1914
		1911	1912	1913	1914	
636	Texas Red Rust Proof	.....	53.31	55.02	18.80	42.37
635	Texas Red Rust Proof	17.60	48.40	35.31	14.31	32.67

TABLE VI.

Variety Test of Oats for Spring Seeding.

T. S. No.	Variety.	Yield in Bushels to the Acre.				Average 1912–13–14
		1911	1912	1913	1914	
636	Red Rust Proof	.....	51.10	49.82	23.32	41.41
430	Sixty Day	8.83	69.97	33.44	11.81	38.40
433	Burt	14.63	42.72	45.31	20.13	36.05
434	Ninety Day	.....	38.03	49.06	19.38	35.49
432	Red Siberian	.....	38.75	34.38	24.68	32.60
431	Red Algerian	.....	32.50	34.38	25.65	30.84
635	Red Rust Proof	.....	30.10	25.33	3.43	19.62

The Red Rust Proof is the standard variety of oats for this section, and it has shown up better both in the fall and spring plantings than have the other varieties. The Sixty Day, Burt, and Ninety Day varieties are valuable for late seeding and for dry seasons. The results indicate no appreciable advantage to be gained from fall seeding, there being less than one bushel difference in the results for three years with T. S. No. 636, Texas Red Rust Proof, when planted for comparison of the fall and spring sown yields.

TABLE VII.

Emmer and Spelt in Comparison with Winter Barley and Oats.

T. S. No.	Crop.	Yield to the Acre in Bushels.				Pounds.
		1912	1913	1914	Average.	
643	Tennessee Winter Barley	45.42	35.00	15.92	32.11	1541
636	Red Rust Proof Oats	53.31	55.02	18.80	42.37	1355
646	Red Winter Spelt	57.29	49.46	9.00	38.58	1074
645	Black Winter Emmer	43.57	38.82	12.75	31.71	887

The results indicate that Tennessee Winter barley is the most dependable one of the lot, with Red Rust Proof oats next in point of desirability. Neither Spelt nor Emmer have given promise of any superiority over the better winter barleys and oats, and their culture does not seem advisable for this section. Tennessee Winter barley is one of the superior crops that we have found, and it has been increased and distributed with excellent results. It has been quite uniform in growth and in the crop of grain, besides being free from plant diseases. It has wintered well and has produced good crops. This barley seems to meet the demands of our section fairly well as a feed crop.

WHITE EMMER AND SPELT IN COMPARISON WITH WINTER BARLEY AND WINTER OATS.

There is more or less inquiry regarding little used types of small grain. It is a fact that both Emmer and Spelt are very hardy. They may each be used for stock feed, being ground for such use. Table VII gives the experiment results with these two small grain crops, and also gives comparable yields of winter barley and winter oats, taken from Tables III and IV. The yields are given in both bushels and pounds, because the various grains do not all weigh the same to the bushel.

RYE.

The varieties of rye grown have shown very little difference, and none is more especially promising than the others. There appears to be no really good rye for this section, and there is not much need of one. Winter barley is to be preferred as a cover crop and as a crop for winter pasturage. Rye has the advantage of being hardier, and will survive usually when winter barley is winter killed, but such occasions are infrequent, and practically need not be considered.

TABLE VIII.

Variety.	Yield in Bushels to the Acre.			
	1911	1912	1913	Average.
Monster	12.57	20.36	14.64	15.86
Russian	9.71	22.50	13.39	15.20
Ivanoff	9.43	18.93	13.75	14.04
Average	10.57	20.60	13.93	

METHOD OF PREPARING LAND FOR WHEAT.

There is not sufficient importance attached to the great crop loss occasioned by poor and late preparation of the seedbed for wheat. Experiments covering this and related subjects are being conducted at this substation. The results of these experiments conducted in 1913 are shown in Tables IX, X, XI and XII.

TABLE IX.

Early Plowing Versus Late Plowing of Stubble for Wheat.

1914.

Description of Plowing.	Description of cultivation after plowing.	Yield in bushels to the acre.	Number plats in test.
Plowed early, deap	Cultivated	32.62	2
Plowed early, deep, replowed late, shallow	Cultivated	32.58	1
Plowed medium early, deep	Cultivated	20.41	1
Plowed early, shallow	Cultivated	24.00	1
Plowed late, shallow	Cultivated	22.00	1
Plowed very late, shallow	Cultivated	20.41	1

In Table IX it is clearly shown that late plowing made poor yields. There is some difference from year to year in the yields from early and medium early plowing, because of the distribution of the summer rainfall, but to date the experiments show that wheat fields should be plowed as soon after harvest as possible, and that no plowing should be neglected until September.

Undoubtedly some of the loss due to late plowing is because of the great draft made upon the moisture and plant food of the soil by weeds in the stubble. Experiments now under way show that most of the good results of early plowing are due to the plowing and the cultivation which followed plowing.

TABLE X.

Deep Plowing Versus Shallow Plowing of Stubble for Wheat.

1913.

Description of Plowing.	Description of cultivation.	Yield in bushels to the acre.	Number plats tested.
Plowed deep, early	Kept cultivated	32.62	2
Plowed medium deep, early	Kept cultivated	27.91	1
Plowed shallow, early	Kept cultivated	24.00	1
Plowed late, shallow	Cultivated	22.00	1
Plowed very late, shallow	Cultivated	20.41	

In Table X there is not reported a plat that was plowed deeply late in the season. The experiment, therefore, cannot be regarded as complete, but the information is presented for what it may be worth. It is clearly brought out that for early plowing there is a progressive loss due to shallow and medium-deep plowing as compared to deep plowing.

It is frequently said that small grain crops require no cultivation except just sufficient plowing to insure a stand. Table XI shows how misleading such an idea is. If the stubble bakes and grows up to weeds and is plowed late, it makes poorer yields than under more intensive cultivation. The early plowing or deep plowing indicated to be necessary as shown in Tables IX and X, is not the only thing needed to insure good yields. Once the ground is plowed it must be fitted and kept in condition. This consists of disking, harrowing, and similar surface tillage, at intervals throughout the summer, and is comparable to the cultivation given corn or cotton during its growth, except that for small grain the cultivation is given in advance of seeding.

Under ordinary conditions, the amount of surface tillage needed is not great. How much attention a field requires is largely a matter of seasonal conditions. After it is plowed the land should be worked down with the drag harrow. Thereafter enough harrowing, disking, or other cultivation, should be given during the balance of the season to conserve the moisture, prevent the formation of a heavy surface crust, and to keep down weeds. There seems to be little doubt that the presence of weeds may be taken to mean that the field is in need of cultivation.

TABLE XI.

Cultivation Versus No Cultivation After Plowing for Wheat—1913.

Description of Plowing.	Description of cultivation.	Yield in bushels to the acre.	Number plats tested.
Plowed deep, early	Kept cultivated	32.62	2
Plowed deep, early, replowed late, shallow	Kept cultivated	32.58	1
Plowed deep, early	Not cultivated	17.66	1
Plowed medium deep, early	Kept cultivated	20.41	1
Plowed medium deep, early	Not cultivated	19.58	1
Plowed shallow, late	Kept cultivated	22.00	1
Plowed shallow, late	Not cultivated	17.41	1

FIGURE 2—SMALL THRESHER USED IN THRESHING SMALL GRAIN FROM EXPERIMENT PLATS.

In Table XI it will be seen that the lack of tillage after plowing caused the early plowed but not cultivated plats to yield about the same as the late plowed and not cultivated plats, while the plats that were well cared for throughout the season made very good yields. This cultivation from July 15 until seeding time did not cost much, and the early plowing did not cost much more than later plowing, but the two taken together show a gain of at least 12 bushels of wheat to the acre.

In this district the common practice is to give very little preparation to corn land before seeding it to wheat in the fall. The results shown in Table XII throw some light on what preparation wheat needs when grown on such land.

It should be remembered that August of 1913 was very wet. An interesting fact brought out in this table is the comparison between drilling and broadcasting.

TABLE XII.

Method of Preparation of Corn Land for Wheat.

How prepared.	How planted.	Yield in Bushels to the acre.
Plowed	Drilled	28.08
Plowed	Broadcasted	25.50
Disked	Drilled	25.25
Disked	Broadcasted	20.00
Nothing done	Drilled	18.66

COTTON.

Experiments with cotton have been conducted in the years of 1912, 1913 and 1914. In 1913 the number of tests with cotton was 100, and in 1914 the tests numbered 152. The work of 1914 was not successful, due to the wet spring and damage by the worms. The results secured in 1913 were poor, too, the land being spotted and not in good shape to produce good yields. In 1913 cotton gave better results

FIGURE 3—SMALL GRAIN NURSERY. THOUSANDS OF SELECTED PLANTS HAVE BEEN TRIED OUT IN THIS WAY.

for flat plowing than it did for bedding. Better results were obtained in check rows than where the seed were drilled in the row. In that year a test was made with dynamiting as a soil preparation, but it appeared to be of no benefit.

CORN.

Corn variety tests have been conducted every year since the establishment of the substation. The best varieties tested are listed in Tables XIII, XIV and XV.

TABLE XIII.

Corn Variety Test, 1912. Best Five Varieties Tested.

T. S. No.	Name.	Source.	Yield, bushels to the acre.
30	Oklahoma White Wonder..	Texas Seed and Floral Co., Dallas, Texas.....	26.96
...	Cowan.....	.....	22.47
28	Improved Indian Squaw...	Texas Seed and Floral Co., Dallas, Texas.....	21.75
386	Hildreth.....	W. R. Hildreth, Altamont, Kansas.....	21.43
61	Strawberry.....	J. L. F. Fentress, San Saba, Texas.....	19.83

TABLE XIV.

Corn Variety Test, 1913. Best Varieties Tested.

T. S. No.	Name.	Source.	Yield, bushels to the acre.
317	Surcropper.....	A. M. Ferguson, Sherman, Texas.....	29.69
318	Surcropper.....	A. M. Ferguson, Sherman, Texas.....	29.28
...	Cowan.....	.....	27.82
...	Commercial White.....	.....	27.20
352	Boone County White.....	T. W. Wood & Sons, Richmond, Virginia.....	25.90
28	Improved Indian Squaw...	Texas Seed and Floral Co., Dallas, Texas.....	25.51
319	Chisholm.....	A. M. Ferguson, Sherman, Texas.....	24.70

TABLE XV.

Corn Variety Test, 1914. Best Seven Varieties Tested.

T. S. No.	Name.	Source.	Yield, bushels to the acre.
318	Surcropper.....	A. M. Ferguson, Sherman, Texas.....	22.12
924	Surcropper.....	A. M. Ferguson, Sherman, Texas.....	21.12
922	Surcropper.....	A. M. Ferguson, Sherman, Texas.....	19.58
...	Commercial White.....	.....	16.36
...	Cowan.....	.....	16.24
317	Surcropper.....	A. M. Ferguson, Sherman, Texas.....	16.14

Surcropper has shown itself as the most certain variety we can grow, and has given more good corn than any other variety. The distinctively large and late Southern sorts, like Giant White and Giant Yellow, have not made yields as good as the average. The Strawberry varieties have not averaged very well. Plantings have been made in the months of March, April, May and June, with results depending largely upon the character of the season. Whether the late plantings will make corn depends largely upon the rainfall, but in most years such plantings will make some corn. For late plantings some of the better June corns are more reliable. Their chief value is for planting where the early corn looks unpromising, or to plant after stubble.

COWPEAS.

A yield of seed was secured on two of the early varieties of cowpeas in the dry, hot summer of 1913. Early Buff (T. S. No. 211) and Yarkand (T. S., No. 219), the yield of the former being at the rate of 6.26 and of the latter 0.46 bushels to the acre. The Early Buff

seems to be one of the best varieties for this section. In the production of seed the early varieties have been more dependable than the late ones, but the later maturing varieties have produced the most forage. Of the twenty varieties tested, those giving the most satisfaction are the New Era, Blackeye, Iron, Brabham, Clay, Whippoorwill, and Groit.

PEANUTS.

Peanuts have been tested but two years. The results follow:

TABLE XVI.

T. S. No.	Variety.	Yield in Pounds to the Acre.					
		1912		1913		Average.	
		Hay.	Seed.	Hay.	Seed.	Hay.	Seed.
51	Spanish	2280	200	5500	750	3890	476
53	Virginia	3700	255	5000	665	4350	460
52	Tennessee Red	100	10	1600	200	850	105

Peanuts were not grown in 1914. While the yields reported in the table are not large, it is felt that the crop is a valuable one here. The Spanish and Virginia varieties are of equal value, apparently.

MISCELLANEOUS LEGUMES.

Several varieties and strains of alfalfa have been grown, but they were not especially promising. They did not make very good growth, did not winter well, and were not strongly resistant to drouth. The fact that alfalfa has not been promising on the upland in most parts of this section has made it more desirable to find a satisfactory winter legume crop. The work done in 1913 and 1914 indicates that hairy vetch is of much promise in this respect. In the latter year the growth was especially good, some runners being nine feet or more in length and where it was thick it stood up nearly two feet tall. Of the nor has it wintered well. Three burr clovers, *Medicago arabica, M. augustifolia* and *V. dasycarpa,* the *sativa* and *augustifolia* made relatively poor growth and are not likely to prove of value. The other two made good growths, but *villos*a was somewhat the better of the two.

Of the other legumes tested so far, white sweet clover has shown the most promise. Red clover, white clover and Japan clover (Lespedeza) have not done very well. Crimson clover has not made good growth, nor has it wintered well. Three burr clovers, *Medicago arabica, M. hispida confinis* and *M. orbicularis,* have been tested. They have not wintered well and have not made especially good growth, but they were not sown early enough for the best results.

GRASSES.

Tests with Sudan grass for seed production have not been successful. Some seed has been secured, but usually the yield has been small. This has been due to wet summer weather in some cases and also to the midge.

TABLE XVII.

Sudan Grass for Forage Production.

Rows.	Planted.	Yield in Pounds to the Acre.		
		1st cutting.	2nd cutting.	Total.
36 inches	April 30	3200	1375	4575
36 inches	April 16	1900	1325	3225
18 inches	May 19	2500	600	3100
36 inches	May 19	1200	1100	2300
36 inches	June 16	.....	100	100

As a hay and pasture crop Sudan grass is the best crop yet tested here. Table XVII gives results in a test made to compare different widths of row planted on different dates.

Several other grasses have been tested for both fall and spring planting. Of these Rescue, Bermuda and Rhodes grasses have given very good results.

SUMMARY.

Substation No. 6 was established in 1910. The site selected comprised 101 acres, one and one-half miles southwest of Denton. Operations were continued three years at this place and then moved to a new location because of more desirable soil conditions at the new location. The new farm consists of 203 acres, five and one-half miles northwest of Denton. It is typical blackland soil and is representative of the great small-grain region of North Texas.

The change in location of the farm necessarily caused a break in the work, since it requires two or three years to condition a farm for experiment work. The information presented in this report deals very largely with results secured at the old site during the three-year period of its operation.

The rainfall is very well distributed in this section, August, September, October and November usually getting good rainfall. This being the case, it is obvious that early preparation of the land influences crop production.

Of twenty-one varieties of winter wheat tested over a period of three years, Defiance and Bacska have been the leading varieties of the hard red group. The Durum wheats have not shown much value. Spring wheats seem to have little value in this section. As a class, the hard red wheats have yielded better than others in every year except 1914.

Results indicate that barley is a good crop for this section. Experiments in 1914 indicated that barley is not adapted to seasons of excessive rainfall. Tennessee Winter barley is outstanding as the best variety for this section. Fall seeding is advised, as results indicate that spring-seeded barleys are not so productive.

In point of yield and ease of production, oats is one of the best small grain crops for this section. The Texas Red Rust Proof oat is the standard variety and has shown better results both in fall and spring plantings than other varieties.

A comparison of Emmer, Spelt, winter barley, and oats, shows winter barley most dependable, with Texas Red Rust Proof oats second in

point of desirability. Neither Spelt nor Emmer has given promise of superiority over the better winter barleys and oats.

The varieties of rye grown have shown very little difference and none shows to be more especially promising than others. There seems to be no really good rye for this section. Winter barley is preferred as a cover crop and as a crop for winter pasturage. Rye has the advantage of being hardier and will survive usually when barley is winter-killed, but such occasions are infrequent.

Experiments covering early and late plowing as preparation for wheat, show consistently better yields where the land was plowed early. Deep plowing versus shallow plowing experiments show yields in favor of the deep plowing.

Plowed lands that were cultivated as compared to plowed lands not cultivated until time of seeding wheat, showed consistently better yields where the land was given intervening tillage. Plowed lands gave much better yields than either disked land or land without preparation.

As to methods of planting, drilled plats showed much better yields than did broadcasted plats.

In the corn work, Surcropper has shown itself the most certain variety grown. The distinctively large and late Southern sorts, like Giant White and Giant Yellow have not made yields as good as the average. For very late plantings June corns have been found reliable.

The Early Buff cowpea has been found to be one of the best varieties for seed. Other varieties which have been very satisfactory are: New Era, Blackeye, Iron, and Brabham.

Peanuts tests in 1912 and 1913 indicated that the small Spanish and Virginia varieties are both superior to the Tennessee Red.

A number of miscellaneous legumes, including vetches, *Lespedeza* and clovers have been tested. None have shown themselves exceptionally well suited to conditions here.

Sudan grass has proved one of the best hay and pasture grasses tested at this place.