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TEXAS AGRICULTURAL EXPERIMENT STATION

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PROGRESS REPORT, SUBSTATION NO. 8, LUBBOCK, TEXAS

1909-1914

B. YOUNGBLOOD, DIRECTOR
COLLEGE STATION, BRAZOS COUNTY, TEXAS.

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*As of September 1, 1917.
**In cooperation with A. and M. College of Texas.
***On leave.
****In cooperation with United States Department of Agriculture.

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ERRATA

'ut in Fig. 2's place should be Fig. 3.
'ut in Fig. 3's place should be Fig. 9.
'ut in Fig. 9's place should be Fig. 2.
'age 30, Table 43, change "grilled" to read "drilled."

FOREWORD.

The annual progress reports of the various substations may be considered part of the general annual report. Much credit is due Mr. A. B. Conner, in his capacity as Vice Director, and Mr. A. H. Leidigh, in his capacity as Agronomist, for painstaking work in checking figures and editing this and other substation progress reports, and grateful acknowledgment is hereby made.

B. YOUNGBLOOD,
Director.

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PROGRESS REPORT, SUBSTATION NO. 8, LUBBOCK, TEXAS, 1909-1914.

R. E. KARPER, SUPERINTENDENT.

INTRODUCTION.

Substation No. 8 is one of the thirteen experiment substations which constitute the out-of-doors laboratories of the Texas Agricultural Experiment Station, administered by the Director.

This report covers the work of Substation No. 8 from its establishment in 1909 to the end of the year 1914. The experiments conducted during this time have been mainly the testing of various crops to determine those best adapted to local conditions, crop rotations, soil fertility and dry-farming studies, methods of production tests with various crops, and the testing of fruits, vegetables, ornamental shrubs and shade trees. It is believed that this substation has already rendered great service to the farmers of this section of the State through its various activities, and it is hoped that the data, representing the results of experiments conducted, which are presented herein, will be of still further assistance to the farmer and the new settler in the Great Plains region of Texas, in solving some of the problems with which they are confronted.

HISTORY.

Substation No. 8 was established in 1909 for the purpose of collecting reliable information and data through experimentation bearing on the agricultural problems pertinent to this section.

One hundred sixty acres of virgin land, a five-room cottage and a well, were deeded to the State of Texas by the citizens of Lubbock county. Additional necessary improvements, such as a barn, implement shed, tenant houses, chicken house, and fences were added by the state. It was also necessary to put the land under cultivation and prepare it for experiment plat work.

NOTE.—W. S. Hotchkiss, Superintendent of Substation No. 2, Troup, was the first Superintendent of Substation No. 8. He was transferred from Substation No. 2, for the time, to take care of the preliminary operations when this substation was established.

A. L. Paschall was Superintendent of the substation from 1909 to 1912.

V. L. Cory was Superintendent from October, 1912, throughout the rest of the period covered by this report. It is desired to give Mr. Cory and his predecessors full credit for conducting the work herein reported upon.

LOCATION.

The substation is located three and one-half miles east of the city of Lubbock, Lubbock county, which is in latitude 33 degrees and 37 minutes north and longitude 101 degrees and 45 minutes west.

The land is more or less typical of the surrounding country, embracing practically all types of land of the South Plains region above the Cap Rock line.

SOIL.

The soil on the substation belongs to the Amarillo and Richfield series. The surface soil is sandy loam of reddish brown color, with a somewhat heavier subsoil, grading down to a calcareous material below, known as "Cap Rock." Much attention has been given to platting the farm so as to secure uniform areas, as the soil varies in depth from 8 to 10 inches on the north and northwest part of the area to about 6 to 8 feet on the south to southwest part.

Since the land was all new and without necessary improvements considerable time was required for getting it in cultivation and in tillable condition. Following this necessary preliminary work, experiments were started pertaining to the problems confronting this agricultural region.

The year 1912 was the first year in which the work done may be regarded as experimental. The experiments conducted have been as follows: 1912, 350; 1913, 2547; and 1914, 2362.

CLIMATIC CONDITIONS.

Table 1 shows the average annual rainfall and its distribution by months for a period of four years, 1911 to 1914, inclusive.

TABLE 1. PRECIPITATION IN INCHES.

Recorded at Substation No. 8, From April 1, 1911 to 1914, Inclusive.

Year.	Jan.	Feb.	Mar.	Crop-Growing Season.						Oct.	Nov.	Dec.	Annual
				April	May	June	July	Aug.	Sept.				
1911.....	.....	.....	.....	2.36	.72	.28	6.75	.21	1.33	1.08	.22	1.55	.....
1912.....	.02	1.28	.61	.50	1.58	.96	3.35	2.37	.73	2.81	.01	.38	14.60
1913.....	.04	.20	1.18	1.82	.24	5.88	.40	.32	4.19	1.53	1.54	2.13	19.47
1914.....	.15	.10	.29	1.47	4.04	3.86	6.17	5.95	.46	7.12	.35	1.47	31.43
Average.	.07	.53	.69	1.54	1.64	2.74	4.17	2.21	1.68	3.14	.53	1.38	20.32

One year of the four had abundant rainfall; but the average for the period is perhaps less than the average would be for a longer period.

A 28-year record at Mt. Blanco, Crosby county, shows an average yearly rainfall of 21 inches and a 21-year record at Plainview, Hale county, shows on average yearly rainfall of 20.9 inches.

From a study of the above table it will be noticed that about 75 per cent. of the yearly precipitation falls within the six months of the crop growing season, April to September, inclusive. The seasonal dis-

tribution of rainfall has a vital connection with plant growth and the fact that about three-fourths of the annual rainfall is received during the crop growing season is a distinct advantage to this section. Unusual or unfavorable distribution is not uncommon, but with the knowledge of this fact and the practice of good farming methods in storing rainfall occurring in the latter part of the crop season for use in crop production during the succeeding season, there is no reason why complete crop failures should occur.

The average date of the last killing frost in the spring, for a period of three years, is April 8; and the average date of the first killing frost in the fall for the same period is November 1. This gives a long growing season and permits a wide range in the planting period.

The altitude of the section is approximately 3200 feet.

The temperatures are not extreme, not often registering to zero in winter or above 100 degrees F. in summer.

GRAIN SORGHUM.

Grain sorghum is probably the most valuable crop to the Plains farmer. The acreage devoted to grain sorghum annually in this section is almost equal to that of all other crops combined. Grain sorghum is to the Plains country of Texas what corn is to the corn belt. The selection of good strains and the proper proportioning of the acreage between these, together with good seedbed preparation and clean culture, should insure grain and forage production every year.

Variety Tests.—The results of experiments with grain sorghums are reported on the following pages. These results indicate that the dwarf varieties of kafir and milo, together with feterita, are on the average the surest of production. While feterita has some disadvantages and is not so widely grown at this time, yet its certainty of production assures it a place among the grain producing sorghums for this section.

Variety tests of the better known grain sorghums were started in 1912 and have been continued each year. A total of nineteen varieties have been tested two years and seven varieties have been tested each year for three years. The information gathered from this series of tests is embodied in Table 2.

TABLE 2. VARIETY TEST OF GRAIN SORGHUMS.

T. S. No.	Variety.	Yield in Bushels to the Acre.	
		Average 1912, 1913 and 1914.	Average 1913 and 1914.
45	Pink Kafir	.....	47.60
44	Blackhul Kafir	.....	44.55
35	Blackhul Kafir	32.07	43.40
1649	Sod Land Feterita	.....	42.85
1648	Feterita	.....	42.60
1647	Feterita	33.10	40.55
671	Dwarf Milo	.....	40.30
46	Red Kafir	29.25	39.95
1645	Standard White Milo	.....	39.35
670	Dwarf Milo	30.60	39.00
669	Feterita	.....	38.95
1644	Standard White Milo	.....	37.50
1643	Standard White Milo	29.03	37.45
672	Milo	27.84	37.25
1646	Dwarf Milo	.....	36.90
1650	Feterita	.....	36.90
34	Dwarf Blackhul Kafir	.....	35.40
673	Dwarf Blackhul Kafir	29.38	34.85
674	Blackhul Kafir	.....	31.70

In 1913, a year of limited rainfall, the early dwarf kafirs gave better yields than the standard kafirs. During 1914, however, a season of favorable rainfall, the standard kafirs showed greater response to abundant moisture conditions and produced the larger yields. The average yields for the two years seem to indicate that the early and dwarf varieties are the more dependable.

The results show better yields during the dry year of 1913 from the dwarf milos than from the standard milos. Furthermore, the dwarf varieties seemed equally as responsive to the favorable moisture conditions occurring during 1914 as was the standard milo. These results indicate clearly that the dwarf milos are superior in production both in favorable and unfavorable years. White milo during both years has shown about the same production as dwarf milo.

The yields of the varieties of feterita are not widely different but results seem to indicate that T. S. Nos. 1647, 1648 and 1649 are slightly better producers than others tested.

A dwarf variety of feterita of considerable promise is at this time being propagated but was not included in the test reported above.

A direct comparison of the three most important grain sorghums is set forth in Table 3. As an average for the three years, feterita and kafir gave better yields than milo. Since feterita and milo require almost the same time to mature seed, the above table shows that feterita is a dependable crop.

TABLE 3. COMPARISON OF YIELDS OF ALL VARIETIES OF KAFIR, MILO AND FETERITA, 1912, 1913 AND 1914.

Crop—All Varieties Tested.	Average Yield in Bushels to the Acre.						Average 1912–14.
	No. Tests.	1912.	No. Tests.	1913.	No. Tests.	1914.	
Feterita	1	18.21	5	26.48	6	53.28	32.66
Kafir	3	11.89	7	22.02	7	56.83	30.25
Milo	3	11.67	7	20.70	7	54.00	28.79

The average of the varieties tested does not show the individual highest yielding varieties. These are summarized in Table 4, in which a feterita is the highest yielding variety for the three years, although in a two-year average this is not borne out in Table 2 where three kafirs are shown to out-yield the best feterita.

TABLE 4. BEST PRODUCING GRAIN SORGHUM VARIETIES OF EACH TYPE—COMPARISON OF YIELDS 1912, 1913, AND 1914.

T. S.	Variety.	Yield in Bushels to the Acre.			Average 1912 to 1914.
		1912	1913	1914	
1647	Feterita	18.21	27.10	54.00	33.10
35	Kafir	9.41	24.50	62.30	32.07
670	Milo	13.81	21.30	56.70	30.60

Table 5 gives a comparison of the yields of Dwarf kafir, Dwarf milo and feterita for 1913 and 1914. For the reason that in Table 2 a number of the larger growing and later maturing varieties were included with the kafirs and milos, it is deemed advisable to contrast the yields of feterita with those of the dwarf varieties of these other two crops. In this comparison, Dwarf milo shows a yield of 4.9 bushels to the acre more than kafir and 3.4 bushels to the acre more than the most dwarf feterita of the five varieties tested.

As a dwarf variety of each of these crops seems to be in demand this showing of the milo is worthy of some comment. It should be stated that the feterita used for comparison is not a dwarf feterita in the true sense, but it is the most dwarf of any of the five feteritas in the variety test.

TABLE 5. COMPARISON OF YIELDS OF DWARF KAFIR, DWARF MILO AND FETERITA, 1913-1914.

T. S. No.	Variety.	Average Yield in Bushels to the Acre.		
		1913	1914	Average.
671	Dwarf Milo	22.30	58.30	40.30
1650	Feterita	26.00	47.80	36.90
34	Dwarf Kafir	26.80	44.00	35.40

Spacing Tests.—The results of spacing tests with Dwarf kafir, Dwarf milo and feterita in 1914 are set forth in Table 6. The spacing tests this year with grain sorghums varied from one inch to eight inches between plants in three-foot rows, and included tests with three varieties. These results are the average of duplicate plantings, thinned to a definite distance between plants. As shown in this table, the plats which were thickest gave the highest yields. Of course, as previously mentioned, it will be remembered that this season was one of abundant rainfall, and it was, therefore, possible to mature plants in a thicker stand on a given area than would be the case in an average season. The thicker rates of planting gave consistently higher yields for all three of the grain sorghums tested than the thinner rates.

TABLE 6. GRAIN SORGHUM SPACING TEST, 1914.

Inches Between Plants in 36-Inch Rows.	Yield in Bushels to the Acre.			Average of Three Crops.
	Milo.	Kafir.	Feterita.	
1 to 2	58.2	58.5	.....	.....
2 to 3	51.7	58.3	62.3	57.4
3 to 4	46.0	52.6	52.6	50.4
4 to 5	43.5	48.2	47.7	46.2
5 to 6	37.9	44.2	51.1	44.4
6 to 7	35.8	35.6	36.6	36.0
7 to 8	32.5	35.5	.....	.....

Spacing tests have been conducted each year since the substation commenced its work, but comparable figures for more than one year are available for Dwarf milo only. These are presented in Table 7. The two-year average for milo agrees very well with the 1914 spacing test results reported in Table 6.

TABLE 7. COMPARISON OF SPACING TEST WITH DWARF MILO, 1913 AND 1914

Actual Space—Inches.	Yield in Bushels.		
	1913	1914	Average.
3 to 4	33.5	46.0	39.75
5 to 6	27.6	37.9	32.75
7 to 8	24.9	32.5	28.70

In view of the rainfall of the two seasons in which the spacing tests reported were conducted, it is fair to assume that in very dry seasons the wider plantings will probably make a better showing. For that reason, the grower of these crops should plant so as to allow sufficient distance in rows to give maximum production in a dry year. The thick plantings reported above are too thick to be regarded as safe in a dry year.

Tests were conducted in 1912, 1913 and 1914 to determine the effect of varying widths of row upon the yield of the various grain sorghums. These tests have been inconclusive.

Grain Sorghums With and Without Cowpeas Between the Rows.—In 1912 tests were started to determine whether a more valuable crop could be produced by planting grain sorghums and cowpeas together on the same land, rather than in separate fields. The results of these tests for feterita and milo, both of which are early grain sorghums, have been as follows:

TABLE 8. FETERITA AND MILO WITH AND WITHOUT COWPEAS BETWEEN THE ROWS.

Average of 1912 and 1913 crops.

Method of Planting.	Difference in Yield with Cowpeas.	
	Loss in Bushels to the Acre of Grain Sorghum Grain.	Gain in Pounds to the Acre of Cowpea Hay.
Grain sorghum alone in 3-ft. rows, versus alternate 3-ft. rows with cowpeas between	3.27	378
Grain sorghum alone in 6-ft. rows with bare middles, versus with cowpeas in the middles	7.25	373
Grain sorghum alone in two rows 3-ft. apart and two bare 3-ft. middles, versus with two rows of cowpeas in the middles	6.29	322
Average of all tests, grain sorghum alone. versus with cowpeas between the rows	5.60	356

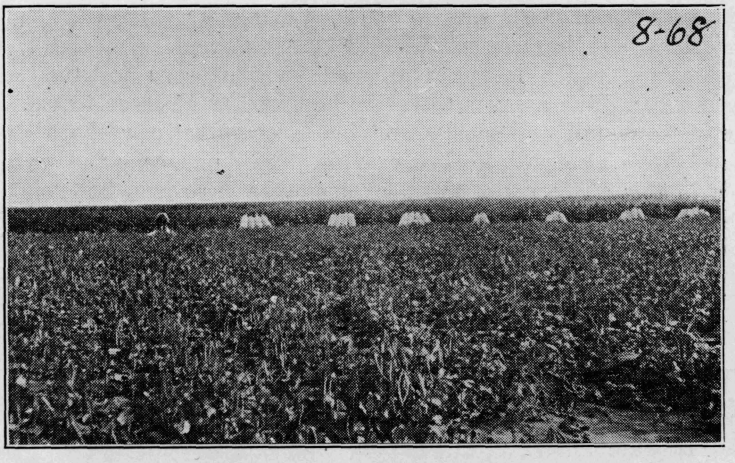

Fig. 1—Picking cowpea seed crop, September 15, 1914. Each lot of bags contains a crop from one experiment plat.

The planting of cowpeas in the grain sorghum crop reduced the yield of grain 5.6 bushels to the acre; but gave 356 pounds of hay, which is, of course, an addition to the grain crop. With grain sorghum worth $2.00 per 100 pounds, the hay would have to be valued at $35.20 a ton to make up for the loss of grain. With grain sorghum valued at $1.00 per 100 pounds, the hay would have to be valued at $17.60 per ton to make up for the loss in grain. With grain sorghum at 57 cents per 100 pounds, the hay would have to be worth $10.00 per ton to make up for the loss of grain.

In other words, grain would necessarily have to be very cheap and hay command a good price for this practice to be profitable. There is a good deal to say in favor of this practice for the man who does not systematically rotate his crops. There would probably be some fertility conserved by the cowpeas.

These conclusions make it evident that from the standpoint of the

first crop only the practice of mixed planting can scarcely be regarded as practical for early grain sorghums in this district. Perhaps the greatest advantage in favor of this practice is that it results in giving more space to the plants of the major crop, which, of course, safeguards against failure in a dry season.

Similar tests with kafir have seemed even less encouraging. It must be kept in mind that the combined crop would be more expensive to handle than separate crops. We advise that the crops be planted on separate pieces of land.

CORN.

Some corn is planted on the substation every year. In 1912, Mexican June corn was the only one of fourteen varieties tested which gave fairly successful results. In 1913, the crop was a failure. In 1914, thirteen varieties were tested and, since the season was rather favorable to the growing of corn, some very fair yields were obtained. An average yield of 54 bushels to the acre was obtained from the Mexican June variety, which is an extra good yield of corn for this sectiin. The Mexican June appears to be the best variety of those tested. This variety grows tall and stocky and has a comparatively short growing period. It is also more or less exempt from damage by the ear worm, which in this section is a prevalent enemy to the corn plant.

Table 9 shows the results of the variety test of corn for this section.

TABLE 9. VARIETY TEST OF CORN, 1914.

Variety.	Per Cent Market Quality.	Yield in Bushels to the Acre.
Mexican June	100	54.6
Shenandoah Special	81	30.2
Pride of the North	76	29.7
Reid's Yellow Dent	83	28.9
Iowa Silvermine	85	27.8
White Elephant	79	26.4
Shenandoah Yellow	78	26.2
Improved Calico	84	24.5
Boone County White	80	24.3
Minnesota No. 13	77	21.9
Cornplanter	76	20.3
Yankee	50	19.4
Brown County Yellow Dent	44	18.5

It will be observed that the above test includes corn belt varieties rather than varieties of corn common to the central part of Texas. The test is regarded as a fair one, however, in the light of former tests, in which Mexican June was the best of the southern varieties tested.

Corn versus Grain Sorghum.—Corn is by no means a safe crop for this section. It cannot compete successfully with the grain sorghums as a grain crop. In some seasons a good yield of corn is obtained, but its lack of certainty of production is such that if grown at all here it should be grown only in a limited way. A comparison of the yields of corn, kafir, milo and feterita at this substation for the three years 1912, 1913 and 1914, is of interest. Table 10 shows such a compari-

son. These yields are for the best producing variety of the respective crops for the average of the three years. The last column gives the average yield for the three years for each of these crops. It will be seen that the grain sorghums gave a yield of 10.98 bushels of grain to the acre more than the average yield of corn for the same period. This gain for grain sorghums amounts to more than one-half of the corn crop.

TABLE 10. COMPARATIVE YIELDS OF THE BEST VARIETY OF CORN, KAFIR, MILO AND FETERITA IN 1912, 1913 AND 1914.

T. S. No.	Variety.	Average Yield in Bushels to the Acre.			Average of Three Years.
		1912	1913	1914	
1647	Feterita	18.21	27.10	54.00	33.10
35	Blackhul Kafir	9.41	25.50	62.70	32.07
670	Dwarf Yellow Milo	13.81	21.30	56.70	30.60
	Average yield of grain sorghums				31.92
321	Mexican June Corn	8.24	0.0	54.6	20.94
	Gain of grain sorghum over corn				10.98

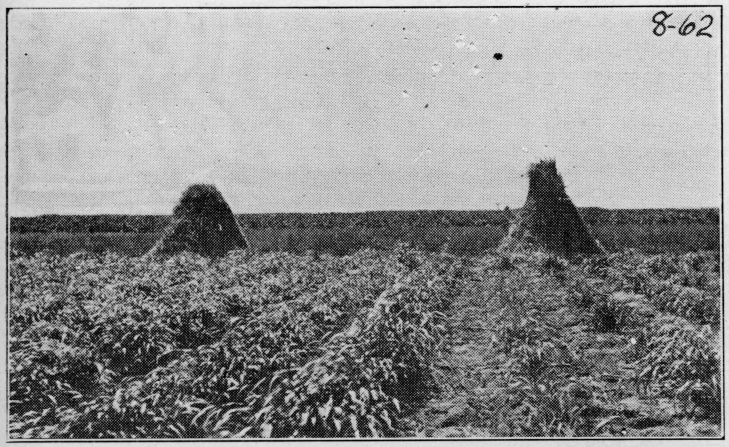

Fig. 2—Sudan Grass as a pasture crop for dairy cattle has been worth hundreds of dollars to this section.

SUDAN GRASS.

Sudan grass was first grown at this substation in 1912, having been shown to be a successful crop at Substation No. 12, Chillicothe, where it was the first grown in the United States. Sudan grass investigations have been one of the main lines of experiment work on this substation since that time.

In 1913 and 1914 a large amount of seed of this crop was distributed to farmers throughout the state and more particularly to the farmers in this section. The dissemination of seed and the active interest

taken in this new crop by the Texas Agricultural Experiment Station has given the growing of Sudan grass an impetus which is lasting. This crop has already been of great money value to the farmers of Texas, but in the future a very much greater value will be derived from the growing of this crop. It has proved to be an excellent hay plant for many sections of Texas which were particularly lacking in this respect. It should be one of the major crops planted on the Plains area of Texas. Sudan grass makes a good pasture crop for all kinds of live stock. It is undoubtedly the best summer grazing crop that can be grown in this section.

Sudan grass was not granted an undisputed place as the best forage crop here until every effort had been made to test all the crops known. A number of other crops have been tested and shown to be inferior to Sudan grass. Tunis grass was seemingly most worthy of careful testing.

Sudan Grass versus Tunis Grass.—Comparisons of Sudan grass and Tunis grass for forage were made in 1914 and are reported upon in Table 11.

TABLE 11. COMPARISON OF SUDAN GRASS AND TUNIS GRASS FOR FORAGE PRODUCTION WITH VARIOUS METHODS OF SEEDING, 1914.

Crop.	Method of Seeding.	Average Yield Per Cutting, Pounds.		Average Total Yield Per Acre.	
		1st.	2nd.	Lbs.	Tons.
Sudan grass	Close drills	5912.5	3265.6	9178.1	4.58
Tunis grass	Close drills	4537.5	2921.9	7459.4	3.70
Difference	Close drills	1375.0	343.7	1718.7	.88
Sudan grass	36-inch rows	6412.5	3563.6	9976.1	4.98
Tunis grass	36-inch rows	5924.0	2360.5	8284.5	4.14
Difference	36-inch rows	488.5	1203.1	1691.6	.84
Sudan grass	18-inch rows	5087.5	3116.7	8204.2	4.10
Tunis grass	18-inch rows	3437.5	3089.2	6526.7	3.26
Difference	18-inch rows	1650.0	275.0	1677.5	.83
Average gain for Sudan grass		1171.1	524.5	1695.9	.85

The Sudan grass outyielded the Tunis grass in all comparisons. The Tunis grass grows taller and coarser than the Sudan grass. It was observed in feeding these two crops to the live stock on the substation that the Tunis grass hay was not relished as was the Sudan grass hay.

In a seed production experiment it was shown that Sudan grass seed is produced more abundantly and can be saved much more easily than the seed of Tunis grass.

Millets have been compared to Sudan grass and shown to be much inferior to it.

Rate and Method of Seeding Tests.—In 1914 an experiment with the rate of seeding Sudan grass in 36-inch rows, where rates of from one to six pounds of seed to the acre were employed, the largest rate of six pounds gave the maximum yield of 4.45 tons of hay to the acre. The results of this experiment are shown in Table 12. The results favor the thicker rates of seeding.

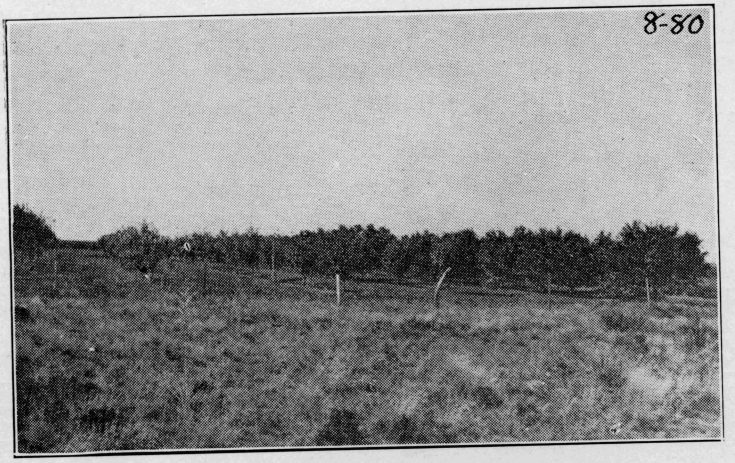

Fig. 3—Sudan versus Tunis Grass eleven days after harvest. The Tunis Grass has made very little growth from the stubble; whereas, the Sudan Grass is growing very rapidly. Shocks in the background are from the first cutting, made eleven days previously.

TABLE 12. RATE OF SEEDING SUDAN GRASS FOR FORAGE IN 35-INCH ROWS, 1914.

Rate of Seeding Pounds to the Acre.	Average Yield in Pounds to the Acre.	Average Yield in Tons to the Acre.
1.3	7805	3.90
2.35	8301	4.15
3.9	8490	4.24
5.2	8559	4.27
6.9	8903	4.45

Fig. 4—Bundles of Sudan Grass from rate of seeding experiment **plat curing** on the ground before being shocked

Table 13 gives the results of a rate and method of seeding experiment with Sudan grass for the years 1912, 1913 and 1914. As an average for two years, planting in 18-inch rows gave the highest yields; but in 1914 the 22-inch rows gave the largest yields of hay of the methods tested for those seasons.

Where the different widths of rows were tested the rates of seeding were the same for each row. Of the different rates of seeding in close drills, the 15 and 20-pound rates gave the maximum yields for the two years, 1913 and 1914, and the yields decreased as the rate to the acre increased. This experiment brings out the fact that Sudan grass need not be seeded extremely heavy.

TABLE 13. RATE AND METHOD OF SEEDING SUDAN GRASS, 1912, 1913 AND 1914.

Method.	Rate of Seeding Pounds to the Acre.	Yield in Pounds of Hay to the Acre.			Average Yield in Tons to the Acre.	
		1912	1913	1914	1912–14	1913–14
Close drills	15	.....	4967.8	8914.6	.....	3.47
Close drills	20	.....	5245.4	8158.3	.....	3.35
Close drills	30	1442	5143.5	7608.4	2.36	3.18
Close drills	40	.....	5397.6	8020.9	.....	3.10
36-inch rows	.....	2400	4427.5	7310.4	2.35	2.93
22-inch rows	.....	.....	.....	9126.6	.....	.....
18-inch rows	.....	.....	6600.0	8800.1	.....	3.85

Date of Seeding Tests.—Results of dates of seeding tests with Sudan grass for 1913 and 1914 are shown in Tables 14 and 15. Results in both years favor the earlier dates of planting. The yields obtained in 1913 gradually decrease as the date of planting becomes later. In 1914, also, the earliest date of April 10 gave the largest yield.

TABLE 14. DATE OF SEEDING SUDAN GRASS FOR FORAGE, 1913.

Date of Planting.	Average Yield in Pounds to the Acre.
May 15	3542
June 2	2459
June 16	2491
July 7	1718
July 21	2039
August 9	0

TABLE 15. DATE OF SEEDING SUDAN GRASS FOR FORAGE, 1914.

Date of Planting.	Average Yield in Pounds to the Acre.
April 10	9941
April 23	7539
May 8	9296
May 25	7906
June 6	9831
June 17	8731
June 30	6141
July 13	6072
July 27	2090

Since the dates of planting are not comparable in the two years of the date of planting test, it is necessary to summarize this experiment by averaging both the results and the dates. This method of reasoning is used in Table 16, which follows:

TABLE 16. DATE OF SEEDING SUDAN GRASS FOR HAY, 1913 AND 1914.

Average Date of Seeding.	Average Yield in Pounds to the Acre.
May 4	6233
May 20	5724
May 29	5182
June 4	6145
June 11	6161
June 16	5611
June 30	4577
July 10	3895
July 17	4055
July 24	2064
August 2	1045

With a normal season, best results in seeding Sudan for forage will likely be obtained from seeding this crop during April and May. April seeding is advised because of the fact that from one to three cuttings may be obtained each season, and it is important to get the early crops if possible.

One of the most important points of Sudan grass is the fact that under proper conditions it is a good seed producer. Many promising hay and pasture crops cannot be extensively used because of a marked lack of seed production. Sudan grass seed as a farm crop is important here. Experiments bearing on this subject are given in Tables 17 and 18.

TABLE 17. SUDAN GRASS IN ROWS FOR SEED PRODUCTION, 1913.

Number Tests Averaged.	Date of Seeding.	Seeding Rate Pounds Seed to the Acre.	Yield in Pounds to the Acre.	
			Seed.	Straw.
2	June 7	1.0	349	.....
4	June 7	5.2	476	1640
1	June 7	6.9	343	2357
2	June 16	6.9	318	1176
1	July 7	5.2	294	2528

TABLE 18. SUDAN GRASS IN ROWS FOR SEED CROP.

Average of Ten Plats. 1913		Average of 4.5 Acres. 1914		Average of Two Years, 1913–14	
Yield, Lbs. to the Acre.		Yield, Lbs. to the Acre.		Yield, Lbs. to the Acre.	
Seed.	Threshed Straw	Seed.	Threshed Straw	Seed.	Straw.
367.9	1775.8	910.5	3881.5	640	2828

MILLET.

Millet was at one time a favorite early hay crop in this district.

Proso is a forage and grain producing millet. It is sometimes called "hog millet" or "broom corn millet." In 1913 and 1914 tests were conducted with both yellow proso and white proso. The results indicate that planting in close drills gives the maximum production of hay. Results of this test are shown in Table 19.

TABLE 19. METHOD OF SEEDING PROSO FOR FORAGE PRODUCTION, 1913-1914.

T. S. No.	Variety.	Method.	Yield Pounds Forage to the Acre.	
			1913	1914
685	Yellow Proso	36-inch rows	.....	2131.3
685	Yellow Proso	Close drills	1870	3437.5
685	Yellow Proso	Broadcast	1650	.....
684	White Proso	Close drills	2062.5	.....
684	White Proso	Broadcast	1611.5	.....

Tests with different methods of seeding German millet were conducted in 1912 and 1914 and resulted in a slightly increased yield by planting in 36-inch rows. Results are shown in Table 20.

TABLE 20. METHOD OF SEEDING GERMAN MILLET FOR FORAGE P RODUCTION 1912-1914.

T. S. No.	Variety.	Method of Seeding.	Yield Pounds Hay to the Acre.		Average Yield Tons Hay to the Acre.
			1912	1914	
1641	German	36-inch rows	2400	3609.4	1.50
1641	German	Close drills	1430	4537.5	1.49

Millet versus Sudan Grass.—As the accepted practice in growing millet is to plant in close drills, it is worth while to compare the yields of German millet, the variety usually planted here, with Sudan grass planted in rows.

TABLE 21. GERMAN MILLET VERSUS SUDAN GRASS, 1912 AND 1914.

Crop.	How Planted.	Average Yield in Pounds. to the Acre.
Millet	Close drills	2983
Sudan grass	36-inch rows	4855
Gain for Sudan grass	.....	1872

The growing of millet for hay was quite largely practiced prior to the introduction of Sudan grass into this section by the substation. It has now been practically entirely displaced by this new and higher yielding hay plant.

SORGO.

Sorgos (sweet or forage sorghums or "cane") are well adapted to this section. The tonnage of green crop obtained from one acre of these crops is considerably more than could be obtained from either the grain sorghums or corn. For this reason they are admirably adapted to use for silage. The feeding value of sorgo silage is practically equal to that of corn or kafir and their larger acre yield makes the sorgos valuable silage crops.

The silo is a valuable asset to farming and its use is becoming quite general in the section. The pit silo is economical and is the kind usually constructed here.

Fig. 5—Harvesting Sorgo in Variety Test. The Sumac, Last Row of Which is Being Cut, Yielded 22 Tons Silage to the Acre. The Next Plat, Honey, Yielded 21 Tons Silage to the Acre.

Sorgos are quite largely grown, also, for roughage for wintering live stock. A number of experiments with this crop are presented on the following pages. Yields of over 21 tons of green forage and over 9 tons of dry forage were obtained in 1914. The Sumac variety is the one most generally grown in this section and is one of the best adapted to this portion of the state.

Variety Tests.—Tests of a number of varieties of sorgos have been conducted each year. The average yields are given in Table 22, which includes only those varieties which have been tested more than one year.

TABLE 22. SUMMARY—VARIETY TESTS OF SORGOS FOR FORAGE PRODUCTION, 1912, 1913 AND 1914.

Variety.	Yield in Pounds Dry Forage to the Acre.					
	1912	1913	1914	Average.		
				1912–14	1913–14	3 Years.
Sumac	4300	2855	*14886	9593	8870	7347
Orange	8150	1985	10560	9355	6272	6898
Red Amber	5500	3014	†11880	8690	7447	6798
Black Amber	3870	1257	11000	7435	6128	5375
Freed	1750	2326	*6050	3900	4188	3375
Minnesota Amber	6915	.....	10780	8847	.....	.....

*Average of three strains.
†Average of two strains.

In 1914 the variety test was enlarged. Table 23 gives the 1914 yields of all varieties in the variety test. Both the green and dry weights are given and since these crops are often used for either silage or roughage, the yield in both cases will be of interest to the farmer. As will be seen from an examination of the table, several of the varieties yielded in excess of twenty tons of green forage to the acre in 1914. The varieties of Sumac, Honey, Planter and Red Amber are shown to be the highest yielders for this period. A considerable difference in the yields of the different Sumac sorgos will be noticed. which tends to show the importance of selected or improved strains of seed of this crop.

TABLE 23. VARIETY TEST OF SORGOS FOR FORAGE PRODUCTION, 1914.

T. S. No.	Variety.	Yield Forage in Pounds to the Acre.	
		Green.	Dry.
1661	Sumac	43780	18700
1660	Honey	41580	17600
1665	Sumac	42020	16500
1658	Honey	43780	15840
1768	Planters	37400	12100
42	Red Amber	30360	11880
1662	Red Amber	28600	11880
1659	Gooseneck	29260	11000
1656	Black Amber	26840	11000
1769	Minnesota Amber	27280	10780
1657	Orange	23980	10560
161	Sumac	15400	9460
1666	Freed	17160	6600
41	Freed	18040	5500

Seed Production.—Since sorgo is important in the semi-arid section of the country it is, of course, necessary and often profitable to raise seed of this crop. It will be of interest, therefore, to know the yields that may be expected from the different varieties. The comparative yields of varieties of sorgo for seed production are shown in Table 24 in the order of their rank. Planter, Sumac, Orange and Red Amber lead in seed production for this season. It will be noticed that the Honey sorgo, which is one of the highest yielders of forage, does not give as large a yield of seed as some of the other varieties. A wide difference in the yields of the different varieties of Sumac (Red Top)

sorgos is shown. The seed yields of sorgos seem to compare favorably with those of the grain sorghums for the same year.

TABLE 24. COMPARATIVE YIELDS OF VARIETIES OF SORGO FOR SEED PRODUCTION, 1914.

T. S. No.	Variety.	Yield in Bushels Seed to the Acre.
1768	Planters	69.87
1665	Sumac	68.64
1657	Orange	62.30
1662	Red Amber	59.22
1656	Black Amber	54.56
42	Red Amber	53.24
1660	Honey	50.16
1769	Minnesota Amber	42.50
1666	Freed	40.83
1659	Gooseneck	38.98
41	Freed	35.46
161	Sumac	34.32
1661	Sumac	21.47

Rate of Seeding Tests.—In 1912, 1913 and 1914 a number of tests were conducted of the rate of seeding different varieties of sorgo in close drills for forage production. In 1913 the highest rate, eight pecks to the acre, gave the highest yield to the acre for each variety, and in 1914 the lowest rate, two pecks to the acre, gave the highest yield to the acre for each variety. These results appear to show that in a more favorable year less seed may be used than is the case in a less favorable year, such as 1913. As the results of this series of tests are not fully comparable, they are not presented in detail. The three-year average and yearly production of Sumac sorgo for two rates are shown, however, in Table 25.

TABLE 25. RATE OF SEEDING SORGO IN CLOSE DRILLS FOR FORAGE PRODUCTION, 1912, 1913 AND 1914.

Variety.	Rate Pecks.	Yield Forage in Pounds to the Acre.			
		1912	1913	1914	Average.
Sumac	2	3000	5671	15170	7947
Sumac	4	3000	5864	14162	7675

LEGUME AND NON-LEGUME MIXTURES FOR HAY.

There is a certain attractiveness to the idea that sorgo, Sudan grass, millet or other crops may be planted with some legume to produce a hay crop that will be larger than that of the legume and richer in protein than the other crop used. Experiments here seem to indicate that under dry farming conditions and with a comparatively short season, this practice is scarcely justified.

Cowpea-Sorgo Mixtures.—A number of tests for forage production with sorgos and legumes mixed were conducted in 1912, 1913 and 1914. Results of these tests are shown in Tables 26, 27 and 28. The proportion, by weight, of seed planted, of one part of sorgo to four parts

of cowpeas, gave the highest yield both in 36-inch rows and in close drills, as shown in Table 26.

TABLE 26. CLOSE DRILLING AND ROW PLANTING EXPERIMENTS IN 6 TO 1 AND 4 TO 1 MIXTURE OF COWPEAS AND SORGO, 1913 AND 1914.

How Planted.	Pounds of Seed Planted to the Acre.	Yield in Pounds Forage to the Acre.		
		Mixture.		Average Yield Both Mixtures for Method of Planting.
		6 of Cowpeas to 1 of Sorgo.	4 of Cowpeas to 1 of Sorgo.	
36-inch rows	9	5435	5560	5487
Close drills	30	2680	3488	3084
Average yield for both methods for mixture used.		4057	4524	

When seeded at different rates to the acre in drilled plantings, the yields obtained have been as shown in Table 27.

TABLE 27. CLOSE DRILLS RATE OF SEEDING EXPERIMENT---COWPEAS AND SORGO MIXTURES, 1912, 1913 AND 1914.

Mixture 4 parts cowpeas and 1 part sorgo.

Rate of Seeding in Pounds to the Acre.	Yield in Pounds Cured Forage to the Acre.				
	1912	1913	1914	Average.	
				1912 to 1914.	1913 and '14
30	3850	1650	5327	3609	3488
40	.....	2640	4915	.....	3777
45	.....	2750	4502	.....	3626
50	.....	3410	4296	.....	3853
60	2750	3740	4674	3721	4207
90	2150	.....	.....	.....	.....
120	1750	.....	.....	.....	.....

In this experiment the seasonal distribution of the rainfall had a very great deal of influence. It is advised that under favorable conditions two to three pecks of seed be used to the acre. When the soil preparation has been poor or the seed is of inferior quality, three to four pecks to the acre should be used.

In row plantings much less seed is required. Two years' tests at four seeding rates were carried out and the results are given in Table 28. The rows were 36 inches apart.

TABLE 28. ROW PLANTED RATE OF SEEDING TEST COWPEA AND SORGO MIXTURES, 1913 AND 1914.

Mixture 4 parts cowpeas and 1 part sorgo.

Rate of Planting, Pounds to the Acre.	Yield in Pounds to the Acre.		
	1913	1914	Average of 1913 and 1914.
4	6820	.....	.....
9	4840	8580	6710
14	4840	9165	7002
19	4950	9423	7186

It is evident from Table 28 that heavy seeding gave the best yields. While the feeding value of the various legume mixtures is greater than where the legume is not used, it would seem that the mixture yields poorly and there also is added expense in harvesting. These considerations make it appear that probably the crops should be produced separately and then fed together, if mixed feed is desired.

Cowpea-Sudan Grass Mixtures.—In 1912 Sudan grass and cowpeas were planted as a mixture for hay, with the following results:

TABLE 29. SUDAN GRASS-COWPEA MIXTURE FOR HAY.

Mixture used, 6 parts cowpeas and 1 part Sudan grass.

Number Pecks of Seed to the Acre.	Yield Pounds of Cured Hay to the Acre.
4	3300
6	2950
8	3350

The 1912 test having given no appreciable variation in yield, due to thick seeding, in 1913 the experiment was modified and the results shown in Table 30 were secured.

TABLE 30. SUDAN GRASS WITH AND WITHOUT LEGUMES.

Mixture.	Rate of Seeding, Pounds to the Acre.		Yield in Pounds to the Acre.
	Sudan.	Cowpeas.	
Sudan grass alone	12	.....	1764
Sudan grass alone	30	.....	2887
Cowpeas and Sudan grass	12	60	1056
Cowpeas and Sudan grass	30	60	2039

The results shown in Table 30 are in favor of heavy seeding, but as the crop secured was almost wholly Sudan grass and as the mixture yielded much less than Sudan grass alone, it is evident that Sudan grass did not readily adapt itself to use with cowpeas.

COTTON.

Cotton is the money crop of this section, and the average yields are very satisfactory. The acreage devoted to the crop is rapidly increasing. A number of experiments with cotton are reported herein.

Cotton was planted on the substation in 1912, and yields of from three to 525 pounds of seed cotton to the acre were secured.

In 1914, owing to the very favorable season, a remarkably heavy crop was secured.

These high plains are at present boll weevil free, and loss because of that insect probably never will be serious. The season is relatively much shorter than it is in the cotton belt. Because of these things, it has been possible to conduct tests of a wider range of varieties of

cotton, and some very good yields have been obtained from varieties that would receive very little attention in central or eastern Texas.

As the earliness of the varieties which are finally recommended for use here is a very large factor, it seems important to carry the variety testing further than the weighing of the amount of seed cotton produced. For that reason, size of boll, quality of lint and other factors are being studied. One of the most important determinations it has been possible to make was the counting of all the bolls harvested. This has given reliable information on the size of boll of the different varieties grown.

Variety Test.—Table 31 gives the averages of fourteen varieties of cotton grown in the three-year period, 1912 to 1914, and forty-seven varieties grown in the two-year period, 1913 and 1914. A number of varieties were grown in only one of these years but are not included, because of there being no other year with which to average.

The yields in Table 31 are seed cotton yields. The lint turnout has been carefully recorded, but is not a great enough variable materially to change the relative rank of the varieties in this test.

Fig. 6—Cotton Variety Test in 36-inch Rows, August 21, 1914. Much of This Cotton Made in Excess 1½ Bales to the Acre.

The column headed "number of bolls to the pound, 1914" gives the number of bolls required to weigh one pound. All of the bolls harvested were weighed and as some rather wide variations were found the midseason pickings are used for this table. These size of boll data are valuable, since they indicate that the best producing cotton varieties here are not the large boll varieties. It would appear from the results of these cotton variety tests that earliness of fruiting has probably had a great deal to do with making the varieties rank as they do at this time.

TABLE 31. SUMMARY---VARIETY TESTS OF COTTON, 1912, 1913 AND 1914.

T. S. No.	Variety.	No. Bolls to Lb.	Average Yield in Pounds Seed Cotton to Acre.		
			1912, 1913 and 1914.	Rank.	1913 and 1914.
479	Toole	89	.....	.....	1614.2
479	Hawkins	85	.....	.....	1581.3
699	Burnett	78	1199.5	1	1539.9
446	Simpkins Prolific	87	.....	.....	1498.2
700	Long Staple	70	.....	.....	1464.0
476	Texas Oak	81	.....	.....	1450.0
472	Peterkin	91	.....	.....	1435.5
152	Mortgage Lifter	54	.....	.....	1381.5
475	Texas Wood	97	.....	.....	1373.0
487	Dongola	64	.....	.....	1335.4
474	Truitt	63	.....	.....	1328.9
415	Huffman	54	.....	.....	1322.1
480	Culpepper's Big Boll	61	.....	.....	1304.7
128 and 698	Mebane	54	980.4	2	1276.3
481	Cook's Improved Big Boll	62	.....	.....	1248.3
135	Union Big Boll	62	.....	.....	1242.1
443	Half and Half	61	.....	.....	1234.3
445	Webber	57	.....	.....	1229.9
16	Crowder	50	894.9	4	1225.1
466	Webber	58	.....	.....	1182.0
444	Haaga's Extra Long Staple	95	.....	.....	1175.9
496	Broadwell's Double Joint	55	.....	.....	1155.7
118	Clarksville Long Staple	73	922.9	3	1145.4
7 and 120	Burn's Long Staple	54	844.6	5	1143.5
129	Edgeworth	62	.....	.....	1137.1
411	Hite's Early Prolific	70	.....	.....	1132.7
482	Bohler's Triple Joint	54	.....	.....	1130.4
413	Snowflake	70	.....	.....	1123.6
486	Robert's Big Boll	64	.....	.....	1119.2
348	Black Rattler	73	.....	.....	1116.8
412	Foster's Long Staple	71	.....	.....	1104.1
3 and 483	Columbia	48	804.4	6	1086.2
414 and 504	Durango	66	.....	.....	1084.2
14	Unknown Long Staple	56	744.7	9	1015.4
130	Bank Account	82	.....	.....	1002.9
1, 485 and 951	Cleveland Big Boll	63	748.0	8	995.4
74, 478, 5 and 121	Allen's Long Staple	92	748.4	7	963.2
15 and 77	Rowden	49	704.8	11	942.3
170	Hartsville	55	.....	.....	929.2
11 and 942	Lone Star	46	707.6	10	902.0
78 and 495	Hendricks	85	634.1	12	865.2
470	Sunflower Long Staple	88	.....	.....	817.4
473	Willet's Red Leaf	93	.....	.....	708.6
471	Dillon	71	.....	.....	485.0
477	Webber	55	.....	.....	352.3
119 and 484	Keenan	70	242.4	13	243.4
10	Yuma	94	132.3	14	160.9

Table 31 shows Burnett and Mebane Triumph to be the best of the varieties tested for three years, while Burnett is third in rank for 1913 and 1914.

Not much may be said regarding the quality of the lint of the highest producing varieties. Some growers contend that the larger boll varieties are to be preferred here, because of their better lint. These questions of comparative yield versus size of boll and quality are being given more attention and in future publications it is hoped that definite facts on the subject may be presented.

Spacing Tests.—Under the dry-farming conditions prevailing in this district of Texas one of the most necessary lines of investigation with cotton is to study the proper stand of plants to leave on the land. Some growers contend that cotton does not need to be thinned, while others

say that a very thin stand is necessary, because of a possible shortage of moisture.

In the spacing or rate of thinning experiments with cotton conducted on this substation the seed is planted thickly in the drill and later thinned accurately by count and measurement. The stand desired was not obtained in all cases. The distances reported here are for the actual final stand obtained.

Table 32 gives the average yields of three years' rate-of-thinning tests with Mebane Triumph cotton. The results indicate that there were no great differences between the various stands from 7 to 16 inches apart in the row.

TABLE 32. RATE OF THINNING TEST WITH COTTON, 1912, 1913, AND 1914.

T. S. No. 698, Mebane Triumph in 3-foot rows.

Actual Space, Inches.	Yield Pounds Seed Cotton to the Acre.			
	1912	1913	1914	Average.
7 and 8	250	484	1873.28	869.09
9 and 10	275	528	1819.00	874.00
11 and 12	200	583	1866.58	883.19
13 and 14	275	480	1817.74	857.58
15 and 16	195	477	1829.76	833.92

Comprehensive rate-of-thinning tests were carried out in 1913 and 1914 with three varieties of cotton, one of these being the Mebane Triumph, also used in the 1912 test. The results of these tests with three varieties are given in Table 33, which shows no very conclusive differences in yields.

TABLE 33. RATE OF THINNING TEST WITH COTTON, 1913 AND 1914.

Mebane Triumph, Burnett, Long Staple. Average three varieties in 3-foot rows.

Actual Space, Inches.	Yield Pounds Seed Cotton to the Acre.		
	1913	1914	Average.
7 and 8	710.5	2047.98	1379.24
9 and 10	515.9	1888.58	1202.24
11 and 12	813.6	1985.46	1399.53
13 and 14	664.0	2004.50	1334.25
15 and 16	622.0	1833.33	1227.66

The 1914 thinning tests with the three varieties of cotton are reported only in part in Table 33, since there were plats with stands above and below those represented in the average. Rate of thinning was studied in its effect on the earliness of fruiting and size of boll. The figures are not conclusive but are important. The year 1914 was a wet year. Three acres of cotton were planted to three varieties. These acres are composed of 28 plats each, or a total of 84 plats, and represented thinning rates from 4 inches apart to 23 inches apart by actual measurement and count of all stalks. All of the bolls were counted on the three acres. The rates of stand represented on each acre gave the following results:

TABLE 34. COTTON SPACING TEST, 1914.

Mebane Triumph, Burnett, Long Staple. Average of three varieties in 3-foot rows.

Space in Row, Inches.	Yield in Pounds Seed Cotton to the Acre.	Number Bolls to the Pound of Seed Cotton.
6– 7	2287	78.4
8– 9	2127	76 5
10–11	1927	74.4
12–13	2033	74.2
13–14	2014	74.3
14–15	1994	74.6
15–16	1823	75.9

A few rates were not present on each of the three acres and are not included in Table 34, because it is an average of all three varieties. Of the plats having a stand between 4 inches and 6 inches the bolls were smaller than those of the same variety at a 6-inch rate. In the plats having a stand between 16 inches and 23 inches the bolls were larger than in the thick seedings of the varieties represented.

The thicker stands yielded best in the early pickings and the thinner stands yielded best in the late pickings. Thick planting influenced the size of the bolls somewhat, making them smaller than those in the medium and thin spacings.

The entire available information regarding the proper spacing of cotton on this substation indicates that stands of 12 inches apart in three-foot rows may be regarded as satisfactory. Thick stands may be expected to force early fruiting and thin stands will cause later fruiting. As early cotton is very important here, because of the altitude and early fall frosts, this is important. Thick planting results in slightly smaller bolls and, of course, a small increase in cost of picking.

COWPEAS.

In this part of Texas there is great need of legume crops. The sorghums and cotton are the most successful crops, and it is only a matter of time until the virgin soils will require the use of legumes as crops to use in rotation, if the crop yields are to be maintained.

The experiment work with legumes consists of an endeavor to find a legume which is well adapted to the Great Plains of Texas and to determine the best varieties and most successful method of growing those legumes which we already have.

Cowpeas, peanuts, alfalfa, sweet clover and field beans are the most important legumes under experiment here. The cowpea is at present the best annual legume. The seed yield of this crop is usually good, but the yield of forage is rather low.

Variety Test.—The results of two years experiment tests of nineteen varieties of cowpeas for seed production are given in Table 35, in the order of their rank. From an examination of the table it will be seen that this crop can possibly be raised profitably for seed production in this section.

TABLE 35. VARIETY TESTS OF COWPEAS FOR SEED PRODUCTION 1912 AND 1914.

T. S. No.	Variety.	Yield in Bushels to the Acre.		
		1912	1914	Average 1912-1914
217	Khotan	12.91	20.8	16.85
208	Old Bokhara	9.79	22.3	16.04
59	Whippoorwill	1.093	30.5	15.79
203	Iron X Large Blackeye	1.98	29.5	15.74
218	Chinese Yellow	6.875	20.4	13.63
216		.93	26.3	13.61
197	Iron X Black	1.56	25.2	13.38
214	Red Ripper	2.29	24.4	13.34
200	Iron X Large Blackeye	2.81	23.8	13.30
211	Early Buff	4.58	22.0	13.29
196	Iron X Black	3.33	23.2	13.26
198	Iron X Black	2.81	21.7	12.25
191		1.04	23.0	12.02
199	Iron X Large Blackeye	2.60	20.8	11.70
192		1.35	21.2	11.27
204	Iron X Whippoorwill	1.45	20.7	11.07
202	Iron X Large Blackeye	1.771	19.6	10.68
201	Iron X Large Blackeye	2.605	16.4	9.50
215	Tinkle's Holstein	1.771	15.9	8.83

Rate and Method of Seeding Tests.—The heaviness of seeding as well as the method of planting cowpeas has been under investigation since 1912. In that year three varieties were tested in close drills for forage, the results being as shown in Table 36.

TABLE 36. COWPEA RATE OF SEEDING TEST IN CLOSE DRILLS FOR FORAGE PRODUCTION, 1912.

Variety.	Yield in Pounds to the Acre, When Planted at the Following Number of Pecks to the Acre.		
	Four.	Six.	Eight.
Peerless	1400	2120	2330
Brabham	1850	2250	1900
Whippoorwill	900	1000	900
Average	1383	1790	1710

For forage, one variety gave the highest yield planted at the rate of eight pecks to the acre. In the case of the other two varieties, a rate of six pecks to the acre gave the highest yields.

In 1913 the seeding rate test was conducted with the New Era variety only, and the season's results are given in Table 37.

TABLE 37. COWPEA RATE OF SEEDING TEST IN CLOSE DRILLS FOR FORAGE PRODUCTION, 1913.

Variety.	Yield in Pounds to the Acre, When Planted at the Following Number of Pecks to the Acre.		
	Two.	Four.	Seven.
New Era	2068	2078	3212

In the test in 1913 the seven-peck rate gave somewhat the highest yield. A similar test to that of 1913 was carried out in 1914 with two varieties, as shown in Table 38.

TABLE 38. COWPEA RATE OF SEEDING TEST IN CLOSE DRILLS FOR FORAGE PRODUCTION, 1914.

Variety.	Yield in Pounds to the Acre, When Planted at the Following Number of Pecks to the Acre.		
	Two.	Four.	Seven.
New Era	3300	4125	4125
Whippoorwill	3025	3300	3570
Average	3162.5	3712.5	3847.5

The heaviest seeding rate gave slightly the greatest crop in 1914.

Table 39 presents a summary of these tests with the crop for forage in close drills.

TABLE 39. RATE OF SEEDING TEST OF COWPEAS IN CLOSE DRILLS, FOR FORAGE PRODUCTION, 1912, 1913 AND 1914.

Rate of Seeding, Pecks to the Acre.	Yield Pounds to the Acre.		
	1912	1913	1914
2	.....	2068	3162
4	1383	2078	3712
6	1790	.....	.....
7	.....	3212	3847
8	1710	.....	.....

It would seem from these results that six to seven pecks to the acre is the proper amount of seed to sow in close drills for the maximum forage production.

It is frequently desirable to plant cowpeas in rows. The field work is rapidly done and the field may later be cultivated, to kill weeds and conserve moisture.

In 1912 a series of fifteen tests of Whippoorwill cowpeas in rows yielded at an average rate of 1609 pounds of cured forage to the acre; whereas, the same variety in close drills yielded less than one-half that amount. In Table 42, however, an average of three varieties is used in comparing the results of row planting in 1912. Thus the results are directly comparable to those in Table 36.

In 1913 the row method of planting for forage production was tested with the New Era variety at six rates of seeding, the results of this test being presented in Table 40, which is comparable to Table 37.

TABLE 40. COWPEA RATE OF SEEDING TEST IN ROWS FOR FORAGE PRODUCTION, 1913.

Variety.	Yield in Pounds to the Acre, When Planted at the Following Number of Pounds to the Acre.					
	3 1-2	9 1-2	10	13	18 1-2	20
New Era	2475	1507	1540	1320	1815	1815

A dry period in midsummer, followed by a favorable September, evidently resulted in the thicker seedings being injured more than the thinner plantings, and unable to recover rapidly.

In 1914 the row method of planting for forage was tested at four rates of seeding, with the same two varieties used in the drilling experiment of that year. The year's yields are as shown in Table 41.

TABLE 41. RATE OF SEEDING TEST WITH COWPEAS IN ROWS FOR FORAGE PRODUCTION, 1914.

Variety.	Yield in Pounds to the Acre, When Planted at the Following Number of Pounds to the Acre.			
	Four.	Nine.	Thirteen.	Eighteen.
Whippoorwill	2749	2887	3093	3300
New Era	2259	3093	2990	3366
Average	2504	2990	3041	3333

The year's work was done under favorable moisture conditions, and the heaviest seeding gave the largest crop.

Table 42 presents a summary of these tests with the crop for forage in rows.

TABLE 42. COWPEA RATE OF SEEDING TEST IN ROWS FOR FORAGE PRODUCTION, 1913 AND 1914.

Rate of Seeding in Pounds to the Acre.	Yield in Pounds Forage to the Acre.			
	1912	1913	1914	Group Average for Comparable Rates.
3 1-2		2475		
4			2504	2489
9			2990	
9 1-2		1507		
10		1540		2256
13		1320	3041	2180
18			3333	
18 1-2		1815		
20		1815		2574
Average of 15 plats	1609			

A comparison of the close drill and row methods of seeding for forage shows that the close drilled planting gave the heaviest yields, as shown in Table 43, the data then presented being taken from Tables 39 and 42.

TABLE 43. GRILLED PLANTING VERSUS ROW PLANTING FOR COWPEAS AS A FORAGE CROP.

Year.	Yield Pounds to the Acre.	
	Drilled.	Rows.
1912	1790	1609
1913	3212	2475
1914	3847	3333
Average	2949	2472

While the results are somewhat in favor of the drill method of seeding for forage, nevertheless, it must be kept in mind that the row method of planting is the safer and simpler practice under less careful supervision than is used on the substation.

PEANUTS.

Peanuts are usually successful in this section and are an excellent crop, especially where there are sufficient hogs kept to harvest them by hogging them off.

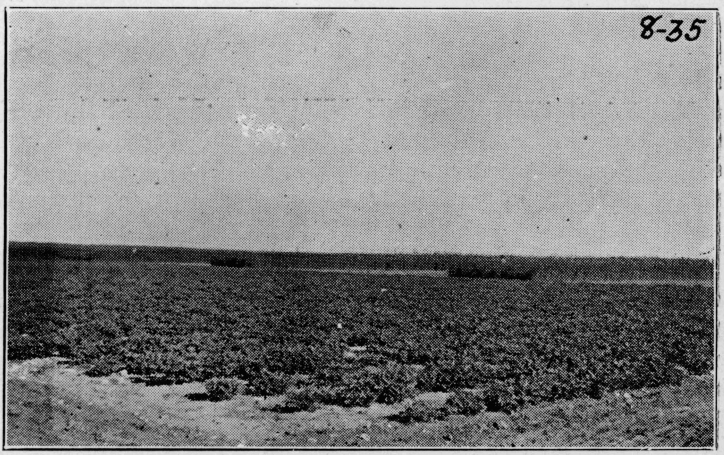

Fig. 7—Spanish Peanut Experiments, 1914.

In 1912 of three varieties tested the Spanish variety gave the highest yield, producing 23.3 bushels to the acre. In the season of 1913 the Spanish, Tennessee Red and Virginia Improved varieties were planted but on account of the very dry weather they did not come up for a month, which made them late. With later damage by rabbits and ground squirrels the crop was virtually a failure. In 1914 the Spanish variety planted on May 30 and harvested October 19 gave a yield of 73.27 bushels of nuts to the acre.

The yield of the Spanish peanuts for the three years is as follows:

TABLE 44. SPANISH PEANUTS YIELDS.

Yield in Bushels of Nuts to the Acre.			
23.3	0	73.27	32.15

ALFALFA AND SWEET CLOVER.

A number of experiments have been started with the production of alfalfa under dry farming conditions. The majority of these tests were started in 1914 and since it takes considerable time to get the

land in proper condition and obtain a stand of alfalfa and results from such an experiment, the yields from this work will appear in a future report. It may be stated here, however, that considerable success has been had with this crop under dry land conditions at this substation. The results to date seem to favor planting alfalfa in rows, and giving the crop regular intertillage with a cultivator, rather than planting in close drills.

Tests of sweet clover were started in the same year as those with alfalfa, and the results cannot be reported here. This crop is giving considerable promise, however, as a pasture and hay crop for this section.

GUAR AND MOTH BEANS.

Tests in 1914 with guar and moth beans show guar to give about two and one-half times the amount of forage produced by the moth beans, but the guar has little value as forage, while the live stock seemed to relish the moth bean hay. Definite seed yields were not obtained, due to the difficulty in getting the seed to thresh out of the pods.

DRY BEANS.

Tepary Beans.—Tepary bean is a successful crop in this section. In 1912 the yield of dry beans was 7.65 bushels to the acre. A number of tests with this crop in 1914 gave an average yield of 27.69 bushels to the acre. As an average of the two years, the yield of tepary beans is 17.67 bushels of dry beans to the acre.

Navy Beans.—A field test of garden bush beans in 1914 gave a yield at the rate of 5.6 bushels of dry beans to the acre.

Lima Beans.—Extra Early Lima beans in a field test in 1914 yielded 16.73 bushels of dry beans to the acre.

BROOM CORN.

Broom corn has not been a popular crop in this part of the state, although the climate is suited to its production.

In 1912 and 1913 broom corn tests gave very good crops, as will be seen by referring to Table 45. These yields are very good. The largest yields were received from plantings made the first part of May.

Broom corn is a specialized type of the sorghum plant. The seed available for planting is poor, due to lack of selection, and also to field cross fertilization.

TABLE 45. BROOM CORN YIELDS, 1912 AND 1913.

Variety.	Length of Brush, Inches.	Yield in Pounds to the Acre.	
		1912 Cured, Clean Stripped Brush.	1913 Cured, Brush Not Stripped.
Dwarf	15	198	1622
Dwarf Standard	22	251	2355
Standard	22	257	.....

SMALL GRAINS.

If there is an abundant supply of moisture in the soil in the fall, small grains may be planted with a reasonable assurance of obtaining a crop. On the other hand, if there is no moisture in the soil the crop is almost sure to be a failure, due to the lack of winter rains.

A number of tests of varieties of wheat, oats and barley have been conducted at this substation. The results of these tests are given in the three following tables. Due to the dry, windy winters, and damage by soil blowing, winter wheat sometimes fails to produce a crop. Some seasons excellent yields of wheat are produced in this section, however, and more especially on the heavier soils. An increased acreage of winter grains is being grown here especially for winter pasture, and this seems advisable, especially when abundant fall moisture is available. Rye, wheat and emmer all make excellent winter pasture.

Wheat Variety Tests.—In the fall of 1911 twenty-seven variety tests of wheat were planted. The crop was a failure. In 1913 of the eighty-three tests with winter small grains, seventy-six were with wheat, three with emmer, two with rye, one with spelt and one with barley. Eight acres were planted to these crops. The dry, windy weather of the winter months destroyed much of the stand so that in the spring all but one acre of wheat, which was the least affected by soil blowing, were disked up and planted to oats.

In 1913 nine varieties of winter wheat were grown, with the Burger, Turkey and Crimean giving the largest yields and an average yield of all varieties of 4.8 bushels to the acre. Table 46 contains the results of this experiment. The yields were all materially affected in this test by the soil blowing, which damaged the stand. All varieties were planted at the rate of three pecks to the acre.

TABLE 46. VARIETY TEST OF WINTER WHEAT, 1913.

T. S. No.	Variety.	Yield in Bushels to the Acre.
589	Burger	5.8
702	Malakof	5.4
581	Turkey	5.2
689	Crimean	5.0
587	Crimean	4.8
588	Eversole	4.2
692	Turkey	4.1
580	Defiance	4.1
586	Kansas Botany No. 415	3.2

Oats Variety Tests.—Nine varieties of oats were grown in 1913 and 1914. Table 47 contains results of trials with oats. In 1913 the varieties were planted at the rate of six pecks to the acre. The Kherson and Sixty Day varieties gave the highest yields, making 11.9 bushels to the acre. In a test of the same varieties in 1913 the Burt and Red Algerian gave the highest yields. All varieties were attacked by the rust. The Kherson seemed to suffer more severely from the rust than did the other varieties, while the Burt seemed to withstand the attack

better than any of the other varieties. Nine other acres were planted to oats in 1914, seven to Burt and two to Red Algerian. The average yield of grain from these acres was 7.1 bushels for the Burt and 10.3 bushels for the Red Algerian. As an average for the two years, the Burt gave the highest yield of grain per acre, with Sixty Day ranking second.

TABLE 47. VARIETY TEST OF OATS, 1913 AND 1914.

T. S. No.	Variety.	Yield in Bushels to the Acre.		
		1913	1914	Average.
633	Burt	11.3	11.7	11.5
679	Sixty Day	11.9	9.0	10.4
677	Sixty Day	11.5	8.9	10.2
680	Seventy-five Day	11.6	7.6	9.6
681	Kherson	11.9	7 0	9.4
678	Red Algerian	6.2	11.0	8.6
683	Red Rustproof	7.8	7.9	7.85
682	Red Rustproof	5.7	5.9	5.8
632	Red Siberian	2.0	6.2	4.1

Barley Variety Tests.—Six varieties of barley were grown in 1913 and 1914. These varieties were planted April 9 in 1913 and April 10 in 1914 at the rate of eight pecks to the acre. The shortness of the growth of barley in this section is such that the crop is not satisfactory. Table 48 shows the results of the variety tests for two years. Odessa give the highest yield of 10.25 bushels to the acre, with Caucasian ranking second with a yield of 9.65 bushels. This experiment shows an average yield to the acre of 7.5 bushels of all varieties of barley for the two years.

TABLE 48. VARIETY TEST OF BARLEY, 1913 AND 1914.

T. S. No.	Variety.	Yield in Bushels to the Acre.		
		1913	1914	Average.
639	Odessa	3.7	16.8	10.25
638	Caucasian	3.6	15.7	9.65
637	Stavropol	4.0	10.5	7.25
640	Yenidje	6.7	7.5	7.10
641	White Smyrna	3.6	9.3	6.45
642	Black Smyrna	4.7	4.9	4.30

Rye.—Rye was planted on the substation in 1914 as a cover crop in the orchard. Also one acre was planted for grain and gave a yield of 10.8 bushels to the acre. Rye is hardy and seems to succeed very well in this section. It makes an excellent winter pasture.

Fertility Investigations.—A piece of sod land in one corner of the farm was cropped for the first time in 1913.

In 1914 a series of dry farming fertility conservation experiments was started on this series of plats, the investigations being parallel to those at Substation No. 7, Spur, Texas. In 1914 the only comparable data from these plats consisted of a comparison of the yields of feterita and cotton, where manured and not manured.

Tables 49 and 50 give these comparisons. Manure was applied late in the spring after the seedbed was prepared.

In this series of experiments only two tons of manure to the acre are used. That gains result from such light applications is significant.

TABLE 49. MANURE VERSUS NO MANURE, FOR FETERITA, 1914.

Manured.		Not Manured.	
Experiment Number.	Yield in Bushels to the Acre.	Experiment Number.	Yield in Bushels to the Acre.
2	52.7	1	46.7
5	60.3	4	50.3
12	47.3	11	49.6
18	47.9	15	44.5
23	48.8	21	54.3
Average	51.4	Average	49.0

Gain for manure.....2.4

The return for two tons of manure is 2.4 bushels of feterita. Valuing grain sorghum at $1.00 per 100 pounds, the manure gave a return value this year of 67 cents to the ton. It costs 30 cents to haul and spread a ton of manure. Deducting the spreading and hauling charge, it had a net value of 37 cents a ton. Since manure is known to benefit crops for several years after being applied to the land, the value of the manure is only partially used this year. On this land only cropped one year the gain for the manure applied is very creditable.

TABLE 50. MANURE VERSUS NO MANURE, FOR COTTON, 1914.

Manured.		Not Manured.	
Experiment Number.	Yield in Pounds of Seed Cotton to the Acre.	Experiment Number	Yield in Pounds of Seed Cotton to the Acre.
7	1560.3	6	1646.6
10	1774.4	9	1575.9
13	1467.2	11	1332.8
17	1695.6	15	1474.1
24	1468.4	21	1591.2
Average	1593.1	Average	1524.2

Gain for manure.....68.9

The return for two tons of manure was 68.9 pounds of seed cotton, ginning 35.3 per cent. lint. Valuing lint cotton at 10 cents a pound and the seed at 1 cent a pound, the manure gave a return value of $1.43 to the ton. Deducting the cost of spreading and hauling this gives a net value this year of $1.13 a ton. Since manure is known to benefit crops for several years after being applied to the land, the value of the manure is only partially used this year. On this land only cropped one year the gain is very creditable.

Averaging the manure value in the ten feterita tests and the ten cotton tests, there was an increase in crop of 1.2 bushels of feterita or 34.4 pounds of seed cotton. These gave an average value of $1.05 to the

ton for the manure. At this value that would cover the cost of spreading the manure on the land, and yet give a per ton value of 75 cents for the manure the first year it was used.

GARDEN CROPS.

Tests with vegetables of many kinds are conducted on this substation. The work so far has consisted mostly of testing the different varieties to determine those best suited to this region. Only a general summary of the work can be given here.

A good garden is a necessity for every farm. The garden should be well located so that it may be irrigated from the windmill or tank when necessary, which is usually several times during the season in this region, depending on the vegetables grown.

The vegetable work in 1912 was fairly successful, with especially favorable yields and qualities of sweet potatoes, egg plant and salsify.

The following data are from the 1913 and 1914 crops.

Sweet potatoes do well in this section. Comparative yields from garden rows in 1913 were as follows:

	Bushels.
Early Golden	555.5
Pride of Kansas	396.0
Yellow Jersey	396.0
Southern Queen	378.0
Red Bermuda	307.0
Yellow Nansemond	291.0
Black Spanish	231.5
Red Nansemond	223.0

Variety Tests for Irish Potatoes.—Irish potatoes have not generally been very successful here. Potatoes command a good price in this part of the state, and their culture is worthy of investigation. Only preliminary variety tests have been made up to this time. Due to an error in weighing, it is not possible to present a true two-year average of all varieties tested. The results are, however, presented in Table 51 for what they are worth. These potatoes were not irrigated.

TABLE 51. VARIETY TEST OF IRISH POTATOES.

Variety.	Yield in Bushels.	
	1913	1914
Banner	14 3	239 2
Early Ohio	25.6	.....*
Triumph	63.8	.....*
Extra Early Waubonsie	67.3	.....*
Irish Cobbler	....	240.0
Spaulding Rose	....	231.1

*Grown in 1914 but there was an error in the weights.

Results of Other Crop Tests.—Tomatoes produced a large crop in both 1913 and 1914 and are one of the best vegetables adapted to this

region. Six varieties were tested in 1913 and fifteen varieties in 1914. Ponderosa and Chalk's Jewell were the best of the varieties tried.

Eight varieties of corn were grown for table purposes. The White Australian, Adams Extra Early, and Country Gentleman were the best of those tested. The ear worm and Harlequin cabbage bug are quite destructive to this crop.

Onions did fairly well in 1913. Of thirteen varieties of onions tested in 1914 the New Gigantic Gibraltar and Prizetaker were the two best varieties. Two Bermuda onions tested were failures.

The cabbage crop was destroyed both seasons by the Harlequin cabbage bug, which is especially destructive to this crop.

The Oxheart and Half Long Orange varieties of carrots grew successfully in 1913. Seven varieties planted in 1914 were destroyed by insects.

Parsnips, beets, Swiss Chard and salsify were all uniformly successful both seasons.

Turnips have been successfully grown and do well both for early and late plantings. The early turnips, however, have suffered from insects.

Spinach and lettuce both made satisfactory growth.

Cucumbers were very prolific in 1914.

All of the beans except one of the Lima varieties produced abundantly.

New peas were moderately successful.

Egg plant, pepper plants, kale and collards did not succeed.

Garden lemons yielded very abundantly.

Fifteen varieties of watermelons were grown in 1914. Most of the varieties did very well. The Golden Honey, Improved Klecley, Halbert Honey, Pride of Georgia and Angel Kiss were all of excellent quality. Baby Delight, Princess and Pickaninny were small melons of inferior quality. Iceberg made large melons of poor quality. Sweetheart produced large melons of fair quality. Tom Watson made the heaviest melons, which were also of fair quality.

FLOWERS AND ORNAMENTAL VINES.

Extensive tests of flowers have been carried out each season. The most successful flowers were Cosmos, Four O'clocks and Phlox Drummondii. Other flowers and vines grown successfully were Morning Glories, Cypress Vine Nasturtiums, Verbenas, Asters, Centaurea, Mignonette, Datura, Chrysanthemums and Petunias.

Thirteen tubers of dahlias were planted and the plants bloomed very well. The Sundew produced more than sixty-five blossoms during the summer.

Fifty-nine Gladiola bulbs and 200 bulblets were planted March 27, 1913. This included twenty-six named varieties. One of Groff's hybrids was selected as the best one. It produced thirty-one blossoms, blossoming from July 4 to July 17, or thirteen days for the thirty-one blossoms. The blossoms were yellow splotched with dark red.

Cannas were grown successfully.

Thirty-two German Iris, all named varieties, were grown with fair success.

The Virginia Creeper and the Japanese Kudzu vines were planted. The Kudzu vine made a rapid and extensive growth.

SHADE AND ORNAMENTAL TREES AND SHRUBS.

Tree planting should be practiced to a much greater extent throughout the plains of Texas. There are practically no native shade or ornamental trees growing in this section. The trees planted on the substation grounds consist mostly of black locust, seedling apricots, Norway and Lombardy poplars and weeping willows. With a little care there is no difficulty encountered in growing shade trees. Wherever possible, trees should be grown in rows or in such position that they can be given clean culture.

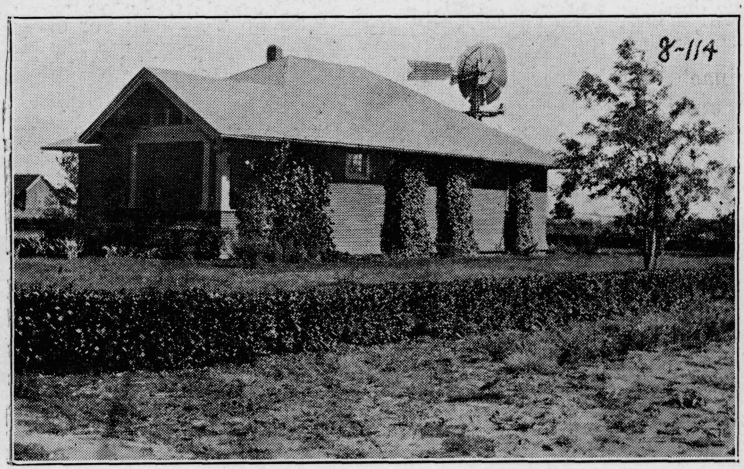

Fig. 8—A comfortable farm home helps make farm life more attractive. This house was made attractive by the use of some of the common flowers and shrubs adapted to this section. Residence on Substation No. 8, Lubbock, Texas.

Several rose bushes and bridal wreaths were planted and were successfully grown.

The Superintendent's residence is surrounded by a lawn which is bounded by a hedge of California privet. It has grown successfully and makes an attractive hedge.

ORCHARD AND VINEYARD.

An orchard of 182 trees was set out in 1911 and 1912. It consists of peaches, apples, apricots, pears, plums and cherries. No fruit with the exception of a few apples was produced previous to 1914. The orchard is growing nicely and should produce well later.

A vineyard consisting of 125 vines was planted in 1911 and 1912.

A number of the vines died out and had to be replaced, but grapes are especially well adapted to this section and the vineyard is now producing an abundance of fruit.

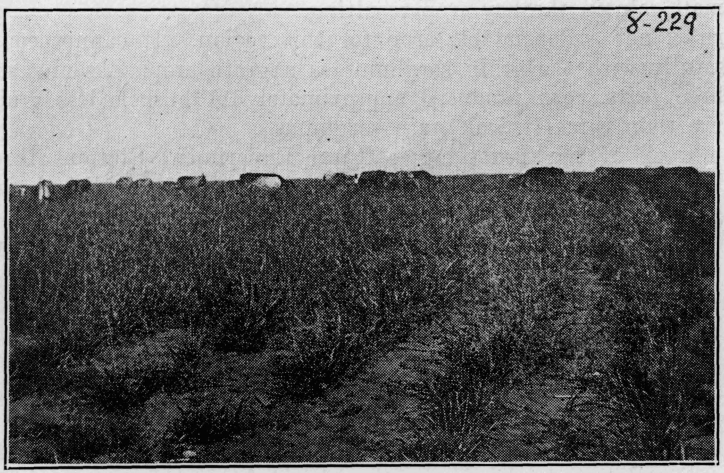

Fig. 9—View of orchard, which at present time is devoted to variety testing of fruits.

SUMMARY.

Substation No. 8 was established in 1909 for the purpose of collecting reliable information on agricultural problems which would be of assistance to the farmers in this region.

The surface soil is sandy loam with a subsoil of sandy loam to sandy clay.

The annual rainfall is about 21 inches; an average of four years rainfall at the substation, however, shows 20.32 inches. About three-fourths of the annual rainfall comes during the growing season.

The average dates of the first and last killing frost are April 8 and November 1 for a three-year period.

Of seven lots of grain sorghums tested for three years, the varieties ranked as follows:

Feterita.
Blackhul kafir.
Dwarf milo.

Of eighteen varieties of grain sorghums tested for two years the varieties ranked as follows:

Pink kafir.
Blackhul kafir.
Feterita.
Dwarf milo.

Averaging all tests, feterita has made slightly better yields than have the other grain sorghums, with kafir second and milo third. Of the dwarf varieties, milo has been the best yielder.

Results for 1913 and 1914 with spacing tests with grain sorghums seem to indicate that the thicker rates of planting gave the higher yields.

When cowpeas have been planted between rows of grain sorghums there has been a loss in the grain crop which is probably greater than the small gain in the hay crop resulting.

Corn is not a dependable crop for this region. It cannot compete successfully with the grain sorghums as a grain crop. As an average for three years, corn produced approximately 11 bushels less grain to the acre than three typical grain sorghums.

The work of the Texas Agricultural Experiment Stations through the dissemination of seed and other activities has established Sudan grass firmly in this part of the state.

Sudan grass and cowpea mixtures showed a less yield than Sudan grass alone.

The maximum rate of 6.9 pounds of Sudan grass to the acre in 36-inch rows gave the maximum yield of 4.45 tons of hay to the acre. When planted in close drills a rate of 15 to 20 pounds to the acre gave best returns. Eighteen-inch rows gave highest yields as an average for two years, while 22-inch rows yielded the best in 1914.

Results from date of seeding experiments with Sudan grass favor the earlier dates of planting, although good yields were obtained by planting as late as the middle of June.

A yield of over twenty-one tons of green forage and nine tons of dry forage were obtained from sorgos in 1914. The Sumac variety is best adapted to this section. The sorgos are an important crop in this section for silage and roughage. The seed yield of these crops often compares favorably with that of the grain sorghums.

With a sorgo-legume mixture the proportion of one of sorgo to four of cowpeas, planted in 36-inch rows, gave the best returns. The seeding rate should be at the rate of some 15 to 20 pounds of the mixture to the acre.

Cotton is well adapted to this district and produces well. As an average of three years, Burnett has yielded 1199 pounds of seed cotton, and Mebane has yielded 980 pounds of seed cotton. Burnett has a medium small boll, while Mebane has a large boll.

A distance of from six to nine inches apart in three-foot rows gave the best yields of cotton in 1914. Results seem to indicate, however, that during a favorable season there may be a wide range of spacing between plants in the row without materially affecting the yield. In a thinning test covering three years, the average yield favors a space of between nine and twelve inches apart in three-foot rows for cotton.

The cowpea is the best annual legume. The seed yields are usually good but the forage production is rather low. As an average of three years, when cowpeas were sown in close drills for forage production a rate of seven pecks to the acre gave the highest yields of hay.

As an average of two years, when cowpeas were seeded in rows for forage production, a rate of 18 to 20 pounds to the acre gave the heaviest

yields, with one exception. Close drilling has yielded more forage than row planting.

As an average of three years, Spanish peanuts have yielded 32.15 bushels to the acre.

Alfalfa is being raised with a fair degree of success on the substation; the work, however, has not progressed far enough to appear in this publication. Growing this crop in rows has considerable promise.

Sweet clover tests thus far conducted have been very favorable.

Field beans have been grown with satisfactory results.

In favorable seasons, winter wheat is a successful crop.

Early varieties of spring oats have made better yields than the southern varieties.

Spring barley has yielded slightly better than the better sorts of spring oats.

Two tons of manure to the acre produced a gain of 2.4 bushels of feterita and 68.9 pounds of seed cotton.

Results are reported on work with garden crops, flowers and vines, shade and ornamental trees and orchard and vineyard.