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Report of the work done at Holly Springs Branch Experiment Station, 1913

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Mississippi Agricultural Experiment Station

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REPORT OF THE WORK DONE AT HOLLY SPRINGS BRANCH EXPERIMENT STATION, 1913

By C. T. AMES.

FIG. 1.—BADLY ERODED LAND WHICH HAS BEEN PUT BACK INTO CULTIVATION.

AGRICULTURAL COLLEGE, MISSISSIPPI

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*In co-operation with U. S. Department of Agriculture.

SOIL EROSION

The desire to ascertain a practical and satisfactory method of controlling soil erosion in the northern section of Mississippi, no doubt had more to do with the location of this Branch Agricultural Experiment Station in this section, than any other one thing. Soil washing is the curse of the area surrounding the Station. The existing conditions that are found in the Brown Loam area—the light silty soil, with sandy foundation in many instances—are peculiarly favorable to easy and excessive erosion, and during the half century or more that these lands have been cultivated, the erosion has been most extensive and appalling. Originally these soils were very productive, and such is the case today where the original soils are found. Just as these soils wash easily, so is it easy and inexpensive to fill the smaller gullies and washes. After a gully gets to be 6, 8, or 10 feet deep, it becomes very much more difficult to fill. Underneath these soils, at a depth of about three feet, we strike in many instances a whitish, hard, impervious clay that is very hard to work. In many instances also we find a reddish soil that somewhat approaches sandstone in texture. The two subsoils described above, when exposed to the weather, denudate very rapidly, especially after freezes. The rains that follow these freezes wash out of the gullies the soil that has sloughed off and in many instances deposit it in the valleys. The tendency of the country is to level up. There are thousands of acres of steep hills in this section that should never have been cleared. Since this has been done, however, they should have been sodded to bermuda grass and lespedeza and utilized as pasture, and it may be stated here that this is the thing to do today where possible. We will discuss this point more fully elsewhere in this bulletin.

The following pictures show a class of work that has been done at this Station. It should be remembered that a photograph can take in a very small scope. However, we shall depend almost entirely on the following pictures to do the talking, stating only that we depended almost entirely upon mules and darkey labor to do the work. The common drag scraper and a turning plow were the only tools used except the mattock and spade used in edging the gullies so the teams would take them. We used some dynamite to advantage, but found the teams and labor the cheapest in most instances. This class of work was done during the winter months when but little else could be done.

FIG. 2.—CONTROLLING SOIL EROSION.

From Left to Right, Top Row.—Station residence from northwest corner of lot, before work was done. On right after completion.

Bottom Row on Left.—Station residence from rear after a snow. On the right, several years later, after the gullies were filled.

FIG. 3.—CONTROLLING SOIL EROSION.

From Left to Right, Top Row.—View of old mule barn before improvements were made. View of new mule barn built on old foundation after improvements.

On the Left, Bottom Row.—A more distant view of mule barn. On the Right.—View after improvements were made.

FIG. 4. CONTROLLING SOIL EROSION.
Top Row on the Left.—A gully 100 yards long. On right from same viewpoint after gully was filled.
Bottom Row.—On left, a typical gully of this section. On right from same viewpoint, two or three years later.

FIG. 5.—CONTROLLING SOIL EROSION BY DYNAMITE.
From Left to Right, Top Row.—A gully before dynamite is used. On Right.—Same gully after $1.00 worth of dynamite is used.
Bottom Row on Left.—Gully before dynamite is used. On Right.—The same gully after $3.00 worth of dynamite is used.

FIG. 6.—CONTROLLING SOIL EROSION.

Top Row on the Left.—A system of ponds or gullies connected by a terrace so as to carry off excessive water after rains. On Right.—Black locust plantings on gullied lands to check soil washing, and as a method of gully filling.
Bottom Row on Left.—Wild honeysuckle growing on the bank of a gully, which checks erosion. On Right.—Narrowing a sand ditch or drain and sodding banks in bermuda grass to replace timber growth.

GULLY FILLING.

The foregoing pictures show the different methods we have employed in gully filling. Gullies have been filled on the Station grounds that cost all the way from $1.00 to $75.00 per acre. Where the gullies are small, it is a very easy matter to fill with turning plow and drag scraper. When the gullies are much larger, satisfactory results can be had by running terraces about 75 yards apart on the hillsides. These terraces will simply be a system of ponds joined together by drains. During excessive rains these drains carry off the surplus water, which prevents the ponds from overflowing. These ponds will catch all of the soil that is washed from the sides of the hill, and after a time, with the assistance of a sod of some kind such as bermuda grass, or wild honeysuckle, or plantings of black locust, even the worst of these gullies will produce a revenue. A plow can be used to good advantage in many places between and on the edge of these gullies to assist nature in the filling. Even if the terraces are not used, the sod or black locust plantings will assist greatly in checking the erosion, and will extend a hope of future revenue, which no man can expect as many of the gullies stand today.

To Prevent Soil Washing.—Anything that will hold the soil in place, such as a sod of bermuda or lespedeza, is excellent; any device that will control the running water so as to make it move slowly is more or less helpful and satisfactory.

Three methods of terracing have been developed with the view to prevent washing. The first is to have a system of level embankments about four feet wide and eighteen inches high. The rows are level and parallel to the embankment. This method is employed where both surface and subsoil are porous and absorb water rapidly. It aims at holding the water practically where it falls until it has soaked into the soil.

The second system of terracing follows the plan of letting the surplus water run, but, by means of rows and embankments, making it run more slowly. To accomplish this, each embankment and each row is given a little fall—the embankment being required to do the bulk of the work.

The third system aims at producing by a method of plowing, real terraces or comparatively level areas on the side or slope of the hillside. To accomplish this, lines of level are run the same as in system one, but no embankments are made. A hillside plow that turns all furrows down hill is always used in breaking.

The second system is the one used on the Station farm. The embankment is essentially a very much enlarged hillside ditch, the bottom being from four to six feet wide and the bank from six to ten wide and about eighteen inches high. Implements can be used and this broad, shallow ditch and broad embankment on gently sloping hillsides can be crossed with rows and so cultivated as to lose very little land. Thus it can be kept as free from weeds and grass as other parts of the field. See figure number 7.

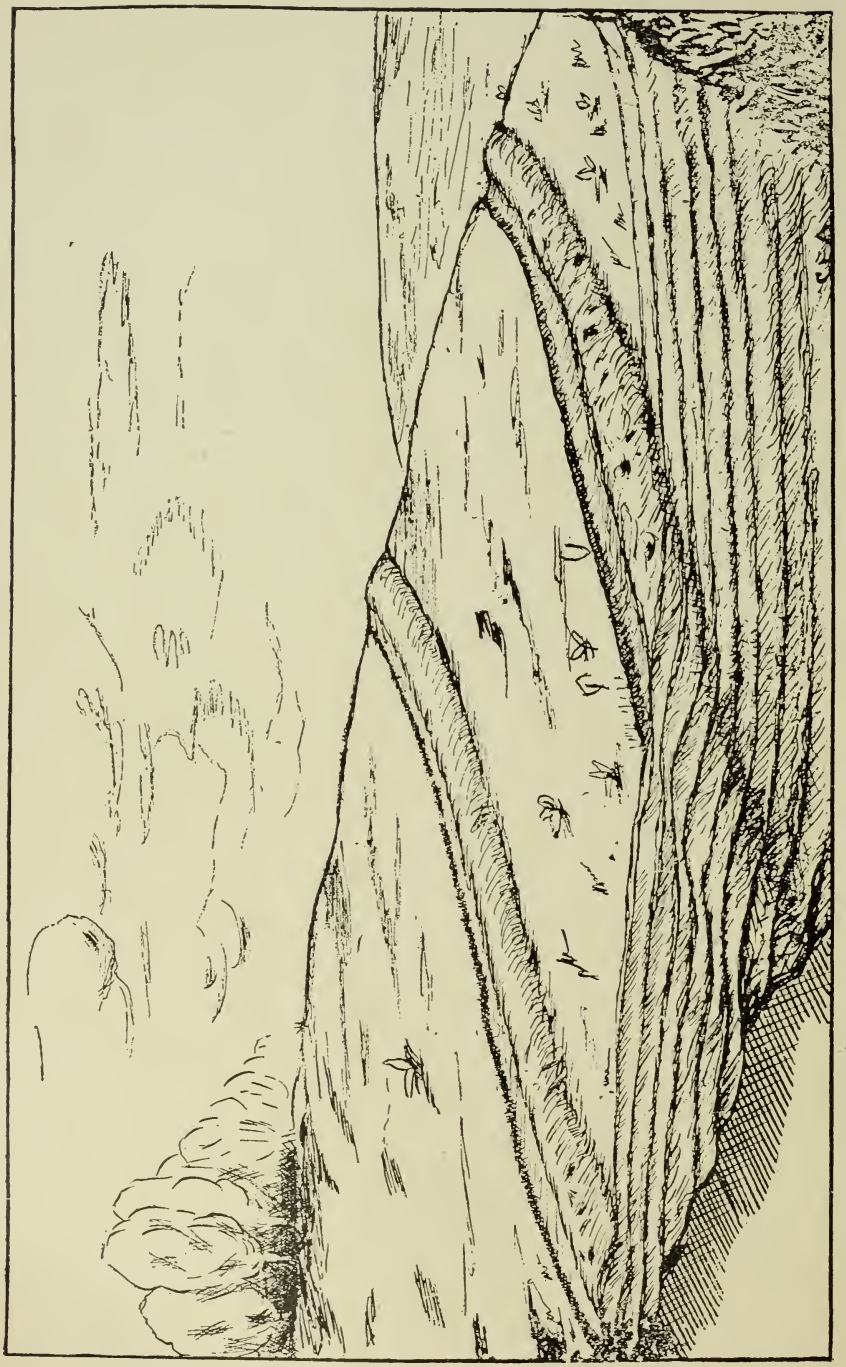

FIG. 7.—SHOWING GRADED EMBANKMENTS WITH ROWS CROSSING.

Where the hillside is more sloping, in this character of soil, it is best not to break the slope of the embankment but to use the terrace as a turn row. The loss of land in this system is not as great as in either of the other systems. In the South, where the rainfall is heavy, and on clay soils especially, this is the system to be used. This Station has about 15 miles of this style of terrace, and with the assistance of winter cover crops, soil washing is reduced to a minimum. We have found it necessary in very many instances to grade the uneven places with scrapers to get the best results in controlling the surplus water. Any low place will get lower after each rain, and it will be found inexpensive to use the plow and scraper on such places.

Laying Off a Terrace.—Use a level to obtain a uniform fall. Any cheap farm level can be used. The one used by this Station has a telescope and cost $15.00. Any place along the line of the proposed terrace may be used as a starting point. Seven inches fall to every 100 feet is enough, both for rows and terraces, but less may be used where the hillside is smooth and not very steep. After selecting the starting point, place the level at some convenient place that will keep the rodman the longest time within the range of the telescope. Level the instrument and keep it level. With rodman at starting point put down a stake. Then have the rodman raise or lower the target until on a line with cross wires of the telescope. Assuming, for description, that the mouth (or lowest part) of the terrace is selected as the starting point, let the rodman step 20 steps, or about 60 feet, in the direction the terrace is to run and lower the target four inches on the rod. Now let him move the rod up or down the hill until the target is again on a line with the cross wires in the telescope. When this point is found, stick up a stake. Again lower the target four inches on the rod and step in direction of terrace about 60 feet and locate second point as described above, and put down a stake and so continue to the end. When necessary to move the level, proceed as given for the first point, using the last stake set before moving as a new starting point for the second position of the level. When the stakes are all set, they are to be used as guides. The real line of the terrace is now made with a plow with the instrument man as a pilot ahead of the team. Getting an embankment or ditch properly located and with the right kind of curves is always a matter that must depend more or less on the judgment of the pilot, or man who walks in front of the team. Small irregularities of the surface affect the location of stakes and are ignored to some extent

in locating the exact line of the terrace. Use the stakes as a general guide only. A plow and scraper will obliterate the little irregularities in the construction.

Making a Terrace.—When the line of terrace or ditch has been determined, plow four to six furrows, turning the soil down the hill each time. Remove this plowed soil with a common drag scraper, making an embankment immediately below the plowed soil. A surface scraper, triangle drag, or road machine may be employed in this work. Make all terraces large enough to handle water after the heaviest rains.

As a general rule, the water in a terrace should run in the opposite direction to the water in the main drain into which it empties; that is, up the valley. The water in the rows should run in the same direction as the water in the main drain, or down the valley. (See figure No. 7). If an attempt is made to run the water in a terrace in the same direction as the water in the main drain, it can be readily seen that the fall of the terrace will have to be greater than that of the drain, or the terrace could not empty into it. In most instances this would be too great a fall.

The perpendicular distance between terraces may range between 4 and 8 feet according to the grade of the land. The distance apart should govern this point.

It is advisable to begin terracing at the upper end of a slope, so that the amount of water that should enter the terrace can be controlled.

Terrace the best and most productive part of your farm first, then the next best, and so on until the whole farm is terraced. If you begin on the gullied land, the chances are that you will become discouraged.

Terraces can be made at $1.00 per 100 yards, allowing for labor only. On gullied land the cost would be greater. This work should be done in late fall and winter when little else can be done.

VARIETY TEST WITH CORN.

Soil.—Valley land.

Date of Planting.—April 3, 1913.

Plats.—One row each, repeated five times, making a total of 1/14.7 acres to each variety, rows four feet wide.

	Name of Variety.	Yield in bushels per acre.
1.	Cocke's Prolific	53.3
2.	Batts' 4 Ear	52.
3.	E-1	49.4
4.	Hickory King	30.5
5.	Silver Mine	40.5
6.	Poor Land (E. B. Anderson)	39.6
7.	Cocke's Prolific (J. B. Allen)	55.9
8.	Square Deal	36.7
9.	Boone County White	47.1
10.	Welchell	44.7
11.	Hastings' Rockdale	36.7
12.	Reid's Yellow Dent	40.5
13.	Munson	47.1
14.	North Carolina Prolific	48.
15.	Funk's 90 Day	34.7
16.	Gourd Seed	44.9
17.	Eureka (Ensilage)	48.2
18.	Florida Flint	39.6
19.	Mosby (Station)	43.
20.	St. Charles	42.2
21.	Cocke's Prolific (from Nashville)	53.7
22.	Davis' Prolific	49.8
23.	Jones' Prolific	49.4
24.	Leaming (Northern grown)	30.5
25.	Hastings' Prolific	47.1
26.	Vardaman's Stooling Corn	57.8

Remarks.—The seed corn used in this variety test was secured from the growers in most instances and from seed houses only when necessary.

The yield was not what it should have been, as the corn was blown down about the time it began to shoot. It never fully recovered, and this prevented proper cultivation.

VARIETY TEST WITH COTTON.

Date of Planting.—April 22, 1913. **Soil.**—Brown loam valley.
Plats.—One row each, repeated six times, making a total of 1-12.25 of an acre per each variety.

VARIETY	Dates of Picking.			Total	Lbs. Seed Cotton per Acre.	Per Cent. Lint.	Length of Staple.	Pounds of Lint Cotton.	Pounds of Seed per Acre.	Total value per Acre.
	Sept. 25	Oct. 14	Nov. 15							
1. Dixie	26	44.5	43.5	114	1396	32	7-8	447	949	$68.88
2. Brandon	27.5	37.5	45.5	110.5	1353	37	1	500	853	76.39
3. Allen's Multiplier	31	34	39.5	104.5	1280	33	5-8	422	858	64.96
4. Dodd's Prolific	37	45	46.5	128.5	1574	31	1	488	1086	77.62
5. Truitt's 90-Day	32	39	49.5	120.5	1476	33	3-4	487	989	75.05
6. Simpkins	38	40	39	117	1433	35	7-8	502	931	76.89
7. Trice	49	50.5	51	150.5	1843	31	1	571	1272	90.86
8. Rublee	41	42.5	47.5	131	1604	34	3-4	545	1059	83.39
9. Ashcraft	31	45	43	119	1457	33	1	481	976	75.93
10. Half and Half	40	40	46	126	1512	39	3-4	590	922	87.43
11. Cook from Cook	45	44.5	46.5	136	1666	38	7-8	633	1033	95.20
12. Cook from Station	35.5	41	43.5	120	1470	38	1-2	558	912	83.19
13. Wannamaker-Cleveland	47	47.5	53.5	148	1813	37	7-8	671	1142	101.50
14. Cleveland Big Boll	40.5	46	44.5	131	1604	35	1	561	1043	86.66
15. Triumph	39	41	46.5	126.5	1549	38	1 1-16	588	961	89.92
16. Uncle Sam	43.5	41	47	131.5	1610	35	1 1-16	563	1047	87.67
17. Rowden	45.5	45	55	145.5	1782	34	1 1-16	606	1176	94.00
18. Calhoun	41	45	50	136	1666	33	1 1-16	550	1116	86.82
19. Lone Star	36.5	42	47.5	126	1543	35	1 1-16	540	1003	84.08
20. Express	44.5	48.5	47.5	140.5	1721	29	1 3-16	499	1222	90.12
21. Allen's Unknown	40	41.5	46	127.5	1562	31	1 3-16	484	1078	84.86
22. Durango	35	43	36.5	114.5	1403	32	1 3-16	440	954	78.14
23. Columbia	29	37.5	29	95.5	1169	31	1 1-4	362	807	65.73
24. Foster (Delta Station)	40	45	44	129	1580	31	1 3-16	490	1090	85.88
25. Sunflower	34	40	32.5	106.5	1304	27	1 3-8	352	952	71.74
26. Haaga No. 2	39	38	34	111	1360	28	1 3-8	371	989	75.43
27. Dodd's Prolific	43.5	46	43.5	133	1629	30	1 1-8	488	1141	82.58
28. Foster (Haaga)	46	42	43.5	131.5	1609	31	1 5-16	499	1110	93.71

Remarks.—Planting early, with normal seasons. The difference in the quality of the seed could affect results materially. All bolls that set, even on the late varieties, matured. In a few instances the very best stand was not secured.

Values on cotton of different staples at Aberdeen, Miss. Based on market of October 16, New York futures for January closing at 12.05 on that date. All values based on strict middling grade.

3-4 inch, 12 7-8 cts.; 7-8 inch, 13 cts.; 1 inch, 13 1-8 cts.; full inch to 1 1-16, 13 1-4 cts.; full 1 1-16 to 1 1-8, 13 1-8 cts.; full 1 1-8 to 1 3-16, 14 cts.; 1 3-16, 14 3-4 cts.; 1 3-16 full, 15 cts.; 1 1-4, 15 3-8 cts.; 1 1-4 full, 15 3-4 cts.; 1 5-16, 16 cts.; 1 3-8, 17 cts.

FERTILIZER TEST WITH COTTON.

Date of Planting.—May 10, 1913.

Soil.—Very poor red clay hill land.

Plats.—1/20 acre each.

Variety.—Trice.

Number.	Yield of seed cotton.	Number.	Yield of seed cotton.
1. 200 lbs. Acid phosphate	430 lbs.	5. No fertilizer	360 lbs.
2. 200 lbs Basic slag	520 lbs.	6. 400 lbs. Acid phosphate	390 lbs.
3. No fertilizer	370 lbs.	7. 400 lbs. Basic slag	540 lbs.

4. 400 lbs. Untreated ground phosphate rock ..... 480 lbs.

This plat (4) extends length of both sets of plats, as indicated here.

Remarks.—The basic slag contains about 50 per cent of free lime and from 15 to 17 per cent of phosphorus. It would appear that this slag has given the best results. There is no question but these soils are deficient in both lime and phosphorus.

EIGHT YEARS' RESULTS WITH FERTILIZERS UNDER COTTON

YIELD OF SEED COTTON PER ACRE.

200 Pounds Fertilizer per Acre.

FERTILIZERS.	1906	1907	1908	1909	1910	1911	1912	1913	Eight years average
1. No fertilizer	520	860	820	310	300	400	300	200	464
2. 200 lbs. Cottonseed meal	680	1140	1240	615	900	885	600	530	824
3. 200 lbs. Acid phosphate	1180	1200	1420	690	1060	1020	670	760	1000
4. 200 lbs. Kainit	520	940	890	460	470	600	460	330	584
5. No Fertilizer	560	860	790	365	290	480	320	230	487
6. 100 lbs. Cottonseed meal 100 lbs. Acid phosphate	980	1140	1240	615	1160	985	730	730	948
7. 100 lbs. Cottonseed meal 100 lbs. Kainit	640	880	1000	550	800	760	620	460	714
8. 100 lbs. Acid phosphate 100 lbs. Kainit	960	980	1100	625	910	845	700	580	838
9. 120 lbs. Acid phosphate 40 lbs. Cottonseed meal 40 lbs. Kainit	1040	1030	1230	670	800	680	680	630	843
10. No fertilizer	600	760	820	340	250	500	230	240	468
11. 150 lbs. Cottonseed meal 50 lbs. Acid phosphate	940	900	1120	580	820	720	510	640	779
12. 100 lbs. Cottonseed meal 100 lbs. Acid phosphate	940	820	1190	630	810	760	580	660	799
13. 50 lbs. Cottonseed meal 150 lbs. Acid phosphate	800	1120	1210	660	800	620	620	580	801
14. No fertilizer	660	690	910	330	340	400	320	200	481

EIGHT YEARS' RESULTS WITH FERTILIZERS UNDER COTTON

YIELD OF SEED COTTON PER ACRE.

400 Pounds Fertilizer per Acre.

FERTILIZER.	1906	1907	1908	1909	1910	1911	1912	1913	Eight years average
1½. No fertilizer	420	580	560	260					455
2½. 400 lbs. Cottonseed meal	780	780	920	470					736
3½. 400 lbs. Acid phosphate	850	940	1070	425					821
4½. 400 lbs. Kainit	420	780	790	400					598
5½. No fertilizer	540	800	650	230					555
6½. 200 lbs. Cottonseed meal 200 lbs. Acid phosphate	1120	1160	1540	910	1186	1245	880	520	1070
7½ 200 lbs. Cottonseed meal 200 lbs. Kainit	760	1080	1180	660	830	1000	730	620	858
8½. 200 lbs. Acid phosphate 200 lbs. Kainit	1180	1200	1460	700	1030	945	750	730	999
9½. 240 lbs. Acid phosphate 80 lbs. Cottonseed meal 80 lbs. Kainit	1218	1270	1570	840	1050	1025	780	610	1045
10½. No fertilizer	520	850	920	250	200	340	270	210	445
11½. 300 lbs. Cottonseed meal 100 lbs. Acid phosphate	1040	1170	1650	850	940	1000	820	1000	1059
12½. 200 lbs. Cottonseed meal 200 lbs. Acid phosphate	1040	1180	1680	830	1000	1030	700	780	1030
13½. 100 lbs. Cottonseed meal 300 lbs. Acid phosphate	760	1060	1080	600	670	850	500	560	760
14½. No fertilizer	700			430	450	340	380	280	430

All of these plats were located in the field as indicated in this table. Only a six foot space between the two sets of plats.

Remarks.—All of the fertilizer plats planted to cotton in 1913 were planted about as early as weather will permit in this latitude. The growth was somewhat retarded early in the season on account of cool, wet weather. Taking the season as a whole it may be considered as normal.

Conclusions.—The use of both nitrogen and phosphorus, either alone or in combination, has given very satisfactory results.

Phosphorus hastens maturity. Valley land that is slow in maturing a crop can be very greatly benefitted by its use.

The use of potash, either alone or in combination with other elements, appears to be unnecessary in these soils.

On thin uplands, the use of an equal mixture of acid phosphate and cotton seed meal, at the rate of 200 pounds to 300 pounds per acre, gives very satisfactory results, and has done so for the past eight years. Two hundred pounds of this mixture has increased the yield of seed cotton in many instances over 500 pounds per year. On the more fertile soils the quantity of phosphorus may be increased to advantage.

Acid phosphate alone, 200 pounds to 300 pounds per acre, can be used to profit after leguminous crops.

The use of 300 to 400 pounds of rock floats will give good results where leguminous crops are to be grown. No legume will make satisfactory growth on the thin uplands of this section without the use of about 2 tons of crushed or ground limestone per acre.

Where rock floats are mixed with manure, or with compost, the phosphorus is made available for plant use.

FERTILIZER AND LIME TEST WITH COWPEAS.

Soil.—Table land, brown loam in texture.

Plats.—1/20 acre each, consisting of four rows. One half of each plat was cut for hay; on the other half the peas were picked.

Variety.—Mixed Whippoorwill and Clay peas.

Planted.—June 7, 1913.

Fertilizer per Acre.	Yield of hay per acre.	Yield of peas per acre.
1. No fertilizer	2400 lbs.	16 bushels.
2. 500 lbs. Air slaked lime in drill	3360 lbs.	23 bushels.
3. 200 lbs. Basic slag	3000 lbs.	23 bushels.
4. 200 lbs. Rock floats	3600 lbs.	20 bushels.
5. 200 lbs. Acid phosphate	3800 lbs.	24 bushels.
6. No fertilizer	2700 lbs.	20 bushels.
7. 500 lbs. Crushed limestone	4080 lbs.	25.5 bushels.
8. 2000 lbs. Air slaked lime broadcast	4360 lbs.	25 bushels.

Conclusions.—Lime and phosphorus are both very beneficial.

Remarks.—Continued rains at hay harvest affected results to some extent.

One application of lime, at the rate of 2 tons of crushed stone or 1 ton of air slaked lime per acre, will increase the yield of most legumes each year for several years. Lime will give better results when used under leguminous crops; however, on these soils, almost any crop will respond to the use of lime. Ten tons of lime per acre for the contents of the first seven inches of a soil is considered the minimum amount of lime for a maximum crop production, whereas these soils contain only about 4500 pounds. In 1912 at this Station, the yield of seed cotton was increased from 600 pounds on unlimed land to 820 pounds on soils that were limed, and the same year the yield of corn was increased 13 bushels per acre by the use of lime; that is, the unlimed soils produced 57 bushels and the limed soils in the same test produced 70 bushels per acre.

It should be understood that lime is not a fertilizer. Lime sweetens and tends to flocculate a soil and will give best results with leguminous crops, after which other crops are greatly benefitted.

We have adopted the practice of applying lime in the fall on land that has recently been turned and harrowing it in thoroughly so as to incorporate it with the soil. Such a method has proven satisfactory. Crushed limestone (dust from under a rock crusher)

cost delivered here $1.75 per ton. This limestone analyzed 67 per cent calcium carbonate. Limestone can be had along both the I. C. and Southern Railroads at about the price given above. Below is figure number 8 showing the results of the use of lime and no lime under soybeans.

FIG. 8.—EFFECT OF LIME UNDER SOYBEANS.

On the Left.—No lime was used.
On the Right.—Two tons of crushed limestone per acre was applied the fall before.

VARIETY TEST WITH SOYBEANS AND COWPEAS.

Soil.—Table land, brown loam in texture.

Plats.—1/20 acre each. One half of each variety was cut for hay; of the other half, seed were saved.

Date of Planting.—June 7, 1913.

Fertilizer Used.—500 pounds acid phosphate per acre.

Cowpeas.

1.	Unknown	4660# vines per acre	10. bushels peas
2.	New Era	3540# vines per acre	22.3 bushels peas
3.	Iron	3960# vines per acre	14.8 bushels peas
4.	Taylor	4340# vines per acre	21.7 bushels peas

5. Red Ripper ..... 4420# vines per acre 14.2 bushels peas
6. Black ..... 4540# vines per acre 14.2 bushels peas
7. Large Black Eye ..... 3260# vines per acre 17.1 bushels peas
8. Ramshorn Ea. Black Eye ..... 2448# vines per acre 18.2 bushels peas
9. Brown Eyed White ..... 3676# vines per acre 19.4 bushels peas
10. Clay ..... 4540# vines per acre 14. bushels peas
11. Blue Whippoorwill ..... 3908# vines per acre 24. bushels peas
12. Brown Whippoorwill ..... 3840# vines per acre 28.5 bushels peas
13. Black Eyed White ..... 3610# vines per acre 10.8 bushels peas
14. Brabham ..... 3604# vines per acre 29.1 bushels peas
15. Groit ..... 4084# vines per acre 26.8 bushels peas

Soybeans.

16. Mammoth Yellow ..... 3660# vines per acre 12.7 bushels beans
17. Small Yellow ..... 3340# vines per acre 14.0 bushels beans
18. Black Soybean ..... 2600# vines per acre 10. bushels beans
19. Hollybrook Ea. ..... 2800# vines per acre 9. bushels beans
20. Brown Soybean ..... 1960# vines per acre 14.7 bushels beans
21. Ea. Dwf. Green ..... 1580# vines per acre 7.3 bushels beans

Remarks.—Continued rains at hay harvest affected results to some extent.

Some of the varieties, such as the Unknown, Clay, Red Ripper, and Black pea, are late maturing varieties and did not mature all of their seed. Such varieties should be planted earlier for best results.

Soybeans.—Both the Mammoth and Small Yellow made excellent growth, attaining a height of four feet. A mistake was made in attempting to save the seed by the use of a threshing machine. As a result many of the seed were lost in curing the vines and in transit to the thresher. The results given above are much less than the actual yield.

STRAWBERRY GROWING.

Strawberries for market have proven a profitable crop in most instances. The berries are large, well colored, and of the finest quality. Soils that would not produce more than one-half bale of

cotton, under favorable conditions, have for the past six years produced an average of 68 bushels of merchantable berries per acre.

The following table gives data obtained:

Years	Acres.	Total crates.	Total sales.	Average per crate.	Number of crates per acre.	Total cost of crates and picking.	Net per acre.	Total net.
1908	5	571	$ 903.84	$1.80	114	$375.98	$105.57	$527.86
1909	5	418	883.75	2.11	83.6	331.44	110.46	552.32
1910	6	486	642.56	1.32	81	329.23	52.22	313.21
1911	8	856	1146.46	1.34	107	576.40	71.25	570.06
1912	6	432	531.92	1.23	72	299.44	38.72	232.48
1913	6	523	475.11	.90	87	339.95	22.53	135.16

The above table gives a net average for the first four years of $84.85 per acre, and for the last two seasons $30.63, or an average for the six years of $66.80. The average date of first picking for the first four years was April 22, and the seasons lasted an average of five and one-half weeks. The last two seasons the first pickings were two weeks later, and the seasons lasted less than two weeks.

The seasons for planting berries are October and November, and February and March. Early fall plantings will produce a light crop the next spring.

As berries are to occupy the same soil for at least three years, thorough preparation of the soil and a liberal use of manures will pay. Plant in 4 foot rows, slightly elevated, with plants about 18 inches apart in the row. By the end of the first season, with proper treatment, the rows should be covered 6 or 8 inches wide with plants. When spring plantings are made, cultivation should begin shortly after planting and be continued until early fall. The cultivation is the same as for any well cultivated crop. Probably the best results can be had with shallow cultivation as soon as possible after each rain. In this latitude no covering whatever is necessary in winter. Cultivation should not begin in the spring until after the berry season is over, but should begin as soon as possible after the season is ended. Bar with a turning plow 4 furrows to the row, reducing the tops of the rows to about 7 inches in width, and harrow down the middles at once. From 300 to 500 pounds of an equal mixture of cotton seed meal and acid phosphate per acre should be applied to both sides of the row in the bar furrow at this time, and the middles turned to the rows and harrowed. After this, cultivation should be frequent and shallow as given above.

The success attained in marketing berries grown here should be attributed to the fact that we have been able to ship almost altogether by freight and in iced cars. The past two seasons, we found it necessary to make some shipments by express, which necessitated the paying of a higher rate of transportation, thus reducing the profits.

Where conditions will allow, a few acres in Klondyke strawberries can be made profitable, if there are enough growers to load iced cars daily. The one crop system is as dangerous in berry growing as in any other one crop. Berries can be grown on almost any soil in the State, and every farm in the State can grow enough for home needs at least.

Below is a picture showing berry picking on the Station farm:

FIG. 9.—STRAWBERRY PICKING.

THE DAIRY.

A twenty-cow dairy was installed August 1, 1909, purely as a demonstration feature of Station work. An attempt has been made to run the dairy so as not to interfere with the regular Station work. The dairy cattle were secured, here and there, from various parts of the County and are mainly low grade Jerseys. A daily record has been kept of each cow in the herd. The first season seven cows were found unprofitable and were disposed of at about what they cost originally. Others were put in their places. The twenty-cow dairy barn was constructed strictly on sanitary principles, and under the partial supervision of a man furnished by the Dairy Division, U. S. Department of Agriculture. The barn is known in the Department as "Barn No. 12 A." It has concrete

floors and troughs, steel stalls and stanchions, and plenty of light and ventilation. The milk house is 200 feet from the barn and has concrete floors and walls with doors and windows properly screened.

Cost of Equipment.

Dairy barn complete	$ 875.00
Milk house	125.00
Twenty cows (4 years ago)	665.00
Steam turbine separator (900 lbs. milk capacity per hour)	125.00
Steam boiler (3 H. P. upright)	76.00
Milk tester, churn, butter print, cans, shipping jackets, wash sink, milking pails, etc.	142.00
Total	$2,008.00

One year later a 100 ton concrete silo, with gas engine, silage cutter, and corn harvester, was added at a cost of $ 800.00

The following table gives four years' results with the dairy, including the number of cows in the dairy each month and the amount of cash received monthly, as sales of dairy products:

Month.	1910 Cows.	1910 Sales.	1911 Cows.	1911 Sales.	1912 Cows.	1912 Sales	1913 Cows.	1913 Sales.
January	19	$ 168.23	16	$ 151.34	13	$ 74.55	19	$ 176.45
February	19	170.58	16	132.50	13	87.85	16	137.59
March	18	164.15	14	149.55	11	79.40	15	159.75
April	18	170.56	13	145.50	16	156.70	16	180.47
May	17	146.20	15	198.50	17	210.65	19	218.45
June	18	178.65	18	187.25	19	215.65	19	179.30
July	17	147.25	17	198.65	17	161.35	20	196.55
August	18	162.85	17	175.00	19	183.65	19	192.45
September	19	178.90	17	158.75	20	194.50	18	167.50
October	17	167.15	16	171.55	20	189.00	18	160.15
November	19	155.10	15	108.95	21	161.75	18	136.29
December	19	160.80	15	94.95	21	156.41	19	162.40
Total Sales		$1960.42		$1872.49		$1871.46		$2066.95

Average gross sale per cow for 1910, $108.31; for 1911, $119.26; for 1912, $108.80; for 1913, $113.60.

Dairy Product.—Almost the entire output of the dairy has been sold as sweet cream. Some whole milk has been sold at 20 cents per gallon. Some butter has been made each winter and sold at about 30 cents in the local market; this we avoided when possible. The cream was sold at 4 cents a butter fat point delivered, or 80 cents per gallon for 20 per cent cream, less express. The only delivery made is to express office. Almost the entire output has been sold in Birmingham, Ala., some 200 miles away. At the above prices it equals butter at 43 cents per pound, and that without the cost of churning, printing, etc. Only one shipment is made daily, which reaches its destination early the next morning.

Handling the Herd.—One negro man, full time, and two men at milking time, constitute the dairy force. The cows are pastured night and day for about seven months, or during the pasture season, and are held under a shed night and day for about five months, or during the winter season. All of the hays are fed under the shed; the silage and grain are fed in the dairy barn at milking time. The herd is kept bedded and has access to clean water. Weekly applications of rock floats adds greatly to the value of the manure. There is no night work connected with running the dairy.

Feed.—The dairy cattle are fed in winter on pea vines, soybean hay, peas and sorghum, oat straw, corn silage, cotton seed hulls, and cotton seed meal. The feeding is done on the basis of the following ration: 30 pounds corn silage, 10 pounds pea-vine hay, 5 pounds cotton seed hulls; and 4 pounds of cotton seed meal per day for each cow weighing about 800 pounds and giving about 22 pounds of milk per day. This ration is a little narrow. If one pound of cotton seed meal were removed and two pounds of corn and cob meal put in its place, we would have a better ration. Valuing corn silage at $3.00 per ton, pea hay at $12.00, cotton seed hulls at $10.00, and cotton seed meal at $28.00 per ton, the above rations cost 15 1-2 cents per day per cow. The summer ration used is about 2 pounds of cotton seed meal and 4 pounds of cotton seed hulls per day while on pasture. On the basis of the above rations the following is an estimated cost of maintaining a cow in the dairy for twelve months:

Winter feed, 150 days at $0.155 per day	$22.25
Summer or pasture feed, 210 days at $0.048 per day	10.08
Pasture rent 2.5 acres at $4.00 per acre	10.00
Ice and fuel used in handling product, per cow	5.00
Total	$47.33

If we allow the value of the manure to offset the cost of labor in running the dairy, each cow in the dairy has produced a net average for the four years of about $65.16. This does not take into account the skim milk fed to pigs and calves, nor the calves themselves.

Pasture.—The pasture is composed mainly of lespedeza and bermuda grass. White clover is now being added. Nine years ago the pasture land was badly gullied; today it is terraced and is supporting one cow to every two acres. Weeds and bushes are easily controlled by using the mowing machine once or twice a season.

Silage.—The best results in dairying or growing cattle of any kind cannot be had without silage as feed. At the present prices of hays, cotton seed hulls, and other feeds, there is no doubt that silage is very much cheaper than any of these. Land that will produce 30 bushels of corn per acre will usually produce 8 tons of silage. Corn silage can be grown and put in a silo for about $2.00 per ton, this is allowing rent for land and full cost of production. Mosby and Cocke's Prolific are both tall growing varieties of corn and fine for silage. Many crops can be used for silage. Indian corn is one of the most satisfactory.

The solid concrete silo at the Station has given most satisfactory results. No loss whatever has been sustained after the top was removed when feeding was begun. A coat of coal tar applied on the inside once every two years has prevented any damage in any way to the silo.

Remarks.—The dairy can be conducted without drudgery and without seriously interfering with other farm work. It furnishes a most satisfactory means of building up and maintaining farm fertility. It furnishes a home market for most of the farm crops, a good dairy cow paying the highest market price for feed. With cheap lands equally productive with any country, with long pasture seasons, short mild winters allowing the use of inexpensive barns, with the best markets in the South for dairy product, the opening is most flattering.

ALFALFA.

The report of the work done on alfalfa by this Station reached the public about one year ago as a circular, "Report of Work on Alfalfa at the Holly Springs Branch Station," and can be had for the asking. Here, we wish to discuss this subject very briefly, and more to induce farmers in the Brown Loam section to make a small planting, than for any other purpose. There is no doubt that it can be grown on almost any class of soil in this section.

The successful growing of alfalfa here may be summed up in the following: lime, fertility, inoculation, and fall planting. Lime should be applied the fall before at the rate of from 2 to 4 tons per acre, on land that was well broken for the purpose. This would be a fine time to add from 10 to 20 loads of manure per acre. Plant this land the next spring in some short lived crop such as cowpeas, potatoes, or beans; remove the crop early in July; turn the land very shallow and keep well harrowed until seed are sown. Plant 25 pounds of seed per acre, after rain, from the last of August to the middle of October, and harrow in. The seed bed should be firm. Three or four hundred pounds of soil from a well established alfalfa field will furnish sufficient inoculating material for one acre. Sow this soil on the land at seed planting and harrow in with the seed. You should get the first cutting of hay by the middle of May the next season, and this cutting should pay you for all expense you have had, except the manure.

Below is a picture showing hogs grazing May 1 on alfalfa that was planted the September before.

FIG. 11.—HOGS IN STATION ALFALFA.

LESPEDEZA, OR JAPAN CLOVER.

Lespedeza is one of the most valuable leguminous plants grown for pasture and forage in this section of the State. It adapts itself to almost any soil, sweet or acid, and from the poorest to the most productive that can be found. It will furnish, in season, as good grazing on the thin uplands, or produce as fine a quality of forage in the low valley lands, as any plant grown in the South.

While lespedeza responds to some extent to the use of lime, it is not benefitted anything like as much as most other leguminous plants. It responds readily to the use of phosphorus as a fertilizer. Below is a picture showing the results obtained from the use of 400 pounds of acid phosphate per acre. In this experiment the yield was more than doubled.

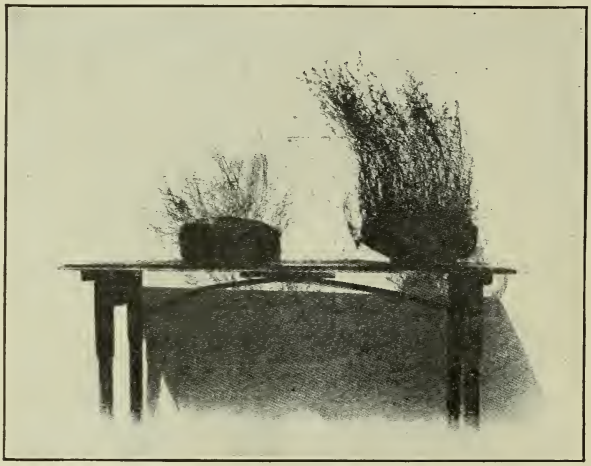

FIG. 12.—ACID PHOSPHATE UNDER LESPEDEZA.

The growth is slow in the spring, but as the season advances the growth is more rapid, and the lespedeza is ready for harvest as hay in early fall. On fertile soils it will produce from one to three tons per acre of very fine hay that is very easily cured. The plant is an annual, but if a few seed are allowed to mature before the plant is harvested, it will be perpetuated indefinitely. Where mowing is done early in the fall, the plant will in most instances make a sufficient growth after the mowing to reseed the land.

This plant should be used more extensively for hay in North Mississippi, but the soils should be prepared properly if the best results are expected. No plant responds quicker to good treatment than lespedeza. Every foot of uncultivated land, whether used for pasture or not, should be seeded to this plant, as it will add greatly to the fertility of the soil. No plant is more easily started than this, and live stock grazing on it when the seed are mature will scatter the seed in the manure that is dropped. The seed may be sown with oats of either fall or spring planting. After the oats are harvested, a fair cutting of hay can be had that fall. In this way this plant can be used in a system of rotation that will be most valuable to the soil. Some farmers in this section who grow considerable stock practice pasturing a piece of land two or

three years, and then putting it into cultivation, and putting the land that has been in cultivation into pasture. Where such a method is practiced, it is necessary to reseed this land for pasture. This reseeding may be accomplished by disking diagonally across the rows and running a section harrow at right angle to the disk and sowing the seed on top of the soil, or the seed may be sown on top of the ground without using the harrow. One bushel of seed (25 pounds) will seed an acre nicely, but very much less can be used with good results after the first year. Probably the best time to sow the seed is the latter part of February or early in March. Lespedeza grows nicely with bermuda and white clover, a combination that makes a most excellent pasture. The seed of this plant are very expensive, from $2.50 to $5.00 per bushel. Every farmer that cuts any lespedeza for hay should make an attachment for his mowing machine so the seed that shatter out in mowing may be saved. The seed thus saved can be easily cleaned sufficiently for home use. The yield of seed per acre is from 5 to 10 bushels, depending somewhat on the growth. The attachment shown in the figure below is very simple and inexpensive. The hay as it passes over the pan made of sheet iron that is attached to the upper side of the cutter-bar of the machine, shatters out a good per cent of the seed and these are caught in the pan.

FIG. 13.—MOWER ATTACHMENT FOR SAVING LESPEDEZA SEED.

The above cut is from Farmers' Bulletin No. 441, published by Mr. W. B. Mercier, of the Department of Agriculture, Washington, D. C., and is shown here through the kindness of the publisher.

THE SWEET POTATO.

This is one of the most universally grown crops in the State, and it is constantly growing in popularity in the Northern markets. This Station has begun a variety test with the sweet potato, and is also trying out the different methods of keeping them until ready for use or for market. It is not our purpose to make a full report here, as we have not secured sufficient data, but to make only a partial report. The following method of growing plants and cultivating the crop has proven satisfactory so far. Bed only the finest selected medium size potatoes, as the best plants can be grown only in this way. Bed the latter part of March, in this latitude, in a hot bed heated with stable manure. Five or six inches of soil should be placed between the manure and the potatoes. Place the potatoes close together without touching, and cover about two and one-half inches deep with rich, loose soil. The bed should be covered with canvas. This is to be left off except during rainy or cold weather.

The soil used here was brown loam of medium fertility. The rows should be 3 1-2 feet apart, the soil being well prepared, and fertilized with 400 pounds per acre, of a mixture of equal parts of cotton seed meal and acid phosphate. The fertilizer should be put down about three inches deep in the row two or three weeks before planting. Set plants about 18 inches apart in the row. Cultivate shallow and frequently.

Early Triumph.—Has so far proven to be one of the earliest and most productive varieties, producing the past season 224 bushels per acre. It is a good eating potato, a good grower, and one of the best keepers.

Nancy Hall.—A yellow yam, short vine, very prolific, and a splendid eating potato. The yield the past season was 173 bushels per acre.

The two varieties named gave the best results of any used in the test and will meet the demand for both home and market use.

It is generally conceded by the best growers that the main points in keeping the sweet potato successfully, are to handle exceedingly carefully to prevent bruising and to get rid of the excessive water in the potato as soon as possible after the potatoes are dug. In many instances growers are very successful in placing them in well ventilated bins, in houses built for the purpose, and allowing them to dry out by a free circulation of air. Others are

successful in bedding as soon as dug, in dry road dust or dry sand. The old-fashioned bank is still in use. In this method 25 or 30 bushels are piled in a cone shape around a ventilator and after drying out are covered with soil to protect them from frost, boards being placed between the potatoes and the soil. There is a method of drying out the excessive water by artificial heat, which is recommended by the U. S. Department of Agriculture in Farmers' Bulletin No. 548. The potatoes are placed in well ventilated bins, and heat is applied by coal or oil stoves for three or four weeks, or until the potato is thoroughly dried.

This latter method gave fair success this past season. The potatoes in the upper bins kept perfectly, while those in the lower bins did not keep so well, which would indicate that the heat was not kept up long enough. The warm winter also had some effect. The thermometer was kept at about 85 degrees for twenty days. A full report of this work will be made when sufficient data have been obtained.

CRIMSON CLOVER.

In the fall of 1913 crimson clover was sown broadcast in corn early in September, and the seed covered by a shallow cultivation. Part of this soil had been limed four years prior to seed sowing, on the other no lime had been used. On the limed soil the clover made splendid growth from the start, and on the unlimed soil the plant made poor growth, showing the want of proper inoculation. On the unlimed soil a light application of stable manure was added broadcast. These plants became inoculated early in the spring of 1914, and but little, if any, difference could be observed between the plantings on either the limed or unlimed soils. Crimson clover is making splendid growth with fall sown oats. The soil where corn was removed for silage, was disked and seeded to crimson clover, and it is making splendid growth. On soil turned in the early fall and seeded to clover, it made very poor growth, and many of the plants died on account of the dry fall, as there was not enough rain to settle the soil firmly.

In this section almost any well drained soil that has been well cultivated in either cotton or corn or almost any other crop, can be seeded to crimson clover to great advantage in the early fall.

There is no reason why a crop of corn and a crop of crimson clover cannot be grown on the same land each season, with an increase in the yield of corn each year that such a method is prac-

ticed. The yield of clover hay will approximate from one to two tons per acre. The cost of seed per acre, from 12 to 15 pounds, is about $1.00, with not more than $.50 for planting. Crimson clover hay is as valuable as cowpea hay for feed. When we consider the small cost of the seed, the time and method of seeding, the fact that it grows during the winter as a cover crop, the fact that it adds nitrogen to the soil, and the fact that the value of the hay is from $15.00 to $30.00 per acre, we cannot doubt that crimson clover is one of the most valuable crops that can be grown on any farm. There are but few, if any, plants that will furnish as much grazing in the early spring as crimson clover provides. Try an acre that is well drained near the house; seed this acre after a rain from latter part of August to middle of October, the earlier the better. Where sown alone, 15 pounds of seed is enough; if sown with oats, half that quantity will be sufficient. To begin with, all plantings should be inoculated. This Station will, upon request ship one sack of inoculated soil to any man in this section of the State, free of charge, except the freight. A light application of stable manure will assist greatly in inoculation. After this acre has been properly inoculated, soil from this acre can be used to inoculate your entire planting. The U. S. Department of Agriculture at Washington can furnish a culture that is very satisfactory for inoculation.