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## A Compilation of experimental and other data on winter legumes.

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A COMPILATION OF  
EXPERIMENTAL  
AND OTHER  
DATA  
ON  
WINTER LEGUMES

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Photo by Courtesy Alabama Agricultural Experiment Station, Auburn, Alabama.

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COMPILED BY  
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION  
IN COOPERATION WITH  
MISSISSIPPI STATE VOCATIONAL BOARD

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J. R. RICKS, Director,  
Mississippi Agricultural Experiment Station  
State College, Mississippi

State College, Miss.,  
August 7, 1934.

To the Vocational Agriculture Teachers and  
County Agents of Mississippi:

This is the first of a series of bulletins to be issued in cooperation with the State Vocational Board for your special use in teaching farmers and farm boys. We have begun this work in response to the many requests that you have made to the station for this specialized type of information.

We hope that this may reach you in time to be of maximum benefit to you. We hope that it serves your purpose properly. If, at any time, you have any suggestions for improvement, we hope that you will not fail to report such suggestions to us. We are here to serve the people of the state and feel that this is only one way of improving our service.

Very truly yours,

J. R. RICKS, Director  
Mississippi Agricultural Experiment Station.

# I. DETERMINING WHETHER OR NOT IT WILL PAY TO GROW WINTER LEGUMES.

## A. COST.

What is the cost of growing winter legumes? How does the cost compare with that of commercial fertilizers?

Table 1 shows the results of a study made by the Division of Farm Management and Costs, Bureau of Agricultural Economics on the cost of growing winter legumes.

TABLE 1. EXTRA COST PER ACRE TO PRODUCE CORN AND COTTON AFTER WINTER LEGUMES†  
COST FOR STARTING LEGUMES AT HIGH PRICES‡

Item	For Corn			For Cotton		
	Cash cost	Non-cash cost	Total cost	Cash cost	Non-cash cost	Total cost
Seed and inoculation .....	\$ 2.96	\$ .....	\$ 2.96	\$ 3.12	\$ .....	\$ 3.12
Man labor .....	.....	0.67	.67	.....	0.60	.60
Horse labor .....	.....	.80	.80	.....	.67	.67
Implement and machinery charge .....	.....	.27	.27	.....	.18	.18
Fertilizer .....	.81	.....	.81	.50	.....	.50
<b>Total .....</b>	<b>3.77</b>	<b>1.74</b>	<b>5.51</b>	<b>3.62</b>	<b>1.45</b>	<b>5.07</b>

### EXTRA COST ON SUBSEQUENT CROP

Man labor gathering extra yield .....	.35	.35	.45	2.50*	2.95
Ginning and wrapping extra yield .....	.....	.....	1.04	.....	1.04
Horse labor gathering extra corn .....	.35	.35	.....	.....	.....
Wagon charge gathering extra corn .....	.05	.05	.....	.....	.....
Hauling extra cotton to gin .....	.....	.....	.....	.60	.60
Extra work plowing down legume .....	.25	.25	.....	.30	.30
<b>Total .....</b>	<b>1.00</b>	<b>1.00</b>	<b>1.49</b>	<b>3.40</b>	<b>4.89</b>
<b>Grand total .....</b>	<b>3.77</b>	<b>2.74</b>	<b>6.51</b>	<b>5.11</b>	<b>9.96</b>

Credit for fertilizer .....	.90	.....	.90	1.31	.....	1.31
Credit for labor applying fertilizer .....	.....	.07	.07	.....	.04	.04
<b>Total Credit .....</b>	<b>.90</b>	<b>.07</b>	<b>.97</b>	<b>1.31</b>	<b>.04</b>	<b>1.35</b>
<b>Net cost at high prices** .....</b>	<b>2.87</b>	<b>2.67</b>	<b>5.54</b>	<b>3.80</b>	<b>4.81</b>	<b>8.61</b>
<b>Net cost at low prices§§ .....</b>	<b>1.88</b>	<b>1.48</b>	<b>3.36</b>	<b>2.39</b>	<b>2.52</b>	<b>4.91</b>

†4.145 acres of corn and 1.877 acres of cotton were studied.

‡Figures in last line of table show net cost at low prices.

\*This amount is about 85 per cent of the total of \$2.95 on the assumption that 85 percent of the cotton was picked by the families and only 15 percent was picked by hired labor.

\*\*Prices used in calculating costs: High prices: Man and horse labor, 15 cents an hour each; legume seed, \$3 an acre; ginning and wrapping \$5 a bale; fertilizers, prices of 1927, 1928, 1929.

§§Low prices: Man and horse labor, 7½ cents an hour each; legume seed \$2 an acre; ginning and wrapping, \$3.50 a bale; fertilizers, 85 percent of prices of 1927, 1928, 1929.

Reference: Table 7, page 12, Technical Bulletin 367, U. S. D. A. Washington, D. C.

Data compiled from a survey of 500 fields of winter legumes grown by 300 farmers in Alabama, Georgia, and South Carolina. Of the usable estimates of



acreage, 125 were made in 1929 for crops of cotton and corn grown after winter legumes in 1928 and earlier, and 375 were made in 1930 for crops harvested in 1929 and earlier. In addition, 31 estimates for corn crops and 14 estimates for cotton crops were obtained for a period of 3 to 5 years.

There were 264 estimates for corn and cotton after vetch, 193 after Austrian Winter Peas, 32 after crimson clover and 11 after Southern bur clover. The size of the vetch fields and winter pea fields averaged, in each case, a little more than 12 acres. The crimson-clover and bur-clover fields averaged approximately 7 acres each.

Both large and small farms were visited and estimates were obtained from areas as small as one acre and as large as 100 acres. Some farmers grew both vetch and winter peas and some had two or more tracts of the same legume growing under different conditions. The acreage frequency is as follows:

FOOTNOTE TABLE 1. CORN AFTER WINTER LEGUMES

Item	Item specified when size of field was					Total
	1 to 5 acres	6 to 10 acres	11 to 20 acres	21 to 50 acres	51 to 100 acres	
Estimates number	136	112	55	43	7	353
Legumes acres	459	995	852	1409	520	4145
Acres per estimate	3.4	8.1	15.5	32.8	74.3	11.7

COTTON AFTER WINTER LEGUMES

Estimate	number	Item specified when size of field was					Total
		1 to 5 acres	6 to 10 acres	11 to 20 acres	21 to 50 acres	51 to 100 acres	
Estimate number	59	34	31	18	5	147	
Legumes acres	202	291	474	535	375	1877	
Acres per estimate	3.4	8.6	15.3	29.7	75.0	12.8	

Reference: Table 2, page 3, Technical Bulletin 367, U. S. D. A. Washington, D. C.

It will be noted that the fields of corn following winter legumes averaged 11.7 acres, while the cotton averaged 12.8 acres. On all the size groups, the acreage per field for cotton and for corn was practically the same, except in that ranging from 21 to 50 acres.

FOOTNOTE TABLE 2—AVERAGE DATES OF SOWING VETCH AND WINTER PEAS.

Legume and section	For cotton		For corn	
	Reports	Sowing dates	Reports	Sowing dates
	Number		Number	
Vetch:				
North of 33°	31	Oct. 15	102	Oct. 15
South of 33°	10	Oct. 27	83	Oct. 22
Winter peas:				
North of 33°	14	Oct. 20	13	Oct. 19
South of 33°	42	Oct. 17	109	Oct. 20

Reference: Table 12, page 22, Technical Bulletin 367, U. S. D. A., Washington, D. C.

Note— The 33° line of latitude passes through Noxubee, Winston, Attala, Holmes, Humphreys, Sharkey and Issaquena counties.

FOOTNOTE TABLE 3—AVERAGE DATE OF TURNING UNDER VETCH AND WINTER PEAS AND OF PLANTING THE FOLLOWING CROPS

Legume and section	FOR COTTON		FOR CORN		
	Estimates on—		Date of—		
	Turning	Planting	Turning	Planting	Interval
	Number	Number			Days
Vetch:					
North of 33°	39	39	Apr. 23	May 8	15
South of 33°	10	10	Apr. 20	May 1	11
Winter peas:					
North of 33°	14	14	Apr. 19	May 10	21
South of 33°	44	45	Mar. 29	Apr. 19	21

FOR CORN

Vetch:					
North of 33°	110	113	May 4	May 19	15
South of 33°	86	86	Apr. 26	May 13	17
Winter Peas:					
North of 33°	14	14	May 1	May 12	11
South of 33°	112	112	Apr. 11	Apr. 28	17

Reference: Table 13, page 25, Technical Bulletin 367, U. S. D. A., Washington, D. C.

FOOTNOTE TABLE 4—PERCENTAGE OF CROP LAND DEVOTED TO VETCH AND WINTER PEAS ON FARMS OF SPECIFIED SIZE

Size group (crop acres per farm)	Farms*	Crop acreage		Acreage in vetch and winter peas		Percentage of crop acreage
		Total	Weighted average per farm	Total	Weighted average per farm	
0 to 50	50	2,096	42	355	7.1	16.9
51 to 100	109	8,842	81	903	8.3	10.2
101 to 200	115	19,284	168	1,783	15.5	9.2
201 to 400	49	13,880	283	802	16.3	5.8
401 to 600	43	23,825	554	1,129	26.2	4.7
Over 600	20	27,375	1,369	581	29.5	2.1
Totals and weighted averages	386	95,302	247	5,553	14.4	5.8

\*Some farmers gave estimates for more than 1 year.

Reference: Table 14, page 28, Technical Bulletin 367, U. S. D. A., Washington, D. C.

TABLE 2—AVERAGE INCREASE IN YIELD, COST, AND NET GAIN PER ACRE FROM THE USE OF WINTER LEGUMES FOR CORN AND COTTON

Item	Corn*		Cotton**	
	At high prices	At low prices	At high prices	At low prices
	Dollars	Dollars	Dollars	Dollars
Value of increase in yield§	14.10	7.05	18.00	7.00
Value of legume pasture and hay	.63	.30	.30	.15
Total	14.73	7.35	18.30	7.15
Net cash cost†	2.87	1.88	3.80	2.39
Net non-cash cost†	2.67	1.48	4.81	2.52
Total net cost	5.54	3.36	8.61	4.91
Net gain all costs considered	9.19	3.99	9.69	2.24
Net gain, only cash costs considered	11.86	5.47	14.50	4.76

\*4,145 acres with increase in yield per acre of 14.1 bushels.

\*\*1,877 acres with increase in yield per acre of 100 pounds lint.

§Corn is valued at \$1 a bushel, high-prices and 50 cents a bushel, low prices. Cotton is valued at \$90 a bale, cottonseed included, at high-prices, which is approximately 15 cents per pound of lint; and \$30 per ton of seed and \$35 a bale, at low-prices, which is approximately 6 cents per pound of lint and \$10 per ton of seed.

†Taken from the last 2 lines of Table 1.

Other conditions same as in Table No. 1.

Reference: Table 8, page 14, Technical Bulletin 367, U. S. D. A., Washington, D. C.

## B. INCREASED YIELD OF SUCCEEDING CROPS.

How much increased yield per acre may be expected on cotton from a crop of winter legumes? On corn? How does cover crop compare with nitrate of soda in producing cotton and corn?

TABLE 3—COTTON FOLLOWING COVER CROPS

Fertilizer N-P-K Cover Crops	Yield in pounds seed cotton per acre										8 Year Average	
	1926	1927	1928	1929	1930	1931	1932	1933	1934			
No nitrogen in fertilizer												
0-9-5 and Aus. Winter Peas	1286	817	594	1405	1020	2217	1293	2135	1346			
0-9-5 and Montanthe Vetch	947	958	667	1165	1071	1510	1130	1882	1166			
0-9-5 and Hairy Vetch	863	753	602	773	1012	1710	1010	2392	1140			
0-9-5 and Rye	960	895	577	885	830	1312	1233	1602	1037			
0-9-5 and No Cover Crop	691	683	422	717	322	1127	865	1125	744			
Nitrogen in fertilizer												
3-9-5 and Aus. Winter Peas	1294	793	696	1223	1189	1917	1283	2255	1331			
3-9-5 and Monantha Vetch	1228	973	802	1513	1473	1922	1220	2395	1441			
3-9-5 and Hairy Vetch	1330	865	807	1388	1147	1837	1233	2625	1391			
3-9-5 and Rye	1189	917	820	985	1271	1895	1095	2270	1305			
3-9-5 and No Cover Crop	956	786	662	965	447	1485	1092	1750	1018			

Reference: Georgia Coastal Plain Experiment Station Bulletin 21, page 44, Tifton, Georgia.

Cotton Variety: Petty's Toole.

Winter Cover Crop turned March 1st; cotton planted first week in April. No fertilizer was applied to cover crop.

Fertilizer: 1000 pounds per acre of the formula indicated.

Soil Type as given by the Tifton experiment station: "Sandy loam underlaid with firm subsoil." "Typical Tifton Sandy Loam." As given by the U. S. Bureau of Chemistry and Soils in "Soil Survey of Worth County, Georgia." "Tifton sandy loam is commonly known as "red pebbly" or "pimply" land. Typically, the surface soil consists of grayish-brown or brownish-gray loamy sand that is slightly heavier textured than the surface layer. The subsoil at a depth ranging from 8 to 15 inches is yellow or bright-yellow friable sandy clay. . . . It is slightly sticky. . . ." Quite similar to the sandy loam soils of South Mississippi.

Tifton, Georgia, is practically in the same latitude as Laurel, Brookhaven and Natchez, Mississippi. (Latitude 31.50, Longitude 83.50°.)

For green weights of cover crop in connection with the experiment, see Table 20, Cut March 1.

The land used for this test has been in cultivation about 40 years. The same land was not used every year of the test, but no record is available of the rotations used. No record is available of the crops grown on the land before the experiment was begun.

The cotton and corn green manure work recorded in this experiment and table 16 is planted on the same two acres every year, but cotton follows on the corn acre, and corn on the cotton acre. The acre that has corn this year will have cotton on it next year. The same two acres have been used throughout this test.

Rate of Seeding—Austrian Winter Peas, 40-45 pounds per acre. Monantha Vetch, 35 pounds, Hairy and smooth Vetches, 30 pounds per acre, Rye, 2 bushels per acre.

Date of seeding cover crop—About October 20.

Method of planting cover crop—The land was disked with a heavy disc harrow and dragged with a section harrow before planting, then planted with 2-horse 8-disc grain drill.

Method of turning cover crop—(1) Land broken with large 2-horse turning plow; (2) Disked and section harrowed; (3) Bedded for planting. Cotton planted on beds.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

TABLE 4—RYE AND VETCH VERSUS MANURE FOR SOIL IMPROVEMENT WHEN COTTON IS GROWN ON THE SAME LAND EACH YEAR.

	1926	1929	1930	1931	1932	1933	Average	1934
Plot 1—check .....	470	800	1020	865	1700	.....	.....	
Plot 2—8 T. fresh manure .....	610	1060	1340	1035	2046	.....	.....	
Plot 3—Rye and Vetch .....	470	1060	1000	1175	1902	.....	.....	
Plot 4—8 T. fresh manure, rye and vetch .....	775	1330	1750	1575	2588	.....	.....	

Reference: Farms Department, S. C. Experiment Station, Clemson College, S. C.

In 1927 and 1928 no record of yield was kept as stand was irregular on all plots.

There was a poor stand on plot 4 in 1933 which probably cut the yield on this plot 500 pounds per acre.

Planting date of cover crop—Abruzzi Rye and Hairy Vetch, Sept. 15 to Oct. 15

Fertilizer applied to cover crop—None.

Fertilizer applied to cotton—600 pounds 4-9-3 per acre at time of planting—150 pounds nitrate of soda as side dressing.

Seeding rates of cover crops—15 pounds vetch and 1½ bushels rye per acre.

Seeding rates of cotton—1½ bushels cotton seed per acre.

Variety—Dixie Triumph No. 25 Cotton Seed.

Rotation Used—None.

Date of turning cover crop—March 1.

Date of planting cotton—April 15 to April 25.

Soil type—Cecil Sandy Loam—In plowed fields, it has a surface layer of light brown or gray sandy loam extending to a depth ranging from 4 to 14 inches. The color tends to become lighter and more gray after long cultivation. This layer is underlain by a surface layer of reddish-yellow friable heavy sandy loam, usually 4 to 6 inches thick. (U. S. Bureau of Chemistry and Soils.)

Number years that land on which test was run has been in cultivation—Not known. Probably 50 to 75 years.

Crops on land for last two years before experiment was begun? Cotton. Fertilizer applied—600 pounds 4-9-3 and 150 pounds Nitrate of Soda. Yields—Not available.

Plot No. 1 was selected as the most fertile at the beginning of this test.

Has test been run continuously on the same land? Yes.

Clemson College, S. C., is on about the same latitude as Booneville and Senatobia, Mississippi.





**TABLE 6—THE EFFECT OF ROTATION AND COMMERCIAL FERTILIZER ON THE YIELD OF COTTON AT HOLLY SPRINGS, MISSISSIPPI**

Yields in pounds of seed cotton per acre.											
	1925	1926	1927	1928	1929	1930	1931	1932	1933	7 Yr Av.	1934
1. Cotton continuously without fertilizer .....	1561	1213	824	786	763	714	390	.....	.....	893	.....
2. Cotton continuously and 600 lbs. 4-8-8 .....	1996	2065	1238	1605	1814	1414	682	.....	.....	1545	.....
3. Cotton in rotation and 600 lbs. 4-8-8 .....	1550	1973	1637	2148	2401	1970	1061	.....	.....	1820	.....

Reference: Bulletin No. 296 Mississippi Agricultural Experiment Station, Table 14, page 11.

"In 1925 a cotton fertilizer test was started on one of these tracts and has been repeated annually without cover crops. The adjoining tract of six acres was divided into two, three-acre plots and continued in a rotation as follows: first year, cotton followed by vetch and the vetch allowed to mature; second year, Corn or silage followed by a volunteer crop of vetch, occasionally cut for hay; and third year, cotton. The volunteer vetch was plowed under about the first week in time for planting cotton April 21. Cotton was alternated from one plot to the other with corn and soybeans, or sorghum. Each year the rotation plot received an application of 600 pounds of 4-8-8 fertilizer, which is the same treatment given the continuous cotton plot."

The averages for the first seven years are as follows:

Plot 1	First 4 years	1096	Last 4 years	663.
Plot 2	First 4 years	1726	Last 4 years	1379.
Plot 3	First 4 years	1827	Last 4 years	1895.

**TABLE 7—WINTER LEGUMES VERSUS COMMERCIAL NITROGEN ON THE YIELD OF COTTON 1928-33 AT RAYMOND, MISS.**

Plot Treatment		Increase over no nitrogen check (Pounds seed cotton per Acre)					5-year average
Fertilizer 800 lbs. per A.	Cover Crop	1929	1930	1931	1932	1933	
6-8-4	None .....	503	383	597	445	597	505
0-8-4	Hairy Vetch .....	168	380	344	313	344	309
0-8-4	Monantha Vetch .....	252	125	374	126	374	250
0-8-4	Burr Clover .....	58	42	321	242	321	157
0-8-4	Crimson Clover .....	5	64	6	235	6	33
0-8-4	Aus. Winter Peas .....	170	32	152	335	152	153
Check plot yield							
0-8-4	None .....	1061	1207	783	576	919	909

Reference—1934 Report Raymond Branch Experiment Station, Raymond, Miss.

"The purpose of this test is to determine how much nitrogen is stored in the soil by various winter legumes. This legume nitrogen is tested against commercial nitrogen. This test is in four series and records for five years are available. The no legume plots carry 800 pounds of a 6-8-4 per acre except in one instance, we use a check which receives no nitrogen in any form. It does get 800 pounds of an 0-8-4 per acre as do all the legume plots. Vetch and Austrian peas have grown well each year, monantha vetch was damaged by cold two years, crimson clover was damaged two years and killed one year, and bur clover has had only one perfect stand, with thin stands the other four years. This test is continued and a companion test under new work was started last fall."

Planting date of cover crop—October 6, 1932.

Planting date of cotton—May 9, 1933.

Fertilizer applied to cover crop—None.

Method of seeding cover crop—Broadcast.

Seeding rates of cover crops—20 pounds for vetch, 30 pounds for peas, and 12 pounds for clover.

Seeding rates of cotton—1½ bushels per acre.

Variety of cotton—Lone Star.

Rotation used—None.

Date of turning cover crop—Turned April 2, 1933.

Spacing of cotton between rows and in drill—2 stalks per hill, 1 foot on 3½ foot rows.

Soil type—Brown loam—Type, Olivier, bottom land. The surface soil is a light brown to grayish-brown silt loam 8 to 14 inches deep with an average depth of about 10 inches. It has a smooth feel, and when dry is mellow and friable. When wet it is of a pasty consistency. The subsoil consists of a bluish-gray or mottled gray and brown, plastic silt loam or silty clay loam, which becomes quite compact at about 23 inches. Typically the brown silt loam passes gradually into the mottled gray and brown material.—(U. S. Bureau Chemistry and Soils.)

Number of years that land on which test was run has been in cultivation—14 of a certainty and 75 by hearsay

Crops on land for last two years before experiment was begun—Cotton, oats and vetch. Fertilizers applied—600 pounds 6-8-4 per acre. Yields—Half bale approximately; 300 pounds seed cotton on checks.

Test run continuously on same land.

Rainfall or temperature data of importance—Wet springs—dry summers.

Monantha vetch froze out in 1932, and in 1933, crimson clover in 1932, and no stand of bur clover in 1933.

Insects and diseases of cover crop—None to any noticeable extent.

TABLE 8—AVERAGE YIELD PER ACRE OF COTTON GROWN AFTER WINTER LEGUMES, BY SPECIFIED INCREASES IN YIELD

Increase in yield (pounds of lint)	Yield of lint per acre			
	Acres studied	After legumes	Not after legumes	Increase Pounds
Decrease .....	Acres	Pounds	Pounds	Pounds
No Increase .....	55	122	298	—176
1 to 50 .....	284	306	306	0
51 to 100 .....	195	315	282	33
101 to 150 .....	487	377	291	86
151 to 200 .....	470	405	270	135
201 to 250 .....	210	492	306	186
Over 250 .....	121	473	240	233
Over 250 .....	55	593	272	321
Total and weighted average .....	1,877	381	281	100

Reference: Table 11, page 18, Technical Bulletin 367, U. S. D. A., Washington, D. C.  
Other conditions same as in Table 1.

It will be noted that the yield was decreased on 55 acres on which cover crops were grown, and that there was no increase in 284 acres more.

TABLE 9—THE EFFECT OF LEGUMES TURNED UNDER ON THE YIELD OF SUCCEEDING CROPS

Pilot	Cropping System	Corn (Bushels per acre)															
		First 10 Yrs. 1896-1905	Second 10 Yrs. 1906-1915	1920	1921	1922	1923	1924*	1926	1927	1928	1929	1930	1931	1932	1933	11-yr. 13-yr. Av.
1	Corn each year peas last cultivation†	.....	19.2**	16.2	16.2	19.3	16.8	17.7	16.7	16.1	26.5	30.9	33.8	.....	.....	X	.....
2	Corn each year, no peas	.....	17.3	10.2	9.2	9.6	7.6	7.1	8.0	12.9	9.8	9.4	8.9	.....	.....	X	.....
4 & 7	(Two-year Rotation) Cotton and vetch Corn & vetch	.....	.....	14.3	19.1	12.1	10.9	.....	14.8	15.5	22.5	41.6	40.0	.....	.....	.....	.....
10 11 & 12	3 Yr. Rotation; Cotton, Vetch, Corn, Oats, Cow peas for hay, vetch	.....	.....	16.7	11.6	17.8	12.0	.....	17.7	16.3	31.7	38.0	25.2	.....	.....	.....	.....
1	Corn each year. Peas at last cultivation†	Cotton (Pounds seed cotton per acre)															
	(Changed to cotton each year in 1932 and legumes discontinued)	Study of residual effect of legumes															
2	Corn each year. No peas Change to cotton each year in 1932.	Study of residual effect of legumes															
3 & 8	Cotton and Vetch continuously. Vetch as cover crop	813	678	419	414	1024	445	.....	926	1161	1477	618	1079	.....	.....	.....	.....
4 & 7	(Two-year Rotation) Cotton and Vetch. Corn and Vetch	.....	.....	555	392	840	725	.....	1347	1146	1714	537	1283	.....	.....	.....	.....
5 & 9	(Two-year Rotation) Cotton and Vetch. Cowpeas§	890	958	1117	578	1430	1120	.....	1504	1411	1483	621	1144	.....	.....	.....	.....
6	Cotton continuously, no legumes	.....	803	307	227	546	152	.....	470	419	586	254	536	.....	.....	.....	.....
10, 11 & 12	3 Yr. Rotation; cotton, vetch, corn, oats, cowpeas for hay, vetch	.....	.....	237	499	720	909	.....	1155	1027	1235	432	1396	.....	.....	.....	.....



Reference—Alabama Bulletin No. 232, Table 1, page 6, Auburn, Alabama.

xPlots 1 and 2 have been discontinued in corn since 1931. They are now being planted to cotton to test the residual effect of the cover crops planted heretofore. They are receiving no nitrogen and no cover crop.

\*Results omitted in 1925 due to extremely dry weather. Results not comparable.

†Changed to corn and vetch in 1925.

§In 1932 and after, peas cut for hay and followed by vetch.

\*\*Only 9 crops.

In the fall of 1921, 400 pounds of superphosphate was applied to the west half of each plot. This was repeated on the same half of each plot in the fall of 1922. The east half of all plots received 800 pounds of superphosphate in the spring of 1923 to equalize the phosphate application. In the fall of 1923, and each fall since, 400 pounds of superphosphate per acre have been applied to the whole of each plot. All plots in experiment got 400 pounds superphosphate in the fall except plot 8, and it was only delayed until spring. All cotton and corn plots received 160 pounds superphosphate and 160 pounds of kainit each year at planting time. Seeding rate of hairy vetch—25-30 pounds.

Average yields of green matter from cover crops for 1926, 1927, and 1929, were as follows: Plots 1, 12,918 pounds; Plots 3 and 8, 9,570 pounds of green vetch, and Plots 5 and 9, 10,904 pounds green vetch.

Planting date of cover crop? After the first rain in September. None planted after October 15.

Date of turning cover crop? About April 1.

Date of planting cotton and corn? About April 15.

Variety of succeeding crops—Whatley corn and Cook cotton.

Soil type—Typical of no particular type. It is in the main a mixture of Norfolk and Cecil sandy loams overlying a Cecil subsoil.

Number of years that land on which test was run has been in cultivation? Known to have been in cultivation 38 years. No record of how much longer.

Has test been run continuously on the same land? Yes.

Width of rows—3½ ft. for cotton; 5½ ft. for corn.

Spacing: Corn, 1 stalk every 27 inches; cotton, 2 stalks every 18 inches.

The cover crop plots were not grazed.

Size of plots—1-16 acre.

Boll weevils were poisoned when the infestation got above 10%

Bud worms gave some trouble practically every year following vetch. No control measures were used. The corn was replanted when necessary. No commercial nitrogen was applied to any of these plots.

Auburn is just a little north of the latitude of Meridian, Jackson and Vicksburg, Mississippi.

Checked by E. L. Mayton, Alabama Agricultural Experiment Station, Auburn, Ala.

TABLE 10—INFLUENCE OF LEGUMES TURNED UNDER ON YIELD OF COTTON AND CORN

Plot Fertilizer treatment Pounds per acre.	Legumes in the cropping system*	Cotton (Lbs. seed cotton per acre.)										12-Yr. Av.		
		1921	1922	1923	1924**	1926	1927	1928	1929	1930	1931		1932	1933
A 240 Superphosphate 50 Muriate of potash	Summer and winter	.....242	648	210	406	1042	751	270	546	.....	.....	.....	.....	.....
	None	.....66	194	48	72	166	208	60	124	.....	.....	.....	.....	.....
B 240 Superphosphate 50 Muriate of potash	None	.....84	132	36	52	184	238	30	30	.....	.....	.....	.....	.....
	Summer and winter	.....102	324	152	120	654	264	39	114	.....	.....	.....	.....	.....
A 240 Superphosphate 50 Muriate of Potash	Summer and winter	.....30.7	20.2	24.4	36.4	37.1	42.0	21.8	43.4	.....	.....	.....	.....	.....
	None	.....13.2	7.1	7.7	9.3	7.1	9.0	4.7	4.5	.....	.....	.....	.....	.....
B 240 Superphosphate 50 Muriate of potash	None	.....16.4	8.3	13.3	15.1	11.8	12.9	5.7	10.7	.....	.....	.....	.....	.....
	Summer and winter	.....24.8	18.2	24.4	30.0	23.9	20.9	6.5	18.3	.....	.....	.....	.....	.....

Reference: Ala. Bulletin No. 232. Table No. 2, page 8. Auburn, Alabama.

\*Two year average yields of green matter turned under were: Plot A, 9 661 and Plot 1, 2 311 pounds per acre.

\*\*1925 yields omitted because of extremely dry weather, so that yields are not comparable.

Planting date of cover crop? September 1—October 15.

Fertilizer applied to cover crop? None.

Seeding rates of cover crops? 25-30 pounds Hairy Vetch per acre.

Variety of succeeding crops—Cook wilt resistant Cotton and Whatley Corn.

Rotation used, 3 year rotation—cotton; oats followed by cowpeas for turning; corn. Changed in 1932 so that oats follow corn.

Date of turning cover crop? April 1.

Date of planting succeeding crop? April 15.

Description of soil type—Hill land—Norfolk Sandy loam—"Has a surface soil of grayish brown or brownish gray sandy or loamy sand, which in the lower part of the plow soil becomes more yellow and a little more loamy. Below this, the sub-soil grades from the overlying sandy materials into yellow somewhat firm friable fine sandy clay, which with depth, becomes firmer. A few brown iron "pebbles" occur in places on the surface and through the soil materials."—(Bureau of Chemistry and Soils.)

Has test been run continuously on the same land? Yes.

Width Rows—3½ ft. for cotton; 5 ft. for corn.

Spacing—Cotton, 2 stalks every 18 inches, roughly; corn, 1 stalk every 27 inches.

Cover crop plots not grazed.

Size of plot—1-20 acre.

Budworms injured the stand of corn on the Vetch plots more commonly than any of the other plots. Austrian winter peas were discontinued after 1932 on account of Anthracnose. Hairy vetch in 1933 and since.

The yields through 1931 may be averaged. In 1932 the rotation in the experiment was changed to corn, oats, cotton instead of corn, cotton, oats, and superphosphate applications increased to 375 pounds per acre to cotton and corn.

TABLE 11—INFLUENCE OF STABLE MANURE, NITRATE OF SODA, AND VETCH ON YIELDS OF COTTON AND CORN

Plot	Fertilizer treatment Pounds per acre.	Cotton (Pounds seed cotton per acre)										
		1925	1926	1927	1928	1929	1930	1931	1932	1933	Av.	1934
1	No fertilizer No cover crop	324	484	321	216	266	.....	.....	.....	.....	.....	.....
2	5 tons manure 400 Superphosphate	680	1704	1480	2082	1412	.....	.....	.....	.....	.....	.....
3	325 Nitrate of Soda 600 Superphosphate 100 Muriate of potash	589	1612	1075	1714	1118	.....	.....	.....	.....	.....	.....
4	Vetch 600 Superphosphate** 100 Muriate of potash	589	1806	1626	970†	1162	.....	.....	.....†	.....	.....	.....
5	No fertilizer No cover crop	321	498	426	338	116	Corn (Bushels per acre)					.....
6	No fertilizer No cover crop	7.3	6.7	5.3	7.1	10.5	.....	.....	.....	.....	.....	.....
7	5 tons manure	11.1	37.9	32.2	59.5	49.0	.....	.....	.....	.....	.....	.....
8	325 Nitrate of Soda 200 Superphosphate 100 Muriate of potash	12.3	43.5	38.0	46.7	37.9	.....	.....	.....	.....	.....	.....
9	Vetch* 400 Superphosphate** 100 Muriate of potash	10.5	44.9	40.8	31.4†	27.7†	.....	.....	.....†	.....	.....	.....
10	No fertilizer No cover crop	5.9	7.3	8.7	7.6	13.1	.....	.....	.....	.....	.....	.....

Reference: Alabama Bulletin 232, Table 3, page 12, Auburn, Alabama.

†Residual effect: Winter legume destroyed during winter before this crop was planted.

\*One ton of lime per acre was applied to plots 4 and 9 every 5 years.

\*\*Plots 4 and 9 received 400 pounds of superphosphate and 100 pounds of muriate of potash per acre in the fall when vetch was planted. The plot on which cotton was planted received 200 pounds of superphosphate at cotton planting time.

Beginning in 1931 plots 1 and 5 planted to cotton received 600 pounds superphosphate and 100 pounds muriate potash per acre annually. Plots 6 and 10 planted to corn, received 200 pounds superphosphate and 100 pounds muriate of potash per acre annually.

Monantha vetch on plots 4 and 9 killed by cold in 1928. Austrian winter peas planted on these plots in January produced only 1900 pounds of green matter per acre. Rabbits damaged vetch and Austrian winter peas on plot 9 so severely in 1929 that only 809 pounds of green matter per acre were produced. In 1932, Austrian winter peas on these plots were completely destroyed by rabbits.

Planting date of cover crop—After the first rain in September. Never after October 15.

Seeding rates of cover crops—25-30 pounds Hairy Vetch. Austrian Winter Peas used first 4 years, but discontinued on account of Anthracnose. Practically no difference secured in yields from vetch and peas.

The peas were seeded at 40 to 45 pounds per acre.

Date of turning cover crop—About April 1.  
 Date of planting cotton and corn—April 15.  
 Variety of succeeding crop—Cook wilt resistant cotton; Whatley corn every year except 1932. Indian Chief that year.  
 Soil type—Norfolk sandy loam. For description see Table 10.  
 Number of years that land on which test was run has been in cultivation—At least 22 years.  
 Has test been run continuously on the same land? Yes.  
 Budworms destroyed enough corn on the cover crop plots each year that some re-planting had to be done. The cover crop plots had to be planted over in 1934.  
 Cotton and corn both on 4 ft. rows.  
 Spacing—Corn, 1 plant every 27 inches; Cotton, 2 plants every 18 inches, roughly.  
 Cover crop plots not grazed.  
 Size of plots—1-20 acre.  
 Checked by E. L. Mayton, Alabama Agricultural Experiment Station, Auburn, Ala.

**TABLE 12—NUMBER OF FIELDS, TOTAL ACREAGE, AVERAGE ACRES PER FIELD, AND AVERAGE YIELD OF CORN AND COTTON GROWTH AFTER SPECIFIED WINTER LEGUMES**

	Fields		Average yield per acre					
			Average size of field Acres	After Winter Legumes		Not After Winter Legumes		Increase per acre Percent
				Bu. or Lbs.	Bu. or Lbs.	Bu. or Lbs.	Bu. or Lbs.	
Corn after vetch .....	202	2,393	11.8	33.3	19.6	13.7	70	
Cotton after vetch .....	62	818	13.2	389	280	109	39	
Total or average .....	264	3,211	12.2	.....	.....	.....	.....	
Corn after Austrian Winter peas .....	129	1,568	12.2	34.8	20.4	14.4	71	
Cotton after Austrian Winter peas .....	64	922	14.4	356	271	85	31	
Total or average .....	193	2,490	12.9	.....	.....	.....	.....	
Corn after Crimson Clover .....	18	151	8.4	43.5	24.4	19.1	78	
Cotton after Crimson Clover .....	14	93	6.6	538	384	154	40	
Total or average .....	32	244	7.6	.....	.....	.....	.....	
Corn after Bur Clover .....	4	33	8.2	23.5	15.0	8.5	57	
Cotton after Bur Clover .....	7	44	6.3	391	293	98	33	
Total or average .....	11	77	7.0	.....	.....	.....	.....	
Total Corn .....	353	4,145	11.7	34.1	20.0	14.1	70	
Total Cotton .....	147	1,877	12.8	381	281	100	35	
Grand total or average .....	500	6,022	12.0	.....	.....	.....	.....	

Combination of Tables 1 and 3, Technical Bulletin 367, U. S. D. A.—“The Use of Winter Legumes in the Southeastern States.”  
 Conditions as in Table 1.

**TABLE 13—AVERAGE YIELD PER ACRE OF CORN GROWN AFTER WINTER LEGUMES, BY SPECIFIED INCREASES IN YIELD**

Increase in yield (bushels)	Acreage studied Acres	Yield per acre			Increase Bushels *7.3
		After legumes		Not after legumes Bushels	
		Bushels	Bushels		
Decreases .....	62	15.1	22.4	.....	.....
No increase .....	357	19.2	19.2	0	.....
1 to 5 .....	408	21.8	17.0	4.8	.....
5½ to 10 .....	908	28.9	19.8	9.1	.....
10½ to 15 .....	1,071	35.0	20.3	14.7	.....
15½ to 20 .....	559	38.3	19.2	19.1	.....
20½ to 25 .....	427	46.4	22.7	23.7	.....
25½ to 30 .....	132	54.2	25.3	28.9	.....
Over 30 .....	221	56.8	18.6	38.2	.....
Total and weighted average .....	4,145	34.1	20.0	14.1	.....

\*Decrease.

Reference: Table 10, page 16, Technical Bulletin 367, U. S. D. A.  
 Other conditions same as in Table 1.



TABLE 14—YIELD CORN FOLLOWING COVER CROP

Fertilizer N-P-K	Cover Crops	1926	1927	1928	1929	1930	1931	1932	1933	8-Year Av.	1934
No nitrogen in fertilizer											
0-10-4	and Aus. Winter Peas	58.0	50.1	54.9	70.4	57.3	45.2	63.5	52.9	56.5	.....
0-10-4	and Monantha Vetch	44.4	37.7	27.3	73.1	47.8	42.6	63.0	64.1	50.0	.....
0-10-4	and Hairy Vetch	42.6	39.7	24.7	56.0	53.8	48.7	62.8	52.9	47.6	.....
0-10-4	and Rye	36.4	33.2	34.8	41.0	33.3	29.4	30.7	36.5	34.4	.....
0-10-4	and No Cover Crop	35.1	34.6	29.5	50.5	34.9	42.8	38.3	35.0	37.6	.....
Nitrogen in fertilizer											
2-10-4	and Aus. Winter peas	47.9	43.4	48.8	73.9	50.0	41.1	63.8	52.7	52.7	.....
2-10-4	and Monantha Vetch	43.0	37.6	29.0	74.1	55.6	47.5	65.2	67.8	52.5	.....
2-10-4	and Hairy Vetch	53.3	38.3	33.5	65.1	53.2	46.6	62.9	56.1	51.1	.....
2-10-4	and Rye	33.7	38.2	39.3	51.2	38.1	32.8	35.8	41.1	38.8	.....
2-10-4	and No Cover Crop	41.5	41.4	33.7	46.8	31.5	39.9	43.2	39.4	39.7	.....

Reference: Georgia Coastal Plain Experiment Station Bulletin 21, page 43, Tifton, Georgia.

Fertilizer—500 pounds per acre of indicated analysis at planting time. No side dressing.

Fertilizer applied when summer crop was planted. Nitrogen included in the fertilizer on one acre and omitted on the other as indicated.

Cover crop turned March 15. Corn usually planted first week of April. Whatley's Prolific Corn used. No fertilizer was applied to cover crop.

Planting date of corn: Usually before April 10. Corn planted in water furrow. Soil type and other conditions same as Table 3.

For green weights of cover crops in connection with this experiment, see Table 20. Cut March 15.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

TABLE 15—WINTER COVER CROP TEST ON CORN WITHOUT FERTILIZER

Cover Crop	Bushels of corn per acre						Increase Over check	1934
	1929	1930	1931	1932	1933	Ave.		
None—check	27.2	22.4	37.4	27.4	37.2	30.3	.....	.....
Vetch	40.3	20.8	39.6	32.4	45.1	35.6	5.3	.....
Crimson Clover	32.9	20.4	38.0	31.4	44.9	33.5	3.2	.....
Rye	24.9	17.2	40.0	28.3	38.9	29.9	—4	.....

Reference: Unpublished data from Central Station, State College, Miss.

Planting date of cover crop—October 1 to 15.

Planting date of corn—May 10 to 20.

Fertilizer applied to cover crop—None; Fertilizer applied to corn—None.

Seeding rates of cover crops—Vetch, 20 to 25 pounds; crimson clover, 15 pounds; rye, 5 pks.

Spacing of corn—one stalk every 30 inches in 42-inch rows in all years except 1932 and 1933. Those years, checked two stalks every 42 inches.

Variety of corn—Cocke's Prolific.

Date of turning cover crop—April 5 to 20.

Soil type—Ochlockonee loam. Very similar to the Ochlockonee fine sandy loam except that it has considerably less sand.

Ochlockonee fine sandy loam—Bottom land of grayish-brown or brown loamy fine sand or fine sandy loam, grading at a depth of 2 or 4 inches into brown or yellowish brown loamy fine sand or fine sand. There is considerable variation in this soil. The subsoil in many areas is poorly drained and remains moist.

Number of years that land on which test was run has been in cultivation—40 years. Crops on land for last two years before experiment was begun—corn both years.

Yields—not available. Fertilizers applied—not known.

Test has been run continuously on same land.

Vetch and rye sown in middles and covered by running middlebuster in middles.

The seed bed for Crimson Clover was pulverized with a Gee Whizz and covered lightly with V-harrow.

### C. RESIDUAL EFFECT:

Does a winter cover crop affect the yield of summer crops after the first year?

Consult Table 31. The vetch on this experiment was killed in January 1928. Therefore, the yields of corn in 1928 on the vetch plot got their nitrogen from former crops of vetch. The yields on vetch plots may be compared with the yields on nitrate of soda plots. The average of check plots 1 and 5 for that year is 6.1 bushels for 18 inch spacing and 7.3 for 36 inch. The average of check plots 5 and 9 for 1928 is 9.9 bushels for 18 inch spacing and 8.3 for 36 inch. The average of check plots 9 and 13 for that year are 12.9 and 7.9 respectively for 18 inch and 36 inch spacings.

### D. RISKS

What are some of the risks that must be taken in growing winter legumes?

## 1. Insect Pests and Diseases of Vetch and Austrian Winter Peas.

### A. INSECT PESTS.

#### THE CORN EARWORM—

Most of the trouble with the earworm on hairy vetch is caused by farmers trying to grow seed. This insect breeds on the vetch and then migrates to the next field and attacks corn, cotton, peach trees and many other cultivated crops.

In case the earworm does develop in the vetch, the first thing to do is to plow a deep furrow around the field in order to prevent the insect migrating. Dig post holes in this furrow to trap them, or sprinkle with poison bait. One of the most effective ways of controlling this insect is to dust in the early morning or late afternoon with calcium arsenate. Another method is to spray the field with a mixture of three pounds of calcium arsenate to fifty gallons of water. The vetch should be plowed under as soon as the poison has taken effect. In case no machine is available, the vetch should be plowed or disked under and poison bait sprinkled over the field. The bait is made as follows: Mix 50 pounds of wheat bran, one pound of Paris green or white arsenate or 2 pounds of lead arsenate, 2 gallons of grade molasses with 3 to 4 gallons of water. Mix the bran and poison together thoroughly, then add the molasses and water and mix thoroughly. Five pounds of salt added to this mixture will help keep it from drying out. Six finely chopped lemons or oranges will give a flavor to the mixture which has been found attractive to the insects. Add enough water to make a moist dough.

In case the earworm should migrate into neighboring fields,

dust or spray with calcium arsenate.—(Bulletin No. 146, Georgia, page 203.) Experiment, Georgia.

#### APHIDS OR PLANT LICE—

Aphids may do serious damage to winter green-manure crops that are allowed to continue growth late in the spring. However, the proper season for turning the green-manure crop down for cotton or corn is sufficiently early so that usually but little, if any, damage is to be expected. In the northern part of the Cotton Belt aphid damage may be expected after April 15, and in the southern part the last of March or early April. When aphids appear in abundance, the green-manure crop should be turned under or disked down at once.—(Farmers' Bulletin 1663, U. S. D. A., Washington, D. C.)

#### BUD WORM (Southern Corn Root Worm)—

The bud worm is not distinctly an insect pest of vetch or Austrian Winter peas, but often does considerable damage to corn following these legumes. Table 16 shows the results of a six-year experiment to determine the best time to turn winter legumes to avoid injury from bud worm at Auburn, Alabama.

TABLE 16—SIX-YEAR AVERAGE PER CENT OF CORN PLANTS INFESTED WITH THE BUD WORM, 1927-1932

Date of turning land*	Date of Planting Corn	Average per cent of corn infested following	
		Legumes	No legumes
March 15	March 16	45.7	8.7
March 15	March 23	55.5	7.9
March 15	March 30	39.2	12.2
March 15	April 6	30.9	7.5
March 15	April 13	12.3	6.6
April 1	April 2	49.2	8.3
April 1	April 9	29.6	8.6
April 1	April 16	28.6**	4.3**
April 1	April 23	9.6	4.9
April 1	April 30	3.2	2.0
April 15	April 16	24.7	2.9
April 15	April 23	8.6	2.3
April 15	April 30	2.1	2.0
April 15	May 7	0.6	0.8
April 15	May 14	0.1	0.0

\*Approximate date.

\*\*Five-year average; 1933 not included due to mouse injury.

Reference: Circular 65, Alabama, page 8, Auburn, Alabama.

#### B. DISEASES OF VETCH AND AUSTRIAN WINTER PEAS. ANTHRACNOSE:

The most common form of Anthracnose is *Mycosphaerella* blight characterized by irregular spots, brown to purplish without a definite margin, but may become large and circular under moist conditions. Small, irregular, brown to purplish spots appear on the pods.

Other forms of the disease are foot-rot and leaf-and pod-spot. The foot-rot is confined to the lower stem and tap root where it frequently rots off the plant. Otherwise, this form is very similar to the *Mycosphaerella* blight.



With the leaf-and pod-spot, the spots produced on the pods and leaves are generally circular, but frequently elongated on the stems. The spots are definitely sunken, tan to brown in color and have a prominent dark brown margin.

Late freezes followed by rain seem to be very conducive to the spread of the disease. Very little damage is caused in years when the late winter and spring is dry.

#### CONTROL—

Probably the most effective control measure for Anthracnose that can be offered to date is to use disease-free seed. The vetch and pea seed obtained from the states in the semi-arid West are more nearly free of disease than seed from any other source. Seed kept over for one year are far more resistant to the disease than seed of the current year. A germination test in 1930 on Austrian Winter pea seed showed the following germination percentages:

Current Years' seed .....	95% germination
1st year kept over .....	90% germination
2nd year kept over .....	60% germination
3rd year kept over .....	30% germination
4th year kept over .....	0% germination

The disease is found not to be nearly so prevalent where the plantings are alternated. They should not be planted on the same fields year after year.

#### POWDERY MILDEW—

Causes the plants to have the appearance of having been dusted with lime, calcium arsenate or flour. It appears only in late, dry spring, on legumes that are kept for hay or seed.

(Adapted from a news letter and statements issued by Dr. J. L. Seal, Plant Pathologist, Alabama Agricultural Experiment Station, Auburn, Alabama.)

## 2. Other Causes of Failure

TABLE 17—ANALYSIS OF FAILURES WITH WINTER LEGUMES GROWN ON LOUISIANA FARMS

	Austrian W. peas	Hairy vetch	Peas and vetch	Peas or vetch with oats
Number of records	134	41	17	5
No. failures reported .....	38	7	3	2
No. Failures due to:				
1. Late planting .....	10	2	0	0
2. Poor drainage .....	12	4	1	2
3. Poor inoculation .....	12	1	0	0
4. Improper planting .....	12	2	2	2
5. Heavy grazing .....	13	4	0	1
6. Winter killed .....	10	1	1	0
7. Wet winter and spring .....	7	1	1	1
8. Unsuitable soil .....	0	0	0	0
9. Land too poor without phosphate and potash .....	1	0	0	0
10. Late germination due to dry fall .....	0	1	0	0

Reference: Extension circular 155, page 5, Extension Service, L. S. U., Baton Rouge, Louisiana.

Two hundred and sixty-four farm records in 20 different parishes were analyzed to determine what conditions were responsible for failure. Most of these records are for the growing seasons 1929-30 to 1932-33, but a few of them date back as far as 1926.



## E. VALUE AS GRAZING CROPS:

What are the relative values of winter legumes as grazing crops? How much feed may be saved?

TABLE 18—OATS WITH VETCH OR AUSTRIAN WINTER PEAS AS GRAZING CROPS FOR FATTENING HOGS (Oats and vetch used as pasture first two years of test, 1926, and 1927; Oats and Austrian Winter peas used as pasture second two years 1928 and 1929.)

	Average of first two years (1926 and 1927) of experiment, using Oats and Hairy Vetch as pasture.				Average of last two years (1928 and 1929) using Oats and Austrian winter peas as pasture.				Average for 4 years			
	Lot 1. Corn Tankage, Minerals, Self-fed	Lot 2. *Corn 12. Tankage 1 Hand-fed 3% Live weight Minerals, Self-fed	Lot 3. Corn Tankage Minerals Self-fed	Lot 3. Corn Tankage Minerals Self-fed	Lot 1. Corn Tankage Minerals Self-fed	Lot 2. *Corn 12. Tankage 1 Hand-fed 3% Live weight Minerals Self-fed	Lot 3. Corn Tankage Minerals Self-fed	Lot 3. Corn Tankage Minerals Self-fed	Lot 1. Corn Tankage Minerals, Self-fed	Lot 2. *Corn 12. Tankage 1 Hand-fed 3% Live Weight Minerals Self-fed	Lot 3. Corn Tankage Minerals Self-fed	Lot 3. Corn Tankage Minerals Self-fed
Total No. of Animals	19	18	17	20	20	19	20	39	37	37	37	37
Av. Initial Wt. per animal (pounds)	69	69.5	68.5	77.05	77.15	76.19	77.15	73.15	72.95	73.15	73.19	73.19
Av. final Wt. per animal (pounds)	190	163.7	156.2	201.45	201.45	165.04	195.6	195.90	164.45	164.45	177.55	177.55
Av. daily gain per animal (pounds)	1.75	1.37	1.09	1.77	1.77	1.28	1.69	1.76	1.33	1.33	1.50	1.50
Concentrates required per 100 pounds gain:												
Corn (pounds)	322.5	293.13	385.03	358.55	358.55	243.87	375.41	341.24	274.01	274.01	392.12	392.12
Tankage (pounds)	19.2	27.55	27.73	19.7	19.7	19.72	26.36	19.83	24.66	24.66	27.70	27.70
Total	341.7	300.68	412.76	378.25	378.25	263.59	401.77	361.07	298.67	298.67	419.82	419.82

Reference: Bulletin 233, Auburn, Alabama.

\*Lot 2 Received corn 10, Tankage 1 the first year; Corn 12, Tankage 1 on second, third and fourth years.

## METHOD OF PROCEDURE

**TIME AND DURATION OF TRIAL**—The plan called for placing pigs on green forage at the earliest date in the late winter or early spring that sufficient pasture was available. The dry lot group was to be started simultaneously with the grazing groups. The experiment was to close at the time the majority of the pigs had reached the stage of growth and fattening required of a top hog on the Montgomery market, which was from 175 to 200 pounds in weight.

**ANIMALS**—Pigs farrowed in the fall were used for each of the experiments. The animals were purebred Poland China, purebred Duroc-Jersey, and Poland China-Berkshire cross. The average age and weight varied each year according to the time pigs could be placed on experiment, which in turn depended upon the growth made by the pasture crops. All pigs were kept under similar conditions prior to being placed on experiment. During the period between weaning and the beginning of the experiment the pigs were placed in a dry lot and fed a ration of white corn 8 parts, wheat shorts 4 parts, and digester tankage 1 part, by weight. (There are two kinds of tankage, digester tankage and stick tankage. Digester tankage is the ground rejected carcasses. Stick tankage is the ground carcasses including the blood. The protein in blood is largely indigestible. Therefore the digester tankage has a higher value per pound of protein.) For each trial the animals were divided into three lots as nearly uniform as possible with reference to breed, sex, weight, conformation, and condition.

**FEEDS AND METHOD OF FEEDING**—The ration used in the different lots were:

Lot 1—White corn and tankage, self-fed, free-choice on pasture. (Self-fed means that the feed was kept before the hogs at all times. Free choice means that the feeds were self-fed separately. In other words the hog could eat as much of each as he chooses.)

Lot 2—White corn and tankage, hand-fed at the rate of 3 per cent of live weight (in two feeds daily.) The proportion of corn to tankage fed was 10 to 1 the first year and 12 to 1 the second, third, and fourth years.

Lot 3—White corn and tankage, self-fed, free-choice in dry lot. A mineral mixture composed of equal parts, by weight, of charcoal, bone meal, and salt was supplied to all lots in a self-feeder. Hydrant water was kept before the animals at all times. The pasture lots consisted of one acre. The dry lot was 20 by 60 feet. Oats and vetch were used as grazing crops in 1926 and 1927, and oats and Austrian Peas in 1928 and 1929.

**WEIGHINGS**—At the beginning and at the end of each experiment weights were taken on three consecutive days, the averages of which were recorded as the initial and final weights, respectively. Weights of individual animals were taken at intervals of 14 days; these weighings served for keeping the ration adjusted to 3 per cent of the live weight in Lot 2.

**RESULTS OF FIRST EXPERIMENT**—The oats and vetch were ready for grazing March 1, and the experiment was started on that date. The 29 pigs used in this experiment averaged 80 pounds each when the test started. There was an abundance of grazing available in the grazed lots at all times. The experiment covered a period of 56 days.

**RESULTS OF SECOND EXPERIMENT**—The season was somewhat earlier in 1927 than in 1926 and the oats and vetch were ready for grazing on February 18. The pigs used this year averaged only 56 pounds each when placed on experiment. There were 10 pigs in each lot when the experiment was started, however, one pig in lot 1, two pigs in lot 2 and two pigs in lot 3 proved to be unthrifty and were removed from the experiment after about two weeks. The experiment covered a period of 84 days.

There was an abundance of grazing at all times in the grazing lots, and a considerable amount of green material was turned under after the experiment closed.

**RESULTS OF THE THIRD EXPERIMENT**—In the third experiment oats and Austrian peas were used as a grazing crop instead of oats and vetch. The experiment was started March 1. The pigs averaged a little more than 100 pounds each.

at the beginning of the test. The one-acre plots furnished an abundance of grazing for 10 pigs in each lot and as in the two previous experiments, a considerable amount of green material was turned under after the test closed.

**RESULTS OF FOURTH EXPERIMENT**—Oats and Austrian peas were again used as the pasture crop in the fourth experiment. They were large enough to graze by February 1, which was from two to four weeks earlier than usual. The pigs in this experiment averaged a little above 50 pounds each at the beginning of the experiment. One pig in lot 2 died during the experiment and the necessary adjustments were made in calculating the results. The one-acre plots again furnished sufficient grazing for the 10 pigs on each and a considerable amount of green material was turned under after the experiment closed.

Checked and approved by J. C. Grimes, Alabama Experiment Station, Auburn, Alabama.

The following is a one-year test run at the Central Station, State College, Mississippi—1904.

**TABLE 19—VALUE OF GRAZING SPRING VETCH BY DAIRY COWS**

Lot No.	FEED PER DAY		PASTURE		MILK PRODUCTION	
	For 4 weeks: prior to beginning of test	During Test (4 weeks)	For 4 weeks: beginning of test	During Test (4 weeks)	For 4 weeks: prior to beginning of test	During Test (4 weeks)
1 (4 Cows)	*J. G. Hay 10 lbs.	**C. S. Hulls 10 lbs.	*C. S. Hulls Typical	Hay	1636 lbs.	1800 lbs.
	**C. S. Hulls 10 lbs.	**C. S. Meal 4 lbs.	Native	Vetch		
	**C. S. Meal 4 lbs.		Pasture	( $\frac{3}{4}$ acre		
	Wheat Bran 6 lbs.			per cow)		
2 (4 Cows)	*J. G. Hay 10 lbs.	*J. G. Hay 10 lbs.	Typical	Typical		
	**C. S. Hulls 10 lbs.	**C. S. Hulls 10 lbs.	Native	Native		
	**C. S. Meal 4 lbs.	**C. S. Meal 4 lbs.	Pasture	Pasture	1710	1528
	Wheat Bran 6 lbs.	Wheat Bran 6 lbs.				

\*Johnson grass.

\*\*Cottonseed.

Reference: Mississippi Agricultural Experiment Station Report—1904, pages 21, 22. State College, Miss.

The cows of Lot No. 1 were turned in on vetch pasture on March 20 and grazed there daily until April 16. Grazing, seemingly, did not decrease the yield of vetch seed. The native pasture at this season was furnishing but little grazing, yet the pasture used was representative of the pastures found on the average farm where no preparations are made for spring pasture. Professor Moore, head of the Dairy Department, says, "It was little more than an exercise lot." The following additional information is given by Professor Moore from his recollections of the experiment: "The cows were grazed only in the day time, but were grazed every day during the four weeks of the experiment."

Rate of Seeding—30 pounds per acre.

Date of seeding—Very probably in September or October.

Method of planting—Land was flat broken and disked, seed were sown broadcast and harrowed in with spike-tooth harrow.

There was very probably no crop planted in the summer prior to the planting of vetch, but if there was, no fertilizer nor manure was applied either to the crop or to the vetch."

Soil Type—Houston clay—To an average of about eight inches consists of a dark-gray to nearly black clay, crumbly when moist and exceedingly sticky and plastic when wet, underlain by a plastic and adhesive clay or silty clay. The latter is uniformly lighter color than the soil, becoming drab or gray at about 30 inches.



At depths ranging from 4 to 8 feet is found the partly decomposed grayish rock from which the soil material is derived.

The granular structure of the dry soil is due to a high content of lime. Small lime balls and occasional fragments of the original rocks are present in the surface soil and subsoil.

The Houston clay locally known as "black prairie" is derived from the underlying soft, impure, bluish limestone which is geologically known as the "selma chalk."—(Dr. Dorman, Agronomy Department, Mississippi Experiment Station. )

In terms of production—15 to 20 bushels of corn or one-third bale of cotton without fertilizer. This was the first year that vetch was grown on this land.

## F. VALUE AS HAY CROP

Are winter legumes satisfactory hay crops? How do the yields compare with other hay crops? How does the feeding value per ton compare with that of other hay crops?

### AUSTRIAN WINTER PEAS AS HAY CROP—

The Austrian Winter Field Pea is a heavy yielder of hay, either when seeded alone or with a small grain. The quality and feeding value is considered about equal to good vetch hay. The yield is usually considered to be about 10 percent higher than for vetch.

The stems are quite soft, leaves are abundant, and the hay material, when properly handled and cured, is a light green color. Livestock of all kinds consume it very readily and feeders claim that they obtain as good results feeding pea hay as with other good legume hays—(Agricultural Experiment Station Bulletin 286, page 15, Corvallis, Oregon.)

### VETCH AS A HAY CROP—

Vetch alone or vetch with a companion crop, preferably oats, is considered by livestock men to be among the best of the legume or legume and grain hays. The hay, if properly handled and cured, is of a bright color, leafy, comparatively fine stemmed, and is high in nutrition and palatability. All kinds of livestock do well on it and will consume large quantities.—(Station Bulletin 213, Corvallis, Oregon, page 17.)

TABLE 20—GREEN WEIGHTS OF COVER CROPS IN COTTON AND CORN GREEN MANURE TESTS FOR NINE YEARS—TIFTON, GEORGIA

Crop	1926	1927	1928	1929	1930	1931	1932	1933†	1934	Av.
				Cut March 1st						
Aus. Winter Peas	22215	21780	20908	7880	3380	6270	3565	5990	6440	10936
Abruzzi Rye .....	8929	10454	8603	3580	2000	5860	610**	4140	3609	5308
Hairy Vetch .....	9583	8712	8820	2960	7040*	6880	8450	12214	4200	7651
Monantha Vetch	21345	20038	27718	9180	13140	13470	13060	8345	8860	15017
				Cut March 15th						
Aus. Winter Peas	21017	25265	19166	9360	11620	7790	1820	8570	13340	13105
Abruzzi Rye .....	10672	9162	7514	10730	2530	10030	770**	8150	3640	7022
Hairy Vetch .....	7395	9020	9256	5080	18910*	8740	10980	17730	7240	10483
Monantha Vetch	17380	26412	24493	14380	18130	19680	10800	15040	14540	17872

Reference: Georgia Coastal Plain Experiment Station Bulletin 21, page 42, Tifton, Georgia.

†Seedings made this year November 25, other years about October 15.

\*Seed for this planting proved to be the smooth type Hairy vetch.

\*\*This proved to be Rosen rye instead of Abruzzi.

Soil type—Tifton Sandy Loam as described in Table 3.



The same two acres are used every year for this test. Cotton and corn as reported in Tables 3 and 14 are alternated each year. Cuttings are made on land following these corn and cotton plots. No fertilizer was applied to the cover crops, but corn and cotton preceding, received the fertilizer as designated in the footnotes of Tables 3 and 14.

Other conditions as in Table 3.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

TABLE 21—DIGESTIBLE NUTRIENTS AND FERTILIZING CONSTITUENTS IN CERTAIN HAY CROPS (DRY)

Kind of hay	Total dry Matter in 100 lbs.	Digestible Nutrients in 100 lbs			Total	Nutritive Ratio 1:	Fertilizer constituents in 1000 pounds		
		Crude Protein	Carbohy- drates	Fat			Nitro- gen	Phos- phorus	Pot- ash
Hairy Vetch .....	87.7	15.7	37.1	1.9	57.1	2.6	31.8	10.3	26.2
Vetch and Oats .....	84.3	6.9	37.0	1.4	47.1	5.8	17.0	6.0	12.7
*Peas and Oats .....	83.4	8.3	37.1	1.5	48.8	4.9	18.2	6.6	16.4
Bur Clover .....	93.0	15.6	42.8	0.2	58.8	2.8	30.7	.....	.....
Cowpeas, before bloom .....	92.2	17.8	27.0	1.0	47.0	1.6	41.9	.....	.....
Cowpeas in bloom to early pod .....	89.4	12.6	34.6	1.3	50.1	3.0	29.6	.....	.....
Cowpeas ripe .....	90.0	6.9	42.1	1.0	51.2	6.4	16.2	.....	.....
Soybean hay .....	91.4	11.7	39.2	1.2	53.6	3.6	25.6	6.8	23.3
Sudan grass .....	88.4	3.7	45.7	0.9	51.4	12.9	13.1	.....	.....
Johnson grass .....	89.9	2.9	45.0	1.0	50.1	16.3	10.6	4.2	11.3
Crab grass .....	90.5	3.5	40.0	1.0	45.7	12.1	12.8	9.0	30.9
Crimson clover .....	89.4	9.7	36.8	1.0	48.7	4.0	22.6	6.1	22.4
Kudzu vine .....	93.3	12.4	37.7	1.1	52.6	3.2	29.3	6.2	.....
Lespedeza or Japan clover .....	88.2	8.6	41.1	1.1	52.2	5.1	19.4	10.3	20.7
*Field Pea .....	88.9	12.2	40.1	1.9	56.6	3.6	24.2	6.7	12.4

Reference: Feeds and Feeding, Henry and Morrison. (Revised.)

\*The field peas grown in the northern states are usually a type called "Canadian field peas." I understand that Austrian winter peas are quite similar, and I presume the composition would be about the same.—(Extract from letter from F. B. Morrison, co-author of Feeds and Feeding.)

## II. DETERMINING WHAT COVER CROP TO GROW

Which cover crop produces the largest increased yields in the succeeding crop? Which winter legumes are better adapted for hay? For grazing?

### A. COMPARATIVE YIELDS OF SUCCEEDING CROPS.

There is an excellent four year test of the effect of Austrian Winter Peas, Monantha Vetch, Hairy Vetch, and Hungarian Vetch on the yields of cotton on page 13, Circular 51, South Carolina, "Winter Cover Crop Experiments at the Pee Dee Experiment Station," but the conditions under which this experiment was run have not been obtained, and it is omitted from this publication. This is a comparative test of the legumes with 200 pounds nitrate of soda per acre, and without nitrate of soda.

Consult also Table 3. With how many winter legumes did the additional nitrogen pay? In how many cases did the cover crop make as much as both the cover crop and nitrogen? Which cover

crop made the highest yield without nitrogen? With nitrogen?  
 See Table 14. Apply same questions as above.  
 See also Table 15.

## B. COMPARATIVE VALUE AS HAY

TABLE 22—VARIETY TEST WINTER PEAS AND VETCHES

Variety	Yield in Pounds Green Weight per Acre					Average	
	1929	1930	1931	1932	1933		
Austrian Winter Peas .....	7,819	4,320	2,560	1,080	6,960	4548	
Chang Winter Peas .....	6,080	1,240	3,379	.....	.....	3566	(3 yrs.)
Monantha Vetch .....	11,179	7,040	5,739	4,221	17,320	9100	
Smooth Vetch .....	10,960	3,160	3,680	2,819	.....	5155	(4 yrs.)
Hairy Vetch .....	7,139	4,080	3,019	2,240	12,720	5840	
Purple Vetch .....	5,059	80	2,960	1,581	2,840	2504	
Hungarian Vetch .....	7,600	5,480	2,419	880	5,360	4348	

Reference: Georgia Coastal Plain Experiment Station, Bulletin 21, page 45, Tifton, Georgia.

Seeded about October 15. Cut March 15.

No fertilizer applied to cover crop, nor had any been applied to the land for the last two years before cuttings were made.

Soil type and other conditions same as given in Table 3.

This test was not planted in the fall of 1933. Therefore, no weights for 1934.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

See Section I. F. for further comparison of values as hay.

## C. COMPARATIVE GRAZING QUALITIES

See Section I. E. for comparison of grazing qualities.

## III. INOCULATING SEED

Does it pay to inoculate winter legume seed?

The experiment in Table 23 was conducted at the Alabama Agricultural Experiment Station, Auburn, Alabama. All plots were fertilized alike with acid phosphate and sulphate of potash. Before sowing, one lot of seed was dipped into water into which there had been stirred and allowed to settle earth from a lawn where common vetch had made a luxuriant growth for several years. The seed of hairy vetch were sown on plots October 17, 1896.

The plants from inoculated seed formed numerous branches which were about 3 feet long. The plants from the ordinary untreated seed formed only a few short branches.

TABLE 23—THE EFFECT OF INOCULATION ON YIELDS AND RETURNS FROM HAIRY VETCH

Treatment of seed	Yields per acre pounds of hay	Increased yield per acre in pounds of hay
Not inoculated .....	232	.....
Inoculated .....	2540	2308

The experiment in Table 24 was conducted at the Alabama Agricultural Experiment Station, Auburn, Alabama. The soil was uniform in fertility. The seed of hairy vetch was sown on one-twelfth of an acre plots, November 4, 1897, at the rate of 30 quarts to the acre. On some of the plots the seed were sown without inoculation. On the other plots the seed were dipped in a solution of vetch "Nitragin." The crop was cut for hay May 9, 1898.

TABLE 24—THE EFFECT OF INOCULATION ON YIELDS AND RETURNS FROM HAIRY VETCH

Treatment of seed	Yield per acre in pounds of hay	Increased yield per acre in pounds of hay
Not inoculated .....	564	.....
Inoculated .....	3270	2706

Reference: Agricultural Education, Clemson College, South Carolina, Vol. IV. Nos. 11 and 12, June and July, 1928, pages 130-131.

## IV. PLANTING

### A. TIME

At what time should winter legumes be planted in this section for best results?

TABLE 25—DATES OF SEEDING WINTER COVER CROPS AT TIFTON, GA.

Cover Crop	Date	Yield in Pounds Green Weight per Acre						Average
		1928	1929	1930	1931	1932	1933	
Austrian Winter Peas—Oct. 1 .....		13,510	.....	9,000	9,480	680	4520	*7438
Austrian Winter Peas—Oct. 15 .....		13,120	7,979	7,680	6,859	880	3979	6749
Austrian Winter Peas—Nov. 1 .....		9,840	4,960	3,000	4,840	680	2440	4293
Austrian Winter Peas—Nov. 15 .....		4,550	1,899	1,240	1,720	232	1080	1787
Austrian Winter Peas—Dec. 1 .....		1,890	480	520	499	130	840	726
Monantha Vetch—Oct. 1 .....		7,440	.....	20,640	11,019	7,100	9160	*11,072
Monantha Vetch—Oct. 15 .....		8,880	7,139	21,160	7,240	5,080	10280	9,963
Monantha Vetch—Nov. 1 .....		8,100	8,000	11,640	7,040	5,200	4899	7,479
Monantha Vetch—Nov. 15 .....		2,605	6,080	3,200	2,600	2,480	2339	3,217
Monantha Vetch—Dec. 1 .....		1,135	1,699	720	699	530	560	890
Hairy Vetch—Oct. 1 .....		4,320	.....	18,880	10,200	7,520	8139	*9,812
Hairy Vetch—Oct. 15 .....		6,020	2,739	21,240	6,720	5,000	6080	7,966
Hairy Vetch—Nov. 1 .....		3,860	2,520	5,320	4,040	2,440	3779	3,659
Hairy Vetch—Nov. 15 .....		1,190	2,680	3,160	1,640	1,640	1920	2,038
Hairy Vetch—Dec. 1 .....		360	800	1,160	320	1,840	1200	947

Reference: Georgia Coastal Plain Experiment Station Bulletin 21, page 47, Tifton, Georgia.

Cut March 15. \*Five year average.

Seeding rates—Austrian Winter Peas, 40-50 pounds per acre; Monantha vetch, 35 pounds; Hairy vetch 30 pounds.

Soil type and other conditions same as in Table 3.

No plantings were made in the fall of 1933. Thus, no results for 1934.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

TABLE 26—POUNDS OF GREEN MATERIAL PER ACRE ON THE TIME AND RATE OF SEEDING EXPERIMENT OF HAIRY VETCH, MONANTHA VETCH, AND AUSTRIAN WINTER PEAS AT AUBURN, ALABAMA

HAIRY VETCH		MONANTHA VETCH		AUSTRIAN WINTER PEAS	
Seeding rate Pounds	Yield per acre Pounds	Seeding rate, Pounds	Yield per acre Pounds	Seeding rate Pounds	Yield per acre Pounds
Planted September 30					
10	1,027	10	8,393	30	7,412
20	1,577	20	9,240	45	8,138
30	2,228	30	9,211	60	8,653
Planted October 26					
10	791	10	5,308	30	4,747
20	1,682	20	6,949	45	5,668
30	1,893	30	7,700	60	6,931

Tabl 26 (Cont'd.)

Planted November 23

10	354	10	1,442	30	2,313
20	676	20	2,000	45	3,322
30	918	30	2,930	60	3,669

Planted December 19

10	None	10	594	30	835
20	None	20	947	45	1,393
30	None	30	1,312	60	1,562

Reference: Alabama Agricultural Experiment Station Bulletin No. 232, page 29, Auburn, Alabama.

Fertilizer applied to cover crops—600 pounds 16% basic slag planted in drill with seed.

Date of cutting cover crop—About April 1.

Soil type—Norfolk sandy loam. For description see Table 10.

Number of years that land on which test was run has been in cultivation—At least 22 years.

Has test been run continuously on the same land? Yes.

Width of rows—12 inches. Cover crop plots not grazed. Size of plot 1-453 acre.

Drill opened with garden plow. Basic slag and seed put in row together and covered with gee whiz.

Practically the same results were secured year in and year out and the experiment was discontinued in 1929 on this account.

Checked by E. L. Mayton, Agricultural Experiment Station, Auburn, Alabama.

### B. RATE

What rate of seeding each legume gives the highest yield of green weight per pound of seed?

TABLE 27—RATES OF SEEDING WINTER COVER CROPS AT TIFTON, GA.

Cover Crop	Rate, Pounds	Yield in Pounds Green Weight per Acre						
		1928	1929	1930	1931	1932	1933	Av.
Austrian Winter Peas	20	2,595	5,179	3,640	5,739	1,219	7080	4242
Austrian Winter Peas	30	3,675	3,659	6,560	6,600	1,981	8680	5192
Austrian Winter Peas	40	3,700	2,520	7,080	8,579	2,040	8640	5426
Austrian Winter Peas	50	4,810	2,000	8,280	8,960	2,680	5779	5418
Austrian Winter Peas	60	5,830	2,339	8,040	9,099	3,059	6120	5748
Monantha Vetch	20	1,445	10,040	3,520	8,099	5,600	7440	6024
Monantha Vetch	25	2,280	11,440	2,800	6,520	5,880	8520	6240
Monantha Vetch	30	2,030	8,080	4,840	7,360	7,000	8819	6355
Monantha Vetch	35	1,840	8,640	3,960	9,840	4,800	10240	6553
Monantha Vetch	40	3,020	8,640	3,840	10,160	6,240	9960	6976
Hairy Vetch	15	940	3,280	8,440	6,200	6,960	5560	5230
Hairy Vetch	20	1,040	2,960	9,920	3,680	7,200	5840	5107
Hairy Vetch	25	1,975	3,080	7,040	4,259	7,200	6760	5052
Hairy Vetch	30	1,705	3,560	8,200	3,539	7,480	6840	5220
Hairy Vetch	35	1,675	4,400	10,840	4,320	8,480	7400	6186

Reference: Georgia Coastal Plain Experiment Station Bulletin 21, page, 46, Tifton, Georgia.

Planted about October 15. Cut March 15.

Soil type same as in Table 3.

No plantings were made in the fall of 1933. Thus, no results for 1934.

Method of seeding and other conditions as given in Table 3.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

See also Table 26 for rates of seeding experiment.

### C. METHODS

What method of seeding proves most profitable? Has a comparative experiment been made with the method of seeding that is most common in Mississippi? How does the labor required for the various methods compare?



TABLE 28—POUNDS OF GREEN MATERIAL PER ACRE ON THE METHODS OF SEEDING EXPERIMENT OF HAIRY VETCH, MONANTHA VETCH, AND AUSTRIAN WINTER PEAS 1927-1929 AT AUBURN, ALABAMA

Date of Planting	Three Year Average 1927-29					
	Broadcast			Drilled		
	Hairy Vetch	Monantha Vetch	Austrian Winter Peas	Hairy Vetch	Monantha Vetch	Austrian Winter Peas
September 30 .....	2,393	8,613	5,186	3,100	10,492	6,906
October 26 .....	1,109	5,428	3,455	1,966	5,912	5,061
November 23 .....	442	1,890	1,928	852	3,063	3,216
December 19 .....	113	347	651	210	903	1,283

Reference: Alabama Experiment Station Bulletin 232, page 28, Table 12, Auburn, Alabama.

Fertilizer applied to cover crop? 600 pounds 16% basic slag, drilled or broadcast with seed.

Seeding rates of cover crop? Austrian winter peas, 45 pounds per acre, Monantha vetch, 20 pounds, Hairy vetch, 20 pounds.

Date of cutting cover crop? April 1.

Soil type. Norfolk sandy loam. For description, see Table 10.

Number of years that land on which test was run has been in cultivation? At least 22 years.

Has test been run continuously on the same land? Yes.

Drilled rows—12 inches apart. Plots not grazed. Size 1-453 acre.

Drill opened with garden plow. Fertilizer (Basic Slag) and seed put in together and covered with gee whizz.

Due to the fact that practically the same results were secured year in and year out, the test was discontinued in 1929.

Checked by E. L. Mayton, Alabama Experiment Station, Auburn, Alabama.

TABLE 29—METHODS OF SEEDING WINTER COVER CROPS AT TIFTON, GEORGIA

Methods of Seeding	Yield in Pounds Green Weight per Acre					
	1929	1930	1931	1932	1933	Average
<b>Austrian Winter Peas:</b>						
Seeded with grain drill .....	6,200	3,160	5,080	1,000	3,960	3,880
Broadcast, covered with disc harrow .....	6,379	3,000	3,859	1,040	6,040	4,063
Broadcast, covered with one-horse turn plow .....	7,320	5,640	6,019	1,699	6,800	5,495
Broadcast, covered with section harrow .....	5,339	2,800	3,560	1,480	5,240	3,684
Seeded in 18 inch rows .....	6,920	3,880	3,779	1,480	5,520	4,316
<b>Monantha Vetch:</b>						
Seeded with grain drill .....	5,680	5,840	8,619	6,800	15,560	8,500
Broadcast, covered with disc harrow .....	4,259	5,680	4,925	5,160	10,960	6,197
Broadcast, covered with one-horse turn plow .....	4,720	7,400	6,779	5,021	13,240	7,432
Broadcast, covered with section harrow .....	3,680	2,800	3,299	3,040	13,320	5,228
Seeded in 18 inch rows .....	3,520	3,400	4,280	4,880	12,720	5,760
<b>Hairy Vetch:</b>						
Seeded with grain drill .....	2,960	7,720	3,360	7,680	9,120	6,168
Broadcast, covered with disc harrow .....	3,019	4,960	2,299	7,400	8,080	5,151
Broadcast, covered with one-horse turn plow .....	1,200	7,840	3,659	8,120	7,400	5,644
Broadcast, covered with section harrow .....	680	3,080	2,040	6,360	8,520	4,136
Seeded in 18 inch rows .....	2,979	5,960	2,240	7,640	6,960	5,156

Reference: Georgia Coastal Plain Experiment Station Bulletin 21, page 49, Tifton, Georgia.

Seeded: About October 15. Cut March 15.

No fertilizer applied for 2 years prior to time green weights were taken.

The method of seeding with grain drill is described in detail in Table 3.

No plantings were made in the fall of 1933. Thus, no results for 1934.

Checked and approved by J. C. Walters, Georgia Coastal Plain Experiment Station, Tifton, Georgia.

## V. GRAZING

Common vetch is eagerly eaten by all farm livestock. As a general rule, the vetch is pastured only when the ground is dry, not only to avoid packing the soil but because both cattle and sheep are liable to bloat on vetch, especially in wet weather.

Even when vetch is grown primarily for hay or for seed a limited amount of pasturing is often desirable, especially where the growth is unusually rank or where it is desirable to make the harvest later. Hogs should not be used for this purpose, as they kill out many of the plants by biting them off below the crown. Sheep and calves do the least damage in pasturing vetch designed for a hay or seed crop.—(Farmers' Bulletin 515, page 7.)

**FALL AND WINTER GRAZING.** The crop should not be grazed until the plants are four to six inches high. Grazing when the land is wet will injure both the crop and the soil, but a reasonable amount of grazing when the land is dry does not injure either. When this practice is followed the crops may be grazed up to March 10th without materially reducing the yield of hay or grain.—(From News Letter issued by Professor J. S. Moore, State College, Miss.)

See Section I. E. and I. F. for information on green weight per acre and value of cover crops as grazing.

## VI. SAVING SEED

### IS IT PRACTICAL TO SAVE SEED OF WINTER LEGUMES IN THE SOUTH?

The production of Austrian winter pea seed and vetch seed is irregular and uncertain, and yields are small even when obtained. Corn ear worms sometimes attack hairy and smooth vetch and defoliate them, but in Rowan County, N. C., seed of smooth vetch has been grown for the market for several years. Further south there is more danger from the worms. If one chooses to make the attempt, however, he had better watch for the worms every day after pods begin to form, and at the first sign of them he can plow down the crop as a fertilizer. If the worms do not appear he can keep the crop for seed.

Winter peas and the aforementioned vetches are harvested for seed in the South by raking the vines when they are ripe or dead ripe. At this time the vines break off at the ground. They can then be threshed or knocked out with a flail. Shattering is greater with hairy and smooth vetch than with Austrian winter peas and Monantha vetch.—(Farmers' Bulletin 1663, page 10.)

### HARVESTING FOR SEED—

Common vetch seed is produced in large quantities in the United States only in the Willamette Valley, Oregon. The methods of handling the seed crop vary, due partly to differences of opinion as the best method, but more largely to the machinery available to the grower.

It is the general practice to cut vetch for seed as soon as the lower pods are fully ripe, at which time the upper pods will be

fully formed and the plant will be carrying a maximum quantity of seed. Later cutting occasions more shattering of seed, while earlier cutting results in a considerable percentage of immature seed. In a few places where but little seed is raised, the crop is cut with an ordinary mowing machine. Two men with pitchforks follow the mower and roll the vetch back from the uncut area, so as to enable the machine to get through when cutting the next swath. Sometimes the first swath cut is rolled on the uncut vetch; and when the succeeding swath is cut, the two are rolled back out of the way. This puts the vetch in larger swaths than the first-mentioned and also somewhat reduces the loss from shattering. These two mower and pitchfork methods were formerly used generally, but now have been largely superseded by other methods.

Whatever method is used in cutting, the vetch is put at once into shocks and remains there till threshed. The most important rule in the growing of vetch seed is to handle the crop rapidly and as little as possible when cut.—(Farmers' Bulletin 515, page 5.)

#### GROWING SEED FOR HOME USE—

Without doubt hairy vetch would be far more extensively employed as a crop if the seed were cheaper. There is little likelihood that European seed will ever reach the farmer at a satisfactory price, but seed can be grown readily in nearly every State in the Union at far less expense than it can be purchased.

At the Mississippi Experiment Station hairy vetch was harvested from the same piece of land five years in succession without resowing, enough seed shattered during harvest to produce a perfect stand. The only treatment has been to plow the land after harvesting the vetch and then sow cowpeas. The cowpeas were cut for hay, after which the vetch quickly made a stand\*

This plan is adapted to all the States south of the Ohio and Potomac Rivers.

Hairy vetch, when cut after some of the seed have matured, if not threshed for seed should be put in a barn with a tight floor as much of the seed will rattle to the bottom. Vetch that is cut so late is not of high feeding value, but the stock will eat much of it and the rest can be used as bedding. In taking out the straw from the mow care should be exercised to shake out any loose seeds it may contain. By this simple method a farmer can easily grow and save his supply of vetch seed at a low cost.—(Farmers' Bulletin 515, page 11.)

On Aug. 10, 1934, Prof. J. S. Moore, Head of the Dairy Department, State College, reported that 1515 pounds of re-cleaned vetch seed had recently been saved from 7 acres of vetch seeded six years ago. This vetch is followed each year by Johnson grass for hay. The land has not been broken in three years. The seed are threshed with an oat thresher. Mr. Moore thinks that a better stand can be secured with volunteer vetch on unbroken land in hay crop, as the seed are protected from sun by the hay and

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\*This very probably came from the Holly Springs Station.



are not covered except by hard rains. The vetch being grown on the dairy farm was originally hairy vetch and still has all the characteristics of hairy vetch except that the hairs have disappeared. It seems better adapted to this climate than the original hairy vetch.

#### SOME HINDRANCES IN SAVING SEED

##### APHIDS OR PLANT LICE—

Aphids usually attack Austrian Winter Peas in Mississippi before the seed mature. Thus far, no practical means has been found by which aphids may be controlled. The New Jersey Agricultural Experiment Station has found that they may be controlled with 3% nicotine dust applied under a canvas at least 16 feet long at a temperature of 65 to 70 degrees Fahrenheit.

##### CORN EAR WORM:

Most of the trouble with the earworm on hairy vetch is caused by farmers trying to grow seed. It is a poor policy to attempt to grow hairy vetch seed under Georgia conditions. The yield is small, and the risk is great.—(Bulletin 146, Experiment, Georgia.)

For further details see page 15.

ANHRACNOSE AND POWDERY MILDEW as described on pages 16 and 17.

## VII. HARVESTING FOR HAY

Vetch should be cut for hay from the period of full bloom to last bloom when the first pods are well developed. It is commonly cut with an ordinary mower with a swather attachment, and the implement does satisfactory work. After cutting, the vetch should be bunched with a horsrake and then shocked with pitchforks. This handling should always be done before the vetch leaves are dry. Vetch should be allowed to cure in the shocks several days, and, if possible, hay caps should be used if rainy weather is feared. Where a swather is not used, the harvesting is considerably more difficult. In either case, it is the common practice to allow the vetch to lie one day before shocking.

It is sometimes desirable to pasture fall-sown vetch in the spring, so as to bring the haying season somewhat later and also to prevent heavy lodging. This is quite commonly done in western Washington and Western Oregon.

Common vetch yields from 1½ to 3½ tons of hay to the acre. An average yield in the Pacific States is 2½ tons and in the Southern States somewhat less.—(Farmers' Bulletin 515, page 5.)

The peas should be cut for hay when the seeds in the lower pods are two-thirds developed. At this stage the plants are usually still in bloom and practically all the leaves are green. The forage cures quite rapidly. In order to prevent the powdering and loss of leaves, the cut material should be windrowed when about half cured and allowed to remain in the windrow until ready to haul or shock. It should then be hauled directly or shocked in medium-sized shocks to complete curing. There should be as little handling as possible after curing so as to prevent the loss of leaves.—(Agricultural Experiment Station Bulletin 286, page 15, Corvallis, Oregon.)

## VIII. TIME OF TURNING WINTER LEGUMES

When should winter legumes be turned to give the highest yields of succeeding crops? When should the succeeding crop be planted?



TABLE NO. 30—THE EFFECT OF VETCH TURNED UNDER AT DIFFERENT STAGES OF GROWTH ON THE YIELDS OF COTTON

Plot	Legume Nitrate Treatment*	Date of turning Vetch	Date of Planting Cotton	(Pounds seed cotton per Acre)										Av. N. Sec. 9 yrs.			
				1925	1926	1927	1928	North Section		South Section		1931	1932		1933		
1	None		April 5	400	376	452		(This plot washed away in 1928)								1934	
2	Nit. Soda		April 5	688	1307	1105	1031	1038									
3	Vetch	Mar. 25	April 5	690	1109	1056	1009	966									
4	Vetch	Apr. 5	April 15	514	1181	939	979	924									
5	None		April 5	364	319	412	233	291									
6	Vetch	Apr. 15	April 25	259	1021	664	1229	993									
7	Nit. Soda		April 25	398	1153	904	1430	1041									
8	None		April 5	417	396	489	312	495									S. Sec. 5 yrs.
				South Section (Replication of North Section)													
1	None		April 5														
2	Nit. Soda		April 5														
3	Vetch	Mar. 25	April 5														
4	Vetch	Apr. 5	April 15														
5	None		April 5														
6	Vetch	Apr. 15	April 25														
7	Nit. Soda		April 25														
8	None		April 5														

Reference: Alabama Bulletin No. 232 Table No. 5, page 18.

\*Each plot in the experiment received 600 pounds of superphosphate and 75 pounds of muriate of potash per acre annually. Nitrate of soda was applied to plots 2 and 7 at the rate of 300 pounds per acre. (The early planted cotton has been killed by cold on several years. When the writer visited the station on July 11, 1934, the cotton on the two earlier planted plots did not have as good appearance as that on the latest planted plot, because that on the early planted plots had to be planted over on May 7, 1934. Planting date of cover crops? After the first rain in September,—Never after October 15.

Fertilizer applied to cover crop? None.  
Seeding rates of cover crops? 25-30 pounds hairy vetch.  
Variety of cotton? Cook Wilt Resistant.  
Rotation used. None—Continuous cotton.  
Description of soil type. Norfolk sandy loam. For description see Table 10.  
Number of years that land on which test was run has been in cultivation? For 22 known years—Don't know how much longer  
Has test been run continuously on the same land? Yes.  
Width rows—3½ ft. Spacing—2 stalks every 18 inches.  
Cover crop plots not grazed. Size of plot—1-30 acre.  
Boll weevils poisoned when infestation got above 10 percent.  
Checked by E. L. Mayton, Alabama Agricultural Experiment Station, Auburn, Ala.

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Photo by Courtesy Alabama Agricultural Experiment Station, Auburn, Alabama, Showing Plots 1 and 2 of Table 9. This is the 34th Consecutive Crop of Corn With and Without Legumes. Photographed June 20, 1929.

TABLE 31—YIELDS OF CORN FOLLOWING VETCH TURNED AT VARIOUS

Plot	Fertilizer Treatment* Pounds per acre	Date turning Vetch	Planting Date	1925**		1926		1927	
				18"	36"	18"	36"	18"	36"
1	None		April 5	4.6	5.25	2.3	5.3	3.5	7.82
2	100 lbs. Nitrate of Soda		April 5	9.96	10.12	17.5	18.4	15.7	13.7
3	200 lbs Nitrate of Soda		April 5	8.83	8.57	28.1	22.9	22.7	18.0
4	Vetch	Mar. 25	April 5	8.36	11.62	26.1	17.9	31.16	23.88
5	None		April 5	3.48	6.96	4.7	8.9	7.76	11.02
6	200 lbs Nitrate of Soda		April 20	7.6	9.75	31.9	33.2	23.08	21.1
7	300 lbs Nitrate of Soda		April 20	7.98	11.3	38.6	37.0	26.94	22.92
8	Vetch	Apr. 5	April 20	8.89	12.1	37.3	32.0	33.26	31.82
9	None		April 5	3.21	3.48	5.2	7.7	8.82	10.32
10	200 lbs. Nitrate of Soda		May 1	10.44	8.41	30.8	29.4	23.94	18.32
11	400 lbs Nitrate of Soda		May 1	7.5	6.96	35.6	35.7	24.1	20.94
12	Vetch	Apr. 15	May 1	4.55	8.3	41.1	37.5	35.18	29.62
13	None		April 15	4.28	5.19	7.2	9.0	10.98	12.26

Reference: Bulletin 232, Alabama, Table 4, page 15, Auburn, Alabama.

\*All plots received 400 pounds of superphosphate and 50 pounds of muriate of potash per acre in 1925 and 1926. In the fall of 1926, plots 4, 8, and 12 received 1 ton 16% basic slag and 250 pounds of muriate of potash per acre. All other plots received the same fertilizer treatment in the spring of 1927. In the fall of 1931, all plots received 3200 pounds of 10% basic slag and 250 pounds muriate of potash per acre. (Mineral fertilizers now being applied every five years in heavy applications.)

\*\*Yields in 1925 were very low due to drought.

Vetch was killed by cold in January, 1928.

One-fourth of the Nitrate of Soda applied at planting time, three-fourths at knee high. †All corn in the experiment was severely damaged by larger corn Stalk Borer in 1932 and 1933, so yields for these years cannot be included in the average.

Planting date of cover crops—After first rain in September, never after October 15.

Seeding rates of cover crops—25-30 pounds Hairy Vetch.

Spacing of corn—5 ft. rows, 1 stalk per hill in drill, 18 and 36 inches as shown in table.

Variety of corn—Whatley every year except in 1932. Indian Chief that year.

(They yield about the same.)

STAGES OF GROWTH WITH BOTH 18-INCH AND 36-INCH SPACING

1928		1929		1930		1931		1932†		1933†		7-Yr. Av. 1925-31		9-Yr. Av. 1925-33	
18''	36''	18''	36''	18''	36''	18''	36''	18''	36''	18''	36''	18''	36''	18''	36''
4.5	5.9	7.2	8.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
11.7	12.1	14.5	10.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22.6	14.7	15.1	11.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
16.0	13.9	31.4	30.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7.8	8.7	12.3	13.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22.0	15.7	26.2	24.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26.3	16.9	27.2	20.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28.9	17.6	38.0	31.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12.1	8.9	11.7	14.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25.0	21.7	20.6	19.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36.8	29.0	29.0	19.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34.6	22.8	32.3	31.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13.7	7.8	7.2	16.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Rotation Used—None—Corn continuously.

Soil Type—Norfolk sandy loam. For description see Table 10.

Number of years that land on which test was run has been in cultivation—Known to have been in cultivation 22 years. Do not know how much longer.

Has test been run continuously on the same land? Yes.

Cover crop plots were not grazed.

Size of plots—1-15 acre.

Budworms attacked corn on vetch plots. No control measures were used.

Austrian Winter peas were run as a cover crop on this test for the first 4 years, but was discontinued on account of Anthracnose. The yield from peas and vetch were about the same. The peas were seeded at 40 to 45 pounds per acre.

Checked and approved by E. L. Mayton, Alabama Agricultural Experiment Station, Auburn, Alabama.

For the average date of turning vetch and planting the following crop by farmers as shown in the study made by the U. S. Bureau of Agricultural Economics, Division of Farm Management and Costs, see footnote Table 3, Section I-A.



## CONCLUSION

The growing of winter legumes is a matter for considerable personal study. Not only should the results of the comparative experiments presented in this publication be studied, but a great many other factors should be considered. The comparative prices of commercial fertilizers and winter legume seeds, the comparative risk in the two, the labor available, and the type and number of workstock on the farm are only a few of the factors to be considered in deciding whether or not to grow winter legumes. The primary purpose for which a legume is to be grown is one of the many factors to enter into the decision as to which winter legume to grow. Even in the matter of the number of pounds of seed to be sown per acre, the choice may lie between heavily seeding a few acres or lightly seeding several acres. The sensible decision on this will depend on the number of acres cultivated, the labor, workstock and equipment available and money available for seed.

These decisions will vary according to the locality of the community, the type of farming and the conditions prevailing on the individual farm.



Photo by Courtesy Alabama Agricultural Experiment Station, Auburn, Alabama, Showing Austrian Winter Peas as Recorded in Table 26. September 29 Seeding in Background; November 23 Seeding in Foreground. Photographed April 4, 1926.

# APPENDIX

**TABLE 32—MINIMUM OFFICIAL TEMPERATURES AT AUBURN, ALA.**

Winter of	Lowest Reading		Next Lowest Reading	
	F	Date	F.	Date
1924-25	22	Dec. 26	24	Nov. 25
1925-26	9	Dec. 28	21	Jan. 14
1926-27	11	Jan. 16	24	Dec. 16
1927-28	8	Jan. 2	13	Dec. 9
1928-29	24	Dec. 9	27	Jan. 12
1929-30	16	Jan. 19	18	Dec. 3
do	16	Jan. 19	19	Dec. 20

Reference: Alabama Agricultural Experiment Station Bulletin 232, page 37.

**TABLE 33—RAINFALL AT AUBURN, ALABAMA**

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct	Nov	Dec.	Annual
1925	11.9	2.88	1.94	2.11	0.71	0.78	4.39	0.01	5.11	7.69	3.29	3.39	44.2
1926	9.85	4.38	7.0	2.63	1.53	4.18	8.58	4.28	5.0	2.03	3.44	4.59	57.49
1927	0.49	6.06	5.35	1.36	1.67	3.58	5.12	2.86	1.10	0.57	2.97	6.89	38.02
1928	1.80	3.51	4.50	9.35	4.81	8.38	6.39	4.99	5.76	1.59	1.61	2.25	54.94
1929	4.28	9.61	17.47	5.32	7.05	4.19	1.63	1.53	4.55	4.04	6.83	4.74	71.24
1930	4.78	3.05	6.36	3.19	2.84	2.09	4.97	4.56	6.17	2.59	7.14	2.12	49.86
1931	2.91	3.38	2.97	4.95	2.82	0.57	4.63	6.37	0.48	0.95	1.50	8.54	40.07
1932	5.61	4.43	3.45	1.92	2.58	2.43	4.79	4.38	3.21	2.12	6.18	7.14	48.24
1933	2.56	6.58	7.41	2.27	1.33	2.32	3.21	3.49	3.44	4.19	1.1	1.95	39.85

From Monthly Summary of Rainfall and Temperature Records, Weather Bureau, U. S. D. A. By courtesy of Professor J. M. Robinson, Entomology Department, Alabama Poly. Institute.

**TABLE 34—MONTHLY, ANNUAL AND AVERAGE PRECIPITATION AND MINIMUM TEMPERATURES AT TIFTON, GEORGIA**

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	Average
January	7.04	5.77	8.76	11.02	.38	1.36	5.11	5.41	2.54	6.06	4.47	5.27
February	1.97	4.43	2.37	4.66	2.93	7.39	4.45	2.56	2.75	2.24	6.14	3.81
March	5.24	4.82	.69	8.30	2.93	5.55	6.19	5.70	2.84	3.50	5.20	4.63
April	1.38	5.41	1.28	3.55	2.58	11.57	3.69	5.96	2.92	1.82	4.44	4.05
May	4.67	1.52	2.88	3.35	.66	3.41	2.34	1.20	3.24	3.68	2.08	2.64
June	8.87	6.50	6.00	2.88	8.40	4.27	7.04	7.22	2.48	3.63	4.33	5.60
July	4.51	5.43	3.34	7.56	6.70	7.93	4.87	5.62	7.11	4.79	9.32	6.11
August	4.14	3.21	1.94	4.20	0.66	18.36	3.29	3.82	4.77	7.51	2.74	5.79
September	1.05	12.01	2.91	2.86	.74	6.72	6.41	3.78	1.56	5.47	3.98	4.32
October	.58	1.01	6.63	1.13	.55	.40	3.31	.23	1.47	5.00	.14	1.86
November	2.01	.26	2.93	4.02	.92	1.11	4.16	2.84	.00	2.81	.78	1.99
December	2.17	6.63	4.65	2.39	7.70	2.48	4.36	3.72	2.73	1.83	1.32	3.63
Yearly Total	43.63	57.00	44.38	55.92	44.15	70.55	55.22	48.06	34.41	48.34	44.94	49.70
Minimum Temperature:												
Jan				27°	15	14	24	22	22	30	32	19
Feb.				25°	35	20	28	31	27	33	15	21
Dec.			14°	28°	21	27	18	28	37	34	30	....



Photo by Courtesy Alabama Agricultural Experiment Station, Auburn, Alabama.  
Showing Vetch Grown on Plot A of Table 10. The Vetch Produced 13,794  
Pounds Green Material Per Acre Following Corn. Photographed  
and Sampled April 13, 1925.

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