Issued November 29, 1907.

U. S. DEPARTMENT OF AGRICULTURE.

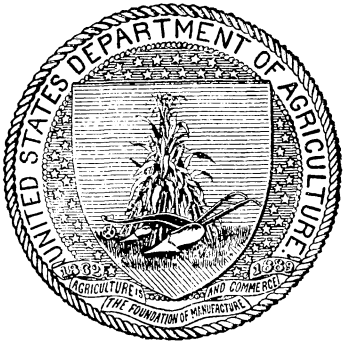
FARMERS' BULLETIN 312.

A SUCCESSFUL SOUTHERN HAY FARM.

BY

HARMON BENTON,

Assistant Agriculturist, Farm Management Investigations, Bureau of Plant Industry.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1907.

LETTER OF TRANSMITTAL

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., October 23, 1907.

SIR: I have the honor to transmit herewith a paper entitled "A Successful Southern Hay Farm," by Mr. Harmon Benton, Assistant Agriculturist, prepared under the direction of the Agriculturist in Charge of Farm Management Investigations of this Bureau.

While this paper is an exceedingly interesting one as showing the possibilities of a small area of land in the South, it should be understood that the conditions under which the farm in question was managed were unusual. As pointed out in the paper, it would not be possible to duplicate in many places the prices for hay received by the owner of the farm in question. There are many sections of the South, however, where hay would sell at a handsome profit, and the adoption of the systems of management set forth in these pages would be of material advantage in building up the soil. The suggestions and recommendations made are certainly worthy of consideration, and I therefore recommend that the paper be published as a Farmers' Bulletin.

Respectfully,

B. T. GALLOWAY,
Chief of Bureau.

HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introduction	7
Location	7
Management	7
Cultural methods	10
Crimson clover	10
Oats	10
Corn	11
Cowpeas	11
Field shed	12
Equipment of the farm and its cost	12
Expenses and receipts of the farm	12
Application to other farms of the system described	13

B. P. I.—316.

A SUCCESSFUL SOUTHERN HAY FARM.

INTRODUCTION.

In localities where a one-crop system has prevailed for a number of years farms which deviate from this system are of special interest, because they show what types of farming are possible in the section in which they are located. In the cotton-growing States such farms are of unusual interest for the reason that so few of them exist. Much of the hay consumed on Southern farms and plantations is shipped from the North. As a result, hay is high priced in the South. There is room for a considerable number of hay farms in that section. That such farms can be made to pay handsomely is demonstrated by the experience of the farmer whose work is described in these pages.

Not every hay grower can follow the methods here described. It is not necessary, however, that a farmer should feed steers for their manure, as is done on this farm, in order to be able to grow hay. While nothing else is quite equal to manure, land can be kept in good heart by plowing under an occasional green crop and then using lime and commercial fertilizers.

A brief discussion of hay growing under more usual conditions on southern farms will be found at the end of this bulletin.

LOCATION.

Eight years ago Dr. D. S. Ramseur, of Cherokee County, S. C., purchased a run-down cotton farm in the Piedmont region, 25 acres of which he has placed under the mangement described below. At that time the land would not produce more than one-fourth bale of cotton to the acre, with 250 pounds of fertilizer. Now the land is yielding more than $50 an acre annually, with less labor than cotton would require. Besides, it is improving in fertility.

The soil varies from a pebbly clay to a sandy loam.

MANAGEMENT.

Under the present management the value of the farm has been greatly enhanced. To illustrate: Doctor Ramseur purchased a few

acres of land from an adjoining neighbor in 1906 at $16.66 per acre. At the same time the neighbor offered $100 per acre for the adjoining portion of Doctor Ramseur's farm. It is interesting to note that the difference in value of these two farms has been brought about by difference in soil treatment in eight years' time; besides, profitable crops of hay have been removed from the land every year.

The management of this farm is of interest to every cotton grower and every tobacco grower. At the time the farm was purchased it was terraced according to the usual custom in cotton fields in that section. By the plan followed the objectionable terraces have been removed and the soil has been greatly increased in fertility and in value. The effect of torrential rains is not so great in washing out gullies, owing largely to the fact that the land is covered with some growing crop all the time and to the addition of organic matter to the soil. The methods used by Doctor Ramseur can be applied to at least a small portion of many southern farms and plantations.

For the first few years the crops on the farm here described consisted of oats in winter, cowpeas in summer for hay, and a sufficient acreage of corn to supply the farm. The application of barnyard manure and the turning under of oat and cowpea stubble made it possible to grow crimson clover, and that crop now occupies an important place in the cropping system and has proved to be most valuable.

No commercial fertilizers have been used on the farm since the present owner bought it. A dressing of 6 to 8 tons of barnyard manure per acre is applied annually. This manure is obtained from feeding beef cattle at the owner's home, one-fourth mile from the farm. The beef cattle are natives, fattened for the local market on cotton-seed meal and hulls. The feed is mixed in the proportion of 1 pound of meal to 5 of hulls. Twenty-five pounds of the mixture are fed per day per 1,000 pounds live weight. An average of 25 animals is kept constantly on hand; these are sold to butchers as demanded by the local market.

No accurate accounts are kept of the feeding operations, but it is estimated that the increase in live weight and the advance in price of fat cattle over poor ones pay for the food and the time consumed in feeding, leaving the manure as profit.

The animals are fed the same summer and winter under a large shed surrounding the main barn. Feed and water are placed in separate troughs, and the animals eat and drink at will.

The principal part of the work on this farm is performed by one man and one horse. Additional help in the way of teams and men is used during the harvest season. The owner informed the writer

that the horse and man did enough "outside work" to pay for the extra help during the harvest season.

During the winter of 1905 the crops consisted of 18 acres of oats and 7 acres of crimson clover. In the spring of 1906, 3 acres of the land that was in crimson clover the preceding fall were planted in corn, the remaining 4 acres of clover land and the 18 acres of oat land being sown broadcast to cowpeas. No regular rotation of crops has been practiced, owing to the fact that the acreage of corn has been decreased as the land increased in yield and that variation of seasons causes the area of crimson clover planted to be variable. The idea is to get over the entire farm with crimson clover as often as possible.

Corn follows a portion of the clover in the rotation, neither being planted two years in succession on the same land, except in the case of crimson clover following corn. By this system corn and clover gradually rotate over the entire farm. More years are required for corn than clover, as it occupies less than one-half the land now planted in clover. Corn always follows early plantings of crimson clover after cowpeas. This system enables the owner to secure two crops a year from the land: Fall crops, clover and oats; spring crops, corn and cowpeas.

It is quite probable that if vetch seed were sown with the oats better results would be secured. The land is now in condition to produce good vetch. This plant would add to the quality and quantity of oat hay produced and at the same time supply a winter legume. This combination was tried in a small way in the fall of 1906. At the suggestion of the writer the same combination will be tested on a larger scale in the autumn of 1907. By planting vetch with oats two crops of leguminous plants can be secured from the same land every year—oats and vetch and crimson clover in winter and cowpeas in summer.

Cotton is never grown on this farm, as it costs too much in proportion to the amount received for the product.

German millet has been successfully tried, but it is not a satisfactory crop on this farm. Its season is not quite the same as that of cowpeas and it does not fit into the system of growing two crops a year. Farther north, where it can be sown later, it would do this.

Doctor Ramseur does not like sorghum as a hay crop. He considers the yield satisfactory, but it can not be baled and put on the market in a satisfactory condition because it is impossible to dry it sufficiently to prevent the juice from breaking out of the stems when it is baled. This objection would not hold on farms where the sorghum hay is fed at home and where, consequently, it does not need to be baled.

CULTURAL METHODS.

CRIMSON CLOVER.

Crimson clover always follows corn and as much of the cowpea land used for early cutting as can be properly prepared for planting before November 1. Clover seed is sown in the corn at the last plowing and on cowpea land as soon as possible after the removal of the earlier cutting of cowpeas for hay. On corn land the clover is sown at the rate of 20 pounds per acre and cultivated in at the last working of corn. After the cowpeas are harvested the land is plowed as well as possible with a one-horse turning plow. Afterwards it is harrowed into good condition. On cowpea land also the crimson clover seed is sown at the rate of 20 pounds to the acre, but is harrowed in lightly.

Doctor Ramseur prefers to plant crimson clover in August and September. He never plants it after November 1, because the young plants are frequently injured by winter freezing, and besides the growth is unprofitable when planted later. After sowing all the crimson clover possible the remainder of the land is sown to oats.

The earlier plantings of crimson clover are ready to cut for hay about May 10. The hay is allowed to remain in the swath until thoroughly wilted. It is then raked into windrows and allowed to remain until quite well cured, after which the hay is thrown into small, tall cocks, where it remains until thoroughly cured. After being cured the hay is drawn to a large shed in the field, where it is allowed to remain until the owner is ready to put it into bales.

From practical experience extending over a period of about four years Doctor Ramseur states that crimson clover should not be cut for hay while too green. He lets about two-thirds of the flowers dry on the seed head before cutting. He states that he practically lost one crop by cutting too green. "If cut when in full bloom it takes much longer and is more difficult to cure." On the other hand, this crop should not be cut too ripe. If allowed to stand much longer than the early flowering stage, the beards of the calyx form "witch balls" in the stomachs of stock eating the hay, sometimes with fatal results.

Doctor Ramseur considers the stubble of a good crop of crimson clover, when turned under, far superior to cowpea stubble.

The yield of crimson clover in 1906 was 3,500 pounds (1¾ tons) of cured hay per acre.

OATS.

After November 1 the portion of the farm that can not be planted to crimson clover is gradually prepared as well as possible with a one-horse plow, and a variety of oats known as the Appler is

drilled in at the rate of 2 bushels to the acre. The open-furrow system is practiced in planting oats, i. e., rather deep furrows are laid off 15 to 18 inches apart, and the oats are planted with a one-horse planter in the bottom of these furrows. In this section oats frequently "heave" during the winter when planted on the level, but if planted in these furrows particles of soil from the sides of the furrows are loosened by freezing and recover the roots of the oats as they are "heaved" out of the soil.

Oats are planted, as previously stated, over the whole area not planted in crimson clover. In 1906 the 18 acres planted averaged 3,000 pounds of cured hay per acre. The oats are cut for hay while in the dough stage. Doctor Ramseur states that it pays him better to convert oats into hay than to grow them for grain. Oat hay is handled in all respects like crimson clover hay.

CORN.

In 1906, 3 acres of the land that had grown crimson clover was well prepared with a one-horse plow and planted to corn about June 1. The corn rows were 4 feet apart, single plants being left 15 to 18 inches apart in the row. The crop was cultivated shallow and level, so that the crimson clover sown at the last plowing could be cut for hay the following spring.

The corn was cut close to the ground about eight days after the fodder-pulling stage had passed, and it was shocked where it was and left for six weeks or two months. It was then shredded. The corn measured $66\frac{2}{3}$ bushels per acre. The stover yielded 2 tons per acre. This is baled and finds ready sale on the local market.

Doctor Ramseur has no shredder, but employs the owner of one to come to his farm and shred his corn. It may not be out of place to state that in this section of the country owners of shredders move around from one farm to another for the purpose of shredding the farmers' corn stover. Doctor Ramseur considers good corn stover equal in food value to cotton-seed hulls.

COWPEAS.

In summer the portion of the farm not needed for corn is planted in cowpeas. The land is plowed as well as possible with a one-horse plow, then harrowed and peas sown broadcast at the rate of $1\frac{1}{2}$ bushels per acre from May 1 to June 25. The seed is harrowed in. The vines are cut for hay after about one-half of the pods are ripe. At this stage they are much more easily cured into hay than if cut earlier. The vines are allowed to remain in the swath until well wilted and the leaves are dry. The hay is then raked into windrows, where it is allowed to remain until the smaller vines are dry. Then

it is placed in tall, small cocks until it passes through a sweat. After it has sweated sufficiently it is carried to the field shed, where it is stacked in a large mow for about six weeks before baling. All hay treated thus passes through a heat, but not enough to cause decay.

Mixed varieties of cowpeas are never sown on this farm, for the reason that different varieties ripen at different times. The owner of this farm buys all his cowpea seed, because he thinks it pays better to sell hay than to save seed. When possible, different varieties of unmixed seed are purchased, as early, medium, and late varieties give him a better opportunity to cut the hay at the proper time.

FIELD SHED.

The field shed is cheaply constructed by erecting four posts on a square 24 feet apart; two of these are 22 feet high and two are 20 feet high. These posts are well braced, and a single pitch roof 26 feet square forms the cover. The hay is drawn to this shed after being field cured, and it remains there for six weeks, or until the manager is ready to put it into bales. It should be noted that hay sells better when baled. When this shed is filled it holds 600 bales of hay, weighing from 80 to 100 pounds each. The mow covers a ground space of 50 by 37½ feet. The hay is allowed to project 12½ feet on the front and two sides, but does not extend beyond the roof at the back, as otherwise water falling on the roof would run off on the hay.

EQUIPMENT OF THE FARM AND ITS COST.

A statement of the equipment used on the farm and its cost follows:

One one-horse Georgia plow stock, with attachments	$5.00
One one-horse smoothing harrow	10.00
One one-horse weeder	7.00
One one-horse curved-tooth slicing and smoothing harrow	10.00
One two-horse mower	35.00
One one-horse hayrake	15.00
One one-horse wagon	30.00
One one-horse hay press	90.00
One one-horse wooden roller	7.50
Total	209.50

EXPENSES AND RECEIPTS OF THE FARM.

The expenses of conducting the farm and the receipts from products sold for 1906 are as follows:

Cost of labor.

One man, twelve months, at $15	$180.00
One horse, use of, and feed	100.00

Miscellaneous expenses.

Interest on 25 acres of land, valued at $100 per acre, at 8 per cent	$200.00
Interest and depreciation on machinery, at 20 per cent	41.90
Total	521.90

Receipts.

7 acres crimson clover hay, 3,500 pounds per acre, at $1.25 per hundredweight	$306.25
18 acres oat hay, 3,000 pounds per acre, at $1.25 per hundredweight	675.00
22 acres cowpea hay, 3,000 pounds per acre, at $1.25 per hundredweight	825.00
3 acres corn, 66.66 bushels per acre, at 75 cents per bushel	150.00
3 acres corn stover, 2 tons per acre, at $15 per ton	90.00
Total income	2,046.25
Total cost	521.90
Net income	1,524.35

These figures indicate very clearly the importance of growing hay on the cotton farms of the South, where a large proportion of the hay required is brought from other States. Doctor Ramseur sold all of his hay at his barn, and could have sold more.

When it was suggested that by the use of two horses and two-horse plows, wagons, and implements, one man would be able to work twice as much land, and do especially the plowing better, the owner of this farm informed the writer that his object was to show what could be done with a one-horse farm.

Doctor Ramseur paid $15 a month for labor in 1906. For the year 1907, owing to the advance in the price of labor it was necessary to pay the same man $20 per month. This man furnishes his own house and boards himself.

APPLICATION TO OTHER FARMS OF THE SYSTEM DESCRIBED.

Comparatively few farms in the South have the supply of manure necessary to duplicate Doctor Ramseur's methods, but even where the manure from cattle is not available it would pay to grow at least enough hay for home consumption, and in many parts of the South by substituting commercial fertilizers for barnyard manure the methods described could be followed with somewhat similar results. On nearly every farm or plantation some manure is available. But even where there is no manure hay could still be grown to advantage. In some cases it would undoubtedly pay to plow under an occasional crop of rye or cowpeas to put humus into the soil; but where one is growing legumes, and especially where there is a crop of stubble to plow under every spring and every fall, there will usually be enough humus in the soil so that commercial fertilizers will make good crops of hay.

Of course it would not be possible in all parts of the South to duplicate the prices for hay received by Doctor Ramseur, but there is not a Southern State where good hay like that grown on the farm here described would not sell at a handsome profit over the cost of its production. But while very few farmers would be able to make a profit of $60 an acre on a hay farm, it would be a poor hay grower indeed, with hay at such a price as now prevails in the South, who could not make $20 an acre above expenses.

A word of caution should be inserted here concerning crimson clover. This crop has become important only in a limited section along the Middle Atlantic coast. Elsewhere results with it have been very irregular. It would therefore be wise for the prospective hay grower to experiment with crimson clover on a small scale until he is sure he has learned how to grow it and has gotten his land well inoculated for it. Practically the same remarks apply to vetch, except that the region in which vetch succeeds is considerably larger than the corresponding region for crimson clover. Vetch usually does not thrive when first sown on a piece of land, and the trouble seems to be due to the lack of the proper bacteria in the soil. By persistent effort, however—that is, by continuing to sow a little vetch on the same piece of land for two or three years in succession—the land will become inoculated, and then vetch may be readily grown; and it is doubtful if there is any hay superior to that made by vetch. A very good plan would be to sow for winter hay crops a mixture of oats, vetch, and crimson clover, or any two of these; then for summer sow cowpeas, using two or three varieties having different lengths of growing season in order to extend the period of hay harvest.

Where manure is not available commercial fertilizers should be used unless the ground is known to be rich. The fertilizers required will depend largely upon the character of the crop grown and upon the soil. In the coastal plains region there is no question that both phosphoric acid and potash should be added even to a leguminous hay crop, and for crops other than legumes some nitrogenous fertilizer should be added. One of the most successful hay growers in the South uses for cowpeas, vetch, crimson clover, and other legumes 300 pounds per acre of a fertilizer containing 10 per cent of phosphoric acid and 4 per cent of potash. This is in the coastal plains region. For crops other than legumes—such, for instance, as Johnson grass and oats—he adds about 200 pounds of cotton-seed meal. In the Piedmont region, where the soils contain more clay, the potash could probably be omitted from the fertilizer without greatly affecting the yield of hay.

There should be no difficulty anywhere in the South in getting a winter hay crop that would yield 1 ton per acre, to be followed by

a summer crop of cowpeas that would yield from 1 to 2 tons per acre. Considering the price of hay in the South and the considerable income from a hay farm, the cost of the necessary equipment is not too large.

In sections where Johnson grass is well established a very good system of hay growing is to sow vetch or crimson clover, or both, with a small amount of oats as a winter crop on Johnson-grass land. Where the land is plowed early in the fall and put in good condition for the winter hay crop, two or three good crops of Johnson grass can be cut the next summer. This system will then give a crop of winter hay and two or three cuttings of Johnson-grass hay every year.

A very good modification of this system would be to grow cowpea hay every other year as the summer crop, alternating with Johnson grass, and growing a crop of winter hay each year. The system would then be, say, oats and vetch, followed by cowpeas, the land being plowed and put in good condition before sowing the cowpeas. After the cowpeas are off, disk in the winter hay crop; then the next summer, after taking off the winter hay crop, let the Johnson grass come on.

One very successful hay grower in Mississippi sows bur clover on Johnson-grass sod in the fall and pastures the bur clover during the winter, allowing it to make just enough seed in the spring to reseed the land. This treatment has increased the yield of Johnson-grass hay prodigiously. This farmer cuts Johnson grass before it heads out, or about the time it is heading, and thus avoids scattering the seed of this serious pest.

It is hoped that a description of Doctor Ramseur's work, showing the possibilities in the production of hay in the South and pointing the way to a satisfactory method, will result in more hay being grown in that section. The farmer or planter who buys hay, even at $15 a ton, when he could grow it, is wasting money. The cost of growing hay under ordinary farm conditions in the South is from $3 to $6 a ton. It is easily seen that where a farmer must pay $15 or $20—and sometimes even $25—a ton for hay, he would save a large part of his expenses by growing his own hay.

On account of the difference in the crops adapted to various soils and climatic conditions, it is manifestly impossible to lay out a cropping system for a hay farm that will suit all sections. If, however, any farmer who reads this bulletin desires to do similar work on his own farm, the Office of Farm Management Investigations, of the Bureau of Plant Industry, United States Department of Agriculture, will gladly assist in arranging a cropping system suited to local conditions.

FARMERS' BULLETINS.

Copies will be sent to any address on application to any Senator, Representative, or Delegate in Congress, or to the Secretary of Agriculture, Washington, D. C.

No. 22. The Feeding of Farm Animals. No. 24. Hog Cholera and Swine Plague. No. 25. Peanuts: Culture and Uses. No. 27. Flax for Seed and Fiber. No. 28. Weeds: And How to Kill Them. No. 29. Souring and Other Changes in Milk. No. 30. Grape Diseases on the Pacific Coast. No. 32. Silos and Silage. No. 33. Peach Growing for Market. No. 34. Meats: Composition and Cooking. No. 35. Potato Culture. No. 36. Cotton Seed and Its Products. No. 37. Kafir Corn: Culture and Uses. No. 39. Onion Culture. No. 41. Fowls: Care and Feeding. No. 42. Facts About Milk. No. 43. Sewage Disposal on the Farm. No. 44. Commercial Fertilizers. No. 46. Irrigation in Humid Climates. No. 47. Insects Affecting the Cotton Plant. No. 48. The Manuring of Cotton. No. 49. Sheep Feeding. No. 51. Standard Varieties of Chickens. No. 52. The Sugar Beet. No. 54. Some Common Birds. No. 55. The Dairy Herd. No. 56. Experiment Station Work—I. No. 58. The Soy Bean as a Forage Crop. No. 59. Bee Keeping. No. 60. Methods of Curing Tobacco. No. 61. Asparagus Culture. No. 62. Marketing Farm Produce. No. 64. Ducks and Geese. No. 65. Experiment Station Work—II. No. 66. Meadows and Pastures. No. 68. The Black Rot of the Cabbage. No. 69. Experiment Station Work—III. No. 70. Insect Enemies of the Grape. No. 71. Essentials in Beef Production. No. 72. Cattle Ranges of the Southwest. No. 73. Experiment Station Work—IV. No. 74. Milk as Food. No. 77. The Liming of Soils. No. 78. Experiment Station Work—V. No. 79. Experiment Station Work—VI. No. 80. The Peach Twig-borer. No. 81. Corn Culture in the South. No. 82. The Culture of Tobacco. No. 83. Tobacco Soils. No. 84. Experiment Station Work—VII. No. 85. Fish as Food. No. 86. Thirty Poisonous Plants. No. 87. Experiment Station Work—VIII. No. 88. Alkali Lands. No. 91. Potato Diseases and Treatment. No. 92. Experiment Station Work—IX. No. 93. Sugar as Food. No. 95. Good Roads for Farmers. No. 96. Raising Sheep for Mutton. No. 97. Experiment Station Work—X. No. 98. Suggestions to Southern Farmers. No. 99. Insect Enemies of Shade Trees. No. 100. Hog Raising in the South. No. 101. Millets. No. 102. Southern Forage Plants. No. 103. Experiment Station Work—XI. No. 104. Notes on Frost. No. 105. Experiment Station Work—XII. No. 106. Breeds of Dairy Cattle. No. 107. Experiment Station Work—XIII. No. 108. Saltbushes. No. 109. Farmers' Reading Courses. No. 110. Rice Culture in the United States. No. 111. Farmers' Interest in Good Seed. No. 112. Bread and Bread Making. No. 113. The Apple and How to Grow It. No. 114. Experiment Station Work—XIV. No. 115. Hop Culture in California. No. 116. Irrigation in Fruit Growing. No. 118. Grape Growing in the South. No. 119. Experiment Station Work—XV. No. 120. Insects Affecting Tobacco. No. 121. Beans, Peas, and other Legumes as Food. No. 122. Experiment Station Work—XVI. No. 124. Experiment Station Work—XVII. No. 125. Protection of Food Products from Injurious Temperatures. No. 126. Practical Suggestions for Farm Buildings. No. 127. Important Insecticides. No. 128. Eggs and Their Uses as Food. No. 129. Sweet Potatoes. No. 131. Household Tests for Detection of Oleomargarine and Renovated Butter. No. 132. Insect Enemies of Growing Wheat. No. 133. Experiment Station Work—XVIII. No. 134. Tree Planting in Rural School Grounds. No. 135. Sorghum Sirup Manufacture. No. 136. Earth Roads. No. 137. The Angora Goat. No. 138. Irrigation in Field and Garden. No. 139. Emmer: A Grain for the Semiarid Regions. No. 140. Pineapple Growing. No. 141. Poultry Raising on the Farm. No. 142. Principles of Nutrition and Nutritive Value of Food. No. 143. Conformation of Beef and Dairy Cattle. No. 144. Experiment Station Work—XIX. No. 145. Carbon Bisulphid as an Insecticide. No. 146. Insecticides and Fungicides. No. 147. Winter Forage Crops for the South. No. 148. Celery Culture. No. 149. Experiment Station Work—XX. No. 150. Clearing New Land. No. 151. Dairying in the South. No. 152. Scabies in Cattle. No. 153. Orchard Enemies in the Pacific Northwest. No. 154. The Home Fruit Garden: Preparation and Care. No. 155. How Insects Affect Health in Rural Districts. No. 156. The Home Vineyard. No. 157. The Propagation of Plants. No. 158. How to Build Small Irrigation Ditches. No. 159. Scab in Sheep. No. 161. Practical Suggestions for Fruit Growers. No. 162. Experiment Station Work—XXI. No. 164. Rape as a Forage Crop. No. 165. Culture of the Silkworm. No. 166. Cheese Making on the Farm. No. 167. Cassava. No. 168. Pearl Millet. No. 169. Experiment Station Work—XXII. No. 170. Principles of Horse Feeding. No. 172. Scale Insects and Mites on Citrus Trees. No. 173. Primer of Forestry. No. 174. Broom Corn. No. 175. Home Manufacture and Use of Unfermented Grape Juice. No. 176. Cranberry Culture. No. 177. Squab Raising. No. 178. Insects Injurious in Cranberry Culture. No. 179. Horseshoeing. No. 181. Pruning. No. 182. Poultry as Food. No. 183. Meat on the Farm—Butchering, Curing, etc. No. 184. Marketing Live Stock. No. 185. Beautifying the Home Grounds. No. 186. Experiment Station Work—XXIII. No. 187. Drainage of Farm Lands. No. 188. Weeds Used in Medicine. No. 190. Experiment Station Work—XXIV. No. 192. Barnyard Manure. No. 193. Experiment Station Work—XXV. No. 194. Alfalfa Seed. No. 195. Annual Flowering Plants. No. 196. Usefulness of the American Toad. No. 197. Importation of Game Birds and Eggs for Propagation. No. 198. Strawberries. No. 199. Corn Growing. No. 200. Turkeys. No. 201. Cream Separator on Western Farms. No. 202. Experiment Station Work—XXVI. No. 203. Canned Fruits, Preserves, and Jellies. No. 204. The Cultivation of Mushrooms. No. 205. Pig Management. No. 206. Milk Fever and its Treatment. No. 208. Varieties of Fruits Recommended for Planting. No. 209. Controlling the Boll Weevil in Cotton Seed and at Ginneries. No. 210. Experiment Station Work—XXVII. No. 211. The Use of Paris Green in Controlling the Cotton Boll Weevil. No. 213. Raspberries. No. 215. Alfalfa Growing. No. 216. Control of the Cotton Boll Weevil. No. 217. Essential Steps in Securing an Early Crop of Cotton. No. 218. The School Garden. No. 219. Lessons taught by the Grain-Rust Epidemic of 1904. No. 220. Tomatoes. No. 221. Fungous Diseases of the Cranberry. No. 222. Experiment Station Work—XXVIII. No. 223. Miscellaneous Cotton Insects in Texas. No. 224. Canadian Field Peas. No. 225. Experiment Station Work—XXIX. No. 226. Relation of Coyotes to Stock Raising in the West. No. 227. Experiment Station Work—XXX. No. 228. Forest Planting and Farm Management. No. 229. The Production of Good Seed Corn. No. 230. Game Laws for 1905. No. 231. Spraying for Cucumber and Melon Diseases. No. 232. Okra: Its Culture and Uses. No. 233. Experiment Station Work—XXXI. No. 234. The Guinea Fowl and Its Use as Food. No. 235. Cement Mortar and Concrete. No. 236. Incubation and Incubators. No. 237. Experiment Station Work—XXXII. No. 238. Citrus Fruit Growing in Gulf States. No. 239. The Corrosion of Fence Wire. No. 240. Inoculation of Legumes. No. 241. Butter Making on the Farm. No. 242. An Example of Model Farming. No. 243. Fungicides and Their Use in Preventing Diseases of Fruits. No. 244. Experiment Station Work—XXXIII. No. 245. Renovation of Worn-out Soils. No. 246. Saccharine Sorghums for Forage. No. 247. The Control of the Codling Moth and Apple Scab. No. 248. The Lawn. No. 249. Cereal Breakfast Foods. No. 250. The Prevention of Stinking Smut of Wheat and Loose Smut of Oats. No. 251. Experiment Station Work—XXXIV. No. 252. Maple Sugar and Sirup. No. 253. Germination of Seed Corn. No. 254. Cucumbers. No. 255. The Home Vegetable Garden. No. 256. Preparation of Vegetables for the Table. No. 257. Soil Fertility. No. 258. Texas, or Tick, Fever and Its Prevention. No. 259. Experiment Station Work—XXXV. No. 260. Seed of Red Clover and Its Impurities. No. 261. The Cattle Tick in Its Relation to Southern Agriculture. No. 262. Experiment Station Work—XXXVI. No. 263. Practical Information for Beginners in Irrigation. No. 264. The Browntail Moth and How to Control It. No. 265. Game Laws for 1906. No. 266. Management of Soils to Conserve Moisture. No. 267. Experiment Station Work—XXXVII. No. 268. Industrial Alcohol: Sources and Manufacture. No. 269. Industrial Alcohol: Uses and Statistics.

O