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April 20, 1906.

MEMORANDUM OF UNDERSTANDING BETWEEN THE U. S. DEPARTMENT OF AGRICULTURE AND THE GENERAL EDUCATION BOARD, FOR COOPERATION IN EXTENDING THE FARMERS' COOPERATIVE COTTON DEMONSTRATION WORK.

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The General Education Board, believing that much good has been and can be accomplished by demonstration instruction to farmers upon the plan of the Farmers' Cooperative Cotton Demonstration Work of the Bureau of Plant Industry, U. S. Department of Agriculture, conducted by S. A. Knapp, Special Agent, has been asked to cooperate financially in the extension of this work.

Therefore the said Department of Agriculture and the above mentioned General Education Board have come to a mutual understanding, as follows:

1st. The Farmers' Cooperative Work, in which the general Education Board is to become interested, shall be entirely distinct in territory and finance from that carried on solely by the Department of Agriculture; the said territory and the amount to be expended each year to be determined by mutual conference.

2nd. To the extent of the annual appropriation made as stated in the preceding paragraph, the General Education Board, it is understood, is to pay all expenses directly and indirectly incurred in conducting the Farmers' Cooperative Cotton Demonstration Work in this extended territory.

3rd. The United States Department of Agriculture shall have supervision of the work and shall appoint all special agents for this extended territory in the same way that they are now appointed, and the said agents shall be under the control of said Department in every respect, as fully as any other agents of the Department.

4th. A full account of all expenses incurred in said territory, with proper vouchers, shall be rendered monthly to said General Education Board, and duplicates of same shall be filed with the U. S. Department of Agriculture. Also monthly reports shall be made to the General Education Board and the Department showing the progress of the work, and at the close of the year a final report shall be made covering the year's work.

Either party may withdraw from cooperation under this memorandum on the first day of January of any year by giving three months' previous notice of such intention.

WALLACE BUTTRICK,

Secretary, General Education Board.

April 20, 1906.

JAMES WILSON,

Secretary of Agriculture.



ARRANGEMENTS MADE BY MUTUAL AGREEMENT  
FOR THE FISCAL YEAR COMMENCING JULY 1, 1909.

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First:- The position of Professor of Extension in School Agriculture at the Agricultural College, cooperating with the Farmers' Demonstration Work, shall be filled by the election of L. N. Duncan, at a salary of \$1,800 per annum, beginning July 1st, 1909. The College shall elect at a salary of \$300.00 and the Department shall appoint at a salary of \$1,500. The United States Department of Agriculture will pay all traveling expenses and two-thirds of the salary of a stenographer. The college will furnish office room and every facility for work.

Second:- The Professor of Extension in School Agriculture will be elected by, and work under, the general supervision of the Board of Trustees and President of the Alabama Polytechnic Institute, and under the immediate direction of *Director of the Experiment Station* the ~~Professor of Agriculture of the Alabama Polytechnic Institute,~~ in such work as is essentially along College Extension lines, and he will be a Special Agent of the United States Department of Agriculture and he shall be under the direct control of Dr. S. A. Knapp in such work as is essentially a part of the Farmers' Cooperative Demonstration Work.

Third:- The lines of work formulated for the ensuing year by the Farmers' Cooperative Demonstration Work and the *Director of the Experiment Station* ~~Professor of Agriculture of the A. P. I.~~ are as follows:



All written reports shall be filed, in duplicate:- one *Director of the Expt Station* with the ~~Professor of Agriculture~~ of the Polytechnic Institute of Alabama, and one with the Farmers' Cooperative Demonstration Work, of the United States Department of Agriculture. His principal work will be divided into two classes,- First, he will have charge of demonstrations in agriculture *at* in public schools, high schools, or other educational institutions that may apply for same. Second, he will look after the Boys' Demonstration Work in connection with school officers and teachers. He will aid and encourage the Boys' Demonstration Work and other forms of agricultural teaching by correspondence, by attending superintendents' and teachers' institutes, and in such other ways as he may have the opportunity to do. It is understood that all the foregoing work shall be along the lines of farm demonstrations, rather than experimental work.

Incidentally, he may give suggestions to school officers in regard to agricultural courses of study and reading. He might also find opportunity to give encouragement relative to school gardens, but these are not to be the principal duties. He may also aid under the direction of the *Director of the Expt Station* ~~Professor of Agriculture~~ *Farmers' Institutes* at Auburn in the conduct of ~~Farmers' Institutes~~ and shorter courses at the College, but it is understood that he is, under no circumstances, to do regular teaching in the College. He is to work in cooperation with the Demonstration Agents wherever possible, and will attend the meetings of Demonstration Agents at the college or elsewhere. The circulars or pamphlets showing the results of the demonstrations



are to be published as coming from the College, with the Department cooperating.

(Signed) O. B. MARTIN, Special Agent for

Dr. S. A. Knapp, Special Agent in Charge Farmers' Cooperative Demonstration Work, U. S. Department of Agriculture.



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Second:- The Professor of Extension in School Agriculture will be elected by, and work under, the general supervision of the Board of Trustees and President of the Alabama Polytechnic Institute, and under the immediate direction of the Professor of Agriculture of the Alabama Polytechnic Institute, in such work as is essentially along College Extension lines, and he will be a Special Agent of the United States Department of Agriculture and he shall be under the direct control of Dr. S. A. Knapp in such work as is essentially a part of the Farmers' Cooperative Demonstration Work.

Third:- The lines of work formulated for the ensuing year by the Farmers' Cooperative Demonstration Work and the Professor of Agriculture of the A. P. I. are as follows:



All written reports shall be filed, in duplicate;- one with the Professor of Agriculture of the Polytechnic Institute of Alabama, and one with the Farmers' Cooperative Demonstration Work, of the United States Department of Agriculture. His principal work will be divided into two classes,- First, he will have charge of demonstrations in agriculture in public schools, high schools, or other educational institutions. Second, he will look after the Boys' Demonstration Work in connection with school officers and teachers. He will aid and encourage the Boys' Demonstration Work and other forms of agricultural teaching by correspondence, by attending superintendents' and teachers' institutes, and in such other ways as he may have the opportunity to do.

Incidentally, he may give suggestions to school officers in regard to agricultural courses of study and reading. He might also find opportunity to give encouragement relative to school gardens, but these are not to be the principal duties. He may also aid under the direction of the Professor of Agriculture at Auburn in the conduct of Farmers' Institutes and shorter courses at the College, but it is understood that he is, under no circumstances, to do regular teaching in the College. He is to work in cooperation with the Demonstration Agents wherever possible, and will attend the meetings of Demonstration Agents at the college or elsewhere. The circulars or pamphlets showing the results of the demonstrations or experiments are to be published as coming from the College,



with the Department cooperating.

(Signed) O. B. MARTIN, Special Agent for

Dr. S. A. Knapp, Special Agent in  
Charge Farmers' Cooperative Dem-  
onstration Work, U. S. Department  
of Agriculture.



U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
FARMERS' COOPERATIVE DEMONSTRATION WORK.  
BOYS' DEMONSTRATION WORK.

ORGANIZATION and INSTRUCTION.

It is worth while to get a boy to form a good purpose and work persistently toward its accomplishment. If a number of boys can be induced to strive for the same goal, with a spirit of friendly rivalry which stimulates observation, study, industry and economy, then the good results will be increased many fold.

Such is the plan of the Boys' Corn Clubs in the Farm Demonstration Work. In order to get the best results it is not only necessary to get the boys to unite their efforts, but it is also essential that other vital forces in the county co-operate. One of the strong features about the Demonstration Work is that it is co-operative. So in the Boys' Department we frequently find the county superintendent of education and teachers, the Demonstration agents, the business men, the newspapers and the parents giving aid and support.

Where this work is being introduced in a county, the county superintendent of education and teachers can reach the boys in all sections of the county more quickly and more effectively than any other agency. The superintendent can explain the plan to the teachers, and they can explain it to the boys and secure the names of all boys who will agree to plant one acre of corn. It is best to begin with corn. It is a fine subject for study, and our people need to raise more corn in order to be prosperous and independent.

After this is done a meeting of all boys interested should be held at the courthouse for the purposes of organization and instruction. Such meeting should be held as early in the season as possible so that every boy may have time for proper preparation of soil and selection of seed. For the first year it has been found advantageous to see that first class seed are furnished to all of the boys alike. After that each boy should select and breed his own seed. Wherever a special agent of the U. S. Department of Agriculture is located in a county it will be found that he will gladly help in giving instructions and advice in regard to the agricultural part of the work, either to the county Club or to local groups of boys whom he may meet in his rounds over the county.

PRIZES and PREMIUMS.

If the merchants and other public-spirited citizens have been visited and the work explained to them before the general meeting of boys, there will be a fine list of prizes to announce. There have been many commendable contributions to this cause in various parts of the country during this year. It adds considerable interest to the work to offer prizes like the following, which have been selected from different lists in the South for this year:- "A Trip to Washington, \$50 in Gold, \$10, \$5, A Nice Buggy, A First-Class Bicycle, A Strong 2-Horse Plow, A Double-Barrel Shot-Gun, A \$5 Hat, A \$15 Suit of Clothes, An Up-to-date Corn Planter, A Ton of Fertilizer, A Two-Horse Wagon," and other articles of utility and value. Some Boards of Trade and Chambers of Commerce have made appropriations direct for prizes and some have given fine recognition to the efforts of the Boys' Clubs by giving them banquets and street car and automobile rides.

CIRCULARS and BULLETINS.

Just as soon as the names of all of the boys are assembled in the office of the county superintendent of education, duplicate lists should be sent to Dr. S. A. Knapp, Washington, D. C., who has charge of the Farmers' Cooperative Demonstration Work. These boys will from time to time receive circulars of instruction and information in regard to preparation, fertilization, cultivation, seed selection, etc. These circulars furnish excellent subject matter for discussion at a Club meeting or for a lesson in school. They also lead to further study of farmers' bulletins and books. A boy will profit from such lessons, discussions and books because he is making practical application of the principles taught. He learns scientific agriculture because he needs it and not because it is scientific.

RULES and AWARDS.

It is not necessary to have many rules. A few regulations, however, are necessary in order to prevent misunderstanding. It is well for the boys to elect their own president, vice-president, secretary and treasurer. Some clubs have badges of membership in the shape of a button with the name of the club, name of the county and state, and the year printed or engraved upon it.







The Purposes for Which The Farmers Cooperative Demonstration  
Work is Organized By The United States Department of Agricult-  
ure and the Methods of Organization.

It has been demonstrated by the United States Department of Agriculture that profitable crops of cotton, ranging from 1/2 bale to one bale per acre, can be raised upon lands infested with the boll weevil and regardless of its presence. The most important work to be accomplished now is to place this information in the hands of every cotton producer in Texas and Louisiana and secure the general adoption of the successful methods by the farmers. The entire cotton producing territory, of the south is threatened by an impending calamity too serious to admit of the application of the usual methods of reform by the simple publication of the information.

It is therefore proposed by the Department of Agriculture to effect an immediate organization of farmers of Texas and Louisiana for the purpose of <sup>a</sup> general test of the methods found successful thus far. ~~xxxxxx~~  
~~xxxxxx~~ Granting that the cultural methods are successful under scientific supervision the all important problem, is, will the average planter, tenant farmer and laborer adopt them and can he be equally successful without that supervision. The test of this should be as thorough and as universal in the infected districts and adjacent territory as possible. To effect this result it is proposed to secure the names of every farmer in Texas and Western Louisiana who is willing to cooperate in the test of these cultural methods, place in his hands all necessary information and direct him in his work for the year. If successful it will be the greatest cooperative trial ever made by farmers.

PLAN OF THE WORK.

- Room 17 Masonic Temple -

1st. A central office has been established at Houston, Texas, and Dr. S. A. Knapp placed in charge of this ~~xxxxxx~~ special work, with such assistance as necessary.



2.

2nd. Two competent organizers will be placed in each Congressional District to organize the counties by districts, Each <sup>local</sup> district of farmers <sup>will form</sup> making a club with a district president. At the time of organization in any district each farmer joining the club shall sign the following agreement.

" I hereby agree to raise \_\_\_\_\_ acres of cotton in the season of 1904 under the direction of the United States Department of Agriculture and to be governed entirely by such instructions in the raising of the crop as said department may furnish me. I further agree to fill out and return promptly such report blanks as may be sent me from time to time."

Name \_\_\_\_\_  
Post Office \_\_\_\_\_  
County \_\_\_\_\_  
State \_\_\_\_\_

When the agreement is signed, full working instructions will be given and the list of names will be forwarded to Dr. S. A. Knapp, Houston, Texas, to whom all reports <sup>should</sup> ~~will~~ be sent.

The district president is authorized to secure additional farmers, care only to be taken that they shall be men who will carry out these arrangements.

Farmers may organize or notify Dr. Knapp that they are willing to organize and a Special Agent will be sent to assist them .

B. T. Galloway,  
Chief Bureau of Plant Industry,  
Washington, D. C.



Memorandum of understanding between the U. S. Department of Agriculture and the General Education Board of New York, for co-operation in extending the Farmers Co-operative Cotton Demonstration Work.

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The General Education Board of New York, believing that much good has been, and can be accomplished by demonstration instruction to farmers upon the plan of the Farmers Co-operative Cotton Demonstration Work of the Bureau of Plant Industry, U. S. Department of Agriculture, conducted by S. A. Knapp, Special Agent, has asked to co-operate financially in the extension of this work. Therefore, the said Department of Agriculture and the above mentioned New York Board have come to a mutual understanding, as follows:

1st. The Farmers Co-operative Work, in which the New York Education Board is to become interested, shall be entirely distinct in territory and finance from that carried on solely by the Department of Agriculture; the said territory to be determined by mutual conference.

2nd. The said General Education Board, it is understood, is to pay all expenses directly and incidentally incurred in conducting the Farmers Co-operative Cotton Demonstration Work in this extended territory.

3rd. The United States Department of Agriculture shall have



supervision of the work, and shall appoint all special agents for this extended territory in the same way they are now appointed, and the said agents shall be under control of said Department, in every respect, as fully as any other agents of the Department.

4th. A full account of all expenses incurred in said territory with proper vouchers, shall be rendered monthly to said General Education Board, and duplicates of same shall be filed with the U. S. Department of Agriculture. Also monthly reports shall be made to the General Education Board and the Department, showing the progress of the work, and at the close of the year a final report shall be made, covering the year's work.

Either party may withdraw from co-operation under this memorandum, on the first day of January of any year, by giving three months' previous notice of such intention.

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The Farmers' Cooperative Demonstration Work.

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## The Farmers' Cooperative Demonstration Work.

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The Farmers' Cooperative Demonstration Work is a system by which the simple and well established principles of successful farming are directly taught to the men on the farms.

### Farm principles taught.

1. A deeper and more thoroughly pulverized seed bed. Deep Fall breaking (plowing) with implements that will not bring the subsoil to the surface.
2. The use of seed of the best variety, intelligently selected and carefully stored.
3. In cultivated crops, giving the rows and the plants in the rows a space suited to the plant, the soil and the climate.
4. Intensive tillage during the growing period of the crops.
5. The importance of selection in the improvement of seed, and how to select and store.
6. The soil must be filled with humous. How to use legumes, barnyard manure, farm refuse and commercial fertilizers.
7. The value of crop rotation and a Winter cover crop on Southern farms.
8. How to do more work in a day on the farm by using more horse power and better implements.
9. Increase the farm stock to the extent of utilizing all the waste products and idle lands of the farm.
10. Produce all the food required for men and animals upon the farm.
11. Keep an account with each farm product and know from which the gain or loss arises.

The foregoing well-known general principles are taught by object lessons in a progressive way.

### The Practical Organization.

To secure the general adoption of this system by the farmers, an effective organization and plan of instruction by object lessons



were devised as follows:

1. A general superintendent is selected by the U. S. Department of Agriculture and given a competent administrative office force.

2. Field agents are appointed, having in charge the practical work in one or more counties, strictly under such general directions as may be issued from the central office. The field agent must have thorough knowledge of improved agriculture and should have had considerable practical experience in farming in the section to which he is appointed. He must also have the tact and talent necessary to influence men.

To do the most effective work all classes must be reached---the bankers and merchants as well as the farmers, for, in the South, they own many farms, control to a great extent the capital required to make crops and are strong factors in public opinion.

The message a field agent takes to his district is that prosperity will come to the country by increasing the earnings of the men who till the soil through adoption of our progressive system of farming, and that his mission is to prove it by practical demonstration. He invites the cooperation of the farmers for this purpose. A public meeting is called and farmers are induced to test the plans upon a few acres. At first only a few may volunteer but later enough can generally be secured---they should be well distributed.

The environment of men must be penetrated and modified or little permanent change can be made in them. The environment of the farmer is limited generally to a few miles. The demonstration must be carried to this limited area and show how simple and easy it is to restore the virgin fertility of the soil, to multiply the product of the land per acre, to increase the number of acres each laborer can till by three or four fold and harvest a profit from untilled fields by animal husbandry. This instruction to the men on the farms must, to be successful, include the following principles.

1. It must be a direct message delivered personally by one



who carries influence. It must be oral, and not written, and sustained by the personal experience of the agent.

2. It must be simple. Teaching agriculture is like that of any other branch---commence at the bottom and give simple, practical lessons on standard crops. In the cotton-producing states, our first instructions include cotton, as the main cash crop, corn, as the standard food for work animals and the basis for more stock on the farm; cowpeas, for food and for renovation of the soil; and oats or wheat as the Winter cover crop. When the farmer has mastered these crops he is ready for diversification in any desired direction.

In districts where cotton is not the standard cash crop, instruction is given in whatever replaces cotton as a money-earning crop. The simple lessons at the start should gradually be made progressive till they cover all information necessary to success in agriculture.

3. The teaching must be by object lessons, and the demonstration to be complete must be worked out by the farmer on his own farm. A government demonstration conducted at government expense and by government experts has little more effect than a book; but what the farmer does he believes.

4. The farmer must be convinced that he will receive a direct and almost immediate gain by following our instructions. The process of changing the environment of a farmer is like that of transforming a farm boy into a scholar. First, the farmer is selected to conduct a simple and inexpensive demonstration. Second, a contract is drawn with the United States Department of Agriculture by which he agrees to follow certain instructions. Third, better seed is furnished him and his name is published in the papers. Fourth, each month when the government's field agent goes to inspect his demonstration many of his neighbors are invited; consequently, he will almost unconsciously improve his farm so as to be ready for company and cultivate all of his crops better. Fifth, a report of his extra crop is made in the county papers. His neighbors talk about it and want to buy seed. Sixth, he sells the seed



of his crop at a high price, his neighbors ask him how he produced it; he is invited to address public assemblies; he has become a man of note and a leader of the people and cannot return to his old ways. Soon there is a body of such men; a township, a county, and finally a state is transformed.

The field agent must collect and keep a permanent record of all the material facts bearing on the demonstration of each farmer--- such as the soil, how long in cultivation, the previous crop, when the field was plowed, depth of plowing, etc. etc. A copy of these records must be sent to the general office, which is then in position to give intelligent direction. The field agent reports to the central office daily by card, supplemented by a full weekly letter.

Quarterly meetings of field agents in a state are held at some central point for conference and instruction. At such meetings two or three of the most eminent specialists in standard crop or soil management are secured for instruction.

#### State Inspection.

The Farmers' Cooperative Demonstration Work covers such a large territory it is necessary that there should be a field agent in each state who may have a certain supervision over the other agents of that state, for the following reasons:

A field agent may be sick or for other reasons be obliged to discontinue his work. In such a case there must be someone familiar with the work to take in charge his territory and instruct his successor. The state inspector would assist the district field agent in holding meetings at important points. He would make monthly visits to all portions of the state under our system and report to the central office, and do such other work as may be assigned him.

#### Advantages of this Plan of Organization.

There is a large supply of good agricultural information available. The United States Department of Agriculture, the State Experiment Stations, the agricultural papers, bulletins and books are replete with valuable information. There is also a vast amount of correct farm practises and of excellent experience and even



scientific knowledge among American farmers, scattered and used almost solely for personal gain. Our Farmers' Cooperative Demonstration Work is able through its central office, where a complete library of practical agriculture is kept, through its field agents and the thousands of cooperating farmers, to gather all this body of agricultural knowledge and make it available for improving farm conditions---all taught in a simple way. A better seed bed requires deeper plowing and more harrowing, hence more horse power on the farm. It also includes the production of more economic crops for feeding teams. Rapid and frequent tillage leads to an inquiry for improved implements. Thus the lessons progress and diversify and upon all the widest experience is brought to bear.

#### Seed Farms.

The good-seed problem has been a most difficult one to solve in the South. Very few farmers paid any attention to planting pure seed or keeping it pure when planted, and still fewer tried to improve their seed by selection. Not one farm in one hundred in the South has proper storage for good seed. It is estimated that ninety-nine per cent of all the valuable seeds distributed by the U. S. Department of Agriculture has been lost. Through our field agents the best seeds for a given section are observed and prominent farmers are induced to establish in every county seed farms, where the cultivation of the crop and the selection and storing of the seed are supervised by our field agents under an agreement that the seed produced shall be distributed to the farmers at a moderate price. A general interest is aroused among the farmers to plant a separate seed patch on every farm and carefully select for improvement.

#### The Farmers' Cooperative Demonstration System tested in States infested with the Cotton Boll Weevil.

For a number of years prior to 1904 the Mexican boll weevil had been steadily encroaching upon the cotton producing lands of Texas until it had spread from the Rio Grande to a short distance beyond the eastern boundary of the state, and threatened the entire



cotton industry of the South. Where cotton is the sole cash crop an invasion of the boll weevil, and the consequent loss of the cotton crop brought disaster to every interest, and so completely demoralized financial conditions as to produce in some sections a panic.

The cotton crop had been generally made upon a credit system by securing advances from merchants and bankers. Upon the advent of the boll weevil, confidence in securing a cotton crop was impaired and, in the worst infected districts, almost totally destroyed. Merchants and bankers declined to advance, or advanced in limited amounts, and with great caution. Labor became discontented and sought other sections or states. Tenant farmers unable to obtain advances removed to non-infested districts and property rapidly declined in value.

Here was a demand for immediate relief, and the demand appealed to the entire nation because the loss of the cotton crop would be a national calamity. In response to this appeal Congress made an emergency appropriation in January, 1904. The question then arose as to the method by which immediate relief could be extended. Further experimentation could only be valuable for the future. Farmers are slow to accept printed conclusions based on things they have not seen, and seldom act upon them.

It occurred to the Bureau of Plant Industry that the most effective immediate remedy would be the Farmers' Cooperative Demonstration Work. The Farmers' Cooperative Demonstration Work was inaugurated as a national project in January, 1904, --- primarily because of the depredations of the boll weevil in the State of Texas. By the rapid spread of this pest east and north, it had become evident that it would in time invade all the cotton-producing states. This occasioned a general alarm among the cotton planters and in the industrial centers of our entire country. This alarm was not without just cause as is shown by the effects of the boll weevil on the cotton crop of Texas up to and including 1903. The crop losses were not uniform in the infested districts---some sections partially escaped; some farmers under the



most unfavorable conditions made a fair crop.

The territory actually worked under the cooperative cotton demonstration plan extends from Spofford, Texas, to Monroe, Louisiana, over six-hundred miles east and west, and from Galveston to Channing, Texas, nearly six-hundred miles north and south. In order to reach as many farmers as possible before planting should commence, four field agents were employed in Louisiana and thirty-seven in Texas during February, March and a part of April. They were then reduced to two in Louisiana and twenty-one in Texas, which were continued for the season.

Special field agents were mainly appointed on the advice of district committees of the prominent business men and farmers conversant with the territory to be worked. The office force consisted of six clerks. More than one thousand farmers' meetings were held and addressed by the general managers or by the field agents. One hundred and twenty thousand envelopes were used, and about three-hundred thousand miles of travel performed by the agents in the prosecution of the work.

The total cost, including all salaries, office and traveling expenses, including \$3,253.00 paid for cotton seed and fertilizers, from January 27, 1904, until December 1, 1904, was \$38,731.41.

#### Result.

Within sixty days from the opening of the central office, the names of 7,119 farmers in Texas and 242 in Louisiana, a total of 7,361 for both states, were sent to the central office---each agreeing to follow instructions and report.

2d. Many agreed to follow the plans of the Department, but said they preferred not to report.

3d. A still larger number quietly undertook to make a better cotton crop than would be made on our special demonstration farms, and they soon found that they were obliged to follow the same general methods. The total number of farmers in Texas and Louisiana who followed the Department's instructions in the main exceeded fifty thousand.



THE COOPERATIVE PLAN OF MAKING COTTON UNDER BOLL WEEVIL CONDITIONS.

The Cotton Cultural System of the Bureau of Plant Industry.

1st. Destruction of weevils in the Fall.

(a) Burn the cotton stalks early in Fall while the weevils are still upon them.

(b) Burn all rubbish in and about the field which might serve for hibernating quarters.

2d. Immediately after destroying the stalks, flat break (plow) the field one to two inches deeper than usual. This assists in destruction of the weevils and in preparation of the field for successful cropping the following season.

3d. Shallow Winter cultivation of the soil, that is, working the land with a toothed harrow or a disc once in twenty or thirty days during the Winter, as the weather may permit, to air the soil and destroy grass. The soil should be in excellent condition at time of planting.

4th. Early planting. The object is to hasten the maturity of the crop. The Bureau of Entomology has shown that boll weevils do not multiply till the squares begin to form, and do not generally become numerous enough to destroy the entire crop before the last of July.

In addition to this, early planting has been found generally helpful as against cotton pests, such as the boll worm and the leaf worm. Furthermore, the Winter rains generally leave the soil with plenty of moisture, while in the Spring there is liable to be a drouth which may retard germination in late planting.

5th. The planting of early maturing varieties of cotton.

6th. The use of fertilizers, especially, acid phosphate and potash to hasten maturity and increase fruitage, and the use of cotton-seed meal (when necessary) to promote vigor and growth. Soils and methods of application are fully explained. We have demonstrated that a small amount of fertilizer properly applied accomplishes marvelous results.

7th. More space between the rows and greater distance in the row when under boll-weevil conditions. Where the fallen squares are



exposed to the rays of our hot midday sun the infesting larvae of the weevil are soon killed. On general principles, more space to the plant makes a better stalk with more limbs, more bloom, and a higher grade of cotton. The spacing between the rows and in the rows must depend on the soil and variety of cotton. More space should be given to fertilized than to unfertilized cotton.

8th. The use of the toothed harrow. While this belongs to the general cultivation of the soil it is of sufficient importance to form a special division. After early planting the germination is frequently slow and the earth may become crusted. The harrow may be used before the cotton is up to break the crust, and should be used soon afterward to keep the soil loose so the plant will take on rapid growth at once. The crop is surprisingly advanced by the judicious use of the harrow.

9th. Intensive cultivation. Plowing or cultivating deep the first time, and shallow at all subsequent times is an important feature of good cotton production. It destroys weeds, increases the plant food and conserves moisture; consequently hastens plant maturity. Under boll-weevil infestation, the cotton crop should be cultivated every week. Some of our most successful cooperators cultivated fifteen times and continued late as possible.

10th. Agitation of the stalks by means of brush attached to the cultivator. Some farmers attach a chain to the tongue and smooth poles to the whiffletrees, also a pole to the handles so as to brush the stalks more than once in passing. This knocks off the infected squares. Larvae in the squares that remain on the stalks are pretty sure to hatch. Agitation of the stalks disturbs the weevil and reduces the damage it does.

11th. Picking up the squares that fall. This reduces the rapidity with which the weevil multiplies and is a great aid in saving the crop. Plowing the squares under or even exposing them to the sun is not as sure destruction as picking up and burning.

12th. Controlling the growth of the plant by barring off or topping. Under boll-weevil conditions the main cotton crop must be made upon the lower and middle limbs. There is no use of a tall plant. As soon as the plant indicates too rapid growth, bar off on



each side, thus slightly root-pruning and retarding upward growth. The tendency will then be to throw more vigor into the lower limbs and to put on more fruit. This method is especially valuable on rich bottom lands where stalks frequently grow six to seven feet high. It should be noted that with the boll weevil no top crop is made hence more bottom crop must be secured, requiring a low, limby vigorous plant.

13th. Selecting the seed. Scarcely any item in the cultural system is of more importance than the selection of the seed, where early maturity is of primary importance. The largest, best and earliest bolls from the most vigorous plants should be selected for seed in advance of the general picking, and be kept in a dry place.

14th. Rotation of crops and the use of legumes. Some of the serious difficulties in cotton production arise from consecutive production of cotton on the same land. It reduces fertility, and hence operates against early maturity. With the best of efforts to clear fields of the weevil in the Fall by burning the stalks and deep plowing some weevils will survive and a few soon infect a field. By planting one-half the land to corn and cowpeas and the other half to cotton, as much cotton can be produced as at present and the land gradually restored to its original fertility. The corn and cowpeas will add materially to the income of the farm.

#### Notes on the Cultural System of Producing Cotton.

(a) The possibility of making a cotton crop under boll-weevil conditions is based on three theories:

1st. That the multiplication of the weevils can be retarded so as not to become totally destructive to the crop until the first and middle crops are out of danger.

2d. That the cotton plant can be so bred and selected as to throw nearly its whole life forces into the lower and middle crops.

3d. That the plant can be so hastened by application of the cultural methods that most of the bolls will be developed to the safety point before the weevils are too numerous.

The so-called cultural system may then be divided into two classes of aids.



1. Such as directly tend to reduce the number of weevils or retard their rapid multiplication, as the following:

(a) Burning the cotton stalks in the Fall while the weevils are still at work upon them, and burn all rubbish in the field.

(b) Spring destruction of the hibernating weevils when attacking young cotton before the squares begin to form.

(c) Picking up the fallen squares.

(d) Violent agitation of the cotton stalks when cultivating or plowing the cotton, which should be continued late as possible.

#### Methods which Aid Early Maturity.

(a) Fall breaking (plowing).

(b) Winter cultivation of the soil.

(c) Planting early as practicable the seed of early maturing varieties.

(d) Planting in rows wider than usual and giving more space in the row.

(e) Use of fertilizers.

(f) Use of the toothed harrow as soon as the crop comes up.

(g) Frequent cultivation of the crop continued late into the season.

(h) Barring off to prevent too rapid growth of the plant.

(i) Careful selection of seed and storing in a dry place.

(j) Rotation of crops and use of legumes.

One of the greatest dangers to the subsequent cotton crop is the wintering of large numbers of weevils. We recognize that enough boll weevils may be wintered over by a general failure to burn the stalks early in the Fall to jeopardize the crop the ensuing year. The Fall destruction of the weevil by the universal burning of the stalks at the proper time, that is while the weevils are still at work on the green cotton, is one which encounters great practical difficulties.

1. At such time the bolls are not usually all open and the farmer is naturally inclined to delay destroying the stalks until he can secure the remainder of the crop.

2. Varieties of cotton differ in time of maturity and the



same variety may differ owing to soil, moisture, fertilization, cultivation, etc.

3. Large numbers of weevils apparently hibernate in adjacent timber, as is shown by their invariably first attacking the fields next the timber. Hence for complete destruction of weevils something more than the Fall burning of the stalks and trash in the cotton field would appear to be necessary. More complete destruction of the weevil will be easier for the farmer when he is better informed of its varying hibernating quarters.

If it is important to destroy the weevils in the Fall, when a large per cent of them would die during Winter in any event, it is still more important to destroy the emerging Spring weevils while feeding upon the young plants. In the same general line is the picking up of the fallen squares. If two or three generations can thus be destroyed it will result in retarding the increase of the weevil and in adding to the cotton crop.

#### Notes.

##### Rotation of Crops.

The Bureau of Plant Industry in all its instructions seeks to build up soil energy and improve its mechanical conditions. An important factor to this end is rotation of crops, and the increase of the humus by plowing under green plants, especially cowpeas. This builds up the soil and renders it more porous and responsive.

On lands considerably worn it is recommended that cotton be invariably planted on lands which were in corn and cowpeas the preceding year.

##### Selection of Seed.

The planting of early maturing varieties and the selection of the seed from the earliest and best bolls on the most vigorous and best developed stalks are fundamental principles in growing cotton regardless of boll weevil, and cannot be too closely followed.

##### Width of Rows.

Special attention must be directed to the proper distance of rows apart, and of thinning of plants in the rows under boll-weevil



conditions. There must be width enough so that the sun's rays can reach the earth between the rows, and thus aid in destroying the larvae of the weevil. If, however, extreme space is given between the rows, and considerable distance is allowed each plant in the row, and intensive cultivation be given, there may be enough stimulus imparted to the growth of the plant to actually retard maturity, unless controlled as explained under barring off.

Frequent cultivation of the Crop Continued  
late into the Season.

Abundant testimony has come from our cooperators to show that as long as weekly cultivation of the crop with violent agitation of the stalks is continued, the damage done by the weevil is greatly reduced, and that as soon as they are discontinued the weevils attack not only all the squares but the half-grown bolls in increasing numbers.

Violent agitation of the cotton stalks at the time of cultivation is of vital importance. It disturbs the weevil and knocks off the fallen squares. The later this can be continued the better.