

U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
B. T. GALLOWAY, CHIEF.

VEGETABLE PATHOLOGICAL AND PHYSIOLOGICAL INVESTIGATIONS—  
ALBERT F. WOODS, Pathologist and Physiologist.  
BOTANICAL INVESTIGATIONS AND EXPERIMENTS—FREDERICK V.  
COVILLE, Botanist.  
GRASS AND FORAGE PLANT INVESTIGATIONS—W. J. SPILLMAN,  
Agrostologist.  
POMOLOGICAL INVESTIGATIONS—G. B. BRACKETT, Pomologist.

OFFICE OF GRASS AND FORAGE PLANT  
INVESTIGATIONS.

W. J. SPILLMAN, AGROSTOLOGIST.  
DAVID GRIFFITHS, ASSISTANT IN CHARGE OF RANGE  
INVESTIGATIONS.

Washington, D. C.,

*For Texas.*

*Kafir Corn - For grain - sow next spring.*

*2 farmers 1 acre each.*

*Vicia villosa - winter pasture on Bermuda sod.*

*2 farmers 1 acre each*

*Berseem to be tested in each case with and  
with out inoculation with bacteria. Small*



M. B. Stevens.

U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
B. T. GALLOWAY, CHIEF.

"Field Agent"

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W. J. SPILLMAN, AGROSTOLOGIST.  
DAVID GRIFFITHS, ASSISTANT IN CHARGE OF RANGE  
INVESTIGATIONS.

For Louisiana.

Washington, D. C.,

June 2nd 1903.

Berseem - as a summer crop

" " winter crop on rice fields.

4 farmers - 1 acre each.  
8 farmers 5 acres

Rape - as a winter forage crop.

2 farmers 1 acre each

Jersey Kale as a winter forage crop.

1 farmer 1 acre

---

For Texas

Berseem - winter crop on rice fields

8 farmers - 5 acres each.

Rape - winter crop for dairy farmers

2 farmers, 1 acre each.

Buffalo grass - to resod land

2 farmers  $\frac{1}{10}$  acre

Erodium cicutarium - Range grass for western Texas.

4 farmers  $\frac{1}{4}$  acre each.

Bur Clover - winter pasture on Bermuda sod.

3 farmers  $\frac{1}{2}$  acres each

Bur Clover - winter pasture on corn fields.

3 farmers  $\frac{1}{2}$  acre each.



## UNITED STATES DEPARTMENT OF AGRICULTURE,

Bureau of Plant Industry,  
Farmers' Cooperative Demonstration Work,  
Washington, D. C.

Familiar Talks on Farming.CULTIVATION OF THE CROP.

One day last spring I called on Uncle John and we went into the field to see his cotton and corn.

Uncle John is a fine, old, conservative farmer, as good and true as men are made, but he cannot help looking at things just as he did when he was a boy, and when he was a boy farming was done with the plow and the hoe, run by hard muscle. No one ever thought of attaching brains to them. As we entered the field Uncle John remarked "You see my stand is not as good as I wanted. I planted a full bushel of seed and a little thrown in extra. It was good cotton seed, I got it from the gin and the plants came up thick enough in most places to raise the crust but in some places it did not come at all. A good many of the plants died, though I gave the crop a good hoeing and kept the grass out. I believe in clean cultivation and for this there is no implement that quite equals the hoe." "My dear Uncle," I replied, "You are worth your weight in gold and if you would change some of your old methods of raising cotton you would soon make enough money to buy yourself and retire from business."

"In view of this unpromising crop I want to tell you several things that will be helpful. The world knows a lot



more about plant life than it did twenty-five years ago.

"Your first mistake was that you did not thoroughly prepare this land for planting. It should have been worked until the soil was like an ash heap, three or four inches deep. You did not drain the rows so that there would be no wet spots, even with a heavy rain. Look at the long spaces where there are no plants. If the soil was ~~been~~ properly prepared there is little danger that there will not be moisture enough for the seeds to germinate but in most climates and soils there is always danger of too much water in the soil. Standing water is death to cotton and corn.

"Your next mistake was in getting gin run seed and planting too many per acre. If you wanted a clean vigorous and thrifty family, you would not go and get a lot of gin run boys and girls." "What do you mean by gin run boys and girls?" rather sharply interposed Uncle John. "I mean", I replied, "boys and girls picked up in the homes of the orphans, without any knowledge of their parentage and you would not get five times as many as you expected to raise, judging that enough of them would die of natural weakness or consumption or from other causes, to leave the proper family. Yet that is what you did with your cotton; but we will talk more of this another time.

"You planted too deep and there was hardly strength enough in the little plant to reach the air and it died before it could draw support from the soil. The plants were in the main too crowded. They lacked food and air. That crust on the soil should have been broken. It shuts out



the air essential to germination and growth and aids evaporation. Delay planting till the weather is warm. Cotton is a tropical plant- prepare a fine seed bed; plant shallow- not over one inch deep, if that depth reaches moisture- and the plants will be up in a few days.

"Run the smoothing harrow two or three times diagonally across the rows as soon as the seed is planted and again when the plants are two or three inches tall. This should be repeated, removing a tooth from the harrow and going astride the rows as in cultivation, till the plants are six inches high. The harrow prunes the roots a little, which tends to give the plant a lower and limbier habit of growth; it opens the soil to receive air; it promotes growth and destroys weeds.

"The hoe is the natural enemy of the cotton planter. It kills some weeds but it finally kills the planter (financially) and as generally used it does not properly air the soil, which is the chief end of cultivation.

"While the cotton plants are small thoroughly work the spaces between the rows two or three times to a depth of at least four inches. This leaves a fine seed bed for the roots to occupy later when they are racing about to find food and water. All later cultivation of plants and middles should be shallow- not over an inch and a half deep. This keeps a dust mulch, checks the rising soil moisture and plant food, just at a depth where there are the most rootlets to utilize them for plant growth.



"A plow is the poorest implement with which to work a cotton crop that could well be used." "Tut! tut!" said Uncle John. "What you said about the hoe was bad enough and now you jump on to the plow- I have used it all my life and it is a pretty good tool." "Yes, you have used it all your life and you have not averaged to make a third of a bale of cotton per acre in all that period; when on such good lands you should have averaged a bale." At present prices this is a yearly loss of \$40.00 per acre lint and seed included. You have 200 acres in cotton- your loss is \$8000 per year. You have been repeating this for 40 years- your losses, even at the lower prices of cotton in former years, have for that period exceeded \$200,000. What have you to show for it? if they have not kept you poor Some old plows and antiquated hoes; they have prevented you from getting ahead. There is nothing on a farm that pays greater dividends than the best teams and tools.

"Shallow cultivation should be continued late as practicable. On very rich bottom lands after the plants are thinned to a stand bar off on each side if they show too rapid growth." This root prunes and checks tendency to make excessive stalk. It also gives the plant a hint that it must commence fruiting. What I have said about cotton is true of corn, only corn requires a deeper seed bed than cotton and different spacing for the plants. The cultivation is practically the same; though local conditions of soil and climate may require considerable modification in the treatment of the corn plant. The experience of the best farmers must determine this."

S. A. Knapp,  
Special Agent in Charge,  
Farmers' Cooperative  
Demonstration Work.



Issued \_\_\_\_\_

B. P. I. \_\_\_\_\_

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UNITED STATES DEPARTMENT OF AGRICULTURE,  
Bureau of Plant Industry,  
Farmers' Cooperative Demonstration Work.  
Washington, D. C.

FAMILIAR TALKS ON FARMING.

DIVERSIFICATION.

On the 1st of June I found time to make another call on Uncle John. He expected me and had invited about twenty neighboring farmers to be present. As I approached the house I noticed some signs of improvement; the front fence was repaired, a few rose bushes had been set out and a new walk made. Within the farmers appeared to be very much interested about something. As I entered the door Uncle John arose with considerable dignity and said, " I mentioned to my neighbors some of the things we discussed when you were here last and they were so interested they asked the privilege of being present when you came again - I sent word this morning; they came early and we concluded to organize a club to talk about our farms. They appointed me chairman. It is time for the meeting to commence. You can talk on any subject you please." "Uncle John," I replied; What were you all discussing so earnestly when I came up to the door?" " Why! you see," remarked Uncle John, " there was a dressed up fellow around here calling agricultural meetings and we went out to hear him. He pitched into the cotton farmers generally and told



us we ought to diversify, that our lands were just right for truck farming and that there was big money in it.

He told about a farmer in Texas by the name of Nye who got five thousand dollars worth of onions off from seven acres and another man at Victoria, Texas who made seven hundred dollars an acre out of celery and a string of farmers somewhere else that made piles of money out of Irish potatoes, cabbage, melons, tomatoes and beans. Such a powerful lot of figures made us sort of uneasy. Do you believe he told the truth?" "Yes," I replied, "he told you the truth. I know Mr. Nye and I know the celery gardener at Victoria and I know many of the others; but he did not tell you the whole truth. He did not tell you that Mr. Nye used sixty loads of well rotted cow pen manure per acre under his first crop, and he did not tell you of the thousands who lost all they had in trying to make truck for market.

What your soil is adapted to raise is about the smallest item in profitable farming. The deep, black, sandy-loam soils of the South are well adapted to raising pineapples, bananas and oranges. There is money in raising them, why not go into the business? The climate prevents. It is too cold. If you could raise them they would not be as sweet as if grown in the tropics - Climate is a great factor. Plants get from six to twenty-five times as much food from the air as from the soil. Grass derives about two and one half per cent from the soil, exclusive of water, corn three and one



half and sugar cane less than one.

Truck is bulky and perishable. After it is raised profits depend upon transportation, the markets and the honesty of the commission men; all of them mighty doubtful. In the Gulf States you are from one thousand to fifteen hundred miles from your markets; eventually vegetables from the West Indies and tropical Florida will go into your markets weeks before your vegetables are ready and prices will drop to cost or below. Later, Northern gardeners, close to the cities, will take the markets. The climate, the transportation and the profits of the commission men are against you. You are just between the early and the late producers. It is a gamble and you will win just enough to make you put up all you have and lose.

The last of May this year I saw acres of fine cabbages in North Carolina plowed under because they would not pay transportation.

Successful production of truck depends upon several things. You should have rich, sandy-loam soil; have the teams and tools to give deep and thorough tillage; fill the soil with well rotted stable manure; have some experience and your farm should not be more than three miles from your shipping place. You reside from five to twenty miles from your nearest station. Probably that man was an agent of some railroad and wanted to increase the freights. Vegetables are great on increasing freights; for they are nearly <sup>all</sup> water - eight to ninety per cent - and it does seem a waste to haul water



fifteen hundred miles. It was rather cool for that agent to ask you to raise water, done up in cabbage, melons and tomatoes and haul it an average of ten miles and ship it fifteen hundred miles so as to make freights."

" You don't appear to be in favor of diversification," said Jim Brown. Brown has worked hard all his life and has rather of a poor eighty acres half paid for. He has always been an enthusiast on diversification. He is now thinking of moving to Oklahoma so as to diversify. <sup>This moving diversification is a poor kind.</sup> " On the contrary," I replied, " I am a great believer in diversification that is safe and always helpful. I will outline what I mean.

The first step in diversification is to diversify from poor crops to good crops; from a promise to a performance; from a tenant farmer to an owner of the soil; stand for something and make good.

The second step is to produce upon your farm all that is required for the family and domestic animals on the farm. Supply your family market before you go into the business of raising foods or fruits for Chicago or New York; raise a variety and a plenty.

The third step is to increase the number of good mares and cattle and hogs on the farm, if you have unused lands, and eliminate the unprofitable.

The fourth is to have plenty of good pasture - not a weed nor briar in it - just choice grasses; have a good meadow, cut and cure enough excellent hay. If you have no meadow put



up plenty of peavine and sorghum hay. Fill all the corn fields with cow peas and have some fields of clear, cow peas and of peanuts. When the corn has been gathered in August you can turn hogs, cattle, horses and mules into the corn fields and be sure that the runtiest pig and the poorest mule will be wolling fat by winter. In the fall plant plenty of rape, crimson clover, oats and vetch for a cover crop and for winter pasture.

Plant more than the stock can eat. It would not bankrupt you if some oats went to seed and you harvested them. Fence tight a good tract of oak woodland and let the stock have free range. Give some additional feed and let the stock come into the spring in excellent thrift.

The thrifty farmer should always have something to sell; a few good colts and steers or a milch cow or some hogs. Every time he goes to town the wagon should carry some fruit, or vegetables, or butter, or eggs, or poultry and on return it should not be loaded with canned vegetables, dessicated fruits, preserved meats nor tinned milk. The wagon that goes to town empty and returns loaded with foods the farmer could produce at home is owned by a man who has but one suspender and wears a crownless hat. Enough of the odds and ends should be sold to pay the running expenses of the farm and the cotton crop should be a clear bankable gain.

Cotton is the greatest cash crop in the world, " Here Ben



Williams interrupted, " I am told" said he, " that I have some sure fine land for long stable cotton and I am thinking of planting some." " You will make a great mistake? " I replied. " There is no long stable cotton raised in your neighborhood. Long staple cottons are generally small yielders and you will not raise enough to make a market. You will probably get no more per pound than your neighbors and raise less cotton per acre. As a rule the farmers in a township better raise the same variety of cotton as far as practicable, if a good one, for it will bring more in the markets.

A case in point is this, the Triumph is an early large boll, prolific cotton of medium staple and exceedingly well adapted to most southern conditions. It grades considerably above average cotton and when grown where the general average of cotton is of good type and quality it brings two cents a pound more than when grown where the average cotton is short staple or low grade. That is, cotton, at present, grades a good deal like men, according to the company it keeps. The average cotton is a degenerate mongrel. There are only a few types that ought to be produced for a standard crop in the United States. If these were generally raised and carefully picked and baled in a county, that county would get an average of two cents per pound more than the farmers now receive. The same holds true of long staple cotton, where only one farmer plants it he can not get the price he ought to have. I have tried to make clear that advising a farmer about his crop from one



standpoint is rank folly. The climate, the season, the preparation of the land and its cultivation, the variety, the markets and even what the neighbors raise are important parts of the problem. Over and above all these is the farmer.

When I go around advising people about growing cotton, I always put my tester into the man. There is more in the man than in the land. A first-class man will make most any soil productive. A low grade man will raise a low grade of cotton on the finest delta lands of America.

S. A. Knapp.



FARMERS' COOPERATIVE DEMONSTRATION WORK,  
U. S. DEPARTMENT OF AGRICULTURE.

At an early period it was found necessary to evolve from the mass of ethical teaching, a few general rules for living, called "The Ten Commandments", by which a man could be moral without going through a course in theology. Just so, in order to instruct the average farmer how to successfully conduct his farm operations so as to secure a greater net gain from the farm, it is necessary to first deduce from the mass of agricultural teachings a few general rules of procedure. They are called "The Ten Commandments of Agriculture," by the practice of which a man may be a good farmer in any state without being a graduate from a college of Agriculture.

THE TEN COMMANDMENTS OF AGRICULTURE.

- (1) Prepare a deep and thoroughly pulverized seed bed, well drained; break in the fall to the depth of 8, 10 or 12 inches, according to the soil, with implements that will not bring too much of the subsoil to the surface; (the foregoing depths should be reached gradually.)
- (2) Use seed of the best variety, intelligently selected and carefully stored.
- (3) In cultivated crops, give the rows and the plants in the rows a space suited to the plant, the soil and the climate.
- (4) Use intensive tillage during the growing period of the crops.
- (5) Secure a high content of humus in the soil by the use of legumes, barnyard manure, farm refuse, and commercial fertilizers.
- (6) Carry out a systematic crop rotation with a winter cover crop on southern farms.
- (7) Accomplish more work in a day by using more horse power and better implements.
- (8) Increase the farm stock to the extent of utilizing all the waste products and idle lands of the farm.
- (9) Produce all the food required for the men and animals on the farm.
- (10) Keep an account of each farm product, in order to know from which the gain or loss arises.

Washington, D. C.,  
July, 1908.

S. A. Knapp.



## THE COTTON AND CORN CROP.

Where our instructions have been followed in the preparation of a seed bed for cotton or corn, the universal report to this Office has been that there was plenty of moisture in the soil to cause germination of the seed even under the drouth conditions prevalent this season in West Texas. This is what might have been expected. The next problems are spacing and cultivation. X

All authorities agree and all experience proves that fruiting plants must have ample space of soil for food supply and <sup>ample distance</sup> for the top to obtain sufficient sunlight, if the plant is to yield its best results. Cotton is no exception to the law of fruiting plants. Space must then be in proportion to the plant. While definite instructions for all cases can not be given, our general rule for width between rows is, make them a little wider than the cotton usually grows tall. Three and a half foot rows will answer on well drained, <sup>loamy</sup> lands for cotton, <sup>usually standing</sup> two and a half <sup>to three</sup> feet tall; for heavier soils give a little more space. Increase the distance between the rows on each field as required by any greater height and spread of the cotton. On post oak flats and bottom lands, requiring at times surface drainage, we have made the most cotton by giving not less than five foot space between the rows. X



### Distance Between the Plants in the Rows.

On fields tilled under our directions the distance between plants in the rows should never be less than fifteen inches, and generally two feet is better because with our preparation of soil and tillage the plants are vigorous and the varieties of cotton we recommend throw long, well loaded fruit limbs close to the ground. Where cotton grows four feet tall and is an improved variety, thirty inches in the row is sufficiently close. Our demonstrations show that more cotton is produced by giving a fair distance and securing as perfect development in each plant as possible. Many of our Demonstrators produced from a bale and a half to two bales and over per acre last year and it was invariably done on the plan of giving space enough for each plant to produce a maximum yield. Rows five feet apart, with a space of thirty inches between plants in the rows will allow 3,477 plants per acre. With this spacing and the best treatment the plants have been made to average over one pound of seed lint cotton each. Close planting ultimately deteriorates the cotton in quality, lowers the yield per acre, and is frequently the cause of shedding the bolls.

Only very general suggestions can be made as to width of rows and distance in the row as soils, seasons, and conditions vary so greatly and the farmer should observe under



what conditions of spacing he secures the best results.

Plant early-maturing varieties of cotton. Some large-boll varieties are even better than the small-boll cottons under weevil conditions. This, however, is largely a matter of soil and climate.

#### Cultivation of the Crop.

Several important things must be avoided if the planter expects to make a large crop of cotton or corn.

#### Safe General Directions.

- 1.- The field should never be grassy, from the time of planting the seed till the crop is laid by.
- 2.- Avoid the crusting of the soil.
- 3.- Do just as little of this work with the hoe as possible.
- 4.- *Give frequent shallow cultivation*  
~~Cultivate shallow frequently and continue late as possible.~~ *practicable without injury to the growing plant.*
- 5.- Thin to a stand early ~~as practicable.~~

\* One of the best implements on the farm is a smoothing harrow, especially one in sections which allows the teeth to be set at different angles. The use of the harrow just before planting and immediately after, and again at right angles with the rows as soon as the cotton or corn is well out of the ground, will promote growth, destroy weeds, tend to prevent baking of the surface, and save expense with the hoe. ~~Commence cultivation soon as practicable under boll weevil infestation.~~



## *Cotton under boll weevil infestation*

Cotton under boll weevil infestation should be forced by cultivating as frequently as once in seven to ten days, depending upon the soil and the weather. Never cultivate when the soil is too wet to <sup>leave</sup> have a loose surface, unless unavoidable on account of the grass. This plan allows about nine cultivations after harrowing. The first cultivation of the middles should be deep, later cultivations shallow. On rich moist lands it may be found advisable to cultivate deep later, to give some root-pruning.

### General Depth of Cultivation.

Depth should be determined by conditions. Where there is excess of moisture in the soil, cultivate shallow as possible; under normal conditions an inch and a half to two inches is ample if the sweep or weeder is used; in periods of drouth two to two and a half inches will give better results, and in sections of slight rainfall a depth of three inches is admissible. These are not exact rules, but guides. The general instructions are to give a little greater depth <sup>of cultivation</sup> under drouthy conditions than where there is normal or excessive moisture. For shallow cultivation use the weeder or the sweep. The implements most useful in cotton and corn cultivation are the section, adjustable-tooth harrow, the weeder and the sweep for shallow cultivation, and the disc and the pointed blade cultivators for deeper tillage. Where these are not at hand the farmer must use as skillfully as possible such implements as he has.



Watch for the boll weevil when the squares begin to drop from the plant. It may be due either to the weevil, to excessive moisture, excessive drouth, or too close planting. If the boll weevil is the cause, all the punctured squares should be <sup>gathered</sup> burned for at least the first month after blooming commences, and it will be wise to continue this for a longer period. A good many weevils will thus be destroyed.

Attach a smooth pole to the cultivator or to the whiffletrees in such a way as to strike the plants and knock off the punctured squares. If these can be swept into the middles the larvae will soon be killed by the heat of the sun and thus save picking up and burning the squares. On sandy loam land frequent brushing of the cotton seems to be helpful. Such weevils as fall into the hot sand in the middles are soon dead.

Cotton not under boll weevil infestation should be cultivated intensively to secure the best results, but as early maturity is not so essential five or six cultivations will generally perfect the crop. Methods of cultivation are the same. The exact number of cultivations can never be justly advised in all cases. If there is any doubt, always incline to the greater number.

The foregoing advices are solely for the guidance of our Demonstrators and Cooperators. It is assumed that they all have some good implements for rapid cultivation and that they are men of judgement and can vary the instructions according to conditions of soil, weather, moisture, etc.



## THE CORN CROP.

Improve the condition and fertility of the soil by rotation of crops, by planting cow peas or other legumes, or by the use of stable manure or compost. Corn requires a deep and thoroughly pulverized seed bed. For the best results the seed bed should be not less than ten inches deep and in some soils deeper than this. How and when to do this is explained in Circular #A-64. *Fall preparation of soil -*

In Virginia and the Carolinas deep breaking and the planting of crimson clover *in the corn, at the time of laying by,* as a winter cover crop are approved by all authorities and have been widely practiced by the farmers with excellent yield and greater profit. Under this system farmers have produced over seventy bushels of corn per acre on good up lands, without the use of commercial fertilizers.

Always plant, if possible, a winter cover crop. If crimson clover does well, by all means use it; further South where conditions are less favorable for clover, plant winter oats and barley, ~~can be substituted~~. For corn, plow under in the spring. In case no cover crop is used, harrow the field occasionally in the winter.

Plant only the best selected seed, such as will produce uniform ears of excellent quality and a large crop if given good conditions. <sup>Home produced seed, if carefully selected and of some approved variety is generally the best.</sup> Plant as early as the season will allow in rows four feet apart on well-drained sandy loam soils, and plant cowpeas, or crimson clover according to <sup>climate</sup> conditions, between the rows at the time the corn is cultivated last. When



the weather is warm one inch is sufficient depth to plant in well-pulverized moist soil for perfect germination and the strongest plants, but no definite rule of depth for planting corn can be given for all territory, owing to difference in depth of soil-moisture and other local conditions. This, however, may be suggested:- Do not plant so shallow as not to reach the influences of soil-moisture, nor so deep as to retard germination. The general tendency in the South has been to plant too deep, causing rotting of the seed or slow germination which adds to the grass problem. Here, as in all cases, the farmer must use judgement.

On rich bottom lands and on post-oak lands nearly level where the rainfall is heavy, corn rows should be five to six feet apart, using the broad ridge system, and cowpeas should be planted on the side at the time of laying by. This method is only advised where the conditions of drainage admit no other. It is the universal plan for corn and cotton in the rice and sugar districts of the Gulf Coast.

Harrow corn before and after planting to prevent the formation of a soil crust. *and agamchoso harrow as soon as the*  
Then give shallow cultivation once in *corn is*  
ten days, and always after a rain, until it is time to lay by. *up*  
Close deep cultivation or plowing is injurious after the corn is eight inches tall. For the after cultivation the weeder or shallow spring tooth cultivator is better than the sweep, the ordinary or blade cultivator, or the plow.

*work* *thoroughly*  
*show* the middles ~~deep~~ when the corn is about eight inches



tall, and keep them well worked.

Thin before the corn is <sup>as early as practicable</sup> ~~eight inches~~ tall to a single stalk fifteen inches in the row when there is high fertilization, intensive cultivation, and the soil is good. When the corn is on land long in cultivation and but little fertilizer is used, two feet in the row will be nearer right. On very rich soil properly prepared and tilled and progressively fertilized, the stalks may stand singly a foot apart in the row, but if a large crop of corn is expected there must be a good stand and more stalks left in the row than usual. The thicker stand is supported by better cultivation and fertilizing. *P* It pays to use commercial fertilizer on corn. The corn crop requires more nitrogen than cotton. It should be fertilized liberally. The kind of fertilizer used, the quantity, and the time of application must be determined by the soil, climate, season, and other conditions and can not be stated in any general rule. In fact, all the foregoing directions are subject to some modifications to meet conditions of climate, soil, season, etc. Generally a fertilizer that analyzes nine to ten per cent of <sup>acid</sup> phosphoric acid, three per cent of nitrogen, and two per cent of potash, does well for corn. A mixture of equal parts of high grade acid phosphate and cotton seed meal is generally advisable for up land corn. Well rotted stable manure is good and produces better results if applied in the winter, so as to become incorporated with the soil.



The items to be emphasized in making a corn crop are the following: (1) Plenty of humus in the soil; (2) Good drainage; (3) soil preparation; (4) selection of seed; (5) excellent cultivation; (6) fertilization.

A good corn crop is a basis of prosperity and ranks next to a good cotton crop.

The plan advised for making cotton and corn is outlined in a recent editorial, (May 13, 1909) by Prof. W. F. Massey, of North Carolina, one of the safest, sanest and best known authorities on Southern agriculture in the United States:

#### SOME HINTS ABOUT PLOWING AND CULTIVATION.

"In turning clover or any green crop do not aim to flop it completely over, but edge up ~~all~~ the furrows. No matter if the clover is not all hidden. If it is turned under flat there is danger that the layer of vegetation will cut off the rise of the capillary moisture and the crop may suffer in dry weather.

Hence, I would edge up the furrows even if there is a good deal of trash left on top. It will do no harm there. Then determine <sup>once</sup> for all that you will turn the turning plow out of the field entirely after the corn is planted. Harrow well before it comes up. Then use the weeder both ways and destroy the weeds when small and save hoeing. There is no need for hoe or plow in the corn field if you work it right.

Cultivate perfectly level and shallow and do not make furrows around the hill to fill with water and start gullies when they break over. Above all, see that the plowing is deep and that a bed of loose soil is made to retain the water and not let it run down hill. If all of our hills on the Piedmont country were plowed and subsoiled a foot or more in all, there would never be any need for a terrace, if, when the land was broken, there was always some dead vegetation to turn under to hold the soil together.

It is shallow plowing and the lack of humus-making material that have made terraces necessary. The good farmer will soon be able to dispense with them, as he will dispense with the purchase of nitrogen for his crops.



Good plowing and shallow and level cultivation will go a long way towards that getting of \$500 more a year from the soil. In fact, I believe that with the great awakening in farming in the South, we are going to have several times that \$500 on Southern farms.

Then, too, do not be beguiled into stunting your crops of corn or cotton. Stunting the growth of a plant can never do any good. What the crop needs is plant food in the soil and good clean cultivation and no tearing of the roots with a plow or sweep stock. Level and shallow cultivation is just as important with the cotton crop too, as with the corn crop, for the roots of both run far and wide across the rows.

Then do not walk four times through every row, but get a two-horse cultivator and ride through once and leave the row better cultivated. Save the human labor wherever you can. The weeder will save as much in the cotton crop as in the corn field. Run both ways; it will break the crust and kill the little weeds and you will only have to hoe to a stand. The hoe has been well called the most expensive tool on the farm, for every hoe needs a man, and one man with a weeder can do more than ten men with hoes.

*S. A. Knapp,  
Special Agent in Charge.*

*Washington, D. C.,  
May - 1909.*



1  
\* Our instructions presuppose  
a seed bed prepared as we have  
directed and the use of a  
section harrow before and  
after planting and while  
the plants are still small  
to prevent crust to destroy weeds.  
This cross harrowing of the rows  
improves the stand and crop con-  
ditions and greatly reduces the cost  
of early tillage. It may be sure-  
however, that ~~there is such~~ <sup>owing to</sup> fre-  
quent & excessive rain ~~fall~~  
the the field becomes grassy.  
When this ~~should be~~ <sup>is</sup> the case, the farmer  
must clear out the grass as soon as  
the weather permits. What implements  
are to be used for this must depend upon  
conditions, and the farmer is the  
best judge.



2) The great majority of evidence favors flat cultivation for both cotton & corn. And this <sup>quite</sup> generally admissible with deep preparation of the soil, except upon lands requiring surface drainage.

\*<sup>2</sup> No exact rule can be given for depth of cultivation because the same crop may require deeper cultivation at one time than another. And different sections of the country vary so much in humidity of the atmosphere, rainfall and soil texture that it is impossible to give any rule except the advice above furnished - to cultivate as shallow as possible necessary to destroy the weeds and to protect the soil moisture.



issued September 29, 1909.

UNITED STATES DEPARTMENT OF AGRICULTURE,  
Office of the Secretary. -- Circular No. 30.

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HOG RAISING IN THE SOUTH.1

Hog raising in one of the most profitable lines of animal husbandry in the South if wisely managed, and one of the most unprofitable if conducted in the ordinary way; that is, if the hogs are raised without care and fed without knowledge and judgment.

Two methods of hog raising are common in the Southern States, both equally objectionable;

(1) When managed by the first method the hogs ~~are~~ allowed free range in woods and swamps, fenced or unfenced; subsist on grass, roots, acorns, and grubs; breed indiscriminately, and the survivors are slaughtered at two or three years of age, weighing net from 50 to 125 pounds. Such animals furnish inferior hams and shoulders, provide scarcely any lard, and do not make a compensating return for the use of the land. The owners are liable to heavy losses from diseases, storms, and other causes, and the product does not meet the requirements of the general market.

(2) The second plan is to keep the hogs in small lots and feed corn mainly. This has been proven unprofitable with corn at the average price in the South. Hogs thus fed show a fevered condition, are restless, and are generally found rooting in the fresh earth.

The cost of raising hogs when fed on corn alone is generally estimated at 5 cents a pound, live weight, when corn is worth 50 cents a bushel, and 7 cents a pound when corn is worth 70 cents a bushel; that is, a bushel of corn will usually make 10 pounds of gain, live weight, when carefully fed to thrifty hogs. This agrees with the results at experiment stations. But corn is not usually fed with care, and when raised on corn alone hogs are seldom very thrifty; consequently the cost will average much greater than this. Investigations show that 7 pounds of gain to the bushel of corn is nearer



the result when corn is fed on the cob without other food. This would place the cost of live gain at 10 cents a pound with 70-cent corn.

The best way to make hog raising profitable in the South is to graze the hogs upon pastures prepared especially for them, supplementing the green food by the addition of a small grain ration. Upon this plan hogs can be raised at an average cost of 1 1/2 to 3 cents a pound, depending mainly upon the management of the sows and pigs and upon an economic plan of fattening.

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<sup>1</sup>In the preparation of this circular, the writer has been assisted by three excellent bulletins on pork production in the Southern States: Bulletin No. 73, Arkansas Agricultural Experiment Station, by Prof. R.L. Bennett; Bulletin No. 143, Alabama Agricultural Experiment Station, by Prof. J.F. Duggar and others, and Bulletin No. 107, Mississippi Agricultural Experiment Station, by Prof. J.W. Fox. Mr. W.B. Mercier, of this Office, assisted in the preparation. -- S. A. K.

Al---68

## CROPPING PLAN FOR ECONOMIC PORK PRODUCTION IN THE SOUTH .

### GENERAL FEATURES.

Prepare a central pasture of Bermuda grass. Adjoining this central pasture should be several small pasture fields -- or they may all be in one field, with movable fences for partition, as required. (See fig.1.) The pastures required in addition to the Bermuda are, for winter and spring grazing, wheat and hairy vetch, chufas, Early Essex rape, and red clover (where red clover will grow) --- or crimson clover may be used; for summer and fall grazing, sorghum, cowpeas, soy beans, peanuts, and alfalfa. Adjacent to the central pasture should be a field of corn in which cowpeas are planted at the time of the last cultivation. The following plan shows the general field arrangement for a hog-breeding establishment where the hogs are mainly fed on green<sup>N</sup> crops.



Fig. 1.-- Showing central lot with necessary buildings.

Convenient outlets to all adjoining lots from central lot.

DETAILS OF CROPPING SYSTEM FOR A HERD OF TEN SOWS DROPPING TWO LITTERS  
A YEAR.

The central field, containing the buildings, breeding pens, and water, should be quite rolling, so as to thoroughly drain at all times; sandy loam land preferred, well set in Bermuda grass, with some trees for shade.

Sow a mixture of burr and white clover on the Bermuda sod in the fall. This will greatly improve it for winter grazing. This lot should contain 10 acres.

On one side of the central field lay off another 10-acre lot, 6 acres of which should be planted in Early Essex rape and red clover; if ~~the~~ too far south for red clover, use crimson clover or Japan clover (lespedeza). The remaining 4 acres should be in wheat or rye and hairy vetch.

On another side of the central field lay off a 10-acre lot, 7 acres for Spanish peanuts and 3 acres for soy beans (large yellow).

On a third side should be another 10-acre field, allotting 5 acres to alfalfa, 3 acres to chufas, and 2 acres to sorghum. This will leave two 10-acre fields, one at each corner, for corn and cowpeas. This plan can be enlarged without material modification by including the peanut and soy bean field in the central pasture and adding other fields for forage crops. There should be some movable fence so as to divide the pastures for the most judicious grazing.

SOWING AND GRAZING SCHEME.

The following table gives in convenient form the time of planting, rate of seeding, and length of time required to produce grazing from the crops recommended.



60A

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PLANT INDUSTRY  
FARMERS' COOPERATIVE DEMONSTRATION WORK.

WINTER COVER CROP.

There are many so called agricultural theories which have been tried out sufficiently to become farm facts. One of the most important <sup>factors in</sup> and far reaching of these for the Southern farm, especially the hill farm, is that of winter cover crops. A system of poor farming has so greatly exhausted the humus in the majority of the fields as to make it well nigh impossible to prevent their further <sup>depletion</sup> exhaustion by the heavy rains of winter and early spring, which carry off much of the valuable elements left onto the bottoms, and into the streams. Nature, always mindful of her <sup>resources</sup> resources has furnished certain plants which may be used to restore to the depleted soils that which man in his reckless use of them has allowed to escape or become so reduced as to render <sup>the lands</sup> them unprofitable for cultivation until they have been partly restored. These winter cover crops will hold our loose soils in place, and where sufficient growth is obtained, can be turned under to add humus to the soil. The sand hills and other loose soils can be largely prevented from leaching if heavy cover crops are turned under for a few years. The truth of this statement may be verified by taking new land where the plant roots and vegetable mold are still in it, or the same may be found in the sod of land where run to pasture for a series of years, <sup>and brought back into cultivation</sup> No washing occurs here even after the heaviest rains. A good cover crop will not only prevent washing and add humus to the soil, but if clovers or vetches are used there will be nitrogen collected from the



air and stored in the soil during winter, as peas and beans do in summer. The ~~crops~~ <sup>plants</sup> most suitable <sup>for cover crops</sup> for this purpose are rye, vetch ~~and~~ crimson and bur clover. <sup>Conditions</sup> ~~Circumstances~~, of course, must determine which to use.

<sup>Standard</sup>  
RYE:- Rye is one of the old ~~established~~ winter cover crops and has been used very extensively in some sections. It has the advantage of ~~the other crops~~ in that it is generally known, is easily planted, will grow almost at any season, will grow on the poorest soils, seed are usually cheap, and it does not require extra care in the way of inoculation as is the case with the legumes. It can be sown in the middles of the corn or cotton at last cultivation or if not convenient to sow at this time it can be done a little later in the fall. When sown early it gives a better cover for the soil and also some good grazing for stock. Where practicable, however, as would be <sup>on the</sup> corn land, it is better to turn under stalks and other growth and plant ~~to~~ rye on good seed bed. It is also a good plan where the soil will grow it to mix vetch with the rye, about <sup>using a bushel of the mixture per acre</sup> 1 bushel of rye to  $\frac{1}{4}$  bushel of vetch. It is better to drill seed especially where planted in middles of corn or cotton. It is claimed that the variety known as Abruzzes which was imported by the Agricultural Department is best suited to South Carolina and adjacent states. There are other good native varieties which can be had at a fair price.



OATS:- Oats may be used instead of rye in many instances, and the <sup>same</sup> general rule for preparation, planting and after treatment may be followed as for rye.  $1\frac{1}{2}$  to  $2\frac{1}{2}$  bushels of seed should be used per acre. <sup>When planted alone  $1\frac{1}{2}$  bu &  $\frac{1}{2}$  bu Vetch together</sup> Rust proof oat seed give the best results in nearly every part of the South. Unless the lands are fairly good, it will be necessary to fertilize the rye and oat crops to get sufficient growth for the most valuable cover crop. Stable manure applied broadcast at time of planting is good for this, or the following per acre: Acid phosphate 150 pounds, cotton seed meal 150 pounds and murate of potash 30 pounds, thoroughly mixed and applied at time of planting.

CLOVERS AND VETCH:- Until ~~our~~ lands become more fertile, and adapted to these crops, the best satisfaction with them can be obtained <sup>only</sup> by making a good preparation and by giving some special care in seeding and inoculating the soil.

PREPARATION:- Turn a few inches deeper than it has been previously plowed. If there is no rain, after this, before time of planting a <sup>roller</sup> ~~rake~~ should be run to firm the seed bed. These crops can be sown in both corn and cotton middles where clean by scattering seed broadcast and running sweep or cultivator lightly to cover. Entire success, however, need not be looked for by this method of seeding, though some splendid results were reported from it last season. The corn lands can be put in fine condition by using a cut-away or a disc harrow to cut stalks and turn top soil. Sow seed and cover with tooth harrow.



*Footnote*

FERTILIZERS:- The clovers and vetch will need fertilizers to get satisfactory early growth. For this purpose stable manure stands first as it not only adds fertility but <sup>carries</sup> ~~seems to~~ <sup>contain</sup> the <sup>inoculating</sup> ~~material~~ so essential on soils first planted to these crops. An application at time of sowing of 300 pounds 16 percent acid, 25 pounds murate potash and 75 <sup>pounds</sup> ~~percent~~ cotton seed meal or dried blood per acre will be good. The addition of the small <sup>amount</sup> ~~nitrogenous~~ fertilizer will aid in giving the young plants a vigorous start. When there happens to be any acidity of the soil, lime at the rate of 1000 pounds (<sup>air</sup> ~~slacked~~) per acre should be applied at time or preparation.

TIME FOR SOWING:- The best time for sowing crimson clover or bur clover is just as early in the fall as danger of summer killing of young plants is past -- not later than September first. Vetch can be sown much later, though the earlier planting does better.

AMOUNT OF SEED: - About 20 pounds crimson clover seed per acre should be used; 30 pounds bur clover in bur, or 15 pounds cleaned seed; <sup>15</sup> ~~20~~ pounds vetch seed when sown with 1 bushel of oats, which plan is always best <sup>if the soil is good enough to allow it</sup> 30 pounds if sown alone. Bur clover will be found to grow better as a rule from the seed planted without hulling. The inoculating germ appears to be carried with the bur. All clover seed should be covered lightly; use roller if the soil is dry at planting time.



INOCULATION:- To get a satisfactory crop of crimson clover, bur clover or vetch the first year, the soil must be inoculated. Stable manure apparently does this in some localities but the safest plan is to procure soil from a field which has already grown the crop, scattering broadcast over the newly planted area. 2 or 3 bushels per acre will answer while more would be better.

*U.S.*  
The Department of Agriculture will furnish inoculating material for any of these crops free to any who make application, full instructions as to use being sent. It is recommended that those desiring this material shall send direct to the Department for it, rather than pay fancy prices to some of the firms making extravagant claims for the same material.

*July 14 1910*

*Approved*

*J. A. Knapp*

*Special Agent in Charge*

*Application must be made on regular forms which you may obtain either from Dr. Knapp at Washington or from my office at Columbia.*



## Farm Methods

reform of farm methods is  
The greatest problem before the American  
people

Greatest in amount we produce about 8 Billions  
Annually - Export over one B - Sell to Cities  
and villages nearly 3 B - Annually

What is the net gain The <sup>Farmers</sup> ~~people~~ get out  
of this vast sum?

They buy back what they sold at a profit  
200 to 1500 per cent Cotton lumber timber fruit  
Wagons pork butter &c

We spend millions for canals - for highways  
for schools for manufactures

How is this reform to be brought about

I am say by teaching the people  
sound principles - Not much reform  
in teaching principles - Nations of Europe  
have about same principles -

Reform begins with practices

Ten Commandments lived at  
bad practices



1<sup>st</sup> Show to the people that bad methods  
of farming are responsible for loss of crop.  
2<sup>nd</sup> Quadruple the average crop  
make all the idle acres produce something  
3<sup>rd</sup> Halve the cost by better transport  
trucks

4<sup>th</sup> Halve the expenses of living by living  
at home - producing every thing  
necessary for the family on the farm  
" The garden - What <sup>corn</sup> Permanent Pasture  
meadow

Powers something to do

2<sup>nd</sup> Step to readjust the schools

3<sup>rd</sup> Step realign the churches

4<sup>th</sup> Public Opinion

Stores sending things home



Meat a roast.  $3\frac{1}{2}$  ~~lb~~  
Pork steak 3 slices -  
Spinache 1 good one.

- 3 Tomatoes good & ripe  
Spinach - 15 cts.

6 Apples good to eat  
Potatoes, Sweet Pts -

Dessert.

~~200~~

Baked pears.

Potatoes - 2 Kinds



MISSISSIPPI,- *Greenville*

COTTON,- THE GREATEST OF CASH CROPS.

--oOo--

The two great necessities of the world, wrought out by human effort, are food and clothing. It is seldom in human history, if ever before, that one nation has had the monopoly of either of these great interests. Such is your peculiar fortune to-day that you produce seventy per cent of the material that clothes the world, and clothing is just as essential as the food supply.

Look for a moment at the increased demands for cotton. If you note carefully you observe that it has doubled once in about twenty-two years. If we estimate 13,000,000 bales as a minimum supply on the part of the United States for the world's clothing at the present time, we go back twenty-two years and we find that a little over 6,000,000 bales was sufficient at that time, and twenty-two years prior to that 3,000,000 bales filled the demands, and twenty-two years prior to that a million and a half bales met the exigencies of trade. If we pursue the same line for the future,- in 1932 it will require 26,000,000 bales and in 1954 52,000,000 bales of cotton must be produced in the United States.



Mississippi,---2

Here is one of the most wonderful opportunities for wealth that has been known within the historic period. Our lands and climate are exceedingly well adapted to the production of the fleecy staple, and the intelligence of the farmers of the South and their long experience with cotton have equipped them to do the work and to do it well. Besides that, our commercial interests are founded on the cotton staple and it is a tremendous affair to undertake to change the entire economic conditions of a great State or of several states.

*2 Reasons against too high priced cotton  
on ourselves  
on foreign nations*

What has happened to disturb our continued prosperity? Simply the invasion of the Mexican boll weevil. But we hear people from all sides saying "We should diversify and raise less cotton." I agree that we should diversify, but we must raise more cotton. We must raise more per acre and devote fewer acres to the crop.

Producing cotton under boll weevil conditions will cause some changes in the methods that you have followed in the past. In the first place it will be necessary to have good drainage



Mississippi,---3

because it is of great importance to get a good stand. With good drainage and a properly prepared soil or seed bed we are almost sure to get a good stand of cotton if we use good seed. The three main features of cotton production which we urge are:

The Seed Bed.

The Seed.

The Cultivation.

Discuss these topics and explain the importance of having early-maturing varieties of cotton, and cotton that puts out fruit limbs among the first branches.

Necessity of keeping the soil in the best mechanical condition for porosity and retention of moisture,- it is necessary from time to time to have rotation of crops, otherwise diseases will get into the crop. We are liable to anthracnose, to wilt, and to root rot.

All of these facts go to show that we must change our methods and we must have more or less rotation of crops, such as cotton followed by a corn crop or a grass crop, because a certain amount of humus must be kept in the soil.



Mississippi,---4

This will require more work per acre and of course with the present labor it means that fewer acres will be cultivated.

*Rice Corn & hay belt*

It will be necessary to produce more corn, more alfalfa, more cow peas, have more winter cover crops, and the use of certain portions of your lands for pasture,- or it may be advisable in some cases on alluvial lands to have farm pastures in the hill section where the stock can be kept during the summer.

In many cases the coming of the weevil may force the breaking up of very large plantations and the introduction of more small farms with a greater diversity of crops.

*Supervision*

It certainly will modify very much the tenant plan, for hitherto we have leased our lands and allowed the tenant to farm at his will. In future the successful planter will be obliged to have his plantation supervised and his work done according to the definite plans.



Mississippi,---5

In case of a merchant owning several farms it can be easily arranged.

In the case of a large number of farmers it will require that one man be employed to supervise and give special directions to the small farmers because it will never be safe, under boll weevil conditions, to allow the old loose way of cultivating cotton. It is sure to result in failure. In fact it always has been a failure to a great extent.

In the course of this diversification necessary to be carried on it is very important that the towns should take a part and should establish such industries as are correlated to the country. For instance, facilities for processing the hogs that are raised in the community and preserving the meats.

Some cotton manufactories in many towns can be established with profit.

Furniture factories.

Wagon factories,--- and many kindred industries.



UNITED STATES DEPARTMENT OF AGRICULTURE,  
Bureau of Plant Industry,  
Farmers' Cooperative Demonstration Work,  
Washington, D. C.

FAMILIAR TALKS ON FARMING.

More Teams and Greater Economy.

Nearly a week after my talk with Uncle John about better cultivation of his crop I visited him again. It is a good place to go, for with all his mistakes in agriculture he belongs to a royal line of old time Southern planters who confer honor upon the section in which they live and of which the world has too few. As soon as possible I referred to our former conversation and asked him what he thought about my suggestions, after mature consideration. He replied, "There may be something in what you say and probably I might get a larger crop by more intensive cultivation but I have made some estimates which show that the added profits will all be eaten up by the increased cost. Your plan calls for increased expenses in a good many items." "I am glad to hear you mention this because it shows you have been thinking the matter over with some care," I replied. "Let us take one thing at a time. Name the principal item of increase in expense under intensive cultivation." "The main increase," said Uncle John, "is in the number of mules necessary to work my crop. I have 200 acres in cotton and about 100 acres in corn and other crops. It takes ten mules to do the field work and it costs me at least \$120 a year to keep a mule. I can't keep a mule



up for work every day for less than \$12 a month and the least time for work in a year is six months. For <sup>the</sup> remain- ing six months the hay, grain and pasture will cost \$8 a month, making \$120 for the year. As I understand, your plan will require half as many more mules to do the work. The cost of keeping five more mules would be \$600. I can't afford it." "Yes you could afford it," I replied, "for it would bring you a large profit, but you are mistaken as to the increased cost. I think your estimate on the cost of keeping a mule one year is rather high. It is true that it is expensive the way you keep animals. Your pastures are mainly weeds and brush. What grass there is does not have much chance to get sunshine enough to mature and become sweet, hence the richer grasses have gone on a strike and refuse to live there and the tough and tasteless varieties of the grass family have taken possession. Your hay is poor and these two causes account for your feeding so much grain, which is expensive. You are mistaken about its re- quiring fifty per cent more mules/ <sup>to do the same amount of work.</sup> It is true I propose to add considerable more mule power, but the better implements fully compensate, so that each man does double or more work per day. Thus your ten mules hitched in spans to the best implements would enable five men to do more and better work than your ten mules and ten men now do. The saving of five men is something. Suppose, however, you adopt the most improved system and use only machine methods in the production of cotton and corn - not practical on all lands, but is on yours - and allow fifteen mules for your work still there



is a reduction in labor from your present system. You cut out the chopping and hoeing and you use fewer men with the teams so that the cost of producing an acre of cotton would be no more than at present and the average yield would be at least three fold. Your plan of keeping mules is too expensive, and you are not alone in this. Probably there is no extravagance on southern farms more universal than allowing the mules to eat up the profits. It is related that once a lady saw a pet turkey swallow her costly diamond; in that case they killed the turkey and recovered the diamond; but the farmer who sees his mule swallow his profits cannot kill the mule and find them. A better way is to prevent his swallowing them. The economic keeping of work animals depends upon three things - the good pasture, the best hay and <sup>the</sup> most economic grain ration. The good pasture is well drained and is free from brush and weeds. Sweet grasses do not grow on wet, sour land; they love sunshine and they are too proud to associate with low weeds.

"There must be a night pasture with an abundance of grass for the mules and a day pasture for off days and Sundays. This plan will save about one-third of the hay and grain during the working season. Poor hay, sun-baked till there is no flavor in it, is little better than straw. The quantity of hay an animal will eat depends largely upon the flavor. High flavored and nutritious hay costs no more, if produced at home, than low grade hay. As to grain, it is unwise to feed so much corn for



there are other foods more economic. Land that will produce 25 bushels of corn per acre will produce two and a half tons of soy-bean hay - equal in food value to 70 bushels of corn, or it will produce two and a half tons of cow-pea hay - equal in value to 77 1/2 bushels of corn, or two tons of peanut hay (Spanish peanut hay with the nuts) equal to 90.4 bushels of corn. It is less labor to work an acre in either of these crops than in corn. They require less fertilizers and the soil is left in better condition. Much of their value depends upon the way they are cured.

"A working day's ration for a mule with a good night pasture would be, hay 6 pounds, soy-bean hay 10 pounds, (or cow-pea hay 9 pounds, or peanut hay 7 pounds) and corn 4 pounds. The actual cost of this ration to the farmer is about 10 cents, or \$3.00 per month; for the six working months this would make \$18.00 and for the six remaining months the mule can be fed on grass and pea vine, pastures and refuse crops at about \$2.00 per month, making a total of \$30.00 per year. For some years I have kept an account of the cost of feeding my mules on this plan and the total cost has been below this estimate. While we are on the mule question let me suggest that it is always good economy to have 20 per cent more mules than actually required for the crop, so as to have an extra animal in case of accident, or to have an additional team for emergency work.

"You have made a strong argument for the use of mule power," said Uncle John, "and I want to think the matter



over. You are a great friend of the mule I see." "I am no believer in the economy of mule power," I replied, "except for the coast country and the lumber camps. The upland farmer uses poor economy when he depends upon mules."

"What would you use?" said Uncle John. "I would use active, blocky, well bred draft mares or the Hackney. The colt raised annually would pay all the expenses and my team work would cost me nothing. That is the French plan and the peasants of France are the greatest farm economists in the world, but we will talk about this another time, I must go."

"Come over again," said Uncle John, quite cordially, "that horse talk rather interests me. In the old time before the war we had horses that were horses; now a gentleman has nothing to ride but a plow mule."

S. A. Knapp.



THE FARMERS' COOPERATIVE DEMONSTRATION WORK  
and it's  
METHODS AND OBJECTS.

In 1903 the first Farmers' Cooperative Demonstration farm under Government control was established at Terrell, Texas, on the farm of W. C. Porter, and was visited by many of the reliable farmers and business men of that section. Such was it's success that several thousand such farms were established in 1904 in the State of Texas, and a few in Western Louisiana. From that date the work has expanded by reason of its uniform success in increasing production per acre, and decreasing the net cost of cotton per pound, and corn per bushel until it now covers a large portion of eleven States: the Atlantic States south of Maryland, the Gulf States, and two interior States, Arkansas and Oklahoma.

In 1909 the Demonstration and Cooperating Farms, with definite reports under our instruction, will probably exceed, when fully tabulated, fifty thousand. Our methods have commended themselves so fully to observing people that additional communities have demanded the work more rapidly than we could secure Agents, and means to pay them.

In the past two years it has been our main effort to retard the extension and intensify the work in the



sections where commenced. In this we have been only partially successful.

The object of the Demonstration Work is to promote good farming, which always has in view the best results, with the largest net profits, without depleting the soil. Whether the work is for the best interests of the farmers, must be judged by the results.

It may be of interest to know how our instructions are prepared.

#### SOURCES OF INFORMATION.

(1) Many thousand Demonstration Farms, representing all the varieties of soil and the climatic conditions in the territory worked. These farms are owned and managed by reliable farmers, who report all material facts about crop production. They are visited monthly by our Special Agents, and written reports made by them to the central Office. At the close of the season a detailed report of the Demonstration Farms is made, giving an exact account of each farm operation and the production per acre.

In this large list of farmers are many of broad education, with special training in the sciences or in schools of agriculture, and they are very successful in their farm operations.



Their reports cover all essential details of preparation of soil, seed, fertilizers, cultivation and costs in the production of standard crops.

(2) The Demonstration Work has 325 traveling Agents and Inspectors. All of them are practical Southern farmers, and most of them owners of farms, on which they have proven the success of the Farmers' Cooperative Demonstration methods. This force is thoroughly organized and supervised by District and State Agents. Agents are appointed because of their knowledge of farming, their high character, and their successful work.

(3) In the central Office at Washington, every man in charge of any of the field operations, or who has any voice in shaping the instructions of the work, is a practical Southern farmer.

(4) A complete file of all the Bulletins issued by the State Experiment Stations is kept in our Office, and it is the duty of our men to be thoroughly posted as to what they have proven.

The published researches of the United States Department of Agriculture are available, and with foreign investigations are studied so far as they bear upon our work.

(5) From this mass of information our instructions are compiled, and are reviewed with care at the annual meeting



of the State Agents at Washington in September.

(6) No other body in the world is in touch with so many good farmers, and has accumulated such an amount of practical knowledge as to the best and most economic methods of producing the staple crops of the South.

The results obtained on our farms in one year, however reliable the persons in charge, are of little value. To be worthy of consideration, the results must show uniformity for a series of years, and must be corroborated by similar tests in many localities.

The second object of the Farmers' Cooperative Demonstration Work is to convey this information to the farmers in such a way that it will be accepted.

No man is asked to make general use of the Demonstration methods, until he has tested them on his own farm. He is advised to try one or two acres the first year, and compare the crop and cost with that of adjacent fields under ordinary methods.

At present the greatest need of the American farmer is not for more experiments, but to be shown the farm-methods, seeds, plants, teams, implements, management, and accounting that are best for the average farmer, in such an effective way that he will adopt them.

If there is any fairer or more successful method



than the Farmers' Cooperative Demonstration Work, it has not yet been brought to public attention.

We have entered upon this work with the sole object of throwing light upon the common problems of the farm, and giving aid to the man behind the plow.

We are greatly gratified at the cordial support accorded the work by the fair minded farmers of the South, and take this occasion to express our thanks.

Respectfully,

S. A. Knapp,  
Special Agent in Charge.

May 5, 1909,

Washington, D. C.



## A PRACTICAL COMPOST FOR COTTON AND CORN FARMERS.

--oOo--

Quite a number of inquiries have come to this Office as to how to compost cotton seed with barnyard manure, so as to attain the best results, using a certain amount of acid phosphate. The following plan has been found thoroughly practical and successful:

Make a bed of black loam or fertile top soil about sixteen feet wide, three inches deep, and as long as necessary to compost all the fertilizer required. Any good loam will answer the purpose for this foundation. Top of this place a layer of stable manure, twelve feet wide, six inches deep, and as long as required, say fifty or one hundred more, according to the amount of compost that it is proposed to make. Top of this place a layer of cotton seed the same width, four inches deep, covering the entire layer of the manure. Then place on top of this a layer of old straw or leaves from the forest or whatever refuse is most convenient, covering the entire pile about eight or ten inches deep. Then place another layer of barnyard manure six inches deep over the entire pile and top of this another layer of cotton seed four inches deep. Top of this place another layer of straw or leaves three or four inches deep, and cover the whole with six inches of the best loamy soil obtainable.



The whole pile should then be thoroughly saturated with water so as not to leach but to wet it through and in order that this may be the case it is better, when half completed, to saturate the lower part, then place the upper part and saturate that. Care must be taken to keep the pile moist so that sufficient heat shall not be generated, to burn. The object of placing the first layer of soil at the bottom is to catch any drippings that may pass through when saturation takes place. The manure is placed under the cotton seed in order to create some heat and thus aid in breaking down the cotton seed.

The pile may be located in the open, only that excessive rains are apt to wash it some, but if under a shed the roof ought not to be very tight because it is better to have some rain fall on the pile, and in fact it can absorb all the rain that falls, if in the open, provided care is taken that the top soil is not washed off. The object of the top soil is to catch all the ammonia that may arise from any ferment in the compost heap. It must be left to the judgment of the farmer when this has become fairly rotted; say, six or eight weeks and in some cases possibly more. Then it is better to commence at one end and fork it over, making a similar pile but mixing the whole with a fork. At this time, if found too dry, it can be



moistened somewhat but if carefully watched it will be about right and should be left in that condition.

Such a composition is better than any commercial fertilizer that can be bought and will cost much less.

S. A. KNAPP,  
Special Agent in Charge,  
Farmers' Cooperative Demonstration Work.



A	B.	C.	
1st year Cotton & vetch or crimson clover	2nd year Cotton stalks & winter growth plowed under in March Corn & Peas & Oats in fall	3rd year When Oats are harvested Sow in Peas. Sow Peas for hay seen in Sept. to May.	4th year Turn under Rye in March & plant in Cotton
Winter growth Turned under & sown in Peas & Corn Sow in Oats in Fall	2nd year Harvest Oats & Sow in Peas - Rye in Fall	3rd year Rye turned under in March & Planted to Cotton	4th year Corn & Peas
1 Solid Peas Rye	2nd year Cotton Rye Crimson Clover or Vetch	3rd year Corn and Peas Oats	Oats Peas Rye

Broken with D. & P. in October  
 2 inches deeper than ordinary & sowed 10. vetch  
 & deeper

Broken with D. & P. in October  
 2 inches deeper than ordinary

Broken with D. & P. in March  
 2 inches deeper than ordinary



Select three typical soils in four different sections of the state of about two acres each. Be careful that these soils are under the control of good men - men who have the facilities to and who will carry out instructions. Select plats in which both soil and sub-soil are as near uniform as possible. Divide the area into three equal plats.

Break plats No. A and B to depth of 2 inches deeper than has been the ordinary custom using if possible a disc plow.

Follow the disc plow on plat, <sup>a</sup> with a sub-soil stirring the sub-soil to a depth of 8 or 10 inches greater than the surface plowing.

Break Plat C in March with Disc Plow to same depth to which Plat "B" was broken. Now divide the Plat again into three equal Plats making these dimensions at right angles to the former Plats.

These new divisions to be known as Plats 1 - 2 and 3.

Plat 1.

First year Plant in cotton and sow Rye, Crimson Clover or Vetch between rows at last working.

Second year. Plow under cotton stalks and winter growth in February or early March and Plant to Corn and Peas.

Plow under corn stalks and Pea vines in September or early October and sow to Oats.

Third Year. When Oats are harvested Break with disc Plow and sow to solid Peas.



Harvest Peas and vines in September and sow to Rye.

Fourth Year. Turn under Rye in February or early March and plant in cotton.

#### PLAT 2.

First Year. Plant in Corn and Peas. Turn under Corn stalks and Pea vines in September or early October and sow in Oats.

Second Year. Harvest Oats and sow in solid peas. Harvest pea hay in September and sow to Rye.

Third Year. Turn under Rye in February and Plant to Cotton sowing Crimson Clover <sup>or</sup> Vetch in Cotton middles at last working.

Fourth Year. Turn under winter growth in February and Plant to corn and Peas.

#### PLAT 3.

First Year. Sow in solid Peas - Sow <sup>over</sup> peas for hay and sow in Rye.

Second Year. Turn Rye under in February and Plant to cotton with Crimson Clover or vetch in middles.

Third Year. Turn under winter growth in February or March and Plant to Corn and Peas.

Turn under Corn stalks and Peas and sow to Oats in September

Fourth Year. Plant in Peas followed with Rye.

Thus we have in all nine Plats. The three sub Plants of "A" should be sub-soiled every third year - After the first sub-soiling this can best be done just before planting the Oats.

By continuing this plat for three or four years some <sup>relative</sup> ~~pass-~~ time data should be obtained as to the relative merits of Spring plowing, Fall Plowing and Sybsoiling upon the staple crops.



UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
WASHINGTON, D. C.

FARMERS' COOPERATIVE COTTON  
DEMONSTRATION WORK.

Early Planting

The cotton planter is generally very anxious to get his seed into the ground. He should not be blamed; he has waited all winter and the first warm days of spring he accepts as a notice that something ought to be done immediately. Frequently he does not wait for the soil to dry sufficiently, but throws it up in clods and plants without waiting to pulverize thoroughly. He uses inferior seed because it was convenient and cheap. Of course he does not get a good stand and he blames the weather. The loss from inferior preparation, poor seed and imperfect stand amounts equal more than a hundred millions in cotton alone. If the other crops be added the total expresses the difference <sup>to millions of farmers</sup> between poverty and wealth. A good stand is a clear gain. It costs just as much to work half a stand as a full stand. If there is nothing quite equal to full preparation of the soil, & properly



plowed and worked, but if  
this has not been done, then  
the spring preparation should  
be all the more thorough.

1<sup>st</sup> - Get the surplus water out by  
opening the ditches or mashing  
them if there are none.

2 When deep enough plow; then  
disc, harrow and roll till the  
soil is as fine as a garden. When  
the soil and weather are warm  
enough plant shallow, using good  
seed and fallow with a roller  
attached to the planter or separate.

As a rule the seed bed should be  
very slightly elevated as a precaution  
against heavy rains. <sup>2<sup>nd</sup> The farmer has made such</sup>  
drainage for the <sup>planted</sup> rows in may retire early  
and sleep soundly; he will get a good  
stand and, with proper working, the plants  
will grow rapidly.

3<sup>rd</sup> One of the great mistakes in cotton  
planting is the use of too much seed.

The average amount for planting an  
acre appears to be a bushel and in some  
sections two bushels. Possibly the object  
is to secure a stand even if poor seed is  
used or to save a stand if many plants die.

Poor seed means weak plants and crowded  
weak plants is a condition inviting attack.  
The plants have a better chance for  
success if they come up singly. 2<sup>nd</sup> will



9  
UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
WASHINGTON, D. C.

FARMERS' COOPERATIVE COTTON  
DEMONSTRATION WORK.

tend to give a bushier form to the <sup>near the</sup> plant and cause the fruiting <sup>to be</sup> nearer the ground.  
A pick of good soil for planting <sup>is better than more</sup>  
It cross narrowing when the  
plants are small serves a good  
purpose. It prevents crust  
disturbs weeds. Slightly thins  
the stand and does a little  
root pruning.

It. The use of much commercial  
fertilizer at <sup>the</sup> time of planting  
is unsafe. <sup>The fertilizer</sup> is liable to come  
in contact with the seed and  
do damage or if a dry spell follows  
planting it reduces the probability of  
germination and in any event is most of  
immediate utility. Generally the best  
results are secured by placing the  
fertilizer in the rows ten days before  
planting or on <sup>both</sup> sides of the row  
planter after the <sup>plants</sup> are up.

Properly understood and applied  
the use of commercial fertilizers are  
valuable and economical.

S. A. Knapp



1; Then by rapid cultivation  
a good crop is made.

We have numerous reports  
for 1909 where every square  
was punctured up to the  
last of June, owing to ~~also~~  
the impossibility of adequately  
working the crop on account  
of almost continuous wet  
weather. and after that  
date a good crop of cotton  
was made (from  $3\frac{1}{2}$  to a half  
per acre) because the <sup>punctured</sup> squares  
were picked and it was  
possible to give the plants  
intensive shallow cultivation.

¶ The only known method  
of making cotton under  
baleworm conditions is two  
fold - first destroy the worms



and force the plant to  
early fruitage and maturity

I have described the  
~~two~~ methods of forcing  
the plant; the destruction  
of the weevil is accomplished  
as follows: The immature weevils are  
1. ~~By~~ <sup>By</sup> burning the rubbish  
in and about the fields.

Then fall break

2<sup>d</sup> When weevils appear on  
the young cotton ~~to~~ in the  
spring destroy them by picking  
or poison

3 The punctured squares  
must be picked up and  
burned

¶ We now come to the main  
question, Can Cotton be  
made on the delta <sup>and adjacent</sup> ~~lands~~  
river lands <sup>successfully</sup> ~~preferably~~?

Without any hesitation  
or mental reservation I  
say it can and I am in a



position to prove it -

As to profit the only addition <sup>to</sup> the  
cost over the old method  
is picking the squares and  
this averages <sup>summed cost</sup> \$1.10 to 1.25 per  
acre. The frequent cultivation  
is more met by the <sup>extra</sup> rapid with  
which it can be done & the  
freedom of the crop from  
grass. We have assumed  
your cotton can be made  
in the delta, but it can  
not be made by our the  
old place.



4

Producing cotton under the boll weevil conditions will cause some changes in the methods that you have followed in the past. In the first place it will be necessary to have good drainage, because it is of great importance to get a good stand. With good drainage and a properly prepared soil or seed bed, we are almost sure to get a good stand of cotton, if we use good seed. The three main features of cotton production, which we urge are: The seed bed, the seed, and the cultivation.

and allow the crop to be worked at all times

I will discuss these topics and explain the importance of having early maturing varieties of cotton and cotton that puts out fruit limbs among the first branches. Necessity of keeping the soil in the best mechanical condition for porosity and retention of moisture, it is necessary from time to time to have rotation

attack

of crops, otherwise diseases will get into the crops. They are liable to anthracnose, to wilt, and to root rot. All of these facts go to show that we must change our methods and we must have more or less rotation of crops, such as cotton followed by a crop, or a grass crop, because a certain amount of humus must be kept in the soil. This will require more work per acre and of course, with the present labor it means that fewer acres will be cultivated. We hear it said on all sides we should diversify and raise less cotton. I agree with you, we should diversify, but we must raise more cotton per acre, with fewer acres to the crop. It will be necessary to produce more corn, more alfalfa, more cow peas, have more winter clover crops, and the use of certain portions of your land for pastures, or 't may be advisable in some cases on alluvial lands to have farm pastures in the hill section where the stock can be kept during the summer.

because you are all intelligent planters and understand it

The necessity

requires more or less

The coming of the weevil has only hastened the time when we should rotate - The cotton time was approaching when we would have found it necessary to rotate crops - The weevil had not appeared



5

Hitherto we have leased our lands and allowed the tenant to farm at his will. In the future the successful planter will be obliged to have his plantation supervised, and his work done according to the definite plans. In case of a merchant owning several farms, it can be easily arranged.

In case of a large number of farmers, it will require that one man be employed to supervise and give special directions to the small farmers, because it will never be safe, under boll weevil conditions, to allow the old loose way of cultivating crops. It is sure to result in failure. In fact, it has always been a failure to a great extent.

you usually  
your

Small

them

The extent that

The Soil yielded only the third  
of a possible crop

TP The planters of Louisiana  
and of a portion of Miss  
have ~~passed~~ been under  
boll weevil conditions  
during the past year  
Let us face the facts with

Sanity

Before the weevil strikes  
a territory the Capital becomes  
alarmed and credits are



6 reduced - a percent of  
the labor immediately  
leaves and less cotton  
is planted - This situation  
is intensified as soon as  
the weevil actually appears.

The planters frequently  
become discouraged and  
plow up large areas. The  
loss from failure to plant <sup>and the</sup>  
abandonment of <sup>the</sup> cotton  
planted up is all charged  
to the weevil - No allowance  
is made for a bad season  
; it is all charged to the  
boll weevil.

Louisiana is a case in  
question - Prior <sup>to</sup> the advent  
of the weevil the <sup>annual</sup> crop production  
of cotton varied occasionally  
over fifty per cent. The crops of  
1905 was less than half that  
of 1904. Though the damage by the  
weevil in 1905 was practically  
nothing and the loss was attributed



7 to a bad season In 1908  
the with the weevil over a  
large portion of the state  
the cotton crop was only  
45,195 bales less than that  
of 1905 when the weevil had  
barely entered the state. It is  
safe to say that had it not  
been for ~~offensive overflows~~  
the continuous rains in  
July which rotted the bolls  
the crop of 1908 would have  
been much larger than that  
of 1905.

The cotton crop of 1909  
in Louisiana will be about  
270,000 bales - one of the  
worst seasons known - How  
much of this decrease in product  
was due to the weevil?

Suppose a full crop for  
a bad season should have  
been 511,738 bales. The same



8 as was produced in 1905-  
before when the boll weevil had  
just appeared upon the border  
of the state but had done  
practically no damage.

Our investigations show  
that ~~practically~~ 30 per cent  
less acreage was planted  
in 1909 and during the wet  
weather of May & June 40  
per cent of the acreage  
planted was abandoned  
or plowed up. ~~deduct~~  
These percentages from  
what the crop of would  
probably have been without  
any weevils and we find  
that - the 30 per cent less planted  
and the 40 per cent abandoned  
or destroyed would leave  
a crop of 214,931 ~~without~~  
~~allowing any loss from~~



9 The ~~range~~ of the weevil  
due to bad season, failure  
to plant and later destruction  
of the crop by plowing up.  
We did get 270,000; consequently  
the great loss was ~~not~~ <sup>ca</sup> not caused  
by the weevil, though it is  
charged to that account.

11 In the same way we are ~~for~~  
investigation the crop in 1909 - The wet weather, the  
reduction in credits, the enormous  
loss of labor in the infested  
countries and the tropical storm  
after the cotton matured are  
sufficient to account for most  
of the reduction in crop yield  
- but of course it is all charged  
to the weevil.



I am not stating that  
the boll weevil does no damage  
but am trying to eliminate  
the damage from the scare  
- from loss of credits - loss  
of labor and a bad season  
from the total loss and  
find out how much should  
be charged to the weevil

Let us eliminate the  
scare & become sane,  
let confidence be restored  
and the labor brought  
back and the weevil problem  
will ~~be~~ become simple



The advent of the weevil is only hastening some things that must have come sooner or later and once important it is more economic conditions.

The planters, the small farmers and the tenant farmers must raise their food supplies for themselves and their house stock.

If the boll weevil had not <sup>made</sup> ~~forced~~ this <sup>necessary</sup> ~~result~~ a world competition would have ultimately forced it. For a farmer to buy every thing with one crop is unsafe and uneconomic.



This is to us no new  
 conflict with the war  
 I recall that when the hell  
 waves were advancing across  
 the prairies of Southwestern  
 Texas the pessimists said,  
 "Just wait till they reach  
 the wood lands ~~of~~ east of  
 the Brazos. Where nearly  
 every small farm is surrounded  
 by a belt of timber forming  
 an ideal place for hibernation  
 no use in attempting to  
 produce cotton under such  
 conditions". The alarm  
 was such that in the wooded  
 portions of Limestone and  
 Robertson counties nearly  
 half the farmers were abandoned  
 and  $\frac{1}{3}$  of the stores in the towns  
 closed. Production in Limestone  
 County where the hell wave



reached it - just from a  
 normal ~~product~~ of about  
 30 was bales per annum  
 to 17,025 bales - Over  
 agents commenced work  
 there in Feb'y 1904 The crop  
 of that year was 43,968 bales  
 and in 1906 the product  
 was 72 bales about  
 26000 more than the normal  
 product before the war  
 appeared - Prosperity smiled  
 on the land till a prominent  
 director of one of the local  
 banks came to me <sup>with</sup> the  
 complaint that their banks  
 were full of money and  
 they could not loan it <sup>as</sup> to farmers  
 because I had told them ~~people~~  
 not to borrow. The politicians  
 complained that political speeches  
 were not in demand; the people



only wanted to hear  
about cotton and the  
hardware men complained  
that they could not sell  
jack knives because all  
the dry goods ~~had~~ whittlers  
had gone to the cotton  
fields

Thurs county by county  
we fought our through  
Eastern Texas against the  
Pessimist - ~~and~~ <sup>as the</sup> Community  
howlers and ~~they~~ <sup>the</sup> ~~took~~ the  
last stand they said "wait  
till you reach the extreme  
eastern counties where the  
precipitation is fifty  
inches and cotton production  
will be impossible - Under  
this wave of discouragement  
the cotton crop in Harrison  
County from the Louisiana border



bell frame a normal  
about 7120000 hairs per annum  
to 7694 hairs in 1907



Our next battle with pessimism  
was in La and we are getting  
that state in line as fast  
as we can get funds with which  
to work. The first year we  
can only put in a few sample  
plots - and it requires three  
years for the work to take a  
good hold upon the planters.

We have the names of two  
<sup>men</sup> thousand planters in Louisiana  
who made good crops the past  
season (1909). They represent nearly  
every cotton producing Co in that  
State and especially those in which  
the worst conditions prevailed.  
P. We have a letter from Col  
Maxwell of Madison <sup>Pa.</sup> which states  
that he worked 1300 acres of cotton  
under Gov. directions in 1909 -  
had ginned from this tract - two  
bales, had 60 more picked and had  
some more to pick. P. Here is a letter  
from Hon. S. W. Hill a large planter  
and a banker of Natchitoches La.



to permit a little ball music  
to depress you of your harness  
and drive you from the soil

If a foreign enemy were to invade your state every man would form in line with rifle to the shoulder to repel the invader - Meet this same insidious enemy in the same way - Organize for the fight - Every man should assist - the banker with his money and the laborer with his hoe till victory is won

You will live to see this land worth three times what it is worth now, and you cannot afford to sacrifice it. Hold your land and there is no reason why you should not succeed. This is the greatest country on earth for the production of the world's greatest crop. You can make a crop here after the 15th of June, just so long as you work your land properly.

Let there be no more possession  
Miss <sup>your</sup> ~~less~~ not know how to  
surrender much less to be  
captured by hellwounds

Unpaul a banner on ever  
 Larkin house and Emblazon  
 it read ~~we do not~~ Surrender  
 we fight invading forces



The cotton crop is a national  
 and a mixed crop. If you fail to produce  
 a full supply the clothing of every  
 tailor, <sup>maker</sup> ~~maker~~ that land and in the factory  
~~laboring man and woman~~  
 with  
 the world will cost more.  
 You must not fail. ~~It is~~  
 Failure means more to the world  
 than to you. If you could  
 not raise a pound of cotton  
 your lands are still worth  
 vastly more than you ask for  
 them for corn, alfalfa, rice, stock  
 raising and other products.

With your superb soil, worth  
 200 dollars an acre for general  
 crop production. with a people  
 of great intelligence and indomitable  
 courage, with one of the best  
 agricultural colleges in the  
 land founded by that great soldier  
 and scholar Genl Stephen D. Lee &  
 worthily supported by its present  
 President - Hon J C Handy, with such  
 splendid public men as you have  
 in every service are you going to



The co-operative work of this year shows that the use of fertilizers not only hastens the maturity of the crop, but increases the yield sufficient to make the outlay profitable where it has been judiciously used. Great care should be taken to adapt the fertilizer to the soil and thoroughly mix it with the soil.



## Barring 28

It is an important feature of the methods adopted by the Plant Bureau to hasten the growth and fruitage of the <sup>cotton</sup> plant to the utmost and it will frequently occur that a growth <sup>so rapid & so vigorous</sup> is secured that it delays fruitage.

In such instances there must be some way of checking the too rapid stalk growth without lessening the vitality of the plant. This is best accomplished by slightly root pruning with the plow. While the plant is not more than a foot tall run a furrow on each side of the row about six inches from the plant. This root pruning tends to make a corresponding change in the top. When the stalk reaches 3 feet tall it should be topped. When infested with the boll



## 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 planted on lands which were in corn and cowpeas the preceding year and that cotton invariably after one year give place to corn and cowpeas.



to weevil there is slight reason for  
having a plant higher than  
three feet as no top crop will  
be made - By root pruning  
the plant will throw out more  
low limbs and send its vital  
energies into first fruitage

### Selection of Seed

1) The Selection of the seed  
from the earliest and best  
bolls on the most vigorous  
and best developed stalks

The planting of early  
maturing varieties and  
thin

are fundamental principles  
in growing cotton regardless  
of boll weevil and can  
not be too closely followed



Methods by which early maturity is secured.

Fall breaking (plowing) the land one to two inches deeper than usual has an economic value in fitting Southern soils for early planting. Add to this some winter cultivation with the harrow and considerable advantage is secured in giving the soil the best preparation for seeding. It retains more moisture and is warmer and more fertile because of this work. Deep plowing, regardless of previous depth, is not advised, because if too much dead soil is brought to the surface at one time it retards plant growth instead of hastening it. Fall plowing undoubtedly aids in destroying weevils hibernating in the field.

Planting Early

Planting early as practicable means that the farmer should use his best judgment with regard to climate and season, but plant as early as it is safe, using the seed of early maturing varieties. Early maturing varieties have been bred and selected till a plant has been secured that will throw its vital forces into the lower branches to secure early and prolific fruitage.

Where later varieties have been planted maturity can be hastened by the use of fertilizers; by topping and root pruning.



### Width of rows.

Special attention must be directed to 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, <sup>extreme</sup> ~~more~~ 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.



~~Dr. S. A. Knapp,~~

~~Special Agent, in Charge.~~

~~Dear Sir:-~~

~~I call your attention~~ <sup>is called</sup> to the following comparative statements in furtherance of our views already expressed in circulars issued from this office regarding width of rows and distance in the row in growing cotton.

That a positive ~~harm~~ <sup>harm</sup> can be done by unqualified statements regarding distance between plants we have long known, and the statements from co-operators appended prove this conclusively.

Mr. W. A. Castleberry, of Minden, La. and W. M. White of Douglas, La. are both good farmers. They used fertilizer and cultivated in about the same way throughout the season. Mr. F. A. Hilley, our Special Agent, who inspected the work on both farms writes that he considers the conditions on the two farms practically the same except as to width of rows, and the results shown indicate an excess width on Mr. Castleberry's cotton.

Final report, 1904, W. A. Castleberry, Minden, La.

Six acres King's Improved, rows six feet wide, made 665# lint per acre.

Final report, 1904, W. M. White, Douglas, La.

Two acres King's Improved, rows five feet wide, made 711# lint cotton per acre.

Mr. Castleberry's cotton was thinned to about 14 <sup>to</sup> or 16 inches in the drill. Mr. White's cotton was thinned <sup>to about</sup> ~~perhaps~~ 18 inches <sup>to 20</sup>, otherwise the conditions were practically the same.



# 2

Mr. J. F. Bradley, of Memphis, in the Pan Handle of Texas, emphasises the excess distance for that section in his final report.

*On the thinnest cotton*  
~~With rows three and one-half feet apart thinned to about 15 inches in the row~~ Mr. Bradley reports a yield of 364# lint per acre.

With the same cotton planted on the same date same cultivation except thinning he reports a yield of 440# of lint per acre.

*The rows were 3 ft 4 inches apart - thinned to 20 inches - on one plat - 10 inches on the other.*  
Mr. Bradley writes that the cotton on this second plat is nearly

twice as thick as on the first, and that it opened to a good picking ten days before the thinned cotton, and that it practically all opened before frost while the frost cut at least one-third of the thinned cotton, and at least one-fifth of it did not open at all.

The statement of Mr. Bradley is not quite definite enough for greatest value but indicates the distance ~~between plants~~ <sup>plants</sup> idea, and especially shows how distance must be suited to soil and climate conditions.

Our circulars have been very clear on that point, and ~~we~~ <sup>we</sup> have taken special pains in letters and in public talks to impress upon our co-operators the necessity for gauging distance between rows and in the row on that basis.

Especially in the Pan Handle country where the nights are cooler and the season not so long the extreme of distance is very much closer than in sections of lower altitude and where the nights are warmer and the moisture greater.

Where the soil and climate forces greater stalk and foliage growth there must be greater distance given and the fruiting must be stimulated and controlled by other means.

With the dry, cool, high altitude, short season conditions of the



#3.

Pan Handle, distance between plants should be much less. In other words, if a too great distance is given it is not only a waste of land but a positive hinderance in the maturity of the cotton.

Our co-operative work this year has also proved that greater distance to a certain extent is necessary under boll weevil conditions. It has shown, however, that if cotton is spread beyond its proper distance the maturity is so delayed that the weevils are enabled to do considerable damage in spite of the best cultivation. It seems to be a question of controlling rank <sup>regulation</sup> cultivation in one way or another. There must be distance between rows to permit the sun to act as there is no doubt the heat of the sun on the fallen squares between the rows kills quite a percentage of the larvae they contain. If the cotton is <sup>slightly</sup> crowded in the row it is simply one means of dwarfing stalk growth and hastening maturity. Other means can be adopted, such as root pruning, <sup>and</sup> topping, but it should be borne in mind that forcing out maturity of the bottom crop is one of the best means of making cotton ahead of the weevil. Cotton not too thin normally throws out its bottom bolls earlier than cotton kept thin enough to promote more vigorous stalk growth.

circulars that each man must gauge the width of rows and distance in the row to suit his local conditions, and that the height to which cotton grows is one of the safest guides in spacing rows.

Very truly yours,

*Houston, Texas,*

*Nov 25/07*



### The use of fertilizers.

The use of fertilizers to promote growth of the plant and to hasten maturity is too well understood to require proof. A judicious use of acid phosphate with a small per cent of potash increases fruitage and hastens maturity of the plant. Generally some nitrogenous fertilizer should be added to promote growth and thus aid in securing a more vigorous plant. This to the cotton planter means the use of some cotton seed meal. Usually a small quantity of this mixed fertilizer will produce results quite marvelous. In some cases the use of about 200# of cotton seed meal and acid phosphate with two per cent of potash <sup>with intensive cultivation</sup> produced a crop five fold greater than the ordinary yield. If one-half of this gain be attributable to intensive cultivation it still shows a large profit in favor of the use of fertilizers.

Caution should be exercised not to use too much fertilizer, or it will promote too rank a growth of stalk, and care should be taken to adapt the fertilizer to the soil and soil conditions. For building up soils there should be a free use of cow peas. Care should be taken to thoroughly mix the fertilizer with the soil, at least,

Farmers ~~were~~ instructed to determine the fertilizer ~~required~~ <sup>was</sup> the usual growth of the plant. If more growth and vigor ~~was~~ <sup>was</sup> required, use cotton seed meal; if sparsely fruited use acid phosphate and

#9.

potash, or if the plant is deficient in both growth and fruitage use a mixture of the phosphate, potash and cotton seed meal.

Even on rich soils where the plant grows very tall with <sup>branches few</sup> throwing ~~long~~ <sup>and numerous limbs</sup>, some cotton seed <sup>meal</sup> ~~meal~~ should be used.

The best results are obtained by carefully mixing the fertilizer with the soil in the rows ten days to <sup>three</sup> ~~two~~ weeks before planting. On Texas and Louisiana soils the use of 200# of fertilizer per acre is more profitable in proportion to cost than a larger amount. Under boll weevil conditions a rapid acting fertilizer is required. This can be aided by allowing more time for the fertilizer to assimilate with the soil before planting the cotton.

ten days before planting; twenty days would be better. A number of cases have been reported this year where the fertilizer did apparently little good owing to a failure to secure assimilation of the fertilizer with the soil prior to planting.

Caution should be used in the use of fertilizers in semi arid districts. If there is no rainfall for some time prior to planting, and for a long period thereafter, the fertilizer will not fully assimilate and may intensify the drouthy soil conditions.



Soil Building - Soil  
protection - Soil preparation

In the discussion of  
the topic assigned here  
it will add to the clear-  
ness of the explanations,  
to first consider soils  
in general. For our  
purpose it is not necessary  
here to discuss the different  
composition of the rocks  
from which soils were  
made, but simply to state  
that they were disintegrated  
by the constant action  
of great natural forces,  
climatic and chemical  
until a matrix was formed  
for plant production  
which we call soil.

These forces which made  
a soil out of rock were  
just as effective to day



2) As in the ages of the past  
and on this fact must be  
our main reliance for  
soil building

The broken and dis-  
integrated rock appears  
to us in many forms.

When the disintegration is  
incomplete we have gravelly  
soils and even here the finer  
portions are capable of  
producing vegetation.

When the rock granules  
are finer and constitute  
a large portion of the soil,  
- 80 to 90 per cent - we have  
sandy soils. When the  
rock reduction has gone  
further and become an  
impalpable powder and  
this predominates we have  
clayey soils. They are of  
all grades, depending upon  
the amount of sand combined  
with the impalpable matter.



3 / Later in the formation of soils we have an increment of vegetable matter, caused by the decay of plants and ~~from~~ this infusion of vegetable mould creates the loamy soils, of which the varieties are very great. This general description of soils is sufficient for our present purpose.

It should be noted that in general the composition of the soil and subsoil are practically identical, only the soil has been modified by more contact with the air and by the infusion of vegetable mould.



Soil Enrichment - Soil preparation  
- Soil preparation

It is a common impression that Nature has prepared soils and stored them with plant food ready for use and, after cropping for some years, a failure occurs it is ascribed to the exhaustion of the soil and the land is turned out to commons to recuperate.

This view is an error; The soil is a subtle and complicated mechanism for the manufacture of plant-food. The quantity of available plant food present at any time in the soil is limited, even in the most fertile



5) The material from which plant food can be manufactured is abundant in nearly every soil. Hence loss of fertility is mainly a partial or total failure in the working of the machinery of the soil which manufactures plant food rather than in the exhaustion of the material from which it is manufactured - This is a fundamental point in soil building.

Practically all soils have an abundance of material for plant food, but in some it may exist in forms unsuited for plant nourishment or in compounds which are insoluble in water and hence not available.



6 Soil building is here to be understood, not as adding to the crude material which is the basis of soils, because as stated there is an inexhaustible supply of this present, but in bringing into greater activity the machinery of nature which manufactures the crude material into available plant food.

The three great forces of nature actively engaged in the ~~food~~ preparation of food for plants in the soil are water, air and heat.

Water is the universal dilutant for the acids which break down the insoluble compounds and the absorbent of the foods ready for plant use.

The presence of air is necessary to the chemical changes



7 That must take place in  
The soil elements to prepare  
plant food

A certain amount of  
heat is necessary to chemical  
action. The changes are  
hastened by the increase of  
heat or arrested by suffi-  
cient cold

Without certain physical  
conditions of soil, water, air  
and heat, chemical action will not  
hence plant food will not  
be formed

Some of the more important  
physical conditions of the  
soil are State of division,  
absorbent power for vapor of water,  
property of condensing gasses,  
power of fixing solid matter  
from their solutions,  
permeability to water,  
capillary power, adhesiveness,  
- capacity to absorb and radiate  
heat. If any of these



8 Conditions, powers or capacities of soil are changed or decreased. Their poverty of soil follows, for fertility depends upon their maintenance in full force and activity.

It is easy for a farmer to change these for the worse or for the better by his methods of cultivation.

The amount of capillary water a soil can contain is increased by frequent tillage.

There is also an increase in the amount of air and heat. So that chemical changes are more rapid.

By the practical farmer soils can be improved economically mainly in five ways.  
1st <sup>or drain age</sup> By deeper plowing in



9/ The Fall Practically  
The stores of raw material  
<sup>in the soil</sup> for plant food are  
inexhaustible - and they  
are fundamentally the  
same as before. The surface  
deep plowing enables  
the air, heat and moisture  
to extend their manufactur-  
ing processes deeper into  
the soil and prepare more  
plant food.

21<sup>st</sup> improves the soil  
mechanically by enabling  
the standing water in  
case of excessive rain to  
fall below the surface roots  
of the plants and it adds  
to the capacity of the soil  
for holding capillary water.

3 By planting renovating  
crops such as cow peas,  
alfalfa or clover. The roots



10) of these plants penetrate to considerable depth, adding to the porosity of the soil, ~~and~~ bringing up valuable mineral matter from the subsoil and add to the available nitrogen of the soil by decomposition of the atmosphere. When the roots decay they are a substantial addition to the humus. Below the few inches we ordinarily plow are vast stores of phosphate and potash and unlimited raw material for plant food which can be reached by the roots of the deep penetrating legumes. Taken into the plant circulation by the power of absorption, elevated by capillary attraction and made into



11/ a component part of the plant and ready to nourish other plants after decay

4 The fourth method of improving soil is by plowing under ~~some~~ green crops. A luxuriant green crop acts as a mulch and when plowed under, increases the porosity of the soil, adds to its power to absorb and hold for use water, the gases and the food elements which might otherwise escape and be lost.

This is the most economical method of adding to the humus of the soil. Humus performs wonderful offices in the soil, mechanical and chemical. It decreases its adhesiveness, adds to its porosity, multiplies its power to absorb and hold water, it decreases soil evaporation, it stores the volatile nutritive



12) material and stimulates  
plant growth. ~~Where there is~~  
An abundance of vegetable  
mould in the soil or surface  
stratum of the earth is one  
of the greatest aids to soil  
improvement and soil  
protection known to man.  
When the water from the  
subsoil rises by capillary  
attraction if there is no  
humus at the surface it  
will evaporate and carry with  
it ammonia and other valuable  
fertilizers and the soil becomes  
too dry. With humus it is  
absorbed and given up to  
the surrounding soil as re-  
quired. A cubic foot of  
humus will absorb three  
times as much water as a  
cubic foot of clay and in  
a given period of time it  
will yield up for evaporation  
less than half the amount  
with humus in the soil there



13 There is a large increase  
of air, moisture and heat  
Experiment has demonstrated  
that soils with abundance  
of humus absorb considerable  
more heat than soils destitute  
of it amounting to a difference in soil  
temperature of 15 degrees in  
some cases. Soil temperature  
is determined by the temperature  
of the earth. The rapidity of  
chemical action in the soil  
and the capacity of a soil  
to absorb atmospheric heat  
Humus stimulates chemical  
action, increases the capacity  
to absorb atmospheric heat  
as well as atmospheric moisture  
and conserves soil heat as  
well as moisture, because  
rapid evaporation is a  
cooling process. Increased heat in the  
soil stimulates chemical action  
and it increases plant absorption  
of food. We would say of man it  
cooks more food and stimulates  
the human appetite.



14) The fifth method of building soils is by direct application of material that has plant food and humus combined as farm yard manure, leaf mould; or the addition of sand to stiff clays or the reverse. It is surprising the amount of manure that a farm will yield in a year if all is saved and properly applied. <sup>Methods of</sup> soil protection are ordinarily limited to the addition of humus; constant shading by some crop or the soil mulch in case of cultivation. To these should be added deep fall plowing to prevent washing and rotation of crops to reduce the excessive demand for certain elements in the soil.

preparation of the soil for crops. By previous statement I have largely anticipated this topic. My statements here are intentionally limited.