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BULLETIN

— OF THE —

AGRICULTURAL EXPERIMENT STATION,

WM. C. STUBBS, PH. D., Director and State Chemist.

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FORAGE CROPS, GRASSES, ALFALFA, CLOVERS, ETC.,

BY

W. R. DODSON, A. B., B. S., Assistant Director and Botanist.

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ISSUED BY THE LOUISIANA STATE BOARD OF AGRICULTURE AND  
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J. G. LEE, COMMISSIONER.

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LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE, }  
OFFICE OF EXPERIMENT STATIONS, }  
Baton Rouge, La., Nov. 1902. }

HON. J. G. LEE,

Commissioner of Agriculture and Immigration,  
Baton Rouge, La.

Dear Sir:—Several years ago, we printed a bulletin on Forage Crops and Grasses, which met with such favor as to rapidly exhaust the supply then issued, and from the numerous demands made upon us in the recent past, it has become imperative that we should prepare another up-to-date bulletin upon the same subject. This has accordingly been done by Prof. W. R. Dodson, and is hereby presented with the request that you publish the same as Bulletin No. 72.

Respectfully submitted,

WM. C. STUBBS,  
Director.



## ALFALFA OR LUCERNE.

(*Medicago Sativa.*)

Alfalfa continues to increase in popularity in Louisiana. Several thousand acres of Red River lands are now profitably devoted to its cultivation. Many sugar planters of South Louisiana are also raising it in areas of 10 to 50 acres on each plantation, exclusively for home consumption. In the hill and bluff sections where proper care has been exercised in establishing it, there are many instances of successful growth. Unfortunately it will not grow in some soils, without previous careful preparation, but where conditions are favorable to its growth, alfalfa surpasses all other plants in producing quantity and quality of hay or green forage.

Some one has predicted that in the near future, "the cow that is fed on alfalfa, will set the price of butter for the world." Whether this be taken literally to mean that the dairy interests will be centered in those sections where alfalfa thrives best, or whether we take it figuratively to mean that alfalfa is destined to become the most important feed stuff in the economics of animal husbandry, I believe the prophecy is a logical one and will come true in a very considerable degree. It is therefore a subject of great importance to Louisiana, as we have a greater area naturally well adapted for producing alfalfa than has any other southern state. There is no good reason why it should not grow very rapidly in popularity as a forage producer in every community where it has once been successfully cultivated. In many places it is in the first stage of adoption. Isolated individuals have small areas of it from which they cut for green feed almost every day from early spring till late fall, or make a small quantity of hay, with the idea of testing the adaptability of the plant to the locality, and the quality of hay it produces.

In other sections more extended areas are regularly devoted to the production of hay, and the supply of winter forage is largely composed of nicely cured alfalfa.

Some planters make a business of raising and marketing alfalfa, depending upon it as a money crop. In nearly all instances where this business has been properly conducted, it has been very profitable. This condition of affairs has come about during the past twelve or fourteen years. When the experiment stations were established alfalfa was practically unknown in Louisiana, and the success that rewarded its planting from the very beginning in the alluvial lands at the experiment station, then located at Kenner, has been heralded throughout the State, and this has had no little influence in establishing alfalfa fields where conditions are favorable.

We must also acknowledge the assistance of emigrants who were acquainted with alfalfa in the west, and have intelligently taken up its culture here.

The men who are in this business in a commercial way, have extensive fields and use the most modern hay implements. This enterprise has developed to the greatest extent in the Red River bottoms north of the sugar producing section. It is estimated that not less than 4,000 acres of land in the immediate vicinity of Shreveport, is devoted to alfalfa.

#### ALFALFA IN RED RIVER LANDS.

This section was recently visited by the writer, for the purpose of getting accurate information on the recent development of the alfalfa industry. Much of the data obtained through the kindness of the planters will be of value to all parties interested in alfalfa.

There is not much difference in the methods of handling the crop on the different plantations, and some general facts may be given once for all. Planting is generally done in the spring, on land that has been in cotton. From 30 to 40 pounds of seed are sown per acre, after the land is well prepared. Broadcast sowers are used. The cheap forms of hand sowers are very generally used. Some planters simply harrow the seed in with a light toothed harrow; a few roll the land after the seeds are sown and then harrow.

Nothing more is done till harvesting. Mowing machines with long blades, seven feet, are quite generally used, but some parties are inclined to think a shorter blade more satisfactory, claiming that the shorter blades give less breakage and are lighter on the team, and they can walk faster, and thus cut nearly as much as with a longer blade.

On the first and second crop tedders generally follow the mowers, as soon as the leaves are well wilted on the most exposed plants.

Various kinds of rakes have been tried, but the ordinary dump rakes, about ten feet wide, are most popular. The side delivery rakes have been tried on some places and abandoned, principally because the laborers used in operating them are too ignorant to keep them from getting out of repair. After the hay is raked into windrows it is gathered by a sweep rake to the shed, or rick, or baler, as the case may require. Hay loaders have been tried on some places, but they have not found favor, principally because most men do not care to run the loaded wagon over the stubble. Stackers are used on the first crop for throwing the hay into a long rick which is covered by a tarpaulin until the hay is well cured for baling, or it is stored under large sheds. It seems to be considered more economical to use the tarpaulins instead of the sheds. Where the hay is baled directly from the windrow, the staker is frequently used to pile the hay close to the press, the advantages of which are self-evident.

I have said that the first crop is stacked under a shed, or stacked and covered with a tarpaulin to complete the curing. This crop is the most difficult one to cure, not only because it is more succulent, but at this season the days are short, the soil under the cut hay is moist, and the air is neither dry nor very warm, so that all the conditions are most unfavorable. However, there is very little hay lost on places that have careful supervision.

#### RENTING ALFALFA LAND.

Where the land is seeded in alfalfa by the owner and rented out, he gets fifteen dollars an acre, and the renter furnishes his own

harvesting tools, or he gets eighteen dollars rent and furnishes the tools for harvesting. This is on land that rents for five dollars an acre for cotton.

We can but mention a few of the successful and extensive growers of alfalfa, near Shreveport.

Mr. August Mayer, one of Shreveport's most esteemed citizens, was a pioneer in alfalfa culture. He began with fifteen acres in 1893. He now has 35 acres that he harvests and feeds from his own barns, and some 30 acres that he has seeded and rents out. Thirty-five acres have just been plowed up for a system of rotation, and that amount will be reseeded on another portion of the farm. The first year after seeding he gets three cuttings, and after that five cuttings each year, aggregating six tons per acre. There is left a half crop which is pastured during the winter. On a plot of 14 acres last year, he cut five crops, and during the mid-winter pastured one hundred cows for three weeks without giving them any additional food, and at the end of the period the cattle were improved in flesh and general appearance.

Mr. W. B. Jacobs, president of the First National Bank, has 100 acres of alfalfa on one of his plantations. He regards his crop as absolutely sure for twenty dollars clear profit per acre. He makes from four to five cuttings each year. Five large sheds are arranged at convenient distances in the alfalfa fields, which serve as storage places for the first crop previous to baling, and for the baled hay subsequently. These sheds were 40x80 feet long, and were all filled to the top with baled hay.

Mr. A. Querbes, a merchant and planter, also one of Shreveport's most enterprising citizens, has fifty acres in alfalfa. He has already made his fourth harvest this year, and will easily get another. He counts on four tons to the acre as the total yield that will be marketed. His books indicate that it costs him \$1.90 a ton to cut, cure, bale and market his crop. Last year he sold his hay for \$15.00 per ton, an unusually good price, but he has never sold for less than ten dollars per ton.

Thus we see that after making all due allowances for possible losses, use of land and so forth, a handsome profit remains to the credit of the crop.

Mr. W. F. Taylor, the large wholesale grocer, harvests for market seventy acres. He has seeded and rented 130 acres, making a total of 200 acres. Mr. Taylor has harvested this season four crops and will get another. It costs him about \$1.25 to harvest and bale a ton, the cost of getting to the market varying. Mr. Taylor says he regards alfalfa by far the most profitable crop that is grown upon his lands.

Mr. Ben Grey has about 250 or 300 acres in alfalfa. Mr. Jake Foster, some 300 acres and W. L. Foster, 400 acres. We reprint here an address by Mr. Foster, published in Farmer's Institute Bulletin No. 4, 1901.

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## ALFALFA.

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PAPER READ BEFORE FARMERS' INSTITUTE FOR 1900, BY HON.  
W. L. FOSTER, OF CADDO.

It seems to me that this queen of all hay and forage plants is too little understood; otherwise there would not be a ton of hay shipped into Louisiana. On the contrary, there would be thousands of tons shipped out of the State at a better profit than is made on cotton at even present high prices.

I am not chemist or botanist enough to say on what lands in the State it will grow *profitably*—but, believe that with proper expenditure of time in preparation, manuring and nursing, it can be made to grow anywhere in the State. I have seen it growing luxuriantly on the poor and worn hill land of the Experiment Station in North Louisiana, but much time and expense was required; on the river lands between Baton Rouge and New Orleans, it seems to thrive well, and on the Red River lands it seems

to be perfectly at home. I may say that I use it as *profit* crop on our low stiff red lands that will not produce profitably any other crop.

Its value as a feed for horses, mules, cows and hogs, is unequalled by any other food. Hogs will make splendid growth on it and fatten readily without any other feed, and that, too, with twenty or twenty-five to the acre, where it grows well. Milk cows will show the difference in quantity and quality of milk, even when they may be already on good native pasture and being fed cotton seed hulls, meal and bran; mules and horses will shed off and improve greatly where it is added to their feed. There are two objections to using it with teams doing *hard* work: (1) care must be taken not to give them too much, else they won't eat any other food, and even Alfalfa *alone* will not sustain them at *hard* work: (2) if you should happen to get out of it and be unable to get it, your teams would for a few days refuse to accept any substitute.

Again it is a fine fertilizer crop; your land is improving each year it grows on it, and when you wish to get rid of it (which will be *never*, unless you want to plant it somewhere else), it is as easily killed as oats or corn.

Most books on the subject condemn it as a pasture, stating that it will not stand it, and that it will bloat *cattle and sheep*. For the past seven years I have turned on it large numbers of cattle, mules and horses, and, though in that time I have occasionally found a dead cow, I have never believed it was the Alfalfa that killed them. My custom, however, is when they are not *running* on it regularly, to turn them on it after dew is off in the morning, and turn them out before night. My horse lot opens into a large patch and the gate is always open at night, except in very wet weather.

As to its *ability to stand tramping* there is hardly any limit, unless land is boggy. I turned out five acres one winter, intending to plow it up in the Spring to kill the native grasses that had about "taken" it. It was between our lot and a corn field of one hundred acres, in which I was feeding two hundred cattle, and

about forty mules were running when not at work. There being no water in the pasture the cattle had to at least cross this Alfalfa patch to get to the water in the horse lot. When the cattle were taken out preparatory to breaking the corn field, the Alfalfa ground was as bare as a floor, but in a few days it began to "green up," and by the time the plows got to it I changed my mind and did not plow it up. The only trouble I have found in pasturing it is that stock will not graze anything but the Alfalfa, thus giving the native grasses a great advantage and aiding them to eventually choke it out. To pasture it from September or October to May, except in very wet weather, and then cut three or four crops of hay, will prevent serious trouble from native grasses, and at the same time produce returns to satisfy the most exacting. In this connection it may be well to call attention to the fact that in Louisiana this crop grows every day in the year when the temperature is above freezing. I have seen it eighteen inches high in February.

#### HOW TO PREPARE THE LAND.

The land should be broken as deeply as can be done with the tools and teams at hand. Then harrow and re-harrow until in *fine condition*. If poor, make the land rich with plenty of stable manure. Try to put it on land that has had clean cultivation for a year or two, so as to have it as free as possible of native grass seeds. The land should have a rain on it after last harrowing to firm it, as I am sure that more poor stands are attributable to porous, open, cloddy land than to any other cause. The seeds sprout, the roots start down, and soon strike a cavity, and then of necessity it dies.

#### WHEN TO PLANT.

I have planted many times, having increased our crop year by year up to four hundred acres. My experience has invariably

been in favor of Spring planting. Theoretically, Fall is the proper time, but practically it is the wrong time. In the first place, your land is occupied by another crop; secondly, Fall is usually dry and you will have difficulty in getting your land in that fine, firm condition which is so necessary to insuring a good "catch." Again, you may plant your seed and not get rain to bring them up till late, and a freeze may strike it just as it gets out of the ground—at which stage it is very easily killed. Further, you may get the plant up, and then have a long dry spell, and lots of it die before another rain fills the ground with moisture. All of these vicissitudes are reasonably sure to be avoided when the planting is made in the latter half of February. The only inducement I could have for Fall planting would be a very loose sandy land that was full of native grass seeds.

#### HOW TO PLANT.

Sow broadcast about thirty-five pounds of seed per acre, on ground firmed by rains or roller—the former much more favorable. Then harrow *thoroughly* with straight tooth harrow, the teeth running about one inch deep—and it won't hurt to harrow it three times in as many different directions. The thirty-five pounds, if equally distributed over an acre, would give more than a plant to every square inch, if they all came up. But it must be remembered, that birds, bugs, etc., must have some; many seed will be covered too deep, many too shallow, and many die after sprouting, hence put down plenty of seed. If only a small patch is to be planted, it may be done with the hand. If a few acres, it will pay to get some one of the many cheap sowers advertised by all seed houses. If fifty acres, it will pay to get a "Cyclone Seeder" which can be substituted for the rear end gate of a wagon and is driven by the wagon wheel. (Can be bought of any hardware dealer.) This will sow a land twenty-four feet wide. By making the first round of the field, and then fastening one end of a twenty-four foot line to the hame of the near wagon mule, and the other to the

saddle of a horseman, and letting the horseman ride in the wagon tracks made the previous round, and the driver keep his team pulled out so as to keep the line tight, there is no necessity for "laying off" the land, or setting stakes. All they have to do is to drive round and round till they finally finish in the center. By measuring the circumference of the wagon wheel and tying something on it, you can count the revolutions while a weighed amount of seed is planted, and then in a minute's calculation tell how much seed per acre you are sowing, and change your machine accordingly.

Before buying seed, be sure to get samples and examine carefully. The alfalfa seed is oblong, or egg shaped, and if you find in it any small dark round seed like turnip seed, do not take them. They are mixed with "dodder" or "love-vine" seed, which are very injurious to alfalfa, and hard to eradicate. If you order seed from a distance, stipulate that they *must be free from "dodder" seed*. Now, to many the foregoing may seem very irksome—and still more so when it is actually put into practice. But, it must be remembered, that alfalfa is not planted for one year, but that under ordinary circumstances it ought to last from five to twenty years without re-seeding. Most "*authors*" say that "it gives very little returns the first year;" my experience is, that, with the exception of the first cutting, it does as well the first year as any other. The first I ever sowed was in February, and the yield five cuttings that year.

#### WHEN TO CUT.

The time to cut is when the plant *begins* to bloom. Theory, chemical analysis, and feed lot tests all prove that. But consideration must be given to the amount to be cut, and the facilities for doing it. If the work can be done quickly, wait till blooms are showing freely—if the work will require ten days or more, begin when first sign of blooming is evident. Of course, in the early season the weather may be too unsettled, then more time must be given. But at this time, and previously, as soon as it is *tail*

*enough* it should be cut and fed green to all stock, and this plan continued till hay is housed, when economy would suggest feeding the hay.

#### HOW TO CURE.

If any iron-clad rule on this part of the work could be laid down, hay raising would be an unalloyed agricultural joy. To the farmer or planter, who looks after his work and takes an active interest in it, there is nothing more enlivening than the merry click of the mower, nothing more interesting than to watch the transformation from the green sappy plant into the dry palatable sweet-scented hay, over which all animals go into ecstasies. On the other hand, nothing is so displeasing as to put up a barn full of nice looking hay, and then find; when he goes to feed or bale it, that it was put away too green, and moulded, or too dry and consequently became woody and lost its leaves. I am fully persuaded of at least one thing, and that is that in this climate hay cannot be sufficiently cured *on the ground* to put away in large quantities without *curing too much*. Hay that seems perfectly cured, (unless it is almost burnt up) in small quantities, will surely heat badly when put in large quantities. Again, one does not want to run the risk of rain on his hay after partially cured by leaving it to cure fully in the windrow. Further, in small quantities, it may heat considerably, but the heat and consequent moisture will be able to escape, and do no damage. All hay should be put away sufficiently green to cause it to heat some—but *not too much*, or not in such bulk that the heat cannot escape, as said above. The past summer, on account of excessive and continuous rains, was the most inauspicious for saving hay, that I ever experienced, and yet I lost a smaller per cent. of our hay than ever before, by using the following routine: Start the mowers as soon as the usual farm hand can be gotten to work; have extra blades and change at least once a day (a sharp blade saves the machine and cuts the hay closer). After the mowers have gotten a start of six to eight hours in May, three to six hours in June and July, (don't run tedders at all in

August), start enough tedders to keep about that distance behind the mowers. The tedder is not *necessary*, but is a great *help* in curing. When the hay shows no dampness when twisted in the hand (about the second afternoon in May, the second forenoon in June and early July, and the first afternoon in latter July, August and September), rake it into windrows, and let it remain about a day in May and June, and no time in July, August and September, when it should be raked in piles and cocked up—the cocks being eight to twelve feet in diameter at the base, and sloping gradually *to a point*, and then *combed from top to bottom*, by dragging the fork down it, thus straightening the outside hay and making it turn water, which it will do first rate after it has had a few hours to “settle.” Of course, if a rain should catch it in the windrow, or *just after cocking*, nothing will suffice but to scatter and dry and then cock up again. After scattering with the forks, the tedder comes in mighty handy to hasten the drying. Let the cocks stand four or five days—they may heat lots and the smoke may curl from them, but the hay must be mighty green for it to damage. When the heat has cooled out, it should be put in large bulk. For this there should be a shed boxed up all round like a barn. It should be not less than sixty feet square and thirty feet high in the center for each fifty acres—it will be full of baled hay by the time the last of a *good crop* is put away. In addition, two or three large tarpaulins should be provided for the overflow, or in case weather threatens and it is desirable not to haul so far. The shed should have the *center space* at least thirty feet to admit of running the hay press *inside*. It should be provided with a carrier track, and a harpoon fork (cost will not exceed twenty-five dollars). The hay having sweated out in the cocks it is ready to put in the shed.

There are plenty of wagons on every farm, but they can be left at the house. Instead, take fifty feet of rope, hitch two mules to a plow double-tree with *hook on it*; fasten to this hook one end of the rope, and drive up to a cock; back up to it, pass the rope round it right at the ground, and again about eighteen inches higher up,

fasten the other end of the rope to the double-tree hook, and head straight for the barn. Arriving there, unwind the rope, and send the team after another cock, while the hand at the barn door rams his harpoon fork into the cock, or the larger part of it, is whirled along in the top of the shed to where it is wanted, when a hand inside jerks a rope dangling from the harpoon, the hay falls, and the fork is returned for another load. I have hauled hay in all sorts of ways, and with every tool I ever heard of, but think this the cheapest and quickest; of course, if the hay is stacked or ricked outside of a shed, the carrier and fork cannot be used, and it is then advisable to buy or use one of the stackers which are advertised by dealers, and are very satisfactory, and simple in operation.

The hay having been housed, it will be more than apt to heat again, and two or three weeks should elapse before baling, to be sure that any *spoiling* may be done before the expense of baling is added.

I should state that it is a good plan to have on hand a number of sheets made of eight ounce towels and about five or six feet square, for putting over *cocks* to protect from rain *when first put up*. To each corner of this sheet tie a string several feet long, and the other end of string, tie around the middle of a stick three-quarters of an inch in diameter and ten or twelve inches long, sharpened at each end. When cocking has gotten well started, let a couple of hands follow with these sheets. Spread one over top of cock, and then with the hands at opposite corners, have them pull strings very tight, kneeling on the ground, run the stick under cock and stick in the ground, then raise the cock up so that stick can stand straight and let the cock down on it. If the four corners are thus properly secured, no ordinary wind can displace the cover, and rain cannot damage the hay to any appreciable extent. As soon as the cock has had a day or so to *settle*, these covers may be taken off, and used on other cocks just put up—the same cover doing service for many cocks. After haying season is over they can be put away for another year, or, better, made into cotton

sacks and sheets, and new ones made when haying time comes the next year.

#### COST AND PROFIT.

These items, as in every other business, depend mostly on the experience, skill and judgment of the *boss*—and somewhat on luck as to seasons. I am free to say that if alfalfa hay is worth as many dollars per ton as cotton is worth cents per pound, I much prefer to raise the alfalfa. On our soils, with ordinary seasons for growing and harvesting, we get three to five cuttings, averaging from one-half to a ton of cured hay per cutting, and bringing in our market at Shreveport, from eight to fifteen dollars per ton. The cost of handling varies, of course, with the seasons. It costs just as much to *cut* and *rake* one-half ton per acre as it does to cut and rake a ton per acre. If rain catches it in windrow or just as it is cocked up, and it has to be scattered, the cost is much greater. From my own experience and my *alfalfa account*, it costs an *average* of \$1.25 to \$2.00 per ton to put in shape for the market. Again, on a large area the cost is proportionately higher than on a small crop. An intelligent negro near our plantation who works twenty mules raising cotton, told me he had sold \$500.00 worth of *surplus* hay per year off of *twenty acres*. For the last two years off of sixty acres he has sold enough to *very nearly make his cotton crop clear*. I think a very conservative estimate would be \$15.00 to \$30.00 per acre net per year, not counting the pasturage in Fall, Winter and Spring.

#### CONCLUSION.

My advice to *everyone who works land* would be to plant a small patch of alfalfa for trial. If he succeeded with it he would have the most valuable crop that grows; if he failed, it would be the most laudable failure he ever made.

I may add further that for some time we were in the habit of rushing our hay on the market, taking what was offered, and

making no kick. The consequence was that \$7 to \$9 was the usual price per ton. But last winter the local hay gave out, and the few who had taught their stock to eat it could get none, so the Colorado product (inferior to the local hay) was shipped in at \$16 per ton in Colorado. Then one of our shrewd planters found out he had a little "surplus," and when it became known, buyers sent to his plantation and paid him \$15 per ton *in his barn*. The result was that last Spring we organized the "Louisiana Hay Growers' Association," got a broker, appointed a committee of three on prices, who fix the price for the broker. The committee refused to put the price below \$10 per ton. As a consequence, when we would otherwise have all been rushing our hay on the market, glutting it cutting prices, and then being sorry for it afterwards, it is now \$11, and I confidently expect to see it reach \$12.50 before the year is out. Further, it is the broker's *duty* to pro-rate his sales among the members, thus averaging up the price, and preventing any one from fear that he will get left. Our membership includes every raiser of hay in this section, the combined average in Alfalfa being 2700 acres.

#### ADDENDUM.

OCTOBER, 1902.

With two more seasons' experience I have no reason to change the views set forth in the foregoing, except: (1) Instead of having so many expensive sheds, I would have but one large barn for storing the *baled hay*. For the curing sheds I would suggest simply the posts for a shed with ridge poles on top. Instead of covering and boarding permanently, would slip upright 1 x 12 around the sides every foot or two to hold the hay in and cover with tarpaulin. These posts should be wide enough to admit the working of the stacker, and such a shed should be on about every 10 acres, thus giving a very short and quick haul with the *sweep rakes*, and consequently reducing the cost of handling to a very low minimum, and doing away *almost entirely* with the hard work of using

the hay forks. When the weather is *settled and hot*, I would substitute this method for the cocking, as given in the previous article.

(2) I have found that when cattle are allowed on alfalfa *at all times*, bloat and consequent death will work considerable havoc among them, but when only put on it when dew is off, there is very little danger.

(3) In 1900, my overseer made with wages hands 253 bales of cotton, costing, in *money* outlay for labor, \$4,500.00, and bringing on the market \$10,575.00. In 1901, the same man, with the same labor, on poorer land, harvested 1100 tons of alfalfa, selling in carload lots for \$15.00 per ton, or a total valuation of \$16,500.00, with a *money outlay for labor and machinery repairs* of \$1500.00. In one case it required about 45 *per cent.* of the *gross* value of the cotton to get it ready for the market; in the other, it required only 10 *per cent* of the *gross* value of the *alfalfa* to put it on the market.

I know one planter who claims to have cleared \$33.00 per acre. Another told me, in July of this year, that with about 150 acres of alfalfa, and 400 in cotton and corn, the alfalfa had *paid all expenses of both crops* up to that date, and he had several carloads on hand—and he was selling it at a reduced price on account of a limited demand at that season of the year.

I repeat, and with emphasis, that, having land which will grow it, a man is almost a criminal not to plant at least enough for his own use. And the only way to find out whether land will produce it, is to try a few acres and see.

W. L. FOSTER.

The following plan of curing alfalfa has been adopted by Dr. Stubbs, at Audubon Park, New Orleans, with very satisfactory results:

The alfalfa is cut in the morning, turned over at noon by a tedder and raked into mows or put into small shocks at night. It is permitted to remain thus for one or two days (determined by pre-

vailing heat and sunshine), and then taken to an open barn, where it is permitted to remain for a few days longer, when it is baled ready for the market. In this way it is cured into a beautiful green hay with scarcely a loss of a leaf. Alfalfa, like all leguminous crops, must not be left too long in the sun, else the leaves will scorch, turn white and drop off. It must also be turned over either by hand or machine while curing to prevent scorching of upper side and to cure out the under side. Alfalfa should be cut for hay just as soon as the purple bloom appears."

#### MARKET FOR ALFALFA HAY.

This hay plant is most popular with the retail trade where it is best known. Mr. A. Querbes, to whom I have already referred, told me that notwithstanding the fact that 4,000 acres of alfalfa was grown in the vicinity of Shreveport, he as a merchant, had to import fifteen car loads of hay from Kansas to supply his customers. A merchant in Alexandria told me that he shipped alfalfa from Denver, Colorado, to supply his customers, paying \$10.00 per ton in Denver, and \$7.00 a ton freight to Alexandria.

#### CHEMICAL COMPOSITION.

When the chemical composition of the plant is fully understood it should be popular wherever tested in practical feeding.

It is exceedingly rich in protein matter, and is fed to best advantage with corn, or other feed of high carbohydrate content. For young, growing animals it is a most excellent feed alone. Recent experiments have shown that it produces beef of very excellent quality.

It is not desired to devote much space at this time to a consideration of the chemical composition of the plant, but we do wish to compare the number of nutritive units produced by alfalfa and corn. A yield of four tons of alfalfa per acre would be the equivalent in protein of 229 bushels of corn; in carbohydrates to ninety-seven bushels of corn, and in fats and oils to seventy-four bushels. Four tons per acre is a conservative estimate.

Recent experiments of two experiment stations have shown that alfalfa can be largely substituted for wheat bran in a dairy ration, furnishing a cheaper supply of digestible protein.

#### LANDS SUITABLE TO ALFALFA..

Prof. F. D. Coburn, Secretary of the Department of Agriculture of Kansas, who speaks with authority for the West, in his book on Alfalfa, states that alfalfa will not thrive in latitudes where the rainfall is greater than 45 inches. As most every one knows, the rain fall in Louisiana is not less than 60 inches. Certainly this would be misleading as far as Louisiana is concerned. Alfalfa will doubtless do well in all of the alluvial lands of the State, bordering on our principal rivers and bayous.

The condition of the subsoil is important. Where permanent water is reached within a few feet of the surface the roots are apt to decay, and the plant die. It is said not to do well where a very stiff clay underlies the surface soil, yet the stiff lands give the best crops. The best fields of alfalfa in the Red River bottoms have a surface soil of fine silt that becomes extremely hard in dry weather. On the Mississippi the black, gummy soils are best suited to this plant.

Another statement of Mr. Coburn may be misleading, as applied to Louisiana. He says: "it is not, however, too broad a statement to say that alfalfa will do well on any well drained soil that will profitably grow wheat or corn." So far as Louisiana is concerned, corn production is no criterion to go by. Our black or red, heavy, alluvial lands that produce poor corn, sometimes are the very best lands for alfalfa. The converse of this proposition is also sometimes true. We have fine uplands that produce magnificent corn, that will not produce alfalfa at all, without special preparation which requires considerable expenditure of labor.

The alfalfa is a plant that sends its roots very deep into the soil and brings a portion of its food from a depth not reached by

other plants. However, it has a surface root system causing it to respond readily to the application of fertilizers.

#### PREPARING THE SOIL AND SOWING ALFALFA.

In the bottom land or land that contains a large amount of humus, decaying vegetable matter, the only thing necessary in most cases will be to prepare the land by thorough pulverizing, and sow the seeds in the fall, and cover shallow with a harrow, or roll the land and then run over it with a very light harrow. Where the soil is badly infested with weeds and grasses, one should use a heavy shading crop to clean the land before alfalfa is sown. If the land is plowed deep in the spring and sown in cow peas or velvet beans, they should leave the soil in excellent condition. Harvest the vines and cross disc well the land with a disc harrow to incorporate the vegetable matter, left on the soil, sow the seed at the rate of 15 to 20 pounds to the acre or in very stiff land more, roll the land and afterwards harrow with a smoothing harrow. This should be done in the early fall—preferably about the first to the middle of October. Later plantings are successful if not caught by a freeze, which is very disastrous to very young alfalfa plants.

Spring sowing has not been a success at the experiment stations. On the Red River bottoms spring planting is generally successful. This is chiefly due to the fact that the lands most suitable to alfalfa there are not so badly infested with weeds and grasses as are the bottoms of the Mississippi. The spring planting permits alfalfa to follow cotton, as the land can be prepared after the cotton crop is gathered. One should be cautious, however, about adopting this plan in other sections of the state, and not condemn alfalfa should spring sown crops be over-run by grass and weeds.

#### ALFALFA ON UPLANDS.

It is believed that with heavy applications of stable manure, the uplands may be made to grow alfalfa to a profitable degree. The following treatment is recommended:

In the spring of the year break the land deep and well. After breaking, spread evenly broadcast from 20 to 30 two-horse wagon loads of good stable manure. Sow broadcast at the same time 200 lbs. to 300 lbs. of acid phosphate. Sow in cow peas at the rate of 1 1-2 to 2 bushels per acre, using a variety that will give a good growth of vines, and harrow in well. Allow these peas to remain on the land, completely shading it, until the middle or last of September. Then cut with a mowing machine close to the ground. Cure into hay and use for feed. As soon as the hay is removed, cross break with a disc harrow, going not over three inches deep. (Don't use a plow). Sow alfalfa at the rate of 15 to 20 lbs. to the acre; roll in with a roller, and right behind the roller run a smoothing harrow, destroying the surface compactness of the soil and leaving a fine mulch to conserve the moisture. In a few days a good stand will be obtained, which will grow sufficiently by winter to resist any ordinary freeze, and by April or May, to give the finest harvest.

At Baton Rouge soil treated in a similar manner gave five cuttings last year, yielding over seven tons per acre, as the hay was put in the barn. Late in the fall, worms destroyed the stand, and it is yet to be seen whether it will be a successful perennial crop. However, it would still be remunerative if it had to be planted each year.

At Calhoun, on the pine hill lands, the results from this method of treatment have been very satisfactory.

#### DODDER IN ALFALFA.

Alfalfa seed are sometimes mixed with the seed of a most obnoxious parasite, the dodder or lovevine (*Cuscuta*), which germinates simultaneously with the alfalfa and afterwards lives upon it, soon destroying it. As these seed are much smaller than the alfalfa seed, they may be separated by a sieve, which will permit the former to pass through while retaining the latter. A common

flour sifter, to be found in every household, will accomplish this purpose. Every farmer should examine his seed carefully for dodder seeds before sowing.

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## COW PEA.

(*Dolichos sinensis* or *Vigna sinensis*.)

The origin and early history of the cow pea is fully discussed by Dr. W. C. Stubbs in Bulletin No. 40 of this station. Only a brief resume at this time will be given.

India was probably the early home of the cow pea. It has been a cultivated plant for many centuries. During early Colonial times cow peas were introduced into this country, and found to be well adapted to the soil and climate of the southern states. Starting probably from South Carolina over a hundred and fifty years ago, they were soon generally distributed over the entire settled portion of the south. North of the mouth of the Ohio river the plant was practically unknown until quite recent years.

Some varieties have recently been acclimated to the northern states, and during the past five or six years they have been growing very rapidly in popularity as far north as Wisconsin.

At the present time almost every issue of the leading agricultural papers contains some reference to or discussion of the cow pea as a forage crop and soil renovator in Ohio, Indiana, Illinois, Iowa, in fact, throughout the great corn producing section of the United States.

It seems very probable that in a few years cow peas will be cultivated throughout the entire United States, except, possibly, the extreme northern portion.

While it has always been a popular crop in the south, its merits have not been fully appreciated, and it is destined to more extensive cultivation and greater usefulness in the future.

## BOTANICAL RELATIONS.

The botanical study of the many so-called varieties of cow peas, with a view of properly classifying them, gives but little relief from the confusion of popular nomenclature. It seems that very few forms are entitled to recognition as botanical varieties, and that probably all forms should be included under one species—namely, *Dolichos sinensis*, or *Vigna sinensis*. Confusion again arises as to what shall constitute a "horticultural variety." It is probably best to allow a liberal use of the term variety, and apply it to any form that has become fairly constant in its characters.

We must therefore rely upon popular names, confusing though they may be at times, until some standard of classification shall become adopted. Unfortunately different names are frequently applied to the same pea in different localities, and sometimes a common name designates different peas in different localities.

The writer, in previous bulletins and articles, has favored basing a classification on the color, form and size of the seed, as these characters are least affected by the season and latitude. Upward of fifty so called varieties have been cultivated at the Louisiana experiment stations. The results indicate that probably none of the new and comparatively unknown varieties are meritorious enough to entitle them to replace those in general cultivation and already most widely known in the state.

The Clay, Unknown, Black, Whippoorwill, Red and Red Ripper are some of the varieties well known and among the best for forage production, and for fertilizing the soil. They ordinarily give a very good yield of seed. The Black Eye, and large and small Lady are among the best for table use.

In Bulletin No. 40 of this station, Dr. Stubbs gives the results of experiments conducted for three years, for the purpose of determining the comparative merits of different varieties for adding fertilizer to the soil. After giving the tabulated report of the analyses from the King, Indian, Unknown, Clay, Black, Purple

Hull, Blue, Red Ripper, Large White, Small White, Speckled and Colvin, Dr. Stubbs comments on the results, as follows:

"The Black leads with the largest amount for the three years, followed by the Unknown; the Indian, the Red Ripper and the Clay. These varieties are therefore to be preferred where so: improvement or a hay crop is sought. The others should be used only when berries or a quickly maturing variety are desired. It should, however, be mentioned here, that the Unknown suffered from accidental disturbance each year, which modified results. It is a late pea, and the first year suffered more than any others from a drought that prevailed during the late summer and fall. The second year, the stand was injured by a pig, which rooted up a part of the seed, and the third year a cow stable, recently built, threw its shadows over this plat for a few hours a day, and it is believed to the injury of the growth. However, with these annual interferences it comes out second best. The differences in the proportions of the fertilizing ingredients to each other is clearly assignable to the varying proportions of stalk, leaves, roots and pods of the different varieties. While seasons and time of planting have much to do with the proportions of foliage to fruit and roots, the following averages for three years will show approximately the relative percentages of pods, vines and roots of the 12 varieties:

Number.	NAME OF VARIETY.	Per cent. pods.	Per cent. vines.	Per cent. roots.	Per cent. peas to hulls.
1	King .....	30	59	11	71
2	Indian .....	22	65	13	73
3	Unknown .....	11	76	13	75
4	Clay .....	27	59	14	71
5	Black .....	21	67	12	75
6	Purple Hull .....	23	59	18	72
7	Blue .....	67	16	17	74

Number.	NAME OF VARIETY.	Percent. pods.	Per cent. vines.	Per cent. roots.	Per cent. peas to hulls.
8	Red Ripper .....	31	53	16	70
9	Large White .....	36	46	16	70
10	Small White .....	25	66	9	72
11	Speckled .....	51	35	14	72
12	Colvin .....	48	36	16	76

The composition of the leaves, stems, roots, pods and peas, are also given, being the averages of all twelve varieties separately determined:

AVERAGE COMPOSITION OF THE PARTS OF THE COW PEA (AIR DRIED).

PART.	Water.	Nitrogen.	Phosphoric Acid.	Potash.
Peas .....	12.68	3.85	.94	1.45
Hulls .....	13.34	1.16	.36	1.23
Vines .....	12.03	1.94	.37	1.82
Roots .....	12.58	1.32	.43	1.52
Stems .....	.....	1.09	.34	2.25
Leaves .....	11.05	3.01	.22	1.12
Leaf Stalks .....	9.64	1.01	.49	1.34

From the above it will be seen that the Nitrogen predominates in the peas and in the leaves, while potash is most abundant in the stems. Therefore, in curing pea vine hay, great care should be exercised to harvest as many leaves as possible, since their loss depreciates greatly its value as food and increases the stems with a superabundance of Potash and deficiency of Nitrogen.

This excessive Potash in the stems of pea vines, also suggests most careful pains in curing them, since fermentation may easily develop "nitre" (nitrate of Potash) in the vines which may, in excessive quantities, have serious effects upon the kidneys of work stock.

The variety of cow pea, therefore, furnishing the largest amount of Nitrogen, is best suited for both hay and as a soil improver, and an inspection of above table will show that that variety must have an abundant foliage, since the leaves are richest in this ingredient. If, however, beans or peas be sought with an early maturity, then the Speckled, Blue, etc., may be the more desirable varieties.

All varieties of cow peas bearing much foliage are late in maturing, therefore for forage and green manuring, they should be planted early to secure maximum results.

The Department of Agriculture at Washington, D. C., is sending out seeds of a variety called the Iron Pea, which has remarkable resistance to root knot, and the wilt disease. Neither of these diseases are prevalent in Louisiana. A few instances of the appearance of the knot disease have been reported from North Louisiana. Where either of these diseases occur, it would be advisable to try the Iron Cow Pea.

Dr. Stubbs, in Bulletin 40 of this Station, makes the following summary of the

#### ADVANTAGES OF THE COW PEA CROP.

"(1) It gathers free nitrogen from the air; (2) it shades the soils in summer, keeping them in a condition most suitable to the most rapid "nitrification" and leaves them friable and loose in the best condition for a future crop; (3) it has a large root development and hence pumps up from great depths and large areas the water, and with it the mineral matter needed by the plant; (4) its adaptability to all kinds of soils, stiffest clays to most porous sands, fertile alluvial bottoms to barren uplands; (5) it stands the

heat and sunshine of Southern summers; (6) its rapid growth enables the farmer in the South to grow two crops a year on the same soil; (7) if sown thickly, will, by its rapid growth and shade, effectually smother all weeds and thus serve as a cleansing crop; (8) it is the best preparatory crop known to the Southern farmer, every kind of crop grows well after it; (9) on the alluvial lands of the Mississippi bottoms, it serves to pump off excessive water, evaporating it through its great foliage, thus keeping the soil in a condition for most rapid nitrification during the entire growing season; (10) it furnishes a most excellent food in large quantities for both man and animals.

With all of these advantages, it is no wonder that it is called the "clover of the South," and were it used regularly throughout the South as one of the crops in a regular but short system of rotation, the soils of this section would soon rival in fertility their primitive conditions."

#### COW PEAS AS A SOIL RESTORER.

Valuable as this plant is for its vine and fruit as food, its superlative excellence lies in the property which it has of restoring worn soils. This property it shares with all leguminous plants, but it surpasses them all in producing the maximum results in a minimum of time. Clovers, trefoil, lupins and alfalfa are used in different countries as soil renovators. They are planted in the fall or spring, and occupy the ground the entire season or longer for good results. In the South the cow pea is planted in the late spring or early summer, and the crop of vines or peas are harvested or buried for fertilizing purposes in early fall. The growth and development of this plant is both rapid and enormous, particularly when planted on good land. It perhaps assimilates more plant food in a short time than any other leguminous plant.

A few results taken from the bulletins of the different Experiment Stations will show the large accumulations of nitrogen

made by this crop upon an acre of soil. There is also given amounts of phosphoric acid and potash contained in the crop gathered from the soil and subsoil.

At the North Louisiana Experiment Station twelve varieties of peas have been grown for three years on the same land and entire amounts of vines, peas and roots harvested, weighed and analyzed. The average of the best for the three years are as follows, per acre:

Black.....	96	lbs. Nitrogen,	19½	lbs. Phosphoric Acid,	81½	lbs. Potash.
Unknown..	88	“	17	“	78	“
Indian.....	79	“	18	“	63½	“
Red.....	70½	“	17	“	65	“
Clay .....	64	“	14½	“	53	“
Whippoorwill.....	55½	“	10½	“	40½	“

NAME OF STATION.	Dry Matter per Acre.	Nitrogen, pounds.	Phosphoric Acid, pounds.	Potash, pounds.
Louisiana Sugar Station, vines.....	3,330	56.	16.	92.
“ “ roots.....	1,040	8.5	4.5	110.
Alabama, vines.....	.....	115.5	39.	89.
“ roots.....	.....	7.5	7.	39.
Connecticut, vines and roots.....	.....	90.	23.	75.
Rhode Island, (Black Peas) vines.....	.....	157.	32.2	109.5
Arkansas.....	.....	68.	14.	50.
South Carolina.....	7,200	205.	33.	155.

Other yields might be given, but these suffice to demonstrate the fertilizing value of the cow pea. The average of the yields of the six States given above is 122 lbs. nitrogen per acre. If it be assumed, which is doubtless true, that the larger part of this nitrogen comes from the air and is therefore a direct addition to the fertility of the soil, one can easily calculate the money value of this addition.

Nitrogen is the most costly of all the ingredients of fertilizers. It is also the most fugitive element of our soils, being washed out by rains and removed largely by grain crops. The average price paid for this element in commercial fertilizers by the farmers in this country is not far from 15 cents per pound. Using this as our factor the money value of an average pea crop, measured by its nitrogen contents alone is over \$18 per acre. In many instances it far exceeds this sum. No account has been taken of the phosphoric acid and potash present, since those come wholly from the soil, but by transferring them from greater depths to the surface soil, which is accomplished when pea vines are turned under as a fertilizer, they are made immediately available for the succeeding crop, and to this extent has added to the money value of the pea crop.

In the experiments at the North Louisiana Experiment Station with different varieties, it was found that the proportions of fruit to vines varied from 10 to 25 per cent. in the running varieties to 60 to over 100 per cent. in the bunch. The percentage of roots to vines depended also upon the character of the variety. The running varieties averaged about 20 per cent., while the bunch ran from 33 per cent. up to 100 per cent., the amount depending entirely upon the bunchiness and prolificness of the variety. The percentage of peas to hulls was more constant, varying between the limits of 70 and 76 per cent.

The moisture in green pea vines may be assumed without much error to be 85 per cent. of its weight, leaving 15 per cent. of dry matter. The growing vine may be roughly estimated to contain 0.40 per cent. nitrogen, 0.07 per cent. phosphoric acid, and 0.30 per cent. potash. The yield of green matter varies with soil and variety, but yields of over 20 tons per acre are recorded.

The pea vine hay, if cured with leaves on and from one of the running varieties, will contain approximately the following percentages: Nitrogen, 2 per cent; phosphoric acid, 3 per cent., and potash, 1.5 per cent.

Therefore, an easy calculation of the approximate value of the fertilizing effects of a crop of pea vines can be made by using the above figures after the weight of green or dry matter to the acre is obtained."

#### METHOD OF PLANTING.

Most of the cow peas grown in Louisiana are sown in the corn crop. The seeds may be sown broadcast immediately preceding the last cultivation, so the seeds will be covered in the operation. The plants are then distributed over the rows and middles. The seeds may be sown in the middles only, in advance of the middle cultivation, or they may be drilled with a planter in rows half way between the middle furrow and the centre of the row, or sometimes a single row in each middle. The sugar planters, using rows five to six feet apart, in alluvial lands, sow broadcast, or in drill on each side of the corn, at the rate of one and a half to two bushels, or more, to the acre, as the corn is laid by.

The pea vines completely overrun the corn until the stalks are almost weighted down by the mass of vines. (See illustration, made from photograph.) While this may injure the corn somewhat, and interfere with gathering it to a considerable extent, the peas are so highly esteemed as a crop for revivifying the soil and preparing it for the future crop of cane, that the loss is not deplored. The results of heavy seeding of cow peas in corn have been so marked, that the sugar planter maintains the custom even when the price of peas is excessively high.

While the sugar planter may sometimes be a little extravagant in planting an excessive quantity of seeds, so that some plants are smothered out in the struggle for existence, the hill planter, as a rule, is too sparing with his peas.

He generally plants in the middle only, or drills with a planter, one or two rows to the middle, using from a half peck to a half bushel to the acre. This seeding is inadequate to give much fertilizer to the soil, or much hay in the harvest.

Sowing in the drill economizes seed, but there should be a sufficient number of vines to shade the ground thoroughly as quickly as possible after cultivation ceases. This can scarcely be done with less than a half bushel to three pecks per acre, when drilled, or two bushels broadcast.

#### ROTATION OF CROPS.

“Every system of profitable farming must sooner or later consist of a rotation of crops with at least one renovating crop in the cycle. The enlightened agriculturist of every country is on the lookout for a valuable leguminous crop, which will be an addition to his fields and his system. The sugar planters of South Louisiana very generally practice a rotation of sugar cane, corn and cow peas. The rotation is not violated even when the peas are extremely high in price. They find that no other crop or fertilizer can compare in results with the cow pea. By turning under the vines with heavy plows in August or September, the ground is in most excellent condition for the planting of cane in October. Thus the fertility and productiveness of his soils are maintained. But the cotton planter as a rule has no rotation. Cotton follows cotton, with an occasional change to corn, with the regularity of the seasons. Under this exclusive culture of cotton, much of the lands of the Southern States have become so depleted in fertility and so deprived of humus as to render uncertain the profits to be derived from its cultivation. Remunerative returns for the labor and expenses of cultivation are rarely received. It is, therefore, a question of paramount importance to every patriotic citizen, how to restore these worn and tired soils. Can these seemingly exhausted soils be restored to their primitive fertility, and at the same time return each year a fair remuneration for the labor and expense involved in the accomplishment? Several stations reply most positively in the affirmative.

Arkansas Station gives results showing that a rotation of crops including the cow pea, will maintain and restore fertility

to worn soils, without the use of any kind of manure and at the same time with a profit.' It shows also, that 'the vines turned under increased the crop of cotton over the plat from which the vines were removed for hay.' 'It was more profitable, however, to feed pea vine hay (with cotton seed) to stock and return the manure to the soil, than to use the vines directly as a fertilizer.'

Extensive experiments have been made at the State Experiment Station, Baton Rouge, La., and at the North Louisiana Experiment Station, Calhoun, covering a rotation of oats, cow peas, cotton and corn and cow peas, with and without appropriate fertilizers, extending over ten years. They have conclusively shown that the poorest lands of this State can easily be renovated by above rotation, and more rapidly in connection with the use of fertilizers. Fair profits may be realized each year by the adoption of the latter system of rotation. The Georgia Experiment Station has tried a similar rotation and finds such beneficial results as to commend the system to the farmers of that State.

Occasionally it may be found that the soil is too poor to grow even cow peas without assistance, and therefore it will be necessary to add mineral manures (phosphates and potash) at the time of planting. In fact it may be deemed wise to add phosphates and perhaps potash, to nearly all soils in conjunction with the planting of cow peas."

#### COW PEAS AS A CATCH CROP,

or as a part of a system of rotation other than noted above, are often very valuable. They may be sown after a crop of any early grain, potatoes, early corn, and a large harvest of hay made in time to plant cane, oats, etc., in the fall. The truck gardener should use the cow pea to follow crops that are exhausted in June or the early part of July.

#### COMPOSITION OF COW PEAS AND VINES.

Every Southern station and many in the North and West have investigated the merits of the cow pea both in the field and

laboratory. Considerable literature upon this subject is therefore obtainable. From the bulletins of the Experiment Stations we learn that the cow pea has been carefully analyzed as a whole when using the vines as hay, and in detail as peas, hulls, stems, leaves and roots. The analysis of the vines as a hay, varies just in proportion to the amount of leaves and pods gathered with the vines. A bunchy variety consisting mostly of stems, cut before developing many pods will be much lower in valuable nutritives, than a running variety with much foliage, or a variety with many developed pods at the time of harvest. This will be apparent from the analysis of the different parts given below. They are the average of many experiments with twelve different varieties of peas, "running and bunch," early, and late kinds.

## ANALYSIS OF DIFFERENT PARTS OF THE COW PEA.

	Water	Protein	Fat	Nit. free Ext'ct.	Fibre	Ash	Nit.	Phos. Acid	Pot-ash.
Leaves . . . . .	11.05	18.84	6.71	32.48	19.74	11.24	3.01	.21	1.12
Leaf Stems . . . . .	9.64	6.12	2.16	46.01	23.47	12.86	.98	.50	1.33
Stems . . . . .	10.00	5.87	.89	38.20	38.84	6.20	.93	.34	2.25
Peas . . . . .	12.14	24.84	1.21	53.76	4.83	3.32	3.97	.94	1.48
Hulls . . . . .	10.46	6.36	.45	38.49	41.43	2.81	1.01	.32	1.18
Roots . . . . .	.....	.....	.....	.....	.....	.....	1.32	.42	1.51

## ANALYSIS OF PEA VINE HAYS.

	Water	Protein	Fat	Nit. free Ext'ct.	Fibre	Ash	WHERE FROM
Overripe Hay . . . . .	10.00	9.57	2.88	39.45	29.34	8.76	Louisiana Station.
Green Hay . . . . .	10.00	15.30	2.60	41.40	22.21	8.49	Louisiana Station.
.....	10.11	15.95	3.63	47.01	16.63	6.76	Arkansas Station.
.....	11.90	14.43	2.49	41.22	21.54	8.42	N. Carolina Station.
.....	10.29	17.71	3.63	40.43	19.76	8.18	S. Carolina Station.
.....	10.00	12.60	2.25	43.65	20.43	11.07	Conn. (Storrs) Station.
Av. of 6 analyses	10.00	13.82	2.37	44.28	20.54	8.90	Conn. Ex. Station

From the above, definite ideas of the comparative merits of the different parts of this plant can be obtained, as well as the composition of pea hay, which varies in nutritive value just in proportion to the amount of leaves and pods which they contain, age of plant and the care with which it is cured. Pea hay consisting only of stems, has a low feeding value.

#### COW PEA HAY.

Cow pea vines properly harvested and cured make a most excellent hay. As will be seen from the analysis, it is rich in protein, and is therefore especially desirable to combine with corn as a ration for work animals. One hundred pounds of cow pea hay is equal in nutritive elements to over 150 pounds of timothy hay, when corn is fed with them as a concentrate. It furnishes the greater portion of the hay produced on the sugar plantations, and a very important part harvested in other sections of the State.

Unfortunately, cow pea hay is not easily cured in prime condition, unless the weather is very favorable. The vines are generally pulled with a pea rake and left in small bunches till they are fairly well dried.

Many planters injure their hay by allowing it to over cure in this condition. The leaves become dried and sun burned, till in future handling they crumble and fall off and are lost. When the vines are pulled, it is generally necessary to shake them to free the dirt clinging to the roots. If this process is postponed till the leaves are dry many of them are broken off and left in the dirt pile. Before the leaves are dry enough to crumble, the hay should be thrown into small cocks, and the remainder of the curing effected. In favorable weather three or four days, at most, will suffice to dry the stems sufficiently for storing in the barn. If the weather is threatening rain, it will doubtless pay to haul a load of rice straw or other grass and cap the shocks of

pea hay, so that they will shed water if rain falls before the vines are cured.

Where the crop occupies level land, the mowing machine may often be used for harvesting, especially if the bunch varieties of peas are used, or the planting has been a little late. Where the vines are matted so as to render the use of the mower impossible, it has been suggested that a disc cultivator or disc harrow, with all but three or four discs removed, be run over the vines to cut them to pieces in advance of the mower.

The best time to harvest for producing the greatest quantity of fine hay, is when the pods begin to ripen. It is better to let them pass this stage, rather than cut them too green.

Where the mowing machine is used and a tedder is available, hay that is cut in the morning and tugged at noon, should be in condition to cock up in small cocks late in the afternoon. Here it should be left till no moisture can be mashed from the thickest stem. Should a rain occur, do not disturb the shocks till the outside has dried off, then open them up sufficiently to secure thorough airing.

The Arkansas station has advocated the use of sheds with tiers of poles, upon which the thoroughly wilted vines are placed, like tiers of bricks in the drying shed, and there left to cure. It is said that vines cut in the morning may be stored in this way in the evening, and cured perfectly. Whether this can be economically practiced on a large scale, is somewhat doubtful.

#### COW PEAS FOR ENSILAGE.

This station has not experimented with the cow pea in producing ensilage. In Tennessee it is successfully used by planting the seeds in the row between the stalks of corn, after the corn is a few inches high. The vines do not then interfere with harvesting with the corn harvester. No doubt the same method could be practiced in this State, but as yet there is practically no ensilage used in Louisiana.

## THE BEST DISPOSITION OF A PEA CROP.

"The various experiment stations of the States where the cow pea is an important crop, have been testing the results of the various methods of disposing of a crop of cow pea vines. They have uniformly agreed that the best disposition of them is to convert them into hay, and return the barn yard manure to the soil.

If, however, there are not enough stock to consume the vines, they should be turned under. The proper time for doing this will depend largely on the character of the soil and the exigencies of the farmer. If a winter crop is to follow, they should be turned under on all soils early enough to insure partial decomposition by the time of seeding. If a spring crop is to follow, and the soil is stiff and clayey, they should be turned under in the fall and the land thrown into high rows, permitting surface drainage, so as to receive the beneficial physical effects which the winter under such conditions will produce. If the land be porous and sandy, but level, it is probably best to leave them to decay on the surface, since the loss thereby (shown by the Alabama Station to be great) is believed to be even less than will occur by plowing them under in the fall and subsequent winter leaching. If the land is rolling, they should by all means be turned under in the fall.

But the truly scientific disposition to make of pea vines destined for the soil on all character of lands, is to turn them under in early fall and occupy the ground at once with a winter crop of grain (oats, rye, barley or wheat) or some of the clovers or grasses. From an economical standpoint, this course should be pursued, even though the winter crop had itself to be plowed under for some spring crop."

## KEEPING COW PEA SEEDS.

The weevils may be kept out of cow peas by the use of carbon-bisulphide. Place the seeds in a tight barrel or box, and pour the

bisulphide in an open dish, using about a half ounce to every bushel of seeds. Place the dish in the box and cover with a heavy cloth. The bisulphide volatilizes, and the vapors, being heavier than air, penetrate downward and destroy weevils. It may be necessary to repeat the treatment in the winter. As the bisulphide is inflammable, care must be taken not to allow fire, lighted cigars or pipes come in the vicinity of the vapors.

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## SPANISH PEANUTS.

(*Arachis hypogaea.*)

This is a special variety of peanut, grown largely in North Louisiana for forage purposes. Its growth is erect, and, at maturity, the pods adhere very tenaciously to the stalk when the latter is uprooted. In sandy, or light, loamy soils, this operation of uprooting can easily be accomplished with hardly the loss of a pod. By gathering them in this way while the leaves are still green, and curing the entire plant with adherent pods into hay, a large quantity of excellent forage of high feeding value can be obtained. This plant, as has been shown elsewhere, has an enormous power of gathering nitrogen. It stores much of it in the fruit. It matures easily, and two crops upon the same soil have been made in one year at Audubon Park. This crop is frequently planted, and hogs permitted to gather it at maturity. As shown elsewhere, its feeding value is very great, and this is abundantly corroborated by numerous experiments in feeding by practical farmers.

The value to the land of this crop is very great, and the yield of nuts is sufficient, if grown in large areas, to justify a considerable commerce with profit to the farmer at the present prices—three cents per pound in Norfolk, Virginia.

## LESPEDEZA, OR JAPAN CLOVER.

(*Lespedeza striata.*)

Lespedeza is a native of Japan, and somewhat resembles the clover plant, hence the name Japan Clover. It grows very thick on the ground, and to a height of twelve to fifteen inches, often higher in rich soil. Very little seems to be known of its introduction into this country. It became conspicuous throughout the South in piney woods and in old fields along public roads soon after the war. It is rapidly spreading as a wild plant, and no doubt in a few years it will be found growing without cultivation in most parts of the State.

It makes excellent grazing and a very fine quality of hay. The growth is slow in starting in the spring, but later it grows rapidly and is in condition to be harvested during the dry season of late summer, when there is generally good weather for hay making. The hay cures quickly and is easily handled. The crop is not cut till some of the first seeds have matured, and it will then reseed the ground and produce a good stand the following year without any further attention of the farmer. In many old fields where the soil has become too poor to be profitable in corn or cotton, lespedeza will not only yield a fair return in pasture or hay, but the soil will be rapidly built up by the nitrogen gathered from the air. Woodland used for pasture would be enhanced in value by scattering a few seeds through the woods in the late fall or early spring. While we find lespedeza growing more extensively on the hill lands, it will grow well on most all lands in this State, even in very wet places.

In the botanical gardens at Baton Rouge a low wet place where the soil remains too wet for cultivation till very late in the spring, lespedeza has been sown with very satisfactory results. Some of our best farmers are devoting a part of their land to lespedeza as a crop in a long system crop rotation. The amount

of hay raised for the market is rapidly increasing, and it finds a ready market at a good price.

It is a plant that deteriorates in quality from improper handling, from the fact that the leaves readily fall off, and they represent the best part of the hay.

If the hay is stirred a few hours after cutting, or as soon as the exposed portion is thoroughly wilted, it may be sufficiently cured to put in cocks the same day it is cut. A day or two in the cocks will complete the drying sufficient to insure keeping in the barn. By this method the leaves are nearly all retained and the hay is of a bright green color, and is highly relished by all kinds of animals.

#### SOWING LESPEDEZA.

When lespedeza is to be planted, it is best to sow it in late winter, or very early spring. If the land is well prepared, no covering is necessary. Sow the seeds at the rate of 15 to 25 pounds per acre, and allow the rain to beat them in. Spring sown oats are seldom satisfactory, but if they are sown the latter part of February or the first of March, and lespedeza sown immediately following, they produce enough good oat hay to justify such procedure, and do not seriously interfere with the lespedeza. A bushel of oats to the acre, sown late in February, gave a little over a half ton of oat hay in May on the Experiment Station this year. The season was unfavorable for a good crop. Inasmuch as one has to cut the weeds on lespedeza land in May or June, when there is no oat crop, and since the oats do not seem to injure the lespedeza, the cost of the half ton of hay was the cost of seed, plus the cost of hauling in the hay.

The white buckshot clays, "crayfish lands," and soils developing beechwood as the native forest, seem to give the finest development of lespedeza. The pine hills throughout the State are

generally well suited to its vigorous development, and it does fairly well on the poorest soil to be found.

A great many old depleted cotton fields that were abandoned because they were not productive, are now yielding a ton and a half to two tons of lespedeza to the acre.

When it is desired to have the lespedeza reseed the land, it should not be harvested till the seeds on the lower portion of the stems have matured. They will then be shattered in the harvest, or left adhering to the stubble, and will, in this way, reseed the field.

If it is desired to gather seed from the crop, it is allowed to get excessively ripe, and raked before it becomes well dried. This injures the quality of hay very much, but it can still be used after the seeds are threshed out. Often a crop of seed may bring more money than the hay.

Very few seeds scattered over a pasture will multiply and spread till a good stand is secured. It makes an excellent pasture, but is not as resistant to drought as Bermuda and carpet grass. It can be pastured till June, and if the stock are then removed, a good yield of hay will be obtained in October.

Lespedeza is well worthy of more extended cultivation.

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## RED CLOVER.

(*Trifolium pratensis.*)

Can be grown with great success all over Louisiana, provided, of course, the soil, if very thin, be properly fertilized beforehand. As a rule, upon the alluvial and bluff lands of the State and the red lands of North Louisiana it may be grown with great luxuriance without any assistance, save a thorough preparation of seed

bed and sowing good seed at the proper time. The seed bed for this crop, as for all other clovers, should be thoroughly prepared and finely pulverized. The seed should be sown at rate of 10 to 15 pounds per acre and covered, so as to insure germination. It, with all grasses and clovers not indigenous to the South, should be sown in this latitude in October. It will afford two good crops of hay, one in May and the other in July. If the one cut in July be permitted to mature its seed, enough will be dropped during the harvest to reseed the ground. The May crop will afford one to three tons of hay per acre, while the July crop will probably not give more than half as much.

There are two distinct varieties of this clover, known as Medium Red, and Large Red or Sappling Clover. They vary only in size of plant.

Where alfalfa can be easily grown, it is to be preferred to the clover, otherwise red clover is one of the most desirable leguminous forage crops. It is well suited to the bluff lands, and produces, on unfertilized soil of this formation, crops equal in quantity and quality to that produced in the middle North, where it is the leading hay plant of its family.

By sowing the red clover with oats a very heavy yield of most excellent hay was obtained the past season. It is believed that this combination will prove a most valuable one. The oat straw supports the clover, and prevents it from falling over from its own weight, as it does when alone. The oat straw also causes the clover to dry out more quickly after the harvest. On the other hand, the clover makes the oat straw hang together better, and it is much easier to handle.

As far as the composition of the hay is concerned, they form a very desirable combination, as the clover is particularly rich in protein, while the oat hay is rich in carbohydrates.

In sowing this crop, we used about two-thirds the usual amount of seed oats, and about eight pounds of clover to the acre.

Both crops mature about the same time. While something of a second crop may be obtained by allowing the stubble to stand, we think it better to plow the land at once and sow cow peas on it.

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## CRIMSON CLOVER.

(*Trifolium incarnatum.*)

This member of the leguminous family is very much in favor in some sections of the South, especially in Virginia, Georgia, Alabama, and South Carolina. It is probably better adapted to the soils of these States than it is to the greater portion of Louisiana. It often does well in soils that do not produce good red clover. The plant is an annual, and a native of Southern Europe, and has been cultivated as a forage crop for a great many years in the warmer portions of that country.

It should be sown early in October in Louisiana. It may be planted as late as November, if we have no heavy freezes during the winter, but it is taking considerable risk to sow so late, as freezes later in the winter may kill it out.

About 15 to 20 pounds of seed should be sown to the acre. It furnishes fair winter grazing, makes a good winter cover crop, and an early harvest of good hay. The hay is possibly a little easier to cure than red clover, but a tedder, or the use of a fork for turning it over, is almost absolutely necessary to secure evenly cured hay.

It should be cut before the heads are ripe, as the spines on the chaff of the ripe clover give rise to mouth and stomach troubles in horses, consuming them.

When properly cured it is about the same composition as red clover, and superior to it in digestibility. It has a nutritive ratio

of 1:3.5 to 1:4, which is narrow, rendering it desirable as a feed to combine with corn, or other concentrates with a wide ratio. All animals are fond of the hay.

Where red clover can be successfully grown, it is to be preferred to crimson clover, as it gives a larger yield and can generally be cut twice.

After the harvest a moderate second growth occurs, but it is advisable to plant cow peas as soon after the harvest as is practicable. This clover has been planted on the station in September, and harvested in May, in time to plant cotton that matured a good crop. It might have been cut sooner than May or turned under for fertilizer.

In another plot the crimson clover was harvested and corn planted about the middle of May, and in July cow peas were planted in the corn; both crops did well.

By thus securing two leguminous crops in a year, the soil would be rapidly built up in nitrogen content, especially if some phosphoric acid and kainite were used as fertilizer with the clover and cow peas.

In Virginia a corn crop always follows a crop of crimson clover and the results are very pronounced. Indeed, as a precursor and purveyor of nitrogen on poor soils, for the corn crop, nothing excels crimson clover and thousands of acres are planted annually in August and September, with crimson clover to be followed, the following May or June after the harvest of the clover, in corn. Acre yields, of course, are thus frequently doubled, besides securing a good crop of clover hay.

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## WHITE CLOVER.

(*Trifolium repens.*)

This is a small annual or perennial clover, spreading with long stems that lie flat on the ground and take root at every joint or

node. The flowering stems and long leaf stalks only stand erect. This clover is not used for hay, but would be a valuable addition to most any pasture. It begins growing in October, and unless the winters are unusually severe, will furnish considerable grazing by January and February. It is about the earliest plant we have for Spring pasturing. It is more desirable for cattle and sheep than for horses. Horses that are at work, after being pastured on white clover, slobber profusely.

The seed can be scattered in a pasture of carpet grass or Bermuda, and a good set secured without any cultivation. It is establishing itself in many pastures, and it would be well to aid it where possible by allowing it to go to seed late in the Spring.

It will grow fairly well in partial shade, and can be utilized in woodland pastures to advantage.

The white clover is highly esteemed as a plant for bees in the North.

When once established it will reappear year after year. It prefers a rich, but will even grow in poor soils. Cultivation quickly kills it out.

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## SOY BEANS, COFFEE BEAN.

(*Glycine hispida.*)

This plant is of ancient origin and is cultivated for forage and for human food. It grows more erect than the cow pea, but otherwise somewhat similar to it. It has been cultivated at all three of the Louisiana experiment stations, with variable results. Some crops have been very satisfactory, while others have been poor. The yield in forage is very heavy, but the fruit is very uncertain. As there is a very large number of varieties, and seeds-

men have not posted themselves in regard to the subject, no distinction of varieties is made in our market, which may be partly responsible for the variable results obtained. Again, we have lost plantings from seeds that would not germinate. In fact, it may be said that generally a very poor lot of seeds have been secured. As this plant cannot be utilized, except where cow peas could be substituted, we do not consider it advisable to undertake to cultivate it generally in Louisiana.

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## BURR CLOVER.

(*Medicago denticulata.*)

This plant is of recent introduction from the Mediterranean region, but is now growing wild in some portions of Louisiana, and throughout the South.

It is an annual, appearing in the fall and growing all winter, produces seed in May and dies. While it is popularly designated as clover, it is more closely related to alfalfa; however, not being at all comparable to alfalfa as a forage crop.

We have been very successful in growing the plant, and it is now quite common about the headlands and ditches of the stations, but we have not been so successful in getting stock to graze it. Prof. Tracy found it a valuable winter growing plant to combine with Bermuda in Mississippi, thus furnishing a perpetual source of green pasturage, as the burr clover would begin to grow about the time the Bermuda would stop growing in the fall, and would mature and be out of the way of the Bermuda in the spring. Where animals developed an appetite for the burr clover, this combination will prove quite valuable, without doubt.

Whether one would be justified in planting it for the purpose of gathering nitrogen to enrich the soil during winter, is yet to be determined. If it is not grazed back the heavy mat of stems and leaves interfere to considerable extent with the early development of the Bermuda, and may in that way do more harm than they do good in the way of adding fertilizer to the soil. The stems are not strong enough to stand erect, and the prostrate plants soon form a mat in early spring that causes the lower leaves to decay, and if a wet season occurs a short time before the plants mature, a very unattractive mulch of decaying vegetable matter covers the surface of the soil, and a considerable time is required before this area is covered by a palatable growth of Bermuda grass. This objection would doubtless be largely removed where animals are trained to graze the burr clover during the winter, thus preventing the excessive growth of vegetable matter that would otherwise be left to decay on the soil surface. At any rate, we advise planting burr clover with caution. One may expect to have to force animals to develop an appetite for the plant, and it should be used only for pasturing, as it does not make very good hay.

It will doubtless grow anywhere in Louisiana.

Where it is desired to try it with Bermuda, sow the seeds on the sod at the rate of about 15 to 20 pounds per acre, and then harrow once or twice with a disc harrow, followed by a smoothing harrow. The following spring it will reseed the land and the seed will lie dormant till the following fall. We have not found it necessary to harrow or otherwise attempt to cover these seeds.

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## VELVET BEAN.

(*Mucuna utilis.*)

This plant is of ancient origin and has been cultivated in some portions of Florida for 25 or 30 years as an ornamental plant,

most serviceable for covering arbors and trellising galleries of dwellings. It was introduced into this country by the United States Department of Agriculture. In very recent years it has attracted considerable attention as a producer of forage and for fertilizing the soil. The Florida station was the first to publish a bulletin on the plant, setting forth its merits. At the time of this publication this station also had conducted experiments with it, testing its productiveness and value. At the present time a considerable quantity is grown throughout the State. It has been grown by nearly all of the experiment stations of the South, and considerable literature on the subject has been published in bulletin form and in the agricultural papers. Louisiana Bulletin No. 55, issued in 1899, Alabama Bulletin No. 104, also issued in 1899, Bulletin No. 120 of the same station, issued 1902, Florida Bulletin No. 60, issued in 1902, are the most valuable and complete of these publications.

#### DESCRIPTIVE.

The velvet bean grows very luxuriantly, producing vines of very great length. The leaves are larger than those of the cow pea, and often lighter green, young leaves especially often spotted with whitish patches about the midribs and leading veins. The purple flowers are in long racemes. The pods are almost black, and covered with velvety hairs.

There are from three to six seeds in a pod. The seeds are 2 to 3 times as large as a cow pea, and in color are mottled black and dirty white. The seed pods do not split open.

It requires a long season to mature its seeds, very few being matured in this state. When they are allowed to run on some support, so as to give the vines plenty of exposure, some seeds are matured. No doubt in a few years, by selecting the early individuals we will have a strain that will fruit well in Louisiana.

The following extract from a letter by Lyster H. Dewey, assistant botanist of the U. S. Department of Agriculture, is of interest:

"So far as I have been able to determine from the specimens and the descriptions the velvet bean is *Mucuna utilis*, Wall. The original description of this plant was published in Wight's *Icones Plantarum Indiae Orientalis*, Plate 280, 1840. The name *utilis* is generally given in recent botanical works of that region either as a synonym of *M. pruriens* or to designate as a variety the cultivated form of the plant with velvety pods free from stinging hairs. This form, even though it may be a race of *M. pruriens* developed through long cultivation, appears to have well fixed characters in the soft pubescence of the pods and the spherical form of the seeds, by which it may be readily distinguished from the specific type. Furthermore, it is especially important from an economic standpoint that they be distinguished, since the stinging hairs on the pods of the species would make that form of little value as a forage plant, while the lack of these hairs on the velvet bean renders this form worthless as a vermifuge. Both forms occur in India and they are apparently distributed to a considerable extent in the West Indies and the tropics of South America."

LYSTER H. DEWEY, Assistant.

U. S. Department of Agriculture, Division of Botany,  
Washington, D. C.

#### CULTIVATION.

They should be planted in rows 3 to 5 feet apart. In alluvial land the seeds may be 2 to 3 feet apart in the row, but when this thin the stems grow very large. In the hill lands more seeds are required. The Alabama and Florida stations and numerous growers recommend a bushel of seed to the acre. The Louisiana stations have not used so much, but thicker planting results in smaller vines, which would be an advantage in curing the hay.

The rows should be cultivated once or twice to enable the plants to get a good start of the grass and weeds.

#### VELVET BEAN HAY.

The hay from the velvet bean is superior to cow pea hay. While it is more difficult to harvest on account of the long vines, it retains the leaves much better than cow peas.

The vines may be cut with a mowing machine, by placing a knife on the outer end of the sickle guard, bolting it on to stand at right angles, to cut the vines that are interlaced with those not severed at the base.

It is said in Florida they cut the vines two or three times during the season. If this can be successfully done, it would remove the objection of difficult harvesting.

Soon after the vines completely shade the ground, the lower leaves begin to fall off and make a mulch on the surface, adding a large quantity of vegetable matter to the soil.

The following pages are reprinted from Bulletin No. 55 of this station.

#### COMPARISON OF SPANISH PEANUTS, UNKNOWN COW PEAS AND VELVET BEANS.

For the purpose of determining the comparative merits of these three crops which are now grown extensively in this state for fertilizing the lands or for furnishing forage for stock, the following experiments were instituted upon the North Louisiana Experiment Station, Calhoun:

A two-acre plot, rectangular in shape, having a uniform width of 105 feet, was selected for the experiments.

The land was well broken with a two horse plow, well pulverized, and laid off in five-foot rows. The plot was first divided

lengthwise into three equal parts, giving seven rows five feet wide to each experiment. In No. 1 was planted the Spanish peanut, a plant grown largely for forage in North Louisiana, being gathered when nearing maturity by pulling up the entire plant, with adherent nuts, and cured into fodder. When thus cured it serves as an excellent food for all kinds of stock, being, in the language of one of our worthy hill planters, "eagerly relished by all kinds of live stock from children to chickens."

No. 2 was planted with the "Unknown" variety of cow peas, a variety which previous experiments had frequently demonstrated its superior excellence for forage and feeding purposes.

No. 3 was planted with velvet beans, a bean recently found very valuable in this and adjoining states, for both feeding and fertilizing qualities. All were planted in the drill in the usual method.

The peanuts were dropped ten to twelve inches apart; the peas lightly drilled in the open furrow; and the beans dropped every two feet, one to two seeds in each place. They were covered in the usual manner. The cultivation was with the two horse cultivator. The season was propitious up to August, when continuous rains prevailed, lasting till late in the fall. These rains produced enormous quantities of vines in the peas and beans, but the peanuts, ripening early in September, were but little influenced by them. On account of the maturity of the peanuts ahead of the other two crops, it was decided to test the comparative merits of the three crops at an earlier date than would have been done had only the peas and beans been under investigation. On September 23, 1898, when the entire plat was literally covered with the growing crops, an area equal to one-three-hundred-and-ninety-sixth of an acre, was taken in each experiment, and the entire crop, consisting of vines, fruit, fallen leaves and roots were carefully gathered therefrom. The velvet bean has the property of shedding all through growth its leaves, replacing them with new growth. The entire crop from each experiment was carefully weighed, dried and analyzed. The following are the results re-

duced to acre yields, obtained by the Station chemist, Mr. Charles E. Mooers, who performed the work:

## SPANISH PEANUTS.

	Nitrogen lbs.	Phos. Acid lbs.	Potash lbs.	Lime lbs.
In vines, leaves, etc. ....	33.75	6.11	60.60	48.64
In fallen leaves .....	6.48	.84	5.20	18.78
In roots .....	2.24	.44	3.11	1.80
In nuts .....	150.22	28.28	23.87	5.14
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Total per acre .....	192.69	35.67	92.78	74.36

## UNKNOWN PEAS.

	Nitrogen lbs.	Phos. Acid lbs.	Potash lbs.	Lime lbs.
In vines, leaves etc. ....	67.80	18.32	98.58	23.45
In fallen leaves .....	36.11	5.64	15.04	64.33
In roots .....	4.50	1.38	9.21	2.65
	<hr/>	<hr/>	<hr/>	<hr/>
Total per acre .....	108.50	25.34	122.83	90.43

## VELVET BEANS.

	Nitrogen lbs.	Phos. Acid lbs.	Potash lbs.	Lime lbs.
In vines, leaves, etc. ....	93.36	19.74	143.13	61.69
In fallen leaves .....	58.17	15.89	33.14	112.95
In roots .....	2.66	.65	40.48	1.85
	<hr/>	<hr/>	<hr/>	<hr/>
Total per acre .....	154.19	36.28	216.75	176.49

An inspection of above will show that including its nuts, the Spanish peanuts harvested from an acre gives 192.69 lbs. of nitrogen; without the nuts 42.47 lbs., against the Unknown cow

pea 108.50 lbs., and Velvet bean 154.19 lbs. Except in the practice followed in North Louisiana, the nuts are removed and marketed, and then only vines are returned to the soil.

It should be mentioned here, however, that at the time of harvest, both the peas and beans contained only a few rudimentary pods (about 100 pounds per acre, dried, of each) and these were mixed with vines and weighed and analyzed. On account of an excessively wet fall the peas failed to mature any quantity of pods, but the Velvet beans gave on November 16th, 4,181 pounds of green pods, which weighed when air-dried 1,126 pounds, which contained 3.32 per cent nitrogen; .45 per cent phosphoric acid; 2.37 per cent potash and .27 per cent lime, or a total per acre of 37.38 pounds nitrogen, 5.07 pounds phosphoric acid, 26.68 pounds potash, and 3.04 pounds lime. Adding these to amounts already given above for Velvet beans, and we have as a total 191.57 pounds of total nitrogen, 41.35 pounds of phosphoric acid, 243.43 pounds potash, and 179.53 pounds lime, per acre.

Bringing together the results of these crops will permit a better comparison. An acre will give the following, of each:

	Nitrogen lbs.	Phos. Acid lbs.	Potash lbs.	Lime lbs.
Spanish Peanuts, with pods. .	192.69	35.67	92.78	74.36
Spanish Peanuts, without pods.	42.47	7.39	68.91	69.22
Unknown Peas . . . . .	108.50	25.34	122.83	90.43
Velvet Beans . . . . .	154.19	36.28	216.75	176.49
Velvet Beans, with pods . . . . .	191.57	41.35	243.43	179.53

Comparing these plants, without their fruit, it is found that the Velvet beans are far in the lead of the other two, followed by the Unknown cow pea. With the fruit, the Spanish peanut is slightly in the lead, but had the season been favorable for a large crop of beans or peas this would not have been the case with the beans, and probably not with the peas. The beans are nearly up to the peanuts, notwithstanding unfavorable season and early frost. The peas made practically no fruit this year, though usually it is 2

heavy bearer. Attention is called to the heavy draft on the soil for potash and lime made by the Velvet beans, and also, that greater portions of the lime, in both peas and beans, are found in the fallen leaves. Spanish peanuts, which are usually represented as requiring large quantities of lime for a perfect crop, has really less lime and potash than either of the others. The content of phosphoric acid is less in the peanuts than in the Velvet beans, and considerably less in the cow pea than peanut, doubtless due, in this instance, to the almost entire absence of fruit on this plant.

A study of the comparative yields of each plant of green matter, and the percentage of loss in curing into hay, also different quantities of roots and fallen leaves of each, will be instructive: Eighteen thousand seven hundred and thirty-two pounds of green leaves and stems which, cured into 4,113 pounds of hay, with a loss of 79 per cent, were results with Velvet beans; 16,261 pounds of green matter, which, cured into 3,665 pounds of hay, with a loss of 77.5 per cent were results with peas; while 9,066 pounds of green peanut vines gave 2,658 pounds, with only a loss of 70.7 per cent. The low percentage in the last is probably due to the maturity of this plant at harvest. Taking the highest yield at 100, the yields of hay would then be 100 for Velvet beans, nearly 90 for cow peas, and 62 for peanuts. The protein in the hay from peanuts is 7.94 per cent, in that from cow peas 11.56 per cent, and that from Velvet beans 14.19 per cent, showing that, in feeding value, the vines of Velvet beans are by far the richer in the most valuable nutritive ingredients, approaching closely the value of alfalfa, given elsewhere. An examination of the vines of the Velvet Beans revealing the number and size of the leaves, and the comparatively small stems, would corroborate the above analysis, since the feeding value of all forage crops is mainly found in the leaves. The large quantity of dry leaves lying on the ground under the growing vines in the Velvet beans, and their composition, has already been noted.

The small quantity of roots of the Velvet bean and Spanish peanut, compared with that obtained from cow peas, is probably

explained by the manner of planting, the last being drilled in the row, while the others were dropped at stated intervals. It is clearly proven, from the above experiments, that Velvet bean, whether desired as a forage, or as a fertilizer crop, is fully the equal, if not the superior, of cow peas, and if the season will permit of its maturing, its fruit will, perhaps, give superior results to the Spanish goober.

It is, therefore, to be recommended, especially upon the light, sandy lands of North Louisiana, either as a forage crop of highest merit, or to be turned under as green manure for the improvement of the soil; the latter course only to be followed when there are no stock to consume it. From an extensive study of this plant in the field, at all three stations, and a chemical investigation of its properties in the laboratory, we are forced to the conclusion that it is a valuable adjunct to any farm where the climate will permit of its growth.

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## HAIRY VETCH.

(*Vicia villosa.*)

The hairy vetch has been growing in popularity very rapidly. The seed the past year, however, were so expensive that it deterred many from giving the plant a trial. It is hoped that the seeds may be procured hereafter at a reasonable price.

The vetch belongs to the leguminous family of plants, is a native of western Asia, and has only been under cultivation for about fifty years. It is only a winter crop in Louisiana, and must be sown from August to October. When the seeds are matured in May the plant dies and does not reappear till late summer and

early fall. It is not advisable to sow vetch alone, as the stems are too weak to support the weight of the plant, and they fall over and mat on the ground till much of the under portion is damaged for hay.

When vetch is mixed with oats or barley, the stems of the cereal support the vetch and better hay results.

When vetch is sown alone, sow a bushel to the acre on rich land, a little more on poor land. When sown with oats, sow a bushel to a bushel and a peck of oats, and three pecks of vetch.

We do not consider it most profitable to delay the harvest for the vetch to ripen its seed to reseed the land. The loss in the quality of hay is more than the seed are worth. With the combination above noted a very large tonnage of very excellent hay is obtained. The vetch hay contains a higher percentage of protein than any other leguminous hay, surpassing alfalfa, lespedeza and the clovers.

There has been considerable variation in the rapidity of fall growth of vetch at the station. Sometimes it has been six to ten inches high by the first of January, and at other times growth was slow and the stems spreading close to the ground. Whether this was due to the season, the source of the seed or a difference in the strain foreshadowing different varieties, we are unable to tell.

#### PLANTING VETCH IN PASTURES.

A few years ago vetch seeds were scattered on some headlands covered with Bermuda grass, at the Baton Rouge station. The headlands were harrowed to half break the mat of grass so the seeds could reach the soil. The vetch developed well and it seemed at first that it would make a most excellent thing combined with Bermuda, furnishing a pasture of perpetual green. But it was found that vetch held on in the spring till the Bermuda was somewhat injured. The following year the vetch came up excessively thick, and formed a perfect mat of slender vines. The following spring the Bermuda was badly damaged. While the vetch was grazed some during the winter, it was not kept close

enough in the spring to prevent forming a dense shade. It is probable that with closer grazing, it would still reseed the land and not injure the Bermuda.

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### BEGGAR WEED.

(*Desmodium tortuosum.*)

The beggar weed has enjoyed considerable popularity of recent years, in some sections of the south. It was first collected in Florida and probably exists wild in many parts of the south. It is one of the genus of which some species are of almost universal distribution, and known by various names, such as beggar ticks, beggar lice, and stick tights. This form has a leaf and fruit quite similar to the common form found through the pine hills of Louisiana, but grows much larger and taller. It seems to have suddenly become a favorite in Florida. One farmer even predicts that in a few years most of the hay and forage of Florida will be furnished by this plant; that it will replace the cow pea.

It is not likely, however, that it will ever become an important crop in Louisiana. It has been grown for several years at all three of the stations with fairly good results.

It has some good qualities, but is not without serious faults. It produces a very good growth, but not as heavy as most varieties of cow peas would on the same land. It does not mature as quickly as cow peas. Unless it is sown very thickly, the stems become very large and woody. It has the advantage that a second harvest may be made from the spring planting, and it is claimed by some that the second crop will mature seed, but such has not

been the case at Baton Rouge. When sown in early spring it will mature a crop for harvest toward the latter part of June. If the seeds are not free from the outer covering, they are very slow in germinating, and should be planted in the fall. Seeds may be obtained with the outer covering already removed, but they cost somewhat more than the ones with the covering still on.

The plant holds its own with our native grasses and weeds, and will not be crowded out by them.

Another thing that may be said to its credit is that it stands drouth well and sends its roots deep down into the soil to draw moisture and food from a depth not reached by most of our plants. Stock eat the plant with avidity, either green or cured. Judging from the appearance of the roots, with their numerous tubercles, and the high per cent of nitrogen in the tubercles, as shown by chemical analysis, it is a good nitrogen gatherer.

When all its good qualities are summed up, they will probably not be weighty enough to replace the cow pea, or be as desirable as some of the other plants for summer growth.

There is another species of beggar tick called *Desmodium Molle*, that is advertised by seedsmen. It is quite a good deal like the foregoing and the same general remarks may be made as to its merits, with some restrictions, as has been made about the *Desmodium tortuosum*.

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## SORGHUMS.

The sorghums are of two races: First, those having stems rich in sugar and glucose, and designated as *Saccharine Sorghums*. They are quite generally cultivated for making sorghum syrup, and outside of Louisiana are popularly known as "sugar cane."

The second race includes those varieties which have a more pithy stem and contain very little sugar. They are designated as *Non-saccharine Sorghums*.

The latter class are most popular in the middle west, and especially in the semi-arid districts, as they are among the best drought resisting plants obtainable. In these sections the large yield of grain is of prime consideration, Their value as forage being of secondary importance.

On account of the depredations of innumerable birds, but more particularly English sparrows, the seeds cannot be profitably grown in Louisiana. Therefore in estimating the comparative merits of these crops, only their value as forage can be considered.

#### SACCHARINE VARIETIES.

A large number of saccharine sorghums are cultivated, but a limited number of the most meritorious are "given in order of their maturity:"

Early Amber, ripening in about 90 days.

Early Orange, ripening in about 100 days.

Coleman, ripening in about 120 days.

Link's Hybrid, ripening in about 130 days.

White Indian, ripening in about 130 days.

These varieties form a desirable succession for soiling.

Sowing sorghum broadcast for the production of hay has not been very successful on the alluvial and bluff lands of Louisiana. Other grasses come on with such rapidity that the sorghum is more or less choked out, or prevented from attaining a normal development.

Possibly by preparing the land by sowing crops of cow peas, Velvet beans etc., to shade and destroy the grasses and weeds, and then following with sorghum broadcast, better success might be the reward. It is safe to say that in the major portion of the state it is not advisable to sow sorghum broadcast for the purpose of producing hay, after the plan successfully followed where native grasses are less luxuriant and rains less frequent. The dryer soils of the hill sections are somewhat better suited to this method of cultivating the crop. Where the method can be successfully carried out, sorghum gives a large yield of hay of good quality.

Sorghums attain their maximum usefulness in this state as producers of green forage for soiling. Probably no other plant will produce so large a quantity of palatable, nutritive, green stock food when it is sown in drills in rows three to three and a half feet apart, and cultivated in the same way as corn, and cut for soiling. As soon as the flowers appear the cutting may begin. New suckers will come from the stubble, giving a second crop, not so large as the first, but maturing quicker. A third and sometimes a fourth crop may be obtained. It is advisable to run the cultivator over the stubble after each cutting so as to loosen the soil and kill the weeds and grass.

The Early Amber and Early Orange are quite generally cultivated throughout the sugar sections for soiling the plantation mules, the crop lasting from June to October. For this purpose the crop is very highly esteemed. It should be cultivated on every plantation and farm, not only for the work animals, but all other animals requiring summer feed.

The stalks are more completely consumed if run through a feed cutter before it is offered to the animals.

It should be planted liberally so that the stalks will not become

too large. On rich land it should be much thicker than on poor land. A stalk to every two or three inches on average land should not be too thick.

When sorghum cultivated as above is cut and put in shocks it dries out very slowly, the stems remaining sappy for weeks, and fermentation may eventually take place and make it unpalatable for stock. If after cutting the stalks are set vertical in mats under shelter, they can be cured.

The last cutting can be used far into the winter. However, the stalks should be run through a feed cutter or shredder for the most economical feeding.

There is as yet no demand for sorghum as a crop for the silo in this state.

#### SECOND GROWTH SORGHUM.

There is an idea quite prevalent that second growth sorghum is poisonous. No doubt a good many animals have died very suddenly when turned to graze upon second growth sorghum. It is believed by some reliable investigators of the subject that such deaths are due to mechanical action of imperfectly masticated portions of the leaves; it is said that the rough edges of the leaves cause lodgment in the larynx at such a position as to bring about suffocation. Dr. Peters of the Nebraska station failed to find this condition in cases investigated by him.

Prussic acid has been found in sorghums by Dunston & Henry, as recently reported to the Royal Society of London, and to this poison is attributed the death of cattle eating green sorghum.

Prussic acid has also been found in some of the non-saccharine sorghums in western United States, in cases investigated in 1901, during the severe drought. It was thought that the dry weather was a factor in the production of the poison.

On the Experiment Station at Baton Rouge, at this writing, calves, yearlings and old cattle are being pastured on third crop

of Early Amber and Early Orange sorghums, Kaffir corn, Milo-maize, Jerusalem corn, etc., and no injury to the cattle has resulted. The first and second crop was cut and fed to yearling steers. Often the blades were not wilted when fed, and no bad results followed. It has been fed in this way for years at all the stations. One should be on guard, however, as conditions may be met with that will result fatally from pasturing cattle on this crop. No doubt more information on this subject will be forthcoming.

#### NON-SACCHARINE VARIETIES.

As previously stated, these varieties are more valuable for the production of grain than for forage. However, they are not without merit when cultivated for soiling. As a rule they have heavier foliage than the saccharine varieties, and the stalks are more easily cured into hay, when cut and put in shocks as corn.

The Yellow and White Milo maize are two varieties producing very satisfactory yields. They are planted in rows somewhat wider than for sorghum and cultivated in the same way. The Yellow Milo maize stools considerably, and should not be planted as thick in the drill as the White.

For general cultivation they are not to be preferred to the saccharine sorghums.

#### JERUSALEM CORN

Is less valuable than Milo maize, and is not to be recommended for general cultivation.

#### KAFFIR CORN.

"The Kaffir corns are low, stocky plants, perfectly erect, producing numerous branches from the top joints, each giving a head well filled with seed. Average height, 5 1-2 to 6 feet. It possesses pre-eminently the property common to all sorghums of re-

sisting drouth. The entire stalk with blades can be easily cured into hay and is available in all stages of growth for green feed. It may be cut several times in a year. It is claimed to be good for ensilage. If all of the top branches be permitted to mature seed, an enormous quantity of grain will be produced. The seed of this plant can be made into flour which is more analagous to wheat flour than any other variety of sorghum, and is used for making batter cakes, muffins, etc. If planted early in March in rows three feet apart at a rate of four to ten pounds per acre (60 lbs. to bushel), it will be ready for use in May or June and will afford ten to fifteen tons dry fodder per acre and a goodly quantity of grain which is highly esteemed as food for all domestic animals, particularly chickens."

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## OATS.

(*Avena sativa.*)

Oats are used in Lousiana for furnishing winter pasturage, for hay, and for soiling, and yet it is a crop that is either not fully appreciated or is neglected. The amount sown annually could be increased many fold with profit to the state. If sown in October good grazing will ordinarily be had by December, and pasturing may be continued till the first of March, and a good crop of grain harvested in May. If the seeds are covered to a medium depth very little damage is done by our average winter freezes. In fact, oats sown in the early fall are about as sure to yield a good harvest as any crop we cultivate.



FIG. 1. Alfalfa. 4,320 pounds Dry Hay per acre, Baton Rouge, March 18



FIG. 2. Harvesting Alfalfa, Experiment Station, Audubon Park, New Orleans, La.



FIG. 3. Looking Between Two Rows of Corn, with a Good Crop of Cow Peas. September.

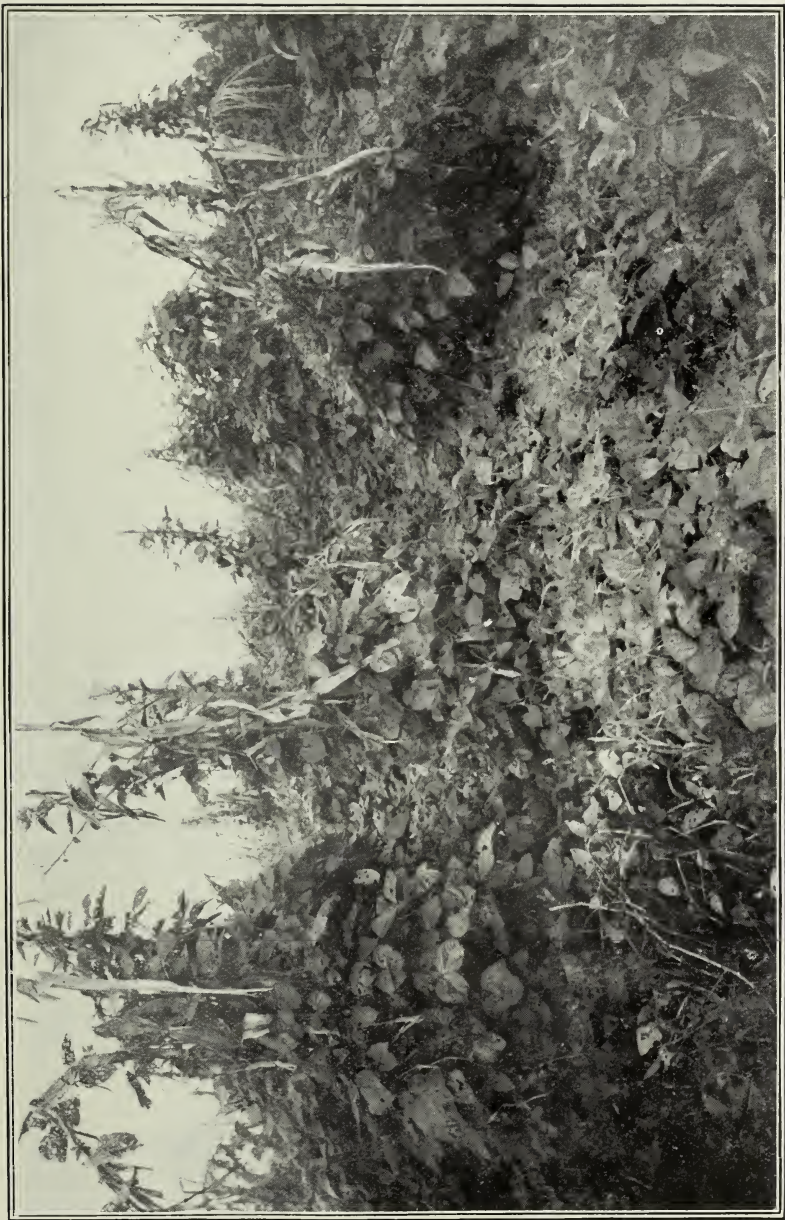


FIG. 4. An Imperfect Stand of Corn Sown in Cow Peas. September.



FIG. 5. Border of Lespedeza Field,  $\frac{1}{4}$  natural size, September.

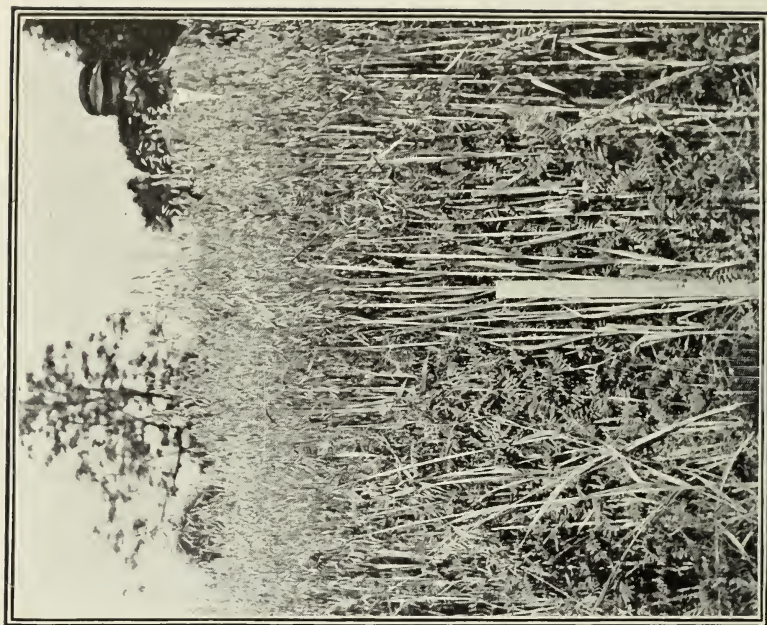


FIG. 6. Mixed Oats and Vetch Photographed April 15.



FIG. 8. Mixed Oats and Red Clover, estimated yield  $3\frac{1}{4}$  tons per acre.

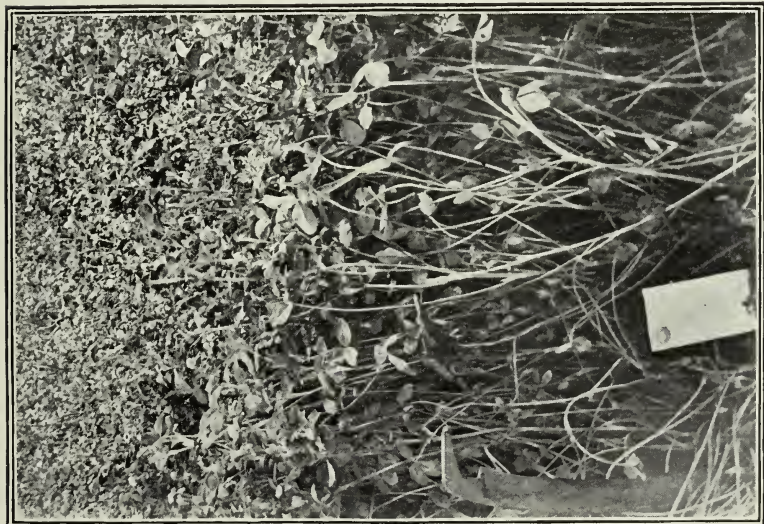


FIG. 7. Medium Red Clover, May 1, yield estimated  $2\frac{1}{2}$  tons.



FIG. 9. Oats, La. Agr. Exp. Station. April 15.



FIG. 10. Hairy Vetch, Illawara, La.



FIG. 11. Cutting Corn with McCormick Harvester, August 6th, Experiment Station, Baton Rouge.



FIG. 12. Husking Corn and Shredding the Stover. Experiment Station, Baton Rouge.



FIG. 13. A single row of Velvet Beans.

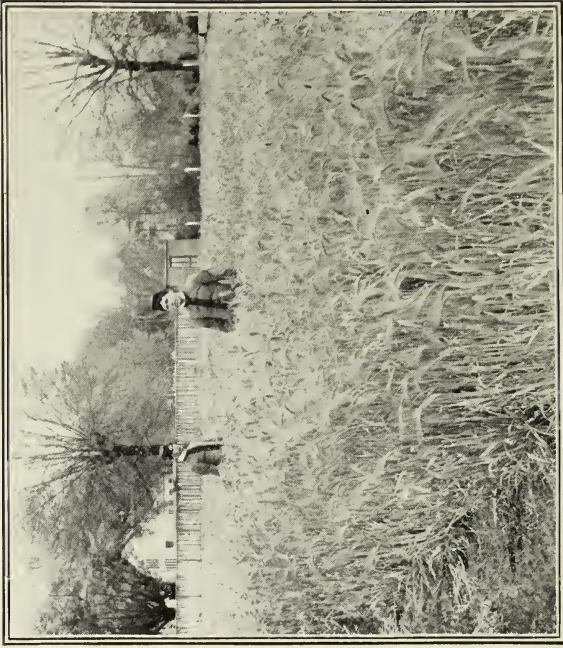


FIG. 14. Barley on La. Exp. Station. March 28, 1901.

Successful planters say that oats sown with a grain drill are less liable to damage by freezing than they are if sown broadcast and harrowed in. The station has made no experiments in this line, from which to speak. Spring sown oats are uncertain and never give a crop equal to that from fall sowing.

The yield per acre of sheaf oats at Baton Rouge has been as much as 3 1-2 tons per acre, where 300 lbs. cotton seed meal and 150 lbs. acid phosphate were used for fertilizer, while unfertilized soil gave nearly two tons per acre.

#### OATS IN ROTATION.

In the rotation experiments at Baton Rouge and Calhoun, oats are sown on the land every third year, followed by cow peas as soon as the oats are harvested. The following season the land is put in cotton, and the third year in corn, with cow peas in the corn, then again in oats, and the same order again followed. Therefore, one-third of the land is each year in oats and peas, one-third in corn and peas, and the remainder in cotton. By this system of rotation the land not only maintains its fertility, but is gradually restored towards its original fertility without the addition of commercial fertilizers.

The results are more satisfactory, however, where this rotation is supplemented with acid phosphate and cotton seed meal, fertilizing the corn with 200 pounds of cotton seed meal, and 100 pounds of acid phosphate per acre; the cotton with 150 pounds cotton seed meal and 150 acid phosphate, the oats as above given, and the peas with 50 pounds kainit and 100 pounds acid phosphate.

By this system the cycle of five crops is made in three years.

#### OATS AND VETCH.

Red Rust-Proof Oats and Hairy Vetch, sown together, make a very desirable combination for winter pasture and an early

spring harvest of excellent hay. The oats support the stems of the vetch, giving the lower leaves more ventilation and light, thus preventing them from being smothered. The oat straw facilitates the curing of the vetch, and the two plants mixed form a better hay than either alone, the vetch being rich in protein, in proportion to the carbohydrates, while the reverse is true of the oat hay; hence, in composition, each supplies the deficiency in the other. When this combination is desired, sow a little less than the usual quantity of oats, with a half bushel to three pecks of vetch seed to the acre. Unfortunately, last year vetch seed were exorbitantly high, bringing four times the price of the year before.

#### OATS AND RED CLOVER.

This combination has been tried at Baton Rouge with very gratifying results. The hay resulting from the harvest was superb quality. The clover dried much more readily when harvested than did clover alone, and the oat straw was not sufficiently over-cured to damage it any.

The yield was very heavy, giving over two and a half tons per acre, as it was stored in the barn.

Sow about eight pounds of clover seed to the acre, and a bushel and a half of oats. It is better to sow the oats first, cover them deeply, then sow the clover and roll the land or run over with a very light harrow, or, if time permits, do both. The crop may be pastured during good weather in winter.

Oats and Alsike Clover was tried, but the results were less satisfactory than with the red clover. This combination may not succeed under all conditions, and will not, in some places, so that it is advisable to test the matter upon a small scale before adopting it for extensive planting.

## VARIETIES OF OATS.

The following report of variety tests of oats, is taken from Bulletin 19, second series, of this Station.

No. of Experiment	Name of Variety	Bushels of Grain per acre	Pounds of Straw per acre	Remarks
1	Prince Edward Island Oat..29.	1576	Ripe June 5, rusted, black grain.	
2	Red Rust Proof Oat.....56.5	2940	Ripe May 25, no rust.	
3	Beardless Rust Proof Oat..45.6	2450	Ripe May 25, no rust, slightly injured by birds.	
4	Virginia Grey Winter Oat.47.8	2670	Ripe June 10; no rust; small stem, small grain; slightly injured by birds.	

"The above experiments in oats are given out of many made during the last few years on all of the Stations. The soil at Calhoun is the lightest and least fertile of those under experimentation. Every year success has attended our efforts in growing oats on all three Stations, provided proper attention was paid to the following desiderata: 1st. Use pure rust-proof seed. 2nd. Plant in October upon well prepared land.

At Audubon Park two good cuttings of hay have been made before letting the oats go to seed. In this way three crops were obtained from same planting, two of hay and one of matured grain. In alluvial districts this practice might be universally adopted, thus insuring a large amount of hay for our stock, without much injury to the final crop of grain. Land in oats should be followed at once with a crop of peas sown broadcast, and this crop can easily be cured into hay or turned under as a fertilizer. In either event, the soil will be greatly improved."

## WINTER BARLEY.

(*Hordeum vulgare.*)

In some publications that have been issued regarding Southern winter forage crops, barley is credited with slow growth, and therefore not very desirable for winter pasture. If sown early in October in Louisiana it makes a very good winter pasture, growing as rapidly as oats. It matures earlier for harvest than oats, but does not make as desirable hay. Cattle are fond of green barley.

Prof. Tracy esteems it as a valuable winter forage crop in Mississippi.

The seed should be sown at the rate of a bushel and a peck to a bushel and a half per acre, late in September, or early in October. It can then be pastured, or it may be cut for soiling, affording two or three good cuttings.

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## RYE.

(*Secale cereale.*)

Rye is more commonly used as a pasture and hay crop than is any other cereal in Louisiana, and its cultivation should be much more extensive. It will grow on nearly all soils that are not excessively wet, but is most satisfactory on a good loam soil.

One should be sure that he is planting southern grown seed. Rye from the north planted in the fall in this state will spread close to the ground, the leaves lying too flat to afford good grazing, while plants from southern grown seed stand more erect and fur-

nish most excellent grazing all winter for all kinds of stock. If all animals are removed early in the spring, a very good crop of rye may be harvested. Some rye should be cultivated by almost every farmer in the state. Sow from a bushel to a bushel and a peck per acre.

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## BERMUDA GRASS. WIRE GRASS.

(*Cynodon Dactylon.*)

Bermuda grass is said to have been first noted in the South in Georgia about 1825, by General Bethune, who planted it in many places in the South. The name would seem to indicate the Bermudas as the land of its nativity, but the grass is well known over southern Europe, and is probably a native of tropical Asia. It is found growing in all tropical countries.

It is now very generally distributed over the south, and every portion of our state is acquainted with it.

It is very generally called wire grass. This, however, means nothing as a half dozen different grasses are designated by the same name. In some localities any grass that produces a slender stem that trails on the ground or lies recumbent is called wire grass.

The writer has not heard any other common names generally used for Bermuda in Louisiana.

The reputed difficulty of exterminating it has retarded its popularity as a pasture and hay grass. It is probably safe to say that more effort has been directed toward the extermination of Bermuda

in the corn and cotton fields than against any other grass in the state. These efforts, however, are necessarily directed against it only during the growing season, the time when such efforts are least effective. Notwithstanding the fight that is made against it, it is undoubtedly the most valuable grass of the south when confined to its legitimate territory. It forms the best sod for holding the soil of the hill lands, and for preventing erosion and land slides on railroad embankments. Nothing can surpass it for sodding the levees of the alluvial lands. It contributes more to the sustenance of grazing animals than any other one grass. A considerable quantity of Bermuda hay of excellent quality is annually harvested. It forms a good sod for lawns and road sides.

Formerly nearly every planter and farmer feared this grass and preferred to keep his farm clear of it. Now many are cultivating it with profit for pasturage and for hay, and it is rapidly growing in popularity.

#### DESCRIPTION.

Bermuda is a perennial grass, being killed to the ground at the approach of winter. It produces vigorous, creeping stems that enable it to spread quite rapidly. The writer has seen these stems twelve to fifteen feet long, produced in a single season in rich soil. It also produces underground stems from near the surface to a depth of four or five inches, and extending outward several feet. These stems produce joints or nodes at short intervals, and each node is capable of producing a new plant, even if completely severed from all the others.

The flowering stems are upright, and from four to fifteen inches high, according to the strength of soil in which they grow. These stems are naked above and have their flowers arranged on one side of the three to five spikes that branch from the top of the stem. The seeds produced in this state are rarely if ever fertile. Imported seeds are very expensive and often of little value. They

are quoted at a dollar and a half to two dollars per pound. For propagation the turf is better and cheaper than the seed. The method of sodding is elsewhere described.

Bermuda tends to drive out other vegetation. Our carpet grass, *Paspalum platycaule*, and *Paspalum dilatatum*, seem to be the only grasses that can successfully cope with it. It does not thrive, however, in shady places, but will withstand extremes of heat and drought. When it is apparently dead from drought, it quickly revives when moisture is supplied. It will withstand inundation longer than any of our grasses and thrives in branch and creek bottoms that are frequently overflowed. It will grow on all soils in Louisiana, but prefers rich land.

#### BERMUDA PASTURE.

We have no other grass that rivals Bermuda as a pasture grass. It is the Blue grass of the south.

It will better stand trampling and furnish more grazing per acre than any other plant available to us. Animals are fond of it at all stages of its development, and it makes a continuous growth from medium early spring to late fall. If allowed to produce a good growth before frost stock will graze with satisfactory results on the dead leaves and stems till late in winter. The stems often remain green and sweet long after the frost has killed the leaves, and in open winters many of them survive, furnishing some grazing almost all winter. It furnishes fair grazing on soils too poor for successful cultivation in staple crops.

At the Experiment Station at Baton Rouge a pasture of some seventeen acres of rather poor soil, set with Bermuda and *Lespedeza*, with some *Paspalums* is sustaining thirty head of cattle, including cows, yearlings and calves. Since the 25th of March they have had no other food. During a portion of this time, while growth was most vigorous, sixteen steers were also on the same

pasture. From previous experience we expect the pasture to remain good till the first of November. Then we will not do much feeding till toward the last of December.

Bermuda pasture should be plowed up every few years. This not only loosens and aerates the soil, but breaks the mat of underground stems and gives new vigor to the grass that survives.

Some have advised that Burr clover be planted with Bermuda, so that the clover would come on as winter pasturage. We have not been successful with such a combination, first, because our stock will not eat the Burr clover; and, second, the clover survives long enough in the spring to injure the Bermuda.

We have tried combining Bermuda and vetches, with the hope of getting a continuous pasture. At first it seemed to be a success, but the vetch was not closely pastured and the following year the vetch was so thick and lived so long into the spring, that much of the Bermuda was killed out. Unsatisfactory results have been also obtained on trying to combine Bermuda and Texas Blue grass. At present we do not know of any plant that we can unhesitatingly recommend to combine with Bermuda for making a good, permanent pasture for both summer and winter. The hairy vetch, grazed so it will barely reseed itself, is probably the best thing that can be planted on Bermuda sod, when no plowing is to be done. If the seeds are sown in the pasture the latter part of August, or in September, many of them will germinate without being covered, but it is best to harrow the sod thoroughly, or run the disc harrow over it, then the smoothing harrow after the seeds are sown.

(See also under white clover.)

#### BERMUDA GRASS HAY.

Bermuda hay is not yet well established in the market, but its merits are recognized wherever it has been fairly tried. Its reputation has suffered somewhat by an inferior quality of over ripe hay that has been put on the market.

Soon after the flowers are formed the upper portion of the stem and the lower leaves die. The grass should be cut while the greatest number of stems are in blossom. Ordinarily this will make the first cutting in June, and the second in September. The yield varies very greatly, with the quality of the soil. A rich, moist soil will give several tons per acre, as the season's crop.

It cures quickly, as the stems are small, and it should not be left in the sun more than a day. As soon as the exposed portions are thoroughly wilted, the hay should be tedded so as to expose the lower green leaves. As it is always thickest near to the ground, the upper portion of the stem will be over cured and sun burned before the lower portion is ready to rake into cocks or windrows unless something is done to invert the swath as left by the mower. If a tedder is not at hand, the grass can be raked into small windrows as soon as the exposed portion is cured, and left in these windrows several hours before it is thrown into shocks. With favorable weather this should be accomplished in one day. The shocks should then be allowed to stand one or two days, and the hay hauled in. If it is desired to bale it, place under a shed or in a large stack, shaped so as to shed the rain, and allow it to stand for a couple of weeks before beginning the baling process.

Where Bermuda does not grow over eight or ten inches high, it is more tedious to handle than where the stems are longer. It does not hold together well, and only a small quantity can be lifted on the hay fork.

#### MAKING BERMUDA PASTURES AND MEADOWS.

In many cultivated fields the grass is well distributed, and when given an opportunity will quickly form a turf without assistance from the planter. Where it has not obtained a foothold and its cultivation is desired, we advise the use of cuttings from the sod, in preference to seeds. The seeds are expensive, of uncertain fer-

tility, and require very careful preparation of the soil previous to planting.

Cuttings are obtained by taking a piece of Bermuda sod, removing the excess of dirt, and then chopping up the sod with a cane or corn knife, so as to leave pieces of the underground stems about two or three inches in length. Every piece having a node is capable of producing a new plant, when placed in moist soil. These fragments of sod, for convenience in handling, are placed in a basket or bucket and dropped in checks one or two feet apart, and covered with a smoothing harrow. This planting may take place any time during the spring or summer, but the earlier the better. Where pasture is desired it is sometimes planted in the corn. At lay by a shallow furrow is turned up. Half way down the ridge and in this furrow the cuttings are dropped one foot apart, and covered with a light harrow.

The grass will make considerable growth during the summer, and the following spring, after the danger of freeze has passed, the land is plowed shallow, and harrowed to a level, and stock kept off it till a good growth is started. The land may be plowed, leveled and planted with Bermuda in the spring. Under such conditions the Crab grass will generally give a good cutting of hay, and the Bermuda will become sufficiently distributed to form a good sod the following spring.

The planting may be done with a hoe, or the sod may be dropped when the soil is wet, and then pushed into the ground with a blunt stick. Barefoot boys can very effectually plant the sod when the soil is soft and muddy, by pushing it down with their toes. An industrious boy can plant nearly an acre in a day in this way. Other methods will suggest themselves to the individual, to best suit the conditions and labor at hand.

As soon as the pastures or meadows become "sod bound," they should be replowed. At this station we have been very successful

in growing red clover and Bermuda by plowing the sod and sowing clover in October. The clover is harvested early in May and with some second growth clover, the Bermuda comes on and makes a good pasture for the remainder of the season.

A similar method, using oats instead of clover, is also successful.

#### METHODS OF ERADICATION.

Some of the very qualities that make Bermuda a most valuable grass where its cultivation is desired, render it a noxious weed in other localities. Its tendency to persist in cultivated fields has brought about a strong prejudice against it, and retarded the acknowledgment of its good qualities. However, it is not very difficult to eradicate from a field if the proper measures are adopted. It cannot stand much of a freeze soon after being plowed and it will not grow in the shade. By breaking the sod shallow in December, and following with a crop that produces a dense shade, such as cow peas, or velvet beans, Bermuda can be exterminated in a single season. The upturned sod should be as rough as possible to insure penetration of the cold. It is better to plant these crops in rows two and a half to three feet apart, and cultivate them once or twice with a side tooth harrow, or until they get such a start as to enable them to shade the ground before the Bermuda gets a good start

Better results in exterminating may be obtained by plowing the sod in October, planting rust proof oats and again plowing and planting cow peas or velvet beans after the oats are harvested.

#### BERMUDA A SOIL BINDER.

Bermuda has no superior in producing a sod to prevent washing on ditch banks, ravines, embankments and levees. while it does not

develop well on pure clay, a thin coating of good soil will establish it, and once established, it seldom dies out.

It is of incalculable value in holding the levees of the Mississippi, and will no doubt be utilized in southwest Louisiana for sodding the levees of the irrigation canals. Small tufts of sod should be set about two feet apart in early spring and a good sod may be expected by the following year.

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## CARPET GRASS.

ALSO CALLED LOUISIANA GRASS AND BLANKET GRASS.

(*Paspalum platycaule.*)

Carpet grass is our most valuable native pasture grass. It is well distributed over the Southern States and is found in nearly all old fields and permanent pastures in Louisiana. Its habit of growth is too flat and spreading to enable one to obtain much hay from it, the specific name means flat stem, the stems near the ground being several times wider than thick and lying almost on the ground for some distance, often taking root at each node. From this portion of the stem a slender naked stalk arises which bears the seeds in two or three small spikes from one to two inches long.

The leaves are broad, short and blunt.

These characteristics should enable one to distinguish it from the other Paspalums.

The grass is an evergreen perennial, but makes very slow growth during the winter.

It produces a thick, permanent sod, and while it appears first in the branch bottoms of old fields and pastures, and in spots retaining plenty of moisture, it stands drought well, and is very resistant to trampling and grazing. It will not grow in shady places or woodlands. It may be transplanted like Bermuda, or the seeds may be harvested and sown. As it spreads rapidly, where it has plenty of exposure, and no tall shading weeds are allowed to develop, it is not necessary to start it thick. Plants two or three feet apart will soon sod the land. It often crowds out Bermuda in the struggle for existence.

While all animals are fond of the grass, they have to graze much closer to the ground to get it, and it is not as nutritious as Bermuda, but it can be grazed earlier and later. On the other hand it is very easily killed by cultivation, and it is never seen in well cultivated fields. It does not make a very pretty lawn grass, but probably forms the most complete carpeting sod of any of our grasses. Where a good growth of Carpet grass is obtained, there is rarely a spot where the soil can be seen at all, even when the grass is cut very close.

It also makes a good binding sod for levees, embankments, etc. It seems to thrive on poor soil in many places.

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## LARGE PASPALUM OR LARGE WATER GRASS.

(*Paspalum dilatatum.*)

This Paspalum is also a native of the state but not so common as the carpet grass. In the prairie land of southwest Louisiana it

affords valuable grazing. It grows to a height of 2 to 4 feet. Near the base it has numerous leaves about a foot long and a half inch wide when fully developed. It grows in tufts, the sod being perennial. The seeds are borne on one sided spikes, each stem bearing several spikes 2 to 4 inches long. The seeds are very subject to a fungus disease (*Fusorium* sp.) which destroys most of them. While no harmful results have been known to come from feeding these diseased seeds, it is at least unwise to feed many of them for any considerable length of time. When the grass is to be harvested for hay, this danger may be averted by cutting the grass soon after it is headed out.

Soon after the black stamens are shed from the seed bearing spikes, the disease begins to appear, apparently causing the seed to burst open and producing a pinkish growth, over the exposed portion, which eventually becomes blackish, from the development of spores of moulds of secondary infection.

While young it makes very good pasturage, but after it becomes coarse, stock are not very fond of it, and will leave it if other grasses are obtainable. It should then be mowed down so as to start a new growth.

As hay, it makes very good food if cut at the time indicated above, and will afford about three cuttings a season, of fairly good yield. It does not spread very rapidly, and prefers rather moist soil, but will stand drought very well.

On the campus of the University at Baton Rouge, and upon the Station grounds, it has become one of the prevailing grasses.

The writer is not aware of any effort that has been made to cultivate or improve the grass, and the seeds are not on the market,

but it is to be valued in Louisiana above some of the grasses long under cultivation.

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### CRAB GRASS.

(*Panicum sanguinale.*)

This grass is a native of the old world, but is now very widely distributed, and is doubtless known to every farmer in Louisiana. It is an annual, but produces a large quantity of fertile seeds that may remain in the soil many months awaiting favorable conditions for germination. The grass grows most luxuriantly in late summer, during our hottest weather. Frequent showers favor its rapid development. It grows almost exclusively in cultivated fields, readily yielding to other grasses when closely pastured. Corn that is laid by perfectly clean may develop a heavy crop of Crab grass by September. It seems that each time the soil is cultivated, fresh seeds are brought to conditions favorable to germination. It is not known how long seeds may remain in the soil without having vitality impaired.

When oat or rye stubble is not planted to cow peas or other shading crop, crab grass soon springs up with a luxuriant growth.

When cut at the proper time (when the flowers are well formed) it is readily cured into a very good hay, superior to timothy. Many small farmers procure no other hay. Crab grass costs them nothing but the harvesting, and it is almost always a sure crop. Headlands, plowed after crops are laid by, develop a good growth

of crab grass that may be profitably harvested. The grass will produce from one to two tons of hay per acre. The plant should be utilized much more extensively than is now the case. The fact that we have to fight it in the fields should not engender a prejudice against it to such an extent as to refuse the full use of it when it may be harvested as hay.

The stems grow to a height of from 2 to 3 feet, bearing at the summit 3 to 6 slender flower spikelets, each from 3 to 6 inches long. The stems are bent near the base and sometimes roots are developed at the lower nodes.

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### ITALIAN RYE GRASS.

(*Lolium Italicum.*)

Italian Rye Grass is another winter grass, somewhat less valuable than Rescue. It is a European grass, and has succeeded better in the North than in the Southern portion of the United States. It furnishes good winter pasturage and a fair yield of hay in April. If cut early, a moderate second crop may be obtained, and the land can then be sown in cow peas. The seeds scattered at maturity on the soil will not germinate the following fall.

This grass is not preferable to oats, barley or rye.

## TEOSINTE.

(*Reana Luxurians.*)

“Teosinte, of South American origin, has decided merit as a forage crop. It stools enormously and upon rich lands makes a very large quantity of forage. One seed on a hill 2 x 3 feet will stool enough to fill entire space. Like corn, it has the staminate flowers in the tassel and numerous pistillate flowers coming out of the axil of each leaf. These flowers develop at maturity into little shucks containing about five to seven grains of triangular shape, closely appressed, diminishing in size from base to tip. At the Sugar Experiment Station at Audubon Park, this plant has frequently matured its seed. In its native habitat it is a perennial, but under cultivation for several years at all of our stations it shows no sign of stubbling or ratooning. Its stalks contain by actual analyses 6 to 8 per cent sucrose. As a green food it is highly relished by stock. It cures slowly into hay and does not withstand drouths like the sorghums.”

•————

## RED TOP.—HERD'S GRASS.

(*Agrostis vulgaris.*)

“This grass has been sown at all three of the stations. It grows fairly well at Audubon Park, New Orleans, but its value on these soils is overshadowed by so many other grasses and forage crops described elsewhere, that it is not deemed wise to plant it.

At Calhoun upon the white crayfish clays which underlie all of the hills and form the water sheds of all the springs of that country, giving extensive outcrops in the numerous spring and creek branches, it is admirably adapted. These clays, termed the "Arcadia clays" in the geological report of Louisiana, are found in all of the swamp and creek bottoms of the hills of North Louisiana. These bottoms, if sown in September or October with this grass at the rate of nine to ten pounds per acre, will give a winter and summer pasture of great value lasting several years and furnishing, if desired, a goodly quantity of hay in early spring. It is highly recommended for such lands. The seed may be obtained at any large seed store in the country. It is an excellent grass and affords a hay of decided merit. These bottoms are better adapted to this grass than to any other crop known."

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### SMUT GRASS.

(*Sporobolus Indicus.*)

This grass is now well distributed over the State, growing in pastures and lawns. It grows in tufts, and late in Summer sends up numerous flowering stems. The fruiting portion soon becomes covered with a black sooty fungus growth; hence the name smut grass.

Stock eat it very well in early spring, but will not touch it after the development of the sooty heads. When this stage is reached

it should be cut as close to the ground as possible to allow a new growth to come on.

It is problematical whether one should try to eradicate it from a pasture where it has a foothold.

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### JOHNSON GRASS.

(*Sorghum halepense*, *Andropagan halepense*.)

The increasing number of inquiries received by the botanist of the experiment station for information regarding Johnson grass justifies some notice of the plant in this discussion of forage crops. These inquiries come mostly from parties who have seen some favorable notice of the plant as grown in other States or from parties desiring to exterminate the plant from their cultivated lands. The experiment station has uniformly discouraged the planting of Johnson grass in Louisiana.

While it is true that our humid climate and fertile soils are calculated to produce a maximum growth of this plant, it is also true that these conditions render it almost impossible to ever exterminate the grass after it is once established.

In some parts of Alabama, Georgia, Mississippi and Texas it enjoys considerable popularity as a hay crop. It is cultivated to a very limited extent, if at all, in this State, but it does not produce a greater yield of hay than can be obtained from a num-

ber of other plants, that can be easily exterminated, when desired, and there seems to be no good reason why any one should ever plant Johnson grass in Louisiana. It has already become a pernicious weed over a considerable portion of the State, and is destined to gradually extend its invasion into new territory. These things must not be forgotten when considering the claims for forage production, advanced by the friends of Johnson grass.

The plant is sometimes introduced into new territory by unscrupulous seedsmen selling it under a false name.

Oats often contain Johnson grass seeds and may serve to introduce it into new territory.

For the benefit of parties not familiar with the plant, as well as those not thoroughly conversant with its means of dissemination and propagation, we give the following summary of characters:

It is a tall slender grass, often attaining a height of 6 to 8 feet in rich soil. The seeds are borne in a loose spreading panicle. The chaff of seed is usually of a rusty red color. The seeds are about the size of broom corn seeds. It produces an abundance of rather short-jointed underground stems, each joint being capable of producing a new plant. These underground stems are a factor in aiding the local distribution of the plant. In cultivating where the grass grows, these underground stems may be broken and pieces carried a considerable distance and deposited, and there develop a new plant. The seeds are eaten by stock, pass through the system undigested, and germinate where they chance to be dropped. Where the seeds are allowed to mature in cotton and corn fields after the crops are laid by, and pastured after the harvest, animals eat the seeds and distribute them over wide areas. Plants maturing in neglected fence rows and along the right of

ways of railroads, may have their seeds scattered to a neighbor's field.

The seeds may be carried in hay, and in bedding for stables and stock cars. Very frequently the plant matures some seeds before it is cut for hay, and the manure from such hay may plant Johnson grass on a new territory.

Lands infested with Johnson grass are frequently planted in oats, and from such lands the threshed grain contain Johnson grass seed. When such oats are fed to work animals, Johnson grass may be planted wherever the droppings are deposited on the farm. As Louisiana consumes a large quantity of oats produced in the territory where Johnson grass is grown, we advise that planters be very careful when purchasing, and avoid grain containing seeds of this grass.

The spread of Johnson grass is being curtailed by the enforcement of legislative enactments in other States, and by strong sentiment against it where it infests cultivated fields. Recently an unsuccessful attempt was made to secure the passage of a law in Louisiana calculated to restrict the spread of Johnson grass.

Probably at an early date some equitable law for its suppression will be imperatively demanded.

*Bulletin No. 11 of the Bureau of Plant Industry, by Mr. C. R. Ball, U. S. Department of Agriculture, gives results of extensive recent study of Johnson grass. It is a most valuable bulletin to parties directly interested in the subject.*

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## BARNYARD GRASS.

(*Panicum Crus-galli.*)

This grass is not cultivated to any considerable extent in this State, but is found sparingly as a native growth in all the alluvial

sections. The special reason for considering it here is that it is being sold under the name of "Billion Dollar Grass," and samples have been received by the station from purchasers with inquiries as to its merits. It is a very coarse tall-growing grass, said to give very large yields of a coarse hay. It seeds very profusely, and the hay is similar to millet hay.

Parties wishing to try it should not pay extravagant prices for the seed, as they can be obtained in almost any rice field for the gathering. It grows in the rice fields and on the ditch banks, and is considered as a weed. In some localities of southwest Louisiana, rice fields are overrun with it, though it is not difficult to exterminate under dry culture.

It is said to be cultivated extensively for hay in one or two counties in Mississippi.

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### SWITCH CANE.

(*Arundinaria tecta*, *Arundinaria macrosperma*.)

The switch cane and macrosperma constitute the cane-brakes of the State. These canes are found more or less abundant on nearly all the bluff and alluvial lands of the State, and often in the creek bottoms of the pine hill sections.

While they are not subject to cultivation, they are of considerable importance in furnishing shelter and food for range cattle

during the winter. The heavy growth excludes the cold winds, and the blades and buds of the previous summer's growth furnish food for dependant animals. Thousands of cattle in the State get no other winter food. For this reason, if no other, cane-breaks should be protected as much as possible from destructive fires. Ravines and uncultivated areas thickly beset with these two grasses, are not uncommon in the midst of cultivated fields. They should be utilized as much as possible in the winter time by allowing cattle that have no better shelter to range on them.

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### RESCUE GRASS.

(*Bromus unioloides*, *Bromus Schraderi*.)

This grass has been cultivated for years at all of the stations with very satisfactory results. It is a winter grass, and is used as a part of a rotation system. It should be sown at the rate of about 30 pounds to the acre in October. Under favorable conditions it will furnish good grazing during December and January, and if then allowed to grow will produce a crop of hay in April. While it will often make something of a second growth, it is more profitable to plant a crop of cow peas, or some other Summer crop to follow. It is not as productive as a crop of oats, but comes earlier.

The grass is very similar to *Bromus Sacalinus*, and the seeds of the latter are sometimes sold under the name of Rescue.

The U. S. Department of Agriculture has recently issued a publication on characters of the seeds of the two plants. It is Bulletin 25, Bureau of Plant Industry. Interested parties may receive this publication upon application.

Either one of the grasses will reseed the land if allowed to do so and a crop of cow peas planted after the grass has dropped its seeds will not interfere with germination in the fall. In this way winter pasturage may be obtained without reseeding. We do not wish, however, to emphasize the value of Rescue.

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### MEADOW BARLEY, SQUIRREL TAIL GRASS.

(*Hordeum nodosum.*)

The botanical department is frequently called on to identify specimens of this grass, and it is presumed that its distribution is becoming very general over Louisiana. The grass appears in early spring and grows vigorously till matured—the middle of May till June. The heads look considerably like barley, except that they are smaller and softer to the touch. At maturity the segments of the heads separate, breaking the head in almost as many segments as there are seeds. The barbed beard of the ripened fruit sometimes becomes a source of annoyance to stock, injuring the mouth and eyes. They get into the wool of sheep, and sometimes work into the flesh of lambs and kill them.

This grass is to be classed as a pest, and however promising it may look in early spring, every effort should be made to keep it from seeding and spreading in our pastures.

It is an annual, dying out in mid-summer, and if it is not allowed to seed, will die out in one year.

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### CORN STOVER.

It has been generally supposed that owing to our heavy dews and humid atmosphere, with copious rains usually through July and August, we could not successfully cut corn and cure it in the shock, as is a very common practice in the North. Experience at Calhoun and at Baton Rouge, however, has fully demonstrated that corn can be cut when the grain is beginning to harden, the stalks bunched in upright shocks and the whole stalk and ear cured without serious loss of corn, and a fair quality of feed secured from the stalks and blades. Further, that if the stalks be run through a shredding machine to cut them into fine pieces, they make a fair quality of hay, and only a small per cent will not be consumed. The shredder breaks off the ear from the stalk, husks it and delivers it at one side of the machine. In the meantime the stalk is cut to pieces and mixed with the shredded shucks and delivered into the barn.

An acre of corn will yield from a ton to a ton and a half of shredded stover. This is sufficient to carry a cow through the

severe portion of the winter, without other food. A small quantity of cotton seed meal—a pound a day for each animal—added to the corn stover, will carry stock cattle through the winter in very good condition, at very small cost.

#### COST OF HARVESTING.

One can estimate the approximate cost of the stover from the following data: With a corn harvester and three mules one man can cut from six to eight acres a day, if the team is fairly fast, and the weather is not too hot. The harvesting will generally be done in August, which is usually our hottest month, and cutting should not go on while a heavy dew is on. Two men are required to shock after the machine. The twine for binding the corn will cost about 40 cents per acre, at the present price of twine.

#### COST OF SHREDDING.

To run the shredding machine three men are required; one to run the engine and change the sacks that catch the shattered corn, one to feed, and one to throw the corn from the wagon to the feeder.

Three wagons, two teams and four men will be necessary to haul the corn from the field to the machine. By drawing the wagon load of corn to the proper place the team can be unhitched and put to the extra wagon and go for another load while the first load is being shredded, and the teams kept busy in this way. One man goes with each team and two men stay on the ground in the field to load the corn on the wagon from the shock, the driver placing it properly to carry a good load. This force with a six horse shredder will shred with ease eight acres a day, if everything is in good working order. We have shredded at the rate

of an acre and a half an hour on short runs of 20 to 30 minutes, but this rate cannot be maintained by the feeder, or by one man throwing the corn from the wagon. The coal to furnish the steam would of course vary in cost, but will not be far from 20 cents for each ton of stover shredded.

From this cost must be subtracted the cost of gathering and husking the corn in the ordinary method.

Of course one should also add the cost of wear and tear on the machinery, and the interest on the investment.

The corn harvester may also be used for cutting early corn for feeding mules or for cutting sorghum for soiling, and in this way save considerable labor in the ordinary routine of feeding, where a large number of animals are kept.

#### DISADVANTAGES CONSIDERED.

The first difficulty that confronts the small planter is the cost of harvester and shredder. While the corn can be cut with cane knives, the same as done by many small farmers in the North, the machine is more economical where it is possible to secure it. This difficulty may be overcome in two ways—A number of farmers may cooperate and purchase one outfit for several crops, or it may be worked on the same basis as the operation of threshing machines in the wheat states. One party owning the machinery may go from place to place, harvest and shred the crop for a fixed charge per acre, or per ton. This method we understand has been tried in East Carroll parish this year.

Another difficulty to be met with is the interference of cow pea vines in harvesting. In a year like the one just passed this difficulty was not met with, as the vines were too much stunted

by the drought to interfere with the harvest. On the other hand the corn stover is the more valuable because of the shortage of the pea vine hay. Whether the harvester will be improved so as to harvest the pea vines without attendant annoyances, or whether the bush varieties of peas may be utilized to advantage, will require further experience to determine. The use of earlier maturing varieties of corn planted closer in the rows, may help to solve the problem. We cannot afford to omit the cow peas to save the stover, and we should not permit so much good food material to go to waste by not attempting to save the stover.

When seasons come like the one just past, when much of the corn has no grain, every effort should be made to save the stalks for forage. The stalks are worth 40 per cent of the crop. They can be cut with cane knives, set in upright shocks, tied tightly, especially drawing all the tops compactly together, and cured into good forage, which in the absence of a shredder may be fed whole during the winter. This method is far preferable to pulling the blades as is unfortunately still the custom with some farmers.

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## DWARF ESSEX RAPE.

(*Brassica napus.*)

Rape is of comparatively recent introduction in the south. Most of the experiment stations have grown it, but very few private

individuals realize its value, and very little is planted. It has been grown at the experiment stations in this state for quite a number of years, with very satisfactory results, for winter soiling and pasturing, but does not do so well for a summer crop. It grows more rapidly than any fall and winter crop of equal value that we can plant. Sown in September or October, it will be large enough to furnish good grazing material in five or six weeks, being six to eight inches high.

At this stage calves, sheep and pigs only should be pastured on it. Large stock pull up some of the plants, trample some under foot that will not revive, and in many instances bite off the stem too low for the development of a good second crop. Large stock may be pastured on it, however, when the plants are larger.

Bloating of animals sometimes results from pasturing rape too heavily, and care should be taken not to allow them to eat it right after rains when it is wet, or when animals are very hungry and apt to over-eat.

Hogs only may be pastured upon it continuously.

It is especially esteemed in the Old World for grazing sheep, and no doubt it will maintain its reputation for the same purpose in Louisiana.

It is a valuable feed for milk cows, maintaining a good flow of milk, but should not be used to excess, or it may produce a "cabbage odor" in the milk and butter.

If cut sufficiently high to take off only the leaves, it may be used for soiling at any stage of development. Sow about four pounds per acre. The seeds cost from seven to ten cents per pound.

This is a plant well worthy of general cultivation for winter forage. It will grow upon almost any soil, but well drained, rich, sandy loam will produce the best crop.

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### CASSAVA.

(*Manihot aipi.*)

Is a native of the tropics, where it is cultivated for its long, fleshy roots. The uncooked roots taste very much like those of the sweet potato, but after they are cooked the resemblance is no longer noticeable. Some people like them for table use, but it is not probable that they will be generally used for table consumption. The roots are very rich in starch and sugar and make excellent food for stock after the animals cultivate a taste for them. It has been our experience that cattle will not eat the roots if they can get anything else. As the sweet potato will yield as much per acre as the cassava, we consider it preferable, for the same purposes that the cassava roots would be used.

The Florida experiment station gives very favorable reports of the yields and results of feeding this plant with Velvet beans, and points out the possibilities for profitable manufacture of starch from the roots.

The plant is probably better suited to the sandy hill lands than to the better grade of soils.

It is propagated by cuttings. The stems are cut into sections several inches long and preserved over winter, and planted in early spring. A new plant comes from the bud of the cutting. The roots are left in the soil until desired for feeding, as they soon decay after they are dug. The plant has been grown for years at the experiment stations, but we have not deemed it worthy of a special effort to popularize its culture.

Possibly in the sandy lands of the south, it may become a profitable crop, especially if the present trials in Florida develop a market for it for the manufacture of starch. At present we do not believe it will prove as profitable as a source of stock feed in Louisiana as some writers hope it will be in other sections of the south. Cuttings may be secured from most any of the seed houses of Florida and Georgia.

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