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KUDZU GROWING IN FLORIDA

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KUDZU.

The following articles on the Kudzu vine and its value as a forage plant for Florida, by Hon. E. B. Eppes, of Tallahassee, and Mr. C. E. Pleas, of Chipley, Florida, are the first authentic publications of special value or merit concerning this plant.

The fact that both Mr. Eppes and Mr. Pleas are scientific Agriculturists, who are successful farmers in the highest degree, adds much weight to their statements concerning this plant. Their experience with it continuing through ten years or more of unflinching success, is convincing testimony of its great value to the farmers of Florida. Its adaptability to so many farm purposes undoubtedly places it among the foremost of both forage and leguminous plants.

KUDZU, THE MISSING LINK IN OUR CHAIN OF LEGUMINOUS FORAGE PLANTS

By HON. E. B. EPPES, Tallahassee, Florida.

This remarkable vine gives promise of being one of the leading sources of wealth in the Southern States in future. It is really a pea vine that springs up from the roots when the first warm days come in the spring of the year and grows vigorously until a killing freeze comes in the fall. This gives a growing season of at least eight months in the year, during which several cuttings of hay can be made (some instances are known where four cuttings of hay, averaging two and one-half tons per cutting and making a total yield of ten tons per acre in a single season, have been made). This hay is of the highest quality, being equal to cow pea or alfalfa and much richer than timothy.

The analysis made by the State Chemist of Florida shows protein 17.43 and starch and sugar 30.20, being a somewhat richer food than wheat bran. Another remarkable feature is that although the hay is as rich a food

as alfalfa, yet it is entirely free from the tendency to cause loose bowels and bloat in horses and other live stock that interferes so seriously with the use of alfalfa. When moistened, kudzu hay becomes almost like fresh foliage again and makes an excellent green ration for poultry in winter. It is well adapted for use in making mixed feed stuffs and for all other purposes that alfalfa can be used for.

The hay cures very quickly, retaining its leaves and bright green color instead of shedding as cow peas and velvet beans do; in fair weather it requires only one day before it is ready to put in the barn. For this reason it can be easily cured in the fields in stacks under duck covers, thereby avoiding the expense of building barns and saving labor by using sweep rakes instead of hauling the hay on wagons, after first cutting it with a mowing machine and raking it into windrows with a common horse rake. The hay is worth about \$20.00 per ton and up, making the product of an acre yield \$200.00 or over.

Kudzu is of even greater value for grazing purposes than for hay, as it requires no cultivation after the first season and will thrive upon land that is too poor and rough for any other crop. It has been carefully tested on all of the types of soil found in Florida and found to do well on all of them from pure sand to the stiffest clay, provided the land is sufficiently drained to admit of growing corn or velvet beans; where the soil is too wet to grow these successfully it is also too wet for kudzu. Like any other crop, kudzu will make a stronger growth on rich land, but it does well on land that is too poor for other hay crops and rapidly improves the soil by drawing in nitrogen from the air through its leaves and fixing it in the soil by means of the bacteria in the tubercles on its roots, for it has the same power that cow peas and other legumes have in this respect. This addition of nitrogen to the soil and the protection from washing rains and the baking heat of the sun afforded by the

dense growth of vines, causes rapid improvement in the quality of the land planted in kudzu; even poor, worn-out land soon becomes like the rich soil that has been recently cleared from the virgin forest. Yet although poor land becomes rich within a few years when planted in kudzu, it is advisable to use some fertilizer on such soil the first season in order to hasten the growth of the kudzu until it can draw in this atmospheric nitrogen. After this it will not require fertilizing, for its deep root system draws potash and phosphoric acid from the subsoil, while its leaves draw all of the nitrogen needed by the plant from the air. In this way the soil becomes richer every year instead of becoming exhausted as from growing grasses for hay. These deep roots live to a great age and become stronger and more vigorous as the years pass by.

One planting is permanent and the yield of hay increases as the ground becomes more thickly set with plants from the vines, taking root at the joints. The great number of vines struggling for air and light have a tendency to become more slender and leafy also, and this improves the quality of the hay by eliminating any coarse vines, thereby enabling horses and other live stock to eat it up cleanly without wasting any of it. The vines that run along the surface throw out roots at the joints that become new plants and bind the soil firmly together, thereby preventing the washing and erosion of hill sides by heavy rains. While this improvement of the soil is taking place the field is giving fine returns to its owner by the immense supply of rich green forage, on which the cattle, horses and other live stock can graze, thereby keeping fat and in fine health at a very small cost for eight months of the year.

The roots of the kudzu penetrate so deeply as to make it proof against any dry weather that is ever likely to prevail here. This feature and its peculiar habit of neither blooming or bearing seed causes the vines to

remain green and growing during the entire term from spring to fall. The hay can accordingly be cut at any time that is convenient when weather conditions are suitable for curing the hay, as kudzu does not become injured by waiting for good weather as other hay crops do. This feature gives an immense advantage over any other hay crop.

Kudzu is propagated by means of the plants that have rooted from the joints of the vines and when transplanted carry with them on their roots the tubercles that are needed to inoculate the soil of the new field so as to provide for fixing the nitrogen from the air into the soil. In planting kudzu, first plow the land deeply and harrow it, then check it into rows $8\frac{1}{2}$ feet apart each way, setting a plant at each check. Lay tap roots along the bottom of the furrow with crowns slanting upward to within two inches of the surface, covering them with loose earth to the level of the surface. This requires 1,018 plants per acre. Give them level cultivation during the first season. A row of cotton may be grown between each row of kudzu the first season if desired. After this they will need no further cultivation, as the vines will run all over the ground the next season and take root at the joints, growing so rapidly as to choke out all other plants (even such pests as nut, Johnson and Bermuda grasses), yet it is an easy matter to get rid of kudzu if desired, for the plants will only sprout from the crowns and can be killed by cutting off these crowns with a disk plow in hot, dry weather in summer. For this reason there is no danger of kudzu ever becoming a pest.

Kudzu will be an excellent crop to replace cotton in boll weevil sections; the demand for the hay is strong and there is no danger of raising too much, as it can be sent to all parts of the world for a market. After the first season there will be no further expense except for harvesting the hay, which requires much less labor than making cotton, and it will enrich the soil instead of

making it poorer as cotton does; this will avoid having to buy fertilizers. It is free from insect enemies and diseases also, and for these various reasons will be far more profitable than cotton.

Agricultural scientists have been searching in vain for such a plant as kudzu and it will fill a long-felt want among our farmers. Unfortunately, however, the supply of plants is very limited and the demand for them cannot be fully supplied for many years to come.

Kudzu is perfectly hardy all over the United States and endures the winters as far north as Nova Scotia. It will therefore be a valuable crop in the Northern States as well as in the South, although the longer growing season South will be an advantage.

KUDZU AND JAPANESE SUGAR CANE

The Solution of the Forage Problem in the South

By C. E. PLEAS, Chipley, Florida.

The man who first introduced Kudzu to America as a forage plant.

One great cause for the slow development in Southern Agriculture has been the lack of good, nutritious pastures and roughage that lasts throughout the entire year.

What we need is a forage that stock can live fat on the year round. There are many most valuable cultivated crops that make great yields, etc., but their period of mature life is short, making frequent plantings necessary in order to have a complete succession. The Velvet

Bean is an all-season crop, yet it is not ready to feed till November. The cow pea, soy bean and the various sorghums and millets are good forage crops, but all must be planted in succession and cultivated for best results. And for those that are to be harvested before feeding, the farmer only has a few days in which to get it in its prime condition and that is frequently impossible in sections of frequent rains, especially during the rainy season.

All the legumes (with the exception of Kudzu) are more or less bad about dropping their leaves and shattering while curing and harvesting. And a heavy rain on them, or any of the grass, hays or fodders, while curing, means serious injury if not ruin. Kudzu overcomes all these difficulties and has many other features in its favor. One planting lasts for many years and it may be cut or pastured at any time during the season, from about the middle of April, in North Florida, till frost, and where a growth is left on the ground, stock will feed on it all winter. I found that my stock would eat the dead leaves and vines that had laid out and weathered till March, and then been hauled in for bedding, in preference to the best hay I could buy. They ate the Kudzu out from under their feet and left the \$20.00 hay in their mangers.

The next winter after making this discovery I had all this trash raked up and hauled and piled outside the barn before we began digging and shipping plants, and wintered two horses and a milk cow and a calf or two, on that alone as roughage, giving them their usual grain feed, of course, and every one of them came through the winter in as good condition as they had formerly done on good hay.

I do not mention this to advocate such a method, but merely to illustrate the fact that Kudzu does not lose its feeding value as readily, by rain or neglect, as other forage plants do, and that there is something about it,

even in its poorest condition, that appeals to the animal's appetite. And the properly cured hay has a delicious fragrance, resembling tea, that is irresistible to stock.

To illustrate the endurance of Kudzu hay in rainy weather, I would cite that in 1908 we made our first cutting with a two-horse mower, cutting 5-12 of an acre in July from young plants set the year before. The yield was 2.88 tons per acre, and when almost dry the following morning after cutting it, it rained just enough to soak the hay good. When dry the next day and men were in the field cocking it up, there came a very hard rain and it drizzled along for three days. Just how badly it suffered could not be determined, but it looked better than velvet bean hay ever does and the stock ate it with apparent relish. In 1912 we cut near 20 tons from about six acres planted in 1910, and with the exception of about two tons that were cut before the rainy season set in, all of it was thoroughly soaked one or more times while curing, and yet no one who did not know the facts would suspect that it had ever had a drop of water on it, and it was doubtless better than most shipped hay.

As to Kudzu's adaptability for cutting or pasturing at any time during the season, I would point out that hay taken May 1st analyzed 17.60% protein. That taken July 30th (a third cutting) analyzed 14.80% protein, while that which had stood all the season without cutting or pasturing analyzed 16.59% protein, and an exceptionally well cured sample analyzed as high as 19.82% protein and about 35% carbohydrates.

In my 35 years' experience in farming in different States, and with various hay crops, I have never seen a hay that cured so quickly, held its leaves so well, or kept its color so perfectly, under various conditions, as Kudzu does. It does not require lime, as is the case with Alfalfa and some other legumes. It does not require a rich soil, and so far as our experiments have gone during the past ten years, fertilizing is not only unnecessary but unprofit-

able, and I have had plantings in which some were located in the very poorest of soils—soil that would not produce corn, melons or even cow peas, and with the exception that the young plants did not start off quite so readily on these poor spots, no one could tell the difference at the end of the second season.

We have never used a pound of fertilizer of any kind except in a very small way as an experiment, and I am safe in saying that our poorest soil will produce six tons of dry hay per acre, in a season, when the plants become matured, without fertilizer, and I have had as high as ten tons per acre on ordinary soil.

Kudzu is known to thrive in all the United States as an ornamental vine and therefore it must be adapted to a greater variety of soils and conditions than almost any other plant; and if it will thrive thus as an ornament, why not under field conditions, making allowance, of course, for a proportional yield as the season is long or short in different localities.

Our native cattle manage to subsist the year round on the indigenous wire grass, and for two or three months in the spring are fat enough for the block, while many die of starvation during the winter, and are too poor to butcher the balance of the year, for the want of nutrition. Blooded stock cannot stand range conditions and subsist on wire grass alone. They require nutritious feed the year round, and Kudzu comes nearer filling this want than any other one forage, yet it is deficient in some feed elements, and to make up the deficiency I recommend the Japanese Sugar Cane, the two making practically a balanced ration. The best way of feeding this combination is, in my mind, to put the cane in the silo and pasture the Kudzu during the growing season, with the cane silage to balance, say a feed at night, and in winter, feed Kudzu hay and silage.

This cane is a true sugar cane and not a sorghum, and is not propagated from seed, but by laying the matured

stalks, which grow very rapidly and increases in yield from year to year, stooling out from the past season's stubble, each year, until it makes a very dense growth and producing as many as 75 or 100 stalks to a single hill, with a yield of 25 tons or more of green forage per acre.

But for the farmer who cannot afford a silo, this cane may be cut and piled, about frost time, and fed in racks, first running it through a cutter or chopping it into short lengths, or it may even be pastured, but pasturing is wasteful, as is also the method of feeding the stalks whole, as much will be tramped under foot.

This cane is adapted to the various soils of our gulf coast region from South Carolina to Texas and for a distance of some 250 to 300 miles north of the gulf. For sections north of the limits of this, cane sorghum may be substituted, though an annual and not nearly so productive.

In the green state, Kudzu contains less water than the clovers, cow peas, velvet beans and alfalfa, etc., which enables it to cure so quickly, the heaviest cuttings requiring only 24 to 28 hours in ordinary weather.

It does not injure horses like alfalfa and is less liable to cause bloat in cattle than clover. In fact, it has every evidence of being ideal for all kinds of stock, and for dairy purposes. One test was to feed it to a milk cow that had never produced yellow butter in the two years we had owned her. The effect was like magic and in a few days' time she was making the first yellow butter since we had owned her, and on the dry hay at that.

We have not been able to pasture Kudzu or cut it very extensively, owing to the great demand for plants, which has required our entire acreage to be devoted to plant production, but we, as well as others, have tried it sufficiently to know that it is entirely successful if not over-pastured. Our plan is to have a succession of three or

four fields, and when one is pretty well eaten down, say in two or three weeks, turn into the next, etc.

Most people think that because Kudzu is a vine and makes such a tremendous growth in a season that it must be practically impossible to cut and handle it as a hay crop. Our repeated experience has been that it is no more trouble to cut or handle than a like heavy crop of red clover, Mexican clover or pursley, crabgrass or any other hay that makes a matted growth, and it is far less trouble to handle than either cow pea or velvet bean hay. Unlike the velvet beans or cow peas, Kudzu is anchored to the ground every few inches, so that the vines cannot drag ahead of the mower blade, as do the cowpeas and beans.

We do not look for the dividing line in cutting, but watch the left mower wheel instead and see that it follows in the track of the right wheel of the previous round. We straighten out the guard rod on the inner shoe of the cutter bar and set forward and just as high as will allow the doubletrees to pass over it without hanging, and the trick is done. Every vine is thus forced down by the traces and under this rod and cut in two, leaving no cross vines longer than the width of the swath.

We turn the hay with forks immediately after cutting, and in doing this it is an easy matter to separate it into fork fulls and handle it the same way throughout the process of curing, loading and housing, and when thus handled in bunches it will come out of the mow the same way in feeding and is easier taken out of the mow than any other loose hay I have ever handled.

On a heavy crop of three or three and a half tons per acre there is little need of a rake, as it is not the trouble to gather up that short hay is, and when in the cock it covers about 1-4 the ground. The teeth stand straight down and do not catch on the ground vines, yet serves the purpose perfectly.

I believe the side delivery rake would work in Kudzu all right, though I have not tried it.

Some writers and farm papers, in describing and commenting on Kudzu, make the mistake of saying that the vine is coarse and grows very large. This is in a sense true, when the vines are allowed to grow for years without cutting or pasturing, but as a field crop, the statement is misleading, for when allowed to stand the entire season the vines are no coarser than velvet beans, and they become woody when cut as hay. Under field conditions the vines rarely live over winter and usually die back between the plants. But even if they did live over it would be an easy matter to go over the fields with a disc or cut away harrow and remedy that during winter. Even that will be unnecessary when pasturing, for the stock will tramp these runners so that they will never make trouble.

After years of experimenting with the various methods of propagating Kudzu we have discarded all except the self-rooted plants. The seed germinate very poorly if at all and must be grown in beds for a year before transplanting, and the resulting plants usually have but one root, a tap root, that cannot be taken out whole. True, the self-rooted plants cannot be taken out whole, but they have many branches usually, which is far better than only one piece.

The cutting method of propagating we discarded after several unsuccessful attempts. We could get perhaps one per cent to live, but they never made vigorous plants and had the same fault as the seedlings—they were not inoculated.

Our self-rooted plants are all inoculated; in fact, it would be impossible to find one that does not carry the bacteria with it when handled in the usual manner. Thus soil inoculation is unnecessary.

For planting, I prefer old ground, or at least second-year new ground, and if possible, land that had velvet

beans on it the year previous. I break the ground "broadcast" and prepare it as for a seed bed by using the drag last. Then I lay it off in five-foot rows and set the plants about every five feet in the row. This will require about 1,600 plants per acre. One man and a boy can set several acres in a day. The man carries a shovel and opens up the holes by sticking it in the ground and pressing the handle forward, while the boy, carrying the plants, sticks them in back of the shovel, with the crowns about an inch below the surface. The shovel is removed and the man steps on each side of the plant to press the earth firmly after it falls back on the plant.

The proper time for planting Kudzu is two to three weeks in advance of corn planting time or a little earlier if one can get the ground ready. A full crop of corn may be grown on the same land, the first year, by dropping the grains between the plants. Neither will interfere with the other and both need about the same attention, only the ground shall be left smooth and level at the last cultivation to permit easy rooting of the vines or runners and subsequent mowing for hay. Plants cannot root as well on a rough surface.

The advantages of Kudzu over other hay crops are almost legion and one cannot realize them until he has fully tried it out. Some get the idea that it will become a pest, once they get it on their farms. I have had it for ten years and have not found it so in any particular. If it gets into the fence rows let it go and you will soon have some most valuable feed in the place of the worthless weeds and briars. When your crops are off, turn the stock in and they will clear your fence corners out. If you ever do wish to get rid of it (and I would not advise it, as it is the most valuable crop one can raise), put enough stock on it to keep it grazed close for about two months in the spring and the work is done. Or it may be thoroughly broken, preferably with a disc plow, after cutting, during the hottest, driest season, or after

killing frosts in the fall, and rarely ever a plant will survive.

At the nominal price of hay, which is about \$20.00 per ton in the South, and at the low estimate of five tons per acre, think what a few acres of Kudzu would mean. I have yet to see any other crop that will yield such a revenue with so little labor and expense, and at the same time build up the soil.

It has taken the velvet bean fifteen or more years to reach its present state of popularity and usefulness, and there are now thousands of head of cattle and hogs fattened on it annually, and I venture the assertion that in fifteen years there will be ten times as many fattened on Kudzu and Japanese Cane.

The South is waking up to the fact that it can grow feed stuff cheaper than the North can, and the North is beginning to realize the same thing, and it will be only a few short years till this section will be teeming with Northern stock raisers and farmers to supply the Northern markets. Now is the time for the Southern farmers to get busy and be on the ground floor.

To give an idea of what is already being done, I might add that over fifty thousand plants were set out the past season in West Florida alone, that I know of, and probably twice as many in other States.

Parties who only had a small area last year have increased it many times over the past winter — one man putting out forty acres, another ten, and so on, while our own acreage is only limited by amount of cleared land on our farms. Another year we expect to at least double our acreage, and those who are in a position to know what Kudzu is actually doing have only the highest praise for it. Same may be said of the Japanese Cane, for the two should go together.

To get an idea of one successful grower's estimate of Kudzu, I wrote him to know the lowest figures that would buy his acreage, either entire or on a five or ten-year lease, and he refused to set any price.