

Duplicate

CIRCULAR 83

(Revision of Cir. 57)

DECEMBER 1939

Kudzu

Its Value and Use in Alabama

By
D. G. STURKIE
J. C. GRIMES



AGRICULTURAL EXPERIMENT STATION
OF THE
ALABAMA POLYTECHNIC INSTITUTE

M. J. FUNCHESS, *Director*
AUBURN

Table of Contents

	Page
KUDZU AS A HAY CROP	3
When to Begin Mowing	5
Frequency of Mowing	5
Cutting	6
Curing	6
KUDZU AS A GRAZING CROP	7
Beef Cattle	7
Dairy Cattle	10
Hogs	11
Chickens	12
Grazing Kudzu in Winter	12
KUDZU FOR SOIL IMPROVEMENT	12
PROPAGATION	14
Crowns	14
Seedlings	14
Vine Cuttings	16
Setting	16
Spacing	16
Fertilizers	17
Cultivation	17
PLANTING ON ERODED AREAS AND IN GULLIES	17
PLANTING ON FILLS AND ROAD BANKS	17
PLANTING ON TERRACE OUTLETS AND VEGETATIVE WATERWAYS	17
PLANTING ON TERRACES	18
CARE OF OLD ESTABLISHED KUDZU AREAS	18
KUDZU AS A PEST	20
SUMMARY	20

Kudzu

Its Value and Use in Alabama¹

By

D. G. STURKIE, Associate Agronomist
J. C. GRIMES, Head, Animal Husbandry Department

KUDZU, a perennial legume that produces large yields of hay, is adapted to temporary grazing by livestock, is an excellent soiling crop and is sufficiently drouth-resistant to produce good yields when other crops fail. Its feeding value compares favorably with other legumes. It is valuable for soil building, stopping erosion, and planting on road banks, fills, and along gullies. Locally in Alabama kudzu is known as "porch vine", "telephone vine", or "wonder vine".

Kudzu is adapted to all soils of the State except the lime soils of the Black Belt and poorly drained areas. It probably makes its maximum growth in the Piedmont and Gulf Coast areas of Alabama. It requires longer to become established on heavy clay soils than on sandy soils. This plant could be used on nearly every farm since there is probably no other crop known that is as well suited to areas of the farm that are not profitable in cultivated crops. However, kudzu like other crops, makes better growth on good than on poor soils.

KUDZU AS A HAY CROP

Kudzu makes an excellent hay. The hay is as high in food value as that of other legumes, is leafy and free from coarse stems, has a good green color when cured properly, and is very palatable. It is the only hay plant now known to be suited to Alabama conditions that may be cut any time of the year from May to October and produce a good quality hay. Since it is a perennial and does not have to be planted each year, it can be grown at a very low cost after it is once established.

Kudzu has been harvested for hay in a number of experiments in Alabama. The average yield of kudzu at Auburn, grown on various areas, during the past 20 years has been more than 2 tons of hay per acre. The results of yields of hay obtained in the different experiments in Alabama are shown in Table 1.

¹The experiments were conducted by E. L. Mayton and R. Y. Bailey at Auburn, Alabama, by J. P. Wilson on the Wiregrass Experiment Station at Headland, Alabama, by Otto Brown on the Gulf Coast Experiment Station at Fairhope, Alabama, and by J. T. Williamson, F. E. Bertram, J. W. Richardson, and R. W. Taylor on the Experiment Fields at Prattville, Aliceville, Monroeville, Brewton, Alexandria, and Lafayette, Alabama.

The experiments with grazing kudzu with poultry were conducted at Auburn, Alabama, by G. J. Cottier of the Poultry Department.



FIGURE 1.—Showing value of kudzu in controlling erosion. Above, gully on area set to kudzu on Alexandria field. Photographed in spring of 1930. Below, same area photographed in spring of 1933. Note the kudzu has completely covered the area and stopped the gully. This area has averaged over $2\frac{1}{2}$ tons of hay per acre per year since 1935.

The area on the Alexandria Field, located on Decatur clay soil, was so badly eroded and gullied that it had been abandoned for cultivation when the Station was established. The areas devoted to kudzu at Aliceville, LaFayette, and Prattville were so poor that they were unsuited to corn or cotton. Since the kudzu on these areas was not fertilized or cultivated, it required 5 years to become established. The results, recorded in Table 1, show that the yield was large at all of these places and that kudzu made a good yield under conditions so adverse that other crops were unprofitable.

TABLE 1.—Yields of Kudzu Hay Obtained at Different Places in Alabama.

Place of test	Date planted	Years cut	Average yield pounds hay per acre
Alexandria	1930	1935 to 1938, inc.	5032
Aliceville	1930	1935 to 1938, inc.	5735
Auburn	1931	1935 to 1938, inc.	5133
Brewton	1936	1937 to 1938, inc.	3668
LaFayette	1930	1935 to 1938, inc.	6173
Monroeville	1930	1932 to 1938, inc.	6809
Prattville	1930	1935 to 1938, inc.	6533

When to Begin Mowing.—Kudzu should be well established, completely covering the ground and about knee high, before mowing is begun. Usually at least 2 full seasons are required on good soil and 3 to 5 seasons on poor soils, unless the kudzu is fertilized, before it is ready to cut.

Frequency of Mowing.—An experiment was started on Norfolk sandy loam soil at Auburn in 1926 to study the effect of time and frequency of mowing on the growth of kudzu. Plants of uniform size were planted in the spring of 1926 and mowing was started in 1928 after the plants had become well established. The number and dates of cuttings, and the yields of hay produced in this experiment are presented in Table 2. These data show that yields declined on all plots, except Plot 4, the second year and on all plots the third year; the loss was greater the third year. In addition to the reduction in yield observations made in the field during the growing season showed that there was a corresponding thinning of the stand on these plots. These preliminary results indicate that October 15 is a more desirable date than August 15 for the last cutting in the latitude of Auburn and that kudzu must not be cut too frequently.

An area was set in kudzu on Orangeburg sandy loam soil on the Monroeville Field in 1930. This area is being used to study the frequency of cutting for hay and the results, Table 3, show that mowing too frequently resulted in low yields. The per-

centage of weeds increased to such an extent that the kudzu has been nearly destroyed on some plots. These results also show that cutting in August was more injurious than cutting in October. Figures 2 and 3 show the kudzu on 4 of these plots in 1939.

TABLE 2.—Effect of Time and Frequency of Cutting on Yields of Kudzu Hay at Auburn.

Plot No.	Number of cuttings	Dates of cutting	Pounds of hay per acre			
			1928	1929	1930	3-Year average
1	2	June 1, August 15	5,749	4,333	1,815	3,966
2	2	June 1, October 15	5,374	4,077	2,595	4,015
3	3	May 1, July 1, August 15	4,256	2,834	1,515	2,868
4	3	May 1, July 1, October 15	3,570	4,300	2,366	3,412
5	4	May 1, June 1, July 1, August 15	3,406	2,944	851	2,400
6	5	May 1, June 1, July 1, August 15, October 15	3,820	2,829	1,205	2,618

Kudzu may be cut once a year any time in the summer that it suits the convenience of the farmer. If 2 cuttings are made, the first cutting should be in June and the last cutting just before frost. Kudzu should not be cut more than twice a year. Probably on the average farm 1 cutting per year made whenever it was convenient would be preferable.

Cutting.—The difficulty of mowing is one of the objections to kudzu as a hay crop. This is especially true of plantings which are being cut the first time. The long vines are caught by the divider board and dragged along, making it necessary to stop frequently to clear the blade. After the first cutting, kudzu can be cut easier than most hay crops now in common use when equal tonnages are produced, provided a good mower is used. A device that greatly assists in mowing kudzu is described in Alabama Experiment Station Leaflet No. 16.

Curing.—In good hay curing weather, kudzu will cure in 2 days. The hay should be cut when the ground and the kudzu are dry, left in the swath for a few hours, and then put into windrows. The next morning after the dew is off, the windrows should be turned. That afternoon the hay should be baled or put into the barn. When the growth is very rank the kudzu may be forked instead of raked.

TABLE 3.—Effect of Time and Frequency of Cutting on Yields of Kudzu Hay at Monroeville.

Plot No.	Number of cuttings	Dates of cutting	7-Year average yield per acre 1933-1939	1938		1939	
				Yield per acre	Per cent weeds	Yield per acre	Per cent weeds
1	1	June 1	Lbs. 4755	Lbs. 5055	0	Lbs. 3420	0
2	2	June 1, Aug. 1	6615	5865	33	5970	20
3	3	June 1, Aug. 1, Nov. 1	6560	5700	55	0 ¹	—
4	3	June 1, Aug. 1, Oct. 1	5654	4335	73	0 ¹	—
5	2	June 1, Nov. 1	6416	6780	5	5625	3

¹The stand was so poor that the plot was not cut in 1939. The kudzu was left to re-establish a stand.

KUDZU AS A GRAZING CROP

Beef Cattle.—Four acres of kudzu on the Station Farm at Auburn were divided into 5 plots and grazed at various rates with beef cows and heifers in the summers of 1934 and 1935. The results, Table 4, indicate that 1 acre of kudzu furnished sufficient grazing for 1 cow.

Since 1935, the 4 acres of kudzu have been grazed as 1 field. The practice has been to use this kudzu pasture as a supplement to the regular permanent pasture. Grazing has been plentiful in the permanent pasture in the spring and fall but scant in the middle of the summer. Dry cows and 2-year-old heifers were usually turned on the kudzu pasture some time in June and were removed in August or September. The average grazing period was 68 days each season and the average amount of beef produced per acre was 128 pounds per season. The pasture was stocked at the rate of 1.25 animal units per acre and at this rate the kudzu was able to survive and make a good growth. In fact, the carrying capacity of the pasture increased with age.

TABLE 4.—Results of Grazing Kudzu with Beef Cows. 2-Year Average, 1934 and 1935 at Auburn.

Plot No.	Method of Grazing	Acres per cow	Cow days grazing	Gain
				Lbs.
1	Alternate ¹	1	52	70
2	Continuous	½	29	25
3	Continuous	1	69	95
4	Continuous	1½	87	137

¹This plot was divided into two ½-acre plots.



FIGURE 2.—Showing the effect on the stand of kudzu from cutting too frequently from 1934 to 1938, inclusive. Above, cut once each year. Below, cut 3 times each year. Note the growth of broom sedge on the plot below. The stand on this plot was so thin that it was not cut in 1939.

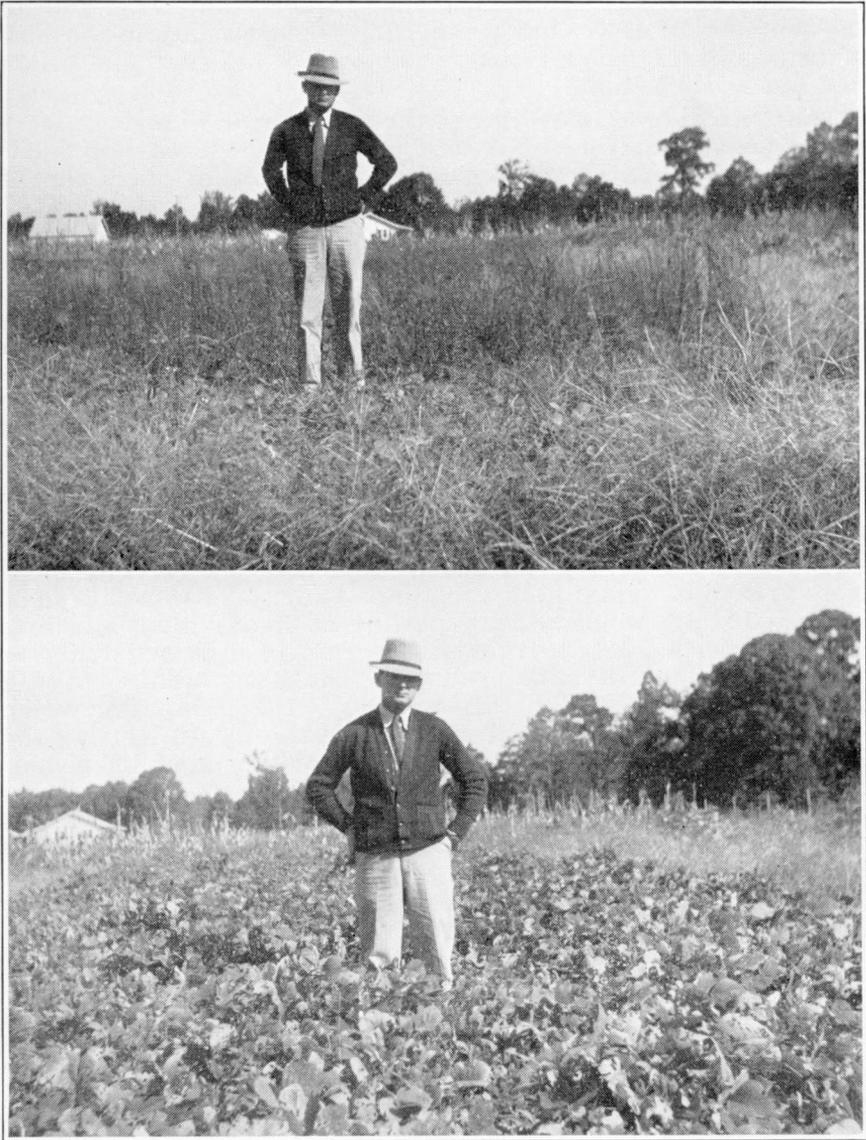


FIGURE 3.—Showing the effect of cutting kudzu the wrong time of the year. Above, cut in June and August. Below, cut in June and November. Notice the growth of broom sedge above.

On the Gulf Coast Substation at Fairhope, Alabama, kudzu was used as a supplementary pasture for beef cattle during the summers of 1937, 1938, and 1939 when grazing in the permanent pasture became scarce. The cows relished the kudzu and did well on it.

Cattle will tend to overgraze the kudzu near watering places and shades; therefore, it is best to divide the area into small plots and practice alternate grazing. One acre of kudzu should be allotted for each cow to be grazed.

Dairy Cattle.—In 1917 cows were grazed on kudzu to determine the palatability and the effect on the flavor of milk. No records were taken on the effect that kudzu had on the production of milk but it was noted that the cows ate the plants readily. During the severe drouth of July 1930, the milk flow of dairy cows was maintained by changing them from grass pasture to kudzu a part of each day. Unfortunately, the area was too small for the number of cows used and no record was obtained which would indicate the grazing capacity of kudzu.

During the summer of 1934, a study was inaugurated by the Dairy Department at Auburn to observe the relative merits of kudzu versus native grass pasture for dairy cows. Two cows were grazed on a luxuriant growth of kudzu and were alternated with 2 cows on native grass pasture at 28-day intervals. Both lots of cows were fed grain at the rate of 1 pound daily to each 2.5 pounds of milk produced. The observations covered three 28-day periods, June 11 to September 2, 1934, after which the test was discontinued because of severe drouth. During the 84 days the 2 cows on kudzu pasture produced a total of 426 pounds more milk and 22 pounds more butterfat than the 2 cows on native grass pasture. The 2 cows on kudzu gained in body weight a total of 108 pounds and the 2 cows on grass pasture lost a total of 52 pounds.

Two lots of 3 cows each were alternated in 28-day periods from kudzu to grass pasturage during the summer of 1938. The only difference between this test and that of the summer of 1934 was that the cows that grazed on kudzu in 1938 received no supplementary feed. The cows on grass were given a grain supplement.

During the 140 days the 3 cows on kudzu produced a total of 8,393 pounds of milk and 383 pounds of butterfat while the 3 cows on grass pasture and a grain supplement produced a total of 8,740 pounds of milk and 407 pounds of butterfat. The amount of grain fed the cows while on grass pasture was 4,586 pounds.

No difference in the color or flavor of milk was noted in any of the tests. The results of the tests indicate that cows will produce well on kudzu pasture without supplementary feed if the pasture is not overstocked, that is, not more than one cow per acre.

Hogs.—One acre of kudzu was grazed by hogs during the summers of 1937, 1938, and 1939.

In the summer of 1937 one sow weighing 215 pounds with 6 suckling pigs averaging 14.3 pounds and 4 shotes averaging 51 pounds were placed on kudzu June 9. These animals received no supplementary feed during the first week but during the next 2 weeks received an average of 10 pounds of corn and tankage daily. Grain feeding was then discontinued. The sow and pigs were on the pasture 30 days (June 9 to July 9). During this time the sow lost 66 pounds while the suckling pigs gained 71 pounds. The 4 shotes which were on the kudzu pasture 60 days (June 9 to August 9) gained a total of 2 pounds.

In the summer of 1938 five pigs averaging 25 pounds each and 3 shotes averaging 80 pounds each were placed on 1 acre of kudzu pasture May 11. They remained on this pasture with no grain supplement for 10 weeks. The pigs lost a total of 2 pounds while the 3 shotes gained a total of 17 pounds.

Three lots of hogs were grazed on kudzu from May 31 to September 8, 1939. The results of this test, Table 5, show that 5 hogs, Lot I, on 1 acre of kudzu without a grain supplement gained an average of 11 pounds each. Seven hogs, Lot II, on 1½ acres of kudzu, plus a 1% ration (7 pounds) of corn and tankage, gained an average of 34 pounds each and 5 hogs, Lot III, on 1 acre of kudzu, plus a 2% ration (10½ pounds) of corn and tankage, gained an average of 39 pounds.

TABLE 5.—Results of Grazing Hogs on Kudzu, with Grain Supplement and without Grain Supplement, May 31 to September 28, 1939.

Lot	Corn and tankage fed	Average in pounds		
		Initial weight	Final weight	Gain
1	None	88	99	11
2	1%	101	135	34
3	2%	104	143	39

The above results together with observations made on grazing kudzu with hogs on the Wiregrass Substation at Headland, Alabama, show that kudzu is only a little better than a carrying pasture for dry sows and shotes above 75 pounds in weight. Such animals will make a slight gain on kudzu alone. **Suckling sows grazing kudzu should be fed from 2 to 2½ pounds of grain supplement per head daily for each 100 pounds live weight. Pigs weighing from 25 to 75 pounds should receive 1 pound of grain supplement daily per 100 pounds live weight. One acre of good kudzu will carry from 4 to 6 head of mature hogs. Hogs like the fleshy roots of the kudzu plant and are bad about rooting it up. Rings should be placed in the noses of hogs before they are turned on kudzu pasture. Even this may not prove completely effective if the kudzu is growing on sandy soil.**

Chickens.—Kudzu was used as a green grazing crop for hens on the poultry farm at Auburn during a 5-year period. The hens were divided into 3 lots as shown in Table 6 and supplied a base ration of mash, grain, and oyster shell. Kudzu was grazed from about the middle of May until the first of October each year. It may be seen from Table 6 that hens which received kudzu, either hand-fed or as a grazing crop, produced more eggs per bird and were heavier in body weight than the hens which received no green feed. Kudzu was one of the earliest summer green feeds, produced a large amount of green feed per acre, and continued to do so during the hot dry weather. **It will usually furnish grazing from about May 1 until frost. Kudzu will not stand continuous grazing and for best results the chickens should be rotated every 30 to 45 days. One half acre of well-established kudzu divided into 2 lots is sufficient for 100 hens.**

TABLE 6.—Summary—Five Years Results of Using Kudzu as a Summer Green Feed for Laying Hens.

Lot No.	Crop	Average number eggs per bird per month	Per cent production	Average weight of eggs		Average body weight	
				Grams	Oz. per doz.	Grams	Pounds
1	Kudzu grazed	10.06	32.88	49.47	20.77	1507	3.32
2	Kudzu hand-fed ¹	10.17	32.24	48.89	20.53	1556	3.43
3	Control (No green feed)	6.22	20.36	48.54	20.38	1451	3.20

¹Three years results.

Grazing Kudzu in Winter.—It is known that cattle eat the dead leaves and many of the vines during the winter but how valuable dead kudzu might be for grazing has not been determined. It is probable that this plant might be valuable for wintering cattle.

KUDZU FOR SOIL IMPROVEMENT

In an experiment at Auburn, kudzu was planted in the early spring of 1916 and turned under in the spring of 1919. The kudzu made little growth in 1916, covered the ground in 1917, and made a dense growth in 1918. From 1919 through 1929, 2 crops of sorghum hay, 4 crops of corn, and 7 crops of oats were grown on the area devoted to this experiment. The average yields of sorghum hay, corn, and oats are presented in Table 7.

TABLE 7.—Influence of Kudzu on the Yields of Succeeding Crops.

Plot	Average yields of following crops		
	2 crops sorghum hay Pounds per acre	4 crops corn Bushels per acre	7 crops oats Bushels per acre
1 No kudzu	3,264	14.7	16.6
2 Kudzu	5,800	34.0	24.5



FIGURE 4.—Showing growth of corn after kudzu on Cecil clay soil near Dadeville, Alabama. Kudzu was plowed up in spring of 1939 and planted to corn. Note unplowed kudzu in foreground. Photographed August 1939.

The results show that in 1919 and 1920 sorghum following kudzu produced 2,536 pounds of hay per acre more than that not following kudzu. The average yield of 4 crops of corn following kudzu was more than double the yield on the plot that had not grown kudzu. The average yield of 7 crops of oats on the kudzu plot was 7.9 bushels per acre more than that on the plot which had grown no kudzu. In 1929, 10 years after the kudzu was turned under, the kudzu plot produced 9.2 bushels of oats per acre more than the plot on which kudzu had never grown.

In the spring of 1930, kudzu was planted at the Prattville and Aliceville Fields for studying its effect on the fertility of the soil. The land used was very poor and produced only 7 to 10 bushels of corn per acre without fertilizer. The kudzu was plowed up in the spring of 1935 and the land has been planted to corn each year since that date. The 5-year average yield at Prattville was 34 bushels and at Aliceville 30 bushels. The results show that the kudzu had markedly improved the fertility of the soil as reflected in the yields of corn.

Since kudzu is valuable for soil improvement, it would make an excellent crop to use in a rotation if some easy way of establishing it every few years could be worked out. On hilly areas it might be possible to have the terraces set to kudzu and when it is desirable to establish it in the area between terraces, corn could be planted and laid by early; the vines would run across the corn rows and take root. The kudzu could be allowed to grow a few years and then the area could be put back into cul-

tivation. The terraces would always furnish plants for re-establishing the kudzu. Experiments are being conducted at Auburn to test the possibility of utilizing kudzu in a rotation and having it re-establish itself.

PROPAGATION

Crowns.—Kudzu is propagated by setting 2-year-old or older crowns which have a bud or growing point and well-developed fleshy roots, 8 to 10 inches long. Crowns which are formed by the vines rooting at the nodes require 2 or more years to become vigorous. Only good vigorous crowns should be used for propagation. The results obtained, in an experiment at Auburn, from planting crowns of various sizes, Table 8, show that large crowns are more likely to live and produce more vigorous plants than small crowns. Figure 5 shows crowns of different ages. Crowns should be obtained locally if possible so they may be set within a few hours after they are dug. If the crowns are to be shipped or stored, they should be kept moist until set; otherwise they may dry out and result in poor stands. As soon as crowns are received, they should be either set or heeled in. Crowns may be dug with a mattock, if only a small number are needed, or they may be plowed up with a turnplow run sufficiently deep to cut the roots at least 6 inches below the buds. When an area is plowed for crowns enough crowns will be left in the soil to re-establish the kudzu.

TABLE 8.—Percentage of Plants Living and the Rate of Development of Plants from Transplanted Crowns of Various Sizes at Auburn, Alabama.

1926			1928		
Average weight of crowns Grams	Plants living %	Plants making excellent growth %	Average weight of crowns Grams	Plants living %	Average length of vine growth Feet
14.7	42.5	16.2	82	97	17.3
17.2	46.3	28.7	156	99	21.7
28.3	66.2	41.2	268	98	30.4

Seedlings.—Kudzu may be propagated by plants grown from seed planted in a nursery from April to July. If the seed are planted early on fertile soil, some of the plants will grow faster than the others and thus shade them. This results in some plants being too large and some too small for propagation. Early planting on soil of average fertility is preferable. The Soil Conservation Service has found that on good soil plantings made from about the last of May to the first of July will result in the production of the largest number of desirable plants per pound of seed planted.

In experiments without irrigation made in 1939 at Auburn

much better stands were obtained with plantings made in May than with those made in June. This was due to the weather which prevailed for the first 15 days after planting. Plantings should be made when there is plenty of moisture in the soil. If the weather is hot and dry when the seed are germinating and while the seedlings are young, very poor stands will be obtained unless the seedlings are shaded.

A level area of loamy soil that will not bake is preferable for the nursery. The soil should be thoroughly prepared and rows laid off 2 feet apart. Apply 400 to 600 pounds of a complete fertilizer per acre, such as a 6-8-4, 4 or 5 tons of stable manure, or 400 to 600 pounds of basic slag. The fertilizer or manure should be mixed with the soil and bedded on. The beds should be allowed to firm and then "knocked down" until only a low bed is left.

The seed should be scarified before planting to insure good germination. The seed should be drilled at the rate of 25 to 30 seed per linear foot of row and covered about $\frac{1}{4}$ inch in depth. It will require about 15 pounds of seed to plant 1 acre. Under good conditions 1 pound of seed will produce 3,000 to 4,000 plants.

The soil should not be allowed to form a crust over the seed. The crusting of the soil may be prevented by scarifying the surface lightly with a rake or by mulching lightly with straw, sawdust, or sand. The plants should be carefully cultivated and all weeds and grass kept out. The vines should be cut off and the seedlings plowed up or dug when the time comes to transplant. The plants should be handled in the same manner as crowns.

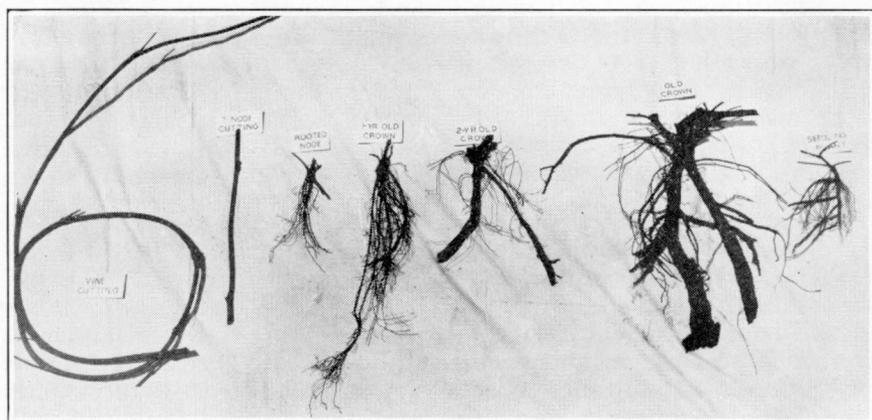


FIGURE 5.—Showing different kinds of kudzu plants. Only the three on the right are recommended.

Vine Cuttings.—An experiment was conducted at Auburn to study the time and method of setting vine cuttings and to compare crowns and vine cuttings of kudzu. The soil was well prepared, furrows opened, and vines or crowns set in the manner shown in Table 9. The percentage of living plants was determined the following summer. The results show that: (1) vine cuttings 5 to 6 feet long were much better than 2-node cuttings, (2) the terminal bud should be left uncovered, (3) setting should be done while the plants are dormant, and (4) a much larger percentage of crowns lived than vine cuttings.

TABLE 9.—The Effect of Date and Method of Setting Vines and Date of Setting Crowns on the Survival of Plants at Auburn

Type of plant set	Method of setting	Percentage of survival when set			
		1938	1939		
		April 10	Dec. 14	Feb. 2	April 11
Crowns	Level with surface	—	51	77	44
6-foot vines	Terminal bud out	10	42	48	6
6-foot vines	Completely covered	0	3	21	2
2-Node cuttings	Terminal bud out	0	10	16	0

The vines should be cut in 5- to 6-foot lengths, dropped in furrows and covered 2 to 3 inches in depth with the top-end bud left uncovered. Care should be taken to see that the top-end bud and not the base-end bud is left exposed. The base and top end of the cutting can be distinguished by examining the leaf-scar. The bud is always formed above the leaf, therefore, the end left exposed should have the leaf-scar below the bud and not above it.

Setting.—Kudzu should be set while dormant and may be set any time from the first killing frost until growth begins in the spring, see Table 9. The land should be well prepared, furrows opened at the desired width, and the crowns, plants, or vine cuttings set 5 feet apart in the furrows. Holes may be dug with a mattock or posthole digger if it is not desirable to plow furrows. The soil should be carefully pressed around each crown, plant, or vine cutting, leaving the bud just above the surface of the soil.

Spacing.—The spacing will depend on the availability of crowns or plants and on the rapidity with which it is desired to establish the kudzu. The closer kudzu is spaced the quicker it will cover an area. By planting close, fertilizing and cultivating, it is possible to get kudzu established in 1 year. If crowns or plants are available, it is advisable to set 5 to 6 feet apart in 5- to 6-foot rows. This will establish the area in kudzu much quicker than setting 5 feet apart in 10-foot rows. If the rows are 10 to 12 feet apart, some crop such as corn or soybeans may be planted in the middles the first year.

Fertilizers.—Kudzu usually responds to applications of phosphate and manure. Phosphate or manure should be well mixed with the soil. It may be applied in the soil around each plant if desired. Excellent results have been obtained by putting a shovel of manure or $\frac{1}{2}$ to 1 pounds of phosphate around each plant.

Cultivation.—Cultivation will result in establishing a stand much quicker than if the weeds are allowed to grow. Many failures with kudzu have been due to lack of cultivation. Each cultivation of a row should be made in the same direction as the previous cultivation to prevent dragging the vines that are taking root. Cultivate kudzu until it completely laps in the middles.

PLANTING ON ERODED AREAS AND IN GULLIES

Frequently it is desirable to plant land to kudzu that is so badly eroded that it is not possible to plow the area for planting. In such a case, holes 18 to 24 inches in diameter and 12 to 15 inches deep should be dug at convenient intervals and locations in the areas between the gullies. The soil removed from the holes should be thoroughly pulverized and mixed with a shovel of manure and 1 pound of superphosphate. The hole should be filled with this mixture, the soil packed, and the plants set. In the gullies it is desirable to build brush dams and set the kudzu in the silt that collects above the dams.

Kudzu is often planted to stop and prevent the further extension of gullies into non-gullied areas. In this case planting should be done as described above both in the gully and along the edges and the upper end. The vines will grow over the edges and down into the gully and gradually stop it.

PLANTING ON FILLS AND ROAD BANKS

The kudzu should be set on the top and bottom of the bank or fill. If plants are available, they should be set along the side of the fill or bank at intervals as close as can be conveniently and economically done, preferably at about 5- or 6-foot intervals. The holes should be prepared and the plants set in the same manner as described for planting on eroded areas and gullies.

PLANTING ON TERRACE OUTLETS AND VEGETATIVE WATERWAYS

Kudzu makes a desirable crop to use in a waterway that is constructed to carry water from terraces. Kudzu will prevent erosion, will grow over eroded spots and thus heal them. The water may flow over it without injuring it. The kudzu may be cut for hay or grazed. The waterway should be con-

structed before the terraces are built if possible. The soil should be well prepared and fertilized and the plants set at 5- to 6-foot intervals. If the terraces are constructed before the waterway is covered with kudzu, it will be necessary to set the kudzu on the edges of the waterway and behind brush dams or Bermuda grass strips placed at frequent intervals across the waterway. The kudzu will keep the Bermuda grass from spreading into the fields and will eventually choke it out in the waterway. If a waterway set to kudzu should silt out and fill, it may be plowed out in the summer and the kudzu will soon grow back.

PLANTING ON TERRACES

In some cases it is desirable to construct a vegetative terrace. If kudzu is used for this purpose, it will protect the terrace from erosion, keep it free from briars and bushes, and will not spread to the cultivated areas as long as the field is in cultivation. The kudzu on the terrace may also be cut for hay. The plants should be set on the terrace line in 5- to 6-foot intervals and should receive an application of manure and phosphate.

CARE OF OLD ESTABLISHED KUDZU AREAS

Experiments were started in 1936 on the applications of fertilizers to kudzu that was well established. These experiments were started at Auburn and at Prattville. The results, Table 10, show that the principal response was to applications of either phosphates or manure.

TABLE 10.—The Effect of Different Fertilizers on the Yield of Kudzu Hay.

Fertilizer ¹	Average yield of hay per acre	
	1936-1938	1936-1939
	Auburn	Prattville
No fertilizer	Lbs. 4249	Lbs. 6020
600 Pounds basic slag, 150 pounds muriate of potash	4790	6930
1200 Pounds basic slag, 150 pounds muriate of potash	4888	6420
2400 Pounds basic slag, 150 pounds muriate of potash	5870	6634
600 Pounds basic slag	5718	6630
600 Pounds superphosphate, 150 pounds muriate of potash, 1 ton dolomite in 1936	5723	7001
600 Pounds superphosphate, 150 pounds muriate of potash	5500	6589
1200 Pounds basic slag, 50 pounds muriate of potash ²	5537	6259
6 Tons manure	5082	6315

¹Fertilizer applied every 3 years except as shown. Fertilizer applied in the spring and disked in.

²400 Pounds basic slag and 50 pounds muriate of potash applied annually after 1936.

Experiments were conducted at Prattville to determine the effect of disking at various times on the yield and on the weeds. The disking had very little effect on the yield but disking in March greatly reduced the weeds in the kudzu. Demonstrations have shown that plowing kudzu with a turnplow in the late winter did not injure the kudzu.

On poor soils and soils of average fertility, kudzu should receive a good application of manure or an application of 600 pounds of basic slag or 300 pounds of superphosphate per acre every 3 years. The fertilizer should be applied before growth begins in the spring and the area disked or plowed.



FIGURE 6.—Showing the effect of phosphate on the growth of kudzu on Decatur clay soil. Above, unfertilized. Below, 800 pounds of basic slag.

KUDZU AS A PEST

Some farmers have opinions that kudzu may become a pest, may not be eradicated, and may spread into fields where it is not wanted. Such ideas are unfounded. It may be easily eradicated by grazing or by plowing. Kudzu has been confined to the edges of fields at Auburn for a period of 35 years and has never become a pest or spread to areas where it was not wanted. It may be confined indefinitely to terrace ridges in a field simply by cultivating the field in row crops.

SUMMARY

Kudzu is a perennial, drouth-resistant legume which is valuable for hay, temporary grazing, cutting and feeding green, soil building, and for preventing erosion.

Kudzu has averaged over 2 tons of hay per acre in various places in Alabama. Cutting may begin when the kudzu is well established. It should not be cut more than once or twice a year.

It was valuable for supplementing permanent pasture for dairy and beef cows. No harmful effect on the flavor or odor of milk or butter was noted from grazing kudzu. Kudzu will be injured by grazing too close or mowing too often. At least 1 acre of kudzu should be allowed for each animal unit to be grazed.

Kudzu may be grazed by hogs and may partially replace the protein supplements but it will not fatten hogs if no other feed is supplied. Care should be taken to prevent the hogs from rooting it up.

Kudzu is excellent for poultry, either hand-fed or as a grazing crop, in the summer from May until frost. One acre should be allowed for each 200 hens.

Kudzu has been very valuable for improving the fertility of a soil.

Kudzu can be propagated by seedling plants, crowns, or vine cuttings. It should be planted on well-prepared land in winter or early spring before growth begins. It should be fertilized with phosphate and cultivated the first year after setting for best results. It will require from 1 to 5 years to establish kudzu, depending on the number of crowns set, the fertility of the soil, and on the care and cultivation given.

Seedlings should be produced in a nursery. The seed should be planted in well-prepared and very moist soil and covered very lightly. The young plants should be shaded if the weather is hot and dry.

Old established kudzu should be fertilized with phosphate or manure and the soil plowed or disked in late winter.

Kudzu is not a pest; it is easily destroyed by close grazing or by plowing.