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GRASSES FOR PASTURE AND HAY IN TEXAS

Address

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GRASSES FOR PASTURE AND HAY IN TEXAS.

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The art of farming consists in a large measure on most farms and to some extent on all farms in growing forage crops to feed domestic animals. Practically all our domestic animals fed upon grass in a wild state. This statement is particularly true of those all-important animals on the farm, the horse and the cow. Domestication did not destroy the ability of these or other grass-eating farm animals to thrive on grass, either green or dry. For this reason grass should be just as much one of the farmer's forage crops as corn, oats, or the grain sorghums, and should receive relatively the same consideration. Furthermore, there are certain features of grass growing that demand for it special consideration. All the domestic grasses, with the exception of Sudan, grown either for pasture or for hay, are perennial and require seeding but once in a series of years. In the case of pastures the stock do the harvesting; and in the case of both pastures and meadows cultivation is an insignificant item. In the humid portions of the State thousands of tons of grass hay are imported annually that could be easily and inexpensively grown.

Grass is one of the domestic forage crops that should be cultivated, not destroyed. The popular notion that ceaseless, indiscriminate war is to be waged against grass is altogether erroneous. All the noted stock raising countries of the world are grass growing countries. The blue grass region of Kentucky is famed for its fine horses. The plains west of the Mississippi in their original state supported immense herds of wild buffaloes. After the coming of civilized man these same plains supported large herds of tame cattle and made cheap meat possible. Cheap grass means cheap meat. These plains are now cut up for the most part into small farms and cultivation has destroyed the wild native grasses. This fact has led many to predict that the day of cheap meat has forever passed in America. Even the removal of the tariff from the meat of Argentine has not yet affected the price of meat to the consumer. Not only has the day of cheap meat forever passed in America but the present rising scale of prices will eventually soar beyond the reach of the average man unless the domestic grasses in pasture and meadow take the place of the wild grasses destroyed. There are large probable profits for all who can engage in stock raising even on a small scale.

Even where live stock raising as a special line of farming is not contemplated, some stock is necessary for the cultivation and maintainance of any farm. These have to be fed at the least possible cost, if the farming is to be done at a profit. It is difficult to understand how any farmer can ignore the subject of grass growing.

THE DIFFERENCE BETWEEN DOMESTIC AND WILD GRASSES.

The quantity and quality of forage furnished by the tame grasses far excell those of the wild grasses. This is a fact of common observation. Many so-called pasture fields that are now growing only wild grasses of inferior quality and useless weeds, would support two or three times as many head of live stock were they seeded to a suitable tame pasture grass. A good pasture grass will increase instead of diminish with constant but proper grazing and tramping of the stock. There are but three forage plants in general use that possess this quality. These are alfalfa, Kentucky blue grass, and Bermuda grass. A discussion of alfalfa is beyond the province of this publication. Kentucky blue grass will not grow in Texas. A discussion of the most suitable permanent pasture grass for the South in general and for Texas in particular is, therefore, confined to Bermuda grass.

BERMUDA GRASS.

Bermuda Grass (Cynodon dactylon) is a native of India, where it is called "doob" grass. It was introduced into Georgia from the West Indies during the war of 1812 by being used as packing in shipments of earthen ware. In the West Indies it is known as "Scutch." In many parts of the South it is known as "wire grass," in other parts as "devil grass." It is so common throughout the South that a minute description is unnecessary. All easily recognize it. In fact, familiarity in cultivated fields has bred contempt. But as a pasture grass it means for the South just what Kentucky blue grass means for Kentucky and the rest of the corn belt. It is a nutritious grass furnishing an abundance of succulent pasturage throughout the growing season, but dying down with the first frost. The sod grows denser from constant use, because it propogates from root stocks regardless of whether it seeds. For this reason it is very difficult to eradicate even when such is desired. Thriving only in warm weather, it grows rapidly if plenty of moisture is present. During its period of greatest growth it should be grazed closely to keep the grass tender and the field free from weeds. The latter is important. Bermuda cannot endure the shade. Where there is not sufficient stock to keep the weeds down they should be mowed. No bushes or briers should be allowed to grow in a pasture field. If they are too large for the mowing machine, grub them up. Sheep are excellent animals for keeping down weeds in a pasture.

Almost all farmers growing cotton under boll weevil conditions will readily subscribe to the theory that live stock farming would prove more profitable. They also realize the well known fact that live stock farming can never be made profitable without permanent pastures, and also that the pastures must be secured before the stock are purchased. They become enthusiastic and purchase some of the Northern grasses like orchard grass, herds grass or timonthy and some of the Northern clovers. With these they seed their pastures. The first hot dry Southern summer either kills these grasses or so cripples them that it becomes obvious that no

permanent pasture can be had in the South from these grasses. It is easy to conclude that since these are the standard pasture and meadow grasses no permanent pastures can be had in the South. Yet the farmer who reaches that conclusion complains bitterly when he finds Bermuda grass in his cultivated fields. Why? It can not be killed. Yet this same farmer laments that he can have no permanent pasture because pasture grasses are so easily killed. The best of pasture grasses is in the wrong place; he can not kill it; he is furious. Transplant it to the right place and just let it live. Let the Southern farmer disillusion his mind of the erroneous idea that Bermuda grass is only a pest. It is one of the best of pasture grasses—the best one for Southern conditions—and should be so treated.

MAKING THE PASTURE.

Bermuda grass thrives best on a moist rich loam soil but will grow on practically all types of soil that can be cultivated in other crops. It is a fine sand binder and is, therefore, one of the best grasses to prevent erosion of hill sides. Although a drought-resistent grass, its range of growth is limited more by the lack of moisture than by difference in soil type or even by lack of fertiiity. It will make considerable growth on comparatively poor land.

The surest way to secure a Bermuda grass sod is to plant bits of turf on well prepared land in spring or early summer in rows 3 feet apart and 15 inches apart in the row. Cover lightly with a drag harrow. In most instances the grass for planting can be secured from some out-of-the-way place on the same farm or from a neighboring farm. Where it is proving troublesome in cultivated fields is a good place to obtain tufts for transplanting. If the grass for transplanting has to be secured from a distance by purchase or as a gift, it will prove convenient to secure only the roots and cut them into lengths of about 3 inches by running them through a feed cutter. They can be cut into the proper lengths with a hatchet or an ax, but at a slower rate. Strew in shallow rows and cover just sufficiently deep to retain the moisture. Each joint on the bits of root will produce a tuft of grass. The least troublesome and perhaps the least expensive method would be seeding. Heretofore the bulk of the seed offered for sale came from Australia and were of very low germinating power. Seed from this source have always proved unsatisfactory. Bermuda grass, however, seeds perfectly in southern California and Arizona. Seed from either of these sources will prove entirely satisfactory. Sow on thoroughly prepared land at the rate of five pounds of seed to the acre and cover with roller or light brush harrow. The seed are very small and to insure an even distribution in seeding the seed should be mixed with meal or dry soil. Sow from February 15 to March 20. Whether the sod is established by tufts or seed, keep all stock off the field the first season or until the ground is thickly sodded.

MIXTURES.

Many mixtures of other grasses or legumes to improve the Bermuda grass pasture have been suggested and tried out. Only one has proved successful, on account of the aggressiveness of the Bermuda grass. Lespedeza or Japan clover, has proven sufficiently aggressive to maintain itself in a Bermuda grass sod. The aggressiveness of these two plants is likely to result in the first to become established on the ground, maintaining itself to the exclusion of the other. Consequently there results a spotted rather than a mixed pasture. However, even when such is the case, Lespedeza being a legume, the quality of the pasturage is greatly improved. The legume and the grass afford more nearly a balanced ration.

If the Bermuda sod is already established, sow Lespedeza seed on the sod at the rate of 10 pounds to the acre and cover with drag harrow. If the Bermuda sod is being newly started, sow the seed on the fresh planted tufts or roots and cover by harrowing. The Lespedeza seed and the Bermuda grass seed can be sown together. Lespedeza is a legume and when sowed on the land for the first time will require inoculation. This can be done by mixing dirt from a field where Lespedeza has been successfully grown with the seed, pound for pound, before sowing. If

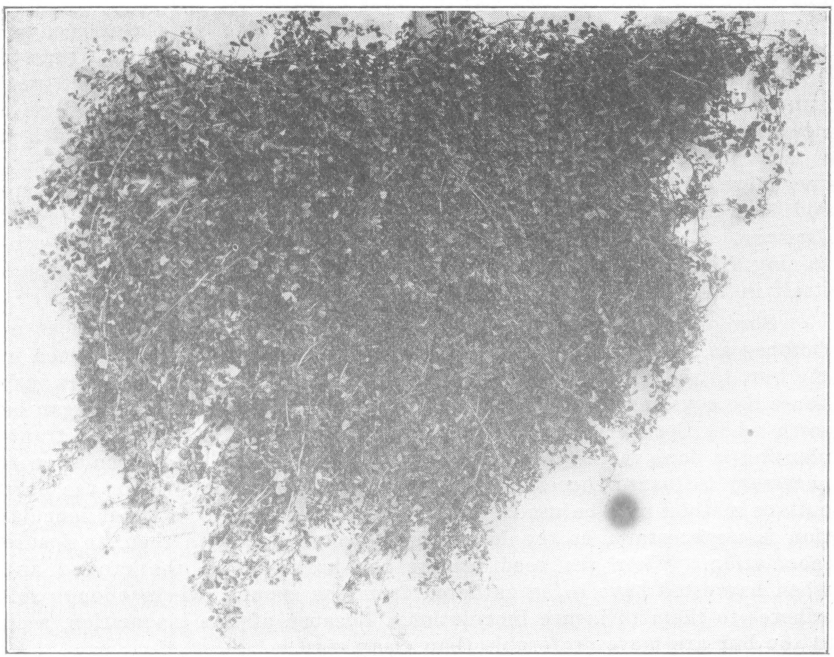

Figure 1: A bunch of Bur Clover, California variety, found growing volunteer in a new made street in the city of Bryan, Texas, in the spring of 1916.

inoculated dirt is not available, inoculation cultures can be obtained free of charge from the Department of Agriculture at Washington, D. C.

BUR CLOVER IN THE MIXTURE.

Whether or not it is considered desirable to have some other pasture plant jointly occupy the land with the Bermuda grass during the summer season, something should be used that will furnish grazing during the winter season while the Bermuda grass is dormant. There is no better plant for this purpose than bur clover, of which two varieties are commonly grown, the California (Medicago hispide denticulata) and the spotted leaf (Medicago arabica). The only economic difference worthy of note is that the spotted leaf variety is slightly more hardy than the California variety. The two can be easily distinguished by the brown spot in the center of the leaf of the spotted variety and by the absence of the leaf spot and the spiral-like form of the seed bur in the California variety. As a pasture plant either variety will give satisfaction. The California variety is the one more commonly seen growing in East Texas.

Bur clover is an annual legume, growing only during the late fall, winter, and early spring. The seed do not even germinate during hot weather. It re-seeds itself with the persistency of the old cockle bur, and when once established on a Bermuda sod the two furnish not only a permanent pasture but also a perennial pasture. The bur clover occupies the land while the Bermuda grass is dormant. The rankness of its growth is illustrated by Figure 1. This is a photograph of three plants that grew entwined from the seed in one bur. They grew on the raw soil of a newly made street in the town of Bryan. The presistency with which it reseeds itself under adverse conditions is illustrated in Figure 2. These specimens were collected May 3rd on a closely grazed Bermuda pasture sod that had received no rain worthy of mention since the preceeding January. The largest specimen had by actual count 103 seed burs containing from 2 to 4 seed each. It grows vigorously and readily reseeds itself in the humid parts of the State on any well drained soil.

Sow on a Bermuda sod that is already established in September or October at the rate of 15 pounds of clean seed, or 40 pounds of seed in the bur, to the acre and cover by harrowing. If the Bermuda sod is very dense the covering should be done by disking. The bur clover seed can be sown when the Bermuda sod is being transplanted, provided the transplanting is done in the fall season. If clean seed are used inoculation is necessary to insure success. Either the soil transfer method or the pure culture method may be used. If seed in the bur is used, further inoculation is unnecessary, as the burs carry enough soil with them to insure inoculation. When the seed mature the burs fall on the ground and when harvested have to be gathered from the ground, where enough soil adheres to them to insure inoculation. Because of this inoculation, seed in the bur are more preferable than clean seed.

The price of seed in the bur is high and a considerable quantity is required to seed an acre. This makes the first seeding expensive. A

good plan for those who do not wish to invest so much in an untried scheme, would be to purchase a small quantity of seed, sow in a select plot, and give the crop special attention. Carefully save the seed and thus a beginning will be made toward growing one's own seed in sufficient quantity to seed any number of acres. Once established it will reseed itself and be perpetuated indefinitely. The trouble lies in getting the first stand. The hulls of the seed are thick and hard and for that reason the germination may be delayed till the next season.

No Bermuda grass pasture is complete without bur clover, yet in the absence of bur clover other plants may be substituted for it to furnish grazing during the winter months. Winter (or hairy) vetch is one of these. Figure 4 shows a bunch of vetch gathered on a pasture lot in the town of Tyler, Texas. It is in full bloom and measures 4 1-2 feet in height. It was gathered in April. This was the fourth crop on the same Bermuda sod but it had been reseeded every season. As can be observed from the cut, for the want of a support crop it had fallen to the ground and had lost all its lower leaves. This loss of leaves is unavoidable in growing vetch on a sod. Yet a large portion of the plant is left for grazing. Sowing vetch on a Bermuda sod will help furnish winter grazing wherever the winter rainfall is sufficient to grow the vetch. Sow 30 or 40 pounds of seed to the acre in the early fall. As a general rule the hard beating rains will sufficiently cover the seed. To be on the safe side, however, it would be advisable to cover by lightly harrowing. If it is not grazed too closely and some of the vetch allowed to mature seed, it will reseed itself. Vetch is a legume and, like other legumes when sown on land for the first time, inoculation will be necessary.

Rescue grass can be sown on a Bermuda sod in the fall and a continuous grass pasture secured. Sow at the rate of about 20 pounds of seed to the acre about the first of October and cover, if the Bermuda sod is dense, by disking. If not grazed too closely in the spring it will produce enough seed for volunteer seeding and will prove practically perennial.

BERMUDA AS A HAY GRASS.

Not only is Bermuda the leading grass of the South for pasture, but in many parts of the South and in the humid parts of Texas it is a most valuable perennial hay grass. It can with great profit be grown for hay along the damp, rich creek bottoms of all East Texas. To illustrate just what can be done with Bermuda grass in a meadow we quote from a letter from Mr. I. B. Christian, of Winona, in Smith county: "I have a meadow of about 15 acres of Bermuda grass, from which for several years I have been cutting all of the hay I have used on my farm for my stock, numbering from 25 to 40 head. The grass can be cut three and often four times each year. It will produce from two to four tons per acre in a season. This meadow is on branch bottom land. I have made inquiry from other parties who have Bermuda grass meadows in this county, and I find that the results obtained by them have been satisfactory, some of

them more satisfactory than my meadow. Mr. T. J. McBride, of Swan, in this county, has a meadow of about 12 acres from which he has cut 200 bales of hay per acre. Mr. Clifton, of Carroll, has about 25 acres from which he has been cutting from 150 to 180 bales per acre. Mr. Henry Gary, of Winona, has a meadow on hill land and also in the bottom. While the hill land has not produced so much it has been quite profitable."

These experiences can be duplicated anywhere in East or Central Texas. The most profitable use to which many creek bottoms can be put would be the growing of Bermuda grass hay. Every farmer should strive to grow enough hay to supply the wants of his own farm.

RESCUE GRASS.

Rescue Grass (Bromus unioloides) grows volunteer in many of the more humid sections of Texas and can be utilized in all those sections for a winter hay or pasture grass. Sow at the rate of 30 pounds of seed per acre on thoroughly prepared land from September 20th, to October 10th. If desired for hay and if weather conditions are favorable, it will be ready to cut the first time by the last of January. It can be cut the second time in March. After the second cutting, there will be sufficient growth to mature seed. This last growth can be turned under when pre-

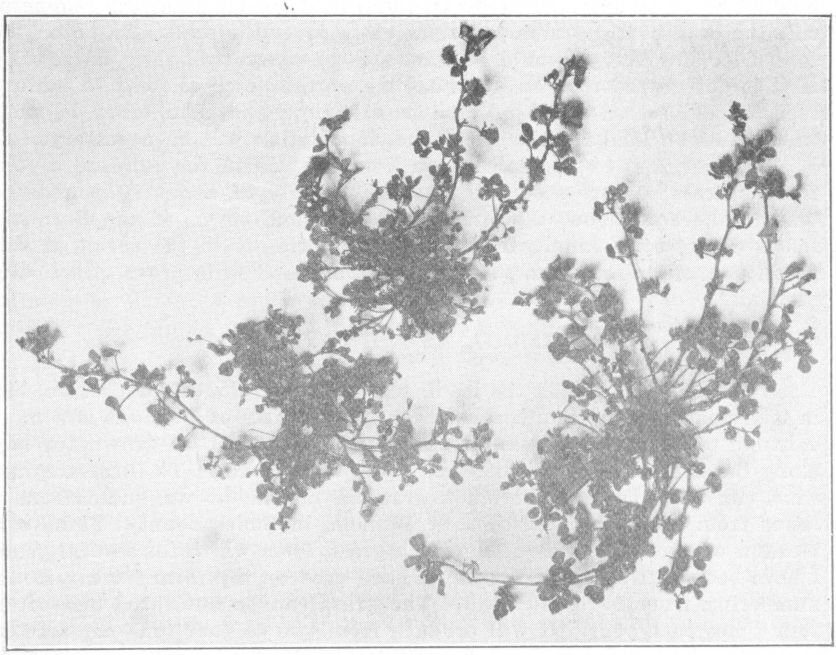

Figure 2. Three small bunches of Bur Clover gathered May 3, 1916, from a closely grazed Bermuda sod pasture after a practically rainless spring. The three together matured more than 150 seed burs.

paring the land for cow peas or sorghum for summer forage. The seed turned under will reseed the land for the next winter season. It is superior as a pasture grass. It produces a large quantity of succulent leaves that are rapidly renewed after being grazed off. It furnishes pasturage during the cooler seasons of the year when other pasture plants are dormant. It can be sown to advantage in a mixture of hairy vetch or bur clover for a winter forage crop. It has been already noted how it can be sown on a Bermuda grass sod.

RHODES GRASS.

Rhodes grass (Chloris gayana) was first grown in South Africa in 1895 by the celebrated South African statesman, Cecil Rhodes. Its introduction into the United States was more recent. It is completely destroyed when the temperature falls below 18 degrees F., hence as a perennial grass it is confined to Florida and a narrow strip of land along the Gulf coast, and is confined in Texas to the south and southeastern portions of the state. Beyond this range of temperature it must be treated as an annual.

The grass is fine-stemmed and very leafy and grows to a height of about 3 feet. Under favorable conditions it can be mowed from three to five times a year and will yield from one to one and a half tons of hay per acre at each cutting. The hay is of an exceptional quality and readily eaten by horses and cattle. It propagates by means of both seed and recumbent branches that grow roots at each joint. Notwithstanding this latter habit of propagation it has shown no tendency to become a pest like Johnson grass.

Experience so far seems to show that early spring is the best time for seeding. The seed bed should be well prepared by thorough plowing and then the subsurface firmed by rolling. If after this part of the preparation the top surface becomes packed by rain or is otherwise crusted, a shallow, thoroughly pulverized seed bed should be made by shallow disking and harrowing. If the surface has not been packed by rain, harrowing will be sufficient. On account of the usually low vitality of the seed heavy seeding is necessary—ten pounds to the acre. Their chaffy character makes hand sowing more practical than the use of a machine seeder. All the seed are produced in Australia and are scarce and high priced. It would perhaps be financially economical and otherwise prudent to begin on a small scale and enlarge the acreage from year to year by using home grown seed and by additional propagation with the rooted joints of the long running branches.

To illustrate what may be expected of Rhodes grass we quote from a letter of Mr. F. E. Mills, of Beeville, Texas, under date of May 26, of the present year: "My experience with Rhodes grass has been very satisfactory. I have a small field that was planted three years ago. It has lived through the winters and through a drought of 18 months duration. We had less than 12 inches of rain in the eighteen months. I have cut per acre from one and a half to two tons per cutting of the finest of hay,

equal if not superior to timothy. I have grazed 20 head of hogs per acre and also 30 head of yearling calves for 30 days. The grass is now green, headed-out and about two feet high—all this practically without rain. For heavy yields it needs moisture and fertility in the soil."

Rhodes grass is a recent addition to our farm grasses and there is yet much to learn about it. But so promising a grass should receive earnest consideration and a fair trial from every farmer living within the range of its growth.

SWEET CLOVER.

Sweet clover (Melilotus alba) is a very ancient plant and was introduced into this country from the Mediterranean region. It is not so valuable a hay or pasture plant as those recommended in this publication, but it does have much value and has a place all its own among the forage crops of the farm.

In this country there are three distinct types or varieties in more or less common use, a small yellow blooming annual variety, a large yellow blooming biennial variety, and a very rank growing white blooming biennial variety. The last is so very superior to the other two that it alone will be considered in this discussion. It is a legume very closely related to alfalfa and in the early stages of its growth very closely resembling that plant. The first season of its growth it attains a height of 18 to 30 inches; the second season a height of 5 to 12 feet. It grows erect, branches profusely, is scant of leaves, and has a long loose racemes of white flowers. It developes an immense tap root. One of its chief characteristics is its bitter taste. This taste renders it objectionable to stock till they acquire a liking for it. Afterwards they eat it with relish.

Sweet clover will succeed under a wide range of soil and climatic conditions. It will grow in the most humid sections of the south. It possesses drought-resistent qualities to a marked degree. Its chief soil requirements are a hard compact seed bed and plenty of lime. It is especially adapted to the black lands of Texas and will grow anywhere in the state except the extremely arid sections. The only hinderance to growing it in the black lands is that it is subject to root rot; yet no one quits growing cotton because the root rot destroys a small per cent of the plants. Again sweet clover is noted for occupying, when once established, ditch banks, abandoned rocky places, and other unused parts of the farm. It would be much more desirable from every standpoint to have these unused parts of the farm seeded to sweet clover than to have them occupied by unsightly, useless, noxious weeds.

Sow in the early spring on a compact seed bed with just enough loose top soil to cover the seed. Sow 20 pounds of hulled seed and 30 pounds of the unhulled seed to the acre. This heavy seeding is necessary, for not more than half of the seed will germinate on account of their hard thick hull. This difficulty can be overcome by soaking the seed in diluted commercial sulphuric acid or scarifying them in a machine specially constructed for the purpose. These methods are applicable only where large

Figure 3. A bunch of Hairy Vetch found growing on a Bermuda sod in a town pasture lot in the town of Tyler, Texas, in the spring of 1916.

quantities of seed are to be sown. Being a legume inoculation is necessary for success when sown on land for the first time. Either the soil-transfer method or the pure culture method can be used. Soil from an old alfalfa field may be used. Sweet clover and alfalfa cross inoculate each other. The least troublesome application of the soil transfer method of inoculating legumes, including sweet clover, is to dampen the seed, spread on a cloth, sift the inoculated dirt, pound for pound, on the damp seed, and sow immediately. This saves the trouble and expense of handling large amounts of soil and it has proven just as effective.

Sweet clover can be utilized for either hay or pasturage. The second year of its growth two crops of hay and one of seed can be obtained. It begins its growth very early in the spring and thereby furnishes usually the first green pasturage of the season. It should be cut for hay before the stems become woody and should be cut four or five inches from the ground. It grows the second crop by sprouting from the base, not the roots, of the old stalk. If there is not enough stock to keep it closely grazed it should be mowed clean. It matures seed only once in two years and unless allowed to mature sufficient seed at the end of the second year to reseed itself the crop will have to be resown. Two annual seedings on the same land in succession will establish a perennial pasture or meadow.

The chief recommendation of sweet clover is for soil improvement. Growing some legume crop and turning it back into the soil while green is one of the quickest and least expensive ways of maintaining or restoring

Figure 4. White sweet clover growing wild on the banks of a small stream in the town of Seymour, Baylor County, Texas. The man in the picture measures 5 ft. 10 in, in height and the clover is much higher than he and very thick on the ground. (Photo by A. K. Short, Agricultural Agent of the Denver Lines.)

soil fertility. This method is called green manuring and when a legume crop is used it supplies nitrogen and humus to the soil. A crop of sweet clover grown on one of the Illinois Experiment farms yielded, when full grown, per acre 10367 pounds of air-dry matter in the tops and 2410 pounds in the roots. The tops contained 197 pounds of nitrogen, the roots 31 pounds. This amounts to a total of 12,777 pounds of air-dry matter to make humus and 228 pounds of nitrogen. This is an unusually large crop furnishing an unusually large amount of the fundamental elements of soil fertility. Yet this crop can be duplicated on any of the lands adapted to its growth in the State of Texas. Its immense tap root has a very beneficial pulverizing effect on hard subsoils. By all means every farmer should give sweet clover an honest trial.

FEEDING VALUE OF GRASSES.

For the information of those interested in that phase of the subject the feed analysis of all grasses here discussed are quoted from Henry's Feeds and Feedings. As hay they are compared with timothy and as pasture grasses with Kentucky blue grass, the leading hay and pasture grasses of the country, neither one of which can be successfully raised in Texas.

Hay (In 100 Pounds.)

	Crude Protein	Carbo-hydrates	Fat	Nutritive Ratio
Timothy	3.0	42.8	1.2	15.2
Rescue	5.0	43.0	1.2	9.1
Bermuda	3.7	37.9	.8	10.7
Johnson Grass	2.9	45.0	1.0	16.3
Sweet Clover	10.0	38.2	0.7	3.7
Green (In 100 Pounds.)				
Kentucky Blue Grass	2.3	14.8	.6	7.0
Rescue	2.6	14.5	.2	5.7
Bermuda	1.4	17.0	.5	12.9
Johnson Grass	1.2	14.7	.5	13.2
Sweet Clover	3.3	10.3	.3	3.3

JOHNSON GRASS.

Johnson grass (Sorghum halapense) is already too familiar to the farmers of Texas to need any description as an introduction. We do not advocate the further introduction of Johnson grass. That is unnecessary; it is already here in abundance. Besides its first cousin, Sudan grass, that can never become a pest, has come to take its place. But any plant that like an unwelcome guest, comes and will not leave should be put to work and made to earn its keep. After all has been said against Johnson grass, it unquestionably does have a value in the arid sections of the western part of the state. Early in the spring of 1916 in Taylor and ad-

joining counties the writer observed that after a four months drought Johnson grass was the one solitary plant showing green above the surface. Even then it would have afforded some tender grazing for young stock. Later, on a trip from El Paso to Abeline over the Texas & Pacific railroad in June we observed that after a protracted drought a few hardy, thorny bushes were showing green in the pasture fields. Yet along the right-of-way of the railroad Johnson grass was green and vigorous enough to furnish considerable grazing. Any economic plant that possesses such drought resistent qualities can not be other than a valuable plant in an arid territory. Where the land is already infested with the grass it should be utilized in some way. In many parts of the State Winter oats sown in the fall on infested land will yield the next season a crop of oats and two cuttings of hay. This is one of the best methods of utilizing Johnson grass and it is a splendid hay when harvested at the proper stage of its growth. As a hay it compares favorably with many of the other grass hays.

SUDAN GRASS.

Johnson grass can be replaced with Sudan grass by those who find the Johnson grass objectionable. The Sudan grass is close akin to the Johnson grass, belonging to the same sorghum family, and possesses all the good hay and pasture qualities of the Johnson grass without its bad qualities of becoming a weed pest in cultivated fields. The latter is the chief difference between these two grasses. The Sudan does not propagate by root stocks and is on that account an annual and has to be reseeded every year.

Sudan grass was introduced into this country from Sudan, Africa, by the agents of the United States Department of Agriculture who were seeking an annual form of Johnson grass. The first seed sown in the United States was a row 16 1-2 feet long on the Chillicothe Experiment Station in Texas. From this small beginning it has spread over all the warmer portions of the country and has been tried out in all parts. It has proved a success in all the semi-arid region of the Great Plains from South Dakota southward and will in all probability in the future mean for this region as a hay grass what timothy means for the humid regions of the North.

It may be mowed for hay from two to four times in a season. Its average yield of hay per acre from 20 different seedings on four of the substations of the Texas Experiment Station, was 7655 pounds, or 3.82 tons. The Ohio Station reports an average yield for two years of 8,300 pounds of hay per acre. There is no question but that yields under favorable conditions are very heavy and it equals in feeding value any of the hays grown in the State except Bermuda grass.

Sudan grass thrives especially well under irrigation conditions and is therefore commended to those Texas farmers who can irrigate it. Under irrigation at Chico, Cal., the yield was 9.8 tons of dried hay per acre; at Bard, Cal., it was 8 tons per acre; at Phoenix, Ariz., it was 7.8 tons.

These yields were practically equal to the yields of alfalfa on the same land. The animal husbandman of the New Mexico Experiment Station told the writer that he pastured 12 head of dairy cows on ten acres of Sudan grass from the first week in June to the second week in October in 1916. The cows were fed their usual grain ration but this Sudan grass was their only pasturage for the entire season. The pasture was subdivided and while one part was being grazed the other part was irrigated and allowed to recover. All stockmen and farmers in irrigated sections will find Sudan hay an excellent feed to ballance their alfalfa hay.

Sudan grass requires a rather firm seed bed. Prepare the land in the spring as for the grain sorghums or corn. In the drier portions of the state early fall breaking of the land to catch the winter rains is advisable. In the semi-arid sections, unless the land can be broken very early, the preparation had as well be postponed till the spring. Do not sow in the spring till the ground is well warmed.

The methods of seeding vary from broadcasting to drilling in rows from 18 to 36 inches wide. Broadcasting is best adapted to sections of heavy rainfall. The drill method with one or two cultivations is best adapted to the semi-arid sections. The greater yields in all instances are likely to come from the cultivated rows, but in many instances the increase is not sufficiently great to justify the extra labor necessary in the cultivation. The quality of the hay is improved by thicker seeding. Sowing with an ordinary grain drill is an eccellent method of seeding.

Sow at the rate of 20 pounds of clean seed per acre when sowing broadcast, or with the grain drill. In rows 18 to 24 inches wide 5 pounds of seed will ordinarily be sufficient. In the wider rows, 36 to 40 inches apart, 3 pounds of seed will be sufficient.

Harvest for hay when in full bloom but before the seed form. Do not allow the hay to bleach in the sun. Do not store, stack, or bale till sufficiently dry to prevent molding.

Many of the facts in this brief chapter have been taken from Farmers' Bulletin No. 605, United States Department of Agriculture, Washington, D. C., and from bulletin No. 172, "Sudan Grass," by the Texas Experiment Station, College Station, Texas. All who are interested in growing this important hay and temporary pasture grass and who may wish more detailed information than is given in this brief chapter, are referred to these publications.

LAWNS.

Nothing adds more to the beauty of a home than a well kept lawn. A lawn adds just as much to the beauty of a country home as it does to the beauty of a city or village home. The home of the farmer can and should be made just as beautiful as the home of his brother living in the city. The first step in beautifying the home and the home grounds is the establishment of a permanent lawn.

A general definition of a lawn is "a firm even sod supporting a vigorous growth of vegetation of uniform texture and pleasing color." In

common practice grass is the only plant that supplies the vegetation in the above definition. A suitable lawn grass must propagate by rootstocks, should be fine and soft in texture and dark green in color. Kentucky blue grass is the ideal lawn grass, but it will not grow in Texas. Bermuda grass is a close second. There are but two objections to Bermuda grass as a lawn: (1) It turns brown at the first touch of frost; (2) its light color is not so pleasing to the eye as the dark green color of the Kentucky blue grass. With these exceptions it makes a splendid lawn grass.

A rich, well-drained soil is an essential for a successful lawn. If it is not naturally rich and well drained it must be made so by drainage and by the addition of sand and manure. Well rotted stable manure free from weed seed is the best manure to apply. Unleached hard wood ashes will prove beneficial. The soil should be brought up to the type of a rich loam, hence the reason for the addition of sand where it is lacking. All should be thoroughly pulverized 10 inches deep. Plant tufts of Bermuda sod 12 inches apart each way. Plant as early in the spring as the tufts are obtainable. The planting can be done any time during the summer season provided means are at hand for watering the grass.

Grass never becomes a lawn till mown. A lawn mower is absolutely necessary. As soon as the grass covers the ground the mowing should begin. Mow as often as the grass grows long enough for the lawn mower to catch it. All the weeds and wild grasses that can not be killed by constant mowing must be uprooted and removed by hand. The best of lawns can be had only where means are at hand for watering them. But where the best can not be obtained the second best is always in order.

A lawn needs constant, careful attention but not a great deal of attention at any one time. The reward will be a piece of smooth velvety sod in front of the home that will prove a delight to any one who has an eye for the artistic.