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Grasses, clovers, forage and economic crops

William Rufus Dodson

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BULLETIN

—OF THE—

AGRICULTURAL EXPERIMENT STATION

—OF—

LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE,

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

Grasses, Clovers, Forage and Economic Crops.

—BY—

W. R. DODSON, A. B., S. B.

WM. C. STUBBS, Ph. D.

ISSUED BY THE BUREAU OF AGRICULTURE AND IMMIGRATION,
J. G. LEE, COMMISSIONER.

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BUREAU OF AGRICULTURE.

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LOUISIANA STATE UNIVERSITY AND A. AND M. COLLEGE,
Office of State Experiment Stations,
Baton Rouge, Louisiana. }

Hon. J. G. Lee, Commissioner of Agriculture and Immigration, Baton Rouge, La.:

DEAR SIR—I hand you herewith a bulletin upon the grasses, clovers and forage crops adaptable to the State of Louisiana, together with slight mention of other economic crops that may be grown, which I ask to be published as Bulletin No. 53.

Respectfully submitted,

WM. C. STUBBS,

Director.

INTRODUCTION.

An enormous quantity of hay is annually imported into Louisiana to feed the stock of planters and farmers. With the prevailing low prices for cotton, sugar and rice this importation can scarcely be afforded from an economical standpoint. It can hardly be justified at all from an agricultural view when it is remembered that nearly one-half of this State is of alluvial origin, low-lying and extremely fertile—receiving an abundant rainfall, generally well distributed throughout the year, with mild winters and prolonged summers—almost perfect conditions for the growing of grasses and other forage crops.

The remainder of the State, while classed as uplands, is really of water origin, varying in elevation from a few to 300 feet, of moderate fertility, and subject to a good annual rainfall, and possesses characteristics which permit of the growing of hay and forage crops with great success. Bermuda (*Cynodon dactylon*), Crab Grass (*Panicum sanguinale*), some varieties of *Paspalum* (chiefly *P. dilatatum* and *P. platycaule*), Lespedeza and false fox tail (*Setaria glauca*) grow with great luxuriance over the entire State, affording most excellent grazing, and, if desired, large crops of hay of good quality. To these add our cow-pea, which is largely grown in every section of the State either as a soil restorer or a food crop, or both, and really there is no necessity of importing another

hay crop to feed the stock of Louisiana. But our soil and climate permit of the successful growing of a large number of foreign forage crops, grasses and clovers, provided they are rightly planted upon well prepared soils and intelligently cultivated and utilized.

A large number of these have been under trials at all three of the State Experiment Stations, especially at the Botanical Gardens of Baton Rouge, and the following pages are given as the results of these experiments. While a very large number of plants have proven adaptable to every section of the State, a goodly number have superior merits, while a few are *par excellence* the crops from which our hays should be made and our stock supplied with pasture. These are described in detail for the guidance of those contemplating trials. It should be remembered that all grasses and clovers coming from a temperate clime should be sown in this State in the fall to insure best results. Experiments have shown that spring planting even with our best plants are subject to conditions which render results very precarious. In planting any crop of value it must be remembered that only upon well prepared and properly fertilized soils, well planted and cultivated, can large harvests be obtained. Forage and grass crops are no exception to this rule. Therefore it must not be expected that poor soils, even when well prepared, or fertile soils badly cultivated will produce large crops of the plants described.

Poor lands, unaided, will not grow grasses successfully. They may by the proper application of mineral manures be induced to grow fair crops of leguminous plants, which by incorporation will greatly improve them and by such continuous growing, may ultimately prepare them for grass production. But it is a waste of time and labor to attempt to grow any cultivated variety of grass upon them before some such preparation.

This bulletin is divided into four parts:

Part I. Treating of the grasses.

Part II. Leguminous Forage Crops.

Part III. Hay and Forage Crops Other Than Grasses and Legumes.

Part IV. Economical Plants Other Than Hay and For-

GRASSES.

BROWN BENT, OR DOG'S BENT GRASS (*Agrostis canina*).

This is not a native of the United States, but has been cultivated to some extent in wet places, where it is supposed to do best. The stand was always poor and growth rather slow, the native grasses crowding it out early in the spring where it had not already been destroyed by our common little purple flowered dead nettle (*Lamium amplexicaule*), one of the worst winter pests we have. When a stand of this grass is obtained it is said to make a good lawn. Not to be recommended.

FIORIN (*Agrostis stolonifera*),

or sometimes called Broad Leaved Creeping Bent Grass, has received a great deal of attention in England and Ireland, and much has been said in its praise. It is adapted to wet soil and districts that are sometimes overflowed, but upon which water does not stagnate. Good both for pasture and for lawn. A poor stand was obtained, but the growth was fairly good. May be tried on small scale for lawns.

RED TOP.—HERD'S GRASS (*Agrostis vulgaris*).

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

At Calhoun upon the white crayfishy clays which underlie all of the hills and form the water sheds of all the springs of that country, giving extensive outcrops in the numerous spring and creek branches, it is admirably adapted. These clays, termed the "Arcadia clays" in the geological report of Louisiana, are found in all of the swamp and creek bottoms of the hills of North Louisiana. These bottoms, if sown in September or October with this grass at the rate of nine to ten

pounds per acre, will give a winter and summer pasture of great value lasting several years and furnishing, if desired, a goodly quantity of hay in early spring. It is highly recommended for such lands. The seed may be obtained at any large seed store in the country. It is an excellent grass and affords a hay of decided merit. These bottoms are better adapted to this grass than to any other crop known.

TUFTED HAIR GRASS (*Aira caespitosa*),

sometimes called Hassack's Grass, is a native of stiff wet bottoms, not relished by stock; used principally for making mats, etc. In the high land it did not succeed. It was not tested in the wet stiff land.

COMMON HAIR GRASS (*Aira flexuosa*).

Native of high dry places, eaten readily only by sheep. A poor stand and a poor growth obtained.

SLENDER FOXTAIL (*Alopecurus agrestis*).

This is a foreign grass, but so far has not been considered of much value. A good stand was obtained, but during the summer it was crowded out by the native grasses. Unworthy of trial.

BEACH GRASS, MAT GRASS (*Ammophila arenaria*)

Of no agricultural value. It grows in sandy places and prevents washing and drifting of sand, especially along coasts. It is also a valuable grass for railroad banks where the soil is sandy and not well adapted to the growth of other grasses. It does not thrive in the bluff lands.

PERENNIAL SWEET VERNAL GRASS (*Anthoxanthum odoratum*).

This grass possesses no particular agricultural value, except that it comes very early in the spring. It is often mixed with other grasses to give them a sweet smell when cured. The seeds are of particular interest to the botanist. The stand was very poor and all was choked out by the natural grasses. Not recommended.

ANNUAL SWEET VERNAL GRASS (*Anthoxanthum puelli*),
differs from the above in being smaller and being an annual.

TALL MEADOW OAT GRASS (*Avena elatior*)

Promises fair results upon good lands all over the State. It should be sown in September or October at rate of 50 pounds per acre. It is a perennial and affords, winter and summer, a good pasture. It can be cut for hay several times a year upon the best lands. Both the grass and the hay made from it are highly relished by stock.

YELLOW OAT GRASS (*Avena flavescens*)

gave poor stand and poor growth. It is claimed that it is good to mix with other grasses for pasture.

DOWNLESS BROME GRASS (*Bromus inermis*).

This grass is thought to have considerable merit in dry land, either for hay, pasture or green feeding. It only gave a fair stand and not a very good growth at Baton Rouge. It was a fair success at Audubon Park, but so many other grasses and clovers of superior merit can be grown here that it seems useless to plant this grass.

SOFT CHESS, OR SOFT BROME GRASS (*Bromus mollis*)

is suited for sandy land, but is not of great agricultural value, so far as known. A good stand was secured, and a fair growth was maintained until late in the summer. It grows well upon most soils of the State, but when other grasses and clovers of superior merit can be grown it is unprofitable to experiment with this crop.

MEADOW BROME GRASS (*Bromus pratensis*).

In England this is a meadow weed, and is only recommended for dry pastures where nothing else will thrive. A poor stand with a fair growth was obtained. Unworthy of extensive use.

RESCUE GRASS (*Bromus Schraderi*)

is at home all over the State. It is an annual appearing early in the fall, and seeding in April or May, disappears. If, however, it be permitted to go to seed in the spring and the seed turned under and land sown in cow-peas, upon harvesting the cow-peas in the fall, a thick stand of this grass will be secured

at once. The seed have the power of remaining dormant in the soil during our summers and germinating upon the first appearance of cold in the winter. Seeds scattered by the wind have covered the headlands at all three stations. It affords a heavy pasture throughout the winter and a crop of hay may be cut from it early in the spring, before it begins to head. After cutting this crop the aftermath, if permitted, will go to seed, which if turned under as directed above will secure another crop for the ensuing year. The grass is of fair quality and the hay made from it relished by stock. It is especially worthy of trial upon the light sandy and loamy lands of North Louisiana. The seeds resemble the oat in appearance and size, and to secure a stand must be covered much deeper than the ordinary grasses and clovers. It should be sown in September or October at rate of 30 pounds per acre.

CRESTED DOG'S TAIL GRASS (*Cynosurus cristatus*).

This grass is being introduced to some extent into this country. It does not make very good hay, but is readily eaten while young and tender and may develop as a good permanent pasture grass. The stems when mature are very tough and are used in manufacturing straw goods. It was not a success here last year. A poor stand was obtained which did not make a very good growth. Previous experiments at Baton Rouge and Audubon Park have shown that this grass seeds well and produces good growth, but on the whole not worthy of extensive cultivation.

ORCHARD GRASS (*Dactylis glomerata*).

This grass is highly esteemed in England and in northern and middle United States. It is good for hay or pasture. It seems better able to keep down native grasses than most any other variety that has been tried thus far. It mixes well with clover. Its growth is checked during the hot summer, but it begins a vigorous growth in the fall and remains green all winter. It is worthy of trial on a small scale by our farmers.

HARD FESCUE (*Festuca duriuscula*),

said to be of some value as a pasture grass. Results here not flattering. Stand and growth poor.

TALL FESCUE (*Festuca elatior*),

a nutritious grass, preferring moist soil, some shade and probably will become a useful grass for woods pasture. A very good stand was secured, with fairly good growth. This was in well drained soil.

VARIOUS LEAVED FESCUE (*Festuca heterophylla*),

a native of Germany, recommended for high ground. The winter and early spring growth was very good; in the summer it succumbed to the encroachment of the native grasses.

MEADOW FESCUE.—ENGLISH BLUE GRASS (*Festuca pratensis*).

Upon the alluvial lands of South Louisiana this grass does well. It is frequently used as a sward grass in the yards of the homes of New Orleans. It is specially adapted to damp soils (not wet) and thrives best in the shade. During the exposition in New Orleans, it was sown on the grounds of Audubon Park. In the shade of the oaks the grass is still growing with luxuriance, being very attractive during the winter. Elsewhere in the park it has been crowded out by Bermuda and Paspalums. As a winter yard grass, it has in the South no superior, giving a deep green sward during the coldest weather, hence sometimes called "Evergreen" grass.

SLENDER FESCUE (*Festuca tenuifolia*),

adapted to dry soils, more for a lawn grass than for agricultural purposes. A poor stand was secured, followed by a poor growth.

ITALIAN RYE GRASS (*Lolium Italicum*).

Upon damp (not wet) fertile soils, this grass gives a most excellent crop of hay early in March or April. It affords excellent grazing throughout the winter. Its main objection is that with us it is an annual, seeding and dying down in April or May. It may be cut in March before seed heads are formed, giving a large quantity of very valuable hay. The second crop, usually smaller than the first, goes quickly to seed. Unlike Rescue it will not reseed the land the ensuing year from the fallen seed of the matured crop. Very few of the seed left on the soil are preserved through the summer. Sow at rate of 40 to 50 pounds per acre.

ENGLISH RYE GRASS (*Lolium perenne*),

is perhaps more extensively cultivated in England than any other grass and seems to be adapted to this climate and soil. A good stand was produced, which made a very satisfactory growth, but is not a perennial with us, few stalks surviving our summers. On a large scale not to be recommended.

RED CANARY GRASS (*Phalaris arundinaceæ*)

inhabits wet soils, and upon our alluvial soils was a perfect success. But to the farmer there are much better varieties equally as well adapted to these soils.

HUNGARIAN GRASS (*Panicum Germanicum*).

Highly esteemed in some parts of the country as an annual soiling grass. Unsuccessfully sown here on account of encroachments of native grasses which spring up simultaneously.

TIMOTHY (*Phleum pratense*)

so extensively raised in the Middle and Northern States, seems to be a failure in Louisiana upon hill and bluff lands. Upon alluvial lands sown in the fall one excellent crop can be obtained. After that the hot summers seem to destroy it.

WATER MEADOW GRASS (*Poa aquatica*),

recommended by seedsmen for wet places. Rather a poor stand was secured, but a fair growth followed during the winter and spring, which was choked out in the summer by native grasses.

CANADA BLUE GRASS (*Poa compressa*),

about the same results as *Poa aquatica*.

WOOD MEADOW GRASS (*Poa nemoralis*),

has been uniformly a failure.

KENTUCKY BLUE GRASS (*Poa pratensis*),

did fairly well, but can not be considered as a success.

SORGHUMS.

Both saccharine and non-saccharine are grown to great perfection all over the State, affording two to four cuttings from one planting. In the Southern portion of the State, where the English sparrow abounds, it is impossible to grow these plants for the seed. Entire fields have been robbed of the seed at maturity, so great are their numbers and depredations.

Of the

SACCHARINE VARIETIES,

the following are given in the order of their maturity :

Early Amber, ripening in 90 days.

Early Orange, ripening in 100 days.

Colman, ripening in 120 days.

Links' Hybrid, ripening in 130 days.

White India, ripening in 130 days.

There are almost innumerable varieties, but the above will afford a desirable succession. The stubble crop matures in a much shorter time than the first or plant crop. As soon as the first crop is harvested, disc cultivators should be run over the stubbles, loosening the soil and killing weeds and grass.

NON-SACCHARINE VARIETIES.

Of these the White and Red Kaffir corns, White and Yellow Milo Maizes, Jerusalem Corn, African Millet and Egyptian Wheat are found on our markets. They have all been repeatedly tried and the following suggestions are proffered :

The Kaffir corns are low stocky plants, perfectly erect, producing numerous branches from the top joints, each giving a head well filled with seed. Average height, $5\frac{1}{2}$ to 6 feet. It possesses pre-eminently the property common to all sorghums of resisting drouth. The entire stalk with blades can be easily cured into hay and is available in all stages of growth for green feed. It may be cut several times in a year. It is claimed to be good for ensilage. If all of the top branches be permitted to mature seed, an enormous quantity of grain will be produced. The seed of this plant can be made into

flour which is more analogous to wheat flour than any other variety of sorghum, and is used for making batter cakes, muffins, etc. If planted early in March in rows three feet apart at rate of four to ten pounds per acre (60 lbs to bushel), it will be ready for use in May or June and will afford ten to fifteen tons dry fodder per acre and a goodly quantity of grain which is highly esteemed as food for all domestic animals, particularly chickens.

The Yellow Milo Maize, or Rural Branching Sorghum, is a tall growing (8 to 12 feet high) variety, stooling fully at the ground and branching at the joints. It bears enormous heads, which upon good ground are well filled and heavy. The heads bend over at maturity, hanging on a short goose neck stem. It is extremely valuable for forage, either green or cured, and its seeds are eaten and enjoyed by all domestic animals. It matures earlier than the White Milo. On account of stooling and branching habits, should be sown in wider rows (4 to 5 feet).

White Milo Maize grows a single stalk 8 to 10 feet high and yielding immense heads of grain. It can be easily cured into fodder. It can be planted in 3—4 foot rows and will afford several cuttings per year. Like all sorghums it has power to resist drouth. Four to eight pounds of seed should be used to plant an acre.

Jerusalem Corn and *Egyptian Wheat* are low-growing, inferior kinds of non-saccharine sorghums, the former with closely appressed heads upon a goose neck stem, the latter with seeds in an open panicle. Both are inferior to the above and should not be used with expectation of best results.

Teosinte, *Reana luxurians*, of South American origin, has decided merit as a forage crop. It stools enormously and upon rich lands makes a very large quantity of forage. One seed on a hill 2x3 feet will stool enough to fill entire space. Like corn it has the staminate flowers in the tassel and numerous pistillate flowers coming out of the axil of each leaf. These flowers develop at maturity into little shucks containing about five to seven grains of triangular shape, closely appressed, diminishing in size from base to tip. At the Sugar Experiment Station at Audubon Park, this plant has fre-

quently matured its seed. In its native habitat it is a perennial, but a cultivation for several years at all of our stations shows no sign of stubbling or ratooning. Its stalks contain by actual analyses 6 to 8 per cent. sucrose. As a green food it is highly relished by stock. It cures slowly into hay and does not withstand drouths like the sorghums.

Pearl Millet (*Penicillaria spicata*), is familiarly known as Cat Tail Millet, Horse and Egyptian Millet. It stools largely from the ground and makes a great mass of foliage which may be cut several times in a season, furnishing fresh growth till frost. It is useful mainly for soiling.

LEGUMINOUS FORAGE CROPS.

INTRODUCTORY.

We have unmistakable evidence that some of the members of the pulse family of plants have furnished food material for civilized man and domestic animals from very early times. In the dawn of civilization these plants were selected for food by the first representatives of our race who sought to cultivate the best of the plants that grew naturally about them. How well they chose posterity has testified. Through all the changes that have transpired since that early time, we have clung to some of these old favorites and the indications are that they will continue to grow in popularity as we know them better, and especially as we better understand their value to the soil. There are, no doubt, other species that have not received due consideration, that may become extensively cultivated.

The *Leguminosæ* is one of the largest families of plants, having about 7000 species in all. Some of these are found in almost every climate of the globe. Some are useful trees, some are insignificant herbs, while all sizes between the two extremes are abundant in almost every country. Some of the most useful plants and some of the most noxious weeds are classed here. The species cultivated furnish a greater diversity of economic products than those of any other family.

Louisiana is chiefly interested in those plants that will furnish food for domestic animals, and form a part of a rotation system of crops. The legumes will do this as well, if not better, than any other class of plants, and at the same time enrich the soil during their growth, increasing the nitrogen content by virtue of the nitrogen-gathering bacteria that develop in the root tubercles of these plants. Some members of this family have already become important factors in the agriculture of the State. Many of the best farmers and planters use a leguminous renovating crop with unfailing regularity.

Some farmers are raising hay for the market, and many devote large areas to grazing purposes. More land should be devoted to these crops. When cotton sold for a high price, farmers could afford to buy northern hay, but the conditions of the times have changed and we must rely upon our own resources for more of our needs. The stream of money going North for hay must stop if we mean to prosper. We are being forced more and more to raise our own feed for mules, horses and stock. To what plants, then, shall we direct our attention?

With the exception of corn and oats it is probably not expedient to raise a grass crop. Not that we have no grass that will thrive, nor because the land will not yield as large returns as Northern land, but because we can raise something better.

The leguminous family offers us several plants that will yield as much or more money value in hay and at the same time enrich our soils by increasing its supply of nitrogen. We shall have occasion to treat this more fully further on.

An ideal hay plant would be one that grows easily, can be matured at seasons that afford good curing weather, gives a large yield of easily digestible food material, not difficult to cure or handle, is relished by stock and gives a good manurial fertilizer that may be returned to the soil.

ALFALFA OR LUCERN (*Medicago sativa*).

This plant has been gaining a foothold in the alluvial lands of Louisiana during the last few years. It has long

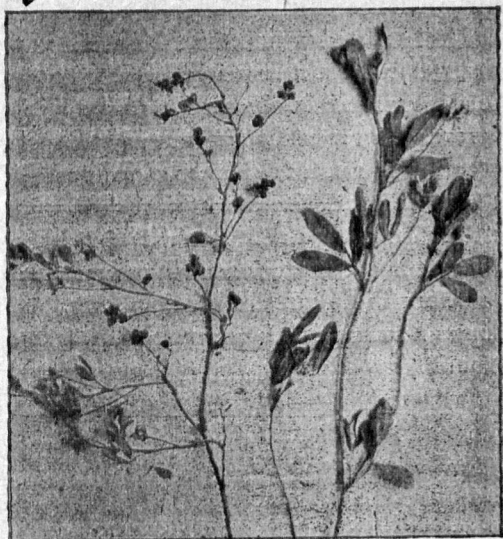


PLATE I.

Alfalfa (*Medicago sativa*), one-fourth natural size. The plant on the right is in bloom ready for the hay harvest. The plant on the left shows the coiled seed pods ready for the seed harvest. This shows only the top portion of the stems.

been cultivated in California and other extreme Western States, where it yields from three to five cuttings every year. It is not a new plant to agriculture, as we know that the Greeks and Romans cultivated it four or five hundred years before the Christian era. It was taken into Mexico by the Spanish about the time of the conquest of Mexico. From there it found its way into western South America, then back to California, and from there it has spread to a number of States where it makes a favorable growth.

Unfortunately it will not grow well in all soils, but where proper conditions are realized, possibly more can be said for it and less against it, than any other hay plant, as a permanent source of food for stock.

When once a stand is obtained, it will last for many years without re-seeding. After sowing it requires no cultivation, making a rapid growth and giving several heavy cuttings the spring and summer following the fall planting. The stems

are not large, and fully half the plant in dry weight is leaves, so that nearly all the plant is eaten by stock. It ranks very high in food value, and when mixed with some grain ration, can not be surpassed for a hay food.

In the alluvial lands, from ten to twelve tons, or even more in favorable seasons, may be harvested from a single acre each year. The stems being rather small, it cures readily, and is easily handled. Of course one runs the risk of losing a cutting sometimes on account of rain, as some of the numerous harvests are more than likely to come during a rainy season, but where the plant does well one can even lose a couple of cuttings a year and then make more hay per acre than they can from many other crops. If everything is managed properly, however, losses can be reduced to a minimum that will hardly be of serious consideration. Arrangements may be made for feeding green hay during the rainy season, and thus prevent any serious losses.

Our Northern friends harvest a ton of Timothy to the acre once a year and send it many miles by freight and sell it to us at a profit. We can harvest ten times as much hay from an acre of alfalfa that is just as good or better than timothy, and the adverse conditions to contend with in saving, are not much worse here than they are there. Alfalfa hay, and that of other leguminous plants does not shed water like grass when thrown in small shocks in the field, and is more liable than grass to damage from showers. It would probably pay to leave strips through the alfalfa field that could be sown in some kind of grass and cut along with the alfalfa; then in case of threatening weather the hay could be hurriedly thrown into shocks and capped with grass so as to stand considerable rain with little damage.

The alfalfa is a plant that sends its roots very deep into the soil and brings a portion of its food from a depth not reached by other plants. However, it has a surface root system causing it to respond readily to the application of fertilizers. Alfalfa requires a rich soil, with a considerable amount of humus. Some have reported that it will grow well in sandy soil, but it requires a rich soil, where the roots will not strike water at a depth of a few feet below the surface. It



will probably do well in all the bottom lands of Louisiana especially along the Red and Mississippi rivers, and may do fairly well on some of the upland. However, the experiments on upland have not been entirely satisfactory.

In the bottom land, or land that contains a large amount of humus, decaying vegetable matter, the only thing necessary in most cases will be to prepare the land by thorough pulverizing, and sow the seeds in the fall, and cover shallow with a harrow. In uplands some nursing may be necessary to get the plants started. The following treatment is recommended: Obtain a bushel or so of dirt and roots where the alfalfa is already growing successfully, put the dirt in a barrel, finish filling the barrel with water, mash up the roots and thoroughly mix dirt and roots in the water, then pour the whole on a pile of manure and sprinkle the manure on the land just before sowing the seed. The dirt and roots from the alfalfa field contain the nitrifying organisms that form the root nodules, which seem to be necessary to the full development of the plant. The manure seems to furnish these organisms with necessary food material till they become symbiotic on the roots of the alfalfa.

The condition of the subsoil is an important factor to the successful growing of alfalfa. Being a very deep rooted plant, it requires a penetrable soil, and will not thrive best when a stiff clay underlies the surface soil, or when the drainage is such that the roots will be immersed in water at a moderate depth. When alfalfa once becomes established it is almost independent of drouth, as it brings water and food from so great a distance below the surface.

The bottom lands that are formed by river deposits are peculiarly adapted for the growth of alfalfa, and the amount of hay produced on this kind of land is almost incredible to one who is not acquainted with the plant.

It must be remembered that it has no place in the short crop rotation system, and is to be planted where it is expected to remain for years without re-seeding. As it is a nitrogen gatherer it enriches the soil instead of impoverishing it.

It is sown either in drills or broadcast. It may even be transplanted with success. It is a perennial and its life is

variously estimated at from two to fifty years. If sown in drills, cultivated and fertilized, it will last much longer than when sown broadcast, though the yields will be much smaller and the hay coarser.

In Louisiana upon the alluvial lands of the Mississippi and Red rivers it is a great success, affording six to eight cuttings per year, with yields at each cutting of $1\frac{1}{2}$ to $2\frac{1}{2}$ tons of cured hay. The Sugar Experiment Station has grown it with unparalleled success for nearly eight years, and by these successful experiments many farmers and planters have been induced to cultivate it on a large scale. It is estimated that over 5000 acres in this State were seeded with this plant last fall and the market of New Orleans is now supplied in limited quantities with alfalfa hay grown upon Louisiana soils. It fetches easily \$15 to \$16 per ton.

It has only partially succeeded upon the bluff lands of the State, but this partial success has demonstrated that by inoculation and persistent effort a good crop can ultimately be secured. At Calhoun upon the yellow sandy clays, by the heavy application of stable manure aided by inoculation a permanent catch has been obtained and the area devoted to the plant is being annually increased. There are now growing on this station three distinct crops, one nearly three years old (having passed successfully through the unprecedented drouth of 1896), which has yielded seven cuttings; another nearly two years old which has given five cuttings, and the third one planted during the winter, from which one crop has already been taken. It is believed by the heavy application of stable or other organic manures and persistent efforts to inoculate the soil with the needed bacteria, any soil in the State may be induced to grow it. The yields in this State vary largely, according to character of soils upon which grown—from three to fifteen tons per acre annually of cured hay. Limited experiments indicate its better adaptability to the stiff clay lands of the alluvial bottoms—a fortunate coincidence, since this character of soils is deemed unprofitable in sugar cane or cotton culture.

Alfalfa hay is one of the richest foods for stock, substituting, in the farm dietary, wheat bran, cotton seed meal,

etc. It is exceedingly rich in proteids, and to be properly used should be mixed with coarser hays, as oat straw, prairie hay, corn shucks, etc. It is suitable alone for young growing animals and horses at heavy work. For milch cows, fattening animals and horses at very moderate work mixtures of alfalfa and sorghum or corn stover have been found exceedingly profitable. It is better adapted to soiling than to pasturing, though hogs can most profitably graze it. Mr. W. L. Foster, of Shreveport, has had extensive experience in growing hogs upon this plant, and estimates that each acre has given him 3000 pounds of pork.

It can be easily cured into hay. The following plan adopted by the station has been uniformly successful: The alfalfa is cut in the morning, turned over at noon by a tedder and raked into mows or put into small shocks at night. It is permitted to remain thus for one or two days (determined by prevailing heat and sunshine), and then taken to an open barn, where it is permitted to remain for a few days longer, when it is baled ready for the market. In this way it is cured into a beautiful green hay with scarcely a loss of a leaf. Alfalfa, like all leguminous crops, must not be left too long in the sun, else the leaves will scorch, turn white and drop off. It must also be turned over either by hand or machine while curing to prevent scorching of upper side and to cure out the under side. Alfalfa should be cut for hay just as soon as the purple bloom appears.

Every farmer or planter in Louisiana should have one or more acres in alfalfa. It should be sown in October, broadcast, upon deeply prepared and thoroughly pulverized lands at the rate of ten to twenty pounds per acre, and covered to such a depth as to secure immediate germination. If the ground be abundantly moist, little or no covering will be needed; if, on the other hand, the soil be very dry, a covering of one to three inches will be required to insure moisture enough for germination. Upon the alluvial lands no manuring of any kind will be needed. The bluff and lighter lands of the State may require heavy applications of stable manure and inoculation before success can be obtained. Alfalfa is a very deep rooted plant, and hence a deep preparation of soil

is necessary. An alfalfa crop may be regarded as a permanent one and will last, when well established, many years. It requires a rich soil to start with; after that it further enriches instead of impoverishing it.

Alfalfa seed are sometimes impregnated with the seed of a most obnoxious parasite, the dodder or lovevine (*Cuscuta*), which germinates simultaneously with the alfalfa and afterwards lives upon it, soon destroying it. As these seed are much smaller than the alfalfa seed, they may be separated by a sieve, which will permit the former to pass through while retaining the latter. A common flour sifter, to be found in every household, will accomplish this purpose. Every farmer should sift his seed before sowing.

BUR CLOVER (*Medicago maculata*)

Has become naturalized in the southern part of the State, appearing early in the fall and fruiting and dying in the spring. It will make an excellent mixture with Bermuda, dying in the spring just about the time the latter appears, and coming up in the fall just as the early frosts sear the Bermuda. It makes a poor hay, and when other green herbage is plentiful horses will not eat it. Cows take to it more kindly, while hogs devour it eagerly. If allowed to seed, it will re-seed the ground annually, thus perpetuating itself.

In the northern part of the State it will be found valuable as a winter pasture. Sow late in August or early in September at rate of fifteen pounds clean seed per acre. It grows wild everywhere in South Louisiana.

RED CLOVER (*Trifolium pratensis*)

Can be grown with great success all over Louisiana, provided of course, the soil, if very thin, be properly fertilized beforehand. As a rule upon the alluvial and bluff lands of the State and the red lands of North Louisiana it may be grown with great luxuriance without any assistance, save a thorough preparation of seed bed and sowing good seed at the proper time. The seed bed for this crop, as for all other clovers, should be thoroughly prepared and finely pulverized. The seed should be sown at rate of 10 to 15 pounds per acre and

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

There are two distinct varieties of this clover, known as Medium Red, Large Red or Sapping Clover. They vary only in size of plant. This crop would be extremely valuable did we not possess another, which with the same expense in preparation, planting and cost of seed, will afford many crops of a more palatable and nutritious hay, lasting several years. Reference is made to Alfalfa. Red clover should always be sown alone and in the fall of the year. It will afford grazing during the winter.

CRIMSON CLOVER (*Trifolium incarnatum*).

This member of the leguminous family is rapidly gaining the high esteem of agriculturists in the South. Thousands of bushels are sown annually in Virginia, the Carolinas, Georgia and Alabama. One thing that tends more than all else to make it popular is that it is sown in the fall and grows all winter, making a good forage in winter and an early crop of hay the following spring. The plant cures quickly when harvested and makes an excellent hay of moderate yield. It has been planted on the station in September, and harvested in May, in time to plant cotton that matured a good crop. It might have been cut sooner than May or turned under for fertilizer.

In another plot the crimson clover was harvested and corn planted about the middle of May, and in July cow-peas were planted in the corn; both crops did well. As corn is generally harvested in September and October, the land could be plowed and sown in crimson clover and give a good winter crop for pasture and in the spring the green clover could be turned under and the land planted in corn or cotton, and the plan of rotation not be interfered with at all, except that another crop



PLATE III.

CRIMSON CLOVER (*Trifolium incarnatum*), one-third natural size, shows only a portion of the stem. The stem on the left is nearly mature, while the one on the right is in blossom.

is added. The plant is a good soil renovator, and does well in poor land. It is well adapted to most of the hill lands of Louisiana. Another great advantage that should be considered is that it covers the surface and fills the soil with roots during the winter and prevents washing and leaching out of the soluble fertilizing material gained during the summer. Too much stress can not be laid upon the importance of keeping something growing on the soil all the time. The crimson clover supplies the want as a winter growth about as well as anything that is to be had. It grows well on poor land, especially if fertilized with acid-phosphate and potash. It is an annual and affords practically but one large cutting of hay.

It may be cut twice if the first cutting be done before the plant goes to bloom.

In Louisiana the seed should be sown in October upon well prepared soil at the rate of 15 to 20 pounds per acre and covered according to weather conditions and soil texture from one-half to two inches deep. The seed are now worth about five cents per pound or \$2.50 to \$3.00 per bushel of 60 pounds, and may be had at any seed store. It will grow on light sandy soils, too porous for other clovers. Upon light sandy soils of this State it may be grown successfully and followed at once by a corn crop, in which at lay by a crop of cow-peas may be sown, thus insuring a most rapid recuperation of the soil by growing two leguminous crops in one year—the one a winter, the other a summer crop.

BEGGAR TICKS, BEGGAR LICE (*Desmodium tortuosum*).

At present we see frequent mention of a plant called beggar ticks, as being a forage and hay crop splendidly adapted to the Southern States. It was first collected in Florida and probably exists wild in many parts of the South. It is one of the genus of which some species are of almost universal distribution, and known by various names, such as beggar ticks, beggar lice, and stick tights. This form has a leaf and fruit quite similar to the common form found through the pine hills of Louisiana, but grows much larger and taller. It seems to have suddenly become a favorite in Florida. One farmer even predicts that in a few years most of the hay and forage of Florida will be furnished by this plant; that it will replace the cow-pea.

It is not likely, however, that it will ever become an important crop in Louisiana. It has been grown for three years at the Experiment Station at Baton Rouge, with fairly good results. It has some good qualities, but is not without serious faults. It produces a very good growth, but not as heavy as most varieties of cow-peas would on the same land. It does not mature as quickly as cow-peas. Unless it is sown very thickly, the stems become very large and woody. It has the advantage that a second harvest may be made from the spring planting, and it is claimed by some that the second crop will

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

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

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

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

There is another species of beggar tick called

Desmodium molle, that is advertised by seedsmen. It is quite a good deal like the foregoing and the same general remarks may be made as to its merits, with some restrictions, as has been made about the *Desmodium tortuosum*.

VELVET BEAN (*Mucuna utilis*) [Wall]

has been cultivated at Baton Rouge and at Audubon Park for two years. The seeds were obtained from Florida, where it is cultivated as an ornamental plant. It is of ancient origin and is well known in some countries. In the United States it is probably not known outside of very limited regions in the South. The Florida Experiment Station published an article on the plant in a bulletin issued in 1895, with the suggestion that it might be made an important field bean. Chemical analyses were made with the result that showed the velvet bean to contain for a given weight compared to the same weight of cow-pea vines, about one-fourth as much ash, one and one-half times as much protein, three times as much fat, less than

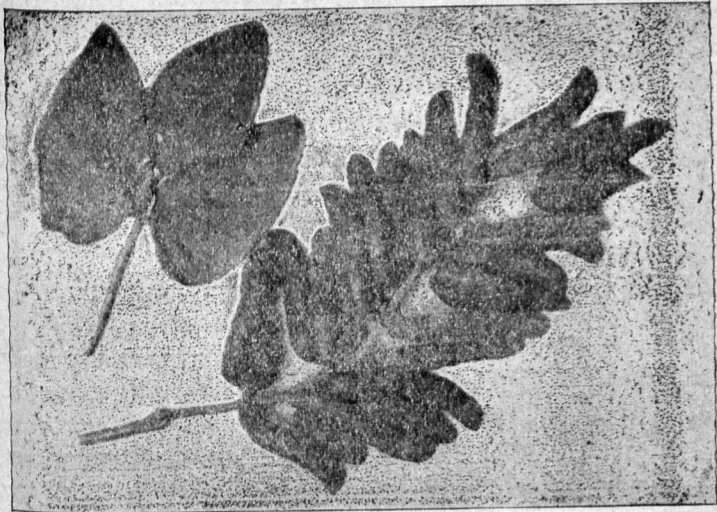


PLATE IV.

VELVET BEAN (*Mucuna utilis*) [Wall], showing the leaf and a bunch of pods. About one-sixth natural size.

one-third the amount of fibre, and one and one-third times as much nitrogen free extract. Therefore if it proves to be of equal digestibility, it will be superior, pound for pound, to the cow-pea. No doubt it will surpass the cow-pea in productiveness, as it is one of the most luxuriant growers ever planted on the station grounds. It also produces an enormous yield of seeds, but the seeds mature late in the season and are liable before all are matured to be caught by the early frost. When planted in the early spring, the vines soon cover the ground and make a very dense shade that lasts all summer, choking out all kinds of native grasses, and is probably the best thing we can use to fight the almost irrepressible coco grass, or knot grass (*Cyperus rotundus*).

It should be planted in very early spring if seed is desired, but may be planted later if only vines are wanted for hay. It may be cut almost any time after a good growth of vines is secured and will cure readily, making a good quality of hay. It dries out a little quicker than cow-pea hay on account of the stems being somewhat smaller. It is a heavy nitrogen

gatherer and the tubercles are the largest of any plant that has been grown upon the station grounds. Coral-like clusters of tubercles, making a mass as large as a hen's egg, may be gathered from the roots, and this mass contains about six per cent. of pure nitrogen, according to analyses made by Mr. Clarke, in 1896. The vines may be cut for hay, which is easily cured and which is greatly relished by all kinds of stock, or turned under with disk plow for improvement of the soil.

Before midsummer the old leaves begin to fall about as fast as new ones are formed, and the ground becomes covered underneath the vine with the dead leaves, which makes a very excellent manure. The plant has not been thoroughly tried yet in the field, but everything seems to indicate that it will prove to be a very excellent plant. As the racemes of pods are large, the seeds can be gathered very rapidly, but they are difficult to shell from the pods. The seeds are much larger than the cow-pea, and there would be a less number per bushel, but if they are planted from two to three feet apart each way, it will be ample to make a very heavy mat of vine, and a bushel will plant more area than a bushel of cow-peas. It is advisable to plant in rows and cultivate once or twice the same as cow-peas when they are sown in drills.

The agricultural press has given considerable notice to this plant during the last year. Those attempting to give a scientific name have given that of *Dolichos multiflorus*. This, however, is a mistake, and should be corrected as soon as possible to avoid confusion. The *Dolichos multiflorus* is an entirely different plant. In order to settle the matter of the scientific name some plants were sent to the Department of Agriculture at Washington for determination. The plant was examined by Mr. Lyster H. Dewey, assistant botanist, who kindly gives very fully the results of his examination. Mr. Dewey's letter is here reproduced :

U. S. DEPARTMENT OF AGRICULTURE, }
 Division of Botany, }
 Washington, D. C., April 4, 1898. }

Prof. W. R. Dodson, Louisiana State University, Baton Rouge, La.:

My Dear Sir—Your letter of March 27th, requesting further information in regard to the technical names of the velvet bean and the cow-pea, has been received.

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

In looking up the technical name of cow-peas I find that there is some difference of opinion even among the best authors, but the majority agree that *Vigna catjang* and *V. sinensis* are synonyms. The specific name *sinensis* being the older, the correct name according to the rules of nomenclature is *V. sinensis* (L.) Endl. Very truly yours,

LYSTER H. DEWEY, Assistant.

PEA NUTS, PINDARS, GOOBERS (*Arachis hypogaea*).



PLATE V.

PEANUT, PINDARS (*Arachis hypogaea*), showing a portion of stem with flowers and fruit. About one-sixth natural size.

Two varieties of pea nuts have been cultivated. The Virginia pea nut, which spreads on the ground, and the Spanish pea nut, which grows more erect. Both are well adapted for this State and can be grown with profit either for market or for the forage. Those who have raised them for hogs, allowing the hogs to gather them from the ground, have generally been well pleased with the experiment. The following disadvantages are to be considered in growing pea nuts: The seeds are generally freed from the pod before planting; this is a tedious job. They have to be planted so as to be cultivated and kept free from weeds and grass, as they do not cover the ground sufficiently with vines to keep down the native weeds. Then they can not be gathered without considerable amount of work per ton of food material, compared with the amount of work ordinarily given to a crop that can be cut with a machine and cured with a couple of days' sunshine. While the yield is satisfactory and the value to the soil is undoubtedly very great, the amount of labor involved in saving a crop is such as to prevent it from becoming very popular at the present time for purposes other than forage. The Virginia pea nut is preferable for hogs, as they are larger and produce a greater yield. The Spanish pea nut is preferable for fodder making.

In North Louisiana large areas are grown in this plant which furnishes a most excellent forage for all kinds of stock, including chickens and children. In harvesting, the vines while still green, are pulled up with all adherent nuts and cured into hay. This hay is exceedingly palatable and nutritious.

Upon sandy land the process of harvesting is extremely easy, the looseness of soil permitting the removal of nuts. Upon loamy or clayey land much difficulty is experienced in harvesting the nuts.

SOY BEAN OR SOJA BEAN (*Glycine hispida* or *Soy hispida*), is a native of Asia. It has been cultivated in Eastern countries for centuries, and in Japan is now one of the most important food plants. It has never been very extensively cultivated in this country for table food, but some districts have

cultivated it for a hay plant. Most of the experiment stations throughout the United States are giving the plant some attention, and many of them find it a desirable forage and hay crop. It seems to be very well adapted to Louisiana as far as the production of hay is concerned, but it is not sure to mature seed. In '95 and '96 the crop of seeds at Baton Rouge was very small, while in '97 there was a heavy crop that matured well, both of early and late planting. It may be that the seeds planted this year were different in variety from those previously planted, as there are said to be a great number of varieties in Japan. As the seeds were secured in this country no variety name was given them. Unfortunately the reports are made from places where the seeds are tested with very little knowledge as to the varieties, and the seed company from which we secured the seed was unable to give any information on this subject. It is the purpose of the station to secure all the varieties possible directly from Japan, and test their relative merits. The term Soy bean is therefore indefinite, and reports as to its merits will mean nothing till someone characterizes the varieties that may be met with. It is well known that there are numerous varieties of the cow-pea, but when the word cow-pea is used, it means one of the forms that are in general use, like the Clay or the Unknown, and if a different variety is meant it is so designated. It should be the same way with the Soy bean. There are possibly as many varieties of one as the other.

One could not assert that a given locality was not suited to grow cow-peas until he had tried a large number of varieties, and it may be the same with the Soy bean. There may be varieties that are peculiarly adapted to a particular climate or soil, while another variety may not thrive in the same conditions.

SWEET CLOVER, MELILOT, (*Melilotus officinalis*).

This is an introduced plant, having come from Europe. It may now be found in many waste places and about old gardens, and quite plentiful along some of the railroads. It is a very thrifty grower, but unfortunately is not a very attractive plant for hay making or for forage on account of a medicinal

principle contained in the tissues of the plant. If soiling only is desired, it would serve that purpose admirably. There may be times when one would want a good soiling crop that would not be eaten readily by stock. It produces a large amount of vegetable matter that could be turned under early in the spring, and would probably be better than a crop of cow-peas, as there would be more vegetable matter turned under than in an ordinary crop of cow-peas. It would be a good crop to cover the land with during the winter where it would otherwise remain bare. Purely as a soiling plant we believe it worth a good deal.

Melilotus alba is very similar to the above, but has white flowers and makes a larger stem, if not too much crowded on the ground. The same remarks as made of *M. officinalis* will apply with slight modifications to *M. alba*.

LESPEDeza, or JAPAN CLOVER (*Lespedeza striata*).

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

It makes excellent grazing and a very fine quality of hay. The growth is slow in starting in the spring, but later it grows rapidly and is in condition to be harvested during the dry season of late summer, when there is generally good weather for hay making. The hay cures quickly and is easily handled. The crop is not cut till some of the first seeds have matured, and it will then reseed the ground and produce a good stand the following year without any further attention of the farmer. In many old fields where the soil has become too poor to be profitable in corn or cotton, lespedeza will not only yield a fair return in pasture or hay, but the soil will be rapidly built up by the nitrogen gathered from the air. Woodland used for pasture would be enhanced in value by scatter-



PLATE VI.

LESPEDeza, or JAPAN CLOVER (*Lespedeza striata*), about one-fourth natural size. Plant taken in July.

ing a few seeds through the woods in the late fall or early spring. While we find lespedeza growing more extensively on the hill lands, it will grow well on most all lands in this State, even in very wet places.

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

plant should be more extensively cultivated in the hill lands of the State.

VETCHES—SMOOTH VETCH (*Vicia sativa*).

This is a plant of vigorous winter and spring growth, making its appearance in September and October, and growing rapidly all winter and early spring. Cattle will not eat it readily when good grass can be had, but in the winter time when grass is scarce they seem to be quite fond of the smooth vetch. By the middle of February a very heavy growth cov-

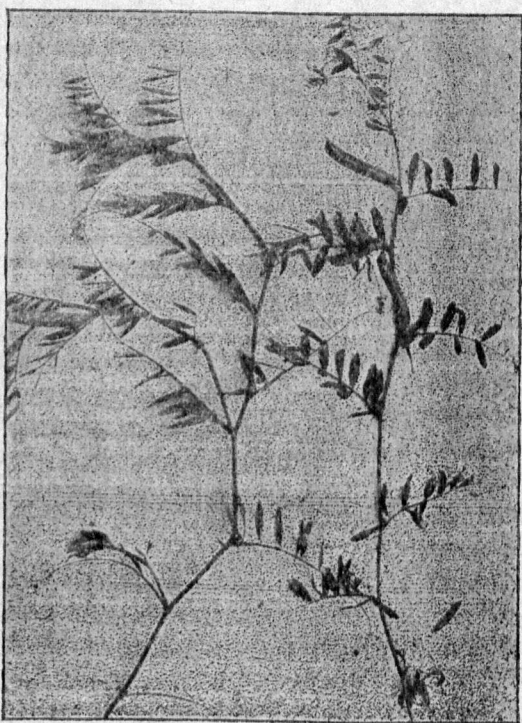


PLATE VII.

SMOOTH VETCH (*Vicia sativa*), about one-fourth natural size. Stem on the left has blossoms; the one on the right the ripened pods.

ers the ground, and in the middle of March it would probably make a ton and a half of dried hay per acre on moderately good land. But as this season of the year is unfavorable for

hay making the plant can only be used for grazing and green feeding. The seeds mature in May and will remain on the ground all summer and germinate the following fall. Unless it is grazed off too close it will spread in spite of the most obstinate weeds. It is easy to get rid of, however, by plowing. In as much as this is purely a winter plant, and we are in need of something to furnish winter pasture, it is recommended for more extensive trial. It is best sown in well prepared land in September or October.

HAIRY VETCH (*Vicia villosa*).

As the name implies, this plant is closely related to the preceding, but the leaves and stems are hairy. It produces equally as good a growth and at about the same time as *Vicia sativa*, and the general remarks about the smooth vetch will hold good for the hairy vetch. The hairs from the plant are more or less disagreeable in handling the hay, which is a consideration to its discredit. This plant, sown in '92 at Audubon Park, has escaped cultivation and established itself on the ditch banks, where year after year it appears, growing luxuriantly. It therefore might be incorporated with success upon some of our permanent pastures, affording winter grazing to the stock. It is highly recommended by Mississippi station.

WILD VETCH (*Vicia Caroliniana*).

This plant grows native in Louisiana, coming from seed. It begins to grow in the early fall and by December has produced enough vine to cover the ground. It continues to grow all winter and matures seed in May, after which the plants die down and nothing more is seen of them till September or the early part of October. The vine is very similar to the smooth vetch (*Vicia sativa*) that is cultivated. The hay from this plant is possibly as good as any of the vetches, but it is not of the most desirable quality. The commendable character of the vetches is that they grow in the winter time when most hay crops are dead.

Vicia leavenworthii, a wild vetch, distributed by the Department of Agriculture. The seeds are said to have come

from Texas, where the plant makes a very luxuriant growth. The seeds received were not fertile and no plants were secured.

PIGEON PEA (*Cajanus Indicus*)

has been cultivated for four year. The plant makes a very fine growth, but becomes too woody to be used for fodder, unless the plants stand very thick on the ground. It grows off slowly for a couple of months, when it begins a more rapid growth, and when sown in the spring will attain a height of ten or twelve feet before frost. If the plants are two or three feet apart they will attain a height of fifteen or more feet, and a diameter of four or more inches. As the plant does not blossom till October or November the seeds can not be matured in the field in the greater part of Louisiana. Plants transplanted to boxes and protected from frost were kept till they were three years old. It seems that there is but one possible use for this plant in Louisiana. In the extreme southern portions of the State, where severe frosts are rare, it might be of service in pasture as furnishing a constant source of excellent browsing for stock, and at the same time serve as a nitrogen gatherer to the soil. It is a deep rooted plant and the roots abound with root tubercles formed by the nitrogen-gathering bacteria.

A letter from Mr. Lyster H. Dewey, assistant botanist of the Department of Agriculture at Washington, will explain the origin and use of the plant in other countries:

U. S. DEPARTMENT OF AGRICULTURE, }
Division of Botany, }
Washington, D. C., January 25, 1898. }

Prof. W. R. Dodson, Experiment Station, Baton Rouge, La.:

Dear Sir—Your letter of January 7th, containing further information in regard to the yellow-flowered leguminous plants, has been received.

I have examined the plant further and find it to be pigeon pea (*Cajanus Indicus*). It is not known with certainty where this plant is native. It has long been cultivated in India, where it is second in importance to the chick pea (*Cicer arietinum*). According to the Botanical Magazine its seeds are used for food by all classes in India. They are commonly cooked with rice. The wood is used for fuel. The charcoal is regarded as especially adapted to the manufacture of gun powder and the young shoots and leaves make excellent forage.

The plant is widely distributed in cultivation in the tropics and is generally known under the names pigeon pea and doll; the latter proba-

ply comes from the Indian name dal or dal urur. Two varieties are recognized in the West Indies. One (*C. flavus*) is called the no-eye pea and the other (*C. bicolor*), is called the Congo pea. The former with yellow flowers and greenish or brownish pods, agrees with the specimen which you send. The Congo pea is a coarser variety with reddish flowers and reddish spots on the pod. The two forms are probably horticultural varieties of one species.

The plant has been naturalized on No Name Key and adjacent parts of Florida, and the people there used the beans for food.

Very truly yours,

LYSTER H. DEWEY, Assistant.

LABLAB BEAN (*Dolichos lablab*).

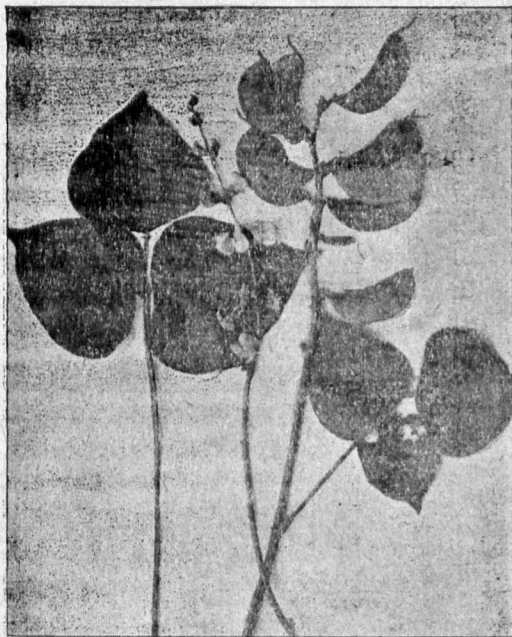


PLATE VIII.

LABLAB BEAN (*Dolichos lablab*), showing leaves, flowers and fruits, about one-sixth natural size.

Probably of rather ancient cultivation in the East, but known in this country only as an ornamental plant. One variety is used in many places for trellis and for covering arbors. The vines look quite a good deal like the garden butter beans,

though the seeds are quite different. They are of moderate size, have a very large seed scar, in color may be white, brown or black. The variety with black seeds seems to do the best here. They produce a very heavy crop of vines, but are a little slow in starting off, though they continue to grow till stopped by frost or long after all the leaves of cow-peas are dead. The lablab beans seem to be rust proof for the rusts that are found here at present. This is a very strong point to be considered in favor of the plant. Considered from the standpoint of growth I believe it superior to the cow-pea. Its greatest drawback is that the seeds are not easily gathered. There are only three or four in a pod and the pods cling to the vine with great tenacity. If the seeds were gathered by hand from the plants it would probably cost twice as much to gather them as it does cow-pea seed. They are not as readily shelled out, but this is a small matter. Where seeds are to be planted in late summer, I should say that cow-peas are the best thing to be planted. When the planting is to be done in the spring or early summer, the lablab bean is better than the cow-pea, because it will not drop its leaves in late summer faster than it produces new ones, and in the course of the season will produce more vegetable matter and enrich the land more than the cow-peas. In curing, they hold the leaves better than cow-pea vines and make just as good hay.

GRAM PEA [GREEN] (*Dolichos mungo*).

This plant is of ancient cultivation, but is little known in this country. It grows a good deal like the cow-pea, but is not so much inclined to produce long vines. It grows rapidly and matures quickly, producing a large quantity of seed, as well as a good yield of hay. The seeds are more easily collected than those of the cow-pea from the fact that they will mature and remain on the vine perfectly sound till a large quantity have ripened, then the whole crop can be harvested and the seeds threshed out. The pods are from two to four inches long and contain from five to fifteen seeds, of an olive green color, flat at both ends. In the number of bushels of seed, they will probably yield more than the cow-pea, but in

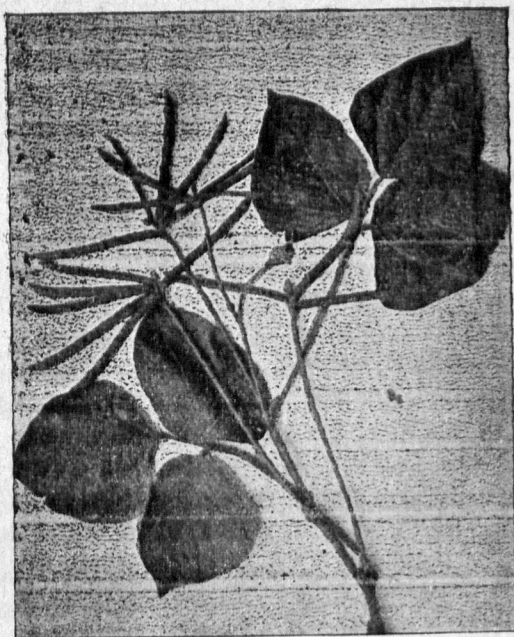


PLATE IX.

GREEN GRAM PEA (*Dolichos mungo*), one-fourth natural size, showing upper portion of stem, with fruit and leaves.

hay a little less. As a soil restorer, it is probably almost as good as the cow-pea.

GRAM PEA [BLACK] (*Dolichos cultratus*).

Resembles *Dolichos mungo*, but has black seeds, grows a little less luxuriantly, but ripens its seeds earlier. If the seeds are shattered from the pods in harvesting and are plowed in about the first of September, another crop of plants will be produced that will make a fair yield of hay. Cow-peas can not be planted this late with any certainty of gathering a crop. This would be about the only thing in which it stands on a par with the old stand-by, the cow-pea. It is a quick growth and should be used only where a short crop is desired.

Both the black and the green gram have been more or less extensively cultivated in European countries.



PLATE X.

BLACK GRAM PEA, showing the upper portion of a stem with flowers, fruits and leaves. About one-fourth natural size.

ST. HELENA WILD PEA (*Phaseolus helvolus*)

is a legume of considerable promise that was taken from the wild state in St. Helena parish by the director of the stations several years ago. It has been under constant cultivation since and seems to be a valuable addition to our list of forage and renovating crops. The stems and leaves are not as smooth as those of the cow-pea, but are fully as large and produce as much foliage. The vines grow to considerable lengths and



PLATE XI.

ST. HELENA WILD PEA (*Phaseolus helvolus*, var), showing the upper portion of a stem with fruit and leaves, about one-fourth natural size.

have rather short internodes, so that each vine has a large amount of foliage. The seeds are kidney shaped and three-eighths of an inch long. The seeds being smaller than those of the cow-pea, it requires less quantity per acre for planting. It matures its seeds late in the fall.

As stated above, it grows wild in some parts of the State and is therefore a very hardy plant. When the seeds are allowed to ripen and fall on the ground many of them will re-

main over winter in a sound condition and germinate the following spring.

The quality of hay seems to be very good indeed, and the vines cure easily, stock like the hay, and in every other way it seems to be a valuable plant.

A limited quantity of seeds can be supplied in small packages from the Station, and it is recommended for trial throughout the State.

FENUGREEK (*Trigonella fenum græcum*).

This plant is cultivated in Europe, where it is used to mix with food for cattle and horses, and is said to increase the appetite and improve the appearance of the hair and skin. It is used as an ingredient of "condition powders." The plant grows fairly well, and when the stems are cured has a very pleasant odor, but the seeds do not mature. It could hardly be said to be worthy the attention of the farmer.

Cytisus poriferus albus.

An African fodder plant, distributed by the department of agriculture for trial, does not promise to become anything of value here.

BROOM—SCOTCH BROOM (*Genista scoparia*).

From planting seeds two years, only one plant has been secured that promises fair to live. The twigs are said to furnish good winter browsing for sheep. It is more of historical than of practical interest. The broom is the badge of the Plantagenets adopted by Henry II and borne by the rest of his race. Plantagenesta, the name of the plant, giving the family title of Plantagenets, figured on the seal of Richard I.

BIRD'SFOOT TREFOIL, YELLOW TREFOIL, SWEET TREFOIL (*Lotus corniculatus*).

This is a small clover-like plant with stems hugging close to the ground. It does not get tall enough to cut for hay. It might do fairly well for pasture for sheep.

LENTILS (*Lens esculenta*).

This leguminous plant forms an important article of food

and is more or less extensively cultivated in some parts of the Old World. It is said to be an excellent food for fowls. It has been planted three years at the Station, with unsatisfactory results. It is not likely that it will prove of any value in this State.

LUPINS.

The following were planted: *Lupinus albus*, *L. atroviola-ceus*, *L. Cruikshankii*, *L. dunnettii*, *T. superbus*, *L. hartwegii*, *L. caelestinus*, *L. hirsutus*, *L. ruber*, *L. luteus*, *L. mutabilis*, *L. nanus*, *L. polyphyllus*, *L. pubescens elegans*, *L. subcornosus*, *L. sulphureus*, *L. tricolor elegans*.

All of the above have large stems and a limited number of leaves that dry up, leaving nothing but stems when the plant is cut for hay. The seeds have to be gathered as soon as ripe, or they will germinate or decay the first rain that falls on them. They are of practically no value here for forage, hay or seed, and can hardly be classed with the attractive ornamental plants.

SAINFOIN (*Onobrychis sativa*)

Used in France as a forage plant; has been grown for three years with unsatisfactory results. It grows slowly and the stems spread so close to the ground that it could not be cut satisfactorily with a machine. It would be choked out by native grasses were it not worked with the hoe.

HORSE BEAN (*Vicia faba*).

This is a plant of ancient cultivation in some parts of Europe, especially for use as a fodder plant. The stems are erect, rather large and succulent, stems and leaves both smooth, seeds large and flat. This plant is being planted to some extent in the gardens of the Italian population. It seems to do well if planted in the fall, but not in the spring. The plants from the spring planting soon turn black after the pods are well formed, and a small per cent. of seeds are matured. It will doubtless be a valuable winter and early spring plant.

FLAT PEA (*Lathyrus sylvestris*).

It has not been long since the papers were sounding the

praises of the flat pea (*Lathyrus sylvestris*) as it grew in Europe, and the very flattering prospects of its development in America. It has not proved a success in Louisiana. It requires one or two years of careful nursing before it gets a start, and then it does not flourish as it is said to do in the other country. The seeds are still advertised for sale by seedsmen, but he who buys will be disappointed if he expects much of it.

Lathyrus hirsutus, planted several years ago at Audubon Park, has escaped cultivation and is now well established on the ditch banks, where it appears in great luxuriance every year. It comes up in late fall, growing all winter, and fruits in spring, after which no more is heard of it until the following fall. It promises to become well established throughout South Louisiana, and appears to have decided merit as a forage crop.

FURZE, GORSE (*Ulex Europea*).

This is a spiny shrub from Scotland, where it is often put through a crushing process and used for hay. It is also used in some parts of this country for a hedge plant, but it is not suited to Louisiana. Very few plants survive the summer.

MEXICAN CLOVER (*Richardsonia scabra*).

This is not a clover, but resembles the latter in its habits of growth. It is annual and a native of Mexico, and has become thoroughly naturalized on the pine lands of East Louisiana. It comes up like crab grass in the cultivated fields after the crop is harvested or laid by, making its best growth late in the season. It is of little use as a pasture, but when cut for hay often yields one to two tons per acre. It is usually, however, mixed with crab grass, and is of a good quality. It makes a heavy growth during the fall, and if uncut furnishes an excellent covering for the ground in winter. It is especially at home upon light sandy soils.

JACK BEAN, OVERLOOK BEAN (*Canavalia gladiata*)

produces a very large vine, almost shrubby toward the base, has very large pods twelve to fifteen inches long, with seeds about an inch long. This plant is said to be held sacred by

the Indians of Jamaica, where they plant it in their gardens to protect their crops. While the plant flourishes here it is hardly probable that it will become important to the agriculturist. It makes a good ornamental plant for trellis.

Canavalia ensiformis has more of a bushy stem than the above, the seeds are smaller and white, but are not good for table use. This plant has been sent to the Station several times for identification. It is not likely that it will become valuable. The stems are too large and woody for hay, and the seeds are too hard for stock feed and are not good for table use.

SUNN HEMP (*Crotolaria juncea*).

A plant cultivated primarily for the fibre of its bark. It is a native of Asia. In India it is cultivated for forage. It makes an excellent growth in Louisiana. The leaves are small and when dried constitute a small part of the weight of the plant. It will probably never have very much claim for cultivation for forage or hay in Louisiana, and experiments at Audubon Park would indicate that it is in this State a poor fibre plant, a fact greatly to be regretted since it is a leguminous crop, and might have supplied fibre and soil fertility simultaneously. It should be sown very thick to prevent the stems from branching.

SUPPLEMENTARY NOTES.

THE COW-PEA, *Dolichos sinensis*, has been fully treated in bulletin No. 40 of this Station, and for that reason this important leguminous plant will receive notice here in a supplementary way. We wish only to give the results of further investigation as to the variability of so-called varieties. The subject of varieties is discussed in the bulletin above referred to, in pages 1446-1450. Special observations have been made on the variability of a few forms, where care was taken to preserve all the seed variations. These particular varieties were selected because they were prolific bearers and the color of the seed would make it easy to detect

any variation in this character. The variations were much more rapid and decided than was anticipated, as will be seen from the following :

The Chocolate Cow-Pea was the first selected. The seed of this variety are brown over about one-half the surface, while the remaining portion is white. The brown always surrounds the eye of the seed and extends over the end next the outer end of the pod, when the seed is in its natural position.

In looking over a quantity of seeds some were found that had more brown than white on the surface, while others had more white. These were planted to themselves and carefully cultivated and harvested. In examining the product of this harvest from the seeds with a maximum of brown, some seeds were found that were almost entirely brown. In the seeds from the planting of seeds with a maximum of white some seeds were found that were almost white save a small brown eye. A majority of the product from each plot were nearer the ordinary type of the regular stock. The seeds showing a maximum of white were again separated, as were also those showing a maximum of brown, and planted the next year. From this planting the variations seemed intensified and every stage between a white seed with a small brown eye and a seed entirely brown could be selected. Such a selection was made and placed on a card and photographed, and is here reproduced in the first line at the top of the page in Plate XII. Beginning at the left side of the page and going toward the right it will be seen that the amount of brown increases till there is nothing but brown on the surface of the seed.

It is highly probable that in a few years one may be able to entirely eliminate the brown eye, if careful selection is continued. On the other hand, the brown seed can doubtless be made fairly permanent, at least as permanent as any of the recognized varieties when the stock has been maintained for a number of years by eliminating all seeds that do not represent the pure brown color. Again, it is very highly probable that any other seed here represented might be made to become fairly constant.

The second line of seeds in Plate XII was secured from

the harvest from planting seeds about like the fourth, fifth and sixth seeds in the line above. The seeds shown toward the center of the second row also have a tendency to assume a flatter form with a greater circumference. In fact they look very unlike the ordinary chocolate pea, and may possibly form a new and distinct variety, as they are quite different from any known to the writer. That is, they would be as much entitled to the name of variety as many others.

Green Collard Cow-Pea, shown in the third row from the top in Plate XII, presents every shade from a dirty-white to a blue-black. Unfortunately the contrast does not show as nicely in the photograph as it does to the eye. The normal seed of this variety is a dirty-white with dark stipple-like dots, giving it a darker color about the eye. It was noticed that some of these seeds were a little darker than others, and some of the darkest ones were selected for a separate planting. As a result from this harvest some seeds were obtained that were considerably darker than the ones planted, while others were not as dark, the majority returning to the ordinary color of the normal seed.

Again the darker seeds were selected for a second planting, and the seeds selected for the photographs are from this crop. Every shade from a dirty-white seed with a darker eye to that of the blue-black seed is present. The shades of color do not seem to have the same value on the photographic plate that they do to the eye, but by noting the contrast of the portion about the eye it can be traced to the vanishing point toward the left end of the row with moderate satisfaction. The black seed at the extreme right is different from any of the ordinary black peas. No doubt it may become constant in this character if carefully selected for a number of years. The same may be said of any other grade produced, so that one might say any seed here represented might be developed into a fairly constant form.

The Saddle Back Cow-Pea has a seed coat of red and white. It seems to be as constant in its characters as most any of the other forms. However, one occasionally finds a seed with more brown than white or more white than brown. A few such seeds were selected and planted by themselves and the

product harvested. A selection from the first year of such planting is represented in the fourth line from the top in Plate XII, excluding the last three seeds in the line. Passing to the right it will be seen that the amount of white surface diminishes, till in the last one there is a mere speck of white on one side. Judging from the results already given this seed will soon give rise to some that will lose the white entirely. On the other hand, we may be able to obtain a white seed with a red eye.

The last three seeds in the fourth row, Plate XII, show the Extra Early Brown Eye and the Black, and a cross between the two. The middle seed being the cross. It is a blue granite color.

Variations in shape of seeds are quite marked when seeds are selected that have deviated somewhat from the normal form. The fifth line in Plate XII shows the results obtained from such a selection. These are seeds of the Green Collard, chiefly selected from the seeds that were inclined to become much darker than the normal type.

The last row in Plate XII was selected from the Coffee Cow-Pea. The same method of selection and preservation as described for the Chocolate was observed in this case. It will be seen that the result is very much the same as that obtained from the Chocolate.

The variable nature of the stem has been treated in bulletin No. 40, and it will receive no further consideration here.

It will readily be seen that many of the connecting links between some of the varieties will reappear under favorable conditions, and we can readily understand how many of the varieties may possibly have been originated by someone who carefully selected the seeds with the idea of producing that variety.

Notwithstanding these facts the seed must be an important character in describing any variety, for the color and shape of the seeds is less variable than other characters. The observations here given simply show that it is not a difficult matter to produce striking variations in the character of the seeds, and that a definite and precise classification of the different kinds of cow-peas is impossible. There are probably only a few kinds that have become well enough established to rank as true varieties, but some of the fluctuating forms may some time become fully established.

FORAGE PLANTS, EXCLUSIVE OF GRASSES AND LEGUMES.

ARTICHOKE, *Helianthus tuberosus*.

The ground artichoke has been cultivated here for several years: It is very well adapted to this climate, and makes an excellent crop for hogs. The plants are cultivated like corn, and the hogs are allowed to gather the crop. The artichoke will not make as many bushels of tubers to the acre as the Irish and sweet potato, and it is doubtful if the food value is as great as either.

BURNET, *Poterium officinale*,

a native of England, cultivated in Europe and Eastern United States for flavoring soups, dressings and salads. It is also used as a forage crop, but is not very well suited for the purpose. It grows well here, but the seeds are not easily germinated.

BUCKWHEAT, *Fagopyrum esculentum*.

Buckwheat is commonly cultivated in many parts of the United States. It is not thoroughly adapted to Louisiana, but will produce a moderate amount of green forage in a very short time if sown in the early fall or spring. Sometimes it does not mature seeds well here.

CASSAVA, *Manihot aipi*,

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

sweet potato will yield as much per acre as the cassava, we consider it preferable, for the same purposes that the cassava roots would be used. From the cassava is gotten the Tapioca of commerce.

Iris pabularia.—This is a plant used for fodder, said to withstand a very dry climate and make a good quality of hay. The seeds are not easily germinated, and the plant does not do well here.

MADDER (*Rubia tinctoria*)

has been cultivated from seeds for two years. When it is cut in blossom it is said to make a good hay. The roots yield a red dye. Very little can be said in recommendation as a farm crop. It is hard to get a good stand, the stems are large and the leaves small, and the hay is not very attractive. The dye made from the roots is not in demand enough to warrant its culture for the roots.

RAPE (*Brassica campestris*),

which resembles the cabbage, but does not form a head, is cultivated in the North for winter grazing. It has been planted for several years at Baton Rouge with very gratifying results. If sown in September or early October it soon produces a heavy crop of leaves that afford good grazing, or they may be cut and fed, and if the stems are not cut below the bud, a new crop of leaves will be produced. It furnishes a supply of food material in the green form at a time of year that such feed is very scarce with most farmers. It is certainly worthy of trial as a winter crop.

SACHALINE (*Polygonum sachalinense*)

was obtained from the California Experiment Station. It is a member of the dock family, and multiplies rather rapidly by sending off side shoots which take root and send up new stems. It was thought that this plant would become a valuable fodder plant. It does not make the luxuriant growth here that is said to be characteristic of it in the West, although it has been on rather rich soil. It has been grown here for three years. It is perfectly hardy and puts up a vigorous tender growth in the early summer, but seems to stop

its growth almost entirely by midsummer. After the tender shoots are produced in the spring they rapidly become woody and hard and undesirable for feeding purposes. It would seem that sachaline has no special features to recommend it in Louisiana. So far as tested it does not make a hay that is attractive to stock, and they will not eat it green when grass is to be had.

SALT BUSH (*Atriplex semi-baccatum*).

The seeds for a small plot of this plant were obtained from the California Experiment Station in 1895, and have been grown on the experiment grounds at Baton Rouge for three years. It is being used in the West for reclaiming the alkaline lands, where few plants will grow. This plant seems to have become a favorite in alkaline districts, where it is said to reduce the alkalinity till other agricultural plants will thrive on the previously barren soil. It makes a good hay and furnishes good grazing. It makes a good growth in this State on soil that is not strongly alkaline, but as it is not more desirable than some of the common plants already in use here, it is not recommended for general use as a plant to be cultivated on the farm.

SUNFLOWER (*Helianthus annuus*).

A number of varieties do well here, but for a heavy yield of seeds or stems none surpass the Large Russian. The seeds are good food for horses and reputed to be especially good for poultry. The leaves are eaten green by cows and horses and make a fair quality of forage. The stems are too large for fodder. The seeds are sometimes ground and pressed into cakes and sold for feeding purposes. The seeds are planted like corn except that they are drilled thicker in the rows. They require about the same cultivation as corn. Two crops can be harvested each year. They will yield from 30 to 50 bushels per acre.

It would probably be to the interest of every farmer to raise enough sunflower seed for poultry feed, but we do not recommend an extensive crop of it.

SPURRY (*Spergula arvensis*)

is recommended by seedsmen as a desirable plant, furnishing good grazing, especially for sheep, and when cut, yielding a good quality of hay. It has been tried at Baton Rouge all seasons of the year, with unsatisfactory results. It produces a very quick growth and a moderate yield, but stock do not seem to be fond of it. When it is planted in the fall it grows rapidly for a few weeks and begins to make seed, and is killed by light frost. The stems are weak and the plant falls over on the ground, and could not be cut well with a machine. If there were not plenty of other plants that make such heavy yields here, spurry might be cultivated to advantage. :

There is only one instance when this plant could be recommended for cultivation in Louisiana, and that is when one has land that might lie waiting for a month after plowing with nothing on it. If spurry is sown it will give a crop in a month from the time of sowing, and if one has cultivated the land and expects to let it lie, a crop of spurry would more than pay for the seed.

TARWEED (*Madia sativa*).

The natives of Chili are said to have cultivated this plant before the discovery of America. They extracted an oil from the seeds, and the cultivation was chiefly for this purpose. It is now cultivated to some extent in this country and in Europe, where the oil is expressed from the seeds and the residue made into cakes and fed to cattle. It is similar to cottonseed cake. It is also claimed that the green plants furnish excellent grazing for sheep. The plant does fairly well here, but it is hardly probable that it will ever become a paying crop.

ECONOMIC PLANTS EXCLUSIVE OF HAY AND FORAGE.

BENE (*Sesamum orientale*)

has been cultivated for several years with good results. The seeds of this plant yield an oil of commercial value. The leaves possess medicinal properties. It is easily grown and a very heavy crop of seed is produced.

BORAGE (*Borago officinalis*),

a very rough hairy plant, with large clusters of blue flowers, which render it quite ornamental. The leaves are sometimes used to make a cooling drink called "Cool Tankard," which is said to be refreshing. The plant grows well only during the cool weather and should be planted in the fall or early spring, preferably in the fall.

CANNAIGRE, OR TANNER'S DOCK (*Rumex hymenosepalus*),

a plant now being cultivated in the Western States for the production of tannin. It is rapidly becoming an article of considerable commercial importance. The plant does moderately well here. The quality of the roots, measured by the quantity of tannin contained, has not been determined. It is very probable that this plant will never become of commercial value in this State, our climate being entirely too humid.

CASTOR OIL PLANT, CASTOR BEAN (*Ricinus communis*).

During the last few years quite a number of letters have been received making inquiry about this plant and its cultivation in Louisiana. It is grown more or less extensively in the central United States for commercial purposes, but in the

South it is only an ornamental plant. Several varieties grown at Baton Rouge have given a good yield of well developed seeds, ripening from July to October. At present there is no market for the crop without shipment to very distant points. There is a tendency to develop excessive foliage at the expense of a heavy crop of seeds, and whether or not it would be profitable is still a question.

CHERVIL (*Scandix cerifolium*),

an umbellifer, common in Eastern gardens, used as a salad and for flavoring meats and dressing. Seeds have been planted for three years, but no plants have been brought to maturity.

CHICORY (*Chicorium intybus*),

a perennial of the composite family, native of Great Britain and now grows wild over most of Europe and the Eastern United States. In many localities it has become a weed that is not easily eradicated. It thrives in Louisiana but there is little probability of it becoming desirable. The blanched leaves are used for salad, though not extensively.

The green leaves make a fairly good pot herb. The chief value of the plant is in its roots, which are dried and baked and used for mixing with coffee. Many claim that it imparts an agreeable and desirable flavor to the coffee. The best qualities are said to come from Belgium and Holland, where it is extensively cultivated. It is not yet extensively cultivated in the United States, but the industry is receiving some attention and may become important. We believe Louisiana would produce an excellent quality of chicory and give large yields per acre.

DANDELION (*Taraxicum dens leonis*),

a common weed of the Northern States, the leaves of which are cooked for a pot herb. The roots yield an extract which is officially used as a diuretic and aperient. It is supposed to act especially upon the liver. By some the roots are used with coffee the same as chicory. It grows well here when cultivated, but will not likely become a weed, as the native grasses and weeds crowd it out during the summer.

SALSIFY, OYSTER PLANT (*Tragopogon parrifolius*),

a biennial cultivated for the fleshy roots, which are shaped like a carrot, but are smaller. When properly prepared the roots have the flavor of baked oysters, hence the name of the plant. It is also said to contain a principle which promotes digestion. It grows well and is easily obtained from seed. It should be planted in rich soil in the fall of the year. Plant in rows a few inches apart in the rows, and the rows far enough apart to allow cultivation.

POPPY (*Papaver*).

Several varieties. So far the attempts to grow poppies have not been attended with success. They may be grown with a moderate degree of satisfaction for the flower garden but not for commercial purposes, even if labor was cheap enough to compete with the opium-producing countries.

PROBOSCIS PLANT (*Martynia proboscidea*, *Martynia craniolaria*, *M. lutea*),

have all been cultivated very successfully. They are used for making pickles. The pods are gathered when small and preserved as are cucumbers. The chief object in cultivating them is for class illustration of the interesting adaptation for the dissemination of the seeds.

RAMIE (*Urtica nivea*)

is a very important fibre plant, or promises to become important. It finds a congenial home in Louisiana. The fibre produced is of an excellent quality. A report on the culture of this plant and the possibilities of its importance has been set forth in a previous publication by the Director. When machines have been perfected for decorticating, ramie growing may become an important industry in Louisiana.

RAMPION (*Campanula rapunculus*),

a native of England, where it is commonly cultivated for its running white roots. Efforts to cultivate it here have not been successful. It invariably dies as the hot weather of summer approaches.

RHUBARB—PIE PLANT (*Rheum compactum*, *R. palmatum*).

The Station has frequently received inquiries from parties who have come to Louisiana from the North, asking if rhubarb or pie plant would grow in this State. We have tried persistently to grow it but have not succeeded. The stems of the leaves are used for making pies and sauce, and the roots furnish an important drug.

TEA PLANT (*Thea viridis*),

from which the tea of commerce is made, grows fairly well in Louisiana. Plants have been in the botanical gardens for several years, are not at all injured by our winters, and produce a good growth of leaves. Under proper care they would probably produce a good quality of tea. The lack of cheap labor necessary to gather and cure the tea, the absence of experienced and skilled management prevents the development of the tea industry in this country. A bulletin has recently been issued by the Department of Agriculture of Washington, setting forth the possibilities of this industry, but whether capital will be induced to make the experiment of making American tea, remains to be seen. To those interested the publications from Washington Department of Agriculture are probably available.

TEASEL (*Dipsacus fullonum*).

A biennial plant of the teasel family. The flowers grow in cylindrical heads from two to six inches in length and from three-quarters to two inches in diameter. The flowerets are separated by large scales which are recurved near the apex, and taper to a sharp point which becomes hard and tough at maturity, affording a comb which is very serviceable to the fuller. It is said to serve better than any mechanical contrivance for bringing up nap in the dressing of broadcloth. For this purpose it is cultivated in European countries. It grows excellently here, producing a great abundance of fine large combs.

ENDIVE (*Chicorium endivia*).

This plant is probably a native of the Mediterranean country, but has of recent years grown in popularity in other countries. In some parts of the United States it has been a favorite for many years. The "broad leaved," the "green curled" and the "white curled" have been tried. None were very satisfactory, though with great care and attention a good plant may be obtained from any.

ESPARTO GRASS (*Stipa tenacissima*),

which is grown in the Mediterranean country for making rope, does not do well here.

FLAX (*Linum usitatissimum*),

from the fibre of which linen is made, is grown as a market crop in many parts of the United States. The plant does very well here and could possibly be cultivated successfully for the market. Access to market being remote and a proper understanding of methods of culture and handling not being understood by our farmers, it will probably not be introduced unless greater inducements are offered for its culture.

ICE PLANT (*Mesembryanthemum crystallinum*),

cultivated mostly as a curiosity. The leaves appear frosty in the sunshine. It is sometimes cooked as a salad. The burned ash of the plant gives an alkali used in glass making. It makes a good start from the seed, but dies before the summer has far advanced. Probably in a dryer soil it would do better.

JUTE (*Corchorus capsularis*) and (*C. olitarius*).

Is now extensively cultivated in Southern and Western Asia and Northern Africa. It is of ancient origin as a cultivated plant. The fibre is used in the manufacture of a great many textiles and in the adulteration of hemp and silk. It is also used in the manufacture of many sundry articles. The pulp of the leaf possesses medicinal properties. The fibre is an article of considerable commercial importance, and as it thrives in Louisiana it may sometime be cultivated on a commercial scale, with good profits. See results of trial as fabric plants at Audubon Park, Bulletin No. —.