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Agricultural Experiment Station,

OF THE

Agricultural and Mechanical College,

Auburn, Ala., - - - July, 1889.

Contents:

GRASSES AND THEIR CULTIVATION.

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BULLETIN NO. 6,

Agricultural Experiment Station,

Agricultural and Mechanical College,

AUBURN, ALA. - - - - - - JULY, 1889.

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PREFACE.

This bulletin is a revised form of the pamphlet on "Wild Grasses," issued from the Department of National History and Geology in 1886. The work has been carefully re-written and additions made of grasses that have been analyzed since the first edition was published.

The cultivation of forage plants is of such great importance to southern farmers and stock raisers, a knowledge of their growth and adaptation to certain kinds of soils and conditions is greatly desired. The present bulletin is therefore given to the public as an introduction to a series on forage plants growing wild in Alabama, that will be issued by the Station from time to time, with the hope that the information furnished will aid in stimulating the planters to renewed efforts to increase the acreage of pastures and the production of hay.

A glance at the list of grasses printed in this bulletin will show that a large proportion of the species growing wild in the United States east of the Mississippi river are to be found within the borders of Alabama. Not half of these have been tested to determine their values for stock-food. Some are known to be worthless, and so considered by most farmers. Many of those that are described in this work are so valuable that if properly cultivated they will supply all the hay needed for the stock of the State, and furnish ample pasturage through spring, summer and autumn.

During the past few years some agriculturists have found from observation and experiment that grass, when well cultivated, adds a large item to the value of the farm; and the question is frequently asked: how can this important stock food be best cultivated and adapted to the uses for which it was intended by nature, and what varieties are best suited for hay?

It is well known that Alabama, like many other Southern

States, requires more wheat, corn and hay than she produces. It is a fact also that large sums of money go out of the State each year to purchase food for men and beasts. A considerable item in this expense is to cover the demand for wheat, corn and hay, and yet the farmer, of this State, has on his lands the means for giving his stock excellent pasturage in a green, succulent state almost throughout the entire year. Plenty of hay will supply our markets with well fed mules, horses and cattle, and the rearing of animals will enrich the soil to increased production. The poor, thin mules and shadowy cattle to be found in so many localities are true evidences of the lack of cultivated grass fields. Cheap food is essential for the prosperity of our people, and this must be produced near the place of consumption. It will not do, therefore, to attempt to raise stock and buy all the hay from distant markets—the profits will be eaten up.

In the preparation of this bulletin liberal use has been made of the following authorities: "The Agricultural Grasses of the United States," issued by the Department of Agriculture; "Flint on Grasses," "Rural Enclyclopedia," "Loudon's Cyclopedia of Plants," "American Weeds and Useful Plants," "Darby's Botany of the Southern States," "Chapman's Flora of the Southern States," "Gray's Botanies," "Beal's Grasses of North America," and many agricultural and scientific periodicals.

The plates that illustrate this paper are copies of those issued in the Annual Reports of the United States Department of Agriculture.

GRASSES OF ALABAMA AND THEIR CULTIVATION.

P. H. MELL, BOTANIST.

Judicious management of pastures will bring in more money to the farmer than any other portion of his farm. The chief requirements for success in cultivating pastures are selection of the right kinds of good seeds, thorough drainage, where it is necessary, application of manures, and the careful eradication of all weeds, bushes, and useless plants. The question of drainage is of very great importance. The grass does not thrive near so well on wet land as on moderately dry soil. Moreover, when stock are required to eat grass growing on very wet marshy land they frequently suffer with diseases of the liver and other vital organs. The food is not so palatable as that produced on well prepared land. What is true concerning pastures holds also good concerning the making of hay for winter use.

Grass lands do not require rotation as with lands planted in other crops; but careful cultivation must be the rule. Suitable manures must be applied at the proper time, and the pasture must not be injured by permitting stock to graze too closely when the land is wet; and the grass must be mowed before it goes to seed so as to prevent the exhaustion of the energy and life of the roots.

When top dressing is to be resorted to it should be done in autumn, because when applied in spring the strength of the manure is lost, to a considerable degree, by the evaporation caused by the warm sun and March winds. In autumn, however, the rains soon wash the manure into the soil so that the roots of the grass can readily utilize the ingredients. Even under the best conditions for top dressing there is a loss in the value of the manure by the evaporation of the ammonia.

When compost or stable manure is broadcast over the land, it is best to mix it either with powdered charcoal or plaster,

so that the ammonia, and other volatile substances, may be absorbed and held ready for the plant as its needs demand. Phosphate of lime in the shape of ground bone, or one of the commercial fertilizers containing phosphoric acid and lime, will produce a luxuriant growth in grass. An excellent fertilizer is also obtained for grass fields or lawns by composting well rotted stable manure with leaf-mould obtained by raking the surface from the forests. Ashes or lime is a useful application once in three or four years, where the soil is not calcareous. It is well to give a top dressing of compost after each mowing, if the best results are to be obtained. This method of treatment will enable the rains to carry down to the roots a quantity of nutrition, and will prevent the ground from baking and getting dry and hot.

A reliable and careful observer states, that in preparing land for grass seed, the soil should be worked not less than two feet deep about the beginning of September, and thoroughly incorporated with well rotted manure. In the furrows, as deep below the surface as possible, should be placed long straw litter or rubbish, and the whole covered up and smoothed over. The straw will serve, not so much for manure as a means for retaining moisture during a dry season. The roots of the grass are thus induced to penetrate deep in the soil and will stand a much better chance for obtaining food for the rapid and luxuriant growth of the plant. As soon as the fall rains set in the grass seeds should be sown.

It is best to mix most grasses so as to give a continuous growth for pasturage, and also to permit of frequent cutting for hay. I give several formulæ, either of which will make good pasturage when seeded on well prepared land.

The formulæ give proportions to be used on one acre:

Blue grass (*Poa pratensis*) 16 quarts.

Timothy (*Phleum pratense*) 4 quarts.

Red top (*Agrostis vulgaris*) 8 quarts.

White Clover (*Trifolium repens*) 2 quarts.

If orchard grass (*dactylis glomerata*) is substituted for timothy and red top, one bushel will be required.

Timothy and clover make a good combination by using 14 to 16 quarts of the first to 8 quarts of the latter per acre. Timothy is sown in spring with barley or wheat and clover in

March or April with spring wheat. Light, dry soils require more seed than moist lands. Seed should not be spared if a thick growth of grass of fine quality is desired. In preparing the land for this mixture and all others it is always best to have it thoroughly cleared from all weeds.

Another mixture is as follows:

Red clover (*Trifolium pratense*) 8 lbs. or 4 quarts.

Timothy (*Phleum pratensis*) 8 quarts.

Red top (*Agrostis vulgaris*) 1 bushel.

When the land is unfavorable for clover, this seed should be omitted and the herds grass increased to 12 quarts and red top to 5 pecks.

A good formula for early and late pasturage is obtained by using the following:

Kentucky blue grass (*Poa pratensis*) 1½ bushels.

Texas blue grass (*Poa orachnifera*) 1½ bushels.

Another formula for dry land of medium quality:

Red clover (*Trifolium pratense*)	2 quarts.
White clover (*Trifolium repens*)	2 "
Blue grass (*poa pratensis*)	8 "
Red top (*Agrostis vulgaris*)	2 pecks.
Timothy (*Phleum pratensis*)	1 peck.

Red clover should be omitted on wet land and red top increased.

An excellent formula for making a permanent lawn is, as follows:

Red top, 1 bushel.

June grass, 2 bushels.

Orchard grass, 1 bushel.

White clover, ½ pound.

Formula for general pasture and stiff lands:

Orchard grass, 1¼ bushels.

Red clover, 12 pounds.

Killebrew recommends the following formula for worn out fields containing gullies, he says:

"The long creeping roots will swing down into the gullies and will soon put a stop to washes, and the immense herbage will, after awhile, renew the fertility of the soil."

Blue grass, 4 lbs.

Orchard grass, 4 "

Gama grass, 1 peck roots.
Bermuda grass, 1 " "
Means grass or Johnson grass, ½ bushel of roots.
Red clover, 8 pounds.

The above formula may be changed with considerable advantage by substituting other grass seeds for those mentioned, as for instance, Paspalum laeve may be used in place of red top. The following species may be also used as substitutes for the red top and timothy—Digitaria sanguinale—Panicum gibbum—Setaria glauca—Tripsacum dactyloides (gama grass)—Phalaris intermedia var angustata—Alopecurus pratensis (meadow foxtail)—Arrhenatherum avenaceum (Tall meadow oat grass)—Cynodon dactylon (Bermuda grass); this grass, however, yields better results when given the entire land to itself—Elusine Indica (crab grass)—Bromus uniloides—Elymus Virginicus (Lyme grass)—Panicum Texanum.

For winter use these formulæ may also be modified so as to contain either tall oat meadow grass [*Arrhenatherum avenaceum*], orchard grass [*Dactylis glomerata*], Italian rye grass [*Lolium Italicum*], wild rye grass [*Elymus*], and wild meadow barley [*Hardeum pratense*]. These grasses will thrive well on moderately sandy soils, but yield much better results when seeded on rich uplands. The special value of orchard grass consists in the rapidity with which it springs up after being grazed down by stock.

September and October are months in which economical planters will endeavor to make and save much hay. Grass should be cut while in bloom, because then the changes of the nutritive matters would be arrested and the hay retaining them would be in the best condition for nourishing stock. In curing, the grass should be exposed to the heat of the sun only long enough to expel the water and leave the other substances in the best condition. It is evident, therefore, the hay should not be exposed to dews or rains. Portions of the sugar or mucilage would be dissolved by moisture and little be left beside fibrous tissues. A clear sky and bright sun will cure hay very soon if it is frequently stirred. The hay should be dried just to such a point so that not enough water remains to cause fermentation when

housed. To prevent fermentation salt may be scattered over the hay as it is stored away, at the rate of four or five quarts to the two horse wagon load. When the seed ripens most of the sugar and mucilage have been changed and the hay is not so good. It is well to bear in mind that all dried grass does not compose hay; stock fed on hay cut while in flower and carefully cured will fatten almost as rapidly as when fed on green pastures.

There is a wide difference in the quantity of hay that should be fed to cattle. Some farmers give a fixed amount of all kinds of dried grass, hit or miss, in so far as the nutritive ingredients contained in the hay are concerned. Stock are thus sometimes scantily fed, because incorrectly cured hay may not contain enough food to satisfy them. In this day of scientific experimentation, the quantity of food measured to stock should be governed by the per centage of nutritive values the chemical analysis proves the food stuff to contain. Most farmers and stock raisers are rapidly becoming familiar with this idea, and greater demands are being made each year upon the scientific investigator for additional information upon this important subject of food.

Before entering upon a practical study of the grasses, there are a few terms it will be necessary for all parties to become familiar with, who expect to cultivate grasses for forage purposes. I have thought it best, therefore, to place here the definitions of some of the terms in most common use among botanists in describing grasses. In the body of this paper I have attempted to use as few scientific names as possible, but some are necessary, and I trust my readers will not become discouraged when they meet with them. The terms and definitions given below have been copied mostly from Gray's Botany.

Awn; the bristle or beard of barley, oats, etc., or any similar bristle like appendage.

Culm; the stem of grasses.

Floret; a diminutive flower.

The florets that are arranged on the culm in panicles, spikes or racemes, have neither calyx nor corolla, but instead are supported by two sets of bracts, the outer set being called the *glumes* and the inner set *paleae*. On one glume is sometimes to be found a slender filament called

an *awn.* In many grasses, however, these awns are wanting and the absence or presence of the awn, together with its position and shape are all used in connection with other features, to designate the species of the grass. Stamens (fertilizing organs) and pistils (seed forming organs) are found in each floret, sometimes both are present in the same floret, and sometimes only one set of a kind in each floret, just as is noticed in other flowering plants.

The stamens are generally in threes or multiple of threes.

Glume; the husks or floral coverings of grasses, or, particularly, the outer husk or bracts of each spikelet.

Keel; A ridge on the palea or glume that resembles the keel of a boat.

Inflorescence; the arrangement of flowers on the stem.

Ligule; the little membranous appendage at the summit of the leaf-sheafs of most grasses.

Palea; chaff; the inner husks of grasses.

Panicle; an open cluster of flowers.

Pistil; the seed bearing organ of the flower.

Rootstock; root-like trunks or portions of stems on or under ground.

Sheath; the base of such leaves which are wrapped around the stem.

Spike; an arrangement of sessile flowers along a stalk.

Spikelet; a small or secondary spike.

Collecting and preserving grasses.

This work is necessary for the proper study of plants, and it is of great importance that the specimens should be collected while in full flower, for in determining the species of any grass recourse must be had to the flower and seed, because no other portion of the plant offers such little changes in form and structure. At the same time leaves, culms and roots are valuable to the analyst to enable him to correctly name the species, and care must be taken to obtain the entire full grown plant for examination and preservation.

The botanical analysis of plants require the knowledge of an expert botanist, but it is hoped that with the assistance of the descriptions and excellent illustrations contained in this bulletin, the intelligent farmer of Alabama will have but little trouble in distinguishing between the more common grasses that grow wild in the State. Analyses are necessary in pronouncing upon the value of the plant for forage purposes, because some grasses that look attractive to the eye are worthless when used for stock food. On the other hand, some of our most nutritive grass-

es are quite course looking and unattractive. If at any time difficulty is met with in determining the name of any grass, samples may be sent to the Botanical Department of the Experiment Station, and information will be furnished free of charge. The plants should be mailed in accordance with instructions contained in Bulletin No. 1, extracts from which are here given:

1. In the case of an herb or grass the entire plant must be sent including roots, stem, leaves, flowers and, if possible, the fruit also. Select fifteen or twenty vigorous, well grown specimens and place them between sheets of thick unsized paper, taking care to spread the leaves and adjust the flowers so that only a small proportion of the parts are folded and bent out of shape. Place a pressure of 30 or 40 lbs. on the paper and place aside to dry. When the plant is too long for the size of the paper, bend the stems until reduced to proper proportions.

2. Take careful notes of the plant surroundings. The character of soil, whether found on up land or low land, moist or dry land, forest or field, time of flowering and seeding, etc., height of plants. State whether the plants are in large or small numbers. Are stock known to eat them, etc.

3. In sending specimens through the mail or by express do not roll the papers, but pack them spread out as they come from the press. Lay the sheets containing the plants one on top of the other; place at the top and botton of the package stout paste board. Wrap all with strong paper and address to Experiment Station, Auburn, Ala., (Department of Botany.) In every shipment send notes, name and post office.

The grasses are best collected between the first of May and the first of October. Many plants mature their seeds by the first of June, and they must be collected early in the spring, just as soon as the flowers are formed well.

The following is a list of the grasses that have been found growing in Alabama, many of which have been analyzed in the Botanical Laboratory during the last few years. A number of these grasses are not natives of this State, but are nevertheless naturalized and may be found growing in a wild condition:

LIST OF GRASSES.

Scientific Names.	Common Names.	Time of Blooming	Place of Growth.
Alopecurus geniculatus, *L.*	Floating foxtail	May-June	Wet meadows.
" pratensis, *L.*	Meadow foxtail	May	Fields and pastures.
Agrostis perennans, *Pucl.*	Thin grass	July-Aug	Moist, shady places.
" scabra, *Willd.*	Rough bent grass	July	Sandy soil.
" vulgaris; var. alba.	English bent grass	"	Fields and pastures.
" arachnoides, *Ell.*	Spider bent grass		Dry soil on sea coast.
Aristida gracilis, *Ell.*	Slender 3 awned grass	Sept.	Sandy fields.
" lanata, *Poir.*		Aug-Sept.	Sandy soil.
" purpurascens, *Poir.*	Beard grass, 3 awned grass	Aug.	Dry soil.
" purpurascens var. palustris, *Chap.*		Aug-Sept.	Margins of pine barren ponds.
" virgata, *Prin.*	Beard grass	August	Dry soil.
" spiciformis, *Ell.*		Aug-Sept.	Pine barrens.
Arundinaria macrosperma, *Mich.*	Cane	February	Banks of rivers.
" tecta, *Muhl.*	Reed	Feb-Mar.	Swamps.
Arrhenatherum avenaceum, *Beauv.*	Tall meadow oat-gras'	June-July	Fields and pastures.
Avena fatua, *Linn.*	Wild oats	June-Sept	
Anthaenantia villosa. *Beauv.*	Smaller crab grass	May-Oct.	Cultivated grounds.
Andropogon clandestinis, *Hale.*		Sept-Oct.	Wet or dry sandy soils
" dissitiflorus.	Virginian beard grass	" "	Barren soil.
" furcatus, *Muhl.*	Finger spike grass	"	Open woods.
" macrourus, *Mx.*	Clustered flower beard grass	"	Low pine barrens.
" scoparius, "	Purple wood grass	" Aug.	Dry, sterile soil.
" tener, *Kth.*		"	Dry, grassy, pine lands.
" tetrastachyus, *Ell.*			
" Elliottis, *Chap.*			
" Virginicus, *L.*			
Brachyelytrum aristatum, *Beauv.*	Awn'dBrachyelytrum	June	Sandy woods.
Bromus unioloides, *Willd.*	Rescue grass	August	Woods.
" ciliatus, *L.*	Fringed broom grass	April	Rich soils.
" secalinus, *L.*	Cheat or chess	June	Grain fields.
Cinna arundinacea, *L.*	Wood reed grass	July-Aug	Wet places.
Calamagrostis Nuttallii, *Beauv.*			
Chloris petraea, *Thurb.*	Seaside finger grass	May-Aug.	Damp soil along coast
Cynodon dactylon, *Pers.*	Bermuda grass	No seed	In all soils.
Ctenium Americanum. *Spreng.*	Toothache grass	July-Aug.	Low pine barrens.
Cenchrus echinatus, *L.*		July-Sept.	Fields & waste ground
" triuloides, *L.*	Burr grass	July-Oct.	Sands along coast.
Chrysopogon avenaceum, *B.*	Indian or wood grass		
Dactylis glomerata, *Linn.*	Orchard grass	April-May	Fields and pastures.
Distichlis spicatum, *Raf.*	Spike grass	Aug-Sept.	Low san'y soils on sea
Danthonia sericea, *Nutt.*	silky flower'd oat gr'ss	Mar-April	Dry pine woods.
" spicata, *Beauv.*		April	Dry barren soil.
Dactyloctenium Ægyptiacum *Willd.*			

LIST OF GRASSES—CONTINUED.

SCIENTIFIC NAMES.	COMMON NAMES.	TIME OF BLOOMING.	PLACE OF GROWTH.
Eatonia obtusata, *Gray.*		June	Dry soils.
" Pennsylvanica, var. filiformis, *Chap.*		"	Moist woods.
Eleusine, Ægytiaca, *Pers.*	Egyptian grass		Cultivated ground.
" Indica, *Gaert.*	Crab grass crowfoot	Aug-Sept.	" fields.
Eragrostis reptans. *Nees.*	Creeping meadow grass	Aug-Sept.	Low sandy places.
" poaeoides, var, megastachya, *Gray.*	Strong scented meadow grass	" "	Sandy fields.
" ciliaris, *L.*			Waste places.
" Purshii, *Schrad.*	Southern Eragrostis	June- "	" "
" Conferta, *Trinn.*		Aug- "	River banks.
" tenuis, *Gray.*	Branching spear gras'	" "	Sterile plains.
" Capillaris, *L.*	Hair panicled meadow grass	" "	Dry fields.
" nitida, *Chap.*		" "	Low grassy places.
" pectinacea, var.			
" spectabilis, *Gray.*	Meadow comb grass	" "	Dry sterile soil.
" var. refracta, *Chap*			Damp soil.
Elymus Virginicus, *L.*	Lyme grass–Wild rye		River banks.
" striatus, *Willd.*	Slender hairy wild rice	July-Aug.	Rocky woods.
Erianthus alopecuroides, *E.*	Woody beard grass	" Oct.	Dry or wet soils.
" " var. brevibarbis.	Short bearded grass	" "	" " "
" " var. contortus.		" "	" " "
Eustachys petraea, *Desv.*			
Festuca myurus, *L.*			Dry sterile soil.
" tenella, *Willd.*	Small fescue grass	Mar-April	Sandy soil.
" parviflora, *Ell*		July	
" nutans, *Willd.*	Nodding fescue		Rich woods & banks.
" unioloides, *Willd.*			
Gymnopogon racemosus, *Beauv.*	Naked beard grass	Sept-Oct.	Dry sandy soil.
" brevifolius, *Trin.*			
Glyceria nervata, *Trin.*	Meadow spear grass; manna grass	July	Wet swamps.
Gymnostichum hystrix, *Schreb.*			
Hydrochloa Carolinensis *Beauv.*	Floating grass		Banks of streams.
Holcus lanatus. *Linn.*	Velvet grass—Meadow soft grass	April--May	Cultivated grounds.
Leersia Virginica, *Wild.*	False Rice or white grass	August.	Damp woods.
Leersia oryzoides, *Swartz.*	False Rice or Rice grass	"	Low, wet places.
Leptochloa mucronata. *Kunth*	Pointed slender grass	"	" " "
Leptochloa polystachya, *Kth.*			
Luziola Alabamensis, *Chap.*			
Lolium perenne, *L.*	Italian rye grass	July	
Muhlenbergia Mexicana, *Trin.*	Mexican Muhlenb'gia	August.	Low places.
" sylvatica, *Wild*	Sylvan grass	Aug-Sept.	Rocky woods.
" diffusa, *Schreb.*	Nimble will. Drop seed grass	Aug-Sept.	Dry woods.
" capillaris, *Kunth.*	Hair grass		Sandy soil.
" trichopodes, *Chap.*	Bunch hair grass	August.	Pine woods.

LIST OF GRASSES—CONTINUED.

SCIENTIFIC NAMES.	COMMON NAMES.	TIME OF BLOOMING	PLACE OF GROWTH.
Melica mutica, var.			
" glabra, *Gray*	Melic grass	April	Dry open woods.
Phleum pratense, *L.*	Timothy	June-July	
Panicum clandestinum, *Linn.*	Hidden flower'd gr'ss	September	Dry sterile soil.
Panicum crusgalli, *Linn.*	Barn or crab grass	Aug-Sept.	Damp shaded soils.
" curtissii, *Chap.*			Ponds and swamps.
" depauperatum, *Muhl.*	Worthless panic gr'ss	June	Dry sandy soil.
" dichotomum, *Linn*	Polymorphous panic	Mar-May	Woods and fields.
" filiforme, *Linn.*	Slender crab grass	Aug-Sept.	Dry sandy soil.
" gibbum, *Ell.*	Spiked panic grass	July-Sept.	Swamps.
" gymnocarpon, *Ell.*		September	Muddy bank of riv'rs.
" latifolium, *Linn.*	Broad leaved panic	May	Dry rich soil.
" microcarpon, *Muhl*	Small seeded panic	May	Dry soil
" paspaloides, *Pers*			
" scoparium, *L.*	Few flowered panic	May	Close damp soil.
" proliferum, *Linn.*	Prolific panic grass	September	Wet places near coast
" prostratum, *Lam.*			
" repens, *L.*	[grass		
" sanginale, *L.*	Finger grass, crab	May-Oct.	Cult. and waste places
" verrucosum, *Muhl.*	Warty panic	September	Swamps.
" viscidum, *Ell.*	Sticky panic grass	May	Wet plac's near coast.
" amarum, *Ell.*	Bitter panic	September	Sands near coast.
" anceps, var. strictum, *Chap.*	Double headed panic	Aug-Sept.	Damp sterile soil.
" virgatum, *L.*	Tall panic, switch	Aug-Sept.	Moist or dry soil.
" hians, *Ell.*	[cane		
" autumnale, *Bosc.*			
" maximum,			
" texanum,			
Paspalum fluitans, *Wall.*	Floating paspulum		River swamps.
" Walterianum,		Sept-Oct.	Low cultivat' ground
" dilatatum, *Poir.*		July-Aug.	
" digitaria. *Poir.*	Finger shaped grass		Open swamps.
" distichum, *Linn.*	Joint grass	July-Sept.	Swamps and low [ground
" compressum, var. imberbe, *Munro.*		Aug-Sept.	
" leutiferum, *Lam.*			Pine barren swamps.
" laeve, *Mx.*	Smooth erect grass		Dry woods.
" Floridanum, *Mx.*		July-Aug.	Damp soil.
" racemulosum, *Nutt.*		Aug-Sept.	Dry sandy soils.
" plicatulum, *Mx.*		Aug-Sept.	Low cultivated gro'd.
" setaceum, var. ciliatifolium,	Hairy slender grass	September	Wet or dry soil.
" platycaule,	Louisiana grass		
Phalaris intermedia, *Bosc.*	Wild canary grass	April-May	Sandy places on coast
Phragmites communis, *Trin.*	Common reed grass	August.	Marshes.
Poa annua, *L.*	Annual spear grass	Feb-Mar.	Fields and pastures.
" cristata, *Walt.*		April	Dry soil.
" compressa, *L.*	Wire grass	May	Dry road sides.
" flexuosa, *Muhl.*	Southern spear grass	May	Rich shady soil.
" pratensis, *L.*	June or Kentucky blue grass	May	Rich soil around dwellings.
" arachnifera	Texas blue grass		
Rottboelia rugosa, *Nutt.*			
" corrugata, *Balb.*			

LIST OF GRASSES—CONTINUED.

SCIENTIFIC NAMES	COMMON NAMES.	TIME OF BLOOMING	PLACE OF GROWTH.
Spartina juncea, *Wild*	Rush salt grass	July-Aug.	Sandy marshy places
" polystachya, *Wild.*	Salt reed grass	Aug- Sept.	Brackish marshes.
" stricta, var. glabra: *Gray.*	Rough marsh grass	Aug- Sept.	Salt marshes.
Setaria glauca, *Beauv*	Bottle grass	July	Cultivated ground.
" glauca, var. laevigata, *Chap.*	Foxtail grass	July	Brackish swamps.
" Italica, *Kth.*	Bengal grass	July-Aug.	Swamps along coast.
Sorghum halapense, *L.*	Johnson; mean; cuba grass	September	Dry barren soils.
" nutans, *Gray.*	Indian grass	August.	Dry soils.
Sporobolus Indicus, *Brown.*	Wire grass		
" junceus, *Kunth.*	Smut grass	August.	Dry sandy soil.
" asper, *Kth.*	Rush grass	September	Dry sandy soil.
" vaginaeflora, *Poir.*	Hidden flower Vilfa	September	Dry sandy soil.
Stipa avenacea, *L.*	Feather grass	July	Dry woods—sparsely
Stenotaphrum Americanum, *Schkr.*	St. Augustine grass	June-Sept	Damp sandy places on the coast.
Trisetum palustre, *L.*	Marsh oat grass		Low grounds.
Tripsacum dactyloides,	Gama; sesame grass.	Aug- Sept	Rich soils.
Tricuspis sesslerioides, *Torr.*	Tall redtop	August.	Dry soil.
" ambigua, *Beuth.*		July.	Low pine barren.
" cornuta, *Gray.*	Horned sand grass	Aug-Sept.	Light soils.
" purpurea, *Gray.*	Sand grass	June	Sandy soil on coast.
Uniola latifolia, *Michx.*	Broad leaf spike gr'ss	June	Shaded fields.
" paniculata, *L.*	Spike grass	July-Aug.	Sandy coast.
" gracilis, *Michx.*	Slender spike grass	July-Aug.	Sandy coast.
" nitia, *Baldw.*		July- Aug.	Swamps.
Vilfa aspera, *Beauv.*			
Vilfa vagniaeflora,			
Zizania aquatica, *L.*	Indian rice or wild rice	July-Aug.	Low grounds.
Zizania miliacea, *Michx.*	Prolific or wild rice	July-Aug.	Wet places

The following grasses have been selected for special notice in this bulletin. As soon as experiments determine the values of others mentioned in the preceding table they will be described in future bulletins issued by the station.

Alopecurus pratensis [Meadow foxtail.]

The culms of this grass are about 2 feet high, and are smooth.

The flowers are arranged at the end of the stem in a dense cylindrical form about 3 inches long. The awns are long, extending some distance beyond the floret. The leaves are smooth, with a loose clasping sheath. This grass resembles timothy very closely, but can be readily distinguished by a careful examination. The chief difference consists in the number of palea, timothy having two and its glumes are awned. The root of the pratensis is a perennial. This plant makes its appearance earlier than most grasses and is an excellent early grazing variety for cattle at the opening of spring. One objection consists in the small amount of foliage presented by the plant. Cattle eat it with considerable relish, and it is possible that by cultivation it may be improved and good pastures obtained.

Its chief advantage lies in the fact that it will stand continued cropping, and presents a tender grazing, even after several cuttings.

Analysis:

Water	60.00	per cent.
Ash	3.10	" "
Fat	1.34	" "
Nitrogen free extract	21.72	" "
Crude fiber	9.51	" "
Albuminoids	4.33	" "

[*Plate I.*]

Arrhenatherum avenaceum. (Meadow oat-grass; tall oat-grass.)

This grass resembles the oat in several respects. Each spikelet has but two florets. The panicle is first contracted,

but after the plant becomes older the inflorescence opens and becomes more spreading. The root is perennial and creeping. The stems grow to a height of 3 feet or more. On account of the rapid growth of this plant, and the lateness of its maturity it makes an excellent pasture for fall grazing. Its composition indicates a grass of good quality, and those farmers who have tried it speak in high terms of praise concerning its agricultural value. When mixed with other grasses sheep eat it with considerable relish. It is pronounced, by those who know, to be the best winter grass that can be obtained. The most favorable time for sowing the seed is from September to October. Not less than two bushels per acre should be used.

Analysis:

Water	14.30	per cent.
Ash	7.23	" "
Fat	2.44	" "
Nitrogen free extract	42.82	" "
Crude fiber	24.36	" "
Albuminoids	10.88	" "

[*Plate II.*]

Bromus secalinus. [Chess or Cheat.]

Bromus unioloides. [Rescue grass.]

These two grasses are related, and are getting to be quite common in the wheat fields of the south. Both may be called winter grasses. The *unioloides* has a more vigorous growth, and was first brought to the attention of planters by Gen. Iverson, of Columbus, Ga. in 1853, and was called by him, "Rescue grass."

Both of these plants grow to a height of 2 to 3 feet, and when fully matured have an open, drooping panicle, with showy spikelets, each containing from 5 to 10 flowers.

Prof. Phares pronounces *unioloides* to be an excellent grass for winter use, and that stock are very fond of it. It is ready for mowing about the first of January, and sometimes even earlier, and will stand cutting until Spring. It pro-

duces an abundant supply of foliage. The hay is pronounced to be good.

Analysis:	*B. secalinus*:	*B. unioloides*:
Water	14.30	14.30 per cent.
Ash	6.10	8.35 " "
Fat	3.49	3.07 " "
Nitrogen free extract	49.11	44.97 " "
Crude fiber	20.39	17.64 " "
Albuminoids	6.61	11.67 " "

Ash:	*B. unioloides*:
Phosporic acid	8.79 per cent.
Sulphuric acid	5.61 " "
Silica	4.84 " "
Chlorine	16.84 " "
Calcium oxide	4.43 " "
Magnesium oxide	4.64 " "
Potassium oxide	37.20 " "

[*Plates III and IV.*]

Cynodon dactylon. [Bermuda grass.]

It is not necessary to describe this grass, since every one who has contended with it, in and about the valued crops of corn and cotton, will quite readily distinguish the plant from all other grasses. It is not a native of this country, but was introduced from southern Europe and tropical regions. It throws out three or more slender spikes on which are arranged small sessile spikelets, each containing one flower, with a second imperfect one. The plant throws out a rank growth of leaves and numerous shoots from underground stems, and is very highly prized for pasturage.

The method of cultivation consists in cutting up the rhyzomas or rootstocks, into small fragments and scattering them broadcast. It is one of the few grasses that are able to withstand continued drought; its succulent underground stem furnishes sufficient moisture and nutriment to keep the plant alive. Hogs are very fond of the underground stems, and stock of all kinds eat its leaves with avidity.

The grass will grow even under the most flagrant neglect; while care and cultivation will bring out its characteristics to a marked degree, and well repay the cultivator for all his expense and trouble. Specimens have been exhibited that were over eight feet long.

It is an excellent grass to prevent the washing of land, for filling up gullies and preserving terraces. It makes one of the best lawns on account of its smooth and regular growth, and its power to withstand the heat of the sun. To bring out its best features, the grass should be mown three or four times each summer, or at least once per month. This will kill the weeds, and other plants that tend to choke it. The Bermuda grass is not so difficult to eradicate from the field as most farmers seem to think. Close cultivation in cotton for two or three years, and thorough pulverization of the soil will destroy this plant.

Analysis:

Water	14.30	per cent.
Ash	7.81	" "
Fat	1.34	" "
Nitrogen free extract	45.09	" "
Crude fiber	19.96	" "
Albuminoids	11.50	" "

Ash:

Phosphoric acid	9.20	per cent.
Sulphuric acid	9.37	" "
Silica	30.29	" "
Chlorine	6.05	" "
Calcium	13.44	" "
Magnesium oxide	5.00	" "
Potassium oxide	22.99	" "
Potassium	6.66	" "

[*Plate V.*]

Dactylis glomerata. (Orchard grass.)

Dr. Vasey says of this grass: "This is one of the most popular meadow grasses of Europe, and is known to most

farmers in the Northern and Eastern States. It is a perennial, of strong, rank growth, about three feet high, the culm and leaves roughish, the leaves broadly linear, light green, and 5 to 6 on the culm. * * * *.

The herbage, when suffered to grow rank or old contains only half the nutriment of that which is of recent growth. Cattle, sheep and horses eat it with the greatest avidity when it is young, but will not touch it when old, hence the importance, when pastures have been understocked, of going over them with a mowing machine; the orchard grass will then stool out, and the cattle will be found eating first on the very spots that they had previously rejected."

Analysis:

Water	14.30	per cent.
Ash	7.63	" "
Fat	3.15	" "
Nitrogen free extract	44.70	" "
Crude fiber	21.40	" "
Albuminoids	8.82	" "

[*Plate VI.*]

Danthonia sericea. (Silky flowered oat grass.)

This grass flowers in March and April, and grows in moderately dry pine woods on sandy soils. The flowers are rough or bearded, and the spikelets, each seven flowered, are numerous and closely packed on an open panicle that is about four inches long. The plant grows to a height of two to three feet. The leaves are linear and numerous, with soft, hairy sheaths.

On account of some resemblance to the cultivated oat (Avena) it has been called silky flowered oat grass. Its agricultural value has not been determined, but its good growth of leaves and smooth flexible culm would indicate that the grass would be a valuable forage plant if properly cultivated. Inasmuch as it makes its appearance towards the close of winter, when grazing is so scarce, the farmers would do well to cultivate it and test its adaptation to stock raising.

[*Plate VII.*]

Eleusine Indica. (Yard grass; Crowfoot; Crab grass.)

This grass is very common all through the Southern States, and is readily recognized. It grows luxuriantly in the barn-yards, gardens and other spots that are rich around the premises. Long, strong, fibrous roots are thrown out, from which grows a thick, leafy culm. The culm is large and succulent, inclining, and terminated by 5 or more spikes that radiate from nearly the same point. The spikelets contain as many as 5 florets, the upper one being rudimentary. The glumes are awnless. The grass is an annual, and grows to a height of 12 or 15 inches. Hogs and cattle are very fond of it; and when it is properly cut, good hay is made. Just as with other grasses, the mowing must occur before the seeds mature, and while the stems are filled with juices. Care taken in maturing, it will yield excellent food for stock. It was introduced into this country from India, but it has become naturalized, and now grows everywhere with much greater facility than some of the native grasses. It seeds so rapidly there is no necessity to repeat the sowing to get a good stand for grazing purposes.

Analysis:

Water	14.30	per cent.
Ash	8.32	" "
Fat	2.17	" "
Nitrogen free extract	47.54	" "
Crude fiber	18.19	" "
Albunimoids	9.48	" "
Ash:		
Phosphoric acid	9.68	" "
Sulphuric acid	5.79	" "
Silica	24.61	" "
Chlorine	6.71	" "
Calcium	56.13	" "
Magnesium oxide	7.38	" "
Potassium oxide	24.79	" "
Potassium	7.39	" "

Elymus Virginicus. (Wild rye grass.)

This is a perennial, and grows to a height of 2 or 3 feet, and produces a rank growth of leaves. The culms are large, and the spikelets are 2 to 5 flowered.

This grass starts early in spring and furnishes a green pasturage through the spring and winter. It is generally found in a wild state on the banks of streams, and loves a moist soil. The plant throws out in March a large tuft of broad, green leaves, and supplies good grazing at that season of the year when green forage is scarce. Its value is recognized by those who have tried it.

[*Plate IX.*]

Holcus lanatus. (Velvet-grass—Meadow soft grass—Velvet lawn grass.)

This grass grows from two to three feet high and presents a beautiful appearance to the eye. It is not considered to be valuable for hay or grazing, because stock are not fond of it, but it grows so well on poor land, where few other plants will produce anything, it may be found to be valuable to use on worn out lands until the soil becomes strong enough for more nutritive grasses. Its chief value seems to be for sodding down lawns. The beautiful velvety cast it gives, and evenness of texture, produces a pleasing effect on the eye. It stands drought well. When other grasses succumb to dry weather this remains green and attractive. It is also useful as a soiling plant. Some farmers in the south who have tried the grass for hay speak well of it, but most persons consider it worthless for stock raising.

[*Plate X.*]

Lespedeza Striata. (Japan Clover.)

Although this is not a grass, still its valuable features as a forage plant will permit of its discussion in this paper. It is an introduced plant, but within the past few years it has rapidly spread over the old fields and meadows of Alabama, until it is not incorrect to call it a wild clover. It is

an annual, reproducing itself year after year by means of seed scattered by the winds just before the plant is destroyed by the frosts. Its value for forage purposes is greatly enhanced by the fact that it grows well on poor sandy and clay soils. It is supposed to have the power of restoring the fertility of worn out soils, and its great tenacity enables it to drive out other plants, even Bermuda grass. The analysis of a specimen obtained from Alabama yields the following:

Oil	3.30	per cent.
Wax	1.10	" "
Sugar	14.74	" "
Gum and dextrin	6.76	" "
Cellulose	23.77	" "
Amylaceous cellulose	14.67	" "
Alkali extracts	16.22	" "
Albuminoids	15.11	" "
Ash	4.33	" "
	100.00	

[*Plate XI.*]

Muhlenbergia Mexicana.
Muhlenbergia diffusa (Nimble Will Drop seed).
Muhlenbergia Sylvatica.

These grasses are mentioned together because they resemble each other in some general respects. They are perennials and flower in August and September. The *Mexicana* thrives best in bottoms in comparatively moist soils and is slow in maturing its seed. For this reason it fills a place among grasses, supplying tender grazing sometime after other grasses have matured their seeds. The roots take strong hold of the soil, rendering it quite difficult to eradicate from cultivated crops. This grass is eaten by cattle with relish. The *diffusa* is considered by some farmers to be equally as valuable as the Mexicana, while others look upon it as worthless. The plant has not, however, been fully tested, and no correct opinion can be given until careful experiments have been made. The analysis below would indicate a first rate forage plant, and inasmuch as it

forms in many sections a large proportion of the pasturage on wood lands, it deserves more than a passing notice. In the Agricultural Report of Tennessee, Killebrew states that experimenters in that State consider it to be an excellent butter making grass, and that it gives a particularly fine flavor to this article of food.

Analysis:

Water	14.30	per cent.
Ash	7.95	" "
Fat	1.55	" "
Nitrogen free extract	47.44	" "
Crude fiber	20.19	" "
Albuminoids	8.57	" "

Ash:

Phosphoric acid	6.65	per cent.
Sulphuric acid	3.39	" "
Silica	39.98	" "
Chlorine	8.21	" "
Calcium oxide	11.95	" "
Magnesium oxide	4.39	" "
Potassium oxide	17.32	" "
Potassium	6.78	" "
Sodium	1.33	" "

[*PLATE XII.*]

Paspalum laeve (smooth erect grass—Water grass.)

A tall erect grass, 1 to 3 feet high, with nearly smooth leaves, the lower ones being more numerous and crowded around the culm. The joints of the culm are smooth and purple. The florets are crowded along the axis in four rows, two on each side. There are a few slender hairs at the base of each spike.

Prof. Phares of the Agricultural and Mechanical College of Mississippi, who has made many valuable experiments on Southern grasses to determine their agricultural value, states, concerning this grass, that it produces good hay on land well prepared, and sends out a mass of thrifty roots that support a large growth of succulent stems and leaves.

This grass is quite nutritious as the chemical analysis below will indicate:

Water	14.30	per cent.
Ash	6.60	" "
Fat	2.36	" "
Nitrogen free extract	46.13	" "
Crude fiber	23.66	" "
Albuminoids	6.95	" "

Ash:

Phosphoric acid	6.18	per cent.
Silica	44.65	" "
Sulphuric acid	5.64	" "
Chlorine	1.73	" "
Calcium oxide	9.36	" "
Magnesium oxide	5.26	" "
Potassium oxide	25.44	" "
Soda "	0.60	" "

[*Plate XIII.*]

Paspalum dilatatum. (Hairy flowered paspalum.)

This grass is larger and taller than the preceding and resembles it very closely.

The dilatatum grass grows in tussocks three to four feet high, and will stand cropping finely because of its firm hold of the soil and long, strong roots. For a similar reason, it also stands a long drought better than most other grasses. Stock are very fond of it and eat it with avidity. Its many culms growing from the same root-clump, and numerous broad leaves, furnish considerable cropping for cattle. The excellent qualities of this grass ought to attract more attention to it on the part of stock raisers.

[*Plate XIV.*]

Paspalum platycaule. (Louisiana grass).

This grass is of equal value with the one last described, but its growth is not as rank, and the leaves and culms are not so long. Cattle are fond of it, and it stands browsing and trampling as well as Bermuda grass. It is said by

some to stand drought well and grows satisfactorily on poor land.

Panicum Texanum. (Texas millet).

A grass that is attracting considerable attention in many sections of the south, and seems to well deserve the flattering notices given concerning it in the agricultural papers. It is an annual that prefers rich soils on bottom lands, and is said to stand drought well. It has such tenacity but few weeds and grasses can withstand its growth. It is said to stand drought better than most other plants, and is valuable for all purposes for which ordinary millets are used. It does not make good pastures but is excellent for hay; stock are exceedingly fond of it and will reject all other hay for it during the winter months. This grass may be used with great advantage in some of the *formulae* given in the first pages of this bulletin, and if care is taken to sow it with seed that produces plants that mature at different dates, the combination will yield hay in a green state throughout most of the year. The Texas millet is supplied with an abundance of rather short, broad leaves, coming from numerous culms produced by the same root. The roots do not reach any considerable depth below the surface, and in raking the hay care must be taken not to pull up the plants. For this reason it is readily destroyed if the land is desired for other crops. An illustration is given of the floret on the plate containing dissections of the grass flowers.

[*Plate XXIX.*]

Panicum sanguinale (crab grass.)

A common grass found in all cultivated fields, and grows from one to two feet high. It flowers from May to October. At one time this grass was considered to be a very troublesome plant to the farmer, because it was so quick in its growth in cornfields, choking the young corn. But its value as a forage plant has been recognized within a few years past. It yields a very fair crop of hay when mowed from between the corn ridges. Stock are very fond of it. If the field on which corn has been cultivated be plowed and har-

rowed, this grass will cover the ground with a growth that will soon produce excellent hay. The culms are bent near the ground and take root at the joint. The leaves are hairy, and the sheaths are shorter than the joints. At the summit of the culms are three to six slender flower stalks, with small spikelets growing thereon.

Analysis gives the following results:

Water	14.30	per cent.
Ash	10.81	" "
Fat	2.42	" "
Nitrogen free extract	36.59	" "
Crude fiber	27.50	" "
Albuminoids	8.38	" "
Ash:		
Phosphoric acid	6.40	" "
Sulphuric acid	4.02	" "
Silica	30.93	" "
Chlorine	2.04	" "
Calcium oxide	4.40	" "
Magnesium oxide	7.98	" "
Potassium oxide	33.56	" "
Potassium	6.67	" "

[*Plate XV.*]

Panicum crusgalli. (Barn-yard grass).

This is a coarse grass that grows in barn-yards and wherever there are wet, sour places about the premises. Its leaves are one-half inch broad, and, when growing well, one to one and a half feet long. The culm is stout and grows from two to ten feet high. The culms are branching and the spikes from one to two inches long and are crowded together, forming a long raceme. The spikelets are thickly clustered along the branches. The glumes have stiff awns (sometimes wanting, however,) that render the grass, when matured, very difficult to digest. If properly cut and cured it makes a good hay, and is much prized by many farmers as a substitute for fodder. In some sections the grass is

looked upon as a worthless plant and efforts are made to destroy it. Flowers from August to September.

Analysis:

Water	14.30	per	cent.
Ash	9.58	"	"
Fat	2.58	"	"
Nitrogen free extract	49.44	"	"
Crude fiber	24.78	"	"
Albuminoids	6.66	"	"

Ash:

Phosphoric acid	4.27	"	"
Sulphuric acid	3.69	"	"
Silica	42.18	"	"
Chlorine	11.48	"	"
Calcium	7.23	"	"
Magnesium oxide	5.52	"	"
Potassium oxide	13.26	"	"
Potassium	12.00	"	"
Sodium	0.37	"	"

[*Plate XVI.*]

Panicum Virgatum. (Tall panic grass—Switch grass.)

The culms are from 3 to 5 feet, and the leaves are reedy. The panicles are large and loose, and the spikelets are scattered, very small, and of a purplish hue. The spikelets are ovate and sharp pointed. This grass grows in moist places and makes a good hay, furnishing, when cut soon, palatable food for cattle. When allowed to grow too old it becomes harsh.

Analysis:

Water	14.30	per	cent.
Ash	3.20	"	"
Fat	1.65	"	"
Nitrogen free extract	52.23	"	"
Crude fiber	24.70	"	"
Albuminoids	3.92	"	"

Ash:

Phosphoric acid	5.50	per	cent.
Sulphuric acid	3.56	"	"
Silica	51.17	"	"
Chlorine	4.93	"	"
Calcium	7.87	"	"
Magnesium oxide	3.63	"	"
Potassium oxide	18.76	"	"
Potassium	3.36	"	"
Sodium	1.22	"	"

[*Plate XXIX.*]

Panicum Gibbum. (Spiked panic grass)

A perennial grass growing in wet places with decumbent and branching culms. The leaves are smooth and about 8 inches long, when under good conditions.

The inflorescence is considerably oppressed and from 3 to 5 inches long. Spikelets are oblong and obtuse. The color of the plant is deep green. Flowers from July to September. This is a good grass for agricultural purposes. The analysis shows a large per cent. of nutritive food. The farmers of the State would do well to sow the seed of this grass on well prepared ground and test its value as a forage plant.

Analysis:

Water	14.36	per	cent.
Ash	7.31	"	"
Fat	3.56	"	"
Nitrogen free extract	43.65	"	"
Crude fiber	20.71	"	"
Albuminoids	10.47	"	"

[*Plate XVII.*]

Panicum proliferum. (Prolific panic grass, sprouting crab grass.)

The culms of this grass are thick and succulent. The flowers are in large panicles, and bloom from August to

September. The culms ascend from a procumbent or bent joint, and are branching and covered with long leaves. It grows from one to three feet high. The spikelets are ovate and acute, and are crowded on the branches. This grass makes excellent hay and will stand frequent cuttings until frost. All kinds of stock eat it with much relish.

Analysis:

Water	14.30	per cent.
Ash	9.58	" "
Fat	2.58	" "
Nitrogen free extract	43.42	" "
Crude fiber	20.63	" "
Albuminoids	9.49	" "

[*Plate XVIII.*]

Poa Compressa. (Wire grass—Blue grass.)

It is incorrect to call this blue grass, because its growth is more decumbent and the stem is more flattened. The grass is found growing in old fields on sandy soils and generally poor land. It does not produce an abundance of leaves, but the hay that is made from it weighs more than other grasses because it loses little in drying. The yield from an acre is very even, and manuring will largely increase the production of hay. Stock eat the grass with relish, and J. S. Gould says that sheep and horses fatten as readily on it as when fed on timothy. This grass is a perennial and grows to one foot or more in height. Very little attention is paid to it by the farmers of Alabama, but it is worth an experiment.

[*Plate XIX.*]

Phalaris intermedia, var. *angusta*; Canary grass; Stewarts Canary grass; California Timothy grass.)—

This grass resembles timothy in the manner in which it heads. It has a luxuriant growth of leaves. The spike is also like the foreign Canary grass that is used for feeding birds, and it grows to a length of 2 to 3 inches. The spikelets

contain two sterile and one perfect flower. The culms are about 10 inches high and quite slender. The grass is pronounced, by those who have given it a careful test, to be valuable for winter pasturage. It dies down in April or May and springs up at the opening of winter, furnishing an excellent green sward during the season of the year when pasturage is most acceptable to cattle. It is worthy a trial by the farmers of Alabama.

Analysis:

Water	14.30	per cent.
Ash	9.99	" "
Fat	3.52	" "
Nitrogen free extract	37.23	" "
Crude fiber	21.29	" "
Albuminoids	13.67	" "

Plate XX.

Phleum pratense. (Timothy)

Dr. George Vasey says, concerning this plant: "This is one of the commonest and best known grasses. For a hay crop it is, perhaps, the most valuable. * * * * * This grass, as known in cultivation, is supposed to have been introduced from Europe, but it is undoubtedly indigenous in the mountain regions of New England, New York and the Rocky Mountains. It is said that about the year 1711 a Mr. Herd found this grass in a swamp in New Hampshire and cultivated it. From him it took the name of Herd's grass. About the year 1720 it was brought to Maryland by Timothy Hanson and received the name of Timothy grass. It is now the favorite and prevailing meadow grass over a large part of the country."

Mr. Charles L. Flint says: "As a crop to cut for hay it is probably unsurpassed by other grasses now cultivated. Though somewhat coarse and hard, especially if allowed to ripen its seed, yet if cut in the blossom, or directly after, it is greatly relished by all kinds of stock, and especially so by horses, while it possesses a large percentage of nutritive matter in comparison with other agricultural grasses.

* * * *. Timothy thrives best on moist, peaty or loamy soils of medium tenacity, and is not suited to sandy or light, gravelly lands * * * *. It grows very rapidly and yields very large crops on favorable soils. It is cultivated with ease, and yields a large quantity of seed to the acre, varying from ten to thirty bushels on rich soils."

Analysis:

Water.	14.30	per cent.
Ash	5.90	" "
Fat	2.84	" "
Nitrogen free extract	48.77	" "
Crude fiber	21.71	" "
Albuminoids	8.48	" "

Phragmites Communis. (Reed grass)

This is one of the largest grasses found in the State and is aquatic in its habits—growing along the margins of ponds and marshes. It is quite coarse and does not furnish a good hay, but stock eat the young, tender leaves when the plant first comes up. As the grass grows older, however, the culms and leaves become hard and tough and stock reject it. The culms or stems make very good thaching and wicker work. The plant is very showy when in full flower, and at a distance resembles sugar cane.

[*Plate XXI.*]

Richardsonia scabra. (Mexican clover—Pigeon weed—Poor toes—Florida clover—Spanish clover)

The plant is not a grass, but on account of its use for forage purposes a discussion of its merits comes appropriately in this connection. It is an introduced species—first making its appearance on the sea board a number of years until now it is to be found all over the fields throughout southern Alabama. Opinions regarding its value for stock food are very contradictory, but a large number of persons who have tried the plant for grazing claim that its fat forming properties are high in the scale. It is not a clover, but belongs to the same family to which coffee and madder be-

longs, viz: Rubiacæl. It is a hardy plant and grows well on poor, sandy soil.

[*Plate XXII.*]

Sorghum halapense [Johnson or Means' grass.]

This is not a native grass, but was introduced into the State years ago. It has been so extensively used in some portions and has obtained such a strong and permanent hold it has become naturalized. It has a rhyzoma or root stock that takes a very firm hold of the soil and gives considerable trouble to eradicate if the land is desired for other crops. The grass grows to a height of six or seven feet and has a panicle a foot or more in extent, open and large. The longer branches of the panicle are five or six inches long. The flowers and seed resemble, in many respects, those of broom corn. Farmers living in the middle portion of the State are very familiar with this plant without a minute description. The name "Johnson" is given to this grass because Wm. Johnson who lived near Selma, first introduced it into the State many years ago.

The grass originally came from Turkey, brought to this country by governor Means of South Carolina in 1835, and was first designated by the name of Means' grass. Five or ten years after Mr. Johnson brought it to Alabama. This grass must not be confounded with Guinea grass because the two belong to different genera. It has an excellent reputation as a forage plant, and cattle are very fond of it both in the green and dry state. To make good hay it should be cut while quite young, two or three feet high, and several times during the season. The grazing of cattle on the grass should be managed with caution.

Analysis:

Water	14.30	per cent.
Ash	6.92	" "
Fat	2.43	" "
Nitrogen free extract	44.77	" "
Crude fiber	21.47	" "
Albuminoids	10.11	" "

[*Plate XXIII.*]

Sorghum nutans [Indian grass—Wood grass.]

This grass grows something similar to the last, and reaches a height of two to four feet with a panicle one to two feet long. It is generally found on dry barren soils growing from perennial roots. There are two varieties of this grass that differ but slightly from each other. When cut early the hay is nutritious and the chief objection that is offered to it is the thin bed of grass it forms in its wild state. This, however, may be overcome by cultivation.

Analysis:

Oil	1.57 per cent.
Wax	0.10 " "
Sugars	7.27 " "
Gum and Dextrin	3.75 " "
Cellulose	36.70 " "
Amylaceous Cellulose	27.25 " "
Alkali extract	14.44 " "
Albuminoids	3.29 " "
Ash	5.63 " "

The ash contains 6.74 per cent. of potassium, 61.55 per cent. of phosphoric acid, and 2.92 per cent. calcium oxide, with other ingredients that are of less value. The sample analyzed was obtained from Texas.

[*Plate XXIV.*]

Setaria Italica. [Hungarian grass; German millet; Belgium grass.]

This grass is an annual. The leaves are very long and the spikes are close together, with the spikelets containing many florets. The culms grow from eight to ten feet in height, and are smooth and branched. The grass flowers from July to September. It makes an excellent green food for cattle. The leaves are sometimes as much as eighteen inches long and rather broad. The ligule is beard like. The panicle is densely contracted. The bristles are yellow and sometimes longer than the spikelets. In cutting this

grass for hay, care must be taken not to let rain fall on it after it is mowed. It should be cut as soon as it begins to bloom—because after the seed are formed the stem makes inferior food and the land is considerably exhausted. When the seed are fed to stock a quantity of indigestible food accumulates in the stomach and the animals are sometimes injured thereby. The seed, therefore, should not be allowed to mature if hay is desired.

Analysis;

Water	14.30	per cent.
Ash	6.43	" "
Fat	2.32	" "
Nitrogen free extract	47.80	" "
Crude fiber	21.02	" "
Albuminoids	8.13	" "

Seteria Glauca. [Bristly fox-tail grass—Bottle grass.]

The spike is cylindrical and in color it is a tawny yellow. The culms are two to three feet high and are sometimes branched. The stem and branches are smooth. The leaves are about twelve inches long with a few long slender hairs at the base. The ligule is small and beard-like, or in other words, contains around its margin a decided fringe. This plant is found in cultivated fields, and flowers from July to August. The stem is erect and somewhat compressed.

The awns or bristles are six to ten in a cluster. This grass is met with after wheat is mown, and generally appears in abundance.

The plate does not represent enough bristles. The grass is ranked equal to Hungarian grass in nutrition, and should be cut early, before the bristles become too hard and stiff. Fowls are very fond of the seed after they mature.

Analysis:

Water	14.30	per cent.
Ash	6.80	" "
Fat	2.62	" "
Nitrogen free extract	50.18	" "
Crude fiber	18.80	" "
Albuminoids	7.30	" "

[*Plate XXV.*]

Tripsacum dactyloides. [Gama grass; Sesame grass.]

Grows from five to seven feet high, with broad leaves resembling somewhat Indian corn. It grows on moist soils, and is stout, coarse and hardy. The culm is solid and grows from a rhyzoma or root stock. The flowers are in three clustered spikes. The spikelets have no awns and are arranged in jointed spikes. The upper florets are sterile, while the lower ones are fertile. This grass flowers from August to September. The quantity of forage that can be gathered from this grass is quite large, because it will stand cutting several times during the season. Stock are very fond of it, and the hay may be cured at an expense considerably less than that required for gathering corn fodder. After the roots have taken possesion of a field, the grass is quite difficult to eradicate. A yoke of oxen can scarcely move a plow through it. But the grass may be destroyed by close cropping when the roots will die, thus enriching the land.

Analysis:

Water	14.30	per	cent.
Ash	5.30	"	"
Fat	2.05	"	"
Nitrogen free extract	48.26	"	"
Crude fiber	22.72	"	"
Albuminoids	7.29	"	"

Ash:

Phosporic acid	2.52	per	cent.
Sulphuric acid	3.69	"	"
Silica	37.84	"	"
Chlorine	13.08	"	"
Calcium oxide	1.64	"	"
Magnesium oxide	1.07	"	"
Potassium oxide	29.06	"	"
Potassium	6.30	"	"
Sodium	4.47	"	"

[*Plate XXVI.*]

Trifolium Procumbens. (Small yellow clover.)

This is a small clover that is found growing in almost every old field throughout the State, reaching a height of three or four inches. Little attention has been paid to it, but the analysis indicates a fair forage plant, particularly when we consider that the sample grew without cultivation. In one hundred parts in a green state there were 3.9 per cent. of albumnious, or flesh forming principles, fatty matters 0.77 per cent., heat producing principles, such as sugar, gum, starch 7.25 per cent. In the sample of dried grass at 212° F. analysis showed the following per centages: Albuminous or flesh forming principles 20.48, fatty matters 4.67 ; heat producing principles 43.86.

It is probable that under cultivation this clover will yield good results and may be made to produce much larger plants.

[*Plate XXVII.*]

There are three other species that grow wild in Alabama, that are worthy of attention, viz :

Trifolium reflexum, Trifolium Carolinianum, and Trifolium repens. The first is called buffalo clover, the second white clover, and the last southern clover. The last two grow almost everywhere over the State, and supply very good cropping for cattle. The T. reflexum grows luxuriantly in Montgomery, and other counties of Middle Alabama, and is attracting attention among stock raisers.

Zizania aquatica. (Wild rice, Indian rice, Water oats, Water rice.)

A grass that resembles rice and grows very rank in marshes and along streams of the State. Stock eat it with great relish, birds are also very fond of the seed and flock in great numbers along the sea shore and fatten rapidly on the seed. It is thought by some persons that if it was cultivated as rice it would yield excellent results. But experience shows that the seed shed so readily before the plant is har-

vested, large crops cannot be obtained. The fact that stock are so fond of it would imply that its cultivation would well repay farmers. Much of the land that is now wasted along the banks of streams might be well reclaimed by planting down in this grass, thus giving a good range for cattle.

[*Plate XXVIII.*]

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MARX-DEL.

A.H.NICHOLS. MARX.DEL.

BROMUS SECALINUS (Chess or Cheat).

BROMUS UNIOLOIDES (Rescue grass).

CYNODON DACTYLON (Bermuda grass).

DACTYLIS GLOMERATA (Orchard grass.)

ELEUSINE INDICA (Yard grass ; Crowfoot ; Crab grass).

MARY DEL.

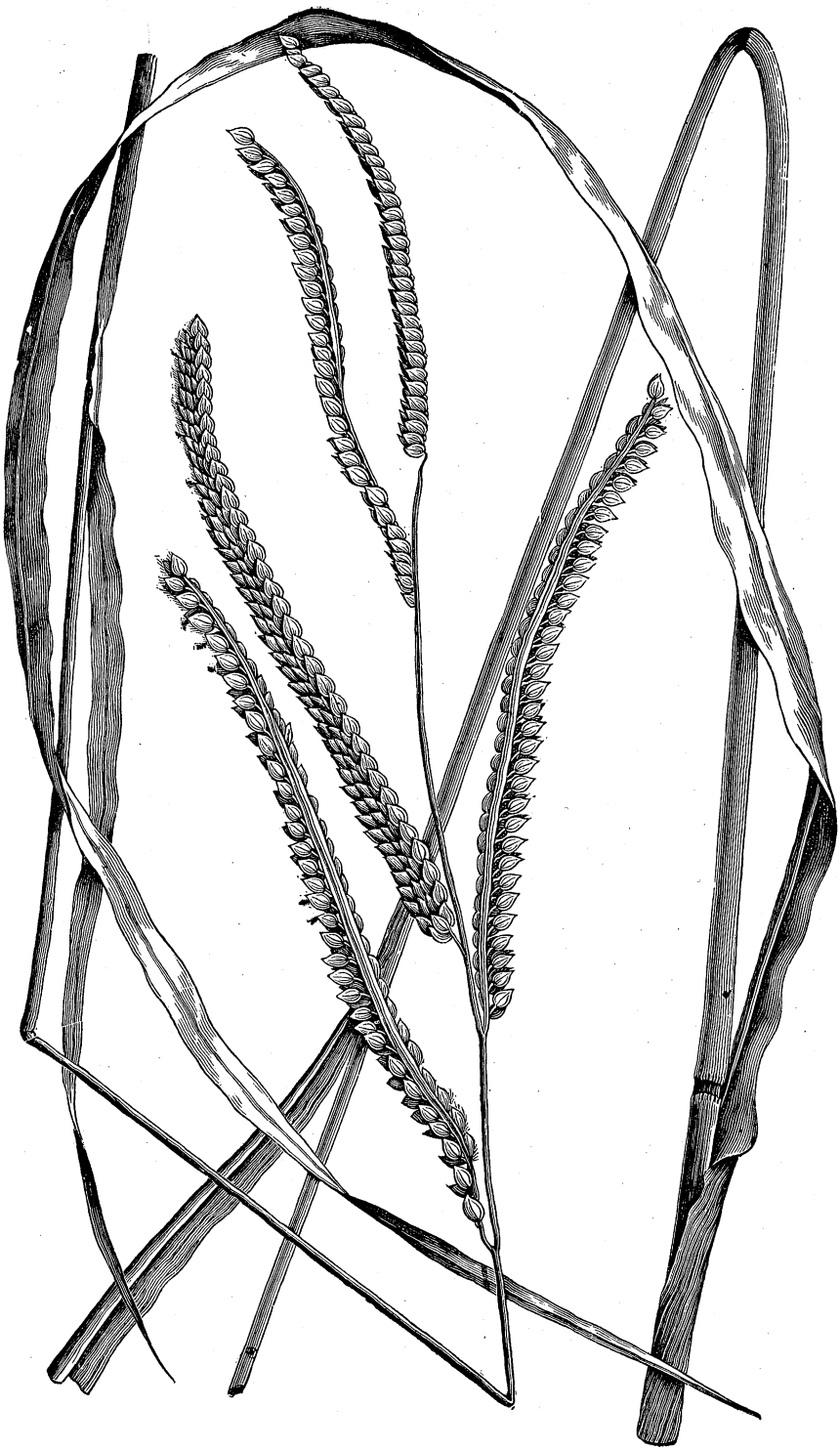
H. H. Nichols. Moore, del.

HOLCUS LANATUS. (Velvet-grass.—Meadow soft grass.—Velvet lawn grass).

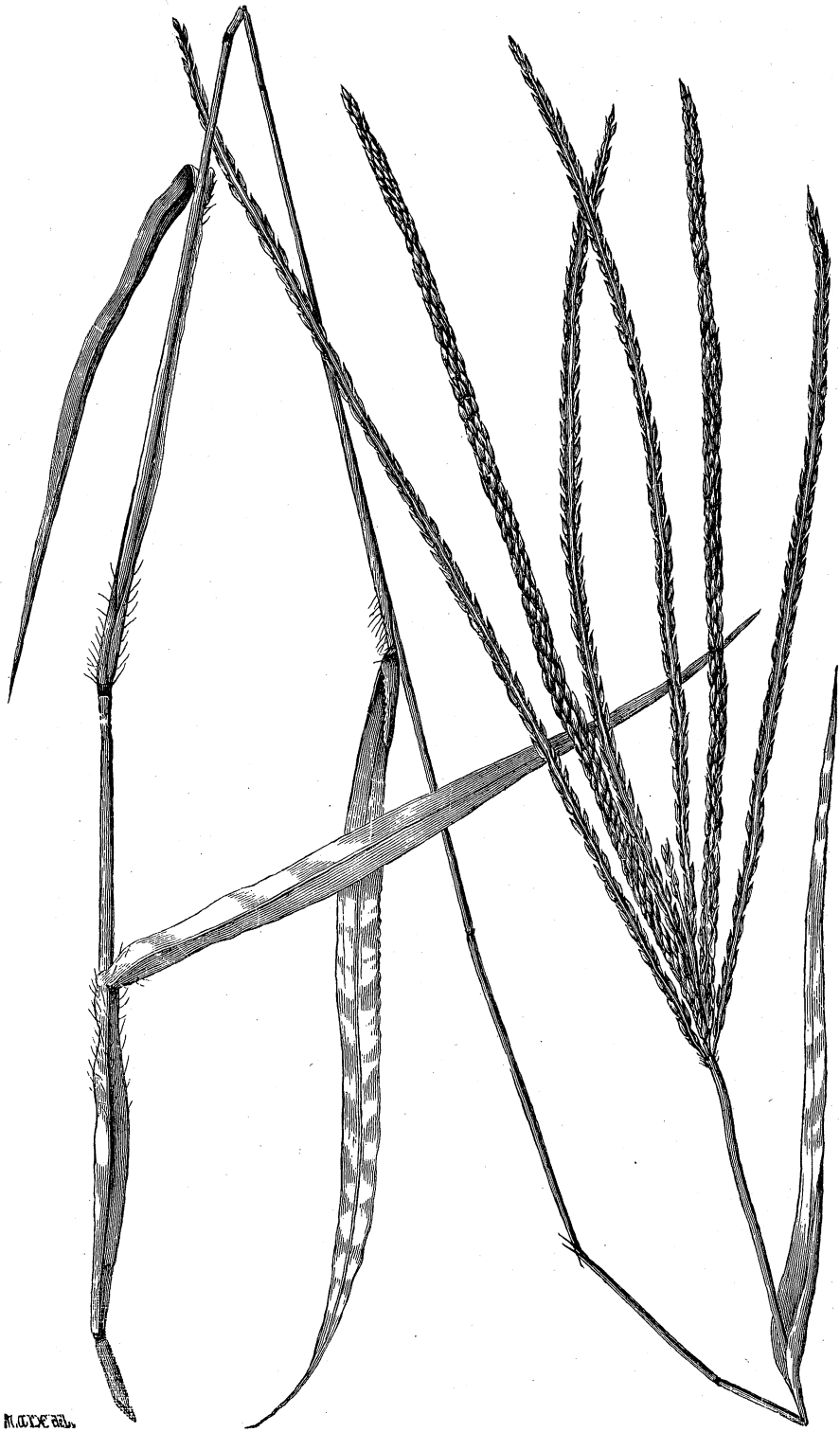
LESPEDEZA STRIATA (Japan Clover).

MUHLENBERGIA MEXICANA.

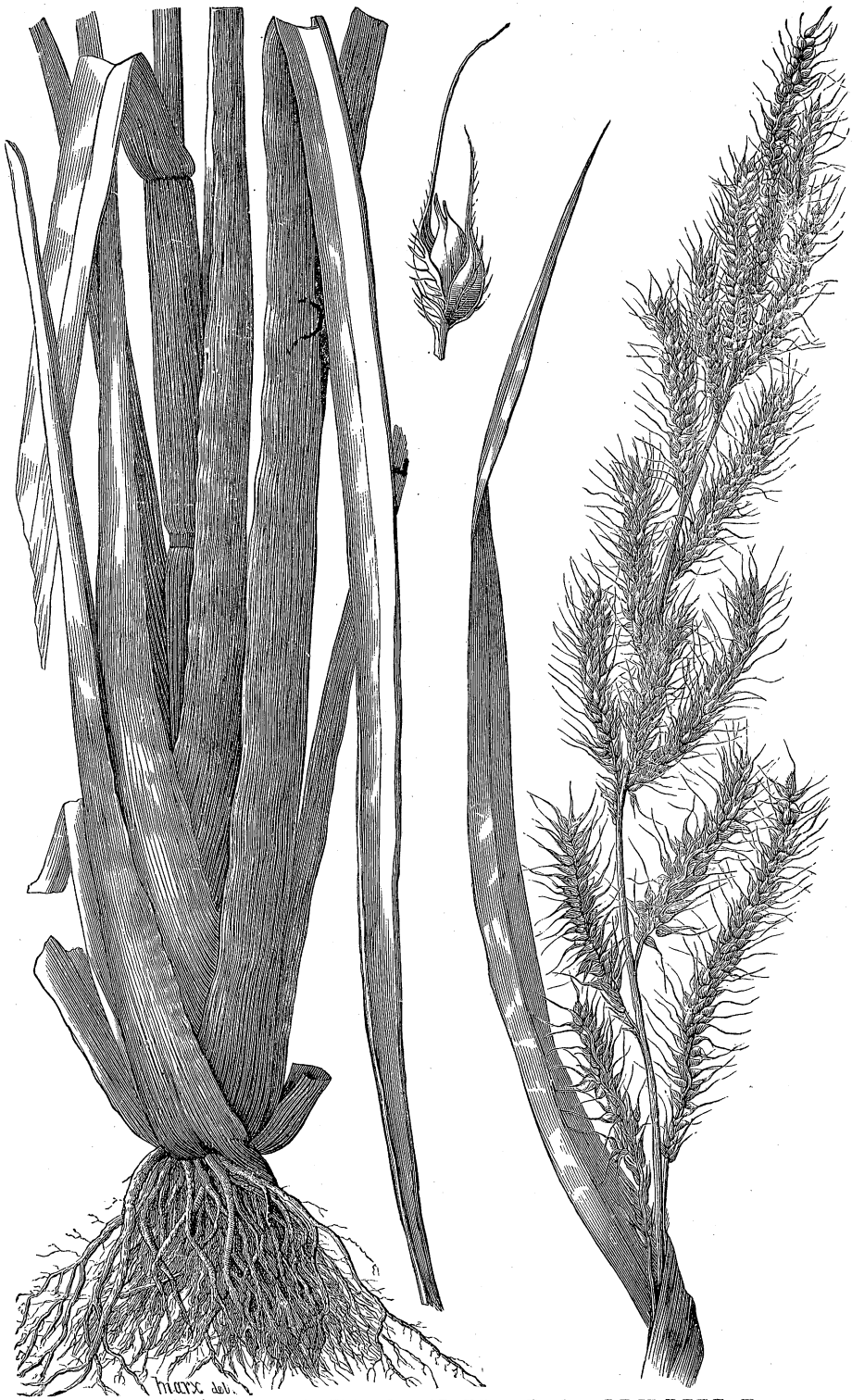
PASPALUM LAEVE (smooth erect grass - Water grass).



PASPALUM DILITATUM (Hairy flowered pàspalum).

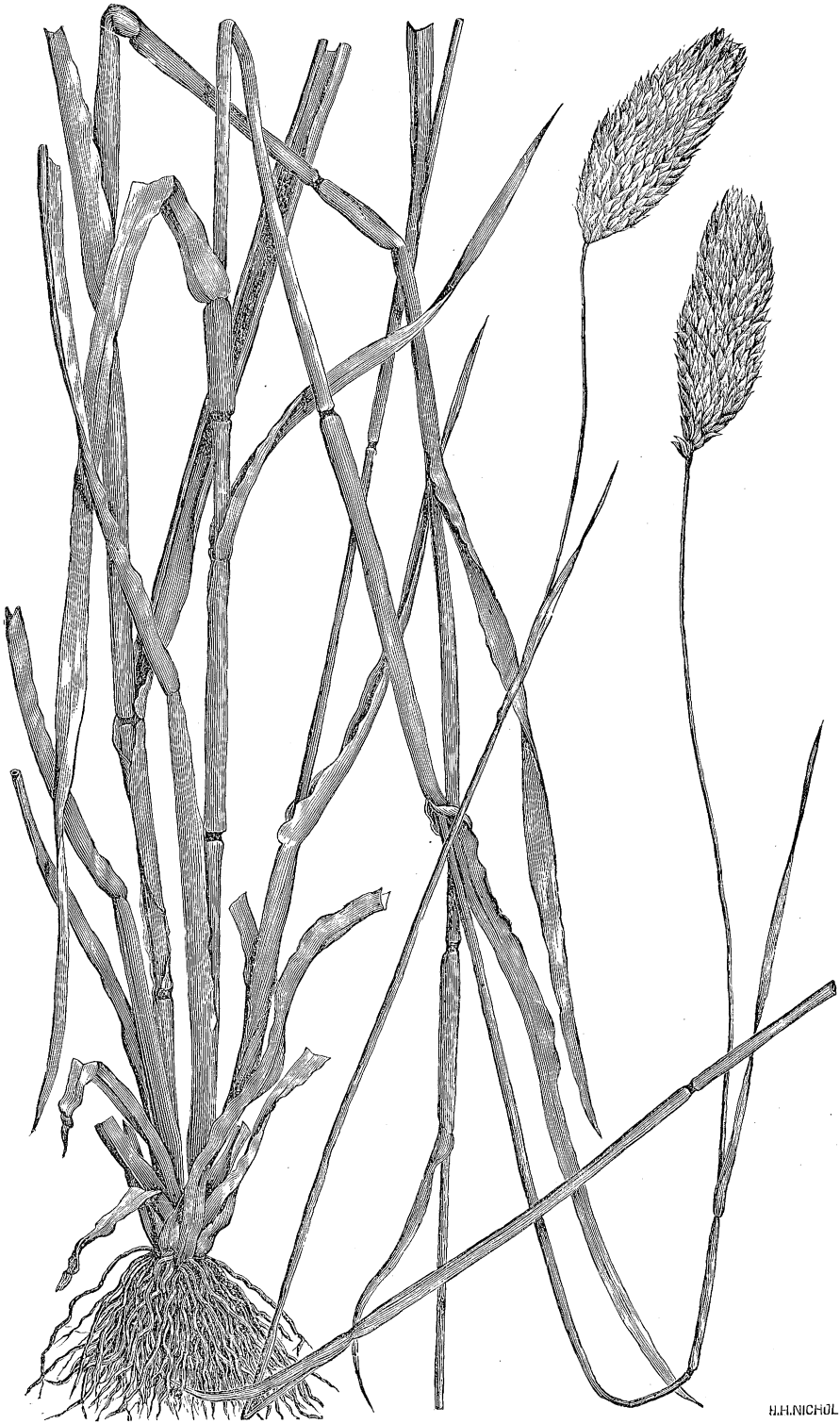


PANICUM SANGUINALE (crab grass).


Marx. del.

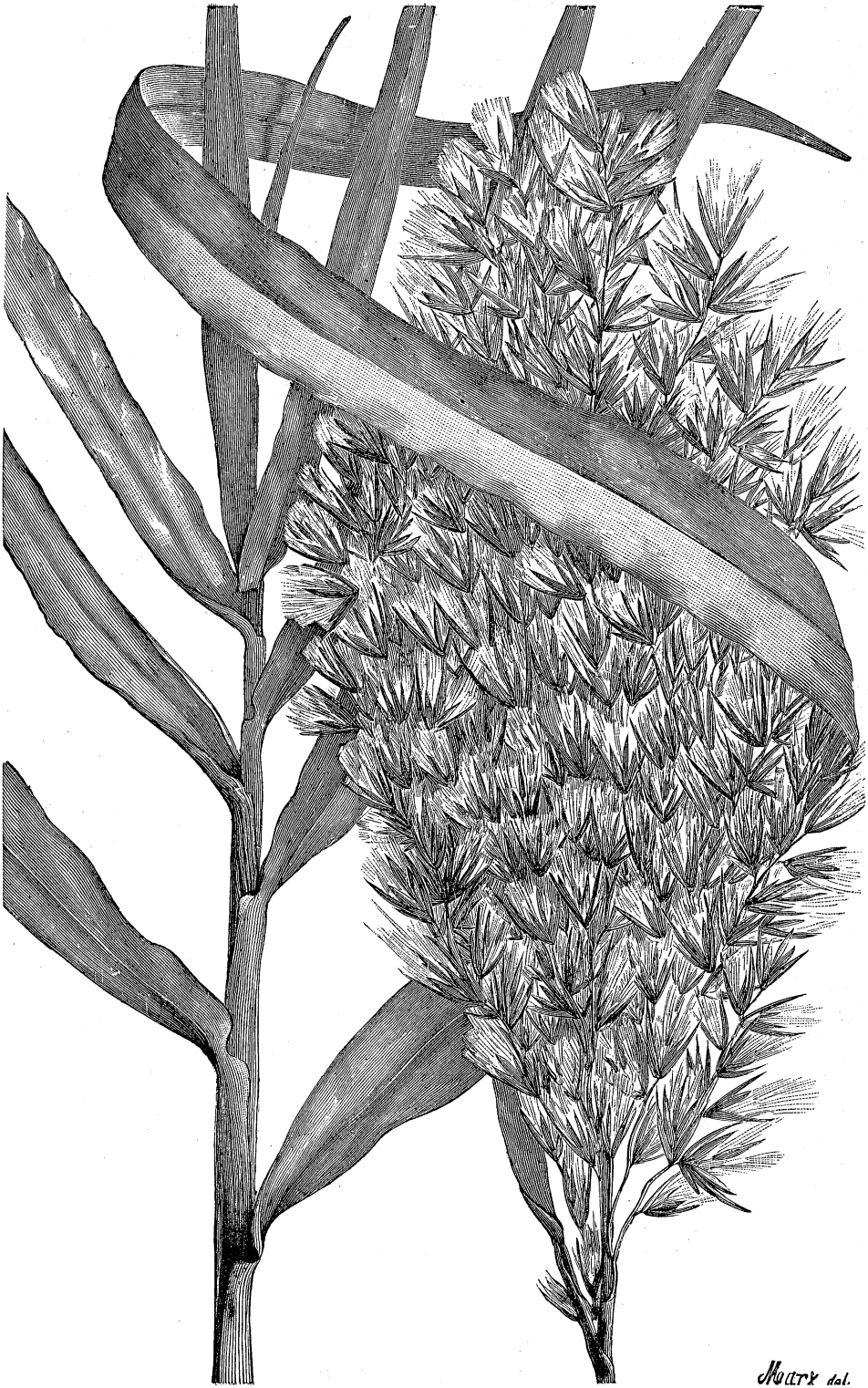
PANICUM PROLIFERUM (Prolific panic grass, sprouting crab grass)

POA COMPRESSA (Wire grass Blue grass).



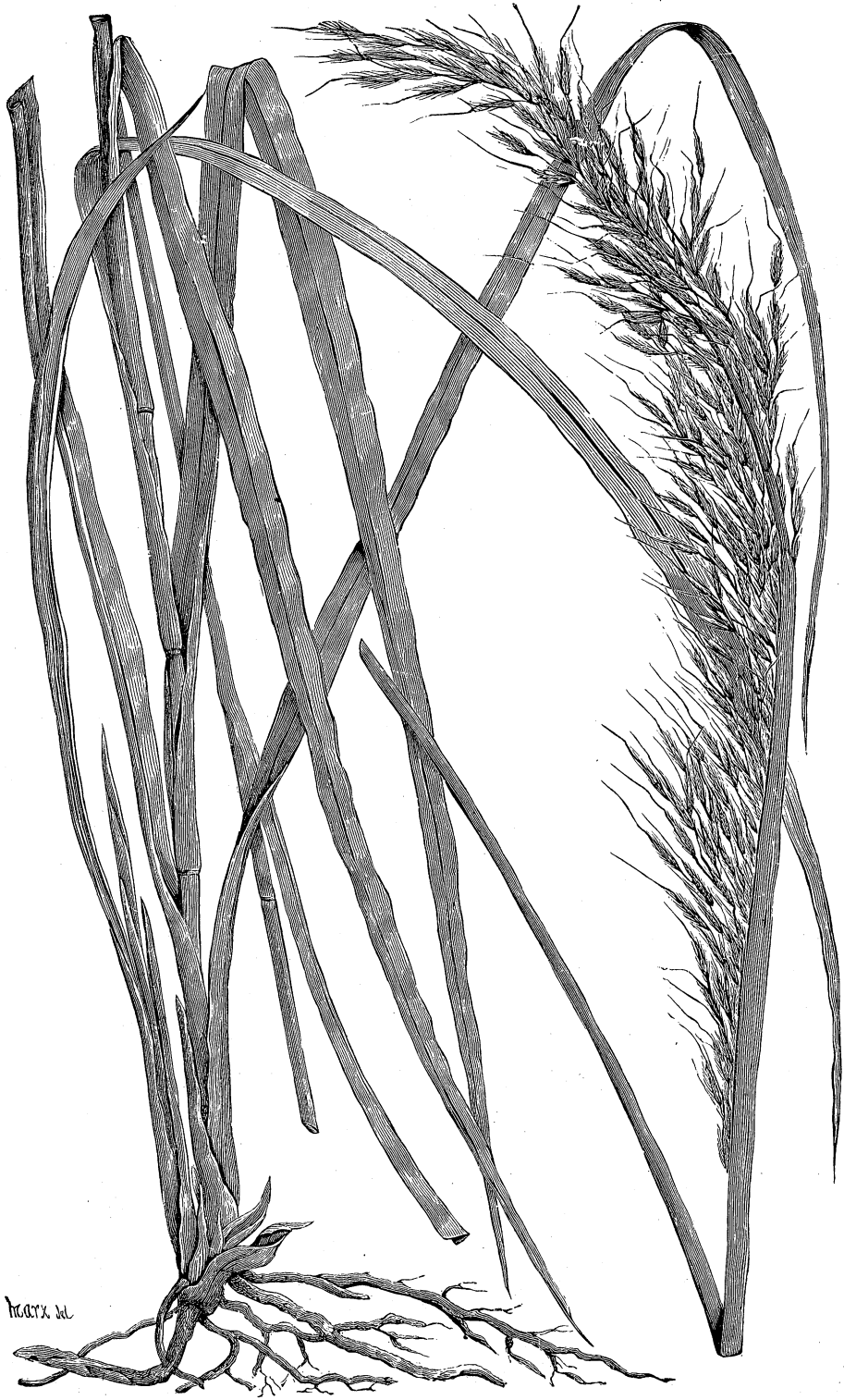
H.H.NICHOLS.SC

PHALARIS INTERMEDIA, VAR. ANGUSTA (Canary grass ; Stewarts Canary grass ;

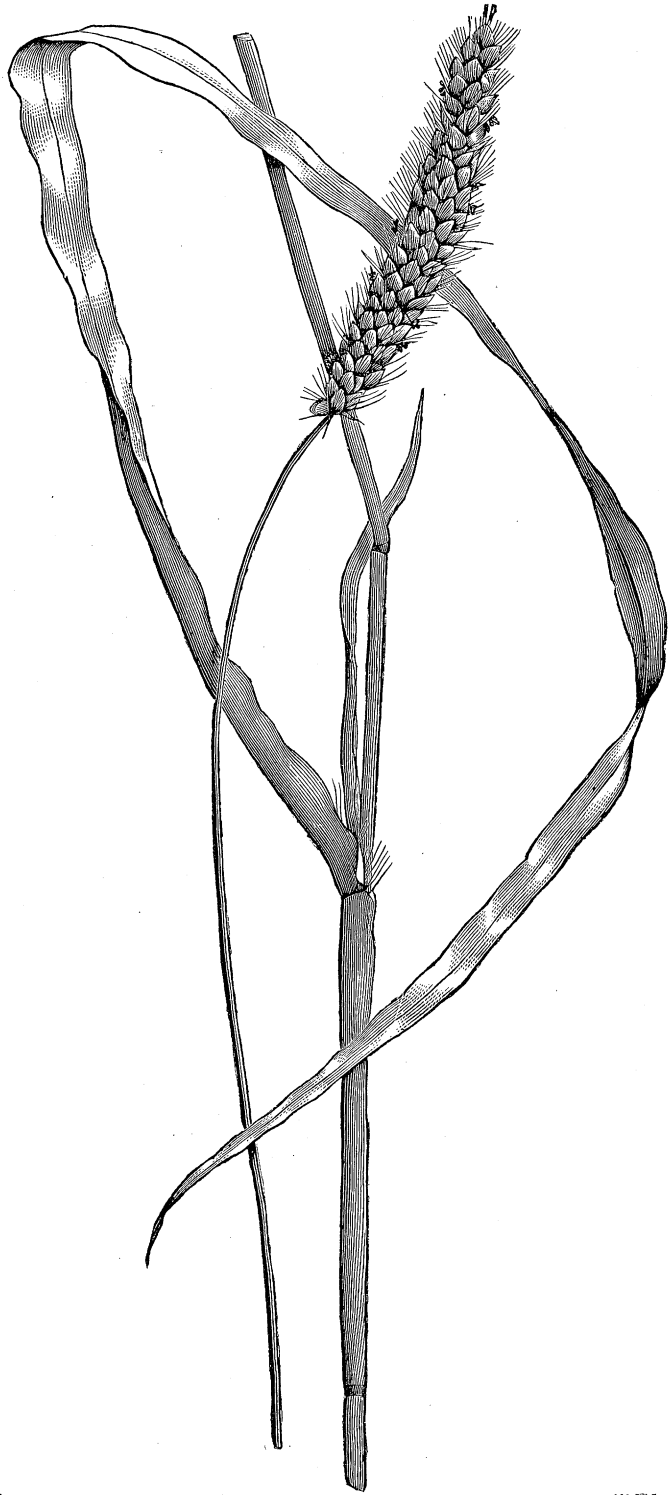


PHRAGMITES COMMUNIS (Reed grass).

RICHARDSONIA SCABRA.(Mexican clover—Pigeon weed—Poor toes—Florids clover—



SORGHUM NUTANS (Indian grass. Wood



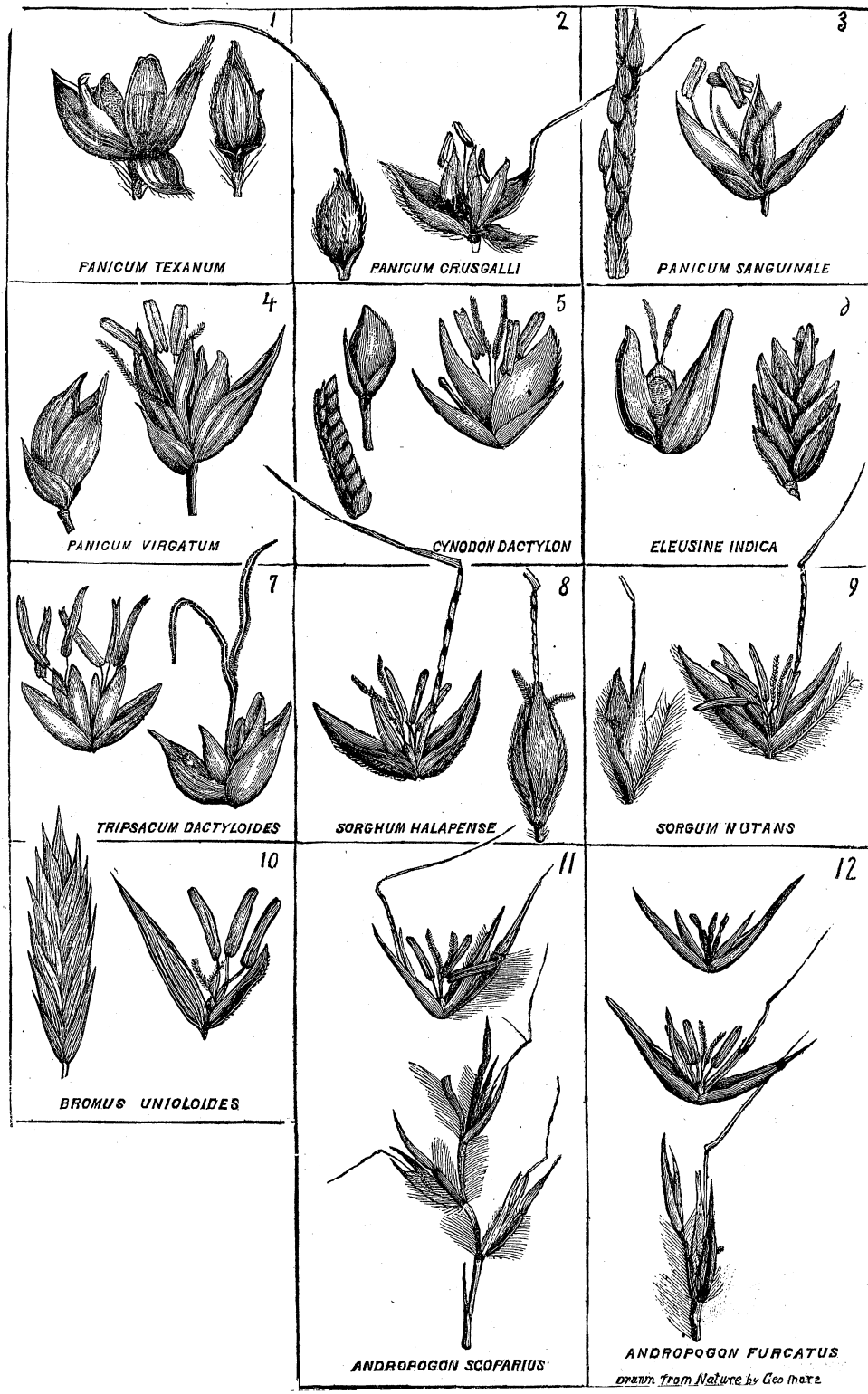
U.H.NICHOLS—END MARX—DEL.

SETERIA GLAUCA (Bristly fox-tail grass—Bottle grass).

TRIPSACUM DACTYLOIDES (Gama grass : Sesame grass).


Maw del.

ZIZANIA AQUATICA (Wild rice, Indian rice, Water oats, Water rice).


1
PANICUM TEXANUM
2
PANICUM CRUSGALLI
3
PANICUM SANGUINALE
4
PANICUM VIRGATUM
5
CYNODON DACTYLON
6
ELEUSINE INDICA
7
TRIPSACUM DACTYLOIDES
8
SORGHUM HALAPENSE
9
SORGUM NUTANS
10
BROMUS UNIOLOIDES
11
ANDROPOGON SCOPARIUS
12
ANDROPOGON FURCATUS
drawn from Nature by Geo Thurz