

WILD GRASSES OF ALABAMA.

*With Full Descriptions of Twenty-five Species
Valuable for Stock Raising.*

By
F. H. Mell, Jr., Ph.D.

NO. I.

*Issued From The
Biological Laboratory Of The State Polytechnic Institute.*



Printed By The Students.

Auburn, Ala.:

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PREFACE.



The cultivation of grasses occupies such an important position in a commercial and agricultural point of view, that a knowledge of their growth and adaptation is of great value to the people. Fully conscious, of this fact, it has occurred to me that the farmers of this State would welcome any work that would give them information upon this most important subject. And I have, therefore, concluded to offer them the following modest production, trusting that its perusal may be the means of stimulating a stronger interest in the universal cultivation of the wild grasses found in such abundance within the borders of the State. The pages of this pamphlet have been carefully prepared from data accumulated from the work done in the Biological Laboratory of the Polytechnic Institute. During the past eight years many specimens of grasses have been examined for persons living in different parts of the State, and much material has, therefore, accumulated, thus justifying the issue of this paper.

It is my intention to follow this work by others on the same and kindred subjects as investigations in the Biological Laboratory progress. The plates that illustrate this paper are copies of those appearing in Dr George Vasey's work on "The Agricultural Grasses of the United States." These plates are used through the kind consent of the author. The chemical analyses have also been copied from the same book, the work of Mr. Clifford Richardson of the U. S. Agri. Dept. In addition to the work above mentioned liberal use has been made of "Flint on Grasses," "Rural Encyclopedia," "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," and many agricultural and scientific periodicals. No effort has been made to present an original production, but simply to collate the facts already known in a shape most acceptable for the study and benefit of the Alabama farmers.

P. H. M.



WILD GRASSES OF ALABAMA AND THEIR CULTIVATION



It is an interesting fact that a large proportion of the species of grasses growing wild in the United States east of the Mississippi River, are to be found within the borders of Alabama. Most of these, however, have been considered by the farmers as very troublesome; and only within the past few years has the subject of grass cultivation received even a limited attention from the farmers of the south. In the northern states it is a rare thing to find a thrifty farmer without his fields of grass for pasture and hay; while the question of paramount consideration, among many southern tillers of the soil, seems to be: what shall be done to destroy the grass of the fields? During the past few years some agriculturists have found from observation and experiment that this plant, when well cultivated, adds a large item to the value of the farm; and the question is now being asked: how can this valuable 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 also 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; and that a considerable item in this expense is to cover the demand for wheat and hay. A quantity of hay is shipped to Alabama each year from Western markets 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. The wild grasses of the State stand ready to furnish hay in abundance if they are only properly cared for by the cultivator. Plenty of hay will supply our markets with well fed mules, horses and cattle. Moreover, 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. We are peculiarly blessed in regard to the salubrious climate and great variety of land that are ours, and if we would only utilize the privileges nature has thus betowed upon us with such a lavish hand we would make our lands the feeders of nations. 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.

Good authorities have furnished the following items in regard to renovating and preparing grass lands for pasture and hay.

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 good and the right kinds of 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 great importance. The grass does not thrive near so well on very 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 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:

For winter use these formulæ may 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 [*Hordeum 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.

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 (*Trefolium 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.

Another formula for land of medium quality and tolerable dryness:

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, $\frac{1}{2}$ pound.

Formula for general pasture and stiff lands:

Orchard grass, $1\frac{1}{2}$ bushels.

Red clover, 12 pounds.

The above formulæ may be changed with considerable advantage

by substituting other grass seeds for these 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 sanguinalis*—*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 unioloides*—*Elymus Virginicus*(Lyme grass).

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 besides 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 4 or 5 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.

There are a few terms it will be well for all parties to become familiar with, who expect to cultivate the grasses for forage purposes. I have mentioned below the meaning of the terms in most common use among botanists in describing grasses, and I think the ordinary reader will find no difficulty in mastering them. I have attempted to use as few scientific names as possible in preparing this paper but it is necessary to use some, and I trust my reader will not become discouraged when they meet with them.

- Awn*; the bristle or beard of barley, oats, etc. or any similar bristle-like appendage.
- Calyx*; the outer set of floral envelope or leaves of the flower.
- Corolla*; the leaves of the flower within the calyx.
- Culm*; the stem of grasses.
- Floret*; a diminutive flower.
- Glume*; the husks or floral coverings of grasses, or, particularly, the outer husk or bracts of each spikelet.
- Inflorescence*; the arrangement of flowers on the stem.
- Ligule*; the little membranous appendage at the summit of the leaf-sheaths 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 a secondary spike.

[Grays Botany.]

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.

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.

A small pocket magnifying glass is found very convenient in examining these plants; and by aid of the plates given in this work, together with the descriptions furnished, little difficulty need arise in arriving at correct conclusions in regard to any of the common species found in this state. This is particularly true if the party making the study will devote a certain amount of time to investigation and practice. These analyses are of special importance in pronouncing upon the utility of the plant for forage purposes. It is not always best to pass judgement on one of these species by the simple effect produced on the eye, because some of our most nutritive grasses are quite coarse looking and unattractive.

A method for analysis, copied from Flint's "*Grass and Forage Plants*" is added below to help those who may desire to find the names of any of the common grasses.

To aid the reader in finding the true name of an unknown specimen of grass, the following arrangement will be found to be very convenient, and easily understood.

Let the flowers of the grass be first examined. If but one is found in each spikelet refer to number 2, of the left-hand column, and then examine and see whether they are arranged in panicles or spikes; if the former, then refer to number 3 of the left-hand column, and see whether they are awned or not. If awned, refer to number 4, if without awns, to number 12, of the left-hand column. If awned, and having two glumes refer to 13, and so on. If without glumes and aquatic, it is *Zizania*, or wild rice.

If in the first examination the spikelets are found to have two or more flowers, refer to number 26, of the left-hand column, and see whether the inflorescence is in panicles or spikes. If the former, refer to 27, of the left-hand column. If the latter, in spikes refer to 39, and then see whether the spikelets are two-rowed, or one-sided. If the latter, refer to 45, and see whether the spikes are digitate and the spikelets in two rows. If they are, refer it to the genus *Eleusine*.

But little practice will be required to gain familiarity in thus analyzing the flowers of the grasses:

1. Spikelets with but one flower,.....	2
1. " with two or more flowers,.....	26
2. Flowers arranged in panicles,.....	3
2. Flowers in spikes.....	16
2. With awns,.....	4
2. Without awns,.....	12
4. Glumes large,.....	5
4. Glumes minute, unequal, one hardly perceptible,.....	11
4. Glumes none, grass aquatic,.....	— <i>Zizania</i>
5. Without abortive rudiments,.....	6
5. With an abortive rudiment of a second flower,.....	— <i>Holcus</i>
6. Paleae two,.....	7
6. Paleae three, upper awned flowers polygamous,.....	— <i>Sorghum</i>
7. Palea with one awn,.....	8
7. Lower palea with three twisted awns,.....	— <i>Aristida</i>
8. Paleae cartilaginous or gristly,.....	9
8. " herbaceous,.....	10
8. " membranaceous, panicle open,.....	— <i>Agrostis</i>
8. " " contracted,.....	— <i>Polypogon</i>
9. Flowers sessile, or joined to the stem at the base,.....	— <i>Oryzopsis</i>
9. Flowers stipitate, fruit black,.....	— <i>Stipa</i>
10. Flowers naked, with one stamen,.....	9— <i>Cinna</i>
10. Flowers hairy, stamens three,.....	— <i>Calamagrostis</i> or <i>Deyeuxia</i>
11. Stamens three,.....	— <i>Muhlenbergia</i>
11. " two,.....	— <i>Brachyelytrum</i>
12. Glumes two,.....	13
12. Glumes none, leaves rough from the end backwards,.....	— <i>Leersia</i>
13. Paleae membranaceous,.....	14
13. Paleae leathery, spikelets all cauline,.....	— <i>Milium</i>
13. Paleae leathery, fertile spikelets radical,.....	— <i>Amphicarpum</i>
14. Fruit coated, or covered with a husk,.....	15
14. Fruit naked,.....	— <i>Sporobolus</i>
15. Flowers stalked,.....	— <i>Agrostis</i>
15. Flowers sessile,.....	— <i>Vilfa</i> or <i>Sporobolus</i>
16. Flowers awned,.....	17
16. Flowers without awns,.....	22
17. Spikes solitary,.....	18
17. " many, awnless, unilateral, paleae cartilaginous,.....	— <i>Panicum</i>
17. " two, fertile,.....	— <i>Erianthus</i>
17. " two, polygamous, sterile flowers bearded,.....	— <i>Andropogon</i>
18. Spikes simple, or nearly so,.....	19
18. " paniculate, or lobed,.....	2
19. Involucre none,.....	20.
19. Involucre of two or more bristles,.....	— <i>Setaria</i>

19. Involucere burr-like.....	61—Cenchrus.
20. Paleae with awns one to three times their length,.....	?—Alopecurus.
20. Paleae with awns five times their length,.....	44—Hordeum.
21. Both glumes and paleae awned.....	10—Muhlenbergia.
21. Glumes awnless, single paleae awned,.....	54—Anthoxanthum.
21. Paleae two, lateral flowers staminate.....	53—Hierochloa.
22. Flowers perfect or polygamus,.....	23
22. Spikes monoecious.....	25
23. Spikes one-sided,.....	24
23. Spikes cylindrical, solitary terminal,.....	4—Phleum.
24. Spikes two or more, spikelets suborbicular,.....	58 Paspalum
24. " digitate or verticillate, linear.....	Paspalum
24. " pedunculate, in a two-sided panicle.....	Spartina.
24. " sessile, in a one-sided panicle.....	Lepturus.
25. " all terminal, sterile above, fertile at the base.....	Tripsacum.
25. Fertile spikes lateral, sterile ones terminal paniced.....	Zea.
26. Inflorescence in panicles.....	27.
26. Inflorescence in spikes.....	39.
27. Flowers awned.....	28.
27. Flowers without awns.....	33.
28. Lower palea awned on the back.....	29.
28. " " awned on apex.....	32.
29. Awn near the base of the palea.....	30.
29. Awn near the apex of the palea.....	31.
30. Apex bifid, awn bent.....	Avena.
30. " " " " lower flower sterile.....	Arrhenatherum.
30. " multifid.....	Aira.
31. Palea with two bristly teeth.....	Trisetum.
31. Palea bifid.....	Bromus.
32. Lower palea rounded, obtuse.....	Briza.
32. " " entire, pointed, fruit coated.....	Festuca.
32. Awn between two teeth, twisted.....	Danthonia.
33. Terminal flower perfect.....	34.
33. " " abortive, or a mere pedicel.....	36.
34. Palea entire, outer one mucronate.....	35.
34. Glumes unequal, like the lower abortive pale.....	Panicum.
34. " equal, longer than the palea.....	Phalaris.
34. Lower palea truncate-mucronate, inner bifid.....	Uniola.
34. Flowers silky-bearded on the rachis.....	Phragmites.
34. Spikelets terete, palea 7-nerved.....	Glyceria.
34. " two to six, five-nerved.....	Poa.
34. " twenty, three-nerved.....	Eragrostis.
34. " flat, lower pale laterally compressed.....	Distichlis or Brizopyrum.
35. Scales two—styles two.....	Festuca.
36. " one " three.....	Arundinaria.
36. Panicle contracted.....	37.
35. " large diffuse.....	Melica.
37. Lower palea 1-pointed, or mucronate.....	38.
37. " " pointless.....	Eatonia.
37. " " three cleft.....	Triodia or Tricuspis.
37. " " awnless.....	Dupontia.
38. Stamens three.....	Koeleria.
38. " two.....	Diarrhena.
39. Spikelets two-ranked.....	37.
39. " unilateral.....	43.
40. Glumes broad.....	41.
40. " subiculate.....	42.
40. " none.....	Asprella or Gymnostichum.
41. " two, in the upper spikelet only.....	Lolium.
41. " " in each spikelet.....	Agropyrum or Triticum.

42.	"	collateral, spikelets in twos or more.....	Elymus
42.	"	opposite, spikelets solitary.....	Secale.
43.	One perfect among several neutral ones.....		Ctenium.
43.	" "	flower below several neutral ones.....	44.
43.	Spikelets conglomerate, or paniculate.....		Dactylis.
43.	"	with more than one perfect flower.....	45
44.	Spikes dense.....		Bouteloua
44.	"	filiform, racemed.....	Gymnopogon.
44.	"	slender, digitate.....	Cynodon.
45.	"	digitate, glumes and pales awnless, blunt.....	Eleusine.
45.	"	racemed, slender.....	Leptochloa



The following is a list of the grasses that have been analyzed in the Biological Laboratory during the last few years. These specimens were sent to the College by parties living in various portions of the State, and give some idea concerning the large number of species to be found growing wild throughout the country.

A number of these grasses are not natives of this state but are nevertheless naturalized and may be found growing in a wild condition.

No.	SCIENTIFIC NAMES.	COMMON NAMES.	TIME OF BLOOMING.	PLACE OF GROWTH
1	<i>Leersia Virginica</i> , Willd.	False Rice or white grass	August.	Damp woods.
2	<i>Leersia oryzoides</i> , Swartz.	False Rice or Rice grass.	"	Low, wet places.
3	<i>Zizania aquatica</i> , L.	Indian Rice or Wild Rice.	"	Low grounds.
4	" <i>milinea</i> , Michx.	Prolific or wild rice	"	Wet places.
5	<i>Hydrochloa Carolinensis</i> Beauv.	Floating grass		Banks of streams.
6	<i>Alopecurus geniculatus</i> , L.	Floating foxtail	May-June	Wet meadows.
7	" <i>pratensis</i> , L.	Meadow foxtail	May	Fields and pastures.
8	<i>Phleum pratense</i> , L.	Timothy	June-July	" " "
9	<i>Sporobolus Indicus</i> , Brown	Wire grass		
10	" <i>junceus</i> , Kunth.	Smut grass	August	Dry, sandy soil.
11	" <i>asper</i> , Kth.	Rush grass	Sept.	" " "
12	" <i>vaginaeflora</i> , Por.	Hidden flower Villa		" " "
13	<i>Agrostis perennans</i> , Puck.	Thin grass	July-Aug.	Moist, shady places.
14	" <i>scabra</i> , Willd.	Rough bent grass	July	Sandy soil
15	" <i>vulgaris</i> ; var. <i>alba</i>	English bent grass		Fields and pastures.
16	" <i>arachnoides</i> , Ell.	Spider bent grass		Dry soil on sea coast.
17	<i>Cinna arundinacea</i> , L.	Wood reed grass	July-Aug.	Wet places.
18	<i>Muhlenbergia Mexicana</i> , Trin.		August	Low places.
19	" <i>sylvatica</i> , Willd.		Aug-Sept.	Rocky woods.
20	" <i>diffusa</i> , Schreb.	Nimble will. Drop seed grass	" "	Dry woods.
21	" <i>capillaris</i> , Kunth.	Hair grass	August.	Sandy soil.
22	" <i>trichopodes</i> , Chap.	Bunch hair grass		Pine woods.
23	<i>Brachyelytrum aristatum</i> , Beauv.		June	Sandy woods.
24	<i>Calamagrostis Nuttallei</i> , Beauv.			
25	<i>Stipa avenacea</i> , L.	Feather grass	July	Dry woods—sparsely.
26	<i>Aristida gracilis</i> , Ell.	Slender 3 awned grass	Sept.	Sandy fields.
27	" <i>lanata</i> , Poir.		Aug-Sept.	Sandy soil.
28	" <i>purpurascens</i> , Poir.	Beard grass. 3 awned grass	Aug.	Dry soil.
29	" <i>purpurascens</i> var. <i>palustris</i> , Chap.		Aug-Sept.	Margins of pine barren ponds.
30	" <i>virgata</i> , Prin.	Beard grass	August	Dry soil.
31	" <i>spiciformis</i> , Ell.		Aug-Sept.	Pine barrens.
32	<i>Spartina juncea</i> , Willd.	Rush salt grass	July-Aug.	Sandy, marshy places
33	" <i>polystachya</i> Willd.	Salt Reed grass	Aug-Sept.	Brackish marshes.
34	" <i>stricta</i> , var. <i>glabra</i> , Gray	Rough marsh grass	" "	Salt marshes.
35	<i>Gymnopogon racemosus</i> Beauv.	Naked beard grass	Sept-Oct	Dry sandy soil.
36	<i>Chloris petraea</i> , Thurb.	Seaside finger grass	May-Aug.	Damp soil along coast
37	<i>Cynodon dactylon</i> , Pers.	Bermuda grass	No seed	In all soils.
38	<i>Cenium Americanum</i> , Spreng.	Toothache grass	July-Aug.	Low pine barrens.
39	<i>Eleusine Aegytiaca</i> , Pers.	Egyptian grass		Cultivated ground.
40	" <i>Indica</i> , Gaert.	Crab grass-crowfoot	Aug-Sept.	" fields.
41	<i>Leptochloa mucronata</i> , Kunth.	Pointed slender grass	" "	" " "
42	<i>Triodia sesslerioides</i> , Beuth.	Tall reedtop	Aug	Dry soil.
43	" <i>ambigua</i> , Beuth.		July	Low pine barren.
44	<i>Tricuspis cornuta</i> , Gray	Horned sand grass	Aug-Sept.	Light soils,
45	" <i>purpurea</i> , Gray	Sand grass	June	Sandy soil on coast.
46	<i>Dactylis glomerata</i> , Linn.	Orchard grass	April-May	Fields and pastures.
47	<i>Eatonia obtusata</i> Gray		June	Dry soils.

48	" <i>Pennsylvanica</i> , Gray		March	Moist woods.
49	" <i>Pennsylvanica</i> , var. <i>filiformis</i> , Chap.			Dry pine barrens.
50	<i>Melica mutica</i> , var. <i>glabra</i> , Gray	Melic grass	April	Dry open woods
51	<i>Glyceria nervata</i> , Trin.	Meadow spear grass; manna grass	July	Wet swamps
52	<i>Arundinaria macrospena</i> Michx.	Cane	Feb.	Banks of rivers
53	" <i>tecta</i> , Muhl.	Reed	Feb-Mar.	Swamps;
54	<i>Distichlis spicatum</i> Raf.	Spike grass	Aug-Sept.	Low sandy soils on sea
55	<i>Poa annua</i> , L.	Annual spear grass	Feb-Mar.	Fields and pastures.
56	" <i>cristata</i> , Walt.		April	Dry soil.
57	" <i>compressa</i> , L.	Wire grass	May	Dry road sides.
58	" <i>flexuosa</i> , Muhl.	Southern spear grass	May	Rich shady soil.
59	" <i>pratensis</i> , L.	June or Kentucky Blue grass	May	Rich soil around dwellings.
60	<i>Eragrostis reptans</i> , Nees.	Creeping meadow grass	Aug-Sept.	Low sandy places.
61	" <i>poaeoides</i> , var. <i>megastachya</i> , Gray	Strong scented meadow grass	" "	Sandy fields.
62	<i>Eragrostis ciliaris</i> , L.			Waste places.
63	" <i>Purshii</i> , Schrad.	Southern <i>Eragrostis</i>	June-	"
64	" <i>Conferta</i> , Trin.		Aug-	River banks.
65	" <i>tennis</i> , Gray	Branching spear grass		Stearic plains
66	" <i>Capillaris</i> , L.	Hair panicle meadow grass	" "	Dry fields.
67	" <i>nitida</i> , Chap.		" "	Low grassy places
68	" <i>pectinacea</i> , var. <i>spectabilis</i> , Gray	Meadow comb grass	" "	Dry sterile soil.
69	" var. <i>refracta</i> , Chap.			Damp soil.
70	<i>Festuca myurus</i> , L.			Dry sterile soil.
71	" <i>tenella</i> , Willd.	Small fescue grass	Mar-April	Sandy soil.
72	" <i>parviflora</i> , Ell.		July	
73	" <i>nutans</i> , Willd.	Nodding fescue		Rich woods & banks
74	<i>Bromus unioloides</i> , Willd.	Rescue grass	Aug.	Woods.
75	" <i>ciliatus</i> , L.	Fringed brome grass	April	Rich soils.
76	" <i>secalinus</i> , L.	Cheat or chess	June	Grain fields.
77	<i>Urtiola latifolia</i> , Michx.	Broad leaf spike grass		Shaded fields.
78	" <i>paniculata</i> , L.	Spike grass	July-Aug.	Sandy coast.
79	" <i>gracilis</i> Michx.	Slender spike grass		"
80	" <i>nitia</i> , Balduc.		July-Aug.	Swamps.
81	<i>Phragmites communis</i> , Trin.	Common reed grass	Aug. Sept.	Marshes.
82	<i>Elymus Virginicus</i> , L.	Lyme grass-Wild Rye		River banks.
83	" <i>striatus</i> Willd.	Slender hairy wild rice	July-Aug. Sept.	Rocky woods.
84	<i>Asprella hystrix</i> , Willd.	Battle brugh grass		Moist rocky woods.
85	<i>Lolium perenne</i> , L.	Italian Rye grass	July	
86	<i>Trisetum palustre</i> , L.	Marsh oat grass		Low grounds.
87	<i>Danthonia sericea</i> , Nutt.	Silky flowered oatgrass	Mar-April	Dry pine woods.
88	" <i>spicata</i> , Beauv.		April	Dry barren soil.
89	<i>Arrhenatherum avenaceum</i> , Beauv.	Fall meadow oat-grass	June-July	Fields and pastures
90	<i>Avena fatua</i> Linn.	Wild oats	May	
91	<i>Phalaris intermedia</i> , Boec.	Wild canary grass		Sandy places on coast.
92	<i>Holcus lanatus</i> , Linn.	Velvet grass-Meadow soft grass	April-May	Cultivated grounds.
93	<i>Paspalum fluitans</i> , Walt.	Floating paspulum		River swamps.
94	" <i>Walterianum</i> ,			Low cultivated ground
95	" <i>dilatatum</i> , Poir.		Sept-Oct.	
96	" <i>digitaria</i> , Poir.	Finger shaped grass	July-Aug.	Open swamps.
97	" <i>distichum</i> , Linn.	Joint grass	July-Sept.	Swamps and low gro'd.
98	" <i>compressum</i> , var. <i>imberbe</i> , Munro		Aug-Sept.	
99	" <i>leutiferum</i> , Lam.			Pine barren swamps.
100	" <i>laeve</i> , Mz.	Smooth erect grass		Dry woods.
101	" <i>Floridanum</i> , Mz.		July-Aug.	Damp soil.
102	" <i>racemulosum</i> , Nutt.		Aug-Sept.	Dry sandy soils.
103	" <i>plicatum</i> , Mz.		" "	Low cultivated ground
104	" <i>setaceum</i> , var. <i>ciliatifolium</i>	Hairy slender grass	Sept.	Wet or dry soil.
105	<i>Anthraenantia villosa</i> , Beauv.	Smaller crab grass	June-Sept.	Cultivated grounds.
106	<i>Panicum clandestinum</i> , Linn.	Hidden flowered grass	May-Oct.	Dry sterile soil.
			Sept.	

107	"	colonum, Linn.		July-Sept.	Damp soil.
108	"	crusgalli, Linn.	Barn or crab grass	Aug-Sept.	Damp shaded soils.
106	"	curtissii, Chap.			Ponds and swamps.
110	"	debile, Poiv.			Low grounds.
111	"	depauperatum, Muhl.	Worthless panic grass	June	Dry sandy soil.
112	"	dichotamum, Linn.		Mar-May	Woods and fields.
113	"	filiforme, Linn.	Slender crab grass	Aug-Sept.	Dry sandy soil.
114	"	gibbum, Ell.	Spiked panic grass	July-Sept.	swamps.
115	"	gynocarpum, Ell.		Sept.	Muddy banks of rivers.
116	"	latifolium, Linn.	Broad leaved panic	May	Dry rich soil.
117	"	microcarpum, Muhl.	Small seeded panic	May	Dry soil.
118	"	paspaloides, Pers.			
119	"	scoparium, L.	Few flowered panic	May	Close damp soil.
120	"	proliferum, Linn.	Prolific panic grass	Sept.	Wet places near coast.
121	"	prostratum, Lam.			
122	"	repens, L.			
123	"	sanguinale, L.	Finger grass-crab grass	May-Oct.	Cult. and waste places.
124	"	verrucosum, Muhl.	Warty panic	Sept.	Swamps.
125	"	viscidum, Ell.	Sticky panic grass	May	Wet places near coast
126	"	amarum, Ell.	Bitter panic	Sept.	Sands near coast
127	"	anceps, Michx.	Double headed panic	Aug-sept.	Damp sterile soil.
128	"	virgatum, L.	Tall panic-switch can		Moist or dry soil.
129	Oplismenus	setarius R.		" "	Sandy woods,
130	Setaria	glauca, Beauv.	Bottle grass	July	Cultivated ground.
131	"	glauca, var. laevigata, Chap.		" "	Brackish swamps.
132	"	italica, Kth.	Bengal grass	July-Aug.	Swamps along coast.
133	Cenchrus	echinatus, L.		July-Sept.	Fields and waste gr'nd.
134	"	incertus(?)			
135	"	tribuloides, L.	Burr grass	July-Oct.	Sands along coast.
136	Stenotaphrum	Americanum, Schkr.	St. Augustine grass.	June-Sept.	Damp, sandy places on the coast
137	Tripsacum	dactyloides	Gama; sesame grass.	Aug "	Rich soils.
138	Luziola	Alabamensis Chap			
139	Rottboelia	rugosa, Nutt.			
140	"	corrugata Balb			
141	Andropogon	claudestinis Hale.		Sept. Oct.	Wet or dry sandy soils.
142	Andropogon	dissitiflorus.	Virginian beard grass.	" "	Barren soil
143	"	furcatus Muhl	Finger spike grass	" "	Open Woods
144	"	macrochrous Mz.	Clustered flower beard grass.	" "	Low pine barres.
145	"	scoparius. "	Purple wood grass.	" Aug.	Dry, sterile soil.
146	"	tener. Kth.		" "	Dry, grassy, pine lands
147	Erianthus	alopeuroides E	Woody beard grass	" Oct.	Dry or wet soils.
148	"	var. bre-		" "	" " "
149	"	vibarbis " var. con-	Short bearded grass.	" "	" " "
		tortus.		" "	" " "
150	Sorghum	halapense L.			
151	"	nutans. Gray	Johnson; Mean; cuba grass.	Sept.	Dry barren soils.
152	Chrysopogon	avenaceum. B	Indian or wood grass.		

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	" "	(Clifford Richardson)

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	" "	(Wolff)

Plate 1.

Paspalum dilatatum. (Hair; flowered paspalum)

This grass is larger and taller than the preceding and resembles it very closely. The plate gives a very accurate illustration

Plate 2.

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 harrowed, 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	"	" (C Richardson)

Ash

Phosphoric acid	6.40	per	cent.
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	"	" (Wolff.)

Plate 3.

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	per	cent.
Crude fiber	20.63	"	"
Albuminoids	9.49	"	" (C. Richardson.)

Plate 4.

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	"	" (C. Richardson.)

Ash

Phosphoric acid	4.27	per	cent
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	"	" (Wolff.)

Plate 5.

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 cen .
Ash	3.20	" "
Fat	1.65	" "
Nitrogen free extract	52.23	" "
Crude fiber	24.70	" "
Albuminoids	3.92	" " [C. Richardson]

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 6.

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 fibre	20.71	" "
Albuminoids	10.47	" " [C. Richardson]

Plate 7.

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 8 to 10 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 18 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 fibre	21.02	“ “
Albuminoids	8.13	“ “

Plate 8.

Setaria Glauca. (Bristly fox-tail grass--Bottle grass).

The spike is cylindrical and in color it is a tawny yellow. The culms are 2 to 3 feet high and are sometimes branched. The stem and branches are smooth. The leaves are about 12 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 6 to 10 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.
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Ash	6.80	per cent.
Fat	2.62	" "
Nitrogen free extract	50.13	" "
Crude fiber	18.80	" "
Albuminoids	7.30	" "

[C. Richardson]

Plate 9.

Tripsacum dactyloides. [Gamma grass; Sesame grass.]

Grows from 5 to 7 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 rhizoma 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 possession 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	5.80	" "
Fat	2.05	" "
Nitrogen free extract	48.26	" "
Crude fiber	22.72	" "
Albuminoids	7.29	" "

(C. Richardson.)

Ash

Phosphoric acid	2.52	" "
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	" "

[Wolff.]

Plate 10.

Andropogon provincialis, [Finger-spiked Broom-grass.]

This grass is found in the high plateaux of the state and is 2 to 5 feet high. The culms are erect and smooth and the leaves are smooth and linear. It flowers in August and September. There are both sterile and perfect flowers on each stalk. The sterile are awnless while the perfect ones have depressed awns. The spikes are arranged in fours and are terminal. This grass is usually found in neglected fields and is considered to be of little agricultural value. In the west, however, it is cut for winter hay.

Analysis:

Water	14.30	per	cent
Ash	3.50	“	“
Fat	2.73	“	“
Nitrogen free extract	49.36	“	“
Crude fiber	26.72	“	“
Albuminoids	3.39	“	“[C.Richardson.]

Plate 11.

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 rhizoma 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 6 or 7 feet and has a panicle a foot or more in extent, open and large. The longer branches of the panicle are 5 or 6 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 Gov. 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, 2 or 3 feet high, and several times during the season. The grazing of cattle on this 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	" " [C. Richardson.]

Plate 12.

Phalaris intermedia, var. *angusta*. [Southern reed; Canary grass; Gilberts relief 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	" " (C. Richardson)

Plate 13.

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	" " (C. Richardson.)

Plate 14.

Muhlenbergia diffusa (Nimble Will; Drop seed; Wire grass.)

A perennial grass, with spreading slender stems and small florets in slender panicles. This grass grows in shaded places in woods and is not generally met with in open fields. It loves a moist place.

The analysis indicates a good per cent of nutritive elements.

Analysis:

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

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	" " (Wolff)

Plate 15.

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	" "	(C. Richardson)

Plate 16.

Sporobolus Indicus. [Smut grass.]

This grass is found almost every where throughout the South in uncultivated fields. It grows from 1½ to 3 feet high, and when young it gives a mass of leaves that supply food for stock from April until frost. When the plant is mature the spikelets are covered with a smut, hence its common name.

A careful test of this grass may yield fine results. The hay, however, must be cut before the culms become hard and smut begins to form on the heads.

Analysis

Water	14.30	per	cent.
Ash	6.03	"	"
Fat	2.80	"	"
Nitrogen Free Extract	44.28	"	"
Crude fiber	22.00	"	"
Albuminoids	10.55	"	" (C. Richardson)

Ash

Phosphoric acid	6.02	per	cent.
Silica	27.36	"	"
Sulphuric acid	4.60	"	"
Chlorine	11.03	"	"
Calcium oxide	2.64	"	"
Magnesium oxide	2.66	"	"
Potassium oxide	33.53	"	"
Potassium	12.16	"	" (Wolff)

Plate 17.

Agrostis vulgaris. [Red tod; Fine top; Herd's grass; Bent grass]

This grass grows to a height of 2 or 3 feet from a perennial root. The culm is slender and smooth, and crowned by an open panicle of flowers. Each spikelet consists of one floret. The leaves are lance linear, rough and about six inches long. The sheaths are smooth. It prefers a damp soil for a luxuriant growth, but is found only along gullies and in fence corners during the month of September.

When cut before the seed are mature this grass makes an excellent hay. During warm days, in winter, the plant comes forth sufficiently to give stock a good cropping food.

Analysis:

Water	14.30	per	cent
Ash	5.90	"	"
Fat	2.84	"	"
Nitrogen free extract	46.77	"	"
Crude fiber	21.71	"	"
Albuminoids	8.48	"	" [C. Richardson.]

Plate 18.

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	“	“ (C Richardson)

Plate 19.

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 rhizomas 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	" " [C. Richardson]

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 20:

Eleusine Indica. [Yard grass ; Crowfoot ; Crab grass ; Wire grsses.]

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 every where with much greater facility than some of the native grasses. It seeds so rapidly there is no necessity to repeat the sowing the grass 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	“ “
Albuminoids	9.48	“ “ (C. Richardsou)

Ash

Phosphoric acid	9.68	per cent
Sulphuric acid	5.79	“ “
Silica	24.61	“ “
Chlorine	6.71	“ “
Calcium	56.13	“ “
Magnesium oxide	7.38	“ “
Potassium oxide	24.79	“ “
Potassium	7.39	“ “ (Wolff.)

Plate 21.

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 3 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 one half less nutriment than 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	" " [C. Richardson.]

Plate 22.

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

<i>Analysis:</i>	<i>B. secalinus:</i>	<i>B. unioloides:</i>
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 " "

(C. Richardson.)

<i>Ash</i>	<i>B. unioloides:</i>
Phosphoric acid	8.79 " "
Sulphuric acid	5.61 " "
Silica	4.84 " "
Chlorine	16.84 " "
Calcium oxide	4.43 " "
Magnesium oxide	4.64 " "
Potassium oxide	37.20 " "

Potassium	16.38	per	cent.
Sodium	1.27	“	“

[Wolff.]

*Plates 23-24.**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.

Plate 25.

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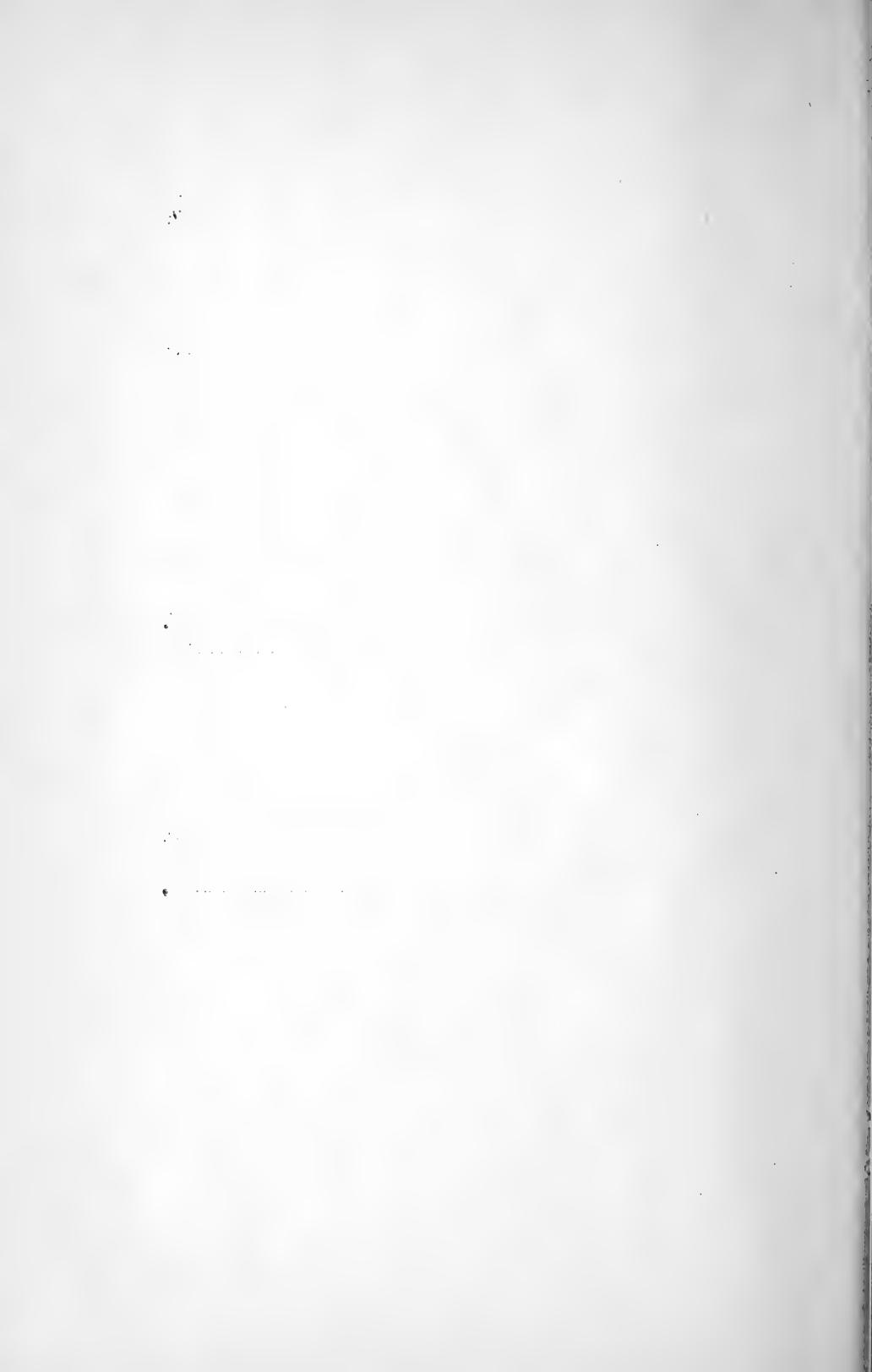
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W. & A. R. S. 261

PASPALUM LAEVE.





Black et

PASPALUM LAEVE.





PASPALUM DILATATUM.





W. D. C. G.

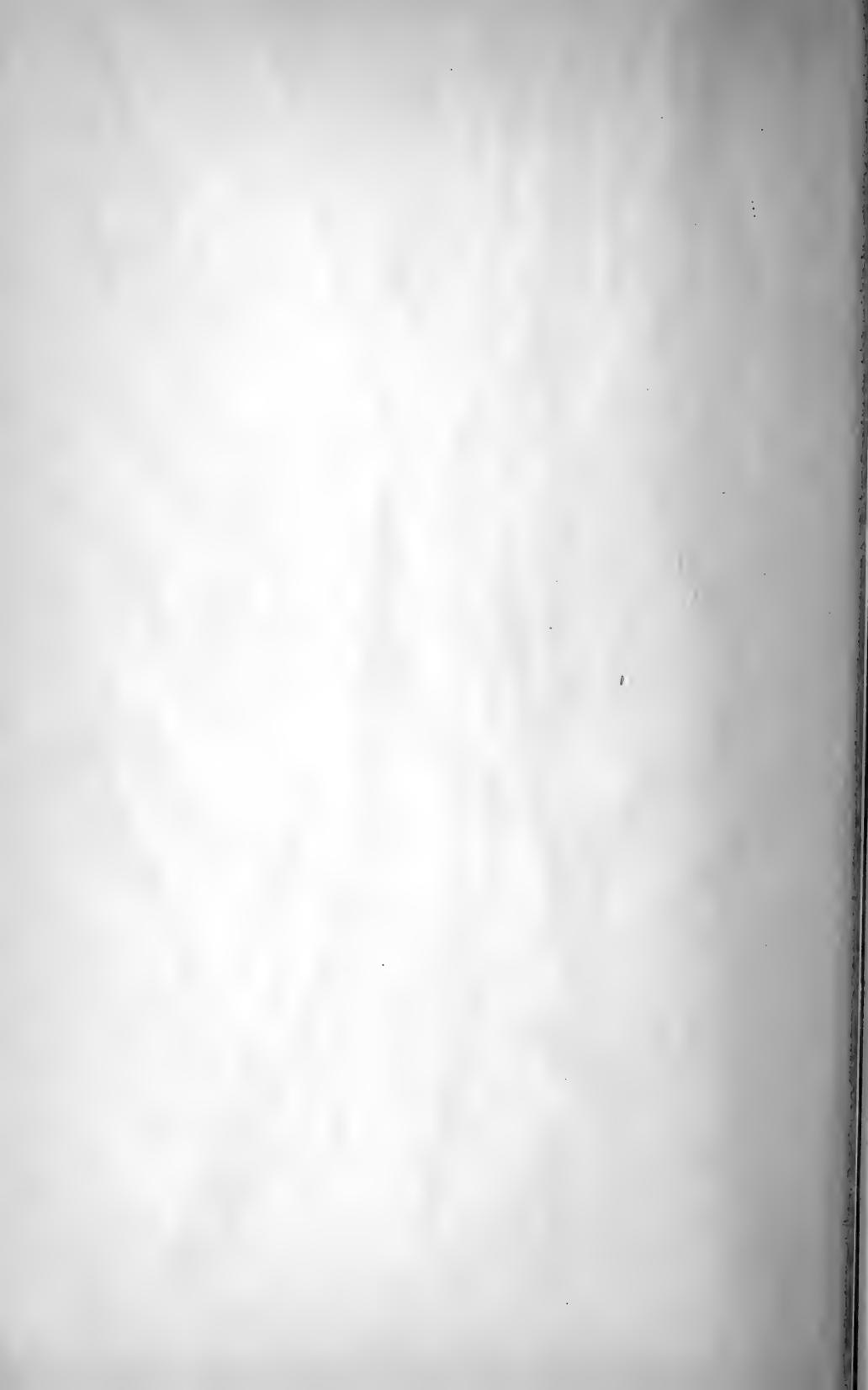
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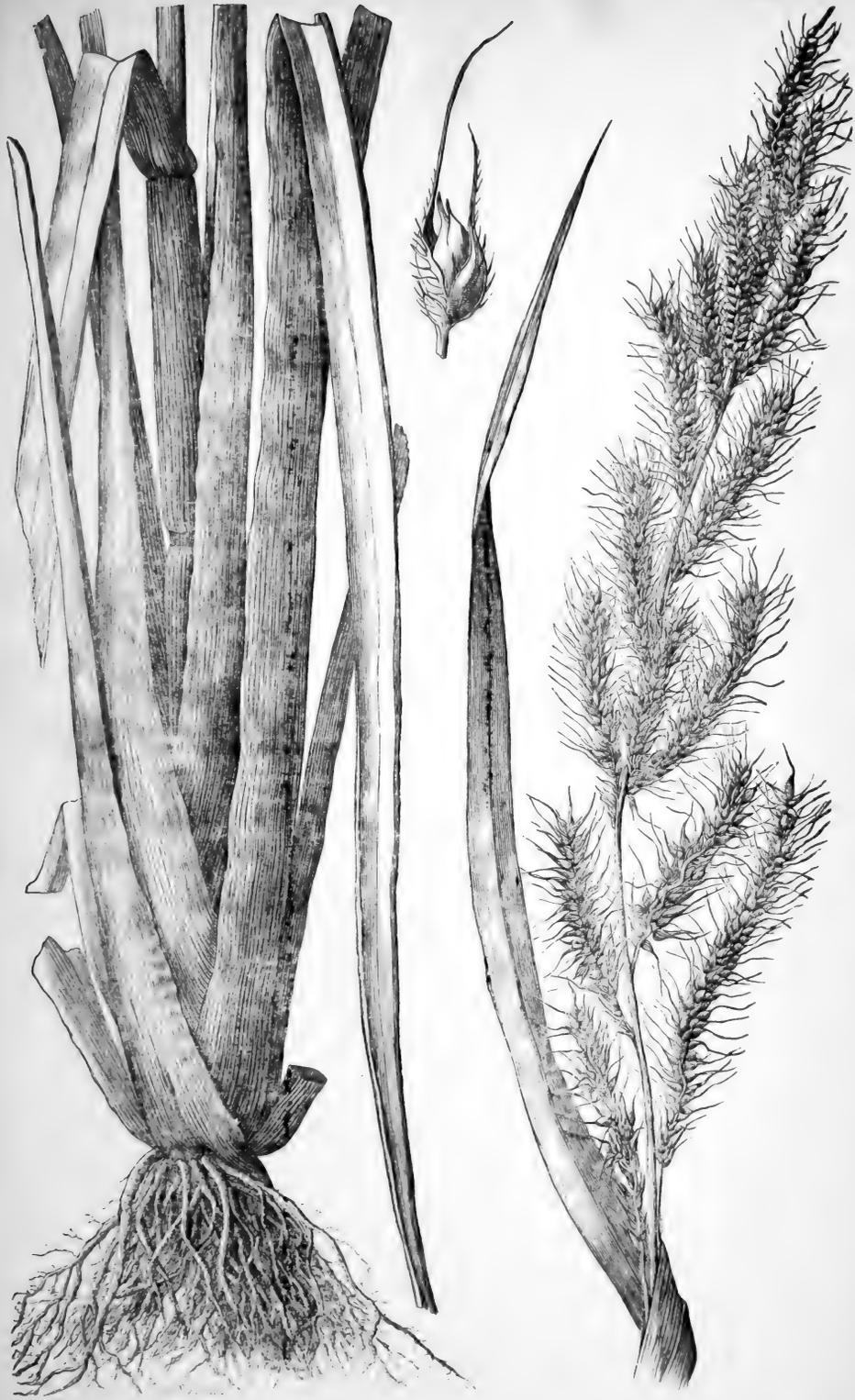




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PANICUM PROLIFERUM.



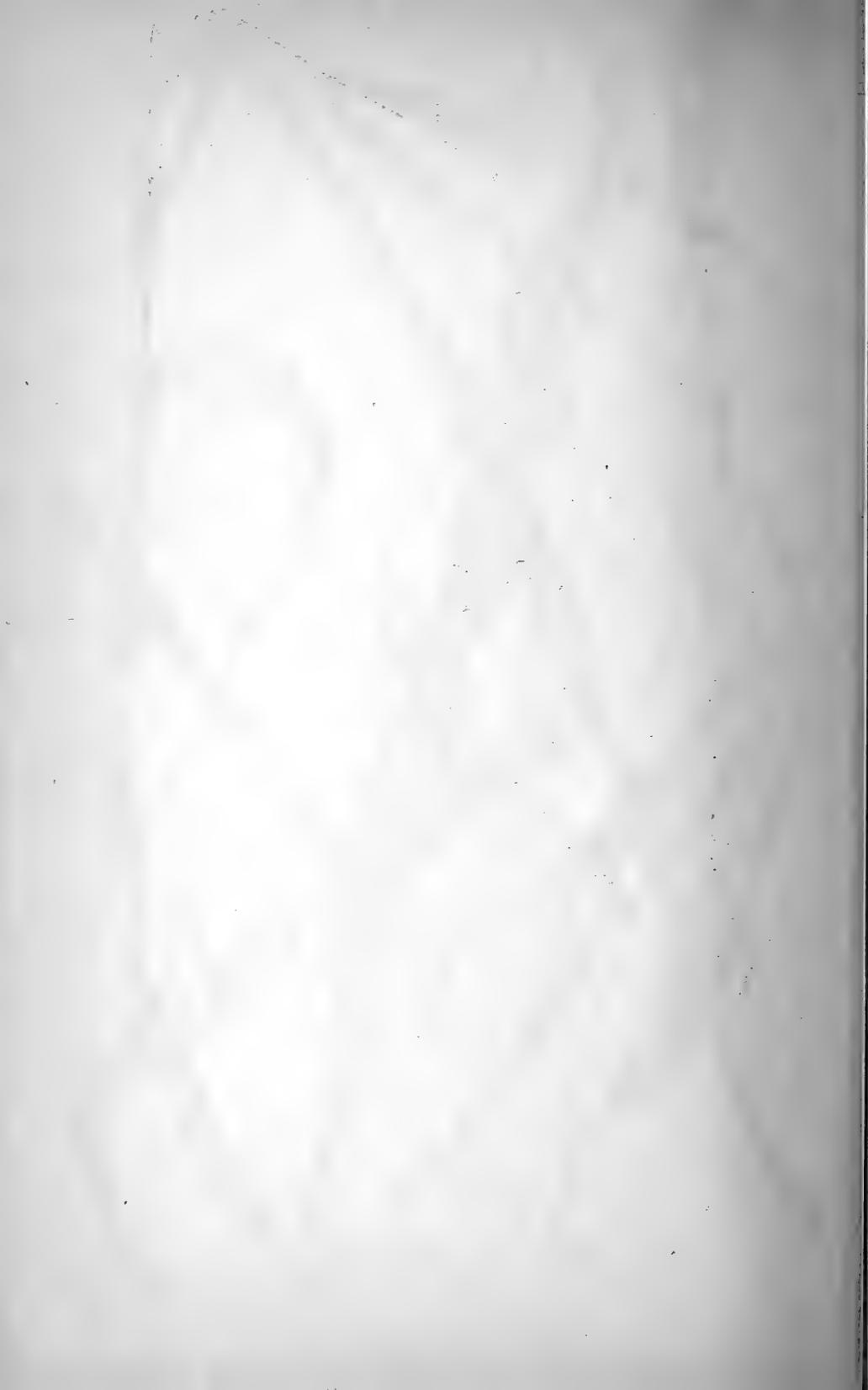


PANICUM CRUSGALLI.





PANICUM VIRGATUM.





PANICUM GIBBUM.

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Mark del

SETARIA ITALICA.





MARX-DEL.

SETARIA GLAUCA.





W. G. B.

1888

TRIPSACUM DACTYLOIDES.

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PLATE 44.

ANDROPOGON PROVINCIALIS.





SORGHUM HALAPANSE.





H. NICHOLS.

PHALARIS INTERMEDIA.





W. B. H. S. - 1898

W. B. H. S. - 1898

ALOPECURUS PRATENSIS.





MUHLENBERGIA DIFFUSA.





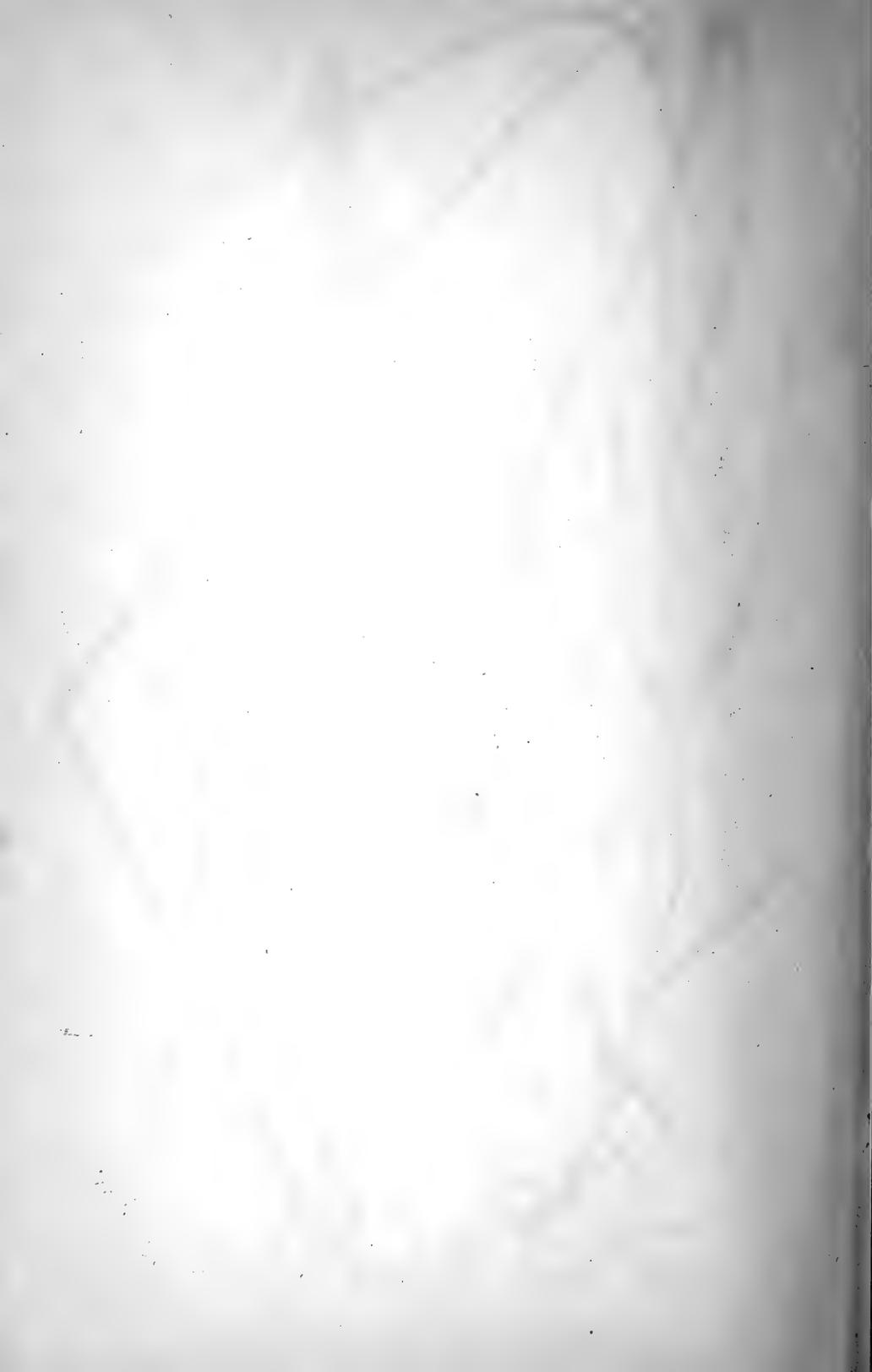
PHLEUM PRATENSE.

alvarezia





SPOROBOLUS INDICUS.





AGROSTIS VULGARIS.





CYNODON DACTYLON.





ELEUSINE INDICA.





W. DEL.

DACTYLIS GLOMERATA.





BROMUS UNIOLOIDES.





H.H. NICHOLS.

MARX. DEL.

BROMUS SECALINUS.



1870

1870

ANALYSE DE



MARY. DILL.

ELYMUS VIRGINICUS.

