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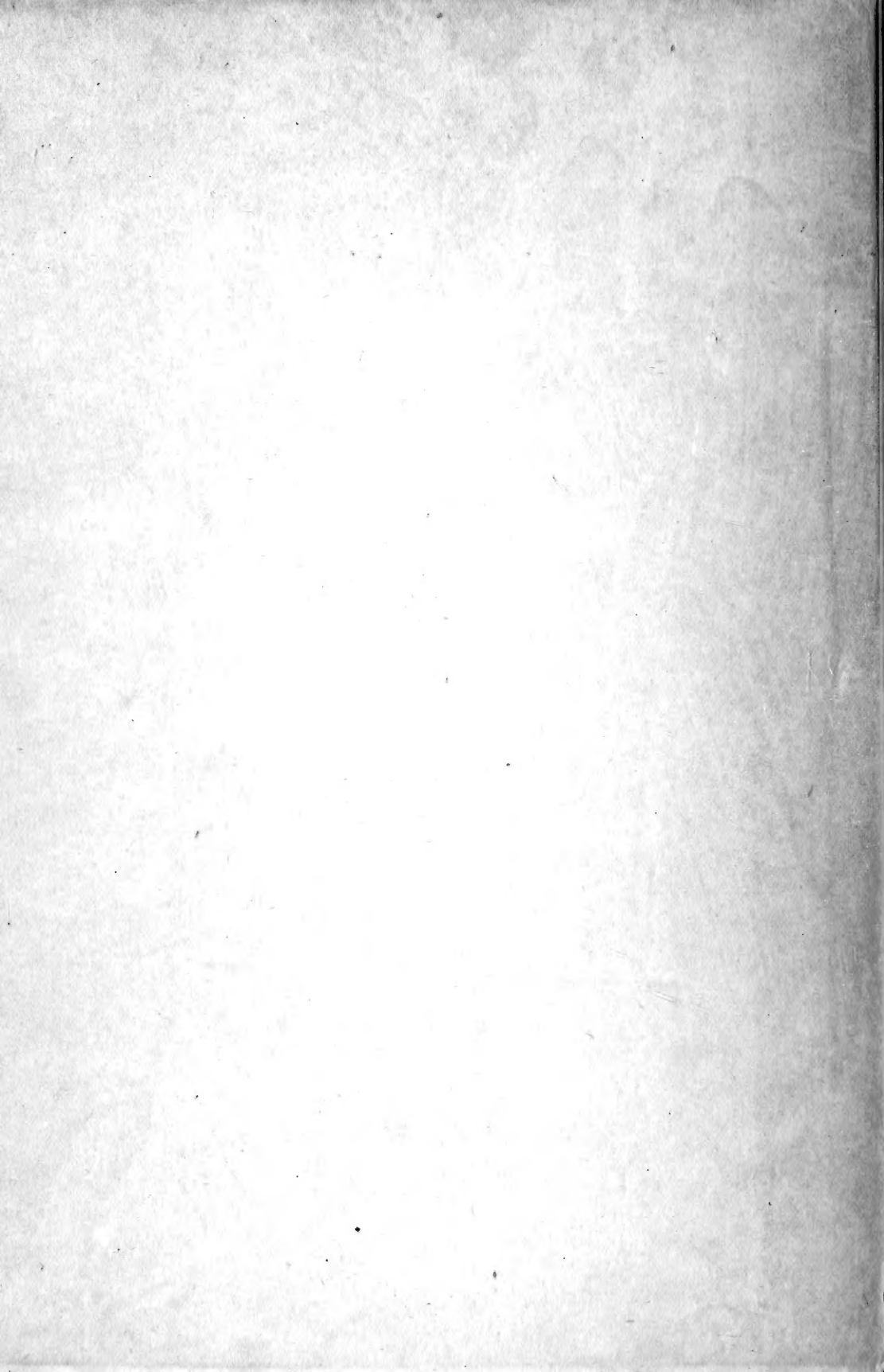
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Nov. 10, 1896 Compliment of
to F. Ward J. Lamson-Scribner.

[Read before the Massachusetts Horticultural Society, March 21, 1896.]

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GRASSES.

BY

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GRASSES.

Coming to Boston to address you on the subject of grasses, is like carrying coals to Newcastle, for is not this the home of the widely known and justly celebrated author of Flint's "Grasses and Forage Plants"? But the subject is a broad one — as broad as the world is wide, and as varied as it is broad; so broad, and embracing so many diverse lines of investigation, all alike interesting, that I have found it exceedingly difficult to determine what subjects to take up, or where to draw my limitations. Good things will stand repeating, and in a multitude of counsellors there is safety. New ideas are rare indeed, but in the application of old ones may spring a happy thought of use to some one, and there always exists this possibility to encourage the speaker.

"The grass faileth; there is no green thing," is an apt expression of the extremity of desolation. Where there is no grass, there are the absolute deserts. Where our best grasses abound, and where they receive the most attention, there we find our highest civilization and greatest prosperity. Destroy the rich verdure of our pastures and meadows, and how much of the pleasure as well as the profit of the farmer's life would be blasted. Destroy the little grass plat of the contracted yard of the citizen, and how much would the enjoyment of domestic life be narrowed.

Grasses may be considered the plebeians among the families of the vegetable kingdom. They are ubiquitous, and in all temperate regions innumerable. In their number of species they constitute one-fourth of the flowering plants of the arctic zone, one-twelfth of those of the temperate region, and from one-twelfth to one twenty-fifth of those of the tropics. In the countless myriads of individuals, particularly in the temperate zone, grasses far surpass all other orders of plants. They form the rank and file of the army of plants; but here, as in armies of

men, it is the rank and file that does the real service. There are, however, lordly members among the grass family, for some of the tropical species vie with the tallest trees in height. The immense bamboo forests of India are forests of grasses, and to the dwellers of those regions they are as useful as are our own forests to us. They furnish material for the construction of their houses and household furniture and domestic utensils, articles of ornament, and sometimes even articles of clothing. Some of the bamboos furnish drink to the thirsty traveler; others occasionally supply food; and several times within historical periods have the fruits of these bamboos saved hundreds of thousands, if not millions, of people from actual starvation. So generally useful are the bamboos that their products have entered into the commerce of the world.

A mere enumeration of the diverse uses of grasses would more than occupy the time which has been allotted to me here; but at the risk of wearying you, I must briefly outline the more important of these. Grains, the product of the cereal grasses, form the staple food of more than four-fifths of the human race. Wheat is a grass, and the world's production of wheat is estimated at two billions four hundred millions of bushels. Rice is a grass, and the production of this cereal in the East exceeds one million tons, and feeds one-third of mankind. Indian corn, that king of grasses and peculiar product of America, is one of our greatest sources of income. Its cultivation now extends over ninety degrees of latitude and has been carried to all parts of the world. Oats, the most nutritious of all grain foods, barley, and rye are members of the grass family; and aside from these grains, there are a number of grasses which furnish human food, particularly to the natives of Southern Asia and the wild tribes of Africa, the value of whose product cannot be estimated. In addition to the direct usefulness of these grain-bearing grasses to man, several are used very largely to supplement the forage of our domestic animals. They have a further use also, in the production of alcoholic drinks. Nearly half of our sugar supply is derived from grasses. The world's production of cane sugar is about three million tons. What is said here of the products of the cereal-grasses indicates only in a slight degree the great usefulness to man of a very few members of the grass family. A larger number are scarcely less useful, although indirectly.

These are the grasses of our meadows and pastures, which furnish us our beef and mutton, our butter and milk; which feed our horses, the noblest of our domestic animals, and still among the most useful, in spite of electric railroads, horseless carriages, and bicycles. The money value of the hay crop of the United States for the year 1894 was estimated at nearly half a billion dollars, and the value of the grasses in pastures of the Northern States may be considered equal in value to the hay produced, while in the Southern States and the great grazing regions of the West, the value of the pasturage far exceeds that of the hay crop. A conservative estimate, therefore, of the annual value of the grasses of the meadows and pastures of this country alone exceeds a billion dollars.

"Before dismissing this subject of the utility of grasses in furnishing food for man and the animals he has domesticated, we shall do well to pause for a little reflection upon its relation to the industry, commerce, and wealth of nations, as well as to man's subsistence — our dependence not only upon the cereal grasses for our staple vegetable food, but indirectly upon the forage grasses for our supplies of animal food, namely beef, mutton, venison, and dairy produce, as well as for various animal substances such as wool and hair, hides and skins, bone and horn, oil and tallow, used for textile and other manufactures (notably woollen fabrics and leather), or for domestic purposes — the large proportion of the world's inhabitants engaged in agricultural (chiefly cereal cultivation) and pastoral pursuits, in some countries from seventy to ninety per cent of the adult male population — the vast internal and foreign trade connected with the distribution of agricultural products by land and sea — the numerous and important industries concerned in operating upon one or other form of this produce in order to prepare it for consumption; and lastly, the enormous capital employed in all these industrial activities, and the consequent accumulation of wealth. It is only when we take a comprehensive survey, such as here indicated, that we are able to form some conception of the transcendent importance of the Gramineæ."¹

There are a number of minor uses to which many species of grasses have been applied; probably the most important is the material they furnish for paper-making. Several of our native

¹ William Hutchinson in "Handbook of Grasses," 1895.

species furnish a good fibre for this purpose, but the grass which has been used most largely in the manufacture of paper is the Esparto grass of the Mediterranean region. The quantity of this grass annually imported into England at present amounts to over two hundred thousand tons, valued at three-quarters of a million pounds sterling. Some grasses are used in the manufacture of cordage, or hats, or of matting; others make thatch; some are employed in medicine; others yield perfumery. Among the natural uses of grasses may be mentioned that of binding drifting sands and the protection of our coasts and river banks from the action of the tides or floods, and their use in protecting the soils of our fields and meadows by the covering which their turf affords. They extract from the earth and the air elements which they transform into substances that serve as food, and in doing this they help to purify the air we breathe.

Contrary to the general idea, there exists among grasses a remarkable diversity of form. So varied is this that botanists have already defined nearly four thousand distinct species. This diversity appears throughout all the organs of the grass. In some the roots are simply fibrous, and the plants grow in tufts or bunches, as Sheep's Fescue and Orchard grass; others have what we call creeping roots, and it is among these that we should look for the best turf-forming species. Some have stems less than an inch in height and appear like mosses covering the soil and rocks; others attain the height of our tallest forest trees. Some have leaves as fine as the finest thread; in others the leaves are those of the ideal blade of grass, while others again have leaves like those of palms, or leaves as short and as broad and as round as those of the well-known smilax. To explain the details and the varieties existing among the flowers of grasses would be wearisome. That grasses have flowers is an idea rarely entertained by any except botanists, and I have frequently heard the remark, "I did not know that grasses had flowers." They do, however, although their special characters may differ from those of other plants; and provision exists here, as it does throughout nearly all the tribes of vegetation which bear flowers, for securing cross-fertilization. The flowers of grasses are inconspicuous and secrete no nectar. They are not, therefore, attractive to insects, which play so important a part in the process of cross-fertilization. The pollen of grass flowers is

dry, light, and powdery, and easily blown about by the wind, and cross-fertilization among grasses is effected by this agency.

If the variety in the external form of grasses is wonderfully great, their internal structure is scarcely less so, and the histological studies of grass stems, leaves, and fruits are exceedingly interesting. Intricate problems in mechanics are exhibited in the structure of the slender cylinders which constitute the grass stem, and which, in many cases, possess a strength most surprising. The amount of mechanical tissue entering into the structure of the stem which holds a heavy head of wheat is insignificant, but the disposition of the various elements of this tissue gives it the strength necessary to perform its proper functions. Again, the leaves of grasses, which many think so much alike that they would consider the expression "as like as two blades of grass" as forcible as the more common phrase "as like as two peas," exhibit a diverse and marvelous interior structure. No more delicate tracings or beautiful designs of lace work can be imagined than are presented by these same grass leaves when viewed under the microscope. The designer might well study these tissues, for in them he would find many new figures and combinations of lines, the beauty of which he could not hope to excel, and the reproduction of which could not fail to receive the highest admiration. In their internal structure as in their outward contour, the leaves of grasses present such definite characters that these may be used to distinguish species. A minute transverse section of the leaf of Kentucky Blue grass, which one could barely see with the naked eye, would, under the microscope, present characters which at once distinguish it from all other grasses. They are totally different from those exhibited by a leaf of Orchard grass, and these again are wholly unlike those of Meadow Fescue. There are certain cells in the leaf tissue, running from the base to the summit, which are larger and have thinner walls than the surrounding cells. These special cells readily absorb or give up moisture, and because of this property they exercise the mechanical function exhibited in the expansion or opening out of the leaves, or their contraction and rolling together.

The provisions which nature has made for the distribution of grasses is an interesting subject, and one worthy of passing notice. In many cases the seeds are covered with delicate chaff-like scales, or are furnished with winged or feathery appendages,

enabling them to be widely distributed by the winds. Others are provided with hooks or barbed spines, by means of which they become attached to clothing or to the wool or hair of animals, and are thus carried about from place to place. Others are so constructed that they will float upon the water, and may be carried long distances by rivers and streams or tides. Others again have firm protective coatings, so that they may pass uninjured through the stomachs of birds or animals feeding upon them, and are disseminated in this way. These are among the natural means of distribution. The manner in which grasses have been distributed through the agency of civilization and commerce is no less varied.

The diversity of form presented by grasses is accompanied by an almost equal diversity in their station, or place of growth. Some are limited to the Arctic regions, others are found only in the tropics; some grow in the sand along seacoasts, others again are confined to the highest mountain-tops near the limits of perpetual snow; some flourish only in moist meadows, others exist in the most arid deserts; some grow in the shadows of forests, others thrive only upon open plains; some are confined to soils heavily charged with lime, others make vigorous growth where practically no lime exists. And it is with all these varied peculiarities which grasses present, that the student of these plants must become familiar, in order intelligently to direct his efforts to improve the forage and grazing resources of the country, the prime feature of interest that the farmer has in this subject.

We will now limit our remarks to the consideration of the economic grasses of this State. It is hard to say which is the most important of these. But if one pays a visit to Cape Cod, as it was my good fortune to do last summer, he will certainly be struck with the great importance of Beach grass, and the special value which it possesses for binding the drifting sands of the coast. Beach grass extends along the sandy shores of the coast just above the reach of the higher tides, from Maine to Virginia; but nowhere along our shores will one learn to appreciate more fully its usefulness as a sand binder than in the vicinity of Provincetown. The natural growth of Beach grass at this point has done much towards checking the progress of the sand dunes towards the town and harbor, the filling in of the latter being threatened by the moving of these great bodies of

sand. The Harbor and Land Commissioners of your State have undertaken to further check the drifting of these sands by transplanting Beach grass to the most exposed points, where presumably it will be most effective. The setting out of the Beach grass was undertaken in May last, and when I saw the plantations, in August, the operation was perfectly successful, and the best results may be confidently expected. This grass is the most valuable sand binder of our coast, and it should be made use of more than it is. We do not need to import the seeds of it, as has been done, nor do we need to depend upon seeds for propagation. The simplest way, and at the same time the most certain means of propagation as well as the cheapest in the end, is that of transplanting, which may be done in the spring, or in some localities doubtless in fall.¹ There is hardly any section along the seashore where Beach grass could not be used to advantage; if it does not exist near by, it may be readily and cheaply obtained. For the binding of embankments, where there is a proportion of good soil, Couch or Witch grass is available. If a good turf is desired, there is nothing better than Kentucky Blue grass, better known in New England as June grass.

There are in Massachusetts about sixty thousand acres of salt marsh, and it may be of interest to stop a moment to consider the plants that enter into the composition of the hay which these marshes afford. These salt grasses are the natural product

¹ The following letter from Mr. L. W. Ross is of interest in this connection :

BOSTON, MASS., March 30, 1896.

PROF. F. LAMSON-Scribner, *Washington, D.C.* :

DEAR SIR: Agreeably to your request when I met you in Boston, I will say that I visited the Province lands at Provincetown, Mass., on March 25 and 26.

The plantings of *Ammophila arundinacea* which you saw last summer have proved a complete success. The winter has been an unusually windy and tempestuous one. Notwithstanding this, however, the plants have held the sand on the area planted securely in place and no "breaks" or "blow-outs" have appeared, to require any attention on the part of our Superintendent during the winter. This I consider somewhat remarkable, for we expected portions of it to be blown away. The whipping of the grass by the winds has broken off and blown away approximately about one-half of the bulk of grass above ground.

It has always been considered by those who claim a knowledge of Beach grass planting, that the spring season is the only one in which it should be planted. Last fall we continued the grass plantings beyond the point where we left off last spring, and contrary to claims made, at the present time it shows to be in better condition and to have stood the winds of the winter much better than the grass planted last spring.

Yours respectfully,

LEONARD W. ROSS,

Forester to Board of Harbor and Land Commissioners.

of the marshes, and the salt hay they furnish is a clear gift of nature, costing little beyond the labor and expense of harvesting. The cutting of the hay is determined more by convenience than by the selection of time when it would be most valuable for fodder, which would of course be when the principal grasses are in bloom; and the methods employed in harvesting are in many cases, and sometimes of necessity, quite primitive. The hay is cut, raked into small bundles, and carried to the stack, which is usually supported upon a circle of piles, raising it above the tides. During the winter season this hay is hauled away for use as fodder or litter or muleh, or shipped to the larger towns for packing purposes. On the higher and dryer marshes other methods of harvesting may prevail. The characteristic grasses of the marshes are the *Spartinas*. There are several species of these, and several of them have a very wide distribution along our coasts, and occur also upon the coasts of Europe. One of the largest of these *Spartinas*, growing where there is a daily flow of tide, chiefly along the ditches and creeks, is the common thatch or creek sedge. It is conspicuous by its size and its broad, spreading, shining leaves. It imparts a disagreeable flavor to the butter and milk from cows fed upon it, and is rarely used for fodder, but chiefly for thatch or litter. The finer variety of the same species is more widely scattered over the marshes proper, growing to the height of from one to two feet. This has narrower, more erect leaves, and is of a lighter green color. Like the large form, it imparts a disagreeable flavor to the milk from cows eating it. Red-salt or Fox grass is another *Spartina*; a smaller species with wiry stems and slender leaves, and is one of the best known of the grasses of the salt marsh, and one of the most valuable. It makes fairly good hay where better cannot be had, and is a particularly useful species for packing crockery and glassware. The dioecious Spike grass, less known than the others, but fairly common on the meadows, also furnishes good packing material. I saw this covering considerable areas on the low marshes at Cape Cod, the male plants and the female plants occupying separate areas, and conspicuous by the yellowish hue which they gave to the vegetation. It is interesting to note that the various grasses of the salt marshes do not ordinarily grow intermingled, as do the species which compose our meadows and pastures, but each holds exclusively areas of greater or less extent.

The largest and most striking of our native grasses, *Phragmites communis*, is occasionally found upon our salt marshes, although it is not limited to these localities. It is a species widely dispersed throughout the temperate regions of the world, growing along the margins of rivers and freshwater lakes. It has remarkably long and deeply penetrating roots, and is especially valuable as a sand and soil binder. There is a small area of this grass growing in the sands near the water's edge on Cape Cod, where it is exposed to the extreme action of the winds and storm tides. It has existed there for many years, and its power to withstand the elements and fix the sands is clearly demonstrated. While its foliage may not resist the cutting action of the blowing sands, as do the leaves of Beach grass, its power to resist the action of the waves is greater. Wherever the waves of the higher tides reach the sands occupied by Beach grass, it is soon destroyed.

Upon the higher portions of the marsh, which usually escape the ordinary tides, occur several fine grasses of excellent quality. Among these are the Creeping or Red Fescue, Sea Spear grass, Creeping Bent or Brown-top, and Black grass. The Creeping Bent or Brown-top is one of the best and most tender grasses for fodder which the marshes produce. It is only a variety of the well-known Redtop of our meadows, with stems which are more or less creeping at the base, and with a less spreading panicle. Sea Spear grass (*Glyceria maritima*) is not uncommon on the marshes of the New England coast, extending southward to New Jersey. It is a tender grass, liked by cattle, and when abundant makes a valuable addition to the salt hay designed for fodder. Red Fescue (*Festuca rubra*) is a native, and occasionally appears upon the marshes, although more abundant upon the sandy soil of waste lands bordering them. It is a grass of excellent quality, and often enhances considerably the value of marsh hay. Of all the grasses of the marshes proper, there is none more highly prized for hay than Black grass (*Juncus Gerardi*), which extends all along the Atlantic coast, from the Gulf of St. Lawrence south to Florida. This, as you will notice, is not a true grass, but a rush, its botanical characters being quite distinct from those of the Gramineæ. Its slender erect stems are from one to two feet high, somewhat wiry, yet soft and apparently palatable to stock. It contains less fibre and a higher nutritive ratio, as is shown by chemical analyses, than Timothy and Redtop.

A more familiar topic, and one of greater interest to the most of us, is the grasses of our meadows and pastures. They are the grasses which feed our cattle ; they are the grasses which brighten and beautify the landscape. They are numerous in species, and a mighty host in individual numbers. I would it were possible for me to introduce to you the various members of the grass family which have made a home upon our soils. Each one has a history ; each one has its peculiar characteristics, distinguishing it from its neighbors. Each one has its field of usefulness, and many of them stand ready to become far more useful, if we will but extend to them the helping hand which we have held out to the few cultivated grasses, to shield them from the attacks of enemies and rivals, and aid them in their struggle for existence. They are all beautiful in their gracefulness, and nothing adds more charm to the landscape than a field of waving grasses or a pasture of emerald turf. Did you ever stop to think of one of the prime features of these grasses which makes them so useful to man ? It is this : their power to exist under repeated cuttings or under the continued grazing and tramping of stock. What other plants possess this quality, even to a slight degree ? To graze or mow the turf-forming species, and walk or tramp upon them, instead of destroying them, apparently adds to their vitality, and surely improves their quality. This certainly seems like a provision in nature, directed by an all-wise Providence, for the good of mankind.

I must confine myself to a few species, those of greatest recognized importance for hay, for pasture, or for the lawn. The best wild or native hay grasses are Blue Joint, Fowl Meadow grass, a species of *Glyceria*, and one of the *Muhlenbergias* or "drop-seeds." These are valuable in the order named, and often afford in our low-lying meadows a large bulk of native hay of excellent quality. Like other species of grasses, they respond readily to good treatment, and the specimens I have here to show you, clearly exhibit their capabilities. Timothy, Meadow Fescue, Orchard grass, Rye grass, and Redtop are the chief and best known of the cultivated or so-called "tame" grasses for the production of hay. In the markets, Timothy is the recognized standard by which the value of other grasses is estimated. It is the farmer's gold coin, although it does not appear to me to be equal in some respects to other varieties. Its clean appearance, even

growth, fair productiveness, and easy propagation make it a favorite grass. The presence of Meadow Fescue indicates a good soil, and upon well-drained clayey lands it is one of the best grasses we can cultivate; it is alike good for hay and pasturage. Where the soil is more moist, but deep and strong, the Large Fescue (*Festuca arundinacea*) may be cultivated. It is one of the most productive of the hay grasses. Almost equally productive on soils suitable to it is Orchard grass, and by many of our farmers this is regarded as equal, if not superior, to Timothy. It has a serious fault, however, of growing in bunches or tussocks. It is not a turf former, and when cultivated the seed should be sown thickly, and it is a good plan to add some other species as a filler. This objectionable habit of Orchard grass may be overcome in a measure by heavily rolling the fields in early spring. Were it not for this tussock-forming habit, Orchard grass would make one of the best of grasses for pastures, because of the early and abundant production of tender leaves. Rye grass, so popular in England, has never come into much favor here, although it is usually recommended as an ingredient for mixtures designed for permanent pasture. On very rich soils, where the ground is fairly moist and the atmosphere humid, its productiveness is very large. It will make a fair turf if well cared for, and may be used alone for lawns, but not in mixtures. Redtop is one of the finest and best of our hay grasses, especially for low meadows, but is less productive than other sorts. The requirements of a good hay grass are productiveness, hardiness, and adaptability to the soil. It must also be nutritious, rich in flesh-forming elements, and possessing little fiber, and must be palatable to stock. I will not attempt to discuss here the question of mixtures for permanent or temporary meadows, further than to say that they must be based upon the conditions of the soil and climate and the wants of the farmer. Regard must also be paid to the time of or succession of blooming of the several varieties which may be sown.

Our pasture grasses are more numerous than those which yield us hay, and a just consideration of them would more than occupy the time of a single lecture. The most important kinds are Meadow Foxtail, Kentucky Blue grass, English Blue grass (*Poa compressa*), certain varieties of Redtop, and species of Fescue. Meadow Foxtail is one of the earliest, quite productive, and by

many is very highly esteemed. It is recommended in all mixtures compounded for the production of continuous herbage through the season. Kentucky Blue grass is a good turf former and a good pasture grass where the land is rich, but does best upon strongly calcareous soils. It is the grass which has made the pastures of portions of Kentucky and Tennessee so justly famous. English Blue grass is, I think, a better pasture grass for New England than Kentucky Blue grass. It will grow on a greater variety of soils. It will grow on soils so thin and poor that little else will grow. On good land its productiveness is scarcely inferior to that of Kentucky Blue grass, and it is equally tender and nutritious. It makes a very firm sod, and withstands the tramping of stock better than many other kinds. The cultivation of this grass in certain portions of Virginia has changed poverty-stricken districts to areas of wealth and prosperity. This has been effected by the cultivation of this English Blue grass and the raising of dairy stock. From my knowledge of New England pastures, I can think of no grass that I would more highly recommend. Lowland pastures should always contain Redtop in some of its varieties. It makes the cleanest, nicest-looking, and sweetest turf of any grass I know. The fine-leaved varieties should be selected for cultivation in pastures. Of the Fescues, Meadow Fescue is a valuable pasture grass, as already intimated, where the soil is good; and on sandy soils Red Fescue is an excellent variety. On the dry uplands Sheep's Fescue is perhaps one of the best species we can cultivate, associating with it English Blue grass.

There is nothing more pleasing to the eye or more beautiful than a well-kept lawn. There is nothing that speaks more strongly for the owner of a house than the lawn which fronts it. The lawn upon the outside should be like the carpets within, and be kept clean with equal care. It is capable of giving pleasure to vastly more people than can enter the door and see the beautiful Wiltons and moquettes, for every passer-by may enjoy it. A good lawn is one of the simplest things to produce, yet one of the most difficult; at least one may reasonably judge it to be difficult by the vast array of wretched failures that appear in almost every neighborhood. What the lawn needs is good turf, and the climate here is excellently adapted to the production of just such turf as is most desired. There are a great variety of

grasses which will produce turf of pleasing appearance under careful management, but this turf varies in fineness and quality, according to the species used to make it. We do not need any lawn mixtures to make a lawn. The worst initiative in the making of a lawn is the sowing of a mixed lot of seeds. The best turf I have ever seen was composed of single varieties in pure cultures, and their beauty fully warrants the extra care and expense necessary for their production. I am happy to be able to show you pictures taken in the most famous grass garden — or turf garden as the manager calls it — in this country. You have all heard of it, and some of you have doubtless met the genius who has developed it. This garden is tended with scrupulous care and given daily attention. Not a weed, not a blade of grass foreign to the variety cultivated, is allowed to appear in any of the plots, or if appearing it is at once removed. It is at all times beautiful, but under the slanting rays of an afternoon sun, the beauties of this garden are most clearly brought out. At a short distance it looks more like unrolled webs of carpet or bands of delicately and variously tinted ribbon, than anything else one can suggest; and here we are able to see the turf-forming qualities (under the treatment given them) of many grasses and of many varieties of a single botanical species. To study the texture of these is most interesting, and the illustrations which I have to show you will in a very faint degree bring out the differences of texture they exhibit. The finest and best varieties of turf, and consequently for lawns, are those of *Festuca* and *Agrostis*. Some of the forms of *Agrostis* are exceedingly fine, yielding what we may very properly term a “nap,” almost as fine and soft as that of velvet. Some varieties of *Festuca* are no less beautiful and hardly less fine. How these grasses would thrive under the shade of trees I cannot certainly say, but I recall a remark made by Mr. Olcott when asked which would do best in the shade. It was: “Those that do best in the sun.” While some may question the exact truthfulness of this remark, there may be more in it than we may at first suppose. But there are good turf grasses which will grow in the shade of trees, where the shade is not too dense and they are given a reasonable amount of care. These are Meadow Foxtail and the Various-leaved Fescue (*Festuca heterophylla*). Crested Dogtail is spoken highly of by some; also Rough-stalked Meadow grass

(*Poa trivialis*) and Wood Meadow grass (*Poa nemoralis*). If I were experimenting, I should use by preference the Various-leaved Fescue or Wood Meadow grass. Where the lawn is small, it looks best unbroken, but in those of considerable extent, trees and shrubbery may be added to adorn it, and with these ornamental grasses may be planted. There have been introduced into cultivation many grasses of special beauty and attractiveness which may be used with good effect singly or in groups upon the lawn. One of the finest of these and the most showy when in bloom, is the beautiful Pampas grass. Nothing surpasses the elegance of its light and silvery-tinted plumes. Where they will grow, some of the bamboos are used with good effect to decorate the lawns; and the large *Arundo* with its beautiful white-striped leaves, and the more common *Eulalia*, and forms of our own *Phalaris*, belong to the group of ornamentals. Then there are finer and more delicate species sometimes used for borders, and of these we may mention such as species of Love grass and the elegant little *Brizas*.

As in all families of any size or pretension we always find among the good members composing it a few black sheep, so it is with the grasses. As good as they are, as useful as they are, as beautiful as they are, there are some which by their conduct, by their selfishness, by their intrusiveness, have become obnoxious, and we call them weeds. The worst of these which the New England farmer has to contend with is Couch grass. There are others, but we will not mention names in so goodly a company. It sometimes happens that men who are very correct in all they do under the restraint of home influences and are counted among the elect, when removed from these influences, will stray from the path of rectitude. So it is with grasses. Our much-loved Kentucky Blue grass, which every one esteems as a good and useful grass citizen, has received a bad name away from home. In New Zealand and Australia its habits are such that it has come to be looked upon as a vile weed — a lawless outcast, despised by everybody.

Your President suggested that I tell you something of what we are doing in the Division of Agrostology. Well, the Division is devoted to the investigation of grasses, and, in addition, to the investigation of forage plants other than grasses. From what I have said already, it is evident that the work is broad, and

involves many special lines of study. The work is intensely interesting, and it is our purpose to make it useful to you all. Our main force at this time is directed to the preparation of a work in which shall be illustrated and described all the North American species of grasses, of which there are more than seven hundred. I am able to show you the character of the illustrations. They are all original, carefully drawn, and executed on wood. The descriptions will be drawn from the specimens, and it is no simple matter to classify these specimens into their proper species, as the botanists among you will understand. During the summer season we have agents in the field collecting the grasses of the country, grass seeds of the more promising native species, and live roots of grasses. These seeds and roots are being propagated in the gardens established by the Department; and at the same time the material thus gathered is distributed to other investigators with a view of widening our knowledge by cultural experiments at other points, or is used in making exchanges. We have a large correspondence that has to be attended to, and questions are asked us relative to the qualities of various grasses and the kinds to be sown in given localities. We try to answer all these questions, but occasionally one is asked which exceeds our ability to answer; for example, this, which was actually asked us: "What was the first principal grass that began to grow on what we know as the prairies of Illinois after the drift period or ice age, and the date, if known?" Such questions we are forced to refer to a higher authority. Then there are collections of grasses constantly being received from various sources, to be named; this work takes time, for often the collections come from regions where the species are little known and their identification involves much study. The care of our grass gardens consumes considerable time, and also the handling of the seeds and the duplicate collections. Our main work, to which our energies at present are chiefly directed, is, as just stated, the preparation of what may be termed the "Handbook of North American Grasses."

The subject selected for me was "Grasses." It is surely an interesting one, and I shall indeed have failed in my purpose if I have not succeeded in securing your interest in it. I have found it impossible to do more than to indicate the importance of grasses, or hardly more than to name a few of their uses or

suggest a few topics for research, almost any one of which would afford an hour's entertainment or profitable discussion. The investigation of grasses has engaged the attention of the ablest men of science, and the study of their development, their classification, their inter-relationships, and their relation to other plants and to man opens a field to philosophy. They constitute the wealth of nations; they feed the world; they minister to the higher esthetic tastes of mankind by their graceful and varied beauty; they heal the sick, and make glad the well.



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