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United States Department of Agriculture,

DIVISION OF AGROSTOLOGY.

A NOTE ON EXPERIMENTAL GRASS GARDENS.

There are some seven hundred distinct kinds of grass native to the United States. This is 20 per cent of the whole number known throughout the world. North America, from the southern boundary of Mexico to the Arctic Ocean, has about one-third the total number of known species. The grasses are the most important family of plants, since they provide food for man and forage for cattle. Wheat, corn, oats, rice, sugar cane, sorghum, and the bamboo which represents house and furniture to so many millions of people in oriental countries—these and many more are grasses. All of our grains the world over are grass products. Besides what we ourselves eat, most of the fodder and pasturage of our flocks and herds, and the pasturage for the wild game is provided by the many species of our prairies, valleys, and mountains.

Next in importance to the grass family is the bean family. All of our cultivated clovers and their relatives—red clover, alfalfa, cowpeas, and the multitude of less known forage plants—belong to the bean family. There are about eight hundred members of the bean family in the United States, not counting the trees. These seven hundred grasses and eight hundred legumes together form one of the richest legacies of our country.

The amount of money invested in the cattle industry is reckoned by the hundred million dollars, and every dollar of that value is absolutely dependent upon the question of forage. Strip our broad acres of their grasses and clovers, and instead of receiving millions of dollars for the meat products sent to foreign lands, we would have to pay out money for them. The cattle industry and the wool industry are dependent upon the question of grass.

Twenty years ago the whole prairie region west of the Missouri was given over to great herds of cattle. But the days of the cattle kings are past, and the lands that were then cattle ranges given up to the support of a few head to the square mile, are now divided up into farms. The native Western grasses are being rapidly driven out to make way for the worthless weeds that civilization and scanty cultivation bring with them. Already the buffalo grass and the mesquite have disappeared from a large section of Kansas and Nebraska. Acres that were once covered with these most nutritious species are now occupied by weedy kinds, and their value as pasture and hay lands is constantly diminishing. Similar destruction of grasses has followed the cultivation of cotton in the South, and of tobacco and hoed crops generally in

all sections of the country. The American has been a grass-killer everywhere.

Nearly all of our cultivated grasses and clovers are of foreign origin. This is true of red clover, cowpeas, alfalfa, and scarlet clover—the principal leguminous forage plants—and of orchard grass, red-top, timothy, and the rye grasses. Kentucky blue-grass was cultivated in Europe before it was in this country. Almost all of the grasses and clovers in common cultivation came from England or Germany or France or China, or from some place outside our borders. This is not because we do not have just as good or better sorts. The English or the German farmer has to earn a living from land that has been in cultivation for hundreds of years, and whatever he takes out of his soil must first be put into it. He is forced to adopt intensive rather than extensive farming. His farm is small. His soil is poor in plant food, though perhaps in the best physical condition; loose, friable, and well stirred by constant cultivation. This European farmer, with his exhausted soil, must compete with the American farmer whose acres are rich with plant food. To do this successfully, the European farmer is prone to try anything and everything that gives promise of producing the proverbial “two blades of grass where one grew before.” He tries the native grasses and clovers that he sees his cattle pick from the hedge rows, to find out what effect cultivation will have upon them; whether they will, if planted in better soil, increase in size and add some value to the scant pastures and hay lands. Every weed of the fence corners that upon chemical analysis seems adaptable to cultivation for fodder is cultivated and perfected and improved until it is settled beyond doubt whether it is worthy or worthless. There is no European country whose natural resources, counted in the number of species of nutritious forage plants, equal ours. There are no finer natural meadows and pastures in the world than are to be found in all sections of our land. And yet these natural meadows, which form part of our most valuable resources, are being broken up and destroyed. Our native grasses and clovers are being driven out by foreign species, not through any superiority of digestibility or chemical composition, but because we have not found time to discover whether our own species are not far better suited for our own soil and climatic conditions. Enough money has been spent by American farmers for worthless fodder plants from foreign sources to more than pay the expenses of the whole Department of Agriculture for one year, with many useful lines of investigation.

All of the cultivated grasses and clovers of which we know the history have been cultivated in a small way at first. They are mostly species which have a large or conspicuous seed head. These were selected and cultivated mainly because their seeds were large enough to attract attention or because the seed could be easily shelled. Many of the grasses sown in foreign meadows have no value with us, and yet they are persistently advertised and offered for sale here because they are valuable in Germany or in England, on the principle that all things good in agriculture come from foreign lands. We have better species and more of them right here at home, that we will not have to plant ten or twenty years to get acclimated, or to learn whether they will grow in our soils. There are sixty native species of trifolium, the genus to which red clover belongs. There are sixty-five peas, all relatives of Kentucky blue-grass. There are twenty-five grasses closely related

to the buffalo grass and the grama. There are ninety native lupins, thirty prairie clovers, forty-five vetches, forty relatives of the beggar weed of Florida, and brome grasses, meadow grasses, pasture grasses, and hay grasses almost numberless, suitable to every kind of soil and climate and rock formation which we possess. Of all this wealth of species not a dozen have been brought into cultivation.

The grasses and clovers and native forage plants of all descriptions should be thoroughly tried on the different soils and in the different sections of the United States. We want to know what plant will provide the greatest amount of the most nutritious forage in the shortest season at the least expense to the farmer. We want to know what forage plants remove the greatest amounts of mineral fertilizers from the soil and what improve the fields that they are planted upon. In short, we want the best, and we believe the best can be grown on American soil from native species.

There are no finer natural meadows and pastures anywhere in the world than in the Appalachian Mountains, and on the Western prairies from the Saskatchewan to the Gulf, and in the mountain valleys of the Western and Pacific States. Take, for an example, the State of Colorado as an illustration of the value of forage crops. The value of her herds and the products of the pastures and meadows which sustain them is equal to the output of her silver mines. Ten years ago, in 1885, there were nine thousand tons of alfalfa seed alone sown in Colorado, and the acreage and the value of the product has increased every year since. It is the same in the Western States and in the Southern States and throughout the length and breadth of our land. Every year more and more attention is being given to the raising of improved hay and forage plants. The raising of cattle is one of the most profitable industries in which the farmer and the man of small as well as large means can engage. There are larger returns for a farmer's labor if he feeds his crops on the farm and sells beef, pork, and mutton, than if he sells his hay and grain to the larger cattle feeders. Then, too, if all of the hay and all of the grain is fed on the farm, the soil is being constantly enriched by the return of the manurial portions of his crops to it. The cattle industry of the United States, instead of being on the wane, is becoming greater every year. The question of cultivating hay and pasture grasses to feed our growing herds and flocks is one of vital importance.

There are natural meadows and pastures in many of the newer portions of the country as good as the best grown in the older-settled Eastern States. The native grass and clover species which go to make up these meadows should be tested under the conditions of richer and better prepared soils.

Congress at its last session established a Division of Agrostology for the investigation of the native and foreign fodder plants. Two grass gardens have been started in connection with the work of the new division. The one on the grounds of the Department in Washington already contains four hundred species, native and foreign. This occupies the strip of ground between the Seed Building and the Agricultural Museum. It is about 300 by 60 feet. On account of the limited space in this garden, each variety can be represented by only a small number of plants. Special attention will be given to the cultivation of wild species which are known to be of some value, and which might be improved if planted on better tilled and richer soil. There

are now some two hundred or more European, Australian, and American species. Experiments will be made in the old English method of propagating pasture grasses by inoculating land with pieces of turf; but the greatest dependence must be placed upon seed, on account of the expense of the former method. The method of inoculating land, as it is called, is probably the best one for establishing suburban and city lawns, for this is the surest way of obtaining pure cultures, and the value and beauty of the lawn depends as much upon the grasses of which it is composed as upon the care. The best lawns, and the most pleasing to the eye, are those composed of a single variety of grass. For establishing pastures or hay meadows inoculation is impracticable, because of the time and labor required.

Experiments on a larger scale have been begun at Knoxville, Tenn., where about $8\frac{1}{2}$ acres have been secured on the grounds of the Agricultural Experiment Station. About two hundred grasses and clovers are growing there, mostly of those sorts which are sold by seedsmen, and such as are in general cultivation in various parts of the United States.

The plats in this garden vary in size from a yard square to half an acre. The land is rich, is in excellent condition, and may be taken as fairly representative of a large class of farming lands in the South. Special attention will be paid to the improvement of native forage plants. In this garden the most promising forage plants for the Southern and Southwestern States will be tried on a large scale, much as they would be if planted by a farmer or stockman. There are large silos on the farm, and the fodder will be tested as to its feeding value in the form of hay and as ensilage, and also for soiling. The question of grasses and clovers and other forage plants suitable to the Southern States will be investigated from as practical a standpoint as possible. Nearly all of the forage plants advertised or recommended by seedsmen as good for the Southern States have been in cultivation there the present summer, and the work will be continued through a series of years. This kind of work can not be done successfully by the farmer or by private means, because decisive results can not be obtained in less than a term of years, and the work can better be carried on by those who are trained for it and who have made this branch of agriculture a lifelong study.

In this connection it might be well to point out the advantages to be derived from such work. If one grass or one clover can be so improved that it will thrive on the arid lands of the West, and will grow as well as the sagebrush and creosote bush, and at the same time be of some value as forage, many times the cost of such experiments will be added each year to the material wealth of the nation. If a good forage plant can be found that can be substituted for a poor one on some sterile soil where it was thought good grasses would not grow, it means that two hundred head of cattle can be pastured on land where only one hundred were fattened before. There is no better or more profitable line of work open to the Department of Agriculture than the development of our resources as embodied in the richest grass flora of the world.

Approved :

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