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CULTURE OF THE GRASSES.

An Extract from the Fourth Annual Report of Charles L. Flint, Secretary of the State Board of Agriculture.

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CULTURE OF THE GRASSES.

It is difficult to overestimate the importance to the farmer of a good selection and proper mixture of grass seeds for the various purposes of cultivation, for mowing, for soiling, for permanent pasturage, or for an alternate crop.

Doubtless the varieties of seed usually sown in this State, consisting almost exclusively of Timothy and redtop, with a mixture of red clover, are among the best for our purposes, and their exclusive use is, in a measure, sanctioned by the experience and practice of our best farmers; yet, it would seem very strange indeed, if this vast family of plants, consisting of thousands of species and varieties, and occupying, as already intimated, nearly a sixth part of the whole vegetable kingdom, could furnish no more than two or three truly valuable species.

When we consider also, that some species are best adapted to one locality, and others to another, some reaching their fullest and most perfect development on clay soils and some on lighter loams and sands, we cannot but wonder that the practice of sowing only Timothy and redtop on nearly all soils, clays, loams and sands, indiscriminately, both on high and low land, should have become so prevalent. It is equally remarkable that while but very few of our grasses, and these, for the most part, species peculiar to sterile soils, flourish alone, but nearly all do best with a mixture of several species, it should so constantly have been thought judicious to attempt to grow only two prominent species together with merely an occasional addition of an annual or a biennial clover, which soon dies out. When

this course is pursued, unless the soil is rich and in good heart, the grass is likely to grow thin and far between, producing but half or two-thirds of a crop, whereas, the addition in the mixture of a larger number of species, would have secured a heavier burden of a better quality. These considerations, it seems to me, indicate the true direction in which the farmer who wishes to verify the saying of Dean Swift and "make two spires of grass grow where one grew before" *without impoverishing the soil*, a condition which ought always to be added, should turn his attention.

I hold this proposition to be indisputable, that any soil will yield a larger and more nutritious crop, if sown with several kinds of nutritious grasses, than when sown with only one or two species. Indeed, it is a fact well established by careful experiment, that a mixture of only two or three species of grasses and clover, will produce a less amount of hay than can be obtained by sowing a larger number of species together. There may be some exceptions to this rule, as in cases where the yield of Timothy and redtop, owing to the peculiar fitness of the soil for these grasses, is as great as can stand on the ground covered by them.

But it is nevertheless true, that if we sow but one kind of grass, however abundantly the seed may be scattered, or on whatever soil it may be, or under however favorable influences, yet only a part of the plants will flourish; vacant spaces will occur throughout the piece which will be filled up after a time by grasses of an inferior quality, weeds or mosses. This is the case in some degree also, where only two, or a small number of species are sown; while if a mixture made up of a larger number of kinds of seed is used, the plants will cover the entire surface and produce a far better quality of herbage.

In sowing such a mixture of several different species, we do but follow nature, who, after all, will generally be found to be the best teacher, for wherever we cast our eyes over an old, rich, permanent pasture, we ordinarily see from fifteen to twenty species of grass or forage plants growing

in social profusion. If the soil be very poor, as a cold, hard clay, or a barren sand, perhaps two or three varieties will suffice, but on good soils a larger number will be found to be far more profitable. Especially is this the case where the land is to be left in grass for some years, and eventually pastured, as is frequently done in New England, for it is then desirable to have grasses that reach their maturity at different times, as a constant succession of good feed throughout the season may thus more surely be obtained. It is well known that there is no month of spring or summer in which some one of the grasses does not attain to its perfection, if we except the month of March. For good soils, eight or ten species of the grasses or six or eight of the grasses proper and one or more of other herbage plants would probably be found to be profitable.

I am aware that the prevailing practice is decidedly against the use of any thing but Timothy, redtop and clover and *that very large* crops of these grasses are often raised, but it is nevertheless true that we obtain on an average less than a ton to the acre, while with the same culture and a larger number of species we ought to get double that quantity.

Before proceeding to consider the proportions in which the different species should be mixed, it may be well to refer to the mode generally adopted for estimating the quantities of seeds their and relative weight. Old or poor seed weighs less than that which is fresh and new. Now if a farmer buys by weight, even if he does get an old or inferior quality of seed, he gets a much larger number of seeds, and this larger quantity of seed which he receives for his money, may make up for the inferior quality, and he will have a larger number of seeds capable of germination than he would have if he bought by measure. It is to be regretted that it has become so nearly universal to purchase by measure, though as this course is for the seller's advantage, it may be difficult to change the custom.

I have expressed the opinion that we limit our mixtures to too few species, thus failing to arrive at the most profit-

able results, and have said that, in a piece of land seeded with one or two favorite grasses only, small vacant spaces will be found, which in the aggregate will diminish very considerably the yield of an acre, even though they may be so small as not to be perceived. It might be thought that this could be avoided by putting into the ground a very large number of seeds. But a knowledge of the quantities of seed ordinarily used in this State for sowing, and an inquiry as to the number of plants necessary to cover the ground with a thick coating of grass, will show that this is not the case. I have in my possession letters from some of the best farmers in all parts of the Commonwealth, in which they state it to be the prevailing practice to sow a bushel of redtop, a half bushel of Timothy, and from four to six pounds of red clover to the acre. Some of them vary the proportions a little, as by the use of one peck of Timothy and a larger quantity of clover, but the general practice is to use nearly the quantities stated, some even using a considerable larger quantity. Now if we examine the table (given in the Report) we shall find that in an ounce of redtop seed there are 425,000 grains. In a pound there are 6,800,000 seeds; in a bushel, or twelve pounds, there are 81,600,000 seeds. Now take only one peck of Timothy seed to mix with it. In an ounce of Timothy grass seed there are 74,000 grains. In a pound there are 1,204,000 grains. In eleven pounds, or a peck, there are 13,244,000 seeds, and if we take but four pounds of clover, which is below the average quantity used, we shall find by the same process that we have 1,024,000 seeds. If now we add these sums together, we shall find that we have put upon the acre no less than 95,868,000 seeds! This gives over 15 seeds to the square inch, or about 2,000 seeds to the square foot!

Now it is a well known fact that the sward of a rich old pasture is closely packed, filled up, or interwoven with plants, and no vacant spaces occur. Yet, in a closely crowded turf of such a pasture, only one thousand distinctly rooted plants were found on a square foot, and these were

made up of twenty different species. The soil should be supplied with a proper number of plants, else a loss of labor, time and space will be incurred; but however heavily seeded a piece may be with one or two favorite grasses, small vacant spaces will occur, which, though they may not seem important in themselves, when taken in the aggregate, will be found to diminish very considerably the yield of an acre, even if they are so small as not to be perceived. And undoubtedly some allowance should be made for the seeds and young plants destroyed by insects, birds and various accidental causes; but even after all deductions for these, we see that in this State, at least, there is no deficiency in the quantities of seed used, and the imperfectly covered ground cannot be explained in this way.

We sow seed enough, frequently, for fifteen plants to the inch, but rarely obtain above two or three, and very frequently even less than that.

The difficulty of procuring the seed, and its expense, have been the strongest objections to the use of many species. A demand for these species, however, would soon remove this difficulty, and varieties would everywhere be kept for sale at a reasonable price. When it is considered that the additional expense of sowing a field or permanent pasture with a greater number of species will be, comparatively, very small, while the additional yield will be proportionably large,—if the result is as favorable as the opinion of many who have made the trial would lead us to expect,—every farmer must admit that it is for his interest to try the experiment, on a small scale, at least.

It will be evident, after a moment's reflection, that very different mixtures, both as regards the species and the relative quantities of each, will be desirable for different soils; that dissimilar mixtures would be required for alternate cropping or laying down land for only a year or two, and for permanent pasture. In our practice it is most common to seed down for some years, and not unfrequently this is done with the design of cutting the grass for hay for a few years and then pasturing the field, in which case our

seeding down assumes the character of laying down for permanent pasturage. Equally good, but very different mixtures might be made, also, for the same soils by different individuals, who had different objects in view, some desiring a very early crop, some wishing to select species which resist the access of profitless weeds, and others to cultivate those varieties which exhaust the soil the least. Each of these mixtures may be best adapted to the specific object of the farmer who makes it, and if composed of a sufficient number of species, may be good and truly economical.

The nutritive qualities of the grasses differ widely; and their value as feed for stock will depend, to a considerable extent, on the management of pastures and mowing-lands.

In forming a mixture for pasture grasses, the peculiarities of each species should, therefore, be regarded: as the time of flowering, the habits of growth, the soil and location on which it grows best, and other characteristics. Among the grasses found on cultivated lands, in this country, the following are considered as among the most valuable for ordinary farm cultivation; some of them adapted to pastures, and others almost exclusively to mowing and the hay crop: Timothy (*Phleum pratense*). Meadow Foxtail (*Alopecurus pratensis*). June, or Kentucky Blue Grass (*Poa pratensis*). Fowl Meadow (*Poa serotina*). Rough-stalked Meadow (*Poa trivialis*). Orchard Grass (*Dactylis glomerata*). Perennial Rye Grass (*Lolium perenne*). Redtop (*Agrostis vulgaris*). English Bent (*Agrostis alba*). Meadow Fescue (*Festuca pratensis*). Sweet-scented Vernal (*Anthoxanthemum odoratum*). Hungarian Grass (*Panicum germanicum*). Red Clover (*Trifolium pratense*). White or Dutch Clover (*Trifolium repens*,) and some others.

Of these, the most valuable, all things considered, is the first, or Timothy. It forms a large proportion of what is commonly called English, or in some sections meadow hay, though it is said by some to have originated where it was first cultivated, in this country. It contains a large percentage of nutritive matter, in comparison with other agricultural

grasses. It thrives best on moist, peaty, or loamy soils, of medium tenacity, and is not well suited to very light, sandy lands. On very moist soils its root is almost always fibrous; while on dry and loamy ones it is bulbous. On soils of the former description, which it especially affects, its growth is rapid, and its yield of hay large, sometimes amounting to three and four tons to the acre, depending much, of course, on cultivation. But though very valuable for hay, it is not adapted to pastures, as it will neither endure severe grazing, nor is its aftermath to be compared with meadow foxtail, and some of the other grasses.

JUNE GRASS (Fig. 1,) better known in some sections as Kentucky Blue grass, is very common in most sections of the country, especially on limestone lands, forming a large part of the turf, wherever it flourishes, and being universally esteemed as a pasture grass. It starts early, but varies much in size and appearance, according to the soil; growing in some places with the utmost luxuriance, and forming the predominant grass; in others, yielding to the other species. If cut at the time of flowering, or a few days after, it makes a good and nutritive hay, though it is surpassed in nutritive qualities by several of the other grasses. It starts slowly after being cut, especially if not cut very early. But its herbage is fine and uniform, and admirably adapted to lawns, growing well in almost all soils, though it does not endure very severe droughts. It withstands, however, the frosts of winter better than most other grasses.

In Kentucky, a section where it attains its highest perfection and luxuriance, ripening its seed about the 10th of June, and in latitudes south of that, it sometimes continues green through the mild winters. It requires three or four years to become well set, after sowing, and it does not attain its highest yield as a pasture grass till the sod is even older than that. It is not, therefore, suited to alternate husbandry, where land usually remains in grass but two or three years before being ploughed up. In Kentucky it is sown any time in winter when the snow is on the ground,

Fig. 1. June Grass.

Fig. 2. Orchard Grass.

three or four quarts of seed being used to the acre. In spring the seeds germinate, when the sprouts are exceedingly fine and delicate. Stock is not allowed on it the first year.

The MEADOW FOXTAIL is also an excellent pasture grass. It somewhat resembles Timothy, but is earlier, has a softer spike, and thrives on all soils except the dryest. Its growth

is rapid, and it is greatly relished by stock of all kinds. Its stalk and leaves are too few and light for a field crop, and it shrinks too much in curing to be valuable for hay. It flourishes best in a rich, moist, and rather strong soil, sending up a luxuriant aftermath when cut or grazed off, which is much more valuable, both in quantity and nutritive value, than the first crop. In all lands designed for permanent pasture, therefore, it should form a considerable part of a mixture. It will endure almost any amount of forcing, by liquid manures, or irrigation. It requires three or four years, after sowing, to gain a firm footing in the soil. The seed is covered with the soft and woolly husks of the flower, and is consequently light; weighing but five pounds to the bushel, and containing seventy-six thousand seeds to the ounce.

The ORCHARD GRASS, or ROUGH COCKSFOOT (Fig. 2) for pastures, stands pre-eminent. This is said to be a native of this country, and was introduced into England, from Virginia, in 1764, since which time its cultivation has extended into every country of Europe, where it is universally held in very high estimation. The fact of its being very palatable to stock of all kinds, its rapidity of growth, and the luxuriance of its aftermath, with its power of enduring the cropping of cattle, have given it a very high reputation, especially as a pasture grass. It blossoms earlier than Timothy; when green is equally relished by milch cows; requires to be fed closer, to prevent its forming tufts and growing up to seed, when it becomes hard and wiry, and loses much of its nutritive quality. As it blossoms about the same time, it forms an admirable mixture with red clover, either for permanent pasture or mowing. It resists drought, and is less exhausting to the soil than either rye grass or Timothy. The seed weighs twelve pounds to the bushel, and when sown alone requires about two bushels to the acre.

The ROUGH-STALKED MEADOW GRASS (Fig. 3) is somewhat less common than June Grass, but is considered as equally valuable. It grows best on moist, sheltered meadows,

Fig. 3. Rough-stalked Meadow Grass.

Fig. 4. Rye Grass.

where it flowers in June and July. It is easily distinguished from June Grass, by having a rough sheath, while the latter has a small one, and having a fibrous root, while the root of June Grass is creeping. It possesses very considerable nutritive qualities, and comes to perfection at a desirable time; is exceedingly relished by cattle, horses and sheep.

For suitable soils it should form a portion of a mixture of seeds, producing, in mixture with other grasses which serve to shelter it, a large yield of hay, far above the average of grass usually grown on a similar soil. It should be cut when the seed is formed. Seven pounds of seed to the acre will produce a good sward. The grass loses about seventy per cent. of its weight in drying. The nutritive qualities of its aftermath exceed very considerably those of the crop cut in the flower or in the seed.

Fowl Meadow Grass is another indigenous species, of great value for low and marshy grounds, where it flourishes best; and, if cut and properly cured, makes a sweet and nutritious hay, which, from its fineness, is eaten by cattle without waste. According to Sinclair, who experimented, with the aid of Sir Humphrey Davy, to ascertain its comparative nutritive properties, it is superior, in this respect, to either meadow foxtail, orchard grass, or tall meadow oat grass; but it is probable that he somewhat overrates it. If allowed to stand till nearly ripe, it falls down, but sends up innumerable flowering stems from the joints, so that it continues green and luxuriant till late in the season. It thrives best in mixture with other grasses, and deserves a prominent place in all mixtures for rich, moist pastures, and low mowing-lands.

Rye Grass (Fig. 4) has a far higher reputation abroad than in this country, and probably with reason; for it is better adapted to a wet and uncertain climate than to a dry and hot one. It varies exceedingly, depending much on soil and culture; but, when cut in the blossom to make into hay, it possesses very considerable nutritive value. If allowed to get too ripe, it is hard and wiry, and not relished by cattle. The change from a juicy and nutritious plant to woody fibre, possessing but little soluble matter, is very rapid. Properly managed, however, it is a tolerably good grass, though not to be compared to Timothy, or orchard grass.

Redtop (Fig. 5) is a grass familiar to every farmer in the country. It is the Herd's grass of Pennsylvania, while in

Fig. 5. Redtop.

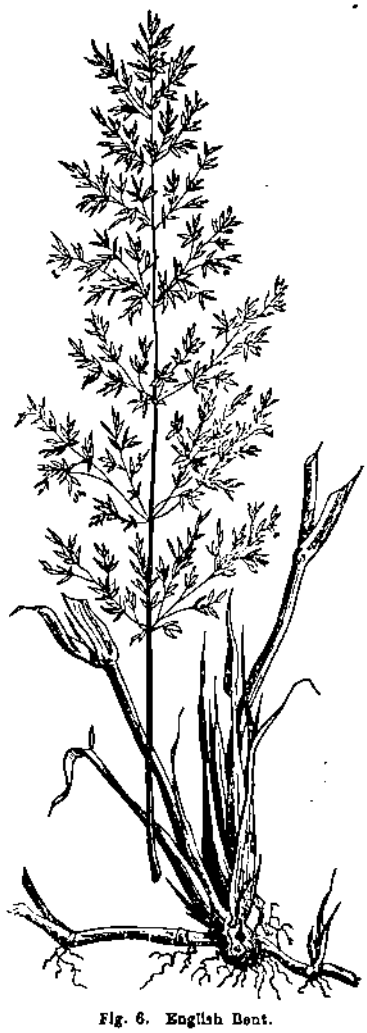

Fig. 6. English Bent.

New York and New England it is known by a great variety of names, and assumes a great variety of forms, according to the soil in which it grows. It is well adapted to almost every soil, though it seems to prefer a moist loam. It makes a profitable crop for spending, in the form of hay, though its yield is less than that of Timothy. It is well suited to our permanent pastures, where it should be fed

Fig. 7. Meadow Fescue.

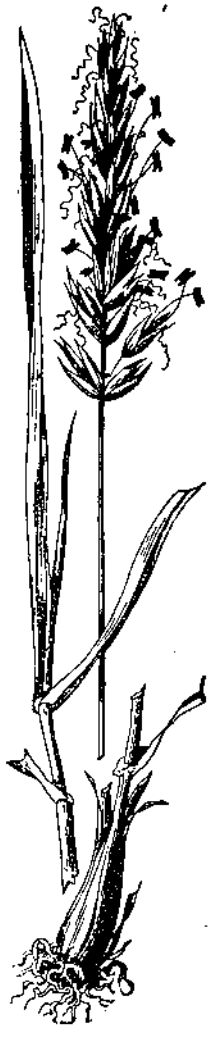

Fig. 8. Sweet-scented Vernal.

close, otherwise it becomes wiry and innutritious, and cattle refuse it. It stands the climate of the country as well as any other grass, and so forms a valuable part of any mixture for pastures and permanent mowing-lands; but it is probably rather overrated by us.

MEADOW FESCUE (Fig. 7) is one of the most common of the fescue grasses, and is said to be the Randall grass of

Virginia. It is an excellent pasture grass, forming a very considerable portion of the turf of old pastures and fields; and is more extensively propagated and diffused by the fact that it ripens its seeds before most other grasses are cut, and sheds them to spring up and cover the ground. Its long and tender leaves are much relished by cattle. It is rarely sown in this country, notwithstanding its great and acknowledged value as a pasture grass. If sown at all, it should be in mixture with other grasses, as Orchard Grass, Rye Grass, or June Grass. It is of much greater value at the time of flowering than when the seed is ripe.

The SWEET-SCENTED VERNAL GRASS (Fig. 8) is one of the earliest in spring, and one of the latest in autumn; and this habit of growth is one of its chief advantages, as it is neither a nutritious grass nor very palatable to stock of any kind, nor does it yield a very good crop. It is very common all over New England and the Middle States, coming into old worn-out fields and moistp astures spontaneously, and along every roadside. It derives its name from its sweetness of smell when partially wilted, or crushed in the hand, and it is this chiefly that gives the delicious fragrance to all new-mown hay. It is almost the only grass that possesses a strongly-marked aromatic odor, which is imparted to other grasses with which it is cured. Its seed weighs eight pounds to the bushel. In mixtures for permanent pastures it may be of some value.

COMMON MILLET is well known as another very valuable crop for fodder in soiling, or to cure for winter use, but especially to feed out during our usual periods of drought. Many varieties of millet are cultivated in this country, the ground being prepared and treated as for oats. If designed to cut for green fodder, half a bushel of seed to the acre should be used; if to ripen seed, twelve quarts, sown broad-cast, about the last of May or early in June. A moist loam or muck is the best adapted to millet; but I have seen very great crops grown on dry upland. It is very palatable and nutritious for milch cows, both green and when properly cured. The curing should be very much like

clover, care being taken not to over-dry it. For fodder, either green or cured, it is cut before ripening. In this State all cattle eat it as readily as green corn, and a less extent will feed them. Millet is worthy of a widely-extended cultivation, particularly on dairy farms. Indian millet is another cultivated variety.

Red Clover is an artificial grass of the leguminous family, and one of the most valuable of cultivated plants for feeding dairy cows. It flourishes best on tenacious soils and stiff loams. Its growth is rapid, and a few months after sowing are sufficient to supply an abundant, sweet and nutritious food. In the climate of New England, clover should be sown in the spring of the year, while most of the natural grasses do far better sown in the fall. It is often sown with perfect success in the late snows of March or April, and soon finds its way down into the soil and takes a vigorous root. It is valuable not only as a forage plant, but as shading the ground, and thereby increasing its fertility.

The introduction of clover among the cultivated plants of the farm has done more, perhaps, for modern agriculture than that of any other single plant. It has now come to be considered indispensable in all good dairy districts.

White Clover, often called Honeysuckle, is also widely diffused over this country, to which it is undoubtedly indigenous. As a mixture in all pasture grasses it holds a very high rank, as it is exceedingly sweet and nutritious, and relished by stock of all kinds. It grows most luxuriantly in moist grounds and moist seasons, but easily accommodates itself to a great variety of circumstances.

With respect to the mixtures of grass-seeds most profitable for the dairy farmer, no universal rule can be given, as they depend very much upon the nature of the soil and the locality. The most important point to be observed and one in which we, as a body, are perhaps most deficient, is to use a large number of species, with smaller quantities of each than those most commonly used. This is nature's rule; for, in examining the turf of a rich old pasture, we shall find a large number of different species growing

together, while, if we examine the turf of a field sown with only one or two different species, we find a far less number of plants to the square foot, even after the sod is fairly set. No improvement in grass culture is more important, it seems to me. I have suggested, in another place, a large number of mixtures adaptedto the different varieties of soil and circumstances, together with the reasons for the mixture in many instances. As an instance of what I should consider an improvement on our ordinary mixtures for *permanent pastures*, I would suggest the following as likely to give satisfactory results, dependent, of course, to a considerable extent, on the nature and preparation of the soil:

Meadow Foxtail, flowering in	May and June,	2	pounds
Orchard Grass.	" "	6	"
Sweet-scented Vernal, "	April and May,	1	"
Meadow Fescue, "	May and June,	2	"
Redtop, "	June and July,	2	"
June Grass, "	May and June,	4	"
Italian Rye Grass, "	June,	4	"
Perennial Rye Grass, "	June,	6	"
Timothy, "	June and July,	3	"
Rough-stalked Meadow Grass, flowering in June and July,		2	"
Perennial Clover, flowering in June,		4	"
White Clover, flowering in May to September,		5-40	"

For mowing-lands the mixture would, of course, be somewhat changed. The Meadow Foxtail and Sweet-scented Vernal would be left out entirely, and some six or eight pounds added to the Timothy and Red Clover. The proper time to lay down lands to grass in the latitude of New England, is August or September, and no grain crop should be sown with the seed.

[*The mixtures of grass seed best adapted to particular circumstances, and the general and economical management of grass lands, are fully considered in the Fourth Annual Report of the Secretary of the State Board of Agriculture, to which reference is hereby made.*]