

CHAPTER VII.

EARLY ATTEMPTS TO CULTIVATE GRASSES.

Meadows of the Romans.—It will be unsafe to enter into details in reference to the time of introduction of most of our valuable grasses. Even to the present day, there is much uncertainty and confusion of the names of grasses.

As a matter of history it may not be out of place to read a few extracts from *L. J. M. Columella*, the old Roman, who wrote about A. D. 50:

“The hay which grows naturally in a juicy soil, is reckoned better than that which is forced by constant watering. Land that shelves gently, if it is either flat or well watered, may be reduced into meadow; but such a level ground is most approved, which, having a very small gentle descent, does not suffer the showers nor the rivulets that flow into it, to abide long in it; or if any water comes upon it, it creeps off slowly; therefore, if in any part it be low and marshy, and the water stagnates upon it, it must be carried off by furrows; for either great abundance or scarcity of water, is equally pernicious to grass of all sorts.”

After speaking of removing brush, briars, and weeds, he says: “It is important that we neither allow a hog to feed therein, because, with its snout, it digs up and raises the turf, nor larger cattle, unless when the ground is exceeding dry, because they sink their hoofs into it and bruise and cut the roots of the herbs. Nevertheless, the second year we will allow smaller cattle to be admitted, after the hay harvest is over, provided the dryness and condition of the place will suffer it. Then the third year, when the meadow is become more hard and solid, it may receive

FIG. 87.—*Cynosurus cristatus* (Crested Dog's tail); a, A whole plant; b, c, two views of a spikelet.—(Plant from Sutton, spikelets by Scribner).

greater cattle also. Moreover, the leaner and pendent places must be assisted and refreshed with dung. Prudent husbandmen commonly lay more dung upon a hill than a valley, because, as I said, the rains always carry the fatter matter down to the lower grounds."

"There is a measure to be observed in drying hay, that it be put together neither over dry nor yet too green; for, in the first case, it is not a whit better than straw if it has lost its juice; and, in the other, it rots in the loft if it retains too much of it; and after it is grown hot it breeds fire, and sets all in a flame. They do not put it up in mows, before that they suffer it to heat, and concoct itself, and then grow cool, after having thrown it loosely together for a few days."

Here in a few lines we get the ancient idea of selecting lands for meadows, of drainage, of clearing out weeds, of keeping hogs and cattle off from newly seeded land, of applying manure, of storing hay, of spontaneous combustion.

The First Meadows of Great Britain.—It is not yet very long since the first efforts were made to improve pastures in Great Britain.

In his *Mystery of Husbandry Discovered and Laid Open*, J. Worlidge, in 1681, writes: "Ray grass, by which they improve any cold, sour clay weeping lands which is unfit for sainfoin, hath the precedence of all other grasses, these are lucerne, clover, tares, spurry, and trefoil." This is the first mention made of rye grass in cultivation, and for many years it was the only true grass, the seeds of which were intentionally sown. Timothy was introduced into England by the soldiers who returned from this country in 1776. Orchard grass began to be sown about the same time, and since then the number of varieties has steadily increased. Some of the above, as well as the following, is adapted from Gould:

The making of artificial meadows began to receive attention

even from the first settlement of this country. In a work written by Jared Elliott in 1749, the cultivation of Timothy and fowl meadow is strongly recommended, the latter grass is especially lauded as in many respects better than any other.

Timothy and red top in the East were sown very extensively, and sea weed and fish were successfully used as manures. Although we were thus early in forming artificial meadows and pastures, our subsequent improvement has not kept pace with our early enterprise, and we are now far behind England and Scotland in this department of husbandry.

In 1824 a new and most important stimulus to their cultivation was offered by the Duke of Bedford, who published his work, giving an account of experiments made by George Sinclair. Since that time Parnell, Way, Lawes and Gilbert, Buckman and Voelcker in Great Britain have done much to advance our knowledge. Numerous prize essays and other communications have appeared, and progress has been rapid and substantial, yet even in Great Britain as late as 1882, one of the best experimenters, C. De L. F. DeLaune, says: "Unfortunately for owners and occupiers of land, the grossest ignorance prevails about grasses. To many almost every herb that is green is considered to be grass."

Progress Has Been Very Slow.—Most of the following paragraph is taken from Gould:

It will not be denied that farmers, in general, bestow much less care, or thought, upon their meadows than they do upon their grain lands. Not many can name for certain half a dozen kinds, and not one farmer in ten thousand knows the names of the grasses growing on his farm, or can discriminate between them. Grass is grass, and that is all they trouble themselves to know. Very many are not aware that they have any other varieties than Timothy, clover (which is not a grass) and red top growing on their farms, although they may have a dozen or

twenty other species; much less do they understand the peculiar properties and the relative values of the different species.

“Not long ago,” says Gould, “we noticed a large tract of Lyme grass, *Elymus villosus*, growing on the banks of a rivulet. We asked the owner of the land, who had lived on it over thirty years, whether his cattle relished it? He told us he did not know; he had never noticed it, and could not tell whether the cattle would eat it or not. He had seen it growing there all the time in great abundance, but never knew its name, never inquired what it was, nor what it was good for. Meadow fescue, *Festuca pratensis*, is a very common grass in the counties bordering on the Hudson river, constituting about one-fifteenth of the crop on the meadows. When it first came in flower this year we asked the first six farmers that we met with what they called it. Not one of them could name it; they were not quite sure that they had it on their farms; they had something that looked like it, but they were not sure that it was the same. Two of them thought that it was June grass. The difference between the two is so marked that an intelligent farmer should no more confound them than he should confound a horse and a ‘cow.’”

Why Grasses are Not Better Known.—Improvements in agriculture have always advanced slowly, with the exception of farm implements, which have not generally been invented by farmers, but by mechanics. Probably no class of men adhere more tenaciously to old practices than the farmers. They have had great respect for fashion and the tradition of their fathers.

Grasses have often been recommended under wrong names, or from a very limited observation, or from selfish motives. Perhaps the seed was poor and failed to grow. The farmer is puzzled and returns to his old ways.

The grasses form an exceedingly natural family, and for this very reason it is difficult for a beginner to readily distinguish individual differences. A certain grass varies much in different

situations and at different stages of its growth. The grasses have a great deal in common, and to a beginner all look alike.

Even for a pretty good botanist, there is no denying the fact that it is quite a task to learn to recognize our common grasses. Still, it is no more difficult than to match horses well, to judge the weight of a hog, or to pick out a good cow by her general appearance. The grasses have small flowers, and these are likely to pass unobserved, while the animals referred to, by daily association soon become familiar.

What Have Been Sown in Great Britain.—The following grasses and clovers have been recommended in various mixtures for meadows and pastures. In this connection, also, we give the number of pounds to the bushel and the number of seeds to the ounce. Most of the leading seedsmen advertise and recommend a different selection of grasses for each geological formation; one for the London clay; one for the Upper Cretaceous; one for the lower; one for the Oolite; one for the Oxford Clay; one for the Lias; others for the New Red Sandstone, Carboniferous Limestone, Coal Measures, Old Red Sandstone, Upper Silurian, Lower Silurian. Lists are made out for rich loams, poor stiff clay, light soil; for one year, two years, three years, and for permanent pasture and meadow. Many species are used over and over in different mixtures but in varying proportions. For ten to thirty or more species are usually named for each mixture.

The writer quite agrees with James Hunter, an English seedsmen, who says: "Although much has been said about 'geological formations' in connection with the grasses, this has really a very unimportant bearing upon the subject, and it is more likely to lead to confusion than otherwise. Four-fifths of those desirable for permanent pasture will thrive upon all good soils. To ring the changes upon the twenty grasses and clovers through some fifty different geological formations, is nothing better than a piece of pedantry. For all practical purposes, it is quite suf-

ficient to know the general character of the soil and the situation." To add to all this, the soils of some formations vary much in fertility and physical conditions.

The more of mystery and complication a seedsman can make out of this subject the more the farmer is likely to rely on his statements, and the more easily can he be deceived.

GRAMINEÆ.	Pounds to the Bushel.	Seeds to the Ounce.
<i>Agrostis stolonifera</i> , Fiorin or Marsh Bent.....	15	500,000
<i>Agrostis vulgaris</i> , Red Top.....	14	425,000
<i>Aira cæspitosa</i> , Tufted hair grass.....	14	132,000
<i>Alopecurus pratensis</i> , Meadow Foxtail.....	7	76,000
<i>Anthoxanthum odoratum</i> , Sweet Vernal.....	10	71,000
<i>Arrhenatherum avenaceum</i> , Tall Oat-grass.....	12	21,000
<i>Brachypodium sylvaticum</i> , Wood Fescue grass.....	10	15,500
<i>Cynosurus cristatus</i> , Crested Dog's Tail.....	26	28,000
<i>Dactylis glomerata</i> , Cock's Foot, Orchard grass.....	14	40,000
<i>Dactylis glomerata, gigantea</i> , Large Orchard grass.....	10	34,000
<i>Elymus arenarius</i> , Lyme grass.....	11	2,320
<i>Elymus geniculatus</i> , Lyme grass.....	12	2,300
<i>Festuca duriuscula</i> , Hard Fescue.....	10	39,000
<i>Festuca elatior</i> , Tall Fescue.....	15	20,500
<i>Festuca elatior gigantea</i> , Large Fescue.....	13	17,500
<i>Festuca heterophylla</i> , Various-leaved Fescue.....	12	33,000
<i>Festuca gigantea</i> , Giant Fescue.....	16	8,600
<i>Festuca ovina</i> , Sheep's Fescue.....	12	64,000
<i>Festuca ovina tenuifolia</i> , Slender Fescue.....	15	80,000
<i>Festuca pratensis</i> , Meadow Fescue.....	15	26,000
<i>Festuca pratensis loliacea</i> , Darnel Spiked Fescue.....	15	24,700
<i>Festuca rubra</i> , Red Fescue.....	10	39,000
<i>Glyceria aquatica</i> , Water Meadow grass.....	13	58,000
<i>Glyceria fluitans</i> , Floating Water grass.....	15	33,000
<i>Holcus lanatus</i> , Woolly Soft grass.....	7	95,000
<i>Holcus mollis</i> , Creeping Soft grass.....	6	85,000
<i>Lolium Italicum</i> , Italian Rye grass.....	18to20	27,000
<i>Lolium perenne</i> , perennial Rye grass.....	18to30	15,000
<i>Milium effusum</i> , Millet grass.....	25	80,000
<i>Phalaris arundinacea</i> , Reed Canary grass.....	48	42,000
<i>Phleum pratense</i> , Timothy.....	45	74,000
<i>Poa nemoralis</i> , Wood Meadow grass.....	15	173,000
<i>Poa nemoralis sempervirens</i> , Evergreen grass.....	15½	133,000
<i>Poa pratensis</i> , June grass.....	14	243,000
<i>Poa trivialis</i> , Rough-stalked Meadow grass.....	14	217,000

GRAMINEÆ.-CONTINUED.	Pounds to the Bushel.	Seeds to the Ounce.
<i>Psamma arundinacea</i> , Sea-reed.....	15	10,000
<i>Trisetum flavescens</i> , Yellow Oat grass.....	5½	118,000
LEGUMINOSÆ.		
<i>Lotus corniculatus</i> , Bird's-foot trefoil.....	62	28,000
<i>Lotus major</i> , Large Foot trefoil.....	64	51,000
<i>Medicago lupulina</i> , Black Medick.....	63	16,000
<i>Medicago sativa</i> , Lucerne, Alfalfa.....	60	12,600
<i>Onotrychis sativa</i> , Sainfoin.....	26	1,280
<i>Trifolium filiforme</i> , Yellow Suckling clover.....	65	54,000
<i>Trifolium hybridum</i> , Alsike clover.....	60	45,000
<i>Trifolium pratense</i> , Red clover.....	60	16,000
<i>Trifolium pratense perenne</i> , Perennial clover.....	60	16,000
<i>Trifolium repens</i> , White clover.....	65	32,000
MISCELLANEOUS.		
<i>Achillea millefolium</i> , Yarrow.....	30	200,000
<i>Cichorium intybus</i> , Chicory.....	32	21,000
<i>Petroselinum sativum</i> , Parsley.....	41	12,800
<i>Plantago lanceolata</i> , Lance-leaved Plantain.....	52	15,600
<i>Poterium sanguisorba</i> , Burnet.....	25	3,320

From Morton's *Cyclopedia of Agriculture*, we glean the following in relation to the number of kinds selected for each use or situation:

1. For alternate husbandry, 4 grasses, 5 clovers and others.
2. For permanent pasture, 10 grasses, 4 clovers.
3. For permanent pasture, 12 grasses, 6 clovers.
4. For permanent lawn, 12 grasses, 6 clovers.
5. For permanent, another mixture, 12 grasses, 5 clovers.
6. For permanent fine lawns, 7 grasses, 2 clovers.
7. For permanent lands for irrigation, 11 grasses, 2 clovers.
8. For permanent lands in orchards, 10 grasses, 3 clovers.
9. For heathy and moory lands, 7 grasses, 4 clovers.
10. For deep mossy ground, 9 grasses, 3 clovers.
11. For marshy grounds, 8 grasses, 1 clover.
12. For sandy woods, 11 grasses, 1 clover.
13. For rocky and gravelly, 13 grasses, 4 clovers.

14. For warrens, 8 grasses, 5 clovers.

15. For drifting sands, 3 grasses, 0 clovers.

These include in all 36 species of grasses, 10 of leguminous plants and 5 of others, 51 in all. The best farmers of Great Britain in more recent times are inclined to reject quite a number of species heretofore enumerated for sowing.

What Have Been Sown in the United States.—In 1858, in a prize essay for which he received \$50, S. D. Harris, of Ohio, says: “Of the grasses that may be called indigenous, and at the same time having the virtues of what are called tame grasses, there are but three kinds deserving of culture in Ohio. These are *Poa pratensis*, *Poa compressa* and *Trifolium repens*. And all worthy of cultivation from any source on arable land are Timothy, red-top, orchard grass, red clover, and, for variety of crop, occasionally German millet and common millet. We should suffer no loss were all the rest stricken from our fields at once.”

In 1865, X. A. Willard reports that after making extensive inquiries of the best dairymen as to the kinds of grasses employed in old pastures, they report June grass, fowl meadow grass, meadow fescue, red-top, wire grass and sweet vernal. Timothy, orchard grass, red clover, and some other forage plants, they report, grow in pastures and meadows.

A leading farmer, in his report for the Board of Agriculture in 1868 says: “In Connecticut the almost universal practice is to sow Timothy and clover, either with rye in the fall or with oats in the spring, or in some few moist or rich meadows to use red-top.”

During the same year, J. M. McMinn writes: “The pastures of Pennsylvania contain June grass (there called ‘green grass’), Timothy, red-top, false red-top (*Tricuspis sesteroides*), blue grass (*Poa compressa*) and meadow fescue. In the meadows a few others were found.”

As late as 1884, in the Northern States, among those who sow seeds on their lands intended for meadows, very few sow any other seeds than Timothy and clover. If left to themselves after a few years several others come in one way and another and increase the variety and quality of old meadows and pastures.

It is not quite as true in 1885, as it was when Gould wrote it in 1869, that "This Babel-like confusion of opinions demonstrates clearly enough that we have no real knowledge on this all-important subject, and that we rely only upon capricious guesses for the settlement of the problem."

Circulars or letters of inquiry in reference to the grasses for pastures or meadows seldom bring valuable or trustworthy information.

From the above it will be seen that the list of grasses now generally sown in any State can be counted on the fingers of one hand, while there are doubtless twenty or thirty which ought to find extensive sale for the various uses and the varied soils and climates of any large State. The list is growing, slowly growing larger.

We wish to impress our readers with the very important fact that little is definitely known regarding the grasses found in our pastures, and still less is known in reference to those best adapted to cultivation. As Gould says: "We must fairly grapple with the undoubted fact that the science of grass culture is yet in the early dawn of its infancy."

The Englishman selects twenty or more; not including some which are not true grasses. He selects some kinds for thin soil or upland pastures, others for stiff clays, others for rich, deep loams, others for meadows which are subject to periodic floods along the banks of rivers, and still others for irrigated meadows in which the water can be entirely controlled.

There must always be a difference of opinion as to the merits of grasses on account of the various soils, climates, seasons and uses.

In looking over a large number of agricultural reports of the Northern States we find in some of them much space is given to discussions of the grasses by the farmers at their winter meetings. There is much said about the care of meadows and pastures, with many repetitions. We cannot help being strongly impressed with the idea that we need many more careful observers—farmers who are trained students of science.

CHAPTER VIII.

TESTING SEEDS. SOME COMMON WEEDS.

Seed Stations and Their Work.—Whether a seed is liable to grow or not depends much on how it was cured and the nature of the place where it has been stored. In the following account of some experiments this subject will receive some attention.

The first station for testing seeds was established by Dr. Knobbe, of Saxony, in 1869. In Germany, in 1878, upwards of forty of the experimental stations had attached to them a seed control department, and 14 of these did nothing else.

Adulterations.—These stations discovered adulterations of seeds which were “most ingenious in character, harmful in effect, and remarkable in amount.” One practice is to kill seeds by boiling or baking and mix them with some desirable seeds which they resemble. The dead seeds in that case tell no tales.

Old seeds, or seeds of another variety, are often dyed or bleached with sulphur, and used to adulterate good seeds of red clover or some other species. Old seeds are dressed with oil and sometimes rubbed by machinery to improve their appearance. Seeds of rye-grass and Italian rye-grass are often adulterated