

## CHAPTER X.

## PREPARATION OF THE SOIL AND SEEDING.

**Drainage.**—The advantages of drainage are many, even for growing grass, though it is probably true that grass land does not require to be drained as thoroughly as that which is arable. Drainage prevents damage from flooding for long periods when not desired. It is a protection against drought; it enables the grasses to start earlier in spring and grow later in autumn; it deepens the soil and prevents baking in dry weather; it allows the plant to receive greater benefit from fertilizers applied to the soil; it allows air to penetrate the soil; it prevents frost from heaving out the plants; it makes hauling of loads easier, and renders the land less liable to injury from the treading of cattle; it improves the better grasses, which thereby encroach on those of less value, including many sedges, rushes and useless weeds. Much of our grass land, especially that in permanent pasture and meadow, would be vastly improved by thorough drainage.

If water, in a wet season, stand nearer than two feet of the surface in a small hole dug in the ground, the land needs draining.

**Preparation of the Soil.**—Strong, deep, calcareous soil, with a clay subsoil, is the best adapted for our most nutritious grasses.

It is most important that the land be clean, finely pulverized and of good tilth when the seeds are sown. If the land can be lightly harrowed immediately before sowing the seeds or immediately after, the seeds will be more likely to get a good start. A brush harrow is a very good substitute for a light one with slanting steel teeth.

**How Much Seed to Sow.**—That depends on the size and vitality of the seed, the number of seeds to the bushel, the con-

dition of the land, whether distributed evenly, and the nature of the season that is to follow. By consulting the table which gives the number of seeds to the ounce, and a little calculation, it will be seen how thickly the grass would grow provided every seed produced a plant.

In the opinion of the writer, it would be better, in most cases, if farmers used less seed to the acre and took more pains to get the land in better condition. Suppose we sow 12 quarts of Timothy seed and 4 pounds of red clover to the acre. This will make 18,944,000 seeds of Timothy and 6,024,000 seeds of clover, a total of 24,968,000 seeds, or about 4 seeds to the square inch. Using finer seeds in mixtures, as prescribed by some of the English people, they often sow from 50,000,000 to 100,000,000 seeds to the acre, or not far from 8 to 16 seeds to each square inch. In either case there can be room for only a small portion of the plants should all the seeds grow and thrive.

Where the plants are crowded closely together, the stems of grasses and clovers are more slender and less likely to become woody. There is probably no danger of sowing too much seed, excepting in the matter of economy. If the young plants are too numerous, the stronger will soon starve and crowd out the weaker.

Under favorable circumstances one seed produces a plant which "tillers" and contains a large number of culms. Even with the best of chances, there will be much loss of seeds and young plants, what proportion no one can tell. The seeds should be well grown, well harvested, well cleaned, and true to name. Some experimenter in Great Britain found 1,100 plants (probably culms) to a square foot of good meadow land, and on water meadows the number was increased to 1,800 plants.

Sinclair found from 634 to 1,798 distinct rooted plants of various species in one square foot in nine separate localities. Where rye grass grew alone, there were only 75 plants. In a well

manured water meadow, there were 1,702 grasses and 96 clovers and other plants. The smaller the number of species the smaller is the number of distinct plants to the square foot. In the words of I. A. Lapham, "Much caution must be used in applying the rules laid down in books (or given in practice) for the culture and management of grasses."

There always will be an opportunity for the farmer to experiment and use all the good judgment at his command. In connection with the account of each grass recommended for cultivation is given the amount usually sown to the acre, provided only one kind were used.

The following is by Prof. J. W. Sanborn, of Missouri, formerly of New Hampshire, and like the six following is from the *Rural New Yorker* :

"The amount of seed should vary from six quarts to about as many bushels. The poorer the farming and the more dishonest the seed dealer, the more seed will be required. Given a soil in fine tilth—that is, plowed well, harrowed by a harrow that lifts and pulverizes it, is smoothed off and fined with a harrow on the Thomas Harrow principle; if the seed is brushed in with a light brush-harrow, and if the soil is an open one, or if it's a little dry, rolled; if the seed is home raised, or not over a year old, and well kept, and the soil is fat with good available plant food—six quarts of Timothy or six pounds of clover will seed an acre. Per contra, if, instead of a fine, rich soil open to, and inviting tiny rootlets in all directions, we have a cloddy soil, plowed badly when wet, half tilled, where dry lumps repel the minute roots of the small seeds of grass, and where cavities are dry and, of course, foodless; if the seed used is poorly preserved or has been moist, and has heated, and if to it, when fresh, is added the seed of the past and of the previous year, and so on, "*ad infinitum*," and if the soil is as poor as Job's turkey, then an unlimited amount of seed will be needed, and no amount will be enough

for a good crop of grass. I use twelve quarts of Timothy and ten pounds of clover seed per acre with good success, and deem this amount desirable. As my farming is rotation of crops, I seldom sow Timothy and clover together."

Gen. William G. LeDuc, of Minnesota, gives the following opinion: "As to the amount of seed per acre, an ideal meadow for me, in this soil and climate, would with present experience, start three Timothy and two clover plants to every square inch of surface. So six pounds of Timothy and eight pounds of clover, if good, sound seed, distributed evenly over an acre and fortunate in time and conditions of planting, according to my experience, give a good stand and lay the foundation for a good meadow."

Prof. E. M. Shelton, of Kansas, writes: "If for pasturage, use one bushel each to the acre of orchard grass and Kentucky blue, to which six or eight quarts of medium red clover may well be added. Liberal seeding is necessary if land is not first class either in quality or mechanical condition, to allow for lost seed. And if the land is in first rate order, liberal seeding pays well in a close, even sod.

"A late crop can be obtained from mixing red-top and Kentucky blue grass, a bushel of each, and if the land is somewhat light and moist, Alsike clover (say four quarts) may be added."

Prof. G. E. Morrow, of Illinois says: "On our prairie soils heavy seeding has not been found necessary. We aim to sow a bushel of Timothy seed to four or five acres, with a bushel of clover seed to eight or ten acres. When clover is sown alone, I should sow about one peck per acre."

Concerning the amount of seed required, the following is from Waldo F. Brown, of Ohio: "Good hay is not produced by thin seeding; for the grasses will grow coarse and rank, whereas heavy seeding will give fine, soft hay."

Prof. Wm. Brown, of Ontario: For rotation, hay and pasture,

sows fifteen pounds of grass and eight pounds of clover seed per acre.

Daniel Batchelor, of New York, recommends a bushel and a half of orchard grass and half a bushel of tall oat-grass.

“A heavy but not wet, clay loam devoted to meadow, should be sown with Timothy, red-top, fowl meadow, rough-stalked meadow, and Italian rye, at the rate of about six pounds each to the acre, in a mixture; to this may be added three pounds of medium clover.

“For a wet, peaty, black soil: Rough-stalked meadow, six pounds; red top, eight pounds; meadow foxtail, four pounds, and Alsike, six pounds, would be a good mixture per acre.

“For land much shaded the following mixture is excellent: One bushel of orchard grass, one of meadow oat-grass, and five or six pounds of wood meadow grass to the acre.”

For New England, A. W. Cheever recommends the following: “If Timothy be sown alone we do not consider a bushel of seed any too much for an acre. Of red-top we would sow at least two bushels. Of orchard grass, two bushels, and a bushel of June grass with it. Rhode Island bent requires less seed by measure than red-top, as the seed is usually much less chaffy. No rule need be given for clover, so much depends upon the amount of seed contained in the land, and in the manure applied.”

Professor S. A. Knapp recommends for Iowa and similar soils and climates, for early and late pasture, the following mixture:

Blue grass.....	Lbs. 8	Orchard grass.....	Lbs. 6
Timothy.....	6	White clover.....	1

For summer pasture:

Timothy.....	Lbs. 6	Red clover.....	Lbs. 4
Orchard grass.....	6		

For permanent dairy pastures on most heavy soils of the East, Sibley & Co. recommend:

	Lbs.		Lbs.
Perennial rye-grass .....	5	Meadow foxtail .....	3
Blue grass .....	3	Red clover .....	2
Orchard grass .....	3	White clover .....	1
Meadow fescue .....	3	Alsike clover .....	1

For the lighter soils of the North and East, they suggest the following:

	Lbs.		Lbs.
Timothy .....	5	White clover .....	1
Taller oat grass .....	10	Red clover .....	2
Rhode Island bent .....	4	Alsike clover .....	1
Orchard grass .....	3		

For wet soils in the North, they suggest:

	Lbs.		Lbs.
Blue grass .....	5	Rye or Ray-grass .....	4
Red-top .....	5	Alsike clover .....	1
Fowl meadow grass .....	4	White clover .....	1

**Sowing the Seed.**—The usual practice in many portions of the Northern States is to sow the seeds of the grasses in early autumn with a crop of winter wheat or rye, or to sow after these crops have been growing for a few weeks.

The clovers are sown in early spring, because the young plants are likely to winter kill if seeds are sown in autumn.

The following is from Professor E. M. Shelton, of Kansas: "The time to sow grass seed is, we believe, without any exception, in the spring; and recent experiments show that this work should not be undertaken too early in the season. In the spring of 1880, a field seeded early in April came to nothing, the violent dry winds that followed the sowing completely sweeping the seed away. Seed sowed after the spring rains have fairly set in, has never failed since 1874 to give a good stand of grass. In a few instances, and where the winter following has proved warm and open, we have had good success with Timothy and clover sowed in the fall; but the result of sowing orchard grass, alfalfa, and blue grass in the fall, has been almost invariably disastrous. Our experience with grass seeds sown in the fall has been this:

they germinate readily, even more quickly than in the spring, but, as the native vegetation fails from the action of frosts, the common grasshoppers collect upon the young grass, doing it serious damage; what remains suffers seriously, and is often quite destroyed by the action of the winter frosts and violent winds of early spring. On the other hand, when the seeding is done very late in the spring, the young and tender plants are consumed by the sun as fast as they appear above the ground. Seed sown any time during the month of April will rarely fail to germinate and make a vigorous growth. However, we cannot advise seeding, as we have before said, until the warm spring rains have set in. We have sown both alfalfa and orchard grass during the early part of May with uniformly excellent results."

Mr. Howard, of Georgia, prefers August and early September as the best time for sowing seeds. There is usually sufficient rain at that season to cause the seeds to germinate. The young plants will have time to make sufficient root to stand the severest cold of winter. Clover and lucerne, and several of the grasses, if sown without grain at this season in the South will give a cutting in the following spring. Grass seed sown late in the fall is liable to be winter killed.

If one could know the nature of the season to follow, he would much prefer to sow grass seeds in a dry day preceding mild, moist weather. It is hardly safe to give fixed rules for the sowing of grass seeds. Where several kinds of seeds are sown, it is well to sow those of equal weight and size together, going over the field again with the heavier sorts.

An experienced person on a still day will sow small seeds quite evenly by hand, but we now have several kinds of light machines, accompanied with directions for use, which will distribute the seeds more evenly than can be done by hand. If there is much to be sown, the cost of a good machine will be more than saved by sowing the seeds in a better manner. If evenly dis-

tributed, less seed will be required. For sowing by a machine, the seeds should be well cleaned and freed from leaves and straws and the machine frequently examined to see that the seed is passing through evenly.

Where the soil is loamy, sandy, or light, it is an excellent plan to roll the surface after seeding. This process brings the soil in close contact with the seed and renders it more likely to germinate.

**Seeding by Inoculation.**—This is rarely practiced, but has sometimes been resorted to in England. It consists in cutting ropes of turf from an old pasture, and these are chopped up into pieces about  $1\frac{1}{2}$  by 2 inches. They are placed by hand about nine inches apart over the ground. This is for meadow what sodding is for a lawn. The results are quick and sure, but rather expensive.

Quack grass, Bermuda grass, and Johnson grass are often seeded by scattering or planting fragments of the rootstalks, either with a hoe or by dropping in part of the furrows as the field is plowed.

**Seeding Grass with Grain.**—The following was prepared by John J. Thomas, of New York: “The most rapid way of obtaining a grass crop is to sow the grass seed alone without any grain. If done early in the spring, on clean, well prepared ground, we may get a cut of hay the same year, usually about two-thirds of a full crop, and a heavy one the second year. It will make a vast difference whether we sow plenty of seed or only a small quantity. We have sown a mixture of Timothy and clover at the rate of a bushel per acre, and had about twice as heavy a crop as that afforded by a scant seeding of less than a peck per acre. It is very important to have it covered with good, mellow earth, buried at a depth not greater than five or six times its largest diameter. To grow freely, one-fourth to one-half an inch is deep enough in moist soil, but clover will germinate and a grow at a depth of an inch. Much will depend on the mellow-



ness and richness of the surface soil. A peck of seed will give a better growth on a fine, fertile surface, than a bushel on a hard crust or among clods.

“A very common cause of failure is sowing clover seed in the spring, on a heavy soil, with winter wheat, where the crust has not been broken since the previous September. Harrowing the surface with a light harrow will make a much better seed bed. But if Timothy seed has been sown in autumn a coarse harrow may tear it up.

“The objection to sowing the grass alone is that we are compelled to plow and prepare the ground for a single crop, while in seeding with grain we obtain both grain and grass at one operation, and with economy of labor. Farmers will therefore commonly prefer seeding with grain, except in certain cases where obtaining an early crop of grass is a paramount object. By seeding with winter grain, if a light top dressing of fine manure was applied in autumn to prevent a hard crust, the seed may be sown as early in spring as may be desired, without waiting for any preparation of the soil, and Timothy may be sown the previous autumn. Or if the soil is likely to settle and become hard, both Timothy and clover may be sown together in spring, after or before the surface is brushed with a light harrow which will not injure the grain. Seeding with spring grain, if properly performed, has much to recommend it. It always furnishes a freshly moved soil as a bed for the seed. But caution should be used not to cover the grass seed too deep, nor to sow a thick and shading crop of the grain.

“The best winter grain with which to sow clover seed is rye. It shades the young crop less, and if the work is properly done it rarely fails of entire success. On the other hand, the seeding rarely succeeds well with a crop of oats, and nearly the only chance for success is in sowing the oats thinly, or not to exceed

a bushel of seed to the acre. Spring wheat and barley are intermediate for the purpose between rye and oats.

“It is usually more certain to rely on a slight artificial covering with soil, than the natural covering which may or may not take place by a shower of rain after the action of early spring frost, which, however, may sometimes succeed perfectly. The pressure of a common farm roller on clover or grass seed, sown on the freshly harrowed soil, covers most of it slightly, and is one of the best means for insuring germination. Another good way to cover the fine seed is to pass an evenly made brush harrow over it. This harrow is easily and cheaply constructed by placing several branches cut from a thickly set tree side by side, and stringing them together by running a stout stake through the forks at the cut ends, taking care that no large projections root into the ground in passing. Such a harrow, skillfully made, will leave the ground nearly as smooth as a floor. After the grain has been removed, it is well to look over the field and sow a few more seeds where the grass seems too thin.”

The following upon this topic is by Prof. J. W. Sanborn, of Missouri:

“I have had but little of the bitter experience complained of by many in sowing grasses with other crops. Grass is, in its early stages, a slow grower, and I can get good results in grain, and under the best conditions, a crop of grass the first year. On a fine tilth and a fertile soil, I think few will fail to secure good grass with a light seeding of grain. Grass alone, sown in the spring, is out-grown by the rapid growing annual weeds, which have to be cut or the misery of their seeding is experienced.

“For several years on a large farm I grew little or nothing except grass. When I had corn and raised no other grain, I sowed the grass occasionally in the corn after the last hoeing. I have done much seeding in August, and some on the early frosts of spring, or late spring snows (the latter method is a bad one),

but now, in a rotation system of crops, I sow in the spring, and meet with good success; and if, in any degree, I have a failure, I can sow again on all thin spots after the grain is off, and still again in the spring when the frost is working the ground, or in the fall, after the spring sowing, on the fall frosts after it is too late for germination. These night frosts and day thawings open and close the ground and let the seed in well, and, on the whole, fall is a good time to sow for several reasons, when one is determined to sow grass seed alone, or when one is sowing over dead spots for new grass. It is an important matter to inspect all fields or sections that need re-seeding. Indeed, an annual seeding of fields is nature's way, and is often profitable."

**Sowing Grass without Grain.**—At the author's request, the following was prepared by A. W. Cheever, of Sheldonville, Mass.:

"Experiments repeated time and again, have convinced me, here in east Massachusetts, where grain crops, compared with hay, have come to take a secondary place in the estimation of most farmers, grass sown alone is almost invariably worth more the first year than the grain and straw together would be if grain were sown with the grass, and the former made the leading crop.

"This is especially true where the land is particularly adapted to the production of hay. For the past fifteen years I have sown nearly all my grass seed alone, and in no single instance have I been sorry I did not sow grain with it to afford protection. When seeding with grass alone, I have generally cut two crops the first year. The first crop should be cut rather early, even if not fully grown. This kills or checks many of the annual weeds.

"I have often sowed the seed in spring, but this is not nature's time for sowing the grasses. Early autumn is undoubtedly the best time in the whole year for sowing most grasses. If sown then the annuals will find themselves laboring under a disadvantage and will soon give up the race.

"Grass sown in early fall will produce as full a crop the fol-

lowing year as it ever will, and the quality will be excellent; but if sown in connection with winter rye or wheat, it will be put back a whole year. The grain is of no advantage to the grass whatever, but rather the contrary.

“The only exception I would make in favor of sowing grass and winter grain together is when the grain is to be cut early, as soon as it heads, for feeding green or to make into hay. Cutting the grain so early in the spring gives time for the grass to make one and sometimes two full crops the first year.

“On good, moist, rich land, I have had excellent success in seeding grass in spring upon green sward turned over the previous fall and the surface thoroughly pulverized before winter and again made fine and mellow in spring. By this method, grass land may be kept producing full crops of grass every year without planting, but it will need reseeding oftener than if an occasional hoed crop is grown. Timothy is one of the poorest kinds of grass for spring seeding without grain, but if sown in August it will produce a full crop the next summer. Orchard grass is one of the best varieties for spring seeding. A great amount of grass seed is annually lost by sowing it in connection with spring or winter grain; the grain crops being harvested in the hottest part of the year, leaving the tender and previously shaded grass plants to be burned up leaf and root by the scorching sun.”

Mr. Howard, of Georgia, writes: “There can be no doubt that sowing seed with grain should always be avoided. It involves the loss of a year in either hay or pasture. If sown with grain, when this is cut the young grass and clover are very tender, having been shaded by the grain. The cutting suddenly exposes them to the sun at the hottest season of the year. There is great danger that they will be burned out. In the event of sowing grass seed with grain, he must always remember that by so doing he loses a year and endangers the grass.”

Here we insert the opinion of Daniel Batchelor, of New York: "Grain and grass have been sown together so long on some meadows that they will no longer bear good crops either of grain or grass; and there are people who keep their arable land in crops as long as they can get anything off, and then they seed down to grass when the soil is so sterile that it will not produce a hay crop. It is not going too far to say that over half the grass and clover seed sown with grain is smothered and utterly lost, and in many instances, after the grain is removed, especially if the weather is hot and dry, there is no hope for a grass crop without reseeding; and even where there is a tolerable catch the meadow is retarded for a whole season. I suppose some will deem it folly, but I think wisdom says: sow grass without any other crops; sow it in autumn; if you are in for rotation, put all your manure on your grass land, so that when you break up the sod or sward for corn, the land may be found in good heart for the crop. Of course, there are plenty of instances where the land is new or where the fertility has been well kept up, in which full success is obtained by growing grass and grain together."

Read what Major H. E. Alvord, of Mass., says: "We succeed well in sowing clover with oats, but prefer to cut off the oats and cure as hay while early 'in the milk.' We have not got out of the ruts sufficiently yet to prevent seeding all grasses and clovers used with wheat, rye, and oats; but I do not believe it to be good farming to try to grow two crops on the same land at the same time."

On this topic, read the experience of Professor E. W. Shelton, of Kansas:

"Oats, wheat, and rye are often recommended as excellent crops with which to sow grass seed. The argument is that the tall grain will shade and protect the young grass. But grass does not need shade when sown in proper season; it needs the sun, and, especially, it needs moisture, and this the vigorous

grain is continually taking from the soil, thus robbing the young grass plants from the start. Every farmer knows how spindling, sickly, and how lacking in strength of root and stem, is a grass or clover plant growing in dense masses of grain. When this grain is harvested in June or July, just when the summer's heats are the greatest, the delicate, starved grass plants are certain to perish, unless long continued, cool, and cloudy weather prevent.

“ We are aware that, upon favorable seasons, considerable success is obtained by seeding the grasses with another crop. But, even during these favorable seasons, a better and more vigorous start will be obtained without the rivalry of vigorous grains; and, upon dry seasons, a failure of the grass is almost certain, when seeded with a grain crop.”

In favor of seeding in autumn without another crop, we may say: the land can be much better fitted for grass in autumn than in early spring. If weeds start in autumn frosts will kill them, while if the grass is sown in spring the weeds keep growing all summer. They may be checked, however, by mowing when the grasses are a few inches high. If there are vacant places they can be reseeded in spring. The first hay crop will be much better. Whatever plan is pursued, a failure or partial failure may sometimes occur.

All the experiments of the writer indicate that in the Northern States young grasses thrive better when they have the full benefit of all the sun and rain. The statement sometimes made, that young grasses and clovers need the shade and protection of some larger plants has no proof to sustain it. Numerous correspondents, without exception, in case they have tried both methods, speak of getting a much better catch of grass when the seed is sown without another crop. Killebrew says that in former years the farmers of Tennessee almost universally sowed grass seeds in the spring of the year on crops of grain, but since

1810 the custom has been to sow in early fall. Many sow grass alone at this time of year and get a full crop the next year. Where grass is sown with another crop they injure each other.

James Sanderson, in *Transactions of the Highland Agricultural Society, 1863*, says: "If the grasses are rank and luxuriant, they greatly retard the harvesting of grain and frequently deteriorate its value. This early luxuriance is often injurious to the grass itself, as it extracts valuable ingredients from the soil. The grain denudes the grass of valuable food and renders it more susceptible of injury from extremes of weather. The plan of sowing grass seeds without a crop has recently been adopted on several farms of Great Britain with great success. Experiments have shown that the profit from the first year's pasture was more than an equivalent for the want of a crop of grain. The next year the field is fit for pasture a fortnight earlier than it would have been if sown with a crop. The grass gets a better start and makes for several years a better pasture or meadow."

He mentions the fact that many men who have tried this plan are of the same opinion. The plan of seeding without another crop has here been made prominent, because many persons have scarcely thought of any other way than that of seeding to grass with a grain crop.

#### **Sowing Seed where Grasses already Occupy the Land.—**

In the Northern States where the land was more or less thickly covered with a growth of sedges and wild grasses, in numerous instances we have seen this order of things very materially changed by the introduction of other species. This was accomplished by simply sowing the seeds over the surface. In some cases a harrow passing over the land exposed the soil in small strips and patches. The change of grasses in such cases is usually rather slow and unsatisfactory, but this is not always the case.

At the Agricultural College, a good lawn on well prepared soil

had for six or eight years produced only the finer grasses and one clover, consisting for a time mainly of June grass, Rhode Island bent grass, perennial rye grass, and white clover. It was mowed often and not allowed to produce flowers or seeds. After a few years the rye grass gradually disappeared, the other plants occupying its place. A year or two later some plats of grasses were established just west of this lawn. In a little while, through the help of the wind, other seeds were sown and inroads were made on this close lawn. Several of the larger fescues, orchard grass, quack grass, and a few others of less note appeared. These are rather on the increase, and with a liberal seeding I have no doubt they would soon be still more prominent. Doubtless this result would not always follow, as very much depends on the soil and climate. This suggests that by sowing seeds of better grasses improvements might often be made in our permanent grass lands.

Concerning the advisability of attempting to introduce "tame grasses" by sowing the seeds on prairie sod, Prof. E. M. Shelton, of Central Kansas, makes the following remarks: "But, whatever may be the character of the soil, prepare the land as well and thoroughly, by plowing and harrowing, as for any grain crop. This is a rule with scarcely an exception; and its violation in various ways explains a large proportion of the failures that have attended the cultivation of tame grasses in Kansas. The question is asked us many times every year: Why may I not scatter the seed upon the sod, as is often done in the East? This is often done, but the practice, so far as our observation has gone, has resulted in almost uniform failure. Where the prairie sod has been largely destroyed by the tramping of cattle, we have known blue grass to succeed partially by this method; but, even in this case, a better sod would have been obtained in less time by thoroughly subduing the land, by two or three years of cropping, before applying the grass seed. As before stated, in the eastern counties of the State, this practice is successfully fol-



lowed; but even here we are satisfied that it would pay the farmer much better, and he would obtain a better sod and nearly as quickly if he should take the 'wildness' out of the land with two or three grain crops before seeding."

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## CHAPTER XI.

### CARE OF GRASS LANDS.

**Permanent Pasture vs. Alternate Husbandry.**—Fifty-five correspondents in a recent report in England agree that "It is certainly unadvisable to break up any tolerably good pastures for the purpose of converting them into arable land."

With his experience and observation in mild and moist Europe, Bousingault believed that there is no system of rotation, however well conceived and carried out, which will stand comparison in point of productiveness with a natural meadow properly situated and properly attended to.

In 1881, nearly half the land occupied for agricultural purposes in Great Britain was in permanent pasture and meadow, and the proportion is on the increase. In Ireland the proportion is still greater in favor of permanent grass land. The proportion is greatest where the air contains most moisture.

The late George Geddes, in the *Country Gentleman* for 1882, reports a discussion of the Onondaga Farmers' Club. Men who had moist lands, with water under them, believed in permanent pasture. Men who cultivated dry soils, well adapted to a rotation of crops, easily plowed, and especially subject to severe droughts, were very decided in the opinion that permanent pastures are of little value as compared with grain crops, and hay and pasture in rotation. Rocky land and steep hillsides are best kept in grass. The amount of rain-fall has much importance in deciding