

Hay. Chemistry and the question now is, what progress have we made? How far are we advanced in all the details of modern agriculture from what could be found in the New England States 30 years ago? M. A. H. Wis. in *Western Farmer*.

MODIFIED ROTATIONS.

There is one important advantage in the permanent adoption of a rotation of crops on the farm, besides the benefits of the crops and soil, and the destruction or exclusion of weeds; namely, the facility with which every part of the plan is arranged and kept in regular order, like a smoothly running machine. The farm being divided into a certain number of nearly equal fields, and a well directed rotation, adapted to the farm, fixed upon, the owner can tell for twenty years to come just what any field shall have in it any year that may be named. He is not subjected to the trouble of planting every year what shall be in this field and what in that, nor the annoyance of discovering, perhaps that he has left one field or crop out of the arrangement, or placed it wrong; nor to confusion next year by what appears to be a good plan the present year.

And yet he shall ever be ready to alter his rotation whenever sufficient reason presents for a permanent change.

He will also find it very useful, without breaking up the general outlet, to modify the filling in as circumstances seem to require. For example, he may apply his manure to different crops; he may plough in autumn instead of spring; he may sow barley instead of oats after corn—and yet preserve the same general frame work of his system.

THE THIRTY YEARS

The most commonly adopted rotation at the present day, in the Northern States, is—1, corn on sod; 2, barley or oats; 3, wheat and 4, meadow and pasture one, two, or more years. But the question, among others for example, occurs, shall we plow the sod in autumn for the corn the following year, or early in spring or just before planting? The answer must vary with circumstances. Just before planting is the most common practice, and it has the advantage of giving a fresh and moist soil for the seed, which generally springs up and gets the start of the young grass that follows. If ploughed two or three weeks in advance of planting, the grass might be two or three inches high by that time, and interfere seriously with the young corn. And yet there are some advantages in ploughing early. The sods rot sooner, and the decaying grass supplies food and gives an early impetus to the plants. If then, the farmer can afford a weekly mellowing of the surface of early inverted sod, thus keeping it mellow and clear of grass and weeds until planting time, he will be likely to have the best crop. But the work must be done right. A common harrow will not do it. It will not prevent the grass from springing up through the sod. But a good sharp steel tooth Shaver harrow will perform the work to perfection. A two-horse cultivator would answer, but the trouble is it will tear up the sod, unless it has been buried deeper than is good for the corn. No better preparation can be made for corn than sod ploughed early with its face kept clean and made mellow by Shares harrow, with the common harrow used between.

The kind of plough used has also something to do with the result. Some ploughs lap over the sod smoothly and beautifully, plastering its face with the moldboard as handsomely as a mason's trowel and (here follows the trouble), allowing it to dry as hard as a brick. Such a plow will not give good corn without a great deal of harrowing and pulverizing. There are other ploughs made in the country, and in different States, that possess the quality of thoroughly pulverizing the surface of the inverted sod in the process of turning it. These and no other should be employed for late ploughing, especially if the soil is strongly of clay. With light soils it is a matter of less importance.

Another question in connection with the time of ploughing is, whether it is best to invert the sod in autumn? This involves several considerations—one particularly, in relation to manuring. We find spreading manure in the autumn twice the value of spring manuring, as commonly performed. It may be applied and spread on the grass with greater facility than on the ploughed surface. After once spread, it should be left on the surface till spring, that rains and melting snows may carry down among the roots the soluble parts of the manure. If spread on a spring ploughed

surface, it cannot be so well diffused among the particles of the soil. These remarks are all made on the supposition that the soil itself remains undisturbed, with its surface only pulverized for plastering. If the sod itself is to be broken up and made mellow, it will be best to plow in autumn, and the buried manure will be thus turned up and will intermix by the working in spring before planting time. We have tried breaking up and pulverizing the sod after early spring ploughing but there was not time enough for it to become well rotted, and there were too many lumps of dead turf left for convenience in planting and cultivating. The labor of the second ploughing is another objection, and we cannot recommend this practice for corn, however well it may sometimes prove for potatoes.

We should therefore "sum up" by recommending early spring ploughing, and subsequent working with Shares harrow, especially if a good pulverizing plough cannot be had, and the soil happens to be heavy; or later, with a light soil or with an implement that will give a mellow surface to the sod.

There are other modifications in the practice of this course of rotation which may be adopted according to circumstances. For example, suppose the soil has become by previous bad management infested with weeds. Many of these may be cleared out by a thorough and laborious cultivation of the corn, or the adoption of summer fallow after the corn, and to precede the wheat. Such a fallow is the cheapest most rapid and most thorough mode of rendering land clean, provided the work is closely attended to, and we have seen a field densely filled with Canada thistles, quack grass, milk weeds, and other perennials, as well as plenty of annual weeds completely extirpated in a single season by repeated ploughing and harrowing all the season through. It is true it might have been done with a hoe crop, but the labor would have been many fold to have had it done by hand; we have neither met with the farmer yet who would do it with sufficient thoroughness.

The summer fallow does not at all derange the course; it only leaves a blank between the corn and wheat, and the owner without his barley or oats.

The second crop in the rotation, that is the one following the corn, in common practice, is either oats or barley; oats, if the soil is rich and strong, or if manure can be applied after the oats are harvested, and barley, if the land is lighter. Joseph Harris, of the Moreton Farm, is very successful with a mixture of oats and peas, as a crop to precede the wheat. In some instances peas alone are sown, in others a crop of beans is raised. If it is feared the land is hardly rich enough for the wheat, it is an excellent and well-known practice to top-dress with rotted manure after the last ploughing in autumn, and before the wheat is sown; a given amount of manure thus going farther towards helping the wheat than in any other way, besides protecting it somewhat in winter, and assisting the germination and growth of the grass seed.

The course here given embraces five years, or it may be prolonged to six or seven years by allowing the field to lie longer to grass, as follows:—

1st. year—Corn on sod, manured the previous autumn.
2nd year—Corn barley or oats, or oats and peas, or peas alone.
3rd year—Wheat seeded to clover.
4th year—Clover meadow.
5th year—Clover ploughed in summer or early autumn, and fall fallowed.
6th year—Oats and peas, or barley, or peas alone.
7th year—Wheat seeded to clover.
8th year—Clover.—*The Cultivator and Country Gentleman*.

The Albany *Country Gentleman* says that the peach crop was destroyed in some parts of Western New York on the night of the 1st ultimo, the previous warm weather having swelled the buds.

LIME IN SOILS.

Lime is very abundant in nature, being found in all fertile soils; indeed, as it enters into the composition of every kind of plant, we may safely conclude that it is necessary to vegetation.

It is an oxide of the metal calcium, possessing basic properties; having a great affinity for moisture and carbonic acid, on exposure to the atmosphere it rapidly becomes a hydrate, and finally carbonate of lime, in which state it principally exists in soils, though it is also found as sulphate and phosphate. From the earliest time lime, either as carbonate or oxide, has formed an important dressing for all kinds of land; whenever new land is brought into cultivation, or old pastures broken up, quick-lime should be applied, whether the soil be stiff clay or light sand. We are better acquainted with the action of quick-lime than of the carbonate, owing to its having engaged more attention from the chemist; but it is reasonable to suppose that the action is similar in both cases, only much more rapid and effective in the former, and therefore its application is to be preferred. As much less is required, the expense of burning is compensated by the saving in labor.

Much difference of opinion still exists as to the action of lime; some chemists would limit its effects to vegetable matter only, others confine its action to the decomposition of mineral matters, while a third class look upon it principally as a manuring substance. We believe its value is due to all three causes. That lime has a most beneficial effect on inert vegetable matter is clear, from the advantages which follow its application to peaty soils; that inert vegetable matter exists in soils that have been long in cultivation and frequently manured is most certain; and that lime would in such cases prove as fertilizing as a dressing of manure seems reasonable to conclude; but of course as its effect is destructive, and in this case dependent upon the presence of vegetable matter, it can never be substituted for manure.

Its action consists in reducing to an available form those substances which have not been already absorbed by plants on account of their insoluble condition. This, it is now generally believed, is effected by the gradual reduction of the humus into its ultimate products, carbonic acid and water, and possible ammonia or nitric acid; the nitrogen of the atmosphere uniting with the hydrogen set free in its nascent state. During this process it is probable that various organic acids are formed, passing rapidly one into another without entering into plants as such.

Lime removes the acidity often found in vegetable soils, either by destroying the acid or combining with it to form an organic salt. Were the action of lime restricted to vegetable matter only, it could not fail to prove a most valuable application, but its relation to mineral matters in the soil is perhaps more important still. In most stiff soils the alkalies are found united with silica and alumina in certain proportions, mostly insoluble, and therefore, useless. Rain-water containing acid might gradually dissolve out portions sufficient for a natural condition, but inadequate to the artificial requirements of cultivation. Lime appears to possess the power of setting free the alkalies and magnesia from their insoluble condition, probably replacing them, and what seems rather extraordinary is that when these substances are added to the soil and would pass away too rapidly and be lost, by some means not yet clearly understood, some possess the property of fixing them as insoluble compounds, causing their union with those very substances from which it had previously displaced them. Any attempts at explanation of these remarkable changes would be out of place here; but should the present discoveries be confirmed by further investigation, a most important fact must follow, viz., the advantage of repeated applications of small quantities of lime, and the wastefulness of the old system of heavy dressings. Lime enters into the composition of most crops, and the quantity for this purpose is but small, and the natural supply in most soils so abundant, that we can hardly attribute the effects of its application to this cause.

From all these facts we should expect to find limestone soils a very fertile class, and when the other essential elements of fertility are present, such is the case. We are not certain that lime as carbonate acts in the same manner as in the caustic state; that its

application to soils, light and heavy, mineral and peaty, has been found beneficial is undoubted. Its influence may partly be ascribed to physical causes, making stiff clays more workable, sands more absorbent, and giving firmness to peaty soils.—*Michigan Farmer*.

OUR OLD PASTURES.

Few particular subjects are of more importance to the farmer than the renovating of old pastures. And although in some sections of the country considerable attention is being given to the subject; in others the farmers are not yet sufficiently awake to its importance, nor have they yet made much effort for the direct improvement of their old and exhausted pasture lands. It is however a branch of farming that, like a good many others, has been neglected too long—and it is now high time that neglected pastures received some care.

One great mania of the early settlers of this country was to cut down trees. They interfered with cultivation, they obstructed the view, they kept out the sun. So that the sharp axe did its work, and we are to-day mourning that our rough hill sides, unfitted for anything but the growth of forests, which it will take generations to replace, were stripped of their original growth to form pastures where our early farmers might graze their cattle. These old pastures that have been grazed for fifty years, are in many cases very rocky, full of cradle knolls, covered with moss and growing up with bushes, brakes and useless weeds. What are such pastures good for but to be left to themselves and grow up again to trees, that they may furnish timber and fuel for succeeding owners? The sooner they are set apart for such service, the better it will be for our farming, and the greater will be the benefit that the present will confer upon coming generations.

Something has been done, and much it is true may be done in the renovation of pastures that have been long grazed, by cutting out the bushes, by sowing on plaster, by pasturing with sheep, and other like means. And if efforts of this kind are spent upon an old pasture so rough and rocky that it cannot be ploughed, they had better be put forth in other directions. Pastures that cannot be ploughed and reseeded must certainly be left to other uses than grazing—unless it be the grazing of sheep.

For many years the opinion was most vigorously maintained that pastures should never be ploughed, for if the sward was once broken it would never again become so compact as to form a good grazing turf. But this opinion has been found incorrect. Pastures may be broken, planted to potatoes, the fall the potatoes are harvested ploughed lightly, and the next spring sown to barley and seeded down to grazing—and a good sward at once obtained and maintained for many years. The grass in our old pastures are chiefly wild grasses, and have found their way in by accident rather than design. In re-seeding a pasture it is very important to have a large quantity of seed of those varieties of grasses that flower successively at different periods, and that are well adapted to grazing. The following mixture has been recommended:—Meadow foxtail, 2 lbs.; orchard grass, 6 lbs.; sweet-scented vernal grass, 1 lb.; meadow fescue, 2 lbs.; red-top, 2 lbs.; Kentucky blue grass, 4 lbs.; Italian rye grass, 4 lbs.; perennial grass, 6 lbs. timothy, 3 lbs.; rough stalked meadow grass, 2 lbs.; perennial clover, 3 lbs.; white clover, 5 lbs.;—or a total of 40 pounds of seed per acre, which would give the enormous number of 54,000,000 seeds, or eight seeds to every square inch of ground. Who doubts that this would, in a favourable season, produce a good, thick, permanent sward—and that cattle would graze from it in preference to the bound out turf of the old pasture?

With the extension of dairy husbandry, there is imperative need of better pastures and of more attention to the improvement, ploughing and re-stalking of our grazing lands. Cold, coarse grasses will keep animals alive, and may possibly make beef—but sweet, nutritious grasses are needed for the production of milk. And from the fact that cows yield milk, pastures fed wholly or chiefly by milch cows are sooner exhausted than those fed by other animals. It is necessary therefore that our farmers give more attention to this subject, and that their clubs and assemblies discuss the best methods of improving, renovating or re-seeding their pasture lands; and be ready the coming season to put the same into practical execution.—*Main Farmer*.