EDITORIAL.

Manure.

Many people consider the subject of manure making and its application to the soil as being something below their dignity, and that it should be left for the ignorant and uneducated. This is a great mistake, for if we view it in the light which the science of chemistry has thrown around it, we will find that it is a most profound study, and one well worthy the attention which the most learned men which the world has produced have given to it both in their teachings and writings. They realized that the success and prosperity of the country depended upon the production of a bountiful supply of food from the plant, and that this supply cannot be maintained if the fertility of the soil is allowed to become exhausted.

Any intelligent person will admit that no country can stand the constant drain of plant food that the export of grain and stock to the older countries has caused without becoming impoverished in time. Indeed, we already hear the cry that the crops are becoming poorer every year, that the land will no longer pay for the labor of cultivation, and that the people are forsaking farms because they will no longer yield sufficient returns to provide food and clothing for the farmer and his family. Is it not, then, time that we should call a halt and ask ourselves the question: Is there no remedy for this state of affairs, or is this country too rich in natural resources to sink into a state of barrenness and sterility? That such a disastrous result can be prevented, if we bestir ourselves before it is too late and use the materials which nature has placed at our hands, is shown by the condition of the farmers of England, whose land has been cropped from time immemorial and is to-day yielding larger crops than ever. In this country we also have a few examples of men whose land is to-day yielding more bushels to the acre than it did when the soil was turned for the first time; therefore, our constant study should be to restore the loss of the past and to prevent, for the future, the exhaustion of our soils.

When our forefathers began the cultivation of the virgin soil they were astonished at the apparently inexhaustible store of plant food which it contained, consequently they cropped it without mercy. They apparently did not realize that the most fertile soil, if continually cropped without some form of plant food being added, must eventually become unproductive. It will be of no use for us to blame our fathers for impoverishing the soil by selling everything and returning nothing, for doubtless they did the best they could under the circumstances; they had many hardships to contend with in building a home for themselves in a new land. If, instead of blaming others, we look around for a solution of the question, we shall find that, with all the stored-up science and knowledge of years at our command, and with our fathers' example to warn us, we are doing but little better—that, in reality, we are but following in our fathers' footsteps, and still further completing the ruin which they began. We complain about hard times and high taxes, but if we were to examine closely, we would find that Canadian farmers are wasting more from neglect of the manure piles than would pay the entire tax of the Dominion of Canada. The first thing for us to do is to say with Cassius:—

"The fault, dear Brutus, is not in our stars,
But in ourselves that we are underlings."

For as long as we feel that others are accountable for results we will do but little towards remedying existing evils.

Before taking up the subject in all its details, it will be instructive, as well as interesting, to know something of the history of agriculture and of the introduction of the science of manuring, If we go back to the dim ages of the past, we will find that the cultivation of the soil for the production of food was one of the first occupations of man. The ancients were also very highly skilled in all matters pertaining to agriculture, for, according to Bretschneider and other writers, China cultivated rice, wheat, millet and sweet potatoes as far back as 3,000 years before the Christian era.

The ancient Egyptians and the Phœnicians cultivated many crops, such as wheat, rice and legumes, on the eastern shores of the Mediterranean Sea; these crops were afterwards introduced into Europe, and were highly cultivated in the palmy days of the Greeks and Romans. Thus it will be seen that, like the science of chemistry, medicine, and learning generally, the cultivation of the soil had its origin in eastern climes.

The early Romans were well advanced in agricultural science, and especially in the art of manuring, which they regarded as being under the special patronage of the god, Stercutius. They were well acquainted with the difference of soils and their adaption to particular crops. Manures were saved with care. The excrements were especially valued and judiciously applied; composts were made in suitable places, hollows being scraped out in the form of a bowl to receive the material. They knew the value of clover and other legumes; we read they were also sown for the purpose of being ploughed under, but it is not likely that they understood their action as nitrogen accumulators, which has only been discovered of late years, and is still but imperfectly understood, but we will speak of this later on.

In our present system of aiding agriculture by the issuing of bulletins and other literature, we have merely copied the Roman custom, for we read that the Roman Senate ordered that the twenty-eight books of Mago, the most voluminous writer of Carthage, be translated into Latin for the use of the people. The result of this fostering care was that Rome had in later times, including a century previous to the Christian era, an agricultural literature unsurpassed by that of any other country, ancient or modern, with the exception of England, France and Germany of the present day.

The folly of having more land than could be handled with profit was well understood, for in writings of Cato we find this terse advice, as applicable to the present day as to his own times: "Our ancestors regarded it as a ground point of husbandry not to have too much land in one farm, for they considered that more profit came by holding little and tilling it well;" and Virgil says: "The farmer may praise large estates, but let him cultivate a small one." One of the most prolific writers on ancient agriculture was Columella, who lived about the time of Christ. In speaking of his own times he deplores the backward state of agriculture, and speaks of soils becoming barren through neglect and an imperfect knowledge of the requirements of the crops cultivated in those days.

When the vast tide of conquest from the north came pouring over Italy, France and Spain, a race of barbarians, the cultivator of the soil was reduced to the position of a serf, whose condition was a most hopeless one, while the higher classes took no interest in agriculture. From this time the state of agriculture was in a very depressed condition all over Europe. In England the tenant peasantry had no security for their property until after the fifteenth century. If the estate was sold by the landlord they were obliged to quit all, giving up even their standing crops without compensation. They were also liable for the debts of their landlord to the full amount of their property. This picture of the misery and suffering which prevailed in Britain will give a fair idea of the state of agriculture in Europe generally at the same time. Under this state of affairs land gradually became impoverished, for we read in the American Encyclopedia that the average yield of wheat in the eleventh century was estimated by the highest authority of that day, the author of Fleta, at only six bushels to the acre, and three hundred years later, in the year 1390, that fifty-seven acres on a farm at Halstead yielded only three hundred and sixty-six bushels. The use of manure had apparently been forgotten, for Jethro Tull, one of the foremost writers of the time, had little faith in manures, and that chiefly as dividers of the soil and as a means of improving its physical texture, and not because he supposed them to furnish any nourishment to the plants themselves.

About the middle of the sixteenth century Martin Tusser published his famous "Five Points of Husbandrie," in which he strongly recommends the rotation of crops. He has the following, which might be applied to many farms of the present day:

"Otes, rie, or else barlie, and wheat that is gray,
Brings land out of comfort and soone to decay;
One crop after another, no comfort betweene,
Is crop upon crop, as will quickly be seene,
Still crop upon crop many farmers do take,
And reepe little purpose for greedinesse sake."

There was no real progress made in the cultivation of the soil until the commencement of the present century, and this was principally due to the teachings and writings of the great Liebig, who enumerated the following important laws of husbandry, which are, in fact, the basis of all modern scientific agriculture:

1. A soil can be termed fertile only when it contains all the materials requisite for the nutrition of plants in the required quantity, and in the proper form.

2. With every crop a portion of the ingredients is removed. A part of this portion is again added from the inexhaustible store of the atmosphere; another part, however, is lost forever if not replaced by man.

3. The fertility of the soil remains unchanged if all the ingredients of a crop are given back to the land. Such a restitution is effected by manure.

4. The manure produced in the course of husbandry is not sufficient to permanently maintain the fertility of a farm; it lacks the constituents which are annually exported in the shape of grain, hay, live stock, etc.

Application of Manure.

The following, taken from the report of Prof. Shutt, Ottawa Experimental Farm, before the select committee of the House of Commons, upon the application of manures, will be of interest to many. In answer to an enquiry as to the best mode of applying manure, whether top-dressing or ploughing under lightly, he gives the following answer:—

That is a difficult question to answer in a word or two. The right application of manure depends largely on the character of the soil and the class of crop which you intend to grow. Most certainly it is no use burying manure so deeply that the roots of the growing crop do not reach it. Shallow feeding crops respond best to a top dressing of a well-rotted or soluble manure. For the majority of crops, however, it is perhaps best to plough the manure in—though not at too great a depth. The physical condition of the soil or tilth is usually very much improved by the presence of the ploughed-in manure.

In answer to the question, Do you recommend drawing the manure directly from the stables and spreading it out upon the land, or piling it, as most of us do, in small heaps? Would you recommend that it should be drawn out during the winter and then ploughed in in the spring? A.—This question of the economic fermentation of the manure and the application of it is an exceedingly difficult and lengthy one to answer. Manure should be managed according to circumstances. We must understand this, that the plant food in manure goes through certain stages of fermentation before its constituents are available for plant food, therefore we wish to induce fermentation either before the manure enters the soil, or after it has been mixed with the soil. With some soils and crops this fermentation should take place partially, at least, before the manure is applied; with other crops and soils, the manure is best ploughed in while fresh.

Q.—Is it not better after being mixed with the soil; is the soil not benefited by it? A.—Yes, with certain soils, *such as heavy clay soils.* I think that not only on account of the mechanical effect, due to the presence of unrotted manure, but also to the fact that the soil itself is of a retentive character, it is often a wise plan to *apply the manure quite fresh and allow it to ferment in such soils.* But in dealing with light soils which easily leach, and with crops which have a short season of growth, and consequently must have food supplied to them in a readily soluble form, I think it would be better economy to apply the manure in at least a semi-rotted condition. Then, again, with very light soils, I would aim rather to manure for the coming crop than to permanently improve the soil. With regard to the application of manure to the field, we may say that it is well, in the majority of cases, that the manure should be partially rotted before it is applied, and to that end it is often most economical of labor to pile it up in the fields in tolerably large piles previous to ploughing. If placed in small heaps during the winter, and the field is subject to floods in the spring, by which large quantities of water are carried off from the surface of the field, undoubtedly there is a great loss of fertilizing material due to the washing out action of the melted snow and the spring rains. Much plant food is thus carried off the surface of the soil before the frost has left the ground. If, in such a case, the manure has been kept in the pile till just before ploughing, the fertilizing material would have been retained.

Q.—This is a vexed question, and if we could give instructions to our farmers in regard to the best use of manures, it will be of great benefit to them? A.—I do not think it will be possible to advocate any one system which is going to be of equal value to all our people. We shall have to educate them in the principles that underlie the care, manufacture and application of manure. When these principles are understood, they will then be able to apply the manure with the greatest advantage to themselves according to the character of the soil and the crops to be raised.