struggle goes on, each drawing his own inferences and controverting them alternately. That a complete knowledge of plaster and its effects has not yet been mastered few scientific men will deny. Notwithstanding the attention heaped upon it, perhaps more than on any other known fertilizer so called, its operations, if indeed they can be called such, are so very different on the same fields and crops under, apparently, similar circumstances, but at different times, that no one needs consider it disparaging to admit at once that he knows but little about it. A wholesome result of this controversy, however, is the series of facts that are gradually but surely coming to light. We are reaching the truth step by step and patient practice will in time enable us to master the whole. We know, for example, that the various effects formerly attributed to the action of plaster, arose not from that source at all, but from the condition of the soil at the time of application. We know that on soils containing an excess of sulphuret of iron its application is a mere waste of labor, for little or no action will follow. Common lime, however, applied to such soils would exert a beneficial effect by disengaging and combining with the sulphur of the sulphuret, forming sulphate of lime, in other words, plaster of Paris. We know that plaster has a powerful affinity for ammonia, and is therefore invaluable as a conservator of that gas in the manure heap and in the soil. We know that it is partial to clayey soils, and that a goodly supply of water or damp is indispensable to its beneficial action. It is an indisputed fact too that itself appears to attract and retain moisture to a considerable degree. The mode of its action, however, or the manner in which it is said to fertilize, is not at all so clear. This is one of the many problems that have yet to be solved. It seems a feasible thing that, as the mineral constituents have a tendency to become fixed in long cultivated soils, the elements of the plaster, becoming separated by the influence of water and solar heat, seize upon these minerals previously inert, and act as a stimulus to chemical action throughout the entire surface of the land. The fact too, so obvious to all experimenters, that the first application of plaster is usually attended with more visible results than any that follow would seem to favor this idea; for the surface soil having become to a large extent satisfied to the depth of cultivation, no further effects will be so very marked in their character until such time as the subsoil takes its place.

Ideas for Hop Growers.

Hop-growers will be interested in the following extract from a communication to the London *Agricultural Gazette*, in which will be found some valuable new ideas:

"Hop-growers are having the old bines that are left in the hills cut off in the late autumn and carried away at once. They pay one penny per 100 hills for cutting these, and give the bines into the bargain, which serve for heating ovens and coppers. The reason for this is, that the flea *(Haltica concinna)*, so very troublesome in the spring to the young shoots, is supposed to conceal itself in the hollows of the bine during the winter. Mr. Kibble, of Tunbridge, published a little pamphlet a year or two ago to demonstrate this, and since then care has been taken to get rid of these bines before the insects emerge in the first mild spring days. There are still the cracks of the hop-poles where they may be harbored; these also serve as comfortable winter quarters for the red spiders, *(Acarus telarius,)* which are so minute that they can hardly be detected without a microscope, but do infinite mischief in hot, dry summers. It would be difficult to evict the flea and the red spider from the poles, though some had suggested that these should be washed over with some composition that would make the quarters not very pleasant retreats.

"A discussion has been going on in Kent as to the somewhat recently adopted custom of grubbing all the male plants in the hop-grounds. Not very long ago it was usual to have so many male plants to an acre, and to treat them just like the female plants, as it was thought that the latter would not be fertilized unless a male plant was within a certain distance. Male plants are banished. Hop-grounds are literal gynæcea in these days. No male plant dare show his graceful flower clusters within the charmed precincts of the "garden of girls." Yet, curiously enough, the female plants are as productive, and the hops are as good and as plentiful as in the time when there was at least one male to 200 or 300 female plants. Although it has been strenuously denied that the hops now are of the same rich, full-conditioned quality, and that they are as plentiful, practical growers, factors, merchants, brewers say that there is no perceptible difference in this respect. Fertilization must be brought about by the agency of the breezes. Pollen is conveyed long distances on the wings of the wind; its granules are minute, light, and would be easily wafted and disseminated throughout many plantations. A single male plant produces an immense quantity of pollen, and the pollen of wild plants is as efficacious as that of the cultivated plants; so that the wild plants seen growing in every hedge in the hop districts are probably the fertilizing agents in those grounds where cultivated male plants are tabooed. Of course, if it were desirable to obtain plants from seed to propagate hops by seedlings, instead of by cuttings, the usual practice, great care must be taken to obtain pollen from true, pure sources. There is not the least necessity for this, and probably growers are wise in the absence of anything like definite scientific information, to leave the process of fertilization to nature. It is manifestly impossible that this can be brought about by the agency of insects. The only safe theory is that the 'wind in its courses' is the real agent."

Plant Growth.

At the Central New York Farmers Club meeting recently, Mr J. V. H Scovill treated the subject of plant growth from a somewhat unusual, though by no means new, standpoint. Taking the figures of recent experiments by Professor Johnson, which showed a cubic foot of ordinarily good wheat soil to weigh, when dry, 86½ pounds, common arable land 80 to 90 pounds, and rich, mellow soils from 60 to 80 pounds, he proceeded to deduce as follows, regarding the necessity of thorough and timely cultivation. Taking these facts into careful consideration we are able to comprehend how large an amount of available plant food nature generously provides upon an acre of land, and this is seldom used in American culture, for there are few farmers who stir the soil to the depth of 12 inches. There are some few favored spots where nature seems to restore itself and supplies with a generous hand the plant food abstracted from the soil by the growing plants. This is especially noticeable in some locations where annual overflows leave a rich deposit; and it is remarked that the rich valleys of the Scioto river in Ohio, though bearing wheat and corn for sixty years, show no perceptible exhaustion. The great proportion of our soil being upland, the ingredients composing it are coarser and to the cubic foot it is heavier, and as a consequence there is less available plant food. The sources of supply are the application of manures, phosphates, nitrates, &c. The more thorough is the tillage of the soil, the finer its pulverization; the more frequently it is stirred the more vigorous and healthy are the growing plants. This frequent stirring of the soil facilitates the absorbtion of ammonia and nitric acid for the uses of the plant. Rain-water has been frequently analyzed for ammonia, which was found in minute quantities, and this property may also be absorbed from the atmosphere by the leaves.

I have observed these influences more perceptibly in the cultivation of the hop than of any other plant. At that peculiar season of the growth when it is just in the burr, I have noticed that with many hills the growth was apparently stationery, but when I used the plough and the cultivator freely and threw fresh dirt about the hills, new vigor seemed imparted; often a change was perceptible in a few hours. Bassingault experimented with this very fertile soil of his garden, which was especially rich in nitrogen, which, were it in the form of ammonia, would be equivalent to more than seven tons per acre taken to the depth of 13 inches, or if existing as nitric acid, would correspond to more than 43 tons of saltpeter at the same depth. The same authority made some beautiful experiments with the sun flower. In a soil destitute of nitrogen was obtained a crop weighing (dry) 4.6 times as much as the seed. In a second pot, with the same weight of seeds, in which the nitrogen was doubled by adding .0033 of a gramme in form of nitrate of soda, the weight of the crop was nearly doubled—was 7.6 times that of the seeds. In a third pot, where the nitrogen was trebled by adding .0066 gramme in form of nitrate, and the crop was nearly trebled also—was 11.3 times the weight of the seeds. The experiments were also continued by using garden soil which already contained a certain proportion of nitrogen, and beyond a certain proportion there was no perceptible increase in the weight of the crop.

A Barn Cistern.

A very small outlay—fifty to one hundred dollars—will sometimes obviate a vast expenditure of time and trouble. Where barns and outbuildings are already closely adjacent to running streams or good ponds, the utility of a barn cistern will not be apparent. But when the nearest water supply is from a quarter to half a mile distant, what is the result? Irregular and inadequate watering to begin with, and, in stormy weather endless inconvenience to the owner and his stock. A serviceable barn yard cistern could be made at a very trifling actual outlay. The digging could be done by the farmer himself at odd hours, and all other expenses connected with it, waterlime, plastering, boarding, &c., would cost but a mere trifle compared with the great subsequent advantages conferred. A writer to the Maine *Farmer* gives his views and experience on this matter thus:—

This cistern has been built and in constant use for twenty years. It is cemented on the gravel, without bricking or stoning, except on one side next to the cellar wall; here it is strengthened by a thin wall of stones laid in cement. From near the bottom a pipe is run through the cellar wall and carried under ground to a warm and convenient corner of the cellar, where it empties into a tub for supplying water to the stock without requiring the labor of drawing or pumping. The cistern is shaped like a common set kettle or farmer's boiler, being about ten feet deep and eleven feet across at the top, and holds one hundred hogsheads. It was covered at first with two-inch chestnut plank laid on chestnut sleepers, but the planks rotted, and have been replaced by green chestnut timber, hewed on two sides and laid close together, filling the crevices with cement. These are still sound, and bid fair to last many years.

Over the timber there is about eighten inches of loam, which entirely excludes the frost from the water and sides of the cistern. Owing to an imperfect waste-way, the cistern has occasionally, in years past, overflowed and softened the bank behind the cement, allowing the pressure of water from within to crack the cement shell and cause a slight leak. The leaks were stopped by brushing the cracks over with a thin coat of cement. It has been tight now for several years.

The cost at the time it was built was only about fifty dollars, including the piping and eave troughs on the barn, and a pump for drawing water from the top. Six barrels of water lime were used, with about double the quantity of clean, sharp, coarse sand. The lime cost, at the time, only a little over two dollars per barrel. The pump cost about ten dollars, and the eave troughs a little more, leaving some fifteen dollars for the digging, covering and work of laying the cement. The digging was all done in March, when other work was not pressing.

If we were going to build again, we should, by all means, build larger. This has never been dry but once in twenty years, and the number of animals kept has never been less than ten, and often nearly twice the number; besides, water is used for washing carriages, and in dry seasons it is drawn from for washing at the house, and to supply neighbors who are less fortunate in a water supply. Still, there has not been a full supply at all times, because the capacity of the cistern is insufficient for holding all the water that falls on the roof.

Improving Pastures.

I have had much experience in improving pasture land of almost every description, and used many kinds of fertilizers in their reclamation, and came to the conclusion many years ago that the plough was indispensable in their improvement. I am aware that much depends on the nature and condition of the soil. When cows were kept on my farm, their manure was not evenly distributed, and being taken out of the pasture nights, the grass failed. Two years since, some eighteen horses and colts were kept; they are very destructive, stamping out the grasses with their incessant running and frolicking, and their droppings (except the liquid) are of very little account, if left on the field and exposed.

As a last experiment I am trying sheep, and for two reasons, and the best one it must be admitted), is the profit of early lambs. My sheep have already had sixty-nine lambs, with the loss of only two, and some of them weigh over thirty pounds. The second reason is the "improvement of the pasture." In that I have not been disappointed. In the first place, my pasture will keep more than I expected, and although they fed in spots where the feed is sweetest, and, of course, leave their manure there, it was not the pasture that needed to be improved the most, except to be enriched. People have expressed their surprise at the results. In passing over the pasture where the sheep frequent most, you would say it was newly top-dressed, and that the grass had thickened wonderfully. On another portion good red top hay was mown, showing that my one hundred and thirty sheep and lambs were not an overstock. Sheep are great scavengers, and there is hardly anything that grows naturally on the lot but they will eat, except a coarse grass that always follows the cutting of wood. There were some seven or eight acres of this description, where wood was cut four years ago; the piece was ploughed imperfectly, harrowed, and grass seed sown, but being a dry year, the coarse grass got the advantage. Horses eat it, but sheep will not; horses would not eat an oak or birch sprout, brier or blueberry bush, but sheep eat everything of the kind. Every day you find them looking for variety, no matter how good the grass is. I cannot say yet as to the profit, but the pasture is improving, equivalent, almost, to the cost of keeping in summer.

H. S. Randall, the best authority, says: "that four hundred sheep will, if properly managed, manure and improve from year to year forty-five acres,"—a statement which, from my own experience, I fully believe in. I do not say the business will be continued on my farm for a great length of time, but some reports shall be made satisfactory in regard to them, if not prevented by dogs or disease.—*Cor. N. E. Farmer.*