

ADDRESS OF M. JUSTUS BARON VON LIEBIG TO THE ACADEMY OF SCIENCES AT MUNICH.

"During last year, experiments relative to the establishment of laws on the nutrition of plants have been pursued by the Institute of Physiology of Plants, under the direction of Professor Nägeli and Dr. Zöllner. There experiments were made upon the potato, as the plant most important for food after the cereals (corn). Three fields were prepared for experimenting on; the first—composed of mould (pulverised peat) from the turf beds of Kolb; the second, of the same soil, mixed with ammoniacal salts, as the principal agent in animal manure; and the third of the same mould, to which was added the fixed elements constituting the ashes of the potato. An equal number of tubers of the same kind were planted in each field.

"Without detailing the various stages of development, I will confine myself to calling attention to the differences between the crops. That from the land manured with the ammoniacal salts was 20 per cent. larger than that of the field No. 1, which had received no addition; but that of the third field (which had the manure of phosphate of lime and of potash) was nearly triple. The proportion of the three crops ran thus—100, 120 and 255. The quantity of potatoes gathered on field No. 3, to which had been furnished the elements composing the ashes of the plant, was 282 hundredweight to each workman,—nearly double the crop given by the best arable land.

"The results so very different of the three experiments can only be attributed to the different composition of the land of the three fields, all other conditions being identically alike. In the two first, a number of circumstances were to produce in the subterranean organs as many organic substances (or tubercules) as in the third; or rather, which is the same, to take from the air a sum equal to their constituent elements.

"These indications, although important enough in themselves, are nevertheless not the most remarkable results of these experiments; for here is the precious information they give us: All the potatoes gathered from the two fields which, by the composition of their soil, presented the elements necessary for the development of the plants only in insufficient quantity, or in false proportions, were the prey of disease. From the shaws, which became black, decomposition spread, and at the end of a few weeks had thoroughly gone through the interior. In opposition, the potatoes in the third field, manured with the fixed elements of the plant, are now (Dec. 1) perfectly sound, in not one is seen traces of the ravages commonly attributed to the *oidium*. Hence, from these observations we see that undoubtedly the conditions favourable to the normal development of plants are also those which prevent disease, and that in consequence the first cause of the disastrous epidemic should be sought in the land. If the land present in sufficient quantity the elements indispensable to organic life, or the growth of the plant, the latter receives the power of opposing resistance great enough to paralyse completely all hurtful influences which can affect it from outside.

"These facts throw the greatest light on the diseases of vegetables in general, and on that of the vine in particular. Oh, that man would remember that the land which has furnished him with the most important elements of his body expects to be cared for by him with discernment and solicitude! Only on this condition can the future and existence of his descendants be assured. The consequence of the infraction of this great law will fall in divers ways on their children and their descendants to the thousandth generation."

Irrigation of Pasture Land.

For several years, Mr. Isaac Brown, 50 Dick Place, G.ange, Edinburgh, has been endeavouring to convince farmers of the good results upon grass crops of irrigation by pure water. On Thursday afternoon he exhibited his system of distributing water over the land in a small field adjoining his house. Among the agriculturists present were Mr. Robert Binnie, Seton Mains, East Lothian; Mr. Milne, Niddry Mains; Mr. Curror, Myreside; Mr. Hutchison, Kirkoaldy; Mr. Suttie, C. E. to the Lands' Improvement Company, &c. The general opinion appeared to be that Brown's plan was superior to that of any other previously introduced. It consists of a series of leaden pipes, placed 14 yards apart, from which the water escapes in small jets at various angles, and falls on the ground in the form of a gentle shower. The distance between the pipes requires, of course, to be regulated by the amount of water pressure. As showing the advantage of Mr. Brown's method, it may be mentioned that in 1860, on permanent grass land, with water from the river Eden, in Cumberland,

seven crops were out from the first of May to the first week in October—each crop averaging 1,000 stones per acre, or equivalent to about eleven tons of dry hay for the seven cuttings. Next year, from the last week in April to the second week in September, six cuttings were taken, averaging 1,000 stones each per acre, or equivalent to more than nine tons of dry hay for the six cuttings. A light dressing of a mixture of super-phosphate of lime, nitrate of soda, and sulphate of ammonia, was given to every second crop, and had the effect, with such a supply of moisture, of maintaining the growth from the beginning to the end of the season, although the heat in both years was much below an average. In these cases the pipes were laid at a distance of 15 yards apart, and having a pressure of 70 feet of water, throw a regular shower over the whole ground. At Battersea, in 1862, with a pressure of from 150 to 250 feet of water, obtained from the water-works, the pipes were laid 20 yards apart, and the ground was most effectually moistened. The present crop at Grange is the third which has been grown upon the ground this season. The land was sown with Italian ryegrass on the 15th May, and a crop, 2 feet in height, was cut on the 23rd of June. In 21 days afterwards a crop of the same height was cut, each crop giving five tons of Italian ryegrass per acre, which was sold at 20s. a ton. The third crop of grass will be ready for cutting on Saturday first. Future crops, it is supposed, will be better than those previously cut; as, the seed having been only sown in May, the plant is not yet developed for full bearing, and it is estimated that as yet only two-thirds of the ground is properly covered with plants. Cutting every three weeks from the first of April to the middle of October will give eight crops. Thus 40 tons of Italian ryegrass may be safely calculated on, and with artificial manure given to every alternate crop, the expense would not be over £5 per acre in the year. To cow-feeders and others, ryegrass is worth more than £1 per ton, and Mr. B. own estimates that by his system the price of cultivation would not be above 4s. 6d. to 5s. a ton after the pipes are laid down—the entire cost of laying, with interest on plant, fuel, &c., being under £20 an acre. Granting money on the land drainage system, interest at 6½ per cent., it is calculated that the profit on the growth of Italian ryegrass for the production of milk in the vicinity of large towns would be from £20 to £30 an acre. The first cost of pipes will amount to from £12 to £15 per acre, which no doubt seems a large sum, but as the difference between the new and the old material is comparatively trifling, irrigators on Mr. Brown's method can, if the worst should come to the worst, which is not at all likely, at any time sell the old pipes for within £3 or £4 of their original cost. —*Scottish Farmer.*

Henry Ward Beecher's Farm.

This farm is at Peekskill, Westchester County, New York, about two miles from the railroad station. It contains forty acres of excellent land, and is pleasantly situated with a southern aspect, commanding an extensive and most charming panoramic view of the Hudson river, the high and surrounding mountains, such as no one knows better how to appreciate and enjoy than the rural loving owner himself.

When Mr. Beecher purchased the place, a few years ago, there was scarcely a fruit tree of any value upon it. Now there are twenty-five hundred choice fruit trees, most of them already beginning to bear. He has erected a large model barn, but as yet occupies the humble cottage he found upon the place, though he has made important additions and improvements.

Mr. Beecher is converting the place, to a great extent, excepting a extensive lawn in front of the house, into a fruit and vegetable farm. He has nearly an acre filled with Delaware and Iona grape vines. And as the trees are yet small, he has raised among them this year between seven and eight hundred barrels of onions.

Around his little cottage Flora reigns in all her glory. There is the greatest profusion of all the choicest flowers, and the whole air is redolent with their sweet and mingled perfumes.

The barn and out-buildings are well stocked with fine horses, oxen, choice breeding cows, swine, fowls, etc. This autumn, Mr. Beecher has been making many improvements in the drainage of his lands and the avenue to his house; all adding greatly to the value and attractiveness of the place.

The influence of a farm conducted like this, though all farmers may not be able to adopt all the improvements that have been there made, must be of the greatest benefit to the agricultural interests of any community. And Mr. Beecher is really a benefactor to all the farming as well as religious interests of the country.—*Correspondence of the Boston Traveller.*

Exterminating Charlock, or Field Mustard. (*Simaps arvensis.*)

We know of no weed in the grain-growing districts of New York, that is so difficult to exterminate as this. Canada thistles, daisies and dock, can be eradicated with facility, compared with this. Field mustard is an annual plant, having leaves like the turnip, and bright yellow flowers. It starts from the seed at any time between early spring and late autumn. The plants grow rapidly, and produce a large number of seeds in a short time. In ordinary seasons, two crops will mature on the same field, but winter kills every plant. The seeds will remain in the ground a life time, without losing their vitality. We have cultivated a field of sixteen successive seasons, allowing no mustard to go to seed; but deep ploughing brought seed to the surface the seventeenth year, so that the ground was nearly covered with the young plants.

When wheat, rye, barley, oats, flax, and such crops are raised, if there is mustard seed in the soil, it will appear, and will ripen its seed before the crops. Much of the seed will shell out while the grain is being harvested. If it should not be covered with earth sufficiently deep to promote vegetation, it will remain until the next season, or until the moisture and heat happen to be just right to cause germination.

There are two things indispensably necessary to exterminate mustard. One is to allow no seed to mature; and the other is to cultivate such crops as will induce all the seed to vegetate, that the plants may be destroyed before they go to seed. Grain having mustard seed among it, should never be fed to stock until after it is ground into meal.

When mustard comes up very thick, harrow the ground thoroughly, as soon as the crop of grain has been removed. After a few weeks have elapsed, harrow it again. This will destroy most of the young plants in the seed bed. After this, use a cultivator instead of a harrow. These repeated scarifications will cover the seed and bring others near the surface so that a large proportion will vegetate and die before winter. The next season harrow the ground early in the spring so as to start a new crop of the seed. Plough it soon after the time for planting Indian corn. Harrow again in about two weeks. After another fortnight, plough and sow buckwheat. As soon as the buckwheat is harvested, harrow the ground again. The next season manure well, and raise a hoed crop; and allow no mustard to go seed. Next sow a crop of winter grain. The mustard may now appear quite thick. But none of it will have time to ripen before winter, when every plant will die. A limited number of plants will appear the next season among the standing grain. When they are in full blossom, let every one be pulled. A careful, faithful man will be able to pull all the mustard in a day that will appear on several acres, after the soil has been treated in the manner recommended. After this any kind of grain may be raised. But for more than twenty years, mustard will come up every season, and must be pulled up before it ripens. This is the only way that our cultivable fields can be rid of this pestiferous plant. Incessant vigilance from year to year will exterminate it effectually.—*American Agriculturist.*

Odds and Ends of Farming Facts.

FROM THE MARK LANE EXPRESS.

The fact seems frequently to be overlooked that weeds do more than merely occupy the space of land which might otherwise be profitably cultivated: they exhaust the soil almost as much as the valuable crops. We say "almost;" for, in the absence of direct experiments upon the point, we only conjecture it; but we may say that the conjecture is well founded. So far as analyses have been carried out, Professor Buckman shows that field-weeds carry off from the soil an abundant supply of alkalies and phosphates.

The extirpation of weeds in pasture-land is best brought about by continual mowing down of their leaves. Let the "fact" be always borne in mind, as the great authority on weeds says, "As the leaves are the lungs of the plant, never in such cases allow the lungs to develop themselves."

A steep for seed-wheat is thus given in a contemporary journal: "Mix one pound of chloride of lime with one gallon of water; after which, let it stand to settle for a short time, and draw off the clear solution. In this, steep the seed-wheat for two hours; then drain, and dry with a sufficient quantity of sand and ashes."

The proportion of husk of the bean in pod to the seed is 14 to 86. The average weight of a bean may be taken at 12 grains, and 680.30 to the pound.