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NEWCASTLE  FARMER.

VOL. I.—NO. III. COBOURG, OCT. 1, 1846. TERMS.—2s. 6d. PER YEAR.

PROFESSOR JOHNSON ON MANURES.

At the meeting of the Royal Agricultural Society of England at Newcastle-upon-Tyne,

Professor Johnson said, that the relation of British agriculture to the present condition of the country involved two points—the one was, how they might produce a larger amount of corn; and the second was how that corn could be produced at a cheaper rate. The first of these ends might be attained either by bringing in a greater quantity of arable land, which the meeting was aware was now exceedingly difficult, or by causing the land now under cultivation to produce a larger amount of corn. The second end, of growing corn cheaper, might also be produced in two ways; either by lowering of rent, wages of laborers, or by obtaining an increased production without an equal increase of toil. Now, if he were asked how much of the soil of this island was capable of increased production without an equal increase of toil, he should say that he believed nine-tenths of the whole land in the country, could grow more corn than it did now and at a cheaper rate. To another question which might be put—how much more could be grown?—it was difficult to give a positive answer, but there were certain facts already known which threw some light upon it. For instance, he might take two parts of the island, resting upon the same geological formation, and of course having nearly the same soil—if one of these districts grew 30 or 40 bushels per acre, then he was entitled to say that, whatever the one district did the other might do. He had lately had occasion to visit the estate of a friend of his, now dead, the late Mr. Aitchison, of Dromore, near Edinburgh, who showed him his farm books, in which the produce of his several fields had been kept with great accuracy from the beginning of the present century, and he found that in 1820 150 Scotch acres produced 54 bushels of oats per acre. And in 1832 (twelve years afterwards) 120 Scotch acres produced 40 bushels of wheat per acre, while 120 more produced 85¼ bushels of oats per acre. He examined the soil, &c. of the farm, and he found nothing in it that would cause any one to expect these extraordinary crops; the land was too dry, to be sure, but it rested upon the coal measures, with an exposure to the easterly winds from the Frith of Forth. Take another case. He had no doubt many present were familiar with great crops of turnips and oats raised in Eastern Ross, and the eastern coast of Sutherland.—Now, the land in South Wales, which the farmers there described as eating up all the dung, and drinking all the water, was precisely of the same character, and it had the advantage of climate into the bargain; why should it not be equally fertile? Then let him compare fertile soils with infertile, and he would say the great question was to bring about such a state of things as would cause the infertile soils to produce as much as the fertile soils now did. He said there was no limit which they could safely assign to the progress of agricultural skill in improving their poor lands. (Hear, hear.) Then the next question that came was, how could this increased production be brought about economically? for, let him here say once for all, that improvements were nothing to him if they did not much more than repay the farmer his outlay upon them. One way of doing this was by mechanical means, such as draining. Another way was by chemical means, involving the application of manures.—He had already alluded to Mr. Aitchison's farm; and he might add that when he asked that gentleman how he produced such great results over such breadth of land, his answer was, that while he followed a good system of rotation, and in other respects adopted the best mode of farming, he believed the secret of his success was, that he manured his lands highly. Now, it might be asked, how did high manuring act? This was to be answered by inquiring first, what the plants required, and next, of what manure consisted? The learned professor then entered into a series of elementary experiments to show what earths, gases, &c., entered into the component parts of the plant, both organic and inorganic; and that the greater part of these were drawn by the roots of the plant from the soil. It was plain, therefore, that manure must contain those substances which the plant required, and which the land in its natural state did not possess. In other words manure was the food of the plant. He would now come to another question. How could a higher system of manuring be adopted and practised? They all knew that there was a great waste of manure, not only throughout the country, but even in a great many farm yards; and one way of securing a higher system of manuring would be to husband that which now ran to waste.—They ought also to endeavour to save the waste of large towns. There were many difficulties attending that subject; because even supposing it were saved, it would not be easy, in the present state of farming, to find a market for it. Then there were substances in all their manufactories which might be rendered very productive. The refuse of their gas works, of their alkali, soap, and glass works might all be turned to account; but because they could be got for very little, therefore farmers would not have them. Another was by an extended use of important manures. The use of bones and of guano had gone far to revolutionise agriculture; and the latter had now in some places superseded the former—so that in Berwick, where three years ago bones were sold to the value of £20,000 annually, this last year only £1000 worth had been sold. But, then instead of the £16,000 which formerly was spent in bones, this year there had been, in the same district, no less than £30,000 on guano, because the farmers had found out that they could apply guano where they could not apply bones, though he believed a process had been discovered which would again bring bones into importance, and enable the farmer to apply them where he could not apply guano. Another means of high manuring would be the use of manufactured manure. Suppose they had nothing but seasand to work upon; they would then require a perfect manure, that was a manure containing everything which the plant required for its sustenance; and he had drawn up tables (which were exhibited) showing the mean results of analyses, undertaken to see how much of each substance the plants really required. As it, however, rarely happened that farmers had nothing but sea-sand to work upon, their course must be to find out what their land really required, as of course they would not need to put in, in the shape of manure, that which the land already possessed. He did not know how the farmers of the south stood in this matter; but he had predicted that the farmers of Scotland would have attained such a thorough knowledge of their land, what it possessed, and what it wanted, that in the course of the next five years they would be able to make up recipes for themselves, send them to the drysalters, and say to them, make up that manure for me that I may grow my wheat. But to bring them to that point, knowledge must be diffused among the agricultural body. Certainly the next generation of farmers must be better educated than the present or the past, else they would vanish from the land, and strangers would take their places. It was important they should know that in all the large towns, manufacturers were now bringing up one of their sons as farmers, and giving him all the knowledge that he would require, in order to conquer the stubbornness of the soil. Hitherto the tide had come the other way—it was the farmers who made their sons manufacturers; now the manufacturers were making their sons farmers.

From the Scottish Farmer.

TURNIP CULTURE.

(Concluded.)

Farm-yard dung should be well decomposed for the turnip crop. It is the opinion of many intelligent Farmers that rank manure is favourable to, or harbours the fly; but be this as it may, it is necessary, in order to prevent or mitigate the ravages of that destructive pest, that the plants should be as quickly as possible beyond the stage of their growth in which they are most liable to be attacked and devoured: and this object can be accomplished only by minutely pulverising the soil, sowing abundance of seed, and having the manure properly fermented previous to its deposition in the drills. Another important advantage arising from having the dung well decomposed, is the facility with which it admits of being evenly distributed along the hollows of the drills.

Among the numerous extraneous manures which are now employed in raising turnips, bones and genuine guano are justly entitled to the pre-eminence. The efficacy of the former is universally known and acknowledged, while that of the latter has been attested by repeated trials in different parts of the kingdom. It is deemed unnecessary to offer any observations in this place on the properties of those valuable substances, as they are now perfectly familiar to all engaged in agricultural pursuits; and our remarks on their application shall be very brief.—It is also considered needless to advert to any other of the portable manures.

When bone-dust is used by itself, the quantity usually applied to the acre is from sixteen to twenty bushels; and it is a well known fact that a larger allowance produces little or no additional benefit—so far, at least, as the immediate crop is concerned. It is frequently, however, applied in conjunction with farm-yard dung, when the latter is not sufficiently fermented, or when the supply is inadequate. Even when a sufficiency of dung is available on the farm, bones may with great advantage be occasionally added on account of their phosphates and other valuable constituents. A mixture of bone-dust, sifted coal ashes, and rich vegetable mould, has frequently been applied to the turnip crop with beneficial effect. An important advantage which bones have over other substances, is that their adulteration, if at all attempted, is more easily detected than in the case of the other portable manures. Bones dissolved in sulphuric acid have been much used of late as a manure for the turnip crop, and in the majority of the recorded instances with the most satisfactory, if not astonishing results. By being thus prepared, they are brought into that minute state of division in which their most valuable constituents are directly available to the crop; but economy is the great recommendation of this manure,—six bushels of bones being amply sufficient for an imperial acre. The quantity of sulphuric acid used is commonly about one-third of the weight of bones. Water is added to the acid nearly in the proportion of three gallons of the former to one of the latter; and the bones saturated with the mixture are sufficiently dissolved in the course of three or four days. For several highly useful instances of the application of this manure to the turnip crop, the reader is referred to last year's volume of the 'Journal of the Royal Agricultural Society of England.'

Genuine guano is undoubtably an excellent manure for raising turnips; and when the quantity of dung available is inadequate to the extent of ground intended for green crop, it may confidently be resorted to as auxiliary. But great circumspection must be exercised in the purchase of the article, as it may be, and very often is, extensively adulterated.—Peruvian guano, though the dearest, is the most certain in its effects. For reasons already assigned, this substance, however genuine it may be purchased, should not be used by itself for the turnip crop—it being found to act more beneficially along with farm-yard dung, or in combination with gypsum, finely-sifted ashes, saw-dust, dry mould, or other matters of a similar kind. Whatever mode of application may be adopted, care must be taken to prevent the guano from coming into immediate contact with the seed, by interposing a small portion of the soil.

When the second or 'rough' leaves, as they are termed, have attained the height of about two inches, the hoeing and thinning processes are commenced. The first operation consists in passing a horse-hoe or drill grubber, of which there are various kinds, along each of the intervals—partly for the purpose of destroying any weeds that may have sprung up between the rows, but chiefly to pare away a portion of the earth from the sides of the drills, in order to facilitate the singling of the plant. It is obviously of great importance to have the young plants singled out as early as possible after their rough leaves have been developed—particularly when there is a thick braird. With regard to the distance at which the plants should be left standing in the rows, something will evidently depend on the variety of turnip and the quality of the soil. All kinds should be allowed ample space for the growth of the bulbs to the greatest size that is compatible with sufficient solidity of texture: but very considerable loss may be sustained by making the intervals unnecessarily wide. It is a valuable and peculiar property of the Swedish turnip that it increases in amount of nutritive matter, in proportion to the size of the bulb; whereas the softer kinds, such as the white globe and its allies, when allowed to attain a large size, become deficient in valuable juices. According to Sinclair, 1728 grains of large-sized Swedish turnips afforded 110 grains of nutritive matter; whereas, roots of a small size only produced 99 grains from the same bulk. On the other hand, a bulb of the white sort measuring seven inches in diameter, yielded only 72½ grains, while an equal quantity of roots, four inches in diameter, contained 80 grains of nutritive matter. Hence, as a general rule, Swedes should be allowed sufficient room in the drills to grow to the largest size attainable; and the distance between the plants of the common turnip should be such as to enable the bulbs to grow to a medium size—the yellow and hybrid kinds being farther apart than the white. On land in a high state of cultivation, Swedes may with great propriety be singled out to the distance of eleven or twelve inches in the longitudinal direction; nine inches may be allowed for the yellow sorts, and eight for the white.

In some parts of the country the thinning of turnips is performed by the hand, with the view of insuring regularity in the spaces between the plants; but this is a very operose and expensive method, and is justifiable only where servants cannot easily be initiated into the proper use of the hoe. This, however, is an operation that requires considerable attention and dexterity to execute it properly—though we frequently see it performed in a very careless and, consequently, imperfect manner. The drills should by no means be levelled down with the hoe, but be kept high at the centre, with a uniform curvature, in order to enable the water to escape quickly from the plants during heavy rains. In performing the second hand-hoeing, care must be taken to avoid cutting or wounding the young bulbs, as those that are thus injured most invariably decay early in winter. Moisture enters by the slightest incision in the rind, and, aided by the influence of the frost, infallibly occasions the putrefaction of the turnip. We find five expert hoers (grown up girls and boys) capable of thinning and first hand-hoeing a Scotch acre per day on an average, while two suffice for the second hoeing; but much will of course, depend on the nature of the soil and other obvious circumstances.

When the land has been thoroughly cleansed before sowing the crop, it is not a difficult matter to keep it free of weeds during the summer months; but whether the ground be clean or foul, there can be no doubt of the advantage of frequently stirring and pulverising the spaces between the rows during the early growth of the plants. It is in fact, a point of the first importance to maintain the soil always in a loose and friable state, for the twofold purpose of allowing the admission of the atmospheric air, which it is now well known exerts a most beneficial influence on the growth of plants, and of enabling the minute fibres of the turnip to extend themselves in every direction in quest of nourishment.

NOTES ON MANURES.

Why do our crops require manure? is a question which is frequently asked by those who direct their thoughts to agricultural subjects; the weed springs up on the way side, the flower blooms on the banks of the mountain stream, and innumerable plants, with rich foliage and delicious fruits, come to perfection "far away" in the lone desert, where the foot, even of the hunter, has seldom been, and where no man watches over them. I remember a writer, in an agricultural journal, at one time asserting, that a handful of seeds, scattered abroad over the fields, would all come to perfection; but though the wild plant springs up seemingly by chance, its growth is regulated by laws as fixed and unchangeable as those which produce the revolutions of the seasons, or the alternations of day and night. Every plant which the Almighty has spread upon the face of this beautiful earth, to delight us with its appearance, to afford us food or clothing, depends for its existence upon certain conditions. The saltworts flourish only on our sea coasts, because only there the matters essential to their growth abound; while the red broom-rape (*Orabranche rubra*) springs up in the soils formed by the *weathering* of the basaltic rocks of Antrim, rich in the substances required for its support. But it is too absurd to suppose, that seeds would arrive at their perfect development in any kind of soil; the experience of centuries teaches otherwise, and science explains the reason.

The seed which we place in the ground "is not quickened, except it die;" it must undergo decomposition to prepare it for the production of the new plant. In the tiny seed of the wheat, changes, so complicated as to fill the profoundest philosophers with astonishment, precede its bursting into leaf. For the continuance of its existence, the young plant must meet in the soil, within the reach of the delicate fibres sent out to collect its food, a store of earths, of alkalies, and metals, properly prepared for its nourishment; some of them required to give solidity to its stem, others to construct the delicate net-work of its leaves, and others, again, to develop its seed; and all these building materials—the wood, the stone, and the iron—must be there, and in proper quantity, or the edifice cannot be erected, the plant will be unable to form that stately stalk, and weighty head of grain, which gladdens the heart of the farmer, and repays his toil. In some situations *all* the materials for building up the wheat plant do not exist, and there, though it may grow for a time, it cannot come to perfection, in other localities, again, all the materials may be present, but, in limited amount, only capable of yielding a poor and starved looking crop, barely sufficient to cover the expenses of the tillage.

The plants which we have selected to supply us with food are not natives of this country; and, in their wild state, most of them are worthless weeds. When we compare them with plants of the same species, cultivated in our farms, we find that they contain a comparatively small amount of those peculiar forms of vegetable matter, which render our cultivated plants so valuable to us for food, for the production of blood. The quantity of mineral matters which plants in their wild state require from the soil, for the continuance of their existence, is exceedingly minute, and, besides, the wild plants are not carried away every harvest, like the crops raised in our fields, but die, and restore again to the soil the substances which they had taken from it, so that in the following season it is capable of again supplying their seeds with the alkalies, and other materials required for their growth; and thus, like what was imagined of the fabulous bird of the ancients, they spring up from their own ashes.—Transported, however, into the farms of the European husbandman, and placed in situations containing a larger supply of the matters which contribute to their development than was accessible to them in their natural state, they have attained a size and value entirely different from what they originally possessed. It is to maintain this abnormal development of all their parts, that the skill and labour of the farmer are unceasingly required; and when we know that, with every ten tons of potatoes that we carry to the market or consume for food, we are removing from our fields 113 lbs. of the alkaline matters, upon the presence of which in the soil the potato plant depends for its full development, and that every acre of turnips sold to the cattle feeder robs our farm of 154 lbs. of the same substances, we can easily conceive that even the richest soil in the kingdom must, in the course of a few years, be deprived of a large amount of its nutritious matters, and become incapable of supplying them in sufficient quantity for the production of crops valuable for food or commercial purposes. Were the farmer to leave his potatoes or turnips to Nature's care, they would return again to their natural state, and lose their value as articles of food. He must, therefore, supply his farm with the alkalies, the phosphates, and other matters carried away in his crops to market.—Observation has taught the farmer that by covering his fields with what is termed manures, he can increase the value of his crop manifold; experience has also taught him, that a field which has lost its fertility can again be rendered productive by covering it with the excrements of animals, and that the amount of crop produced will be in proportion to the supply of manures. For centuries he has applied these substances without the slightest knowledge of their operation; indeed, until within these few years, agricultural science was not sufficiently advanced to give him much assistance in such inquiries. But we are now in a new position; the conditions which influence the growth of plants have been carefully investigated; the balance, that unerring test, has been applied to these important questions; and a flood of light has been cast upon what was formerly, even to the philosopher, but "a palpable obscure." I do not pretend to say that we, as yet, enjoy a clear day-light view of this subject in all its parts. Agricultural chemistry is a new science, and, on many points, those labouring to advance it hold conflicting opinions, but the researches of Liebig and Boussingault, of Sprengel and Johnston, have already given us much, that we can lay firm hold upon, and which is of great value to the practical agriculturist.—*John F. Hodges, M.D., in Northern Whig.*

A SURE CURE FOR THE BOTS.

MESSRS. EDITORS:—In your paper of May 16th, I noticed an enquiry for a cure for the bots in horses. Here it is, as simple and as cheap as any one can ask:—One ounce of copperas, pounded and put into a junk bottle, with 1½ pint of warm water; shake it until it is dissolved, pour it down the horse's throat, and the horse will be well in two minutes.

I have used this medicine more than thirty years; I have given it and ordered it given to more than one hundred horses, and never have known but one case but what it cured immediately; then it was not given until the third day after the bots got their hold; it was then too late, they had eaten through. A horse that is apt to be troubled with bots should be fed half a spoonful of fine copperas, in his feed, once in two or three weeks; every man that keeps a horse should keep copperas on hand.—*Boston Cultivator.*

ON THE CHEMISTRY OF VEGETATION.

BY DR. MUSPRATT.

A series of communications containing analyses of the ashes of plants and manures, and other useful information connected with the tillage of the earth, have been so long required, and are so essentially of service at the present time, when artificial fertilizers are coming into vogue, that, at the suggestion of numerous friends I undertook to amass all the information in my power, and now place it before the agriculturists, with the view of affording them an insight into the economy of the vegetable world. There can be little doubt that, in a few years, all the recrements of the farm-yard will be carefully collected and applied to the fields, and as science advances the results of the field produce will be conducted with as much surety as those of the laboratory, and will ultimately point into the true path for the farmer to take, in order to keep his land in a fertile condition.

It must be evident to all reflecting minds, that there are a variety of substances at present discarded which, sooner or later, will constitute races of vegetables, and contribute to the sustenance of thousands of beings; for we know that all bodies are only lost to us for a time; even organic matter, which, during its degradation, is resolved into carbonic acid, water, and ammonia, finally re-enters the vegetable organism in the persistent form, destined to pass again through the same ceaseless cycle of vicissitudes and metamorphoses. I shall first commence with the tuberous plants, appending a numerical statement of the constitution and composition of the inorganic ingredients of turnips and potatoes, which are cultivated to such a great extent in Europe and elsewhere:—

CONSTITUTION WHEN TAKEN FROM THE FIELD.

		Turnips.	Potatoes.
1.	Water	38,314	14,625
	Organic matter	5,374	4,681
	Inorganic salt	323	195
		44,0 lbs.	19,500 lbs.

CENTESIMALLY REPRESENTED.

		Turnips.	Potatoes.
2.	Water	87,057	75,000
	Organic matter	12,210	24,000
	Inorganic salt	733	1,000
		100,000	100,000

PER CENTIC COMPOSITION OF THE INORGANIC INGREDIENTS OF TURNIPS AND POTATOES.

TURNIPS.

	Tubers.	Leaves.
Silica	6,15	7,07
Phosphoric acid	5,80	5,42
Sulphuric acid	12,70	13,94
Chlorine	3,79	4,86
Lime	11,91	34,21
Magnesia	4,02	3,24
Iron	50	93
Potash	37,69	17,69
Soda	16,62	12,20
Loss	82	50
	100,000	100,000

POTATOES.

	Tubers.	Leaves.
Silica	1,01	16,08
Phosphoric acid	4,82	6,30
Sulphuric acid	6,52	1,33
Chlorine	1,99	1,61
Lime	3,99	42,33
Magnesia	3,91	5,49
Iron	39	06
Potash	48,50	26,49
Soda	28,19	27
Loss	68	04
	100,00	100,00

By referring to table 1, it will be seen that a crop of turnips removes from the soil 322 pounds of inorganic salts, which, by calculation from table 3, contain about 180 pounds of alkalies. Now, it being a well-established fact that some of the best samples of guano only contain 4 per cent. of potash and soda, it necessarily follows that a farmer must administer upon well-drained land two tons of this deposit in order to restore the alkalies, abstracted either by a crop of turnips or potatoes.

The quantity of guano generally applied to the acre is 5 cwt, which contain 26 pounds of the fixed alkalies; consequently were the farmer to grow turnips or potatoes for three or four years successively, upon the same land, manuring each crop with guano, he would have removed seven times the amount of alkalies he had returned to his soil, and by continuing in such a course, the land would sooner or later yield no crop at all. "If the elements are contained in the soil in sufficient quantities, it produces a rich crop; if it be defective even in one of those only, this is shown very soon, by the impossibility of growing on it certain kinds of plants."

Regarding draining, I am convinced, from conversations with intelligent farmers, that if slowly disintegrating inorganic fertilizers are applied to a land, it cannot be over-drained; but if soluble composts like guano, stable dung, ammoniacal salts, are to be administered, the less drained the land the more durable the manure; it being well known that the water, issuing from the drains of a land well incorporated with guano or stable dung, contains quantities of potash, soda, lime, magnesia, sulphuric and phosphoric acids and chlorine, which are the principal constituents in the great laboratory of nature for the sustenance of vegetable life. From the foregoing statements, the agriculturist will see that, to grow turnips to an indefinite period upon the same land, a mixture must be applied for each crop, consisting of potash, soda, and lime, sulphate of lime, phosphate of lime and magnesia, phosphate of magnesia ammonia, and silicate of potash; and if his land be well drained, the above salts must be so combined as to form a slowly disintegrating compost.

The manure for carrots, parsnips, beet, and other bulbous roots, being so similar to those for potatoes and turnips, and the porous soil the one in which they flourish the best, I need not dwell any more upon this class of plants, whose cultivation I hope may increase, as they afford a palatable and excellent nourishment. I shall now proceed to the cereal grasses, of which the most commonly cultivated, and the most important as the food of man, is wheat, but in the north of Europe rye is extensively grown; its bread, however, is much inferior in nutrition to that of wheat. It is a much hardier plant than wheat, and will thrive upon inferior soil, as arenaceous ones, while wheat delights in a stiff somewhat calcareous clay.

Barley also likes a light soil, but the oat will grow almost anywhere, which distinguishes it from the other cerealia. The composition of all these plants is very analogous, but their exhausting properties differ widely, as will be seen from the annexed numbers, which represent the quantities of inorganic constituents removed on an average from an acre, by each:—

	Grain lbs.	Straw lbs.	In toto. lbs.
Wheat,	28½	160	188½
Rye,	14½	130	144½
Oats,	61	70	131
Barley	41	84	125

I shall now give Boussingault's, Will's, Fresenius', and Bichon's analysis of the first two; as for the oats and barley, I am not aware of any good analyses existing of them, but one may infer that the nature and proportion of their ingredients are analogous to those of wheat and rye:

WHEAT.

	Fresenius and Will Giessen. Grain	Boussingault Alsace. Grain	Bichon Holland Grain	Mean of several analysis Straw
Silica		1,31	42	79,61
Phos'c acid	49,21	48,30	46,14	2,90
Sulph'c do		1,01	27	99
Chlorine				1,38
Lime	3,09	3,00	3,91	
Magnesia	13,54	16,26	12,98	4,84
Iron	36		9,50	
Potash	33,81	30,12	6,43	10,02
Soda			27,79	26
	100,01	100 00	107,44	100,00

The above table shows that the principal ingredient taken off in a crop of wheat is silica, which the farmer scarcely ever thinks of returning to his soil. Guano does not contain any silicates: thus, when a farmer has manured his wheat fields for some time with this deposit, he complains of slender stalks, and no wonder, when, in luxuriant growth, their ashes contain 67 per cent. and upwards of this valuable substance. The quantity of silica taken from an acre, in a crop of wheat, generally averages 132 pounds; therefore, to restore this to the land the farmer must add, besides guano, 200 lbs. of silicate of potash or soda, a salt which is now an article of commerce. Wheat is a great exhauster of the soil, and especially of the first ingredient in table 5, and on this account it is one of the most difficult crops to grow, year after year, upon the same soil, for, if we suppose in an acre of land there are about 378 lbs. of available silica, this quantity could only serve for two crops of wheat, consequently, to bring the soil into a proper state for again growing any of the cereal grasses, it would have to lie fallow for a length of time, and, if the district was feldspathic, lime would necessarily heighten its productiveness.

Stable dung is an excellent manure for the cereals, as it contains a large proportion of silica, besides other valuable constituents. Its mechanical effect also upon the stiff clay soil is very serviceable; for the best and most powerful manuring will have little effect unless the physical condition of the soil is strictly attended to. The state of the field has an enormous influence upon its productiveness, and it is for this reason that poor soils, of no great fertility in themselves, often yield more luxuriant crops than rich, clay lands, on account of the rain and atmosphere percolating through their pores, and coming in immediate contact with the root, whilst moisture on a retentive soil often evaporates before it has had a sufficient time to penetrate it. These inconveniences are, however, fast disappearing, owing to the ingenious and superior implements that are daily brought to the assistance of the agriculturist for pulverizing his clay; and also through the system of draining now extensively followed.—There is a great loss of alkaline salts when stable dung is applied upon well drained land, therefore, if the farmer were to collect the saline liquid issuing from his drains, and use it for irrigation, he would soon find the benefit of such a procedure.

Having now given the analyses of the cereals and tuberous plants, I shall introduce Dr. Richardson's analyses of farmyard manure—

1. Fresh.

Water	64,96
Organic matter	24,71
Inorganic salts	10,33
	100,00

2. Dried at 212 degrees.

Carbon	35,40
Hydrogen	5,27
Oxygen	25,52
Nitrogen	1,76
Ashes	30,05
	100,00

5.—INORGANIC MATTER.

A. Portion soluble in water.

Potash	3,22	
Soda	2,73	
Lime	0,34	
Magnesia	0,26	
Sulphuric acid	3,27	
Chlorine	3,15	
Silica	0,04	13,00
Carried from B	86,99	
	100,10	

B. Partially soluble in muriatic acid.

Silica	27,01
Phosphate of lime	7,11
Phosphate of magnesia	2,26
Phosphate of iron	4,68
Phosphate of manganese	trace.
Phosphate of alumina	trace.
Carbonate of lime	9,34
Carbonate of magnesia	1,63
Sand	30,99
Carbon	83
Alkalies and loss	3,14
	86,99

It is evident that stable manure contains all the necessary ingredients for the support of vegetable life, but the quantity usually applied to the acre is not sufficient to yield alkalies to a large crop of tuberous plants. This might not be noticed for a series of years upon rich soil, but if it were administered for two or three successive seasons upon scanty soils, and 18 to 21 tons of turnips extracted each harvest, the impoverishment of the soil would necessarily become visible, and the farmer on reflection would discover that the 20 tons of manure given contained 134 lbs. of potash and soda, while each crop of tubers required 182 lbs. of the same metallic oxides. The other ingredients, however, are present in sufficient quantity for any crop—that is, if 20 tons of the stable dung are yearly given to the acre. By a partial supply of the alkalies, the equilibrium of fertility is not restored; and with regard to guano, "if we supply this alone we do not act wisely, because we consume our capital by rich interests, and leave to our children an exhausted soil." I shall now annex two analyses of guano, the manure which has of late years created such a furore in the United Kingdom:—

	I.	II.
Moisture and combined water	22,200	21,510
Potash	4,371	1,144
Soda	057	3,430
Ammonia	6,682	5,434
Magnesia	802	764
Lime	11,972	15,356
Hydrochloric acid	1,750	2,414
Sulphuric acid	3,640	2,109
Oxalic acid	6,470	12,850
Phosphoric acid	14,922	16,328
Organic matter and water,	4,952	11,556
Animal matter and water,	1,331	740
Humus	2,636	2,060
Uric acid	16,523	2,308
Sand, &c.	1,560	1,648
Loss	128	352
	100,000	100,000

Mr. Denham Smith, who analysed numerous varieties of South American Guanos, states that the above specimen—which I have placed second—was considered by the importers to be of a very superior quality. If this were the case, and turnips have been manured with it two years successively upon poor land, I pity the farmer that bought it, for the crops he harvested must have completely exhausted his soil of alkalies, the constituents of every useful manure, for through their presence the virgin condition of a soil is preserved. The uric acid in No. 1 is eight times as much as in No. 2, evidently showing that the latter must have been more exposed to the air, and consequently its uric converted into oxalic acid. I have recently investigated several samples of this deposit, but could not detect a trace of uric acid in them. Some chemists judge of the excellence of guano by the quantity it contains of this acid, which appears to me to be very erroneous, for the effects of uric acid upon vegetation have never come to light; I thought Dr. Ure would have pursued this path, but I suppose the opinions that Baron Liebeg advanced during the meeting of the British Association, at York, stopped the Doctor from giving to the public any further observations upon the subject. Guano also contains very little magnesia, which plays a grand part in vegetation, for it enters very largely into the various graminæ.

(To be continued.)

LIME ON LAND.

With the exception of thorough-draining, there does not exist a more important agent in the improvement of waste land than lime. It acts both mechanically and chemically, altering the texture, and increasing the productiveness of the soil. When applied to stiff clays it renders them porous and friable; and when applied in large quantities to light soils, it injures them, by the extreme looseness which it produces. Being an alkali, it has the effect of neutralizing acids present in the soil, converting the enemies of vegetation into auxiliaries: for example, if applied to soils containing sulphate of iron, it changes that deleterious substance into sulphate of lime, or gypsum, as it is commonly termed.

Whenever there is a supply of vegetable matter in the soil, an application of lime renders it fit for serving the purposes of vegetation. This is especially the case in peaty soils, where abundance of vegetable matter exists, but inert, and unfit to produce anything but coarse and useless herbage. After an application of lime to such soils, the inert vegetable matter becomes decomposed, and fitted for producing abundant crops of valuable cultivated plants. Even when a healthy soil has been limed, and left untilled, the original coarse plants are extirpated, and their place becomes supplied by nutritious and valuable grasses.

Besides these considerations, it is now a well-known and recognised principle, that the presence of lime in the soil is absolutely necessary before cultivated plants can be grown in perfection, as it forms a very important constituent in their composition. It must, however, be borne in mind, that in order to derive the full benefit we expect from an application of lime, the land must be completely drained, because lime is perfectly efficient only in a thoroughly dry soil.

The quantity of lime to be applied to an acre must depend on the nature of the soil. A clay soil will require an allowance which would ruin a light or moory soil. Indeed, the nature of the soils are so varied, that it is impossible to lay down any fixed rule as to the quantity of lime to be applied to land; and, again, that which would prove to be too much for grain crops grown on a mossy soil, would be found rather favourable to the growth of green crops and artificial grasses. The greater part of our waste lands being composed of peaty soils, I would, therefore, recommend that the quantity of lime applied should not exceed, per statute acre, from 75 to 90 bushels of good lime, freshly burnt, and laid on when newly slaked. Strong clays require a much heavier dose, but peaty soils are easily hurt by an overdose; and although certain theorists recommend a large quantity of hot lime to be given to such soils, in order to cause a speedier decomposition of the inert vegetable matter, yet no experienced improver of waste lands will agree with such views; and to successful practice merely speculative theory, however plausible, must yield.

From the Farmer's Gazette.

POTATO CULTURE.

SIR—In reading your excellent note on "Soda Ash," it struck me that if the guano were used, as you advise, the soda ash might, with advantage, be deferred for about six weeks after the guano, and then given by hand, as a top-dressing between the drills. If previously mixed with a little powder of chalk, or of dry bog-mould, this soda-dressing would be given with better effect. No lumps of it should touch the stems. If the scuffler can be used to mix it, the better; but if this would endanger the stems, it may be dispensed with, as the soda not being volatile, will be carried into the soil by next rain, and when given at this advanced period of the season, will carry on growth and help to protect the tubers from worms. From experiments some years ago, I would strongly *disadvise* giving the soda in the drills before the sets. In the *first* stage of potato growth, the plants are fed entirely by the sets. If we can keep up their supply of food afterwards, our duty is performed. Never give hand-manures under a clear sun or dry air, but in prospect of a shower.—Yours, &c.

April 27, 1846. NEMO.

[Our correspondent's remarks are excellent, and we hope they will have their due weight with those of our readers who intend using the manures referred to.]

STEEPING POTATO SEED IN DILUTE SULPHURIC ACID.

Edinburgh, April 27, 1846.

SIR—In the Pamphlet, No. 7, on the Potato Disease in Scotland, which I lately sent you, there is a very valuable suggestion in relation to the steeping the sets intended for planting, in very dilute sulphuric acid, and afterwards dusting them with quick lime.

As persons are sometimes apt to imagine that there is some mystery in the use of substances with which they are but little acquainted, and feeling the importance of any suggestion which might in the least tend to prevent a recurrence of the national calamity that has befallen us, I have thought it desirable to describe the mode in which the suggestion alluded to might be put in practice, premising, as you are already aware, that the substance formed by the combination of sulphuric acid with quick lime, is sulphate of lime or gypsum. As this substance is well known to most of your readers, they may be, perhaps, induced to make a trial, when otherwise they might be afraid of the consequences resulting from its application.

The sulphuric acid is put into a tub, diluted with fifty times its *weight* of water, the potato sets are put into a basket, the basket then dipped into the tub, over the mouth of which sticks are placed, the basket is then placed on the sticks, so that the liquid may drain back into the tub, the seed is then thrown out of the basket, and the lime, thrown with a shovel dusted over it. This is the whole process at once, cheap, simple, and expeditious.

It is recommended also to be cautious in the use of much or highly fermented manure; and in any case I should strongly recommend the placing some earth on the manure, and on this earth depositing the seed, in this way preventing its coming in actual contact with the manure. This can be accomplished in various ways according to the different methods of planting pursued; and I am sure no one will think a little extra trouble or expense thrown away in making experiments on a matter so deeply affecting the very existence of so many of our poor population.

Though it must be confessed we as yet know nothing of the cause of the disease, it by no means follows as a necessary consequence, that we may not discover a cure; in fact this has been done with respect to diseases of the wheat and other plants; and however desirable it doubtless is that we should arrive at a knowledge of the causes producing disease, we must remember, that what might seem to be the natural order of events is frequently reversed, and that we have, in some cases, arrived at a knowledge of the nature of disease from reasoning on the fact that certain applications have effected a cure, and being thus led to consider what the properties were which could have produced this result; and in what manner.—Yours, &c.,

FITZHERBERT FILGATE.

From the Farmer's Gazette.

LETTER I.

THE NATURE AND ORGANIZATION OF PLANTS.

To the young Farmers of Ireland.

MY FRIENDS,—It is now some twenty years since I wrote my "Hints to Small Farmers:" some of them, I am happy to think, were useful, and have been taken; but in the interval between that time and the present, agriculture has been making rapid progress as a science, and the result of science, practically applied, has been an improved system of husbandry, although in many respects we are lamentably backward.

Now I have been thinking that neither you nor I should lag behind those who are moving onwards; and I have been planning a fresh set of "Hints," so as to arrange, in as familiar a manner as I can, some of those principles with which every intelligent person should be acquainted.

Chemical investigations have shown us that the perfection of plants depends chiefly on the nature of the soils in which they are nurtured, and the manures with which they are fed. In addition to the gases supplied by the atmosphere, and the powerful agencies of light and heat, the Almighty has provided against the infertility of the earth by causing death to produce life—by rendering it a law of nature, that all animal and vegetable substances shall, in their decay and dissolution, become sources for the renewal of vitality.

Now if it be true that the perfection of plants depends on the soil they are placed in, and the manures they are fed with, a knowledge of what is the best soil and best manure, and why the best, is plainly necessary for the good farmer. I purpose to touch on both these points, in connection with other matters of general importance; if I shall be obliged to use hard words sometimes, blame those who invented them, not me. I promise you to use them as seldom as possible, but there is no branch of learning without some little difficulty; and having mastered the terms of art, you must next master the art itself.

And now let us start pleasantly; but before I proceed to show what is the food of plants, and the constitution of the earth which yields it, let me describe to you a plant itself.

Let us take this full sized cabbage; you see what a large frame has arisen from so small an atom as a seed, and how many different parts have been produced, as roots, stalks, leaves, &c. Now let me trace the progress of its growth, and the uses of the different parts.

The seed when first sown was filled with a substance called carbon, which is necessary to the future existence of every plant.

This carbon is shut up in a kind of skin, and until this covering bursts and the carbon is set free, no growth can take place; so long as it is in this condition, the seed is at rest; but when the moisture of the earth around it introduces some oxygen, which is an ingredient in the air we breathe, (the atmosphere being composed of two gases, oxygen and nitrogen,) to the carbon within the grain, it becomes freed from its imprisonment, and changed into carbonic acid gas; from this moment we may date the life of the plant.

From the lower end of the seed proceeds the root, which strikes into the earth, and from the upper the stem which shoots into the air; in the middle is lodged the *embryo*, or principle of life—as in an egg—which is supported until the leaves appear, by the nourishment contained within itself. This will show the great importance of having a plump and heavy grain for seed, with the sound and healthy state of which the future plant will correspond. Every farmer's wife knows from experience, that a strong healthy chick is not to be expected from a small egg; she therefore sets large well-formed eggs under her hen, because common sense informs her that the quantity of nourishment contained within a full-sized egg, is greater than the amount of it in a smaller one, and the *reason* in both cases is the same.

Before the true leaves of this cabbage appeared, and this is generally the case in the higher order of plants,* two little green sprouts resembling leaves, called *cotyledons*, issued forth, and these were connected with the embryo, and acted as nurses to the growing plant, until the real leaves succeeded above them; they then dropped off, having discharged their duty of conveying air to the embryo within: after the leaves appeared, the woody fibres of the plant began to be formed; and principally through their means, in a manner which will appear by and by. To show you the necessity of moisture to the first existence, and after progress of any plant, I need but mention that a grain of mustard seed (if sufficiently shaded from the light), will grow in water without any earth.

Hyacinth bulbs grow in dark glasses filled with water. Some of you I dare say, have seen malted barley—if so, you know that the grains have pushed out shoots from having been soaked in water of a sufficient temperature,—*heat* being always necessary to the growth of a plant, and more or less so, according to its particular nature and constitution,—but though seeds will sprout and live without any earth in the commencement, they will, generally speaking, perish quickly if not placed in the earth, which is undoubtedly their natural position; nor would any plants live long in *pure* water.

It is plain that the roots are necessary to enable the plant to take a good *hold* of the ground for protection, but they have a yet more important part than this to perform.

Examine the roots of this cabbage—you perceive that they are furnished with a great mass of fibres, like coarse threads of hemp or flax; and that some of these fibrous roots have struck downwards into the soil to a considerable depth, while others have branched out sideways—and if you look closely at the extremities of the roots, you will see (where they have not been destroyed in the taking up, for they are extremely delicate,) soft white threads from six to eight inches long, covered with a fine down resembling cotton; these ends, which are called spongioles, from their power of imbibing moisture like a sponge, suck up portions of the nourishment which the earth and air around them contain, and convey it upwards through the roots, (which may be considered a multitude of mouths,) into the stalk, and thence with force and rapidity as it rises into the stems, and leaves, and every part of the plant.

Since then, a continued process of nourishment to the plant, from the soil is going on, I cannot understand how it is possible, that the steeping of seeds in certain substances (as I have read of with doubt and astonishment,) can afford future nourishment to the plants, and render a supply of manures, or whatever may be their usual food, unnecessary to them after the grain of seed has disappeared, and thus render their mouths useless. If such wondrous effects can be produced by such simple means, and if more luxuriant and quickly grown plants can be obtained by the process to which I am alluding on the seed alone, there is an end of all received opinions regarding vegetation.

* In some plants, such as wheat, there is but *one* cotyledon; and in others, such as fern, there is not even one.

On account of the exceeding tenderness of the spongioles, they cannot absorb any nourishment in a solid form; it is therefore received by them in that of fluid, containing gases and earth salts in a dissolved state. This fluid is the sap, which though at first very thin, becomes thicker and heavier as it rises to the farthest points of the branches, and penetrates into the leaves, by dissolving some of the slimy vegetable matter which it meets in the stalk, and at last it becomes changed into a sweetish substance of the leaves.

The leaves perform their work by means of a vast number of little holes on their surface, which can only be distinguished by a microscope, called sporules, which, like the pores of the human skin, have the power of perspiring,—and they have also the faculty of inhaling air, and which causes the sap to flow; while the more watery and lighter parts of the *crude* juice, (as the sap in its first state is called) escape through those pores, the most substantial particles remain, and thus the returning sap, being digested and changed in its qualities by the leaves, which may be considered both as lungs and stomach, gives solidity to every part through which it runs, depositing like a flowing river, rich matter in its course, and enlarging every portion of the plant through which its fertilizing particles pass.

The rising juices have different channels to avoid confusion between them. The rising sap flows through the part of the stem called the *alburnum*, which is the newest portion inside, and falls thro' another layer called the *liber*, which is next the rind; and the falling sap does not descend in a straight course downwards through the liber, for if it did, that part only would be benefitted, but by little cross tubes called the *marrow rays*, which lead to the heart of the stem; this central part is the most firm and substantial, from being fed through these rays with the *proper* juice, until it can consume no more. The greater age of the heart, is undoubtedly the chief reason of its being the most solid part; but it is probable also, that this solidity is owing to compression, caused by new layers continually increasing around it, and also to its greater protection from outward moisture.

The leaves, as you have seen, are most important members, and according to the nature of any plant, more or less porous; and therefore, more or less capable of taking in, or giving out air and moisture.

In those vegetables of which the leaves are few and small, the soft green part of the rind performs the same offices.

Understanding the nature and functions of the leaves, you must perceive the folly of stripping off the sound and active leaves of such a plant as this cabbage, before it has completed its growth, for by so doing, you diminish its powers of digestion, and therefore prevent it from becoming so large and solid, as it otherwise would be. By destroying the proper balance of power between the roots and the leaves, there is danger (but to some plants more than others) of overloading the system with food; for if the roots or mouths swallow more than can be converted by the leaves into fit nourishment, then the circulation becomes checked, and the patient may die of indigestion, or at least be cut short in its growth.

For this week I must end here, subscribing myself your faithful friend,

MARTIN DOYLE.

Newcastle Farmer.

COBOURG, OCTOBER 1, 1846.

It is but a few years since an intelligent English nobleman, whose attention had been especially directed to Agricultural pursuits, and the effects which must ultimately result from the application of science to that department, remarked, that shortly, in consequence of scientific enquiry, he should be enabled to carry the manure for an acre of land, in his snuff-box; when one of the old school of prejudiced farmers observed, "*when* that is the case, my Lord, I will undertake to carry your harvest from that acre to the barn in my waistcoat pocket."—But his lordship was in the right, for the maximum quantity of what are justly termed hand manures, is so very small, that it is approximating to a mere snuff-box full.

So much has been said and written on the comparative value, mode of application, and beneficial results of the different descriptions of artificial manures, that the mind becomes bewildered amidst scientific descriptions and technical phraseology, so that a plain farmer, unaccustomed to learned, and especially chemical disquisitions, is apt to start back in dismay, and be sorely discouraged at not being able to comprehend the terms themselves, or the mode of application of the materials most likely to prove beneficial.

It must be remembered, that the manures now being brought forward, are nothing new in themselves, but are merely the concentrated essence of the stimulants and fertilizers contained in, and hitherto supplied by the contents of the barn-yard, they do not supersede that supply; but on the contrary greatly augment and render it of much greater efficacy,* by drawing upon other sources, which chemical research has found available for that purpose. The greater portion of the mass accumulated in the muck heap, was merely the vehicle with which the manure, properly so called, was incorporated, and by which it was conveyed to the land. The bulk of the article was often little more than so much fine soil arising from the advanced process of decomposition of the animal and vegetable substances of which it was composed, and which, in a short time, would have been comparatively worthless as a stimulant and fertilizer.

Barn-yard manure undoubtedly contains the principal constituents necessary to supply to the numerous plants under cultivation the amount of the natural food required by each, so long as the demand shall not exceed the supply; but when (as at present) it is expected that, instead of 12 or 15, there should, in order to a profit, be a return of 25 or 30 for one, then a demand, of course, follows for a supply of such substances, whose component parts shall be the very essence of those manures hitherto given in bulk; or a rapid deterioration must follow the overtaxing the fertilizing powers of the natural soil.

The successful application of these artificial manures must be accompanied by a knowledge of the various amounts of the different ingredients necessary to the crop under cultivation, as the requirements of one class of plants may be totally different from another, and it will be equally necessary that a knowledge of the component parts of the soil should be obtained, in order to derive the greatest possible amount of benefit; the manure must not only be adapted to the plant, but also to the soil; for while some soils are nearly devoid of certain ingredients, others may be already in excess, and consequently, instead of an addition *in the manure supplied*, may require a corrective, to render them the most productive; hence arises the necessity of chemical analyzation; of so much importance indeed is this, that the various Agricultural Societies of Europe have connected with them an agricultural chemist, from whose lectures much benefit is experienced, and to whom application is made by the various members of the Society for information, and by whom the different descriptions of soils on their farms is analysed; and they at once obtain the knowledge of the description of manure best suited to the soil for any particular crop they intend cultivating. The Province of Demerara has just appointed an agricultural chemist, at a salary of £1000 per annum; and it cannot be doubted that a portion of the funds of the Agricultural Societies of Canada West could not be more beneficially appropriated, than in procuring and amply remunerating a clever practical man for the same purposes; and we do hope that when the Provincial Society shall be matured, that this subject will not be lost sight of.—Again;—but prudence has just whispered in our ear,—husband your resources a little, remember, an Editor's labours, like the pains of purgatory, (unless you get a friendly lift) are,

(To be continued.)

* A French chemist now in England proposes converting the whole barn-yard manure into guano, and is engaged in the process.

We had purposed inserting, for the benefit of our readers, an article on the analyzation of soils,—so plain and simple, and the apparatus needful, to be procured for three dollars,—but want of space precludes the possibility in the present number, but will endeavour to make room for it in our next. We are obliged to exclude, from the narrowness of our limits, as much plain, useful, practical information, as is worth ten times the amount of the subscription to the *Farmer*.

We would especially direct the attention of our readers to the first of a series of letters from Martin Doyle to the young farmers of Ireland. They will be found replete with the most useful information, and at once convey instruction in a clear, simple, and pleasant manner.

It would have given us much satisfaction and our readers much pleasure, if our space would have allowed us to insert a letter of Baron Liebeg, which we find in that excellent agricultural paper, the *Albany Cultivator;* and as we know many of our subscribers take that paper, it would be well if they would lend the August No. to their neighbours.

We are sorry to hear that the Turnips in some parts of the District are likely to turn out equally bad with the Potatoes. We saw a large quantity the other day apparently affected by the same blight, so bad indeed that the Cows would not touch them. We hope that our Farmer friends in other Townships will favour us with information on the subject.

THE PACES &C. OF THE HORSE.—I am anxious, in this place, to add my anathema against that inhuman instrument of torture, the bearing-rein. It is no less detrimental to the utility of the animal than it is replete with agony to him. It must have been invented by a savage, and can only be employed by the insensate. Whence the benefit of unbearing a draught-horse when going up-hill? Because the head can then be thrown into its natural position, and materially assist by its weight in drawing the load. If it is beneficial to loose the head at that time, it must also be so on other occasions. Look at the elongated mouths of the unfortunate animals thus so wantonly abused—torn by the bit in their unavailing efforts to overcome this truly barbarous instrument! What produces that dreadful disease, poll-evil, but the action of this cruel strap; constraining the head during the violent exertions of the animal, producing inflammation and ulceration of the point upon which it articulates with the spine? Poll-evil, so generally supposed to originate from blows inflicted on the part, is attributable alone to the gagging-rein. I never saw a horse used entirely for the saddle attacked with this affection. In order to obtain momentary relief from the torment inflicted by the bearing-rein on the poll and mouth, the poor creature is compelled incessantly to toss up his head. By thus strapping down the head you say, practically, "I expect you to draw a certain weight, but I will take away part of your power of doing so." Some have urged that the bearing-rein contributes to the safety of the animal, who, without it, would be more liable to come down. However applicable such an argument may be to those employed in quick draught—though even with them the utility of this instrument is not only exceedingly doubtful, but fast giving way to a more rational method of treatment—it assuredly does not apply to cart horses, for little fear is ever entertained of their falling; and broken knees, so common among the faster breeds, is rare amongst them.—*J. H. Winter, M.R.C.V.S.*

TOWNSHIP CLUB MEETING.

The Township meeting for October, will be held at the usual place, (the Town Hall,) on Saturday the 3rd inst., at 4 o'clock, P.M.—Subject for discussion,—

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