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NEWCASTLE  FARMER.

VOL. II.—NO. I. COBOURG, SEPTEMBER 1, 1847. TERMS.—2s. 6d. PER YEAR.

From the Journal of the Royal Ag. Society.

ON THE MAINTENANCE OF FERTILITY IN NEW ARABLE LAND.

The question for consideration is:—How can any given degree of fertility in land be maintained? Professor Johnson has conclusively answered it, when he says—'Soil which are chemically and physically alike are agriculturally equal.' Given, a soil whose net annual produce shall be a certain acreable sum, and you preserve its agricultural identity—its capability of annually raising similar crops, simply by taking care that its composition and its texture shall remain unaltered. This is what theory says upon the subject, and one does not see what objection can be made to a statement whose truth is so nearly self-evident. Agriculture is just to be considered as a manufacture, by which certain substances contained in the soil are converted into vegetable and animal produce; and its results, or, to use other terms, the fertility of land, must therefore depend on the occurrence of those substances in abundance, and in due relative proportion. Let them be present *thus*, and let the great mass of the soil—the mixed clay and sand and lime in it—be of such extreme as permits a sufficiently free passage through it both to air and water, and the soil will be at its highest pitch of fertility. Let either its texture or its composition fail of this standard, and its productiveness will diminish. And there is no need for imagining any mystery in this matter, as one is apt to do in cases, as in Agriculture, where the unknown principle of life is concerned—this failure in the productiveness of a soil doubtless occurs just in the same way as does that of a tile-mill or a cotton factory, to which the raw material has been supplied in diminished quantity or of inferior quality. The fertility of the soil will be perfectly restored by replacing its texture and composition in their original condition. These are two essential elements of its agricultural character. The *latter* is of the same obvious and immediate importance to vegetable growth that the furnishing of its food store is to an animal; for on the composition of the soil depends the supply of nutriment to the plant. The *former* exerts an influence in several ways. On the texture of a soil depends its suitableness for the growth of different crops; light soils being adapted to one class of plants and heavy soils to another. It is on this also there will for the most part depend *rapidity* of vegetable growth; for to it is due the *facility* with which rain-water, falling on the surface of the land, dissolves its soluble portions out, and carries them to the roots of the plants. And, lastly, it is to the texture of the soil that that free access of air and of rain-water to every part of it is due, to the chemical processes connected with which so much of agricultural fertility must be referred. And it is this aspect of the matter which connects it with the subject of the present paper. Dr. Daubeny pointed out, in the last number of the Journal, that independently of the small quantity of vegetable food, so to speak, available for use at any one time, an immense store resides in most soils in a dormant condition, capable of gradual developement as it may be required; and this process of developement may by various artificial means, as by fallowing, the cultivation of fallow crops, the application of lime, &c., be greatly accelerated. It thus appears that there is hope for almost any soil; that in few cases can land be so 'run out,' as to require the direct supply of *all* the substances which are needed to create fertility; for many of them are already present, and it only requires a little skilful management to exhibit them. It is on the same ground that we must explain the practice, often to be seen, of allowing worn-out land to 'rest' for a while after a long period of mismanagement has exhausted its fertility. The success of this expedient, however, does not justify the practice, which is obviously most wasteful both of time and of means. The amount of 'active' fertility in the soil ought by a judicious system of cropping and of consumption on the farm, to be made nearly to reproduce itself year by year; and the gradual developement of that which lies 'dormant,' instead of acting as a sinking-fund to wipe out the evils of past mismanagement, would then go annually to increase the fertility of the land. It is the liability of arable land to the mismanagement I speak of which has hindered the conversion of thousands of acres of grass land, at a time when the large acreable produce of good arable culture is so much wanted. May we not hope that the greater capability of improvement, which is also characteristic of *cultivated* land, will as agricultural intelligence extends, be efficient for the future in inducing owners of pasture lands rapidly to bring them under the plough.

The following particulars regarding the cultivation of Whitfield farm, and its results, fully bear out the views which I have quoted from Professor Johnston and Dr. Daubeny.

The principal feature in the system, and of course I do not describe it as anything new, is the alteration of grain crops for *sale* with green crops for *consumption*.

After the drainage of the land, half of it was ploughed up before winter, and half pared and burnt early in spring; the former portion was sown, most of it, with oats; the latter was prepared for turnips. The elements of fertility naturally present in the soil insured the abundance of the first crops, and thus sufficed, free of expense, to start that system of Husbandry in full vigour, which more than any other that can be named has the merit of self-maintenance. Every other year, for a longer or shorter period since, every field on the farm has borne a crop of wheat, and on the alternate years the crops have been successively clover, turnips, carrots, clover, mangold wurtzel, and patatoes. The root crops have been for the most part carried to the buildings, and there consumed with and on the straw, by cattle, sheep, and pigs. The dung thus manufactured is either carried out, as it is made, to the fields on which during the ensuing year it will be used, or to stations near the liquid manure tanks, where it may be properly manufactured. About three thousand cubic yards are thus annually applied to the green crops. It is not only made from the consumption of roots and straw, but large quantities of oil-cake, oats, linseed, and beans are also consumed, and these no doubt add much to the richness. The annual application of so much fertilising matter insure, heavy crops of roots and straw—to insure *that* on which the Farmer depends for the re-application each year of an equal quantity of manure. The system thus maintains itself: it was set agoing without much expense, and it contains within it the elements of a permanent establishment.

No doubt in this, as in every other system of cultivation I have heard of, the soil suffers an annual abstraction of its substance; but this is not necessarly inconsistent with the maintenance of fertility. Dr. Daubeny has shewn us the soil contains, so to speak, an exhaustless store of fertilising matter; and all that needed to make this abundance apparent as well as real, is so to expose the soil, as that for every abstraction by the growth of a crop, a transfer of equal amount may be made by the solvent powers of atmospheric agents from the *dormant* stores within it, to those which are immediately available for the use of plants. It is upon an abundance of the latter description that the current fertility of a soil depends, and this may be maintained in spite of the continued robbery occasioned by selling crops, provided the balance be made good. Now the efficiency of the system of cultivation adopted at Whitfield, in maintaining fertility, notwithstanding heavy sales of farm produce, may be accounted for in great measure by the frequency of fallow crops, whose cultivation is attended by such constant and repeated stirrings of the soil, that rain water will have peculiar facilities for acting as a solvent upon its substance. In addition to this there must be considered the purchase and consumption of considerable quantities of cattle food, and the preservation of the manure made from it.

These are the three points to which we must look for the maintenance of arable farming. As regards the second, I may just state how far the matters annually brought on to this farm go to balance the loss it sustains of the matters annually carried off it. The account stands thus:—There is an annual abstraction from the soil of about 500 quarters of wheat—the produce of 120 acres of land; and on an amount of beef and mutton equal to the increase during five months on 30 or 40 three-year-old oxen, and during eight months on 250 to 300 shearling sheep, as well as of the substance of some 20 or 30 bacon hogs, bred and fattened on the farm; in addition to this, there has lately been an annual sale of about 50 tons of Belgian carrots, and about 40 tons of potatoes. The mineral portion of all this matter is annually taken out of the soil. In the sales of vegetable produce alone, it thus sustains an annual loss of about 4 tons of its most valuable portion. But this is compensated by the purchased cattle-food which is consumed upon it:—About 200 quarters of oats, 10 to 20 tons of oil-cake, and 40 to 50 quarters of linseed, barley, and beans, are thus consumed. The weight of their mineral constituents may be about 33 cwt. This reduces the amount of robbery committed to 2¼ tons; and we must suppose that the land is annually suffering an abstraction of this quantity of its best part, not to speak of the mineral portion of about 40 tons of butchers' meat also taken out of it. And all this, and more—for the land, so far from suffering from the treatment it receives, is exhibiting every year great ability to grow the heavy and bulky crops it has hitherto yielded—all this and more must be manufactured and prepared as vegetable food, by the agency of the air and rain, out of the very substance of the land.

'But this obviously cannot last for ever—the land must ultimately be exhausted;'—So *he* will say who has not duly considered the origin of the soil and the means by which it is maintained. The mineral part of the soil is obviously the result of the disentegration of rock; and in the subsoil below it an endless store of similar matters exist. We may see here the great advantage of any system by which the rain-water shall be enabled and induced to sink *through* the land down to the subsoil below it, *there* to effect the solution of those substances occurring there, which in their present state are useless to plants. And probably one great cause of the barrenness of undrained land is to be found in the circumstance that its crops, after using up the limited stores of food which it contains, are afterwards dependent upon the very small portion which the rain-water, under the unfavourable circumstances in which it is there placed, can provide for them. Undrained lands send the water off their surface; they do not permit it to penetrate, and thus it has no chance of performing that which may be called its appointed office—no chance of preparing from the substance of the soil a sufficient supply of nutriment for the plants growing on it.

The third point referred to above is also a most important one in the general scheme of permanent arable culture. It will be seen that, as it is, under our plan of cultivation (and the same will be found to a greater or less extent under every other plan in operation,) a large draught is annually made upon the substance of the soil, in order to maintain its fertility; and it is not desirable unnecessarily to increase this call by carelessness in using the means we have of supplying the wants of the crops. The management of manure is obviously a most important branch of the Farmer's business, and one to which a great deal of attention has of late years been directed.

Nevertheless, on a farm of any extent, my experience, so far as it goes, is entirely opposed to the alleged economy attending the use of the liquid-manure cart, which has been so extensively advocated. It is no doubt of the greatest importance that the urine of the animal feed on the farm be all saved; but this advantage is *dearly* bought by the labour which attends its *direct* application on distant fields. I believe that the cheapest and best method of consuming cattle-food, both as regards the manufacture of butchers' meat and the management of manure, is Mr. Warner's system of box-feeding. In it the straw used a litter accumulates under the cattle for many weeks together, the urine is entirely absorbed, and no water falls on the mass to wash out any of its soluble parts. This is the plan adopted here. The boxes are cleaned out when they become conveniently full, which may be at intervals of twelve to fourteen weeks; and the manure, which is of the richest quality, is then at once taken to the field where it is to be used, laid upon a bed of earth, and thickly covered with the same. The manure from the sheep is prepared in the same way; it is removed, perhaps twice in the winter, from the sheds under which it accumulates. That, however, which is made in the stable is of course daily carried out to a heap yard by, and the urine of the horses is collected in a tank near the place, and from this it is pumped, to soak the half-wetted straw.

It must be acknowledged, that here, as on every other farm that I have seen, there are many cases of waste in operation. The rain, as well as the liquid manure, falls upon the dung-heap; and if the latter enriches, the former impoverishes the mass, which is alternately saturated by them. Large open yards, too, necessarily receive an immense quantity of rain-water in the course of the winter. Upwards of 27,000 cubic feet annually fall during that season on ours; a quantity and weight which it is impossible, with profit, either to collect in tanks or to carry to the fields. A large portion of this water *must* therefore run to waste, and it carries with it the soluble part of whatever manure it washes. We endeavour to prevent this as much as possible; and in consequence of our system of box and shed-feeding, we doubtless sustain less loss in this way than many other Farmers; but a certain injury is no doubt suffered—one, however, which we think cannot be remedied by any application of the cumbrous machinery of water-carts and tanks.

It is to these three departments of farm-management, then, that we must look to keep up the fertility of land under arable culture: the alternate system of Husbandry, by which the land receives almost every other year a thorough fallowing and cultivation; the consumption of large quantities of cattle-food, by which the loss sustained by the soil in consequence of sales of farm-produce is in great measure balanced; and the careful preservation of the manure that is made. Let the pitch of fertility be what it may, and whatever its cause, I have no doubt that attention to these particulars will preserve it. It may be owing to the natural character of the soil; it may be due to the skill of a former tenant; or it may be the extraordinary effect of *rolling or burning an old sward*—of bringing old pasture into cultivation. However it has arisen, there can be no doubt that ordinary energy will maintain it, if attention be paid to the points above alluded to.

No reference has been made to the use of artificial manures, as they are called. I believe that they are rarely necessary to the maintenance of fertility; no doubt they may often be advantageously used to *increase* fertility, but that is hardly ever desirable in the case of newly-broken-up land; good crops may generally be obtained in such a case without much assistance, and that they continue to be so obtained I am very sure. Will not the experience at Whitfield Farm, which I have described, be admitted as proof of this? Some of the land is a deep gritty sand; much of it a stiff clay soil; in many places a peaty loam. On some fields we have a shallow limestone soil on rock; on others a deep vegetable mould resting on magnesian clay and stone: on *all*, when grassland after drainage has been broken up, the scanty produce of cheese and butter, characteristic of its former condition, has been exchanged for bulky crops of roots and grain, a large produce of food for man and for beast; and on *all*, without the use of bought manure of any kind, these crops, so far from diminishing as years pass by, rather exhibit an increasing fertility in the land which yields them. Is there not variety enough of soil and uniformity enough of result here, to justify general confidence? The fact is, that our crops of straw have latterly been so bulky as seriously to interfere with the produce of grain; the wheat has been laid and its yield injured in consequence of the luxuriance of its growth. This has been a growing evil, but it is certainly no sign of diminishing fertility.

Now, I am perfectly aware of the extreme changeableness of farm experience, arising doubtless from the many uncontrollable and variable causes on which that depends; but it is impossible to disregard the *uniform* evidence of an experience extending over eight years; and I certainly think that the results of farm practice at Whitfield may well convince any landowner that the breaking up of his grass-lands, if profitable to him the first year, may easily be made so during every succeeding year of their cultivation, whether he grows wheat only, as we do, or introduces other grain crops.

From the Farmers' Gazette.

THEORY OF VEGETATION—DEEP DRAINING.

The quantity of rain which falls at any particular place is determined or measured by a machine or instrument called the rain guage: that portion of this rain which is evaporated, as also the part which would filter through a perfectly drained soil, are measured by an instrument called from its inventor the Dalton guage. Thus these three important items, the quantity of rain which falls, the portion of that rain which is removed by evaporation, and the part of that rain which should filter through the soil are determined by these two instruments, the construction of which is deferred to preserve the uniformity of this article. Thus we learn that the mean annual rain in Paris is 20 inches, the mean annual rain in London is 23 inches, and the mean annual rain in Dublin is 30 inches. That Ireland therefore from the peculiar position, receives a much larger amount of rain, than an equal surface of countries in the same latitude, or even in a more southern latitude, is manifest by experience; as is also the fact of her superior fertility; and as heat, rain and vegetation, were shewn to accompany each other in the same proportion and degree, so that any increase or diminution of the one, was always accompanied with a corresponding increase or diminution of the others, may it not, according to the laws of probability, be fairly and legitimately inferred, that the superior fertility of Ireland is owing to the greater amount of rain which she receives, connected with the additional heat, with which in her case that rain is accompanied? Undoubtedly it may, until a case be shown of a country, which with a less amount of rain, shows an equal degree of fertility as that of Ireland.

This position will become more evident, by contrasting the state of two tracts in the same immediate neighbourhood, which are differently circumstanced with regard to rain. Thus the eastern side of the Andes within the Tropics, receiving the entire moisture wafted by the trade winds, has vegetation the most luxuriant; whilst the western side of the same acclivity, being thus debarred from any moisture, is destitute of vegetation, and a barren desert. The position will become still more apparent, when we investigate the properties which rain-water possesses, and the influences which it exerts on vegetation. The vegetable we know supports the animal kingdom, the several constituents of which, after decomposition, eventually find their way either as gases into the air, or are carried by rivers into the sea, whence, after the regular cycle of new combinations, they are again evolved by evaporation, and descending in rain, bring along with them these kindred substances which are held in solution in the atmosphere. Potass, salt, sulphur, carbonic acid, and ammonia are known to be indispensable and essential elements in vegetable production. Now in the decomposition both of vegetable and animal substances ammonia is evolved, and being one of our lightest substances it mounts into the upper region of the air: but as it possesses a capability of being absorbed in a considerable degree by water, it is therefore brought down by rain and deposited on plants, promoting their growth and giving that impulse to vegetation which after dry weather invariably produces. It is believed that the nitrogen or flesh producing principles of vegetables derived or assimilated by plants from this substance, and it is calculated that considerably more than one cwt. of this ammonia is deposited on each acre of land during a year in this country by rain-water.

Again carbonic acid is essentially necessary to the life of plants, and constitutes the chief nutriment of vegetable matter; now rain-water, says Dumas, falls loaded with this carbonic acid, which gives stability to the texture and protects all the vegetable tissues. This carbonic acid is also the agent, which by dissolving the phosphates, gradually disaggregates the skeleton elements of the superior animals, and transforms the final vestiges of animal life into the incipient production of vegetable matter.

Sulphur, salt, and potass are equally indispensable to the wants of the vegetable kingdom. The quantity of sulphur requisite to supply the wants of the population of this point on the ocean is estimated at 554,428,575 lbs. (avoirdupois) and 2,772,142,875 lbs. are necessary to supply the necessities of our irrational brethren on the same spot, all of which is derived from the soil through vegetables. The absolute necessity for an adequate supply of salt need not be insisted on, being manifest to everybody; a considerable portion for domestic purposes is extracted by artificial means from sea water, but the main supply necessary for vegetation is derived naturally through the agency of evaporation and rain from the ocean. The essential necessity for a supply of potass has been demonstrated by that proprietor of Gottengen, who having occasion for potass planted his land with wormwood, which extracting the potass from the soil, the land, from the deficiency of potass thus created, became incapable of producing grain for many years after. These being all soluble are borne along by rivers into that great laboratory the ocean, whence after the usual routine they are again similarly extracted by evaporation, carried along by those wing-footed messengers the winds, and finally sown by the rains in the bosom of the soil, to carry on their life supporting ministrations.

Thus to rain are we indebted for ammonia the flesh producing principle; to rain are we indebted for carbonic acid the pioneer of the bone or skeleton-producing principle; and to rain we are indebted for the alkalies or fat producing principle; so that in fact and reality the bone, fat, and muscle of society are required and sustained through the intervention and agency of rain-water: to it also are we indebted, as already shown, for a considerable supply of heat, the source of vegetation. Farmers therefore need not dread a copious supply of it; nor are they at all justified in considering any quantity of it to be an enemy, as many well intentioned but short-sighted advisers would lead them to imagine.

The plain object of the farmer is to abstract from this rain-water the heat, ammonia, carbonic acid, sulphur, salt, potass, and such other valuable ingredients as it holds in solution, and then as we do in the ordinary operations of life, get rid of this water after it has performed the functions for which it is intended, that we may be again ready for a supply—to extract and preserve the ore and remove and expel the dross, a proceeding which, as shall be shown in a future article, can be effected only by DEEP DRAINING. M. M.

From the Albany Cultivator.

WHAT MANURE DOES THIS FIELD NEED?

THIS inquiry is beyond question one of the most frequent and important that presents itself to the farmer.

With the light which has, within the last few years, been thrown upon the subject of manures, their nature, and the secret of their value, something like a practical course has been revealed. It may be illustrated as follows:

If a soil fails to produce a given crop, it is because it either wants the *requisite texture*, or it wants certain essential inorganic ingredients, or it may be deficient in both.

If vegetable refuse in sufficient quantity has been strown over and ploughed in, the deficiency of one or more *essential inorganic ingredients*, must be considered the solution of the failures.

Now how shall this deficiency be ascertained? How shall it be determined what a soil needs?

It may need gypsum, or phosphates, or potash, or soluble silica, or lime. It may be benefitted by ashes, or poudrette, guano, or fish. But it probably does *not* need *all*, and would not, probably, be equally benefitted by them severally.

Which, then, shall be selected? How shall any one without aid, be enabled to determine what will benefit his soil *most?*

The following suggestions are made in general reply to this inquiry.

Having prepared a few square yards or rods, so that the texture shall be all that is desired, let equal areas—six feet square each, for example—be accurately measured and staked. If the soil in the same field be variable, each kind may be treated for a separate experiment.

Then let equal quantities by weight of a thoroughly pure grain, wheat, or rye, or oats, or any other it may be desired to try, be sown and covered, in these several areas. Only one kind of grain will be employed in the experiment. If others are to be tried, let separate areas be selected and prepared—a suit for each grain.

Then take small quantities of gypsum, potash, soda, ashes, bone-dust treated with diluted sulphuric acid, night soil, or any of the so called manures it may be wished to try, and put them upon or near the surface of the soil. If deeply buried, they might be dissolved by rains, and carried down beyond the reach of roots.

Now all will receive from the frost, the rains, the dew, the sunshine, and the drought, the same treatment. From the native soil they will derive equal measures of nutriment.

But from the added manures they will derive unequal advantage. Some of the additions will contain a desired ingredient—others will not; and the relative values will be indicated in the relative weights of the ripened grain at harvest.

The seed was weighed. The harvest must be weighed. The better manure will be pointed out in the higher weight and plumper appearance of the grain.

That the manures may be compared, and the relative profits of this or that readily estimated, positive quantities should be employed, that is, such, that by measure or weight, the cost of that used may be accurately known.

The weighing for the occasion, if not otherwise convenient, might be made with the sugar and tea scales of the nearest grocer. As the grain to be sown is, for each lesser piece of ground to be the same in weight, the quantity for one being determined, it may be placed in one scale pan, and the other parcels severally balanced against it.

There is some trouble in all this care about *quantities*; but if the conviction be deepened that a faithful attention to them is indispensible in experimentation that is to be of value, it may perhaps be more cheerfully engaged in.

It sometimes, indeed frequently, happens that farmers purchase large quantities of a given manure, because they have learned that it had been found serviceable in particular cases. They hope to reap a profit commensurate, within certain limits, with the amount of manure employed; regardless of the greater or less correspondence there may exist between the soils upon which it had been found profitable and their own. They employ it. They are disappointed.—The manure does *not* contain what *their* soils need, though it may have been admirably suited to the improvement of others.

What the producer wishes in making purchases of raw material, is, to obtain as much of that which can be used, and as little of that to be thrown away, in a given quantity, as may be.

So with the grain grower. He wishes to pay for *just that* which will grow wheat, or corn, or oats. Other materials, of no service to the immediate crop, only to be washed away by rains before a seed demanding them shall be sown, he cares less to pay for.

E. N. HORSFORD.
Cambridge Laboratory, May, 1847.

From the Farmer's Gazette.

SALT.

OXYGEN is a body existing only in a gaseous form. We can neither see, taste, nor smell it, yet we know it is absolutely necessary for the support of animal life; it is also the principle of combustion and is considered the most powerful and energetic agent in nature. It is therefore the great agent which joins and prepares the other simple substances for further associations, which they are unable to effect without having been breviously united to oxygen; and as it is a component part of atmospheric air and also of water, its sphere of action is very extensive.—Its compounds with the metals are called oxides.

Hydrogen is a body existing also in a gaseous form. It is procured solely from water of which as its name implies it is the principal ingredient; (oxygen being the other constituent) hydrogen possesses all the physical properties of common air, but it is sadly deficient in the vital ones, breathing it being instantaneous death to animals. It is also the lightest of all bodies, and is therefore that used for inflating balloons, which it soon carries with it to the higher regions of the atmosphere; and not only does hydrogen rise in its uncombined state but it also rises in vapour combined with oxygen and with some other substances, and thus there are always the elements of water in the atmosphere; when these elements are exposed to a heat, equal to that which appears red in day light, which is estimated at about 1000° of Fahrenheit, they combine, and by the process of combustion form water. The compounds of this gas with the metals are called hydrates.

Chlorine is another gas, of a yellowish green colour, with a very disagreeable astringent taste, and a most suffocating smell, exciting much irritating in the windpipe, even when diluted to a considerable degree with air. By great pressure it is made to assume the form of a liquid of a bright yellow colour. This gas seems to be an intimate relative to oxygen, for in common with it, it supports combustion, and imparts light and heat when strongly and suddenly compressed. Its bleaching powers is one of its most important properties, for it removes immediately all animal and vegetable colours, so that they can never again be restored. It is also very effectual in fumigation by purifying the air of infectious diseases—it speedily destroys the infection of fever and small pox, and the latter disease will no longer be propagated by articles subjected to the influence of chlorine. This gas was discovered in 1770. Its compounds with the metals are called chlorides. The combination of these two latter gases, hydrogen and chlorine in equal bulks, form a compound the bulk of which is equal to the bulk of the two composing ingredients, and named from its composition hydrochloric acid. A composition of the first mentioned gas, oxygen, with the simple elementary metal sodium, forms a compound named soda. These substances hydrochloric acid and soda, are both, when pure, of a very caustic nature, that is very destructive of the substance of the human body, so that a small part of either taken singly as compared to what is taken daily in the compound would produce instant death, yet the compound resulting from the union of the two is that wholesome and familiar substance COMMON SALT. Thus, a composition of hydrogen and chlorine forms a compound named hydrocloric acid, and a composition of oxygen and sodium forms a compound named soda, and a composition of both these compounds forms a compound which is common salt.

Silica is a general term for what we commonly call sand, fine quartz, or flint, it is generally insoluble in water and acids, and constitutes the major per centage of most soils, and a large per centage of grain and straw; but as this silica is insoluble in water and acids, and, therefore however finely divided, cannot enter into the roots of plants, which feed only on liquids and gases, and what the former holds in solution, it is manifest that this silica must be decomposed and exist in a soluble state, and in actual solution, before it can be susceptible of being assimilated by the roots of plants for their sustentation and nutriment. How is this most essential and also most difficult decomposition effected?

The combination of the second mentioned gas, hydrogen with the elementary metal potassium, forms a compound called potass; this potass and soda the base of salt, are in their similar properties very intimately related to each other, and are called (by an Arabic term meaning salt and acrid) alkalies. Oxygen and hydrogen adhere to each other in a particle of water or steam with a vast and absolutely immeasurable force, and chemists would as successfully attempt to cleave the globe by mechanical force, or melt it by fire kindled on its surface, as to separate, by either of those means, the oxygen and hydrogen of a single particle of steam or water, but this is an operation performed immediately by the action of potass or soda, for these substances and hydrogen have such strong attraction for each other that they combine whenever the metal comes in contact with water. The compound earths thus formed are exceedingly stubborn, so that unless by their action on each other, furnaces cannot change them even to liquidity. Take an instance from the arts: thus, in the manufacture of glass and the vitrifiable ingredient of porcelain, the above-mentioned silica is liquified by and combined with soda, and the compound becomes frit or rough glass, and the furnace would eternally refuse to decompose or even liquify the silica without the energetic action of the soda. This is a most important case in point in any inquiry concerning the effects of salt in agriculture, for the action of soda is similar on the silicate in the soil, decomposing and holding it in solution, and thereby rendering it susceptible of being assimilated by the delicate fibres or rootlets of plants, for the sustentation and nutriment of the system.

But not only do the alkalies potass and soda decompose that most important constituent silica, but they are also themselves extensive, essential, and vital ingredients in the composition of the principal crops grown in this country: thus, wheat, oats, potatoes, turnips, and mangel wurzel contain of the alkalies potass and soda 42, 49, 57, 54, and 45 per cent. respectively; therefore in manuring with salt, soda, or potass, you give to plants in the most convenient form, the ingredients most necessary for promoting their health growth, and vigour. Potash forms a large portion of all land plants, and soda of all sea plants; and in general the plants cultivated by the farmer appear quite indifferent as to which of these alkalies they obtain, for a small supply of the one is always made up by a corresponding increase of the other in the plant.—Land frequently cropped is, it is manifest, deprived of a great quantity of these alkalies, they supply the starch or fat-producing principle of vegetables. Animals retain soda in the system, but their excretions reject potass, and return it to the earth, but as it is soluble, the natural course of rivers carries it off to the sea, whence it is again slowly returned held in solution by rain water, and hence the necessity for a new supply from ashes, seaweed, &c. But potass, soda, or salt being, as was shown indifferently incorporated into the system of plants, either of them is an excellent substitute for the other or both, and thus their use and effects become equally manifest.

We rational animals feed on vegetables with soda, and when we are deprived of soda, our meals not only lose their relish, but become actually nauseous, and therefore injurious; this may be also inferred from the fact of soda being a principal ingredient in our composition; but so is it also in the composition of our irrational brethren, cattle and sheep, and therefore not only by analogy, but also by positive fact, salt, as a main constituent of their composition, must be necessary to them, and as their means of procuring it are limited, and as they receive no artificial supply of this commodity, the eagerness and relish, and consequently the efficacious manner in which they take the additional quantity, afforded by the costs and salt marshes, is quite natural, and what should very legitimately be expected. Sulphur and salt being radical constituents of animals, the absence of the latter from the inferior order may produce as destructive effects on the system, as the absence of the former is known to do on the human body in long sea voyages, by predisposing it to, and afflicting it with scurvy. All the materials of life are continually drained into the ocean.—Its crystallizable salts afford the supply of soda necessary for man's sustentation, and that of the animals he subjugates to his service, whilst its unchrystallizable compounds, potass, are equally useful in supplying the necessary ingredients for the welfare of the plants cultivated by him. In fine, sulphur, salt, and potass being all soluble, are borne by the natural course of rivers into the ocean, whence after the regular cycle of new combinations, they are again similarly extricated by evaporation, borne along by those wing-footed messengers the winds, and deposited (*principally on the sea coasts*) by the rain in the bosom of the soil, to carry on their life-supporting ministrations.

He that rewards the deserving makes himself one of the number.

From Bell's Weekly Messenger.

FALLOWING.

The great agricultural operation of fallowing has certainly of late years been accomplished with less labour yet with more success. It would, perhaps, be attended with still greater good results if the farmer more commonly understood the chemistry of a fallow—if he did not too frequently conclude that the destruction of weeds, and the rendering heavy soils more friable, are the only points to be attended to. That there are other phenomena, however, resulting from this operation has been shown by the laborious researches of more than one great chemist. To a few of these recent investigations we could not, perhaps, direct our attention at a more useful period than the present. That the inorganic ingredients of the soil are gradually decomposing by external agencies, and that the ingredients into which they are resolved are thus rendered more available for the support of growing plants, has been long since shown. It has also been found that this decomposition is accelerated by a more free access to these earthy matters by the atmosphere. Hence one advantage of diminishing the closeness and tenacity of the soil. "All soils contain," observes Professor Johnstone (Elements of Chemistry, p. 120), "an admixture of the fragments of those minerals of which the granite and trap rocks are composed, which by their decay yield new supplies of inorganic food to the growing plant. The more frequently they are exposed to the air, the more rapidly do these fragments crumble away and decompose. The general advantage, indeed, to be derived from the constant working of the soil, may be inferred from the fact, that Tull reaped twelve successive crops of wheat from the same land, by the repeated use of the plough and the horse-hoe. There are few soils so stubborn as not to show themselves grateful, in proportion to the amount of this kind of labour that may be bestowed upon them."

The farmers of the north of Hampshire, also, whose soil consists of a very thin stratum of red clay, resting immediately on chalk, have yet found so total an absence of lime from their soils, that they have long been in the habit of digging pits to a depth of more than 20 feet. and wheeling over their lands very considerable dressings of chalk, in many instances spreading 2000 bushels per acre. It is quite certain, therefore, that as merely affording a more copious supply of inorganic ingredients to the long cultivated soil, the effect of an increased depth of ploughing will generally be to add to its fertility. There is another mode in which a soil is deprived of its earthy matters; thus, as Professor Johnstone remarks, certain substances are contained in every soil, whether in pasture or under the plough, which gradually make their way down towards the subsoil.—

They sink till they reach at least that point beyond which the plough does not usually penetrate. Every farmer knows that lime thus sinks, though many are not aware that the coltsfoot which infests their fields is a sure indication that the lime still lingers in the subsoil, and might be brought again to the surface by a deeper ploughing. In peat soils top dressed with clay, as in Lincolnshire, the clay thus sinks. In sandy soils, also, which have been clayed the clay sinks, and in all these cases I believe the sinking takes place more rapidly when the land is laid down to grass; where soils are marled the marl sinks, and the rains in like manner gradually wash out that which gives their fertilising value to the under chalk soils. "If this," add Mr. Johnstone, "be the case with earthy substances, such as those now mentioned, which are insoluble in water, it will be readily believed that those saline ingredients of the soil which are easily soluble will be still sooner washed out of the upper, and conveyed to the under soil. Thus the subsoil may be gradually become rich in those substances of which the surface soil has been robbed by the rains. By bringing up a portion of this subsoil by deep ploughings we restore to the surface soil a portion of what it has been gradually losing. We bring up what may probably render it more fruitful than before." The young farmer need hardly be reminded of the necessity of varying his operations with the nature of the soil he attempts to improve; that in many situations deeper drainage must precede deeper ploughings, and that in other soils it is well to deepen only by slow degrees, to avoid bringing to the surface, in the first instance, more than an inch or two of the under stratum, and to let that portion remain for a season, mixing with the soil and exposed to the action of the atmosphere before the next thin paring of the substratum is brought by the plough to the surface. Of this opinion appears to be Mr. J. Wilson, of Penicuick, who, when speaking of subsoil ploughing, thus remarks (Trans. High. Soc., 1847, p. 619)—"Besides being a valuable auxiliary to furrow draining, by breaking up the tenacious till, and allowing the water to escape into the drains, it likewise enables the farmer, during the course of cultivation, to mix small quantities of the virgin earth of the subsoil with the surface, which, little by little, gradually tends to increase the depth of the vegetative mould, a plan certainly more judicious than that practised by those who advocate the cause of shallow culture to save manure, and I suspect in most cases more expedient than at intervals to bring up large quantities of the under stratum to improve the exhausted soil." These gradually soil-deepening fallows, too, are exactly those which we have long seen so successfully carried on upon the poor thin gravelly soils of Spring Park, by Mr. Hewitt, who tersely observes (Farmers' Almanac, v. iii., p. 30,) in his advice to the young farmer, "never be contented until all your land has been trenched, and turned over with the plough a foot in depth."

Newcastle Farmer.

COBOURG, SEPTEMBER 1, 1847.

Many erroneous opinions were formerly held, respecting plants, it was supposed they possessed the power of generating vegetable substance, that their growth was in fact a creation of something, previously nonexistent, miraculously called forth; and assuming form, color, aroma, division of parts and organic functions of life; such is not the case, high authority declares "there is nothing new under the sun," all the elements of the first creation are still in existence in one form or other, neither augmented nor diminished; different combinations in almost endless variety are entered into in a manner far surpassing our imaginations and understanding.

"So the old Ceasers' turned again to clay,
May patch a hole to keep the winds away."

Decomposition, is but the separation and distribution of elements hitherto combined in one form, again to amalgamate and unite to produce other and more intricate and beautiful wonders of nature; and this without any fresh exercise of creative power, since all the works of the great Creater are indissoluble.

All plants do combine various gases or elements of vegetable matter, but all plants do not combine the same elements, nor an equal portion of those elements: for in some instances, some one or other are in excess, while these, in other cases are found in exceedingly minute proportions or are altogether rejected. It is therefore necessary (when contemplating the application of particular manures) to make the enquiry, whether such manures form the constituent parts of the crop to be raised, and also whether the land cultivated is deficient in such constituents.

In some instances, it may be, that the manure employed may not *directly* enter into the composition of the plant but only serve the auxiliary purpose of fixing and conveying, or generating, by combination with other substances some of those gases which would not be evolved without the aid of such substances, or they may act by collecting the ammonia of the atmosphere and conveying it, at once to the roots of the plant.—That the amount of rain which falls, produces fertility, is evident, especially as rain is generally accompanied by an increase of temperature, and the action of such water (charged with atmospheric gases) on the various ingredients contained in the soil, renders them fit to enter into the composition of vegetable substances, but where the soil is already surcharged with moisture from want of under draining this water does not penetrate, but passes at once from the surface and all its beneficial action is dissipated and lost. Poverty of soil, implies a deficiency of some one or more of the elements necessary to the growth and maturity of Agricultural produce; this defect, may be natural as not entering into the texture and composition of a particular soil, or may arise from the adoption of such modes or continued course of cropping as shall have exhausted faster than they could be generated these particular ingredients—but we hardly conceive a case wherein restoratives may not be found to supply the deficiencies.—Analysis will point out the defect, and science will suggest the remedy.

It will only be by careful, and long continued study and enquiry, that material important facts will be developed, but such will come to light and ultimately, as the human family increases, and the vast population crowd upon each other, spots heretofore deemed unmanageable and almost inaccessible (as in China) will be subject to culture by the hand of man, until the desert become a garden and the whole wilderness be made to blossom as the rose.

The harvest in this district is fast approaching its close, and on the whole has been a favorable and certainly an early season. Our belief as far as relates to the wheat crop is, that it will be found much below an average when it comes to the scale; a great breadth of land which had been sown in the fall, was broken up again for spring grain, and many of the crops left to mature, will scarcely more than return their seed after paying for harvesting; the very best crops cannot (except in solitary instances) be called heavy and the remainder are decidedly light, and the spring wheat will not be more than an average.

Barley and Oats seem to have done better than ordinary and of the former a fair average may be expected; the latter except in very unfavorable situations a full crop.

Peas, also seem to have done well, and are not infested so much with the grub as in some seasons, and the haulm has escaped the mildew.—The Potato will no doubt be found much freer from the disease than during the past two years and from what we can learn such is the expectation formed in the British Isles, indeed throughout Europe generally; an event calculated to give the greatest satisfaction, seeing how largely it has contributed as food for the support of millions, and who were without the means, (even if they had the inclination) to adopt the more costly substitute of the various Grains; nor could cultivateable land be found on the instant for the growth of the additional quantity necessary, seeing three acres would be required for the grain for every one in use for the cultivation of the root and this, it would be impossible to find in a condition to be immediately available.

Before the issue of our next number the fall wheat will have been sown, at any rate on all the old cultivated lands—whether after fallow or peas, the lands carrying hoe crops being most likely destined, either for Spring Wheat or Barley. The vast amount of wheat of last year's sowing which was lost by killing either during Winter or Spring, will doubtless induce great caution in putting the Seed into the ground, which will be done in what is considered by each party in the best and most approved manner. We have seen the wheat plant to have suffered severely in almost every variety of situation and mode of treatment, it has prospered and failed on land indifferently, or well tilled; open, and sheltered situations have both suffered; early or late sown have brought no exemptions, and all the numerous varieties of the grain have been hurt more or less; that some descriptions of wheat are much hardier than others is admitted on all hands the difference being almost uniformly in favor of the Red over the White varieties, and still the latter are sought after and most readily adopted, and why? because the merchant and miller will give three-pence per bushel more for one than the other, but what compensation is this to the farmer, it amounts to about 5 per cent. on his sales at a probable loss of 10 bushels per acre or from 30 to 40 per cent. on all the wheat he raises: There may be some white wheats more hardy than others but they are all less so than the Red and for this reason we would advise the adoption more generally of the latter, and if we were about to sow much wheat we should get the land in good tilth, plough it in with a shallow furrow then leave it as left by the plough and not suffer a harrow to go near, thus affording the young plant all the protection of the furrow's depth and a hold for the snow to afford a covering.

SUCCESSFUL STEEP FOR SEEDS.

Much has been said and written on the subject of soaking seeds in different preparations, for the purpose of promoting their rapid vegetation and growth. As far as I have heard or read, these experiments have proved that the most of these solutions or preparations are nearly or quite worthless. I will, however, state a few facts in regard to one solution that I have tried for the last three seasons.

In the winter of 1845 I found, in the Philadelphia Saturday Courier I think, the following recipe—"Soak garden seed four hours in a solution of chloride of lime in the proportion of ¼oz. chlor. lime, to one gallon of water." The writer observes that seeds which were soaked thus, came up some days sooner than those which were not soaked, and that the plants kept the lead through the season.

The experiment being easily tried, I made up my mind to give a fair trial, and see what the result would be. On the 10th May, 1845, having my ground ready, beds made, hills all prepared, so that as little time as possible should be consumed in planting, I put cucumber, muskmelon, beet, summer savory and radish seeds, and corn, beans and peas into the solution, let them soak four hours, and planted immediately.—Twenty-four hours after planting, I dug up some of the corn and peas, and found that their roots were from one to one and a-half inches in length. In forty-eight hours the roots were three to four inches and the spire one to one and a-half inches in length. The precise day that they broke ground I now forget.

My cucumbers and melons came up quick and well, and for the first time in my life, my beets were up before any weeds were started. In a garden adjoining mine, planted nine or ten days previous to mine, beans were just breaking the ground when mine were planted, yet mine passed them in a week, my corn came up about the same time, and my peas came up first. Now as to the *moisture* merely, seeds lying in the ground eight or ten days would imbibe as much as they would by being soaked four hours. I have not marked the exact time of my seeds vegetating, since 1845. I know, however, that my seeds do not fail me as they used to do, and as my neighbor's very frequently do.

This year I did not plant my garden till the 17th of May. Everything that I soaked came up quick, so that my plants were altogether ahead of the weeds, and my cucumbers and melons have kept out of the reach of the bugs, while my neighbors have planted two, three or four times. I have never seen any notice of this solution, except as above mentioned. Two or three of my neighbors have tried the experiment this year with the like good result. BAILEY. *Binghamton*, 1847.

WHAT MAY BE DONE WITH POOR LAND.

Near to the town of Mere, in Wiltshire, we *(Hants Advertiser)* were struck at beholding the fine crops, the excellent order the fields appeared to be in, the low neat cut hedges or fences, and the immense quantity of oxen, cows, and sheep grazing in the meadows; this led to any inquiry to whom those rich, broad fields belonged. To Sir H. R. Hoare, the rich banker of Fleet Street, London, was the ready reply, whose seat is about three miles from Mere, and who has the following seven farms in his own hands:—Shirton, Knoyle, Colcot, Hill Grounds, Brenham Lodge, Top Lane, and Search Farm; altogether containing between 3000 and 4000 acres of land, once so poor and considered so unproductive that every farmer of the old school failed in getting their living from the farms they occupied; hence Mr. Hoare, one after the other, was driven to make the best of such land, or suffer it to be still less useful if overrun with weeds. He therefore hired farm bailiffs, purchased horses, and every necessary implement of husbandry; employed at least 150 labourers, keeping between seventy and eighty horses, giving constant work to woodmen, carpenters, bricklayers; thus more than 200 men through him have constant employment, winter and summer, wet or dry, at good wages; the lowest amount paid to labourers is 12s. per week, some having 21s. at the present time; no reduction in the cold and short days. His cottages are let to his labourers at from 30s to 40s. per annum, with large gardens, sight of common or pasturage, enabling some to keep a cow or two, and in the winter to fatten two or three pigs. About one-third only is grazing land; he has never less than 1000 and 500 ewes for breeding, of the pure Southdown breed; nearly 1000 acres of this very land was never considered to be worth more than 1s. per acre per annnm, when Mr. Hoare had it first in his possession, the occupiers thinking three to four sacks per acre of wheat a good field; now by cultivation, draining, manuring, it would let for 30s. per acre. Five hundred acres of wheat grown last year on this land produced from 10 to 11 sacks per acre. This gentleman lets off a large breadth of land to farmers in the neighbourhood, giving every encouragement and assistance to those who will follow in his plans, by lending them money, finding them drain tiles, and rendering every assistance they may reasonably ask.

PREPARATION OF LIQUID MANURE.

The most simple method of procuring and applying liquid manure is as follows:—Let a tank be made sufficiently large to contain the urine of all the cows for six months at least, during which time each cow will void from 500 to 600 gallons of urine; of course the quantity will vary according to the description of food used, and the time required to "ripen" it will also depend upon the season of the year and state of the weather—a shorter time in warm and a longer in cold weather. Let the tank be divided into at least two compartments, each having a pipe or sewer to admit the liquid to enter; allow but one at a time to receive it, and when that is half full, add an equal quantity of water, and let the urine flow into the second. To render the liquid more valuable, the ammonia must be "fixed," or converted into what chemists call a "sulphate," by applying sulphuric acid, sulphate of iron (green vitrol,) or sulphate of lime (gypsum.) The quantity of either of these necessary to be applied must depend on the state in which the liquid is at the time of the application, and a little experience will point out when to stop adding the sulphate, which is indicated by the effervescence, or bubbling, ceasing. The time to apply it is when you stop letting in the urine, and have added the water, well mixed with the urine; the place to apply it is in the tank, before you pump or fill the liquid into the barrel, or liquid manure cart. For a small farm, a few common barrels, buried or sunk in the floor of the cow-house, in some convenient corner, will be the cheapest and best kind of tanks, as they there will be free from excess of water enter into them; but they should be carefully covered, so as to keep down the bad smell which will be perceived until the application of the sulphate. We hope these few hints will suffice for the present.—*The Farmer's Gazette.*

LIQUID MANURE.

The following statement by Liebig would not require great exertion to remember, and might prove useful to every cultivator of the soil, viz., that with every pound of urine a pound of wheat might be produced, and with every pound of ammonia, which evaporates, a loss of 60 lbs. of corn is sustained.

There is generally a scarcity of vegetables in the garden about the time when the old goes out and the new comes in; and the frosts of last winter have helped to clear the ground sooner than the gardener cared about. An opportunity may be had in many places for trying the value of liquid manure upon certain crops, which will make them somewhat earlier and more abundant. Try it upon winter spinach. Clear the ground well of any weeds that may be found among the plants, then stir the soil well between the rows with a fork; after the stirring, give the soil a good watering with the liquid manure; in a few hours afterwards the ground may be smoothed between the rows, and the effects of the operation will soon begin to make their appearance in shape of broad dark green leaves. The same operation may be done to rhubarb plants, in places where it is not forced, and the plants will be the better of it for a time to come.—*Scottish Farmer.*

IMPORTANT.

It is said by some agricultural writers, that it takes one acre of land to sustain five sheep, during summer and winter. We, however, will calculate one acre to *three* sheep. The land which would do this, we calculate at $5 the acre, if fenced in large lots. The price of sheep immediately after shearing, averages, say, $1, and lambs, 75 cents. The profit and loss account with 100 sheep, would be thus:

SHEEP ACCOUNT—DEBTOR.

100 sheep, to interest of purchase money,	7,00
Interest of 33 acres of land, at $5,	11,55
Curing and stowing hay, on 5 acres above,	6,25
To expense of shearing,	3,00
To loss by death, 2 per ct. over pulled, wool,	2,00
Labor of foddering during the winter, say	5.00
Salt, tar, and summer care,	4,00
Int. on winter shelter, worth, (say $25)	1,75
	$40,55

CREDIT.

By 300 lbs. wool,	25 cts.	$75,00
80 lambs,	75 cts.	60.00
Manure,		10,00
		$145,00
Cost as above,		40,55
Balance,		$104,45

Giving a profit of over one dollar a head, or a hundred per cent. on the investment for a hundred sheep.

Hints to Farmers.—"It is in vegetable as in animal life; a mother crams her child exclusively with arrow root—it becomes fat, it is true, but alas! it is ricketty, and gets its teeth very slowly, and with difficulty. Mamma is ignorant, or never thinks, that her offspring cannot make bone—or what is the same thing, phosphate of lime, the bulk of bone—out of starch. It does its best; and were it not for a little milk and bread, perhaps now and then a little meat and soup, it would have no teeth at all—A fowl with the best will in the world, not finding any lime in the soil, or calcareous matter in her food, is incapacitated from laying any eggs at all. Let Farmers consider these facts, which are matters of common observation, and transfer analogy, to the habits of plants, which are as truly alive, and answer as closely to evil or judicious treatment as their own horses.

A Miller, meeting one of those boys (of which most towns have one) called an "idiot," asked him a question, which Jock was unable to answer, "Jock," said the miller "you are a fool," "yes sir," said Jock "everybody says so; but (continued he) there are *some* things I know, and some I don't know." "Well what do you know?" "Why," said Jock, I *know* millers always have got pigs," "Well and what don't you know?" "Why" replied Jock, "I *don't know* whose meal they eat."

A horse consumes the produce of four or five acres in Oats and hay; and in farming, every horse consumes one-sixth of what he cultivates.

Food for Pigs.—For Pigs.—Peas, and hard grain should be ground; for Sheep and all animals chewing the cud, this is not necessary.

Natural Curiosity, the Fern.—If the stalk of this plant be cut through (from the flat side) at the surface, or a little below, or above the ground, an exact miniture representation of the "knotted and gnarled oak" will be seen on the partcut.

Nuisance.—The idle levy a very heavy tax upon the industrious, when, by frivilous *visitations* they rob them of their time, such persons by their daily happiness from door to door, as beggars their daily bread: and, like them, sometimes meet with a rebuff. A mere gossip ought not to wonder if we evince signs that we are tired of him, seeing that we are indebted for the honor of his visit solely to the circumstance of his being tired of himself.

To stop a fit of Coughing.—A correspondent of the London Medical Gazette states, that to close the nostrils with the finger and thumb, during respiration, leaving them free during inhalation, will relieve a fit of Coughing in a short time.

Bleeding at the Nose.—Persons subject to this complaint will find a simple and instantaneous remedy, in tying a piece of thread, or twine tight round the upper joint of the little finger on the side the nose bleeds from. Smelling the common garden parsley is also said to be effectual.

A wealthy citizen of Athens, complained that Aristippus the philosopher, in requiring five hundred pieces of money for the instruction of his son, had demanded as much as would purchase a slave, "purchase one then with money," said the philosopher, "and you will be master of two."

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