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THE

NEW-BRUNSWICK AGRICULTURIST.

AUGUST, 1841.

Printed at the Brunswick Press, Prince William Street, by W. L. Avery.

THE NEW-BRUNSWICK AGRICULTURIST.

VOL. I. } SAINT JOHN, AUGUST, 1841. { No. IV.

ROTATION OF CROPS.

(Continued from page 74.)

AGRICULTURAL chemists have laid down the following propositions for the direction of practical husbandmen in the rotation of crops, viz.:

1. That all plants have a tendency to exhaust the soil.

2. That some plants exhaust it more than others.

3. That all plants restore to the soil an excrementitious principle.

4. That this principle does not act as a manure to the plant which restored it to the soil, but that this vegetable excrement, deposited by one species of plants, may act as a manure to other species different from that which deposited it.

5. That all plants do not restore to the soil the same quantity or the same quality of this matter.

6. That two species of different plants may grow together, and mutually benefit each other by their interchange of this principle, and that this interchange, with others again, would injure both.

7. That all plants affect differently the growth of weeds;

From whence it follows:

1. That a continued succession of the same crop must exhaust the soil.

2. That soils are injured by crops, in proportion to the quantity of nutritious matter they extract from the soil, and the diminished quantity of nutritious principle which they restore to it.

3. That plants of the same kind should not return too frequently in succession, or in the circle of cropping.

4. That perpendicular rooting plants, and those which direct their roots horizontally should succeed each other.

5. That two plants, equally favourable to the growth of weeds, should not succeed each other.

6. That crops which exhaust the soil, such as wheat, &c. should only be sown when the soil is in good heart.

7. And that the succession of crops should be regulated by the influence of particular crops upon particular soils, as some soils are more readily exhausted than others.

It may here be observed, that particular insects feed upon particular plants, and that their destruction must follow that interchange or rotation of crop which deprives them of their food in the particular plant; hence their destruction may be considered as one among the many advantages of rotation.

Although general rules may be given for a system of rotation, still much "judgment and experience are necessary to arrange the plant, and to adapt it to all the varieties of climate, soil, and situation; for although it may be an apparently easy matter to follow up an alternate crop of *white* and *green crops*, yet very little observation will convince any practical man, that the general rule may be strictly observed, and still the system of cropping may be very defective."

Experience has proved that the fertility of soils is destroyed in various degrees by different plants; and that in some cases the fertility cannot be restored by the ordinary manures, ever so abundantly bestowed, if the exhausting crop is continued on the soil. Chemistry, by its analysis of soils, has discovered the presence of various salts, which enter the vegetable system, and it may reasonably be inferred that their presence increases, and that their absence destroys the fertility of soils, and that the *degree* of fertility will depend upon the quantity of such matters. It has also discovered the important principles in the atmosphere, which are essential for vegetation, and by an analysis of manures it has ascertained their relative values, and the superiority of some over others, in consequence of the greater quantities of fertilizing salts which they contain.

The chemical composition of a soil must therefore influence the success or failure of the crop; and, consequently, whenever it is in the power of the farmer to ascertain the constituent principles of his soil by chemical examination, he should avail himself of the information, as it would assist him greatly in determining the choice of his crop. We are aware of the difficulties which have hitherto opposed this species of valuable knowledge in our Provinces; but they are now in some measure removed by the presence of gentlemen in them, who can give the requisite information to those farmers who will take the trouble and the proper method of obtaining it.

As we have already observed, some plants, if continued on land, destroy its fertility for similar crops, notwithstanding the most copious supplies of manure; thus wheat or peas, grown year after year on the same land, will dwindle and fail in spite of the most abundant manuring. The fate of peas in this respect is obvious in those gardens where they are planted yearly on the same ground, come up, dwindle, turn yellow, and yield no crop, to the astonishment of ignorant gardeners, who blame the season, insects, or the seed.

Potatoes form some exception to the general rule, as they are known to yield well year after year on the same soil, if well manured. The cultivation of this crop on many of our farms which display no systematic cropping, proves that the potatoe may be raised in this manner for successive years. But we would ask, is it not possible, that the deteriorated and diseased state of this vegetable, which so frequently occurs, may be owing to its continued growth upon a soil which is yearly losing some proportion of the constituents necessary for the perfect developement of a wholesome vegetable. It is true that the tops and seeds of the plant, which are left upon the field, may partially restore these constituents; but not in a proportion equal to that in which they are removed by the fruit: and, if, as agricultural chemists assert, plants throw out an exerementitious matter, might not the continued growth of the same plant amidst such matter, even if the other constituents of the soil permitted a healthy action, contract disease? We ask the question, and submit it to the consideration of the inquiring and practical farmer. For it is obvious that the potatoe crop in these Provinces is frequently injured both in quantity and quality by causes which have not been recognized.

The advantage and necessity of rotation being established, we must next inquire, what crops can be grown to the greatest profit of the farmer, and what are the succession of crops best calculated to improve the condition of the soil eventually, and thus increase the profits of the owner of it.

As the rotation is governed in some respect by the peculiarity of the soil, we shall annex a table, which has been given by Von Thaer, as a classification of soils, calculated to assist the judgment of the farmer.

This table shews how many parts of clay, and sand, and carbonate of lime, and humus, or vegetable mould, are contained in a hundred parts of different soils, suited for wheat, barley, oats, and rye.

Nos.		Clay Per cent.	Sand. Per cent.	Carb. of Lime. Per cent	Humus Per ct
1	First class of strong wheatsoils	74	10	4½	11½
2		81	6	4	8½
3		79	20	4	6½
4		40	22	36	4
5	Rich Barley Land,	20	67	3	10
6	good wheat Land,.......	58	36	1·22	4
7		56	39	small quantities in each	2
8	ordinary do	60	38		2
9		48	50		2
10		68	30		2
11	Good Barley Land,	38	60		2
12	ordinary do	33	65		2
13		28	70		2
14	Oat and rye Land, ...	23½	75		1½
15		18½	80		1½

Nos. 1, 2, and 3, are alluvial soils of the richest quality, and they are rendered easily managed by the large quantity of humus, or vegetable mould, which they contain. No. 4, is a fine clay loam, easily worked and kept in heart. No. 5 contains such large proportions of sand and humus mixed with the clay, as to adapt it well to the growth of barley and green crops, and it is therefore well suited for rotation crops. Nos. 6 and 7 are both good soils; the quantity of lime in some measure compensates for the small quantity of humus. Such a soil requires a proportionate quantity of dung to remedy this deficiency. Nos. 9 to 12 are fair average soils, but require the addition of lime or marl. Nos. 14 and 15 are light sands, requiring manure, judicious management, and the aid of a folding flock.

It may here be observed that if the vegetable or surface soil is only about 6 inches deep, its productiveness will be influenced by the character of the subsoil, or undersoil, which may be either too porous or too retentive, and, consequently, produce unfavourable effects in particular seasons. But if the surface soil varies from 9 to 12 inches, the character of the undersoil is of less moment, although a limestone bottom is considered the best.

We are told that the rotation must be governed in some respect by climate. This may be perfectly correct as regards the value of the produce obtained from the soil; but we do not understand what particular influence climate can exert upon the chemical composition of a soil giving certain principles to, and receiving certain principles from plants, governed by the general laws of the vegetable economy, for wheat in New Brunswick and wheat in England require and receive the same principles and *salts from the atmosphere and earth.*

The following crops are those generally cultivated in these Provinces, we see no reason why the same system might not be adopted here. The crops are, wheat, barley, oats, rye, beans, peas, clover, potatoes, and turnips. Tares, or vetches, are also used in the rotation in Great Britain, and are appreciated as an excellent food for cattle, sheep, and pigs.

Although it is impossible to define any one system of rotation that will answer equally well in all situations, *still " it may be stated as a principle* that will hold true in most instances, that *alternate husbandry*, or the system of having green and grain crops to follow each other with some modification, is practicable on every soil," and as all soils by continued tillage will become languid and lose their fertility, notwithstanding manures, *pasturage* is introduced into the rotation to restore the exhausted nature of them.

Rotation on clay soils.—Heavy clays of a cold nature.—A well wrought naked summer fallow has been considered the basis of good husbandry on such soils; but when they are well furrow-drained it is thought that the turnip, potatoe, or other green crop might be substituted for the naked fallow. The fallow, generally dressed with lime, cropped with white beans and clover, has constituted the rotation on such soils. A crop of oats has succeeded the wheat, after which the land has been laid down to clover for two or three years, when it was again broken up.

The ordinary rotation on *thin clays*, is, 1. Turnips, well dunged. 2. Oats.

3. Clover. 4. Oats. "In most clays of the ordinary description, the last crop of oats should be sown with pasture grasses, and left for a few years or until they begin to engender moss."

On a strong land of a dry and not of too tenacious a quality, the most general routine is, 1. Fallow. 2. Wheat. 3. Beans. 4. Barley. 5. Clover. 6. Oats, or sometimes wheat. If there is any doubt about the ripening of the bean or the potatoe, oats may be substituted in its place.

A favourite rotation on some of the strong lands of England, is, 1. Summer fallow, limed. 2. Barley. 3. Clover, first fed, and afterwards kept for seed. 4. Wheat. 5. Beans, dunged. 6. Wheat. 7. Oats.

The wheat and oats are taken in this rotation in alternate successions, without any material damage to such soils, although "two successive crops of white corn are justly objected to, upon the best principles of cultivation."

"All other circumstances being favourable, good clay soils are particularly adapted for the production of wheat and beans, and may be continued under these crops alternately as long as the land can be kept free from the weeds by drilling the bean crops. This is the most profitable course of cropping that can be followed, provided a sufficiency of manure be procured, and the drilled beans be alternately horse and hand hoed. The nature of the soil, or other circumstances, may render a crop of clover or rye-grass necessary occasionally for one year, and this can be succeeded by oats." The rotation then would be. 1. Fallow. 2. Wheat. 3. Clover and rye grass. 4. Oats. 5. Drilled beans. 6. Wheat. In this rotation the manure should be applied every 3d or 4th year, first to the fallow and then to the bean crops. When the soil becomes weedy, another naked summer fallow should be given, which commences a fresh rotation. The following rotation is sometimes pursued, as being less expensive and more easily effected. 1. Fallow. 2. Wheat. 3. Drilled beans. 4. Barley. 5. Clover and rye grass. 6. Oats. 7. Drilled beans. 8. Wheat; after which a new fallow begins a new rotation.

In some cold clays the following rotation is recommended. 1. Fallow, with dung. 2. Barley, beans, or oats. 3. Clover cut the first year, and pastured for two or three years. 4. Oats; and then a new succession.

Alternate crops of potatoes, wheat, and clover have been successfully grown in the neighbourhood of large towns, where manure could be easily obtained, and the crop of wheat was of less consequence as an article of sale in the market, than the potatoe. A better course, however, is that which is adopted in the neighbourhood of Edinburgh and Glasgow, viz. 1. Potatoes. 2. Wheat. 3. Clover. 4. Oats.

Rotation on Loams.—Every soil intermediate between absolute clay and sand, or gravel, is termed loam. Loamy clays constitute the best description of clay soils, and may be cropped under nearly the same principles as those applied to light ground from which they differ only in their degrees of quality; rich free loam is the most profitable description of land; it is easily cultivated, and produces almost uniformly excellent crops. The management of this loam depends greatly upon the subsoil. If the subsoil is retentive, the surface will require to be cleared from root-weeds once in a rotation of six or eight years, by means of a summer fallow; whereas, if the subsoil is porous, an effectual cleansing may be given by a drilled crop of turnips, or potatoes. The rotation may then be 1. Turnip fallow. 2. Wheat. 3. Clover and rye grass. 4. Oats after grass. 5. Drilled beans. 6. Barley. 7. Clover and rye grass. 8. Oats, and this to be succeeded by turnips. Manure should be applied with the beans. On some fertile loams, the rotation is, 1. Turnips. 2. Oats. 3. Clover. 4. Wheat. 5. Oats. 6, Beans, and 7. Wheat again. Upon rich clay loams the rotation may be 1. Fallow; or turnips dunged. 2. Wheat. 3. Beans, drilled and horse hoed. 4. Barley. 5. Clover and rye grass. 6. Oats or wheat. 7. Beans, drilled and horse hoed. 8. Wheat. The clover stubble must be dunged. This is considered an excellent rotation for an abundant return throughout the whole. Some farmers think that it would be better to dress the clover stubble with ashes, or plaister of Paris, and put the dung upon the crop of Beans.

The rotation on clays and loams of an inferior description has been— 1. Fallow, with dung. 2. Wheat. 3. Clover and rye grass. 4. Oats. 5. Beans, drilled with horse dung. 6. Wheat. This is considered the best rotation for such lands. The land should be well drained, well tilled, and well dunged. On such soils, where the growth of the bean is considered uncertain, the rotation is a bare fallow, wheat, grass for 2 years, after which oats and wheat. This system, although at variance with the general rules of good husbandry, is recommended upon cold thin lands, as the surest to repay the expences of cultivation.

The following rotation has been pursued by eminent agriculturists upon good wheat and bean land. 1. Wheat on a clover ley. 2. Tares. 3. Barley. 4. Beans. 5. Wheat. 6. Tares. 7. Barley. 8. Clover.

Light, calcareous, and gravelly soils.—On such lands the rotation may be 1. Turnips. 2. Barley. 3. Seeds, under pasture during three years. 4. Oats. 5. Drilled beans and peas. 6. Wheat.

Light lands imply sandy loam, or loamy sands, which are mere gradations of the same constituents. Every rotation on them should be commenced with a well wrought and well dunged turnip fallow.

Another course of crops for such soils may be, 1. Turnips in drills. 2. Wheat or barley. 3. Clover and rye grass. 4. Oats, and round again to a new rotation. "On good turnip soils this rotation may be repeated indefinitely, provided the turnip crop be eaten on the ground, that the grass crop be pastured, or that the manure derived from the hay be returned to the ground. In this rotation the alternate pasturage should be occasionally introduced to keep up the fertility of the soil. On good turnip soils, manured only with the manure obtained from the barn yard, the following rotation is recommended. 1. Turnips. 2. Wheat or Barley. 3. Clover and rye grass. 4, 5, and, if necessary, 6. Pasture. 7. Oats; and round again. But when manure is within reach, as, for instance, near towns, the white and green crops may be followed alternately for a number of years in this manner: 1. Potatoes or turnips. 2. *Wheat.* 3. *Drilled peas* or beans. 4. Wheat or barley. 5. Potatoes or turnips. 6. Wheat or barley. 7. Clover and rye grass. 8. Oats. This rotation is practised near Edinburgh: *but it is thought that the* wheat occurs too often.

Near large towns, 1. Potatoes. 2. Wheat. 3. Clover and rye grass. By some the clover is followed by oats, and the rotation again begins. Others end the rotation with clover. Pasturage, however, must be resorted to, when the soil becomes exhausted, notwithstanding the abundant application of manures.

Rotation on sandy soils.—Sandy soils are not favourable to the growth of wheat, unless they contain a large proportion of clay, or receive dressings of alluvial compost, marl, or some substances which will impart to them body and strength. Barley, oats, and especially rye, are sure crops upon such lands. When well manured they produce good crops of potatoes and turnips. They consume large quantities of manure. Such soils should be pastured for a term of years. The following six years rotation has been recommended on sandy lands: 1. Turnips, with dung. In

England these are consumed on the ground. 2. Barley or oats. 3, 4, and 5, grass pastured by sheep. 6. Rye or oats. We have seen excellent crops of wheat and peas upon such sandy lands in many parts of Nova Scotia, when they were strengthened, either by clay or marsh land, and they have yielded luxuriant crops of grass, when the green sward has been top-dressed with such dressings.

In elevated districts, where the soil is dry, and the climate not too severe for wheat, the following rotation has been recommended: 1. Turnips drilled and dunged. 2. Barley, with red clover and rye grass. 3. Grass for soiling, or hay. 4. Wheat. 5. Peas. 6. Barley, with seeds. 7, 8, and 9. Pasture. 10. Oats. The land for wheat to be ploughed by the end of September, and lightly dunged. In elevated and wet situations, the soil must be tilled with a view to convert it into pasturage; as tillage for crops in such places is a doubtful experiment.

The most eligible rotation for every kind of soil must be ascertained by reference to local circumstances, and must be regulated in its duration by the richness of the soil.

The preceding rotations apply to lands already under the plough.

Uncultivated and fern lands must be prepared by breaking up with a deep furrow during the winter or early in the spring, and it must be thoroughly harrowed, and rolled, and grubbed. A dressing of five or six chaldrons of lime should be laid upon the summer fallow, ploughed in as hot as possible, and in the following spring it may be cropped, commencing with a crop of oats, followed by turnips, dunged.

Over-cropped lands are restored to fertility by laying them down to pasturage. This is the true method of effecting its restoration.

Rotations, it will be seen, embrace the alternations of green with grain crops; but as an unvarying routine has been found to fail and injure, the character of the green crops has been changed. This is done, either by changing the green crops in the rotation, or alternating one rotation with another, which is called *shifting* the course, and is practised by many eminent farmers with advantage.

We have given a brief outline of the system of rotation, that has prevailed in England and Scotland, and we now submit them to the attention of our farmers; we know no reason why they might not be adopted in these Provinces. But if they have been tried, and have not answered the condition of the country, we shall feel obliged by communications upon this important subject, founded upon the experience of judicious and observing farmers, and pointing out the defects of the preceding rotations and the advantages of any other which they may have substituted for them.

The great objects in all rotations are food for man, food for animals, and food for the soil; and every farmer who wishes to succeed in his rotations, must observe economy, management, and system, in the collection, composition, and preservation of his manures. Rotations will be failures with those farmers who allow the valuable liquid of their manures to be washed and drained away, and the fertilizing vapours of them to be dissipated in the air. We may venture this general observation, that the advancement of agriculture, and the success of the agriculturist, will be in proportion to the value which he attaches to manure—for "*muck is the mother of the meal chest.*"

AGRICULTURAL CHEMISTRY.

The art of Culture.—Carbonic acid, ammonia, and water yield elements for all the organs of plants. Certain inorganic substances—salts, and metallic oxides serve peculiar functions in their organism, and many of them must be viewed as essential constituents of particular parts.

The atmosphere and the soil offer the same kind of nourishment to the leaves and roots. The former contains an almost inexhaustible supply of carbonic acid and ammonia: The latter, by means of its humus, generates constantly fresh carbonic acid, whilst during the winter, rain and snow introduce into the soil a quantity of ammonia, sufficient for the developement of leaves and blossoms.

Leibig considers humus absolutely insoluble in cold water, which he considers a wise provision of nature, for if it was, the fertility of meadows would be destroyed by irrigation, or overflowing, especially those which lay under water for some weeks.—He thinks this insolubility is established by the fact that the filtration from vegetable moulds over calcareous caverns into them, in the form of stalactics, is not accompanied with the presence of any humic acid, which he thinks also is a convincing proof that this acid, viz. humic acid does not exist in common vegetable mould. Humus may be preserved for centuries, if kept dry, but when moistened with water, it converts the surrounding oxygen into carbonic acid. As soon as the action of the air ceases, that is, as soon as it is deprived of oxygen, the humus suffers no farther change. Its decay proceeds only whe e plants grow in the soil containing it, for they absorb by their roots the carbonic acid as it is formed. The soil receives again from living plants the carbonaceous matter it thus loses, so that the proportion of humus in it does not decrease.

All plants die in soils and water, which contain no oxygen. Absence of air acts in the same manner, as an excess of carbonic acid. Stagnant water on a marshy soil excludes air, but a renewal of water has the same effect as a renewal of air, because water contains it in solution. If the water is drawn from the marsh, free access is given to the air, and the marsh is changed into a fruitful meadow.

The process of putrefaction requires the presence of oxygen which it attracts from all surrounding bodies; these are said to be de-oxidised or deprived of their oxygen by it. The substances receiving the oxygen, are *oxidated*. Now, the moment at which all the organic matter existing in a soil enters into a state of *oxidation* or *decay*, its fertility is increased. Humus supplies young plants with nourishment by the roots, until their leaves are matured sufficiently to act as exterior organs of nutrition. Its quantity heightens the fertility of a soil by yielding more nourishment in this first period of growth and consequently by increasing the number of organs of atmospheric nutrition.

The amount of food which young plants can take from the air in the form of carbonic acid and ammonia is limited; they cannot assimulate more than the air contains. If an over-abundant supply of food in the soil gives too great an increase in the growth of the stems, leaves, and branches of a plant, these will require for the completion of their growth, and formation of blossoms and fruit more nourishment from the air than it can supply, consequently the plant will not be matured. In many cases the nourishment in the air is only sufficient to complete the formation of the leaves, branches and stem. This is exemplified in the transplanting of ornamental plants from small pots into larger ones. When on the contrary we take away part of the branches and leaves, we prevent the developement of new branches; an excess of nourishment is procured for the trees, and is employed by them in the increase of blossoms and enlargement of the fruit, vines are pruned to effect this intention.

A new and peculiar process of vegetation occurs in all perennial plants, such as shrubs, fruit, and forest trees, after the complete maturity of their fruit. The stem of annual plants, at this period of their growth, becomes woody and their leaves change in colour. The leaves of trees and shrubs on the contrary remain in activity until the commencement of winter. The formation of the layers of wood progresses, the wood becomes harder and more solid but after August the leaves form no more wood: *all the carbonic acid*, which the plants now absorb, is employed for the production of nutritive matter for the following year: Instead of woody fibre, starch is formed, and is diffused through every part of the plant by the autumnal saps." We may here mention, that *bread* is made from the bark of Pines in Sweden during famines. The following directions are given by Professor Autenrieth for preparing a palatable and nutritious bread from the Beech, and other woods destitute of Turpentine. Every thing soluble in water is first removed by frequent maceration, or soaking in water, and boiling; the wood must then be reduced to powder; and after being repeatedly subjected to heat in an oven, it is ground to a flour in the usual manner of grain. Wood thus prepared, is said, to acquire the taste and smell of flour. It is never quite white. It agrees with corn flour in not fermenting without the addition of leaven, and in this case; some leaven of corn flour is found to answer best. With this it makes a perfectly uniform and spongy bread, and when it is thoroughly baked, and has much crust, it has a much better taste of bread, than what in time of scarcity is prepared from the bran and husks of corn. Wood-flour also boiled in water, forms a thick tough, trembling jelly, which is very nutritious.

Starch can be recognised in the body of a tree by the aid of a good microscope. The barks of the several aspens, and pine trees contain abundance of this substance, which can be extracted from them, as from potatoes by trituration with water. It exists also in other parts of perennial plants. An early winter, or sudden change of temperature checks this provision of nature; the wood does not ripen, and its growth in the next year is very limited. From the starch, thus accumulated, sugar and gum are produced in the succeeding spring. After potatoes have germinated (sprouted,) the quantity of starch in them is diminished. The juice of the Maple tree ceases *to be sweet from the loss of sugar*, when its buds, blossoms, and leaves obtain maturity.

The sugar-cane loses a part of its sugar, when it blossoms; and sugar does not accumulate in the beet-root until after the leaves are completely formed.

Experiments have established the important fact that the produce of potatoes may be much increased by plucking off the blossoms from the plant producing them. In two fields of equal size and equally tilled and manured, the plants deprived of their blossoms yielded 47 bolls; the other field in which the blossoms were left untouched yielded 37 bolls.

These facts prove the part, which sugar, starch, and gum fulfil in the developement of plants; and explain the reason, why these substances exercise no influence on the growth, or process of nutrition of a matured plant, when supplied to them as food, which has been done as experiments.

Starch, sugar, and gum, when accompanied by an azotized substance (a substance containing azote, or nitrogen) serve to sustain the embryo plant until its organs of nutrition are unfolded. These are stored by the plant in its seed. Carbonic acid, water, and ammonia are the food of fully developed plants. Accordingly pure water is more advantageous to the growth of a young plant, than that containing carbonic acid, but after a month, the reverse is the case.

The formation of sugar in maple trees does not take place in the roots but in the woody substance of the stem; the quantity of sugar in the sap augments until it reaches a certain height in the stem of the plant, above which point, it remains stationary.

In whatever form therefore, we supply plants with those substances, which are the produce of their own action, in no instance, do they appear to have any effect upon their growth, or, to replace what they have lost.

The quantity and quality of substances generated by the vital processes of a plant will vary according to the proportion of the different kinds of food, with which it is supplied. The developement of every part of a plant in a free and uncultivated state depends on the amount and nature of the food afforded to it, by the spot on which it grows. A plant is developed on the most sterile and unfruitful soil, as well as on the most luxuriant and fertile; the only observable difference is in the height, size, number of twigs, leaves, branches and blossoms. The individual organs of a plant increase on a fertile soil, and diminish on a sterile one.

The fundamental principles of agriculture must be based upon a knowledge of those certain conditions which favour the developement of the stems, leaves, blossoms and fruit of plants, and upon which they are dependent. There is no profession, continues Leibig, which can be compared in importance, with that of agriculture. There is in no other profession, in which, the application of correct principles is productive of more beneficial effects, or, is of greater, and more decided influence.

The methods employed in the cultivation of land are different in every country, and in every district; and when we inquire the cause of these differences, we receive the answer, that they depend upon circumstances. No answer could show ignorance more plainly, since no one has ever yet devoted himself to ascertain what these circumstances are.

A similar answer is given to the inquiry respecting the manner, in which manure acts. It is referred to an "incomprehensible something." This answer has been received without an effort to discover "the component parts of manure, or, to become acquainted with its nature."

In addition to the general conditions, such as heat, light, moisture, and the component parts of the atmosphere, which are necessary to the growth of all plants, certain substances are found to exercise a peculiar influence on the developement of particular families of plants. These substances either are already contained in the soil, or are supplied to it in the form of *manure*. Until these points are satisfactorily determined, a rational system of agriculture cannot exist. The power and knowledge of the physiologist, the agriculturist and the chemist must be united for the complete solution of these questions.

The general object of agriculture is to produce in the most advantageous manner certain qualities or a maximum size in certain parts or organs of particular plants. This object can only be attained by the application of those substances, which we know to be indispensable to the developement of these parts or organs.

The rules of a rational system of agriculture should enable us, therefore to give to each plant, that which it requires for the attainment of the object in view.

The special object of agriculture is to obtain a developement and production of certain parts of plants or of certain vegetable matters, which are employed as food for men and animals, or for the purposes of industry.

The means employed for effecting these two purposes are different.—Thus, the mode of culture employed for the purpose of procuring fine pliable straw for Florentine hats, is very opposite to that, which must be adopted in order to produce a maximum of corn from the same plant. Peculiar methods must be used for the production of nitrogen in the seeds; others, for giving strength and solidity to the straw as will enable it to bear the weight of the ears.

The increase or diminution of vital activity depends only on heat and solar light, which we have not arbitrarily at our disposal: all we can do is to supply those substances, which are adapted for assimilation by the power already present in the organs of the plant. What are those substances? They may be easily detected by an examination of the soil, which will enable us to discover the circumstances, under which a sterile soil may be rendered fertile.

Arable land is originally formed from the crumbling rocks, and its properties depend on the nature of their principal component parts. Sand, clay, and lime are the principal constituents of the different kinds of soil.

Pure sand, and pure lime stone, in which there are no other inorganic substances except siliceous earth, carbonate or silicate of lime, form absolutely barren soils.

Agillaceous earths form always a part of fertile soils.

From whence come the agillaceous earths in arable land; what are their constitu · and what part do they act in favouring vegetation? They are produced by the disintegration of aluminous minerals by the action of the weather; the common potash and soda felspars, Labrador spar, mica, and the zeolites are the most common aluminous earths which undergo this change. These minerals are found mixed with other substances in granite, gneiss, mica-slate, porphyry, clay slate, granwacke, and the volcanic rocks basalt, clinkstone, and lava, &c.

Aluminous minerals are the most widely diffused on the surface of the earth, and all fertile soils, or soils capable of culture, contain alumina as an invariable constituent. There must, therefore, be something in aluminous earth which enables it to exercise an influence on the life of plants, and to assist in their developement. *The property on which this depends is that of its invariably containing potash and soda.*

The fertility of sandy soils, we may here observe, is referrible to the quartz and loam, which is found in sandstone.

Alumina exercises only an indirect influence on vegetation, by its power of attracting and retaining water and ammonia. It is itself very rarely found in the ashes of plants, but silica is always present, having in most places entered the plants by means of the alkalies, viz. ammonia, potash, and soda.

Potash is present in all clay, and even in marl. It has been found in all the argillaceous earths submitted to experiment.

A thousandth part of loam, mixed with the quartz in new red sandstone, or with lime in the different limestone formations, affords as much potash to a soil only 20 inches in depth, as is sufficient to supply a forest of pines growing upon it for a century. A single cubic foot of felspar is sufficient to supply a wood, covering a surface of 40,000 square feet with the potash required, for five years.

Land of the greatest fertility contains argillaceous earths and other disintegrated minerals, with chalk and sand, in such a proportion as to give free access to air and moisture.

When volcanic ashes have been exposed for some time to the influence of air and moisture, a soil is gradually formed in which all kinds of plants grow with luxuriance. The fertility is owing to the alkalies contained in the lava, which by exposure to the weather are rendered capable of being absorbed by the plant, for the lava itself could not from its origin contain any vegetable matter.

Sturve ascertained that water, impregnated with carbonic acid, decomposes rocks which contain alkalies, and then dissolves a portion of the alkaline carbonates. Plants, also, by producing carbonic acid during their decay, and by means of the acid which exudes from their roots in the living state, contribute also to destroy the coherence of rocks. Next to the action of air, water, and change of temperature, plants themselves are the most powerful agents in effecting the disintegration of rocks. Various species of plants emit acetic acid during germination; and a plant which has just broken through the soil, and a leaf just burst open from the bud, furnish ashes, which contain so much, and generally more, of the alkaline salts, than at any other period of their life. The experiments of *Becquerel* have shewn the manner in which these alkaline salts enter young plants. The acetic acid formed during germination is diffused through the wet and moist soil, becomes saturated with lime, magnesia, and alkalies, and is again absorbed by the radical fibres in the form of neutral salts. After the cessation of life, when plants are subjected to decomposition by means of decay and putrefaction, the soil receives that which had been extracted from it.

Air, water, and change of temperature, prepare the different species of rocks for yielding to plants the alkalies which they contain.

The original supply of alkalies in a soil must become exhausted by the vegetables growing upon it in the course of time, unless those alkalies are again restored. A period will arrive when it will be necessary to expose it from time to time to a farther disintegration, in order to obtain a new supply of soluble alkalies. But when one or more years have elapsed without any alkalies having been extracted from the soil, a new harvest may be expected.

Harvests of wheat and tobacco were obtained for a century from the same fields in Virginia without the aid of manure, but now whole districts are converted into unfruitful pasture lands. From every acre of this land there was removed, in the space of 100 years, 1200 lbs. of alkalies in leaves, grain, and straw. It became unfruitful, because it was deprived of every particle of alkali, which had been reduced to a soluble state, and because that which was rendered soluble again in the space of one year was not sufficient to satisfy the demands of the plants. Almost all the cultivated land of Europe is in this condition. *Fallow* is the term applied to land left at rest for farther disintegration. It is the greatest possible mistake, to suppose that the temporary diminution of fertility in a soil is owing to the loss of humus. It is the mere consequence of the exhaustion of the alkalies.

Some farms near Naples, which is famed for fruitful corn land, have yielded wheat for a thousand years, without any part of that which was taken from the soil being restored to it; nor is it known that humus was ever contained in the soil. The method of culture explains the permanent fertility, which is peculiarly applicable to that country. A field is cultivated once every 3 years, and is in the interval allowed to serve as sparing pasturage for cattle. The soil experiences no change in the two years, during which it there lies fallow, further than that it is exposed to the influence of the weather, by which a fresh portion of the alkalies contained in it, are again set free or rendered soluble. The animals fed on these fields yield nothing to these soils which they did not formerly possess. The weeds upon which they live spring from the soil, and that which they return to it as excrement must always be less than that which they exhaust. The field, therefore, can have gained nothing from the mere feeding of cattle upon them; on the contrary, the soil must have lost some of its constituents.

(To be continued.)

THE TURNIP FLY—(*ALTICA.*)

We extract from the 2d vol. of Paxton's Horticultural Register, page 376, the following interesting remarks respecting the turnip fly. The writer made a variety of interesting experiments to ascertain whether these destructive insects came from other plants, or from the soil, but these were inconclusive, or rather proved that they did not come from other plants, and that the egg was not deposited in the soil. His fifth experiment, however, was conclusive; he says—"With a lens I examined the seed, and found on it a number of white flattish substances; some of the seeds were without any: these I concluded were eggs. I therefore made some pretty strong brine, and soaked the seed in it for 24 hours, then dried it thoroughly, and sowed it again, and there was not a single fly, neither was there a single turnip injured. I tried it again and again, and I found that without weakening the brine, if the seeds were only kept in it three honrs, there were no beetles, and yet the seed came up as well as ever. I now practise this method with turnip seed, cabbage seed, and, in fact, with all the cruciform plants in common cultivation, with very satisfactory success. The experiments were made with Swedish turnip seed, which is generally more infested with these beetles than any of our older sorts."

We may here observe, for the information of those readers who are not acquainted with botannical descriptions, that the *cruciform* plants, (or *cruciferæ*,) form one of the largest and most natural families of the vegetable kingdom, composed of herbaceous, and many other plants, intermediate between shrubs and herbs, as, for instance, the various kinds of mustard, cress, horse raddish, water cress, sea cake, the various kinds of sweet herbs, &c. &c.

ON THE CULTURE OF POTATOES.

As our Provinces are potatoe countries, and as the potatoe constitutes one of our most important crops as it regards either the table, the stall, or the soil, we shall direct the attention of our readers to the following observations, gathered principally from the experience of eminent and practical agriculturists in England; for we think we may venture the assertion without fear of contradiction, that, notwithstanding the extensive culture of this valuable vegetable throughout these colonies, very few experiments have been instituted to ascertain the best method of culture, the best seed potatoes, the comparative superiority of the entire tuber (or whole potatoe), or the cut potatoe, or the best end of the potatoe when cut for seed, the best method of keeping them through the winter, the best kind of potatoe for fall, and winter, and spring use—the best kinds of potatoe for the table, and the most profitable kinds for feeding cattle. There has been more attention paid to the quantity raised from an acre of ground, than to the quality of the article as regards its nutrition. This is an error; for it is a well established fact, that the nutritive property in vegetables is not in proportion to their bulk, and that half a bushel of some potatoes may contain as much of it as a bushel of another kind. This being the case, the farmer, therefore, who raises 100 bushels of an inferior quality has more trouble and expence, but no more profit, than another who raises 50, or 75 bushels of a more nutritive potatoe. This vegetable affords sustenance to a large proportion of the human species, and it may be called the bread fruit of the poor; it is, therefore, a matter of importance to direct more attention to the cultivation of it, for the benefit of those who feed principally upon it, and who, influenced by their own destitute circumstances, purchase potatoes which have nothing to recommend them but their cheapness.

The following circumstances require particular attention in the culture of the potatoe, viz. the soil, manure, the preparation of the soil, the best form of the best kind of seed, the best manner of planting it, the advantage or disadvantage of earthing or hilling them, the management of the tuber, or potatoe itself, its stalk or haulm, the blossom, and the apple or seed. But as a full inquiry into these several subjects would exceed our present limits, we shall confine our observations to a few interesting particulars.

Light, dry, friable loams, or sands of tolerable consistence, are the best soils for potatoes; but they will grow upon almost any land that is not too wet and clayey; reclaimed bogs and peat land, well drained, produce good crops; alluvial soil yields a good return, but green sward and burnt new lands are most favourable to their growth and quality. It is probable, however, that different kinds of potatoes would thrive equally well on different soils, as regards the weight of produce, although the nutritive qualities might differ.

The product of 4 eyes, cut from the same cluster of potatoes, and planted on 4 different soils, was—

On a strong rich loam,	34 lbs.
On a light rich loam,	29 "
On a good gravel,	19 "
On a sandy soil,	13 "

This experiment is by no means conclusive, as another kind of potatoe, on the same soils, might have reversed the proportions—the above shews merely the difference of weight. An analysis of the various quantities, by shewing the quantity of starch in each, would have determined the actual preference of the soil, as the amount of nutritive matter is not always in proportion to the amount of bulk. We would therefore suggest to our farmers the expediency of ascertaining the fitness of particular soils to particular potatoes, with a subsequent inquiry into the quantity of nutrition in each. This may be easily done by planting one hill of the same kind of potatoe in different soils, measuring the weight yielded from them, and ascertaining the quantity of starch, which is the nutritive principle contained in the respective products. This may be effected by those who do not understand chemical analysis, in the following manner: grate the potatoe, diffuse the pulpy mass through a large quantity of cold water, and allow it to remain at rest for a little while; in this process the saccharine and mucilaginous matters that exist in the potatoe are dissolved by the water—the starch being insoluble, and heavier than water, *falls to the bottom* in the form of a fine powder, and the fibrous matter floats above. It may be purified by washing it repeatedly with cold water, and pouring off the supernatant liquor, after the deposit of the starch. On the large scale, the supernatant liquid is not poured off until it begins to ferment; a larger quantity of starch is procured in this manner, and the fibrous matter is more easily separated.

The starch, (or fecula,) is obtained mechanically in this way from the potatoe, and in like manner from the fruit and roots of other plants. Potatoe-flour, Indian arrow root, British and foreign tapioca, sago, and cassava, consist almost entirely of starch. We may here observe, that the nutritive power of the potatoe is increased when it is eaten in conjunction with flesh, or substances containing *gluten*, viz. wheat or oats, as the gluten renders the starch capable of assimilation, or digestion. Thus potatoes, when given with hay alone, are scarcely capable of supporting the strength of a horse, but form with hay and oats a strong and wholesome food. For it has been observed, that granules of unchanged starch have been discovered in the excrements of persons who live almost exclusively upon potatoes, while none was discoverable in the discharges of those who took some flesh or glutinous food with them.

The chemical analysis of the potatoe has discovered the following constituents, viz.

Starch, - - - - - -	13	3
Water, - - - - - -	73	12
Albumen, - - - -	0	92
Uncrystallizable sugar,	3	30
Valatile poisonous matter,	0	05
Peculiar fatty matter, -	1	12
Parenchyma, - - -	6	79
Malic acid and salts, -	1	40

We may here observe that starch is converted into sugar when germination takes place; this is exemplified in the malting of barley. This loss of starchy principle after germination may account for the deteriorated quality of the potatoe in the spring, after the sprouting of the eyes, and, therefore, we should either keep the vegetable for use, in a reduced temperature if possible, or remove the seed eyes before they germinate.

We may further remark, that if potatoes are grown when they are not supplied with earth, in cellars for example, a true alkali, called *solanin*, of a very poisonous nature, is formed in the sprouts, which extend towards the light, while not the smallest trace of such a substance can be discovered in the roots, herbs, blossoms, or fruit of potatoes grown in fields.

Various manures have been used in the culture of potatoes, but it is found that stable dung is preferable. This, however, may be mixed with other substances, and be occasionally improved. It has been said, that although an abundant quantity of manure increases the quantity of the crop, yet that it injures the quality of the potatoe for table consumption. Some farmers spread slacked lime, viz. 60 bushels to the acre, over the field when the young plants appear; they plough the earth from the rows, spread the lime evenly over the surface, and after a few days return the earth and mould up. The application of lime will be governed by the nature of the soil. Experiments have proved, however, the superiority of dung, especially when urine was added to it. There have been various opinions respecting the mode of dunging the land. Some lay the dung over; others, again, lay it under the sets, or seed; others, again, scatter it over the field, and plough it in. An experiment, made under the direction of the Board of Agriculture in England, proved that the produce of an equal weight of sets and manure was, when the sets were laid over the dung, 105lbs. 4 oz.; under the dung, 84lbs. 3 oz.

The ground for potatoes should be well worked, for the more thoroughly it is pulverized, the more abundant will be the crop.

The following are the varieties most commonly cultivated as field crops in Great Britain, viz.: the kidney, the Cumberland and Lancashire white, the purple streaked, the Scotch dun, the pink eyes, the golden dun, or copper nose, which is highly esteemed for the table, the Perthshire red, which is a good keeper, fine flavoured, and prolific, the Wellington, the cluster, the champion, the ox-noble, the white and red Surinam, the Munster, the Connaught cups, the red and white apple, the red-nosed and white kidney; a large species has been lately introduced from the continent, which is described as yellow, mealy, and good—it is called the "*La divergente*." Mr. Howden, of East Lothian, has published a list containing experiments upon 130 different kinds of potatoes. In 1835 an account was published of the Rohan Potatoe, an extraordinary species, which lately appeared in Switzerland, and is thus described by Prince Charles de Rohan, from whom it takes its name. "Three tubers (or potatoes) chosen at random, weighed each 13 lbs. 7 oz., and a small tuber, having only 4 eyes, weighing when planted a few grains less than half an ounce, produced 48¼ lbs. It is, however, not the largest tubers which succeed the best as seed. The mode of planting is described as by the spade; the earth being dug to the depth of 20 inches, and the distance between the holes 4 feet; two or three eyes being dibbled into each. The plants should be earthed up frequently, for the stems reach to six or seven feet in height. It is a late species, but very farinaceous, and of excellent flavour, and it should not be taken up until after the stalks have withered."

Mr. Knight, the intelligent president of the Horticultural Society in England, has recently adopted a method of planting potatoes, different from the common furrow and lazy bed systems. He says, "the soil in which I proposed to plant being very shallow, and lying upon a rock, I collected it with a plough into high ridges of 4 feet wide, to give it an artificial depth. A deep furrow was then made along the centre and highest part of each ridge, and in the bottom of this, whole potatoes, the lightest of which did not weigh less than 4 ounces, were deposited at only 6 inches distance from the centre of one to the centre of another. Manure in the ordinary quantity was then introduced, and mould was added sufficient to cover the potatoes rather more deeply than is generally done. The stems of potatoes, as of other plants, rise perpendicularly under the influence of their unerring guide, *gravitation*, so long as they continue to be concealed in the soil, but as soon as they rise above it, they are to a considerable extent under the controul of another agent, *light*. Each inclines in whatever direction it receives the greatest quantity of that fluid, and consequently each avoids and appears to shun the shade of every contiguous plant. The old tubers being large, and under the mode of culture recommended, rather deeply buried in the ground, the young plants in the early part of the summer never suffer from want of moisture, and being abundantly nourished, they soon extend themselves in every direction till they meet those of contiguous rows, which they do not overshadow on account of the width of the intervals. The stems being abundantly fed, owing to the size of the old tubers, rise from the ground with great strength and luxuriance, support well their foliage, and a larger breadth of this is thus, I think, exposed to the light during the whole season, than under any other mode of culture which I have seen; and as the plant acquires a very large size early in the summer, the tubers, of even very late varieties, arrive at a state of perfect maturity early in the autumn." This method yielded an abundant crop, the bushel averaging 82 lbs. This experiment suggests the necessity of attention to the distance which should separate the rows of potatoes, and to the direction of those rows, so that the plants may have the best chance of the full influence of that important principle, light. We would urge attention to this circumstance, as we have often observed the rows in our fields crowded together, the vines overshadowing them so as to exclude the light between them; the stalks spindling, pale, and decaying near the earth, and the tubers, or potatoes in the hill, small and few. We are informed by Mr. Knight, "that the distance of the intervals between the rows should be wholly regulated by the length acquired by the stems in each peculiar situation and soil. If the utmost length acquired by the stem be 4 feet, let the intervals be 4 feet also, and if the variety be of dwarfish habits, the stems not exceeding 2 feet, intervals of 2 feet will be sufficient. *The rows should be made from north to south*, that the mid-day sun may be permitted fully to shine between them. Each set, or cut seed, should weigh at least 6 oz. and they should never be placed at greater distances than 6 inches from centre to centre, and a preference should be given to *whole potatoes*. If the plant be very dwarfish, 4 inches from centre to centre between the sets will be sufficient; and if the form of the potatoe be long or kidney shaped, a good deal of advantage will be gained by placing them upon their ends, so that the end which joined the parent plant will be downward. The largest products will generally be obtained from varieties of rather early habits, and rather low statures, there being in very tall plants much time necessarily lost in carrying the nutriment absorbed from the soil up to the leaves, and down in the state of living sap to the tuber."

Strong stemmed varieties are preferable, as they do not fall and overshadow each other, and Mr. Knight prefers incorporating the manure with the soil, by means of the spade or plough, to the dropping of it in with the sets. The earlier potatoes are planted the better.

There has been some diversity of opinion concerning the advantage of using the whole potatoe, or the cutting, as seed. Mr. Knight is in favour of the whole tuber, and Mr. Dale, of Derbyshire, relates an astonishing difference of increase from it. He says that an eminent horticulturist was engaged in experiments upon the potatoe for 20 years, and finally came to the conclusion "that the best crop was obtained by setting whole."

Some farmers have planted merely the eye, which was scooped out of the potatoe for the purpose, but the practice is objectionable. The sets should not be taken from potatoes that are exhausted by growing in the heap. It is said that the eyes or buds nearest the root fibre, sprout a week or more later than those furthest from it, on the same principle that the top shoots of a tree come first into leaf, and, therefore, in planting uncut sets, the product will be unequal in size, and ripen at different times. In planting cut sets, the two sorts of eyes should be planted in different rows. This is practised in Lancashire. It is recommended by some to obtain seed potatoes that have grown in a soil different from that in which it is intended to plant them.

Various experiments have been made to ascertain the difference of produce from the whole and the cut tuber, and in a field of five acres it was found that there were only two tons in favour of the whole tuber. It would appear as a conclusion, that a single eye from the outer end of the potatoe, with a large proportion of the tuber attached to it, and taken from a full grown, healthy potatoe, is as productive as the entire tuber. Every farmer, however, should know and remember, that the eye of the potatoe on the end which connects it with the stalk, germinates later and more feebly than the eye upon the outer end. This may be seen in the sprouts upon the tuber, before it is planted. It has been found, also, that the potatoe raised from the outer end not only grows larger and ripens sooner, but that it is also of a finer quality.

The "British Husbandry" recommends the entire cluster of buds taken from the top end, or nose, of the tuber.

There has been a great diversity of opinion, also, respecting deep or shallow planting, and the earthing up of potatoes. Some recommend deep planting and earthing for a copious crop; others, again, recommend slight earthing or moulding up, as they say the tubers do best, and ripen sooner, when nearer the influence of the sun and air. As climate influences the growth and productiveness of all vegetables, we would urge the propriety and advantage of instituting a series of experiments in our own Provinces, to ascertain the truth of these important questions. Similar contradictions exist with regard to the propriety of removing the blossoms with the intention of throwing more nourishment to the tubers. But the results of various experiments prove that the amount of produce is increased by the removal of the blossoms immediately upon their appearance. Some farmers have cut the *haulm*, or stem, and branches of the plant; this is decidedly wrong, for it has been found that this erroneous practice has caused a loss of 93 bushels per acre. This cutting not only lessens the quantity of the produce, but it vitiates the quality of it; for the leaves of plants imbibe a large proportion of nourishment from the air, and perform also a most important character in the economy of the plant.

We think it a question of some consequence, and worthy of attention and experiment, to ascertain whether the removal of the blossom does not injure the future productiveness of the tubers, which have been deprived of those blossoms, or vitiate the quality of the future fruit raised from such potatoes.

When we consider the great variety in the growth and kind of the potatoe, and the mixture of good with the predominance of bad in those varieties, which we see exemplified annually in our markets,—when we consider the frequent instances of deterioration in the early blue nose of this Province, and when we contemplate the powers of judicious cultivation, which has converted the sour crab of the forest into the golden pippin, and the rough almond into the melting and delicious peach, we see at once a wide field open for ingenuity and inquiry in the improvement of the potatoe. Much has already been effected since its first introduction, but much more may still be accomplished in discovering and improving good kinds, and in discouraging the growth and sale of those inferior qualities which form the principal article of nourishment for so large a proportion of the human species. This improvement can be accomplished by proper observation and experiment, and by the growth of potatoes from the seed in the apple, and the careful selection of the best kinds for future planting. But as we have already exceeded our intended limits, we must postpone our observations with some suggestions upon this very interesting subject for a future number.

HORTICULTURE.

The Cultivation of Asparagus.—This vegetable delicacy is imported to this city every year during the season of it, from Boston; and although when it arrives, it is generally injured, still it is sought and purchased with eagerness: the importation is a reflection upon our gardens, for the plant grows well even in St. John with all its disadvantages of climate. Asparagus when once laid down continues productive for many years; nor does it require half the care usually bestowed upon it. It may therefore be made one of the most lucrative beds in the garden of the Horticulturist. Asparagus requires a deep rich soil; a rich alluvial is an excellent soil for it. The ground should have a rich coat of good dung *trenched in*, and also a coat of very rotten dung digged into the surface. The beds should be four feet wide, with two feet wide alleys between them. Three rows of two year old plants, which can be bought from a nursery man, are placed in drills ten inches apart, made by the hoe; the roots being spread out right and left and covered carefully with loose earth; the whole being afterwards smoothed by the rake. The plants should be placed so deep as to permit the crowns to be covered with two inches of fine earth, and the roots ought to be let down to their full extent in the ground in an open and expanded manner. The roots should be planted early in the spring, and during the following summer all that is requisite is to keep the beds clear from weeds. The roots should be planted in dry weather, and after they are planted, they may be well watered to quicken their growth. When the stems have died down in the autumn, they should be cleared off, and we reccommend them to be burnt, and the ashes strewed over the bed. The surface of the bed should be stirred up with a fork, taking care not to go deep enough to injure the roots. The beds may then be covered for the winter with a coat of short decayed litter, and over this a little earth may be thrown from the alleys. In the spring this litter and mould may be raked off and digged into the alleys, which forms a spring dressing; this autumn and spring dressing continued every year afterwards. The shoots should not be cut for eating until the 4th year, or the 2d year from the planting of the two year old roots. When roots cannot be easily procured the seed may be planted a reasonable depth, and observe the same distances. Several seed may be planted in each distance, so as to ensure growth, and the superfluous plants, when they are up, may be rooted out. The rich alleys between the plants form excellent rows for Cauliflowers.

By the following method, beds of Asparagus may be made to give two crops in the year. Towards the end of July, especially if it be rainy weather, cut down the stalks of the plants, fork up the beds and rake them. If the weather be dry, sprinkle the beds with liquid manure, and leave them rather flat on the surface, so that they may retain all the moisture. In ten or fifteen days, the asparagus will begin to appear. If the weather continues dry, apply the liquid manure three times a week. By this method you may cut asparagus until the end of September. *Grayson's new giant asparagus* is the best for cultivation. Plantations of asparagus may be renovated when the ground has been too coarse and poor, and the shoots too severely cut in using. In the memoirs of the Caledonian Horticultural Society, we are directed by Mr. Robertson to the following method. Having a quantity of furnace ashes, which had lain for some years, he had them sifted, and mixed with a small portion of vegetable earth from tree leaves; this compost was allowed to lie for about two months, and in the latter part of October he commenced top dressing by taking off the old soil to the depth of from six to nine inches, or as deep as could be got without injuring the plants. The compost of leaf mould and ashes was then laid on, so as to cover the crowns of the plants about four inches deep; on the approach of winter, the bed was covered with stable dung, and whenever the weather permits, the bed may be moistened with liquid manure. This has occasioned a fresh growth, exceeding in size, quantity and quality, the former growths. The top dressing compost may be made thus:—one fourth sandy peat moss from the surface of a dry heath; one fourth furnace ashes, well sifted; one fourth vegetable mould, formed from tree leaves; and one fourth of well rotted stable dung, with a portion of quicklime: the whole well mixed together.

Sea-kale.—Sea-kale is a plant of easy culture. If raised from seed it requires two years to bring it to perfection, but is hardy and withstands the frost. If planted out from a hot bed, the roots on being divided may be propagated abundantly, and it may be brought into eating earlier than the asparagus. The following directions have been given for its cultivation. The beds ought to be prepared as for asparagus; and when they can get a natural covering of sea-weed, so much the better, but an artificial dressing may be prepared, with 9 parts leaf mould, 1 part wood ashes, and about one pound of common salt to every barrow full of the compost. Three barrows of light sandy turf and one barrow of the above compost form an excellent proportion of soil for the growth of sea-kale. When neither turf nor sea weed can be obtained, good kale can be procured in any light garden soil, trenched as directed for asparagus, and manured with wood ashes. Coal ashes are injurious to it. The prescribed quantity of common salt must be used on the beds. When the plants appear, some wood ashes may be sprinkled round them to protect them from vermin. But we would refer the gardener to the brine, for the seed, which was found to protect the turnip. The beds must be kept clear from weeds, and hoed about an inch deep. If three or four plants come up together, they may remain until they interfere with each other, when all must be removed excepting the *strongest one*, so that a complete row of single plants, from twelve to fifteen inches apart remain. The plants pulled up may be transported elsewhere if required. The remaining plants grow luxuriantly and form a beautiful line of sea green foliage in contact. The summer culture consists in clearing away the weeds and in digging the alternate spaces two or three times to the depth of nine inches, so as to render the soil perfectly fine. In the July and October diggings it will be well to give a two inch layer of decayed leaves with one fourth part of wood ashes, and to dig it in. Sea-kale may be planted on a bed of light sandy soil, and it may be *forced* in the spring, by covering it with flower pots covered with manure, and throwing some litter over the beds. But it is said that this forced and early growth injures the plant. When the leaf manure cannot be obtained, light rotten barn yard manure may be substituted for it.

The Musk Melon.—The striped Housainee Persian.—The melon has been cultivated for many years in England, and it is said to have been originally brought from Jamaica. The varieties under the title of *musk melons* have been considered natives of Southern Europe they are very numerous, Loudon's catalogue describes nineteen varieties, but the sub-varieties from intermixture are almost unlimited. If *melons of different varieties are grown* in the same bed, " not only will the seeds of each be more or less contaminated, but there is reason to believe that those taken from the same individual melon will be found to produce plants, whose fruit may differ very considerably in appearance and character.

The melon is a *species* of the *genus* (or *family*) *cucumis*, or cucumber ; cucumis is derived from a Greek word signifying a swelling, and melon is derived from another Greek word signifying an apple, so that *cucumis melo* means literally the apple cucumber; but the melon resembles the apple more in its odour than its form. It frequently happens when melons and cucumbers are planted in the same bed, that the intermixture of the male and female flowers of each plant produces, on the respective vines, fruits uniting the appearance of cucumber and melon—therefore such vines should always be planted in detached and separate beds.

Melons are divided into early and late kinds. The early kind comprehends the *beechwood*, *cantaloup*, *Des Carmes*, early cantaloup, germek, green-fleshed Egyptian, green-fleshed Staliur, green fleshed Masulipatam, Polignac, rock scarlet fleshed. The later kind comprehends the Cephalonian, the Persian Daree, the Dampsha, Geree, the Persian green Boosainee, Persian striped Hoosainee, the Persian Keiseng, the Gerger, Neeksheven, silver rock, Sir Gore Onsley's Persian, small Levant, sweet melon of Ispahan, Valentia, the Windsor scarlet fleshed.

The Hoosainee is one of the superior varieties which have of late years been introduced from Persia. It comprises two kinds, the *Dampsha*, and the *sweet melon of Ispahan.* It is said, that if the Dampsha "*is kept in a dark room, it will remain good during the winter months.*" The sweet melon of ispahan " is a large and very peculiar fruit, somewhat resembling in figure a large swollen cucumber, its skin is extremely delicate, pale, *sulphur yellow*, *smooth*, *or with* very few vermicular reticulations, flesh white, flavour luscious, abounding with a rich saccharine juice. Pigeon dung is used as a manure upon melon beds in Persia, where this fruit is cultivated in greatest perfection. The *striped Housainee* melon was not known in England until 1831. " It is," says a writer in Paxton's Horticultural Register, " a noble fruit, one of great beauty and excellence ; its skin is firm but thin ; the rind under it, and the fleshy cellular substance adjoining to the depth of rather more than the eighth of an inch, is of a bright green, gradually becoming paler, till it meets and blends with the bulk of the flesh, which is of a pinkish buff or salmon colour. The green portion is not quite so tender and juicy as the internal substance, but the whole may be eaten, so as to have nothing remaining but the thin external integument : there is no defraud in this fine fruit ; all is juicy and eatable ; the flavour is delicious ; the odour that of a fragrant apple, and the fruit will long remain good without decay." This melon is egg-shaped, the stalk end being the largest; it is of a dark green colour at first, but as the fruit advances in growth, the stripes become very apparent, of a sombre green, dividing the surface into marked distinct portions, but without any furrowing; this smoothness is ultimately covered with an ash-grey-coloured net work. When nearly ripe, small greenish yellow spots are observable among the interstices of the netting, and a clear yellow circle surrounds the insertion of the foot-stalk. The state of perfect ripeness is not marked by any determinate change of colour: the general tint is a sea-green, covered more or less with the pale grey network. The green-stripes in some instances remain unchanged: at other times they are nearly obliterated. "The maturity of the fruit," says Mr. Knight, "will be ascertained by little globules, apparently of water, but really composed of the juice of the fruit, appearing at the junction of the fruit and its stalk: if such bubbles appear and are sweet to the taste, the fruit should be instantly cut. The bubbles have sometimes appeared on the stalk about 1½ inches from its insertion into the fruit. The yellow circle around this part, its softness, and a crack of separation at the juncture of the stalk and melon indicate maturity. It has no distinctive odour unless accident cause disease, or the leaves be broken so as to destroy their vital energy. In such case, the fruit will be arrested in its growth, it will become yellow and then emit the odour of a melon. Injury of the leaves materially injures the fruit. The plant in its habit of growth is one of the finest and most interesting objects imaginable. The stem if led perpendicularly to the height of 3 feet will comprise about ten clear joints: from each joint at its angle a noble leaf nearly a foot in diameter is produced. It is supported by a petiole or foot-stalk about 12 inches in length, the leaf is a vivid green, and its surface rough with short bristly hairs; it is heart-shaped and very broad near the base; lateral shoots are sent forth from the axils of the leaf, but these should be removed to a certain height; the flowers both male and female are small and of a pale yellow colour, and rather few in number; the male flowers appear first, which insures the safety and perfection of the fruit; the melons formed above the tenth joint are generally found to set with greater certainty and to grow larger than those which form in the earlier stage of the plant near its root." "The Housainee melon," says Mr. Knight, "is of very easy culture, the plant very productive of fruit but long in ripening, but when ripe it remains long in perfection." "The fruit never decays, bursts or becomes flavourless." Mr. Knight observes that he has found the *natural habit* of the plant to prove *permanent*, which he considers an important feature in its character.—"This melon appears to be the peculiar favourite of Mr. Knight, the venerated President of the London Horticultural Society." Mr. Knight cultivated this melon with great success in his hot house, by planting a single melon seed in a pot, training it upon a trellis, placed about 14 inches distant from the glass, and permitting each plant to bear only one melon. They were however disposed to burst; an accident which he effectually prevented by *raising the points of the fruit higher than the stems*; which done, not one failed to ripen in a perfect state.

The Persian varieties of melon differ from those commonly cultivated in Europe; they are destitute of the hard thick rind, and they abound in tender flesh filled with a rich, copious, sweet, delicious and cool juice. They require a high temperature, a dry atmosphere, but an extremely humid soil. But care must be taken that they are not supplied with an over abundant humidity, which causes spotting and injury before the fruit is ripe. Horticulturists differ in their descriptions respecting the external and internal appearance of the striped Housainee, but they all agree in the superiority of it as a fruit. It is cultivated in Persia in the open fields; the days there are very hot, and the nights very cool with heavy dews. In England the melon requires a long time for its growth and perfection, but in that country vegetation is slow. The hot days and cool damp nights of our Provinces with our rapid vegetation would be favourable to the cultivation of it, provided the horticulturist gained time in the spring with glasses, and protected the fruit in the latter part of August and September with coverings at night, and glasses during the day as the weather might require. We have raised several varieties of the Green-flesh and Nut-meg in great perfection in the interior of Nova-Scotia with very little trouble in this manner, and we have seen the Cephalonian, acquire a very large size. This melon however was disposed to burst; and we would remind the gardener of Mr. Knight's simple expedient in elevating the end of the fruit, whether this is trained on a trellis, or grows as melons generally do in our Provinces upon dunged beds.—We think it would be an improvement in our method of cultivating them, to train the vine upon an inclined plane trellis, made of a few laths nailed across each other, so as to elevate the fruit a few inches from the ground, as we have generally observed the portion of the melon in contact with the earth of a white colour, differing from the exposed portion of the fruit, and showing that it was deprived of the wholesome and requisite influence of light and air, which must consequently, retard and vitiate thorough ripening.

When the melon is raised on dunged beds with a fine clayey soil, they do not require so much water as when raised in pots, or on silicious earth. They should however be kept moist, until they give evidence of approaching maturity, when the quantity of water must be greatly abated. The plants should be covered with mattings or double nettings during the intense heat of noon.

When this fruit is raised in a hot-house the temperature should be 70° exclusive of solar heat during the day and 60° at night: in direct sunshine 80° to 100°, (the thermometer being in the shade) *may be allowed.*

Pigeons dung is the best manure for melons: when this cannot be procured hen-dung is the next in preference. "Dove's dung is in great request in Persia and Syria for the culture of melons. Large pigeon houses are built in many places expressly to collect it. The melon is now as it was 2500 years ago in Persia one of the necessaries of life, and when the Prophet Isaiah meant to convey an idea of a famine he predicted that a 'cab of dove's dung would be sold for a shekel of silver.'"

When the melon is not trained on such a trellis as we have mentioned, it would be well to place it on a small cradle, to raise it from the ground. The healthy green leaves of a vine should not be removed, as they each perform a salutary office in the economy of the plant.

Liquid manures (especially after they have fermented) are found best for melon beds. The wash of sheep dung is an excellent dressing, as also a similar wash made from poultry dung. It may be prepared in the following manner: "Put into a three gallon tub about one fourth of its contents of recent dung, add a gallon of scalding water, stir the mixture thoroughly twice, and let it settle; the clear supernatant liquor only is to be used. If this becomes very fetid, a few grains of chloride of lime in each quart will correct it.

The great *Germek* of Persia and its varieties are remarkably fine melons, they ripen sooner than the Housainee, but are liable to crack when maturing, which process takes place very suddenly after they have attained their growth.

We have given a lengthened article upon the cultivation of the Persian melon, which we would recommend to our horticulturists instead of the many inferior kinds which we have seen raised in several parts of both Provinces.

Conservative Lace-net.--Mr. Brough, of Pelham street in Nottingham, has made a beautiful and cheap article as a covering for trees and plants, to guard them from wasps and flies. It is eight feet wide, and only ten pence a yard.

AGRICULTURAL IMPLEMENTS.

THE want of convenient implements of husbandry is conspicuously apparent among the many deficiencies which characterize the agricultural establishments of New Brunswick and Nova Scotia; and although our farmers complain incessantly of the shortness of the seasons, and of the insufficiency of labour performed, compared with the price which they give for it, still very few put suitable tools into the hands of their workmen. Some of our farmers entertain an hereditary attachment to the awkward implements which for generations have been handed down, unaltered, from father to son; whilst others, again, patronise the manufactory and importation of a few improvements in the shape of "Yankee notions," which might be made in our own Provinces, and for which large sums are annually remitted to the United States. The forks, rakes, pails, axe-handles, &c. which are exhibited in piles at the doors of so many shops in this City, are proofs of my assertion. It must be confessed, that too many of our farmers manifest but little observation, and still less enterprize. They pursue their *make do*, but not *do well*, system, year after year. Although we fully appreciate the benefits which are derived from the improved breeds of cattle, and of choice seeds, still we are convinced, that agricultural societies would promote the object of their associations by more attention to the introduction and distribution of improved implements of husbandry, and to the encouragement of the manufacture of them in our own Provinces. At present it would seem as if the ash of our own country was unfit for the handle of a fork or an axe, and as if none out a "Down Easter" or New Yorker could give either of them the legitimate length and turn. Our farmers talk of the length of our winters, the shortness of the spring, the price of labour, the uncertainty of the crops, and many other drawbacks and difficulties, which receive additional influence from their own apathy; for notwithstanding the long winter evenings, it would appear that they do not furnish time and leisure for making many conveniences for farming purposes. When a farm is in that perfect state of snugness and arrangement, as respects stables, barns, barn yards, gates, fences, and such agricultural implements as an industrious farmer with common ingenuity might make, then, and not until there is an overplus of time with such a state of things, can it be said with truth that the hours of a long winter are profitless and unavailable. But it must be confessed, that the work of a long winter's evening, or a stormy winter's day, is too frequently postponed for the long days of a short spring, when we have often seen the farmer and his workman repairing carts, ploughs, harrows, hoe-handles, &c.

When we compare the implements in use upon a farm in England with those upon a farm in New Brunswick or Nova Scotia, we must conclude either that time is more valuable in Great Britain, and that, therefore, the farmer uses every means to make the most profitable use of it, or that time in our Provinces is of no value, and that we do not require those implements which are found to husband it in other countries. But as the very opposite state is the truth of the case, the want of farming utensils is one among the many neglects which characterize our agriculture. We have often seen two men grinding a scythe, and not unfrequently the assistance of a boy required to pour water, whilst one man held the scythe and another turned the stone. Of course the parties must have a chat, and as talking and turning would be doing two things at a time, they must rest occasionally from their labour, that they might use the more restless member in their mouth with more comfort. Many an hour has been wasted in this manner, which would have been saved by a grindsone fitted with very simple machinery, to be turned by the foot like a turner's lathe, and to revolve through some water in a trough beneath it. With such an instrument, one man sharpens his own scythe or axe in a few minutes. We have seen a grindstone fitted in this manner, and the entire cost of it, we believe, was but twenty shillings. Now, as time is money, and as hours make days, we would ask any farmer how many twenty shillings are consumed in a year with the grinding of scythes and axes, when an extra hand is required for the operation. Every farmer, therefore, should possess a grindstone upon rollers.

The revolving horse-rake "is found to be one of the most useful labour saving machines now in use. One man and horse, with a boy to lead, will rake on an average from 25 to 30 acres per day with ease, and do the work well."

The different agricultural societies would do well to unite a proportion of their funds for the importation of pattern implements of husbandry, such as improved ploughs, harrows, grubbers, scarifiers, scufflers, horse-hoes, drills, drill-harrows, and drill rollers, furrow-slice compressors, and any other implements calculated to expedite work upon improved and economical principles.

Much has been said against the capabilities of our Provinces as agricultural countries, but little has been done to ascertain the power and extent of them. Work is performed under most disadvantageous circumstances, and still the returns from it are bountiful. The fertilizing influence of snow upon the soil, gives not only a rapid but an abundant crop; and the present season, which commenced with such unpromising appearances, is a convincing proof of the capabilities of the Province, notwithstanding long winters, short springs, despair, and our defective systems of husbandry.

COMMUNICATION.

[For the New Brunswick Agriculturist.]

Sir—That the science of agriculture is advancing, and, an increasing interest in the cultivation of the soil is becoming manifest in New Brunswick, can scarcely be doubted. Notwithstanding it may be said that little has been done in comparison, with the vast improvements which might be made in thi most laudables branch of industry. To you the friends of agriculture in the Province are already much indebted, for engaging in the enterprise of diffusing such information among our farmers as cannot fail, if duly appreciated, and applied, to promote their best interests and to disseminate a praiseworthy spirit of emulation in every county; and ultimately to remove those obstacles to a proper system of farming, which are known to exist in every quarter.

It would be scarcely believed in other countries, that in many of our new settlements, the barn manure and vast quantities of straw, taken from land recently cleared, are allowed to accumulate from year to year around barns instead of being annually applied to the soil.

It might be asked how much lime, mould, and peat, are applied to lands in districts where these substances abound. How small is the number of farmers who enter upon courses of experiments, or make any attempt at a proper system of agricultural improvement. Before the soil can be properly improved the intellectual powers of the husbandman must be aroused, and he must not only feel his importance in a national point of view, but also devote the energies of his mind, to his honourable and respectable employment. To bring about that improvement in the present state of the agriculture of New Brunswick, by which the capabilities of our soils may be known, and the country relieved from the importation of foreign bread, and even beef and pork, the inquiries of scientific men must be enlisted and our legislation must feel the importance of that branch of industry, upon which, with the aid of her mines, the future prosperity of the Province must mainly depend.

Besides the formation of County agricultural societies, there should be a Provincial agricultural society, to hold meetings semi-annually.—Practical farmers and men of science would then be brought together, and the agricultural interests of the country would be strengthened and improved, by their combined efforts in aid of the common cause. Persons from all parts of the Province would then be associated and the wishes of the people generally would be known. The improvement of stock, changing of seed, and other important matters would be discussed, and the general good would predominate over local jealousies.

The establishment of agricultural schools, as connected with experimental farms, and an agricultural survey of the Province, are also very desirable, and require the aid of some legislation.

It cannot be doubted that a Provincial Agricultural Society, conducted with prudence and ability, and embodying the remarks of practical men on the various branches of husbandry, would prove of incalculable advantage to young and inexperienced farmers; and it only requires the spirited operations of farmers themselves to bring these things into effect. The agriculturists must act with zeal and liberality, or they never can arrive at any degree of perfection in their occupations, or render them profitable to themselves or creditable to the country. The legislature has already shewn a disposition to assist in the agricultural improvement of the Province, and it cannot be doubted that they will continue their efforts to promote the success of plans proposed by the people themselves. The best methods of culture, cropping, and rotation, should be carefully inquired for and encouraged; and a series of experiments should be commenced, with due regard to our climate and local circumstances. By collecting the scattered fragments of useful agricultural knowledge, and by bringing them to act first upon the minds, and then upon the soils of our farmers, such results may be anticipated as have followed in other countries, and the whole system of agriculture in the Province be brought into a healthy and profitable state. Much may be expected from the achievements of the "Agriculturist," should it meet with proper support. Wishing you every success in the advancement of these and other necessary objects,

I am, Sir, yours, A Farmer.

☞ *We acknowledge the receipt of a communication signed* "Tyro." *on Banking accommodation for farmers, containing many sensible remarks, which we shall insert in our next number. We regret that want of room this month has prevented us from publishing it.*