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1811











Essays on field husbandry, by Jared Eliot

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# PAPERS

FOR

## 1811,

COMMUNICATED TO THE

### MASSACHUSETTS SOCIETY

FOR

### PROMOTING AGRICULTURE.

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PUBLISHED BY THE TRUSTEES.



Without encouragement of Agriculture, and thereby increasing the number of its people, any country, however, blessed by nature, must continue poor.

SWIFT.



**BOSTON:**

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1811.

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**OFFICERS OF THE SOCIETY,**

**CHOSEN JUNE, 1811.**

—♦—

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# PREMIUMS

OFFERED BY THE TRUSTEES OF THE MASSACHUSETTS  
SOCIETY FOR PROMOTING AGRICULTURE.

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1. To the person who shall discover an effectual and cheap method of destroying the Canker-worm, and give evidence thereof, to the satisfaction of the trustees, on or before the first day of June, 1813, a premium of *one hundred dollars*, or the society's gold medal.

2. And a premium of *one hundred dollars*, or the society's gold medal, to the person who shall, on or before the first day of October, 1813, discover an effectual, and the cheapest method of destroying the Slug-worm, and give evidence thereof to the satisfaction of the trustees.

3. To the person who shall produce the largest quantity of wool, meat and tallow, from the smallest number of sheep, not less than ten, raised on his own farm, a premium of *thirty dollars*; to be claimed on or before the 1st day of August, 1814.

4. To the person who shall invent a cheap method of raising water, for the purpose of irrigating land from rivers and ponds from ten to twenty feet above the level of the same, and give evidence thereof to the satisfaction of the trustees, on or before January 1, 1814, *one hundred dollars*, or the society's gold medal.

5. To the person who shall present to this society the most complete (being nearly complete) Hortus Siccus, exhibiting distinct specimens of the greatest variety of grasses, in general use, and specify, to the satisfaction of the trustees, their respective qualities, productiveness, and usefulness as food for different kinds of animals, the gold medal, and *fifty dollars*; to be claimed on or before the 1st day of October, 1814.

6. To the person who shall produce, from seed, the best growth of thrifty trees, not less than 600 in the whole, and in the proportion of 2400 to the acre, of any of the following kinds of forest trees, viz. oak, ash, elm, sugar maple, beech, black or yellow birch, chesnut, walnut or hickory, *twenty-five dollars*; if all of oak, *fifty dollars*. Claims to be made on or before the 1st of October, 1814.

7. To the person who shall ascertain by accurate analysis, the constituent parts of several fertile soils respectively, and in like manner the parts of several poor soils, and thus

shall discover the defects of the latter ; and shall show by actual experiments how the said defects may be remedied by the addition of earths or other ingredients which abound in the country, and in a manner that may be practised by common farmers, *fifty dollars*. And if it shall appear to the satisfaction of the trustees, that, upon an extensive practice, the improvement of the poor soil would be more than equivalent to the expense of the improvement, the addition of *one hundred dollars*. A minute description of the several soils, and all the circumstances attending the processes, cultivation, and results, will be required. Claims to be made on or before November 1, 1814.

8. To the person who shall, by actual experiment, on a quantity not less than half a ton, shew the best method of curing clover hay with salt ; regard to be had to the quality of the hay, and the saving of labour, and the shortness of time between cutting and packing it in the mow, the silver medal, or *thirty dollars* ; and to the person who shall shew the next best method, *twenty dollars*. Samples of the hay to be exhibited, three months after it is cured, to a majority of the selectmen, or to the settled minister and justice of the peace in the vicinity. Claims to be made on or before the last Friday of November, 1812.

9. To the person who shall give the most satisfactory account, verified by experiments, of the effect of ploughing in green crops for manure, nor not less than two acres, the silver medal, or *thirty dollars*. Accounts with certificates, to be produced on or before the first Tuesday in March, 1812.

10. To the person who shall lay before the Board, the most satisfactory account of the application and effect of manures, verified by practical experiments, on not less than one acre for each sort of manure, the silver medal, or *thirty dollars*. To be produced on or before the first Tuesday in December, 1813.

11. It is required that the communications, for which the foregoing premiums are offered, be accompanied with proper certificates from the selectmen, magistrates, or clergymen of the vicinity, or other vouchers, to the satisfaction of the trustees ; that they be delivered without names, or any intimation to whom they belong ; and that they be severally marked in such manner as each claimant shall think fit ; the claimant sending also a paper, sealed up, having on the outside a corresponding mark, and on the inside his name and address.

RICHARD SULLIVAN, *Rec'g. Secretary.*

## PREFACE.

THE Trustees of the Massachusetts Society for promoting Agriculture, present to the Public a new edition of an old and valuable work on the various branches of Agriculture. This Treatise has been out of print many years. It was published by the author, (the Rev. Dr. JARED ELIOT, of Killingworth, in Connecticut,) in 1747, under the title of "*Essays on Field Husbandry, wrote from a Journal of thirty years experience.*"

THE Trustees consider these Essays as highly valuable to the Agricultural Interest of the Northern States. They relate to facts, which have, in many instances, been verified, since the author ceased from his labours. The distribution of them through the Country may be more useful than the communication of extracts from foreign publications, and will preserve the memory of a man, who has deserved well of his country.

THESE Essays are very diffuse, and state the general practice of Agriculturalists in the author's day. Respecting the culture of foreign and domestic Grasses and Grain, he is very minute. MILLET,

though called by the author an ordinary species of grain, is noticed as of much importance, is very productive, and good food for hogs and poultry, and is recommended strongly as a *grass crop*. It has however been generally neglected, and perhaps for want of fair experiments.

THESE Essays display, by a variety of experiments, the importance of draining swamps and wet meadow land. It is universally acknowledged, at the present day, that the best and most productive lands are useless from stagnant water. In this condition they contribute greatly, if not principally, to the propagation and continuance of the most fatal autumnal diseases, which this country experiences. Whereas, if those lands were drained and cultivated, they would, in a short time, become the most valuable in the country; the pestilential effluvia, which is so extremely fatal every year, would no longer arise from them, and a noxious waste would thus be converted into fruitful fields.

THE very ingenious paper, from the Hon. SAMUEL TENNY, of New-Hampshire, relative to Orchards, deserves the particular attention of every intelligent farmer, as well as gardener. His advice respecting the cultivation of Apple Trees, which is equally applicable to other fruit trees, cannot be too often read, nor too strongly recommended.

THE Trustees are convinced from observation, that Agriculture, in almost every branch, has been much improved since their first publication in 1793. Whether these improvements have been effected by

their publications or not, is of little consequence to the members of this Society. The good of the community has been their only aim. No private emolument or advantage has been received, or expected, but in common with the great family of mankind.

THE manufacture of Butter and Cheese, has been greatly improved. The breed of Cattle and of Sheep, has been more attended to than formerly. The Trustees feel the highest satisfaction, in having offered the first premium (500 dollars) for encouraging the importation of Merino Sheep, which, with the high price of the animal in the market, after his value was known, induced merchants to import them into every part of the United States.

THE Trustees received last autumn, a small parcel of a new species of Wheat, from a friend in Europe. Its stalk is solid, and is supposed to be proof against the Hessian fly. They have received also from the same hand, a large species of white Rye. Both have been distributed in the country, and will, another year, it is hoped, be found to have succeeded.

*Boston, 1811.*



ESSAYS  
UPON  
FIELD-HUSBANDRY.

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PART I.

IT is not an hundred and thirty years since the first settlement of New-England, and much less than that since the greater part hath been planted.

When we consider the small number of the first settlers, and coming from an old cultivated country, to thick woods, rough unimproved lands ; where all their former experience and knowledge was now of very little service to them : they were destitute of beasts of burthen or carriage ; unskilled in every part of service to be done ; it may be said, that in a sort, *they began the world anew.*

When we consider these things, the progress that hath been made in so short a time is very wonderful.

For some time after the country was settled, they had no cattle at all ; when some were brought over, what with bad hay they provided, it being cut upon bog meadow, the multitude of wolves and other beasts of prey, for sundry years they were kept so low and had so few cattle, that the common price for a grown bullock was twenty pounds sterling, which is equal to two hundred pounds old tenor.

I remember when I was a boy, I heard a very ancient woman of good credit say, that she had seen twenty broad pieces paid down for a two year old heifer, which is now equal to two hundred and fifty pounds old tenor.

Although the progress we have made be very considerable, our country yet needs and is capable of greater improvement in the management of our lands ; of which I design to consider in several sorts.

1. Those coves and swamps that are adjoining to salt marsh, which lie so flat and low that they cannot be drained : I have seen sundry such places upon the sea coast. I have such a piece of ground, which I am obliged to fence in, in order to inclose some other land ; which put me upon thought of trying to make something of it, it being now wholly unprofitable.

Last fall I began upon it and drew a ditch of four feet wide from a large salt creek, and carried it up in the middle of the cove seventy rods, in order to turn it into salt meadow, that being the best that I could do with it. It so far answers the design, that the tide flows regularly into it, to the upper end of it ; the tide now flowing, where I suppose it never reached before. There must be smaller ditches on each side, to cut off the fresh springs, and small grips cut from the great ditch in sundry places, that so the salt water may be spread and communicated to all parts of it.

The lower part next the salt marsh is rushes, the next are reeds, then large brakes and bushes, and last of all a thick swamp. If this land can be converted into salt meadow, it will be much cheaper than to purchase so much salt marsh, and will lie very convenient to my other land.

Salt water will effectually kill trees and bushes where it comes, both root and branch.

2. The second sort of land that I shall consider, is, the low sunken lands, which have no communication with the salt marsh : of this sort there are three kinds, viz. thick swamp, boggy meadow, and smooth, even, shaking meadow ; this last sort is called cramberry marsh : he that would do any thing to effect with

either of these sorts, must in the first place see whether there be deep mire ; if it be shallow and soon come to hard sand, clay, or gravel, it will not be worth while to expend cost upon it.

Again, you must examine what fall there is. If the fall be apparent to the eye, and this for ten or fifteen rods, you may be satisfied ; if you are uncertain, try it with a water level or spirit level. If your marsh be small, the drein long, rocky, and likely to be chargeable, it may be best to let it alone ; but if it be a large swamp or meadow, although the main drain should be a considerable charge, that should be no discouragement.

That low ground which is thick with wood and brush, will be the most chargeable ; the bog meadow the next in charge, because the bogs must be cut up with a bog plough or with a hoe ; either way is chargeable. The shaking meadow has the best surface and is easiest to bring to mowing.

Last August was twelve month I began to drein a pond that lies but a mile from my house ; it was not a natural pond, but made so upon design. Our record informs that it was granted to a man to prevent the miring of cattle ; the owner of it laid it under water about eighty years ago. It was over grown with pond lillies ; it was thought by most that to drein it was impracticable. Some said, that it was as unlikely as to drain the ocean. At the outlet there seemed to be little or no fall ; but trying it with a level, my son and I found that in forty rods there was fall sufficient. We therefore set about dreining it, have succeeded so far that it bids fair to make a good piece of land. It had been under water so long, and was so full of pond lilly roots, that when the water was drawn off and the lilly roots dried and shrunk up, it grew to be puffy, and did not for this reason do so well as we expected : The grass seed did not come up well, nor stand so

well as in land that has lain open to the heat of the sun. The whole pond was about twenty acres, and the soil is eight or ten feet deep ; there are in it many large springs, which are fifteen feet deep.

I began last March to drein another meadow of forty acres, up in Guilford woods ; this was a shaking meadow ; a man standing upon it might shake the ground several rods round him. It seemed to be only a strong sward of grass roots laid over a soft mud of the consistence of Pancake-batter ; there was not abundance of bushes in it, but abundance of cramberry vines, and a great burthen of poor wild grass. The meadow was deemed so poor that none would take it up. I was pitied as being about to waste a great deal of money ; but they comforted themselves that if I spent it unprofitably, others that stood in need of it would get it. They are now of another opinion.

At the only outlet of this meadow, there was fall sufficient, but very rocky ; we must dig four or five feet deep to get the advantage of it.

In March when I went up to make the outlet drein, there was such a torrent of water that we could do nothing. I ordered therefore a tree to be cut down across the brook, and prepared fitches instead of plank which we set aslant, the upper end resting upon the staddle that was fallen across the brook, laid them as close as we could, and stopped the chinks and large chasms with top tow, by which means we shut the water into the meadow, then wrought at the trench or main drein in the day, and let it out at night, till it was in a good measure accomplished. When I ordered the top-tow to be carried, the men wondered what it was designed for, but when they saw how useful it was in making a cheap dam, they were pleased with it. I put them in mind of the Dutch proverb, which says of things that are very mean, *That something is always good for something.*

When the weather grew sufficiently warm and the meadow a little settled, we began to ditch. I cut a ditch on each side and one in the middle. As far as we went it soon rendered the meadow firm and dry; I then proceeded to sow grass seed, such as red clover, foul meadow grass, English spear grass, and herd grass. Of all the sorts of grass seed I sowed, none seemed to take hold and come up so well as red clover; this I found to be the boldest and most hardy grass.

Where the sward was strong, although the clover came up well, yet what with the toughness of the ground and the overtopping growth of the wild natural grass, the clover made but slow progress till the fall of the year, and then it mended considerably. But where there happened to be no sward to hinder it, the clover grew up to the height of mid thigh, went to seed, and ripened.

Of the other sorts of grass came up but poorly; the land I suppose was too new and too tough for it.

Some time in *September*, I ploughed up a piece of it where I had not sowed any grass seed, it ploughed very tough, and the cattle mired some, but we kept them upon the grass as well as we could; after all we left many baulks. About a month after I set some men to hoe up the baulks, and was agreeably surprised to find how easy it hoed up. I find the meadow rotted and mellowed more in one month in the fall than it had done in the whole summer. The same I found by the ditch banks. If I had omitted my ploughing till a month later, it had been done with much more ease to man and beast.

In July I sowed a little piece of turnips, they came up but never grew till the ground began to rot in the fall of the year, then grew well in the short time they had left. I expected they would have been rank, but they were good and sweet.

Some are deterred from such an undertaking as that of dreining their land, by reason of the great charge. They terrify themselves without reason. When I was about to cut my main drein, some thought it impossible, but at best it would cost an hunderd pounds. It was a bad place of rocks; some I dug up, some we broke up with steel wedges, and some we blew up with powder; but after all it did not cost more than twenty pounds.

As to the great charge of ditching, they do not consider that the outside ditches serve for fence, as well as to cut off the springs and drein the meadow, and it is as cheap fence as any we can make; so that there is none but the middle or intermediate ditches, that are properly to be considered as a charge in dreining.

Some may think this long history of two pieces of meadow, this tedious detail of so many minute particulars to be needless, trifling and impertinent.

I have been particular in describing the main or outlet drein of each meadow, that it may be seen that the difficulty of rocks is not insuperable, nor the charge of a long drein intolerable.

I mention the cheap moveable dam which may be made in a few hours, that if they should be incumbered with water to hinder their work, there is a remedy at hand.

I informed you of the growth of one of the meadows that it was moss and pond lillies, which will soon die when the water is gone; the moss creates the most trouble, but will burn when it is a dry season.

I gave an account of the depth of the soil, because I was when I began, uncertain whether by ditches three feet wide and two and an half deep (such as mine are) would be sufficient to fix the shaking meadow,

and render the deep mire firm and dry enough for grass and tillage. I think there is reason to believe that the shaking meadows have been formerly beaver ponds.

I described the extent and bigness of each meadow, because I was uncertain whether the ditches would drien well when they were very long.

Some of mine are an hundred and fifty rods long, and must be yet much longer; yet as far as we have gone, they draw well. In order to have them draw well and run free, it is absolutely needful, and a main point, to have your outlet drein deep, so that the water run briskly.

If the ditches draw well, there is another advantage; in the spring, when there is much water, by stopping one ditch, you may shift the water into another, to cleanse it, and so to a third. Hereby you will save the charge of the yearly scouring of them with the shovel, which is a good saving. I find by experience I have that advantage.

I have insisted the longer upon this article, it being an affair of importance. If it should answer our expectation, it will put us into the improvement of land of which as yet we have had no benefit; nay, it has been rather hurtful. It opens to us a new scene, and time may possibly discover it to be the easiest of tillage, the richest and best land.

By the working of my own mind I judge of others; however, if I have been mistaken, and that which is uncertain to me, is clear and easy to others, and so have been longer upon this particular than is needful or useful; I beg pardon of the reader.

When I engaged in this affair, it was with some mistrust and uncertainty. I am sure, last year I should have been glad of such an history of facts, (as imperfect as it is,) it would have afforded me light, courage and instruction.

As to what remains farther to be done, I should be, glad to meet with an experienced person to give me instruction. Our reasonings and speculations without experience are delusory and uncertain. It used to be the saying of an old man, that an ounce of experience is better than a pound of science.

In a country where such like dreining is become a common practice, such an account as I have given, would be needless.

I find by experience, that such dreined land must have one summer to ferment and rot, so as to become proper soil, before it will be fit for grain and every sort of grass. If I had sowed red clover instead of the other sorts of grass, I had saved five pound in seed. Clover outdid my expectation, and the other sorts fell short of it. If others save where I lost, and mend wherein I was mistaken, it answers my design in writing.

By a little experience we have had of these dreined lands, we find they will produce Indian corn, sixty or seventy bushels to the acre, and flax. If life and health be continued, I design to try liquorice roots, barley, Cape Breton wheat, cotton, indigo seed, and wood for dying, which I have sent for, as also water melon seed, which came originally from Archangel, in Russia which is said produces melons which grow to a great size. But what I have principally in view is hemp. New-England doth not, I suppose, expend less than several hundred thousand pounds worth of foreign hemp yearly. If we can raise more than to supply our own occasions, we may send it home. I remember when I was young, a gentleman came from England, sent over by the King, to invite the country into that trade; he offered in the King's name to find seed to begin with, and four pence sterling per pound, let us raise what we would, (which is

three and four pence old tenor,) and if I remember right, forty shillings bounty on every ton.

It is not a mere conjecture that the dreined lands will produce hemp. I am informed by my worthy friend Benjamin Franklin, Esq. of Philadelphia, that they raise hemp upon their dreined lands.

Hemp requires such very strong land to produce it, that it would consume all our dung to raise it in any great quantities; so that we should not be able to raise bread corn: therefore, how inviting so ever the trade is, and how great so ever the encouragements have been, both from home and by our own governments, we have not as yet engaged in that affair: we have now a promising prospect of success in these dreined lands; what may be the issue, time and experience must determine.

The books of husbandry say, *that a thousand weight to the acre is an ordinary crop of hemp.*

If a man had a small meadow of dreined land, that he could lay under water and draw it off at his pleasure to water his hemp, it would, I fancy, be of great value. I have heard that a man in the Jersies, hath such a meadow of half an acre, which yields him as much hemp yearly, as fetches him fifty pounds York money; but this seems incredible.

Some think that it is good to lay their low lands under water in the winter to enrich them, and practise accordingly; but this will kill your English grass after a few years; for English grass will not subsist without a winter. In the southern colonies the less winter the less grass. In Virginia, North and South Carolina, they have no English grass at all. Where there is no English grass, it is difficult to make cattle truly fat; so that winter brings its good as well as its evil things.

3. The third sort of land I would speak of, is *our old land which we have worn out.* This is a difficult

article without dung, which cannot be had for love or money : where that is wanting, it may be supplied with other manure. Clay will mend sandy land, especially if the clay be burnt ; and sand will mend clay ground. The clay will fix the too loose con- texture of the sand, and sand will open the parts of clay which is too close.

I found at my farm at Guilford, a sort of shell sand, tried it, and found it equal to good dung ; some that I ordered to be carried up on the tilled land, has produced five crops, and is not yet spent ; how long it will last we do not know. They begin to carry it up into the town.

I have carted this fall upon my land at home some loads of creek mud, that had been laid up a rotting two years : I also carted home one load from the dreined pond ; it looks like dung ; also one load of clay, one load of sand, and a load of loam. What all or any of these will do, experience must inform.

Another way to help worn out land, is to sow it with clover seed ; but if the land be too poor it will not grow : therefore, if we can raise our Indian corn upon our dreined land, then we may spare a sprinkling of dung for our old poor land ; then sow it with ten pounds of clover seed, which is five quarts to the acre ; it might cause it to set very thick. Ten pounds is not too much. He that raiseth clover hay, need not be afraid of the expense of seed ; for an acre of clover will yield two bushels of clean seed : the second crop of clover is the best for seed : so that in getting seed, you have no need to spoil your best crop of hay ; as we know what threshing will do, it spoils the hay in a great measure.

If you depend upon the second crop of red clover for your seed, the land must be very rich, and you must mow your first crop early. There is so much profit in clover grass, that it is strange it is so much

neglected. As seed sells now, that is twelve shillings a quart, an acre of good clover will make thirty five pounds old tenor. There is no charge about it but only the price of the seed, mowing and cleansing the seed, which is done with a great deal of ease, in a way that deserves to be made public.

If seeding the land with clover will not make poor land rich, yet it will prevent our better land from being worn out; and by ploughing in a good coat of white clover, the land would be prepared for a crop of wheat.

Seeding the land when we lay it down is of so much importance for present profit and future advantage, that it is a settled opinion at the Isle of Wight, *that if they should fail but for one year to seed their land for grass, it would be to their damage more than twenty thousand pounds sterling.*

Another way of mending poor land, is, by feeding it close a few years with sheep, to destroy the briars, weeds and mangy grass: this hath succeeded to bring in the English grass and make a strong sward.

It will be best to take out the sheep at the latter end of *August*, that so what English grass there is, may make coat for the ground before winter, and then shut it up that it may not be fed. By the end of *August* the wild trash has done growing.

In England, to recover their poor land, they direct to sow their land with turnips, and at winter put their sheep upon it; and they will live a while upon the tops and then scoop out the turnip itself; by that time the land with the sheep dung will be rich enough for barley in the spring. But our poor land is so poor that it will not bear turnips bigger than buttons. This method looks likely, if tried, to make rich land richer. Some propose to sow oats and when grown up plough them in.

4. I designed to write something concerning our poor rough, stony, uneven land in the woods, which is now of little service to us. I would propose a way how it might be improved so as to become useful and profitable land, which I proposed to submit to the reader's better judgment : but finding that I have already gone a greater length than I at first designed, it must be omitted.

A barrel of cider of sweet apples when made into molasses, will be worth three pounds, abating five shillings for the making, when cider made of common apples, a barrel will be worth but twenty shillings, exclusive of the barrel.

I have been told that half a peck of the little round white beans mixed with a bushel of rye, will make bread something like wheat ; I have never tried it, but design to see what it will do.

I have been told that summer wheat sowed with barley is not apt to blast, and do well together ; also summer rye and oats : as also oats and peas produce a good crop when sowed together ; the oats bearing up the pea vines prevent their falling to the ground.

I find by experience the best time to fatten swine, is to begin at the first of *August*, if you have old corn : *Hogs will fat slowly in very cold weather* ; they will eat much and fatten but little : if you make a very warm house they heat in bed and catch cold when they come out into the cold air.

To save corn, steep it in water or swill till the corn grow very soft ; this opens the parts : give them the corn to eat and the water to drink in which the corn has been steeped : the hard dry corn, a great deal of it, passeth through them undigested ; this is the hardest part of the corn and that which principally makes the flour. There is a tradition, that if you feed one hog with corn, the dung of the first hog will fat another hog, and his dung a third.

Although I believe the story to be fabulous, yet it serves to shew that the sense of mankind, is, that in the manner we feed swine, there is a great deal of loss.

I took the hint of steeping corn, from the advantage I once found by some corn I bought that had been ship wrecked, had lain in the water till it was grown soft.

Such is the difference in corn and in swine, that it is impossible to fix it absolutely and know certainly how much there is saved by this method. It is better than grinding, besides what we save in the toll and the time and charge of the carriage : for it is found by experience, that even bran when steeped in water a long time is much the better.

I asked an honest, judicious neighbor of mine, who had leisure to try this method of steeping corn longer and with more exactness than I had done, how much he thought was saved by it ? he said, at least one bushel in seven ; he believed more. But we will suppose it saves but a tenth part, then see how much it will save in the whole colony ? Suppose there are in this colony, about sixty towns, great and small, new and old : we will suppose two hundred families in each town, one with another, and each family to consume or spend as much pork as will require one with another twenty bushels of corn to make the pork for each family. Sixty towns of two hundred families each, makes twelve thousand families, and twenty bushels of corn to each family, makes two hundred forty thousand bushels of corn : the tenth part of this is twenty four thousand bushels. If there be not so many towns and families as is supposed, there is much pork fatted and sent away in barrels, and many herds of fat swine drove away that are not consumed in the government, enough to make it up ; and surely

the saving of twenty four thousand bushels of corn yearly, is worthy of our care and consideration.

Since the foregoing was written, a person of good credit informed me, that there being in his neighborhood a dealer in horses, who was famous for skill in making horses fat in a short time ; he desired the jockey to tell him how he did it : the secret was to mix Indian corn and oats together and soak it in water till it was soft ; that in cold weather he steeped it in a cellar that it might be kept from freezing.

My informant told me, he had made trial of it and found it did well, giving it to his horse in the same proportion as he was wont to do of dry provender.

An handful of dry ashes put upon each hill of Indian corn, in some land, has been found to do good equal to dunging in the hole : some say there ought to be half a pint of ashes to each hill, and it should be put on a little after the corn is come up.

I was told by an experienced farmer, that if you girdle trees, or cut brush in the months of *May*, *June* and *July*, in the old of the moon, that day the sign removes out of the foot into the head, especially if the day be cloudy, it will kill almost all before it : they will bleed, he said, more freely in a cloudy day ; for the hot sun dries up the sap. I have never tried it. If this could be certainly found out, it would expedite the cleaning land and save a great deal of labor. But experience is authority to whom we are to submit : I am not forward to believe without trial.

Swamps that are full of wood and brush, and covered with moss, if they are deep soil and can be well drained, cleared and ditched, will make good land for corn and grass.

Elder bushes are stubborn and hard to subdue, yet I know by experience that mowing them five times in a year will kill them.

It might serve to increase useful knowledge, if something of this nature were published every year, giving a faithful account of the success of all the experiments and trials that may be made on various sorts of land, and of divers sorts of grain, roots, grass and fruits, not only such as we have in use, but also what we have not as yet introduced among us.

There are few men of business, ingenuity and observation, but what have found out things valuable and useful, but for want of some proper method to communicate them, they die with the discoveries, and are lost to mankind.

Therefore, whoever has made any observations or discoveries, although it be but a hint, and looks like a small matter, yet if pursued and improved, may be of public service. If they see cause to favor me with such discoveries and experiments as they have or shall make, I shall receive it with thankfulness, and publish it either with or without their names to it, as they shall see fit : for if this Essay should be thought useful, if God give life and health I purpose next year to furnish you with another winter's evening entertainment : for I would be glad to do good as far as lies in my power.

A discovery of the nature and property of things, and applying them to useful purposes, is true philosophy. A great deal of what has passed in the world for learning, is philosophy falsely so called.

A certain person among the Greeks, being a candidate for some office in the state, it was objected against him, that he was no scholar. True, saith he, according to your notion of learning, I am not ; but I know how to make a poor city rich, and a small city great.

The world was a long time amused with the learning of Aristotle, and the Arabians spun out of their own brains, and not founded in truth ; yet

among all this trumpery there was two pieces of useful knowledge, for which we are indebted to them ; one was the knowledge of the nine figures, so useful in arithmetic ; the other was the first rudiments of algebra, now grown up to a great height. Experimental philosophy being founded in nature and truth, is obtained no way but by time and diligence : The knowledge of things useful are gained by little & little.

We are not to admire or despise things merely because they are new ; but value things or disregard them just so far as they are found (by experience that faithful instructor) to be useful or unprofitable. Wisdom is profitable to direct.

Wisdom is the principal thing, therefore get wisdom ; especially that wisdom that is from above : it is first pure, then peaceable, gentle, easy to be entreated, full of mercy and good fruits ; without partiality and without hypocrisy.

There are some pieces of pasture land wholly destitute of water, which renders them less useful and valuable. It is known that frequently springs are nearer the surface on hills than in plains : therefore, to remedy this inconvenience, dig a well on the brow of an hill ; when you come to water, stone it over, or stone it up ; then dig a trench in the side of the hill to reach to the bottom of the well : stone up your trench and cover it with earth ; or a trough may answer the end when buried in the ground. Where the water issues out, there dig a watering place.

Since the foregoing pages were written, I have made trial of ditching in swamp land when the ground was frozen two inches deep : it is performed with a broad axe having a long helve, with which we cut the ground, roots of brakes and bushes, with speed and success.

You must have an iron hook with two or three teeth set in a handle, to draw out the sods when they are cut.

The laborer works clean and dry. You cannot conveniently make the ditch quite half the proper depth ; the rest must be left till summer to be finished. If we could do half our ditching in the winter, it would be a good saving.

Under the article of ways to mend old worn out land, sowing it with red clover, some may wonder to find it there said, that five quarts was a proper proportion of seed, when it hath been found by experience that two quarts to the acre will produce a good burthen : It is true ; but you will find when the crop is carried off, that the roots will be at a great distance from each other ; nor will these void spaces fill up till the clover is run out its period : whereas it would quit cost in feed and after crops, to seed so much that the grass may set thick. It was not proposed to use so much seed to the acre, till in the common method we have a plenty of seed.

What is here written is but a foundation laid for a future and more agreeable superstructure. Having prepared a sort of land that has been but little in use among us, I propose to have a new sort of improvement.

N. B. What hath been inserted in this essay only upon hearsay, is not offered as certainly to be depended upon ; but only as probable and worthy to be tried.

## PART II.

THE last years essay having met with a more favorable reception than I expected, fifty of the last years essay (if it should bear another impression, and as many of this present essay) having been lately sent for by B. Franklin, Esq. of Philadelphia, a person of merit and learning; being encouraged by him, as also by other gentlemen in these parts, of worth, capacity and learning, on whose judgment I depend more than my own; therefore, agriculture being a profession so useful to mankind, that notwithstanding it hath from its vast variety of depending objects very numerous uncertainties attending it, I shall proceed to make the best of such a difficult subject, in which times and seasons make such great alterations.

When our fore-fathers settled here, they entered a land which probably never had been ploughed since the creation; the land being new they depended upon the natural fertility of the ground, which served their purpose very well, and when they had worn out one piece they cleared another, without any concern to amend their land, except a little helped by the fold and cart-dung, whereas in England they would think a man a bad husband, if he should pretend to sow wheat on land without any dressing.

Sometimes they dress land with lime, chalk, soot; sometimes with rags, hogs and cattles hair, horn-shavings and ashes, and with various other sorts of manure by which means they have fine crops of wheat upon land which hath been improved more than a thousand years; for they reckon twenty bushels to the acre but a middling crop.

Our lands being thus worn out, I suppose to be one reason why so many are inclined to remove to new places that they may raise wheat; as also that they may have more room, thinking that we live too thick.

Now whether I have assigned the true reasons or causes of the present difficulties under which many parts of the country suffer, is submitted to the censure of the judicious reader : the matters of fact are certain, whatever becomes of the reasons assigned : for if all men cannot judge, yet all men can feel.

Every observing reader of history must have taken notice of the account given of great numbers of people living on and having their subsistence from very small parcels of land, and mighty armies are raised from a small territory, which is to the surprise and admiration of the reader ; which will afford a great variety of useful reflections.

The children of Israel were very numerous considering the smallness of the land of Canaan, as will appear by the list given in to king David, consequent upon his command to have the people numbered : More particularly what will shew the populousness of that land, is what we read, 2 Chron. xiii. 5 : And Abijah set the battle in array, with an army of valiant men of war, even four hundred thousand chosen men : Jeroboam also set the battle in array against him with eight hundred thousand chosen men. It is true, their militia was formed as ours, of the body of the people, from sixteen years old to sixty, yet this seemed to be a collection of only their best men and the flower of their military force ; they were chosen men, men of valor, neither old men, sick persons, nor new married men, who were exempted by law, cowards, or cripples ; of which there must be great numbers, besides women and children, who have mouths to eat, though they had neither hands nor strength to fight. This Holy Land was an inland country, not supported by trade, but supplied by the product of their own land.

England is a small country, compared with France, Germany and Russia, yet the Holy Land from Dan

to Beersheba was not more than equal to one third part of England : the two capital or royal cities, viz. Samaria and Jerusalem, were not fifty miles distant from each other.

Again, the old Romans lived upon small shreds of land : The Roman History informs us of the quantity of land there was in the whole farms of even the foremost men and men of the first figure and highest rank in their whole commonwealth. Manius Curius Dentatatus was three times chosen Consul, which was the highest ordinary office in the State ; led the Roman army, fought with and entirely routed Pyrrhus, drove him out of the country, and had a triumph for his victory : The whole of this great man's farm on which he lived, and from which he drew his whole subsistence, was no more than seven Roman jugera, which is about four acres and an half ; being offered more by the government, he refused it, saying, that he was an ambitious and dangerous person who was not content with, or should desire more than seven jugera.

The same Roman History informs of Lucius Quinctius Cincinnatus, that he was consul of Rome 459 years before Christ : He was also in a time of great danger chosen Dictator, who by his office was above all other magistracy, he was invested with sovereign and supreme power, both civil and military : In this exigency of the State, he raised armies, marched against the enemy, subdued them, made them pass under the yoke, as a token of subjection, triumphed for his victory, and all this in sixteen days ; laid down his great office and returned home to his little farm, which consisted but of two acres and a quarter of land. His farm was originally seven jugera, but to pay a debt which his son had contracted, he had been obliged to sell the one half of it :

Nor is he the only good provident father consumed and wasted by a rakish spendthrift son.

When I first read these accounts, I concluded that these small tracts of land were situated and circumstanced like the Garden Ground near the city of London, where two or three acres will support a family : But upon further reading, I found this seven jugera was the whole share of a commoner.

From these scraps of history we may collect and conclude, that a little good land will support a family ; and that to make it yield so much, they must have had an art and skill to which we are strangers : To attain that skill which is lost, or to find out something now to substitute in the room, is our proper business, and is the design of this essay.

Mr. Ellis, in his book of Husbandry, tells us, that the small tenements or little farms in England, which formerly would afford keeping but for one cow, are now so improved by sowing colworts, clover, and other sorts of grass, that now they will maintain a dairy of ten cows. He also tells us that a farmer made sixty pounds sterling from one acre of carrots.

But it will be said that Canaan and Italy were known to be very rich land. It is granted, but whether they were so by art or nature is not certain. Canaan was a land peculiarly blessed of God, with much rains, fruitful seasons, and good government ; without which husbandry will not flourish. It is now well known, that these two countries, one is under the Turk, and the other under the Pope, are poor and in a wretched condition.

Mr. Addison informs us, that Campania, that in the time of the old Romans was esteemed as the Garden of Italy, is now good for nothing ; for want of good husbandry the water stagnates, and corrupts to that degree, and is thereby rendered so unhealthy, that he supposeth if men were disposed to improve it

they could not live long enough there to drain and bring it into order.

The reader will see what use we are to make of history, and in what manner to improve it : for if we only read the story without making reflections or improvement, religious, natural or political; if we read only as a mere amusement, without turning and improving the various incidents to some useful purposes, I cannot see why a romance might not be as good, or better, than a true history. As now.

When we read of the extent and grandeur of the Roman Empire, what is that to me, whether it was great or small, unless I observe at the same time I read of their greatness, I consider the ways and means by which they advanced to make such a shining figure in the world? That which rendered them so illustrious was their virtue, their laborious life rendered them hardy, their frugality, integrity, but above all their matchless love to their country, which was their reigning passion.

If I read the history of the battle at Pharsalia, what is it to me, whether Pompey beat Cæsar, or Cæsar overcome Pompey, if I do not observe that the luxury of Pompey's army, their confidence in their superior numbers, which contributed a great deal to their overthrow? And on the other hand, the care, prudence and wisdom of Cæsar, who told his men, that they were going to engage a number of perfumed sparks, that would not for the world but carry their fine faces home to Rome without wounds or scars; therefore, ordered his men to flash their faces; his soldiers followed the counsel and it succeeded.

We learn from History that great numbers got their living from a little land; but what were their rules of husbandry, and by what art, is in a great measure lost. The oldest Roman husbandry that has been transmitted down to us, is a book written

by Cato ; I have not seen it, but it is said doth no great honor to the author. The next is Virgil, which is a better piece of poetry than a book of husbandry ; in which he hath taken more care to embellish his poem than to instruct a farmer.\*

The oldest book of English husbandry was wrote (as I think) by Lord Chancellor Fortescue, in the reign (if I remember right). of Henry the Seventh.

The only old rules of husbandry that I have met with, I find in the Bible ; and there not professedly taught, but only for illustration and by way of comparison : Yet this serves to shew us what was the practice of farmers in those days. In the particulars there mentioned, the ancient method of husbandry we have suggested to us.

1. The first thing I shall mention is the account given of the profit and advantage of Goats. Prov. 27. 26. Lambs are for cloathing, and Goats are for the price of the field. They are excellent to subdue rough uncultivated land : They are in their nature abundantly fitted to serve that useful purpose ; they destroy bushes, briars and weeds : by their tread, their dung and urine, which is very hot, they sweeten the ground to that degree, as in a little time the land will be cloathed with grass ; yet that a piece of land subdued by them will thereby be doubled in its value or price, is what perhaps, hath not been so much thought of as would be proper.

2. The next thing is what we read, in Eccl. xi. 6. *In the morning sow thy seed, and in the evening withhold not thy hand : for thou knowest not whether shall prosper, either this or that, or whether they both shall be alike good.* The true intendment and moral improvement, is not my present business or design. I

\* The above is not said to depreciate the character or derogate from the merits of that truly great man ; for a great deal of our present husbandry is justly called *Virgiling*.

remember a farmer of good credit told me, that being for some reason obliged to be early, he sowed oats at break of day, and had harrowed all in before sun-rising: He observed that the oats sowed thus early, out-stript the other oats sowed the same day after the day was come on, grew six inches taller, had a larger head, and appeared every way better, although that part of the land which was sowed early, if there was any difference, was the poorest side. It is agreeable to reason that it should do good: For the dews are impregnated with nitrous salts, and is the principal thing which enrich the ground when it lies fallow; this dew being harrowed in with the seed may promote its growth. If the seed were sown in the evening so as to lie all night to be soaked and softened with the dew, and then harrowed in the morning, *thou knowest not whether shall prosper, this or that*; it may therefore be best to make trial of both ways. I persuaded one of my neighbors to make trial of this method in sowing mesling this last sowing season.

3. Another piece of ancient husbandry we have an account in Isa. xxviii, 24—27. *For the fitches are not threshed with a threshing instrument, neither is a cart-wheel turned about upon the cummin: but the fitches are beaten out with a staff, and the cummin with a rod.* It seems that the wheel was used for those sorts of grain which were hard to be separated from its chaff, but the fitches and cummin, as they might be threshed with a little stick, the wheel was needless; but for those sorts of corn as were hard to thresh, to save labor and time, they were wont to do it with a cart-wheel, as v, 28. *Bread-corn is bruised; because he will not ever be threshing it, nor break it with the wheel of his cart, nor bruise it with his horsemen.* And there is no doubt but that a wheel might be so contrived, as to thresh out a great deal of grain in a day.

The other way mentioned in the text of threshing with horses, I am told is now in use among the Dutch people; and that in this method, their horses will trample out sixty bushels in a day. At present we are more concerned how to raise wheat and rye, than to learn any expeditious way to thresh it out: if ever we should be blessed with large crops, such an invention might be of use.

There are various ways of cleansing red and white clover seed, which is a difficult seed to be parted or separated from its chaff or containing coat: The ways of doing it has been held as a secret and a mysterious business; and indeed most of the ways in use, or are commonly known, are slow and not so effectual to get out all the seeds as would be desired.

Being now upon the article of threshing with the wheel, I shall set before the reader the way of cleansing or getting out clover seed with a wheel, which I look upon by far the most effectual and expeditious method.

Take your clover hay to a tanner's bark-mill, where they use a stone wheel, grind it, and clear it from the chaff with a corn-fan, what heads or chaff is not fully cleared and all the seed got out, put upon the floor and grind it again, and fan it as before: in this manner, I am told, a man will grind, fan and make quite clean a bushel in one day: nor will the stone-wheel crush and spoil any of the seed; a mischief which at first one would think unavoidable.—Where a stone wheel cannot be had, it may be worth the while to try a cider-mill; but I fear there will want the roughness of the stone to tare off the chaff. This I esteem as an article of some importance, and I hope will be more so; for I believe it will not be well with New-England, till every farmer shall have a bushel or two of clover seed to sow every year upon his own land.

I informed a gentleman who raiseth a great deal of clover, of this method of cleansing the seed by the stone-wheel and fan; he said he was obliged to me, for he did believe that it would save him twenty-five pounds money in one year in cleansing his seed.

4. We read, I. Kings, 19. 19. of *Elisha, who was ploughing with twelve yoke of oxen before him*. This was a mighty team: It must be a plough of a very different structure from what is now in use; but some imagine the text is to be understood of twelve different teams and ploughs, from what follows, *And he was with the twelfth*. His twelve yoke of oxen brings to my mind what Mr. Ellis relates of a minister in England, who had been over sea, and brought home with him a plough with which one yoke of small oxen ploughed twelve acres of land in one day: But we know not what sort of a plough it was, that either the prophet or the minister made use of: If ever there was such a plough as that twelve acre plough, it is pity Mr. Ellis did not enable himself to give a description of it.

5. I shall name but one rule of husbandry more from the Scripture, and that is from 2 Cor. 9. 6.

The Apostle exhorting to liberality, refers them to a known rule among husbandmen: *but this I say, He that soweth sparingly, shall reap also sparingly: and he which soweth bountifully, shall reap also bountifully*. In the application of this rule we are to be under the conduct of reason, use, prudence and discretion: we are not to cover the ground with seed; for instead of having more increase, we shall have less: but that we do not spare, but use such proportion of seed as is found by experience to be best. In England they sow two bushels and an half of wheat to one acre, and as much flax seed upon an acre; but these proportions are too much, and with us will be a waste of seed, if not prejudicial to the

crop: But in strong land more seed than we ordinarily use would be best. Last summer I saw flax on strong dreined land, which was choaked with weeds, and much hurt for want of more seed: Thick seed-  
ing in such land would have kept down the weeds, and would have rendered the harle finer, and would likely have much increased the crop.

In dreined land, of which I gave a large account last year, I sowed a little hemp seed. I sowed my little piece very thick; it was a well proportioned harle, and run up six feet and an half high. The improvement of such dreined land for hemp was what I had in view, so I have the satisfaction to find by that small trial, that it is a sort of land that is likely to answer my expectation when it comes to have sufficient age, for such land must have time.

Now I am upon this article, I would inform the reader, that old hemp seed will not grow, not so much as one seed of it: The knowledge of this may be an advantage to such as have dreined land and would sow hemp. Dreined land, some of it this last summer hath yielded great crops of grass and Indian corn, eighty bushels to the acre. I have also the pleasure to observe, that lately here and in the neighbouring towns, the farmers are ditching, dreining and entering apace into that useful branch of good husbandry.

These rules of husbandry taken from the Scripture, being so remarkable and useful, I wonder no writer on this subject hath taken notice of them. The text saith, *sow bountifully*: Let it be remembered, that whatsoever helps we have from the Holy Scripture, relating to the life that now is, the primary and original design of it is to promote the divine life, should therefore be valued and improved accordingly.

Now since there are very few fragments left us of the old rules and art, by which great multitudes of

people had their sole maintenance from a verry little land, so little that if they were as plain and frugal as the old Romans, yet people cannot live upon the air : In our way of husbandry we should think it impossible for a family to live upon two acres and a quarter of land. These rules being lost, we have this comfort, that what hath been done may be done again. Old arts when they have been long lost, are sometimes recovered again and pass for new inventions, or at least some other good rules may be substituted in the place of such as are lost.

1. Useful arts are sometimes lost for want of being put into writing. Tradition is a very slippery tenure, and a slender pin to bear any great weight for a long time.

2. When they are committed to writing, the devastations of war, fires and other disasters may destroy all those valuable monuments of antiquity and treasures of useful knowledge. As it was in Italy when the Goths, Vandals, and other rude people brake in upon them and laid all waste ; like what was said of the locusts, before a fire, and behind a wilderness.

3. Sometimes indolence and carelessness may be the occasion of this loss. For instance, our first planters were wont to roll their barley, as they do at present in England, with a large wooden roller drawn by an horse, which is of service to break all the clods and fasten the loose earth about the roots, and prevent the progress of worms. I remember I heard an old man say, his father left him to roll a piece of barley, he was idle and left a part of the land not rolled, thinking it would not be known ; his father found by the difference of the crop at harvest, and said upon it, you was an idle jack, and did not roll this part of the field. We raise now but little barley ; it may be (at least in part) owing from a neglect of this part of husbandry ; the knowledge of which is lost.

This brings to my mind what a man once told me, That having suffered much in his young apple trees, by the mice eating off the bark under the snow, both in his nursery, and orchard planted out : to prevent the like evil for the future, he used to tread down the snow hard about his trees and it was effectual.

I have seen the like mischief done to button-wood trees, planted for fence and fire-wood. A young tree which we have planted, it is worth while to take some pains to preserve it. I mention this now lest I should forget it.

Another piece of skill which we have carelessly lost, is the knowledge of the proper times to cut timber.

Our forefathers had this knowledge, so that the timber they cut would last a great deal longer than the timber that is cut in these days.

If it be said that they had great choice of timber ; why so have we had in those towns which were new settled within these fifty years. So that it is not strange that old arts are lost in a long tract of time, when we have in less than an hundred years lost a skill so useful and needful.

The way to get out of this difficulty, arising from the scarcity of hay, which is the present subject of complaint, seems to be easy and natural ; which is by clearing and draining swamps, cranberry and bog meadows. The last summer has shewed us what may be done. Some of the most forward of those lands have yielded four loads of English hay to the acre. But as this clearing, ditching and draining, will, when it is in the hands of the most able and wealthy, require time : it will be still more difficult to the poor and less able, who cannot well expend labour when they receive no present pay ; but even in this pitiable case, I have seen how much a careful redeeming of time and a good resolution will do : A

great deal of clearing and ditching may be done in the winter, when little else can be done: But, *while the grass grows, the steed starves. What can be done for a present supply?*

Red clover is of a quick growth, and will supply our wants for the present; a few months brings it forward to an high head. There are few people yet know the value of this beneficial grass.

I had often met with it, that our nation being much exhausted and ruined by the civil war, retrieved their great losses by some new husbandry, and in a little time recovered themselves and got to a better state than ever; but never could learn what was this advantageous improvement, till I found by reading Mr. Hurlib's Book of Husbandry, that it was principally by introducing this clover grass, called Flanders grass; because the seed was brought from Brabant and other parts of Flanders.

The propagating this grass in a plentiful manner, will answer two useful purposes at once; it will supply us with hay, and if sowed thick and there be a good sward to turn over, will be likely to supply us with wheat: for in England, the farmers say, *A clover lay is a good foundation for a plentiful crop of wheat.* And with us (as some tell me who tried it find) it ploughs harder than white clover sward, and looks redder and not so promising as the other, being both in the same field; yet at harvest the red clover land yielded as good a crop as the white clover land. But our old worn-out land is poor and will not produce clover. If you sow clover seed in poor land, it will not come up but little better than if it had been baked, and that which comes up will not grow thick enough, or sufficiently tall to mow; there must therefore be provision in this case, otherwise the direction will be useless.

To provide a remedy for this evil, is the next thing to be considered.

Ashes is allowed on all hands to be some of the best dressing or manure for land; it enricheth much and lasts long; but the misery is, we can get but little. It is a frequent saying, if we could get a sufficiency of ashes, we could do well enough. It takes a great deal of wood to make a little ashes: but peat will yield abundance of ashes, some sort of it. This is a fossil, of which many in this country have not so much as heard the name. They have known it in England and Ireland a long time; and thousands of families have no other fuel for firing but peat: but the use of it for land is a new thing. Theirs is so good, that fifteen bushels of the ashes is full enough for an acre of land: they reckon fifteen bushels of these ashes as good as forty of that made of wood. That about Longley and Newberry, where they find peat, the ashes have been so useful, that land that before would rent but for five shillings a year, by the help of ashes was raised to twenty shillings sterling the acre.

As to the formation, original or matter of which peat is produced, it is reasonably supposed to be made of the wood which grew before the flood: when the trees and shrubs were torn down by the mighty commotion of wind and water, these were hurried to and fro, at length lodged by their own weight and intanglement into low grounds, and in time was converted to what is now called peat. It is of an unctuous, bituminous nature; some of it when dry, resembles the thickened juice of plants. That this is the original of it, I think I can produce satisfactory and undeniable proofs. A person digging peat at my desire, told me that he found the perfect shape of a log, but converted to peat, and as soft as butter. I have found in the peat where it was deep, the fibrous

parts of bark ; (Hair we know resists corruption a long time) I have also found coals and burnt sticks and other bits of wood not turned to peat. Sundry persons coming to see some dried peat, and having heard what I thought of its original, one of the company breaking a lump of it found in it the dung of some fowl, that retained its perfect figure, colour and consistence, as though it had not been voided a month past : at this the man says, *If it be so as we have heard, I do not know but I have found the dung of that very dove which came out of the ark.*

What induced me to search after peat, was the great desire I had to find some inexhaustible store of manure for our land, but finding by books, that the peat they used in England, they found in intervale lands, and that they dug through several beds or layers of earth, six or seven feet deep to come at it, I thought if I should search for it and find it in such land, the charge of turning that top-earth would be too chargeable for us to bear ; but after some reasoning upon it, I thought it probable it might be found in swamps, searched and found it in some places within six inches of the surface ; in a few weeks I found it in three several towns, and in seven distinct places, and do believe it to be very plenty in the country.

It may be known from mud by its cutting sleek and smooth, and is much like as when you cut butter or hog's fat in very cold weather ; some is softer, but that which is most compact and hardest is the best. If you are still at a loss, dry a piece upon the slice, then put it into the fire, its manner of burning will shew whether it be peat : When you once know it, you may always know it, let it be of what colour it will.

I have found three sorts, white, brown and black ; I call it white, as being a lighter colour than the other sorts : It is before it is burnt, of the colour of wet

ashes made of wood, but after it is burnt, is as white as chalk: the ashes are very light, therefore conclude that they are not very strong; but it yields plentifully, being as to appearance as much after burning as it was before it was burnt. Seven bushels of this was scattered upon green wheat this fall, and I hear makes the corn look greener and more fresh and lively.

I gave a farmer some bushels of brown peat ashes, which he sowed upon his winter corn in the poorest part of his lot, the corn he tells me looks well, and equal in goodness to land which was moderately folded with the sheep. This way of sowing ashes upon corn is what in England is called top dressing.

Another farmer having prepared a piece of ground for turnips, one part he dunged with yard dung, another with wood ashes, another with peat ashes, in proportion to fifteen bushels to the acre, the remaining part he put nothing upon it; that part dressed with peat ashes produced the best turnips.

This white sort of peat is so destitute of oily, sulphurous bituminous parts, that it will not burn alone without the assistance of wood; but by some that I tried, I believe a little wood will burn a great deal of it. It is easy to get thousands of bushels of these ashes.

Brown peat after it hath been spread and dry, let it be shoveled up in a long heap; when it is once set on fire with a little brush, or small wood laid on the windward side, it will burn of itself, nor will the rain put it out: if it be wet when it is burnt, it yields fewer ashes. You must take care it do not burn too fast; restrain the fire by putting on more peat, but if you stifle it too much in the middle, instead of ashes you will have charcoal. This sort of peat shrinks much in drying and in the burning, not yielding much ashes; but the ashes of a reddish color

and heavy, and consequently better than the white sort. This sort makes excellent charcoal, better than that made of wood. The peat looked so well, I procured a trial of it raw in the blacksmith's forge, found that a good white welding heat might be raised by that alone. I had a coulter laid with it very well; but then it is too slow in raising such a heat; but mixed with charcoal, it seems to do well. After the coal is put on lay the peat so as to surround the coal, it being a little of the nature of sea coal, it renders the fire more compact, the heat more intense, and the coal much more durable; besides this being two thirds cheaper than common charcoal, it would probably be a good saving to the smith and bloomer. What it will do in a furnace for iron, I cannot say.

The third sort of peat that I have found, is black peat; this I suppose to be the best, as affording a plenty of ashes, and better than either of the other sorts: this is that which they use in England to burn, in order with its ashes to manure their land; nor do I know whether they have any other sort, except turf-peat, of which sort I have a specimen by me, which came from Ireland; which I do not think to be properly peat, but a fibrous complication of moss roots.

I suppose peat may be found in all parts of the country, yea all over the world; which is an evidence of the care, wisdom and goodness of Providence, in preserving as it were in pickle, the wood which grew before the flood for our use, and that the ruins of the old world should supply the wants and wastes of the present. This affair of peat also affords us an evidence, from the nature of the thing, that the Mosaic or Scripture account of Noah's flood is true.

As to the advantage of peat, it is so little time since the discovery of it, that we have not had time to make trials and experiments of it or its ashes, as can

be very certain or instructive : but hope another year a satisfactory account may be given of this new improvement.

Another sort of manure for the enriching land, is what I just mentioned the last year, and that is shell sand : it is called sand, but improperly : as it lies on the beach, to an observing eye, it would be thought sand, whereas it is not gritt, but small broken shells. It is remarkable that such large beaches in which there are many thousand cart loads, yet composed chiefly of shells not bigger than a man's little finger nail : as also, that if you take away twenty or thirty tons, the cavity will be filled in a few days with the same sort of small shells. This I suppose to be the same sort of shell sand which in England and Ireland they carry in bags on horses twenty or thirty miles into the country to sow on their land to enrich it, and save the wheat from blasting and mildew.

We design here this winter to build a small float or vessel of twenty tons, to bring that sand from Guilford to this town.

The next sort of manure which I shall mention, is clay ashes. We have very little clay here ; if it had been plenty, I should have tried the most likely ways to burn it that I could think of : I cannot think but that it might be burnt with as much ease as white peat : the clay that is of a reddish colour is esteemed the best, and that three cart loads of the ashes is accounted sufficient to dress an acre well.

The last sort of dressing I shall take notice of, is lime stone, which abounds in the back parts of the country. I have not heard of any on the sea coast, or on the land adjoining to navigable rivers for twenty miles back ; for thus far the inhabitants may be supplied with shells from the sea : at about twenty miles end, more or less, the lime stone begins and extends far and wide ; which is an evidence that the

world is made and governed by a kind, wise and intelligent Being.

This is a manure when burnt, which is much used and esteemed by farmers in England, although it be to us difficult and chargeable to burn it, yet there they have the skill to burn it cheap, with peat, turf or wood in a well regulated fire. A little fire or water will do great things, if duly ordered so as to have the advantage of its full force.

It hath been for a time, my desire and endeavor to find manure for our land, such as will be cheap, within every man's reach and enough of it; and I cannot but flatter myself with an hope that these four sorts of materials will afford the sufficiency so much wanted, and will prove an inexhaustible fund for that purpose: but time and experience must determine this important affair.

I should have observed before, that in England, peat ashes brings forward clover grass in an extraordinary manner, and so sweetens the ground that let the grass be ever so rank, yet the cattle eat it with eagerness before other grass.

I have heard of swamps in the country that after all proper expense upon them, are barren and unfruitful, either at first or afterwards. I went to see such an one last summer, and found the cause of its unprofitableness was brown peat's lying too near the top. Brown peat, when it is stirred and exposed to the air and sun, becomes hard like cinders: if this be the case in one place, it may be so in another. Peat that comes nearest to the top of the ground, that I have seen, is five or six inches, the top-earth is of a reddish colour.

A certain farmer of good credit, willing to promote the public good, told me, that when he had washed his sheep, he did not shear them as soon as they were dry, as is the common custom, but laid them in a

clean pasture five or six days, that so the wool might have time to acquire its primitive oilness drawn from the sheep's body, which made it stronger and better to card, spin, weave, dress and wear; which put me in mind of what I had read, that in England they shear some of their sheep unwashed, to mix it with the Irish wool, which is too dry and stiff for good working.

Since I am upon the article of wool, I will mention one thing relating to dying blue; I supposed that the urine in which the indigo is dissolved, was not impregnated with salt sufficient to open the parts of the indigo and set the colour; I told a woman I would advise her to make a strong lye or lee of common wood ashes, then boil that away to a dryness, take an ounce of this salt with an ounce of indigo, put it into the usual quantity of urine, which she and others tried and found it did great service, by setting the colour deeper and lengthening out the indigo: she further told me, that she put some of the salt into old dry stuff almost spent, it so renewed it that it did good service. I suppose that crude sal-armoniack would do better still, being nearer a kin to urinous salt.

If I have forfeited my readers favour, or it should be so ordered by Providence, that I should discontinue the essay, I hope the hints that have been offered may be pursued by my countrymen, who are enterprizing and ingenious. I shall add no more but only a few receipts.

If a farmer in England should sow his wheat dry, without steeping in some proper liquor, he would be accounted a bad husbandman. Mr. Ellis directs to put in a quart of salt into as much water as is sufficient to cover two bushels and an half of wheat, to which add two quarts of slacked lime, put in the wheat after you have well stirred the brine, let the

wheat steep twelve hours, then draw off the water, spread the seed after it hath drained half an hour, sift upon it dry lime, stirring it about, which will make it dry enough for immediate sowing.

I have not room to name the advantages they say they have from this practice. When I did it this year, I used tide water; this saves salt: some direct to make the brine very strong, so as to bear an egg.

*A Receipt for increasing a Barley Crop.*

Dissolve three pounds of copperas in a pail full of boiling water, add to this as much dung-puddle water as will well cover three bushels and an half of barley, stir it and let it steep twenty four hours; save the liquor for after steeping, with a little addition it will do again and again; when the seed is spread and dreined, sift on fine lime, which dries it fit for sowing.

I dreined my wheat after steeping in a corn basket.

*A Receipt for burning Clay.*

Any sort of clay will do for ashes, but that of a reddish colour is accounted the best for that purpose.

Dig your clay with a spade in spits, of the bigness of ordinary bricks; dig two, three, eight, ten or twenty loads of clay, more or less, as you please; take small billets of wood, or faggots of brush, pile it up in the form of a pyramid or sugar loaf, three or four feet high, then take these spits of clay, after they are dried in the sun, surround your pile of wood with them, laying them close to the wood, laying them one upon another till you have enclosed the pile of wood, only leaving an hole on the side to put in the fire, and an hole on the top to make a draught; then surround again with spits of clay from top to bottom, as before, and then again a third laying in the same order, then kindle your fire; when it is well got on

fire, stop up the holes with clay, the innate heat will fire the clay till it grow so hot that you may put on wet clay in great quantities; but you must mind not to put on clay so fast, or lay it so close as to put out your fire, for if you do so, you must begin all anew. If you desire to burn so much clay as that the heap grows so high that you cannot reach to lay it up, you may build a stage with boards, by which you may advance to as great a height as you please. The pile must be watched and tended night and day, till it is fully burnt.

The author of the book out of which this receipt is taken, very much commends clay ashes, and tells what is a comfortable hearing, which is, that forty bushels of these ashes is a full dressing for an acre of land.

The reader must take this upon trust; if true, it will make well for Hartford, Wethersfield, and those towns which abound in clay.

It may be tried with a very little cost; if any should try, I should be glad to know the success. By wet clay above named, we are to understand clay in its natural moist state, as it is taken from the pit. I suppose that to burn large quantities of clay at once in one pile, will be both cheaper and better performed, than when burnt in small heaps.

I shall conclude with one receipt more, which is infallible and invaluable, and derived from the highest and best authority: *Seek ye first the kingdom of God and his righteousness, and all these things shall be added unto you. Godliness is profitable unto all things, having the promise of the life which now is, and of that which is to come. This is a faithful saying, and worthy of all acceptance.*

## PART III.

*Sow the fields, and plant vineyards, which may yield fruits of increase. Psal. cvii. 37.*

*For thou shalt eat the labour of thine hands: happy shalt thou be, and it shall be well with thee. Psal. cxxviii. 2.*

THE foundation of a settlement in New-England, was not laid otherwise than at a great expence of lives and estate. Almost half the planters died soon after their arrival, of such distempers, which had probably been contracted by hunger, cold and other hardships to which they had been exposed.

This, and the following transmigrations, the historians of those times inform us, cost for the transporting inhabitants, ninety five thousand pounds sterling; for bringing over live stock, horses, neat cattle, sheep and goats, twenty thousand pounds: for provisions, until it could be raised in the country for their subsistence, forty five thousand pounds more; which reduced to our currency makes a prodigious sum.

They having laid for us a good foundation, and left us, their posterity, possessed of the fruits of their expence and labour; we shall be wanting to ourselves if we fail to improve and manure this great and good land; or neglect to follow the example of virtue and industry which is set before us.

The continuation of this essay is designed to forward and promote such improvement.

If the aboriginal natives, the Indian inhabitants of this country, did subsist here in great numbers when destitute of ploughs, the labour of the ox, or any instrument made of iron, or any other metal: it would be to our dishonour, if from indolence or want of application, we do not comfortably subsist, and advance in our improvement.

It hath been observed by our writers, that Old England, in former times, suffered more frequently and more severely by famine, than in later times. This was not owing to the inclemency of the seasons in those distant times, or to better seasons in these days, that there is a greater plenty. Our English historians inform us, that there was so great a famine in the reign of Edward the Third, that bread corn was sold at thirteen times more than the usual price. Any remarkable scarcity is now very rare. There may be two reasons assigned, under Providence, as the cause of this difference.

1. In those ancient times, England had but little shipping or trade: there was then little sent away besides block-tin and wool: there being no market for corn, flesh, and other provisions but what could be found at home; there was no encouragement to raise it, more than to supply their own wants: if they did raise more, it must lie upon their hands, there being yearly but little corn sowed, if the seasons were a little unfavorable, it was immediately felt; whereas when a great deal is planted and sowed, if there happens hail, frost, blast and mildew, so as to cut short the crop, yet there will be sufficient for the inhabitants.

2. Another reason of the difference between the former and latter times, is this: in these times there is a greater variety of lands under improvement than formerly; some dry land, some moist, some clayey, and some sandy ground; some high, and some low dreined land.

The farmers of the present age make use of a greater variety of grain than formerly. They sow five and twenty sorts of wheat; many sorts of grass, many sorts of roots and fruits; the advantage obtained thereby is very great; the season that ill suits with one sort of land, or grain, may agree well with ano-

ther : A wet summer will suit the dry land, and dry seasons agree with the low moist land ; when one fails, another hits. A variety of grain and grass may be fitted to that sort of land to which in its nature it is most agreeable.

It is allowed by all, that to obtain great crops of barley, the land should be very strong ; be made mellow, that is reduced to a great degree of fineness ; these being the two necessary properties for barley ground, I thought that certainly the dreined land, which would produce eighty bushels of Indian corn to the acre, and the ground very fine and mellow, would not fail to produce great crops of barley. I made a trial ; but it proved otherwise than was expected ; the produce was small and poor : whereas the same land afforded very large flax, at which I much wondered, till I met with an old English rhyming proverb, viz. to have great crops of flax and barley—

*Sow flax in the mire,  
Sow barley in the fire.*

By sowing in the fire, we are to understand that barley must be sowed in land well heated with dung, lime, or ashes, or other hot manure.

I suppose that if the aforementioned land had been dunged, and thereby warmed, it might have yielded much barley.

It would be of advantage to introduce a great variety of sorts of grain, not as yet commonly in use among us.

From what experience I have had of it, I would recommend Millet ; some of this seed was sent to me under the name of East India Wheat ; I soon discovered that it was no species of Wheat, but that it was Millet. It is a small grain of a yellowish color, and of the bigness of turnip or cabbage seed ; it was antiently used as bread-corn, as we may see in Ezek. 4. 9.

I tried a little of it, exactly measuring the ground and product; made a computation, and found that although the land was poor, yet it yielded at the rate of thirty two bushels to the acre. I have been told that strong land will produce fifty or sixty bushels to the acre; it may be sowed in the Spring, or in June; it is but a mean sort of grain, yet it will save better.

The sore drought in the Summer past, which almost destroyed the clover grass, put me upon thoughts of a supply of fodder when clover fails; pursuant hereunto, I ploughed up some flax ground, in July, sowed Millet seed the twenty sixth day, it came up, but much flax came up with it, rendered it unfit for mowing, as I designed; I should have ploughed up oat stubble instead of flax ground.

If the scattered oats had grown up, it would have helped the crop when it came to be mowed, rather than obstructed it.

The Millet being thus incumbered and choaked with the flax, I let it stand for feeding; I put a cow into the same field to fat, and observed that although there was good rowen of spire grass, and white clover, the cow neglected that, and would feed constantly upon the Millet, till that was all spent before she would eat the grass, by which I was assured that it was good feed.

Although the seed be small, yet it puts up a large strong stalk, bigger than that of wheat. It hath on the sides many large leaves like Indian corn at moulding, or hilling time, so that it looks likely that if mowed green, it will make good fodder, which may be an help to those who foresee they are likely to want hay.

If you sow it so early as to have a crop of grain, and it stands till the seed be ripe, yet the straw will be good.

There is one advantage attending this grain, that a little seed is sufficient ; two or three quarts will seed an acre. It is probable that when it is sowed only for pasture or mowing, it will be best to sow it thicker than when it is sowed for a crop of grain.

I gave a little of the seed to a man that hath but little meadow ; he sowed it last Spring, yet notwithstanding the drought, he had a good yield ; it bears the drought as well as wheat. The man is so well pleased with it, and thinks it will be such an help to him, that he designs to sow the next Spring all that he raised.

I scattered a few seeds in the dreined land, have reason to think it will prosper well in such land.

Although it may do to sow it late, yet the last years experience makes it evident, that sowing in the Spring is best if you design a crop of grain.

It is a grain that will serve to feed the poultry, and when ground to meal serve for the swine ; nay, I have known the time when we should have applied it for human sustenance.

It is a Summer grain, and therefore not exposed to be killed with the winter, as it frequently happens to wheat and rye ; nor have I yet observed it subject to blast or milldew ; for these reasons it may be of advantage to encourage its propagation.

As wheat is justly termed the *golden grain*, and as we have but few sorts of it among us, it may be of advantage to encourage a greater variety, and especially of Summer wheat, since we find the other wheat is subject to be destroyed in the Fall by wheat-lice, and in the Winter by frost.

There is a sort of Summer wheat brought into use, not subject to blast as the sort we had formerly among us.

We should sow both Winter and Summer wheat, if one fails, the other may prosper.

Some Maslin that I sowed in peat land never came up at all, no more than if it had been sowed on the sea-beach ; this land had been dreined longer than that where the corn grows, which is an evidence that peat land requires more time, and will be longer before it will be fertile and bring forth corn, and grass, than that land which is proper earth. At first I was of the opinion that peat land would never be fruitful, but time and experience hath taught me that I was mistaken ; it is slower in coming too than other land, but afterwards produceth both corn and grass as well as any of the dreined land.

This is what I think I ought in justice to insert, considering what I have said in a former essay.

What induced me to think that peat land would prove totally barren was this, I observed the land that had been dreined some years, yet would bear nothing. I also took notice that when it was made small, yet every particle was hãrd like rosin ; but I find that the rain and frost in time will reduce it to mould, and then be very good land.

As it may be to our advantage to sow a great variety of grain, so various sorts of grass that are good should be propagated among us, and may be equally advantageous. We should have grain and grass to suit various sorts of land. We many times, as it were, commit a rape upon our land, by forcing it to that improvement for which it is not fitted by nature ; we have the clearest discovery of this in flax ; we shall see it flourish well on some land, and again in other land full as strong, and good for grain, yet there flax will do nothing. It may be so in all other sorts of grain and grass which we sow, although as yet we have not the skill to find it out.

This is a piece of knowledge in husbandry in which we are still very deficient, and must be obtained by strict observation and experience.

Indian corn, as it is a native of the country, seems to do well in any sort of land, either sandy or clay, high or low land, provided it be but strong, whether it be made so by art or nature.

There are two sorts of grass which are natives of the country, which I would recommend; these are Herd Grass, (known in Pensylvania by the name of Timothy-Grass) the other is Fowl Meadow, sometimes called Duck grass, and sometimes Swamp-wire grass. It is said that herd grass was first found in a swamp in Piscataqua by one Herd, who propagated the same; that fowl meadow grass was brought into a poor piece of meadow in Dedham, by ducks and other water fowl, and therefore called by such an odd name. It is supposed to be brought into the meadows at Hartford by the annual floods, and called there Swamp Wire grass. Of these two sorts of natural grass, the fowl grass is much the best; it grows tall and thick, makes a more soft and pliable hay than herd grass, and consequently will be more fit for pressing, in order to ship off with our horses; besides it is a good grass, not abundantly inferior to English grass; it yields a good burthen, three loads to the acre. It must be sowed in low moist land; our dreined land when it is of sufficient age, is land very agreeable to this sort of grass. As the seed is very fine, there is danger of sowing it too thick, as some have done so as to come up thick like hair; this is a loss of seed, and prejudicial to the grass. When you bring too a swamp by flowing, have killed your brush and ditched your land, and got it a little dry, you may sow your seed among the trees and brush; it will come up, establish itself, and prevent other bad grass from taking possession; then you may clear off the wood and brush at your leisure; and then you will have good grass to mow as fast as you can clear the

land. I have seen it grow knee high where the dead brush was very thick.

This grass has another good quality, which renders it very valuable in a country where help is so much wanting; it will not spoil or suffer, although it stand beyond the common times for mowing. Clover will be lost in a great measure if it be not cut in the proper season. Spire grass, commonly called English grass, if it stands too long will be little better than rye straw: if this outstand the time, it is best to let it stand till there comes up a second growth, and then it will do tolerably well; but this fowl grass may be mowed at any time, from July to October.

One of my sons told me, that at New-Fairfield, he saw some stacks of it that the people told him was cut in October, he pulled out some of the hay, it looked green, and had a good smell. This is a great convenience in time of sickness, or any other casualty whereby we may be hindered from mowing in season.

This good property renders it a fit sort of grass for a new country, where we often have business crowd too hard upon us.

In reading Mr. Ellis, I find by him that in England they have got herd grass seed from this country, and set a value upon it; if they like that, they would like this much better.

Our common spire grass beareth the inequality of our climate better than any other foreign artificial grass; it is a hardy grass, and it is the best we have for winter feeding.

I have tried two sort of grass, which they value very much in England, viz. La Lucern and St. Foin; they will flourish a while, but others have found, as well as I, that it will not bear the rigour of our climate: a hot dry summer, or a hard winter, will destroy it.

I have some of the seed sent to me from Philadelphia, by a good friend there, which I design to try

upon my dreined land, and see if I can succeed any better than I have done heretofore.

As we ought to propagat various sorts of grain and grass, that so we may have the advantage of all sorts of land, and seasons, so we should adapt our tillage to the various sorts of land which we improve. We find land will yield wheat best when it is ploughed three times; and some will be hurt by it.

At Long-Island they turn up their old land for wheat, and begin to plough as soon after wheat harvest as they can: at sowing time harrow their land the same way that it was ploughed; in this way they have although not great corn, yet there being but little labour or expense, they have saving profitable crops.

The experienced farmers say, that their grass ground thus ploughed once in five years mends the land in this way of tillage; the land must be smooth and free from stones.

Eight or ten years past, an old experienced farmer told me, that he had observed much land worn out and spoiled by shallow ploughing; he earnestly recommended deep ploughing, even thin shallow land; said that he had tried it long, and often: thereupon I ordered a piece of land to be ploughed so deep, that our farmers thought that I had spoiled the land. We have had wheat twice since that time upon the same land, think that deep ploughing did the land no hurt, but good.

I have been told, and know it by my own observation, that if you sow rye successively every year on the same land, the crops and land will grow better.

Some land that at first would yield but five bushels to the acre, without the least charge of dung, or any manure, in time would afford a crop of fifteen bushels to the acre.

It should be ploughed, and the seed harrowed in soon after the crop is taken off, the sooner the better: it will take less seed, because what sheds out in harvesting the antecedent crop, will serve in part to seed the land; and the stubble being turned in when it is new and fresh, is much better than when it hath stood long drying in the sun and wind.

But I believe the principal thing is the sowing early; for although rye will do when sowed late, better than wheat, yet early sowing agrees with it better than with wheat.

I remember Hartlib tells us that Sir John Culpeper sowed winter rye in the spring, fed it close till common sowing time, and had the biggest crop that ever had been known in that part of the country.

This way of sowing rye yearly, must be profitable; as it mends the land, and the crop is obtained with little charge; the land may be ploughed with a small team, and there is but little expense of seed.

A small crop obtained with little charge, may afford more real gain, than when you have a great crop where much labour and cost is bestowed: by the great crop you may get fame, but by the small harvest you may get the most money.

But to the successful ordering this piece of husbandry, some few rules should be observed.

1. Land that you would devote to this sort of improvement, should be free of stones, stubbs, and such like impediments, which might hinder your well ploughing and harrowing.

2. The land should be very free from chadlock, tares, chess; which if in the ground will increase very much in this course of tillage.

3. Also your seed should be perfectly clean, and free from all kinds of trash; otherwise tares, cockle, chess, and the like, although there be but little, yet it will increase from year to year, till you are run out before you have made a full experiment.

4. The land that you would improve this way, must be entirely free from blue grass, called by some Dutch grass, or wire grass.

If the land be inclined to this sort of grass, this sort of tillage will so much encourage this grass, that in a little time you will be forced to give over this kind of improvement; as I know by experience: for having a piece of land, otherwise fit for this sort of husbandry, in two years I was quite beat out of the field, by the universal spreading of this grass, which took such full possession of the ground as to spoil the crop in a great measure.

The drained laud hath succeeded so well this two years past, that the same land which might be bought five or six years past for six pounds per acre, will now sell for an hundred pounds per acre; nay, even although it be not cleared of the wood and brush, provided the growth be killed with previous flowing.

By the way I would observe, that if a swamp be full of small brush, and but few great trees, the cheapest and best way is to flow it, and kill it with the water; but if there be but little small brush, and the land be very thick with trees, it is best to clear it by hand; for when it is killed with drowning the land, the trees are extremely hard to cut, so doth but delay the time, and increase the charge.

I am told by a credible person that tried it, that the best way is to draw off the water at the beginning of the dog days; the mud will be so heated with the sun, that in this method the swamp will be more killed in one year, than it will be in two years when the water is kept up all the time: and it stands with reason it should do so; for it is the heat and scalding of the water or mud which doth the business.

I have observed, that where the water stands deep, and consequently keeps cool, the bushes and trees are the longer before they die.

But however as this is not backed with much experience, every one must act his own judgment.

Since the dreined lands are so valuable, we should extend that improvement as far as we can.

I have observed in many fields there are small swamps or frog-ponds, which have a good deep soil, and are very rich; and would be profitable, could they be dreined: but they lye low, and are incompassed on all sides with high land, that it is impossible to drein them in the ordinary way. These swamps or frog-ponds, contain some a quarter of an acre, some half an acre, and some two or three acres. Let them be great or small, they are worth bringing to, if possible, at a reasonable expense.

If they can be dreined, and recovered at all, it may be done in a way that is easy and cheap.

1. In the first place, clear off all the bushes and let in the sun full upon it; and this alone will do more than most men will believe, especially if it be not fed with springs.

If the sun did not draw off abundance of water, why do not the Mediterranean and Caspian Seas drown all the country round, when there are so many great rivers continually discharging themselves into those Seas, where there is no out-let?

2. Look round on all sides, and see if on some side of the swamp there be not some river or low ground which is lower than the bottom of your frog-pond, which you desire to drein. On that side near the edge of the pond, dig an hole so deep till you come to a stratum or layer of gravel, or coarse sand, then stop, and by a channel or little ditch let the water out of the pond or swamp into the hole; and observe if in the space of three days the water begins to soak away, you may expect by this means to draw your land; this subterraneous passage in time will draw away the water.

But in order to succeed, you will find in a few days there will be a fine sediment, thin like a cobweb in the bottom of the hole, which will entirely stop the passage of the water ; but this film is easily broken by stirring up the bottom with an hoe.

This film will hold water like an iron pot, if it be not stirred and broken once in a few days.

When you have drawn off the water, so that you can plough the ground, that will effectually break up the pan bottom, so that the water will soak away, and the land be useful and profitable for the time to come.

As the bushes that grow in these frog-ponds are button-wood, for the most part, it is difficult to subdue them any other way but by ploughing.

This way of subterraneous dreining is more uncertain than when you have a visible out-let drein, yet the trial may be made with a little charge.

It is not only worth while to drein and subdue such places on the account of the profit that may be made hereby, but also for the sake of the deformity that is hereby removed : for these frog-ponds spoil the beauty of a field ; and are undesirable, like ulcers or sores in a man's face.

When you are about to drein such land, or looking out for low land which is lower than the swamp you would drein, it is not much whether such river or low land be near, or at half a mile's distance.

I have known sundry such pieces of land dreined the common way, that have been so good, that in a short time they have paid all the charge expended upon them, and would look as though they never had been what they really once were.

It is a common thing in swamps to find the moss two or three feet deep : at first I was a great deal concerned about it, how I should get rid of it ; as also whether the land would be of any worth if the moss was removed ; as is said, *can the rush grow up*

*without mire? can the flag grow without water?* So I found when the water was drawn off by ditches, the moss grew so dry, that in a hot dry season in the summer, it would burn quite down to the ground: but to burn that, or any other trash that you would consume, set fire to it when the weather is clear, the sun hot, and a strong southerly wind, which makes fire rage more fiercely, and do much more execution than a northerly or westerly wind: in a northerly wind the air is thin and light, so that the fire is not strongly compressed; the moist, heavy south wind prevents the dissipation of the fire and renders it more compact.

We see a smith will swab and wet his coals, by which means the heat is greatly increased. Now whether the reasoning be just or not, the fact is certain, which is the chief concern of a farmer.

In the first essay it is said, that the deep swamps are to be preferred to, and chosen before those that are shallow; and I am now more confirmed in my choice: for experience shows that the deep soil beareth extreme drought better than any other land in the hot season. The cold drought in the spring will hurt such land, so that the first crop of grass will not be very great; but the second crop will be extraordinary good.

The Reverend Mr. Todd was offered thirty pounds for the second crop, or rowen of half an acre.

The red clover in my drained land, which in the latter end of May last, in the cold drought looked then as though it would come to nothing; when hot weather came on, although the drought continued, yet the grass recovered to a good colour, and grew up well.

This is what may be considered as a very great advantage, and justifieth the choice of a deep soil, of eight or ten feet deep.

Our ditching and dreining drieth only the top of the ground, not more than three feet deep in the hot and dry season, I suppose that the moisture from the mud and water underneath is drawn up by the force of the sun, so the roots of the grass are furnished with sufficient moisture to bring forward such a mighty burthen of grass.

It is to be observed, that this is not to be expected till the land be concocted, changed and altered by the sun and air; for at the first, soon after it is dreined, it pincheth with the drought more than any other land.

Those swamps which are thick overgrown with moss, when they are so far dried by dreining, that the moss will rot, or burn off, that land proveth as good as any other dreined land. I mention this, because it is best that the farmer work as free from discouragement as possible.

Our dreined land, which is so good for Indian corn, and in all other respects is so well adapted for producing that grain, yet being moist and of a very loose contexture, the corn planted becomes an easy prey to crows, and other birds; unless prevented will pull up a great part of it, and destroy the crop; which is a great loss, in land so fruitful as we find such land commonly is: this is a great difficulty attending such land, which to avoid, take the roots of swamp hellebore, sometimes called poke, tickle weed, bear root; this root is known by these several names in different places—boil these roots in so much water as to keep them covered an inch deep; by two hours boiling, the liquor will be of sufficient strength—strain it out; put in your corn while the liquor is warm, and let it steep twenty hours, then it will be fit for planting. This is found to be an effectual security in the case.

The Reverend Mr. Todd informs me, that having met with much trouble and loss, having had his corn repeatedly pulled up, he planted his ground with

soaked corn, steeped in the aforesaid liquor; but not having enough of that, he ordered the planting to be finished with unsoaked corn. The event was, that the birds pulled up but two or three hills of the soaked corn, but left not one in ten of those hills which were planted with the unsoaked corn: this which was thus pulled up he planted over again with soaked corn, except some hills in the middle of the piece which was planted a second time, with unsoaked corn; it was planted in the middle, thinking that the birds would not find it; but the result was, as before; the unsoaked was all pulled up, and the hills planted with the steeped corn was spared.

Therefore with a great deal of reason he concludes his letter to me in the following words:—

“ Upon the whole, I think this experiment to be a full proof that corn so prepared when planted, is secure from the birds; the knowledge of which I cannot but think will be of great service to the country, as the preparation is cheap and easy, and our swamps seem by far to be the best land we have for Indian corn. My little swamp this year yielded at the rate of above ninety bushels to the acre, and was easier and cheaper tilled than the same quantity of upland.”

Marl is a sort of manure much used in Great Britain; they dig it up, and let it lie exposed to the rain and air twelve months, to soften and dissolve, then spread it sixty loads to an acre, which they say will last fourteen years. There are three sorts of this fat earth, white, blue, and that of a yellowish red, what I have found is white.

Sundry persons having tried the method prescribed in the first essay to get water in a pasture where it is wanting, and find it to succeed well, as I am informed.

Captain Fisk, of Middletown, having a large pasture wholly destitute of water, and without prospect of

help, but reading that book, he was encouraged, pursuant to the directions there given, he dug a well on the side of an hill; at six feet deep obtained water, by trench dug from the bottom of the well let out the water into a cistern or pond, had water not only for his cattle, but also to water and enrich the land which was lower. This water, as he sayeth is worth more than one hundred pounds. I am informed, that he hath dug in another place and obtained water, as before; but whether it was with a design to water his land, or his cattle, I cannot tell.

I would direct to another way to make an artificial spring, but I find I have not room for it in this essay.

Although herd grass be a valuable sort, yet the fowl meadow grass hath quite eclipsed its glory.

The old Romans regarded the study of husbandry and the improvement of their own language, as two very important parts of learning, men of the first figure employed their time in it. Virgil and Varro did not think this below the dignity of their pen; whereas with us there is so little care to cultivate our own language, that with too much propriety may be called our mother tongue: and husbandry is left to the invention and conduct of common labourers. The product of husbandry is necessary to life, is the basis of trade, and sinews of war; and our own language is the ordinary channel of conveyance for divinity, law and politics, it is that by which commerce, conversation, and all the important affairs of life are managed; therefore both deserve our attention and regard.

But while we are concerned about the common support of life, let us have a due regard to, and follow that solemn advice given us by a teacher sent from God. Joh. 6. 27. *Labour not for the meat which perisheth, but for that meat which endureth unto everlasting life, which the son of man shall give unto you.* Let this be our main care and chief concern.

## PART IV.

*I went by the field of the slothful, and by the vineyard of the man void of understanding.*

*And lo, it was all grown over with thorns, nettles covered the face thereof, and the stone-wall thereof was broken down.*

*Then I saw, and considered it well: I looked upon it, and received instruction. Prov. xxiv. 30, 31, 32.*

IN Norfolk, when they have once enriched their land, they are careful to order crops, so that the land may continue in the same state of fertility, without any farther additions of manure; their method is the very reverse of ours, they never seed the land with what is exhausting, two or three crops successively, but after wheat or barley, they sow pease or clover, as I find by a book a gentleman was so good as to send me, containing a scheme of management, in certain farms for thirteen years past. We are not so wise; there is nothing more common, than to put two drawing crops together, after Indian corn then comes oats.

The Norfolk method is well calculated for Weathersfield, Glassenberry, the east side of Hartford, Windsor and Springfield; in these places there is sand above and clay below, it is the same in many other parts of the country, but there are places where there is so little clay, and that so situated, as to render this method impracticable; and therefore ways and means to manure, and to increase dung, must be useful to the farmer, especially considering how little dung we make in the ordinary way, and how little all the dung we make will produce.

The dung of cattle, in the Summer, is very rich, and will do great service, if we improve it in the best manner; therefore, to save it and increase the quantity, I ordered a yard to be made in the street, proportion-

ed to the number of cattle, to be enclosed, it was made long and narrow for these two reasons. First, for the convenience of ploughing it; and secondly, for the advantage of setting and removing the end-fences, so often as I should have occasion to plough up the yard; when the yard was fenced, I put in the cows every night, one month; then opened the two ends and ploughed it up, ploughing as near the two side fences as possible, then reset the fence, ploughing it up thus every month through the whole Summer, then carted it upon my next adjoining land, it being very heavy, a long land carriage is not easy: I found the whole furrow depth of earth was become dung, making an increase beyond what one would imagine, I had four fold more than I should have produced in the common way. This dung was spread upon both grass land, and corn land: I did not find but that its effects were equal to other dung.

Another way by which I have increased the quantity, is, by carting into the yard, a great quantity of sea-ware, sea-wreck, or as it is commonly called, seaweed; this being trampled and broken short by the cattle, and enriched with the dung and stale, becomes good dung, in six months time, and is much lighter than that made with earth, and consequently much more fit for distant improvement. This is the method I have most frequently used: but I think the other sort, made of earth, to be preferable.

Before I had tried the way of making earth dung, I was afraid that it would deface and spoil the street, but in a little time the bald place, by the dew, the sun, and other concurring benefits of the atmosphere swarded over again, and recovered to its pristine state; so that practice will not be attended with any lasting mischievous consequence. Those whose land is so full of rocks and stones, that they cannot take benefit by the first method, that is, converting earth to dung,

and being far from the sea, can get no sea-weed; and therefore, what can they do to increase their dung, the following method may well answer this intention.

Mr. Masters, of Pennsylvania, an ingenious and public spirited farmer, was so good as to write me a letter, to inform me how he increased his dung; his way is to hire poor children to gather up the fallen dry leaves in the woods, and by fence sides; puts them up in stacks to settle, then carts them home, puts them into his yards, his stables and cow-houses, where they are poached and trampled in together, with the dung and stale of his cattle; and in the conclusion, makes great increase of manure; he has tried it so far, and so much, as to know it to be a great improvement. The dung and stale of beasts is so abundantly charged and impregnated with salts, proper to promote vegetation; which, to preserve entire, it is proper to mix it with hungry poor stuff, which will imbibe all the salts both fixed and volatile, otherwise the sun will exhale much of the volatile part, and the rains will wash off a great deal of the fixed salt.

At Narraganset, I remember I saw swamp mud carted into a cow-yard to increase the dung, was told that it served to that purpose very well.

For want of dung, common sea-salt may be made use of; a gentleman at Middletown, who came from the West-Indies, bought a piece of poor land, put on it five bushels of salt to the acre, sowed it with flax, a small strip through the whole piece he put no salt upon it, the consequence was, the salted part produced fine tall flax, and the small strip was poor and short. A man of Guilford told me, he had tried it upon his wheat land, it assisted and increased his crop very well. One of my sons sowed five bushels of salt, last fall, upon his wheat; what will be the consequence we cannot tell yet—the advance at present is not considerable.

Sea salt seems not immediately adapted to promote vegetation, but rather the contrary, especially if there be too much of it. It is said that the Isle of Ormas, the soil being strongly impregnated with rock salt, is very barren.

In the scriptures we find, that saltness was an indication of barrenness, natural and judicial. Judges ix. 45. *When he had taken the city, it is said of Abimelech, he slew the people that was therein, and beat down the city, and sowed it with salt.*

Of him that trusteth in man, it is said, Jer. xvii. 6. *For he shall be like the heath in the desert, and shall not see when good cometh, but shall inhabit the parched places in the wilderness, in a salt land, and not inhabited.*

Moab was threatened by the prophet, that it should be as Sodom, and the children of Ammon as Gomorrah. Zeph. ii. 9. *The breeding of nettles and salt pits.* Deut. xxix. 23. *And the whole land thereof is brimstone and salt, and burning, that is not sown, nor beareth, nor any grass groweth therein.*

There are two sorts of salt, which do immediately promote vegetation, and render the land fruitful.

One is what is called nitrous salt, this is what is contained in dung, the other is called alcalious salt, this is what renders ashes such a useful manure, for if this salt is dissolved with hot water, and drawn off from the ashes, as when we make lee it robs the ashes of its vegetative virtue, so far as it is deprived of this salt.

Common sea salt, although of itself, and in its nature; it be unfit to divide the earth, and so to promote vegetation, yet being of a kindred nature with the other salt, the nitrous salt of the air and earth joining with it, I conceive it is assimilated, overcome and converted to nitrous salt. It is said, that where they make salt-petre, after they have drawn out all the salt from

the earth, or other matter from whence it is extracted, they expose the *caput mortuum*, or matter from whence it is drawn, to the air, and in seven years it is fit for a new operation,

Common salt is used in England for manure, and is of so much advantage in farming, that Mr. Ellis in his books of husbandry, proposes that the duty upon salt should be taken off in favour of agriculture.

Another way of mending land, is, what they call in England, green dressing; this is by sowing buck wheat, oats or rye, and when it is grown up and is full of sap, they plough it in, after this let it lie till fully rotten, then plough again and sow your wheat. I am told the Dutch people, on poor pine plains, in this way, have fine crops of wheat; but for green dressing I should prefer above all, sowing millet, on the account of the cheapness of seeding the land, the cost is but a trifle; the stalk and leaf growing large, it must afford a good large coat to turn in when ploughed. Being once at Kent, an old country farmer had been in practice of green dressing, he had ploughed in green oats; it seemed to alter the colour of the land, it looked much better than the rest of the lot where there was nothing but a furrow that parted. The farmer said, that he could raise land or increase the strength to a great degree in a few years, in the following manner; after his oats were harvested, he added some seed to the scattered oats, ploughed it in, at the end of September ploughed in the green oats, and sowed it with rye; the next summer, when the rye was well grown and full of sap, ploughed that in, at common sowing time, it would be fit to produce a large crop of wheat; all the cost of ploughing and seed, is not so much as the cost of dung, carting and spreading, if we can get it, but the difficulty is, it is not to be had upon any terms; there are very few such bad husbands as to sell their dung.

Mr. Edmond Quincy, of Boston, a gentleman of learning and ingenuity, to whom I am indebted for many useful hints and observations—he informs me, that having a son residing at Portmore, in England, the young gentleman writes, that some farmers in that neighborhood are entered into a new practice, which is to sow their dry land which is not fit for pasture with rye, and feed their sheep upon it, so that it may not spindle or grow up: that this feed makes excellent mutton, and will continue to grow from year to year without any tillage or resowing; he doth not say how long it will continue: possibly the practice is so new, that they do not know themselves. I have observed that where sheep are well kept, and remain upon the land night and day, the land will grow better. As rye will endure the heat of a strong sun much better than grass, 'tis seldom hurt with drought: I suppose this may be of great service in our Southern Colonies, where the heat comes so fast, that the grass has not time to cover and shelter the roots from the piercing rays of the sun: the advantage of the grass growing up before there is a strong heat, is, that the grass gathers and preserves the dews for the benefit of the roots: when dew falls upon naked and unsheltered land that is not ploughed, made soft, and so fitted to drink up, and retain the dews, or well cloathed with grass; what falls in the night is exhaled in the day, and thus the ground is robbed of that which is the chief riches of the atmosphere.

If I understand it right, this being the state of some of our Colonies, the above named method of making artificial pasture with rye, may be of advantage to them, and of use also to us where the soil is dry.

That wheat and rye bear drought much better than grass, is an old observation preserved in one of the English proverbs—

*Wet May makes short corn and long hay,*

*Dry May makes long corn and short hay.*

As the old English proverbs contain truth and good sense, founded on due observation and experience, I have a fondness for them.

The Honorable Society for promoting Husbandry and Manufactures in Ireland, published a way of raising calves, that appears rational, natural and easy. As this essay may fall into such hands as may never see it, unless it be by this conveyance; I shall insert it with the advantages that arise from it.

“Take the best English hay, chop and bruise it, put it into a churn or barrel, pour boiling water thereon, in such proportion as that it will be well impregnated with the spirit and virtue of the hay. Never let the calf suck at all: for the first ten days, give a mixture of three quarters of milk, and one quarter hay tea; the next ten days, half milk and half hay tea; all the rest of the time, till the calf is fit to wean, give three quarters hay tea, and one quarter milk:” they say that calves brought up in the way will not be pot-bellied. By this means the natural food of cattle is prepared, by extracting the nutritive virtue and spirit of hay, mixed in a fluid, and so fitted to the tender stomach of such young creatures.

I apprehend there are many advantages resulting from this method.

First—It is generally allowed, that the milk of a good cow, in six months, is equal in value to her body; the saving two months milk is considerable, or if it were but one month, it is not to be despised.

Second—This way is much better for the cow.

A farmer of my acquaintance, who kept a stock of seventy head of cattle, always brought up his calves

by hand, giving them all the milk; this he did without any such saving, only for the benefit of his cows.

Third—Another advantage is, that the cow will hardly fail of going to bull; there is more loss in a cow's going farrow, than people ordinarily imagine; it is a great charge to keep cattle winter and summer: an ox pays the charge of keeping with his labour; young cattle in their growth, a fattening beast, with his fat and flesh; a breeding cow pays with her calf and milk, but a dry cow pays nothing at all.

Fourth—I may add also, that this way of bringing up calves, saves the trouble and bawling noise of weaning. If those farmers who have great stocks, will not be at this trouble, yet one would think, at least, that those people who have many children, and but one or two cows, should readily fall into his saving way.

It is some time since I saw the above mentioned receipt, so am not certain as to the periods, whether a week or ten days, and think it not material.

There is a weed which grows in wet meadows, and is something like the haums, or vines of pease; when it is hayed with the grass, the cattle eat it freely; it is of such mischievous, noxious quality, that it makes mares, cows and ewes cast their young, to the great detriment of farmers.

A person of good credit told me, that by giving his cattle a cock or two of such hay, he lost by it, to the value of forty or fifty pounds: not knowing the botanical name of this plant: from its ill and singular quality, we call it stink weed: I had abundance of it in one swamp, and I know by experience, that draining will entirely destroy it, and it is for this reason that I mention it.

There is another weed called St. John's wort; it fills the ground, we are obliged to cut in with the grass, to rake it, cart it, house it, carry it out, and

when we have done, no creature will eat one mouthful of it, nor doth it make dung, and consequently is a dead weight upon the farmer. To kill and eradicate this, put in sheep early in the spring, and in two years they will destroy it without any hurt to sheep.

Some trials I made last year, gives me reason to hope, that I have found out certain seasons for cutting bushes, by which they will be more effectually destroyed by once cutting, than I have ever yet found, till now, which if I find according to my hopes, I design in my next essay to communicate it.

In a former essay, I mentioned the strange and peculiar property of foul meadow grass, that it will hold out to be in season for cutting, from the beginning of July till some time in October; this I wondered at, but viewing some of it attentively, I think I have found the reason of it: when it is grown about three feet high, it then falls down, but doth not rot like other grass when lodged; in a little time after it is thus fallen down, at every joint it puts forth a new branch; now to maintain this young brood of succors, there must be a plentiful course of sap conveyed up through the main stem, or straw; by this means the grass is kept green, and fit for mowing all this long period.

Whether this young growth from the joints, be owing to the horizontal position of the straw, or whether it is a confirmation, of that doctrine, that the joints of plants are seed-vessels, I leave to naturalists to determine.

I find by experience, that the best time to mow this grass, is when these new branches or succors have obtained to their full growth.

He commends and encourageth the clearing and dreining of swamps and bogs, "as there is a depth of rich soil, for the nourishment of the rankest vege-

tables, cannot fail of being the best of every man's estate who is possessed of them ; thinks they will prove like the dreined bogs in Ireland."

This branch of husbandry is improved and advancing yearly, and in many places, makes a fine shew. Take a view of a swamp in its original state, full of bogs, overgrown with flags, brakes, poisonous woods and vines, with other useful product, the genuine offspring of stagnant waters.

Its miry bottom, an harbour to turtles, toads, efts, snakes, and other creeping vermin. The baleful thickets of brambles, and the dreary shades of larger growth ; the dwelling-place of the owl and the bittern ; a portion of foxes, and a cage of every unclean and hateful bird. Now take another survey of the same place, after the labour of clearing, ditching, dreining, burning, and other needful culture has passed upon it.

Behold it now cloathed with sweet verdant grass, adorned with the lofty wide spreading well-set Indian corn ; the yellow-barley ; the silver coloured flax ; the ramping hemp, beautified with fine ranges of cabbage ; the delicious melon, and the best of turnips, all pleasing to the eye, and, many, agreeable to the taste ; a wonderful change this ! and all brought about in a short time ; a resemblance of creation, as much as we, impotent beings can attain to, the happy product of skill and industry.

Sumptuous buildings and fine gardens, afford a pleasing prospect, and strike the eye agreeably ; what are the gaudy shews, the fleeting joys of Ranelagh ; the glittering scenes, the chanting music, the splendid banquets of Vauxhall, compared with the more than rural pleasures, to be enjoyed in these new sprung fields, considered as a rich source of supply for man and beast ? but more especially considered as a compendious lasting fund of charity ? it being a more

extensive charity to prevent beggary, than to relieve it. These views serve to waft away the soul upon the wings of exulting elevated thoughts and warm desires, towards the Great Creator and Beneficent Ruler of the Universe ; to Him who is the Father of Light and Life, from whom doth descend every good and perfect gift.

This affords a pleasure that repays much cost and care : this a pleasure which the stranger to serious thought and reflection intermeddles not with-all.

While we are in the world, we are necessarily concerned with the world : *Let us therefore set our affections on things above, and not on things on the earth, for we are dead, and our life is hid with Christ in God.*

*When Christ, who is our life, shall appear, then shall ye also appear with him in glory, Col. iii. 2. 3. 4.*

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## PART V.

*For your sakes no doubt this is written ; that he that plougheth, should plough in hope, and that he that thresheth in hope, should be partaker of his hope.*

1 Cor. ix. 10.

*The sluggard will not plough by reason of the cold, therefore shall he beg in harvest, and have nothing.*

Prov. xx. 4.

WEALTH or riches may be considered as nominal or real, natural or artificial : nominal or artificial are those things which derive all, or the greatest part of their value, from opinion, custom, common consent, or a stamp of authority, by which a value is set ; such as silver, gold, pearl, precious stones, pictures,

bills of credit. Some of these things have a degree of intrinsic value in them, but not in any proportion to the value to which they are raised by custom or consent: for instance, silver and gold have a certain degree of intrinsic worth, but nothing equal to iron in the necessary service of life, either for instrument or medicine.\* A diamond hath an intrinsic worth from its hardness; but as to many other precious stones, a load-stone, a mill-stone, or a grind-stone, is of much more real worth and use to mankind. Pearls are prescribed in medicine for great people: but is not of use but as a testaceous powder; and for that use an oyster shell will do as well: but many things in high esteem have no intrinsic worth at all.

Natural or real wealth are such things as supply the necessities or conveniences of life: these are obtained from the earth, or the sea; such as corn, flesh, or fish, fruits, food and raiment.

Husbandry and navigation are the true source of natural or real wealth. Without husbandry, even navigation cannot be carried on; without it we should want many of the comforts and conveniences of life. Husbandry then is a subject of great importance, without which all commerce and communication must come to an end, all social advantages cease, comfort and earthly pleasure be no more. Nay, this is the very basis and foundation of all nominal or artificial wealth and riches. This rises and falls, lives or dies, just in proportion to the plenty or scarcity of real riches or natural wealth. We have a pregnant proof of this, 2 Kings vi. 25. *And there was a great famine in Samaria; and behold they besieged it until*

\* As the Indians of Peru, long before they had knowledge of any other parts of the world, although they had no iron, yet they had plenty of gold and silver. If in that day, an axe of iron could have been obtained for ten pounds of gold, the purchaser with reason might think he had a good bargain.

*an asses head was sold for four score pieces of silver, and the fourth part of a kab of doves dung for five pieces of silver.* With submission, I rather think it should be rendered the contents of the dove's crop. The dove's returning home from the field with crops full of pease and other grain, would, when extracted, be a welcome entertainment to the hungry inhabitants, and sell for a good price; whereas the proper excrements or dung, especially of such animals who void no urine, is so loathsome, and so destitute of nourishment, as to be unfit for food, even in times of greatest extremity.

If second hand food has been so high in the market, how valuable are the clean productions of the earth? Husbandry is the true mine from whence are drawn true riches and real wealth. As dung and other manure is of such advantage in raising corn, in the foregoing essay the reader had set before him the Norfolk husbandry, where we find that clay answers all the ends and purposes of dung, and for duration much exceeds it: as also divers ways of making, and methods to increase the quantity of dung or manure.

In this essay, I design to shew how land may be tilled, and the dung so applied as that a little dung shall extend as far, and do as much to promote and produce a crop of corn, as six times so much dung applied in the common way. The old worn out land is to be tilled in such a manner that affords a prospect, that the same land in two or three years, shall produce crops without dung, or any sort of manure, in some measure agreeable to the method of the excellent and truly learned Mr. Tull; a summary of whose principles or doctrine, I here present to the reader in his own words:—

“The only way we have to enrich the earth, is to divide it into many parts, by manure or by tillage, or

by both : this is called pulveration. The salt of dung divides or pulverizes the soil by fermentation, tillage by the attrition or contusion of instruments, of which the plough is the chief. The superficies or surfaces of those divided parts of the earth, is the artificial pasture of plants, and affords the vegetable pabulum to such roots as come in contact with it. There is no way to exhaust the earth of this pabulum, but by the roots of plants, and plants are now proved to extend their roots more than was formerly thought they did. Division is infinite, and the more parts the soil is divided into, the more of that superficies or vegetable pasture must it have, and more of those benefits which descend from the atmosphere will it receive. Therefore if the earth be divided, if it be by tillage, it answers the same end as if it had been performed by dung.”

In the fore cited passage, Mr. Tull has had but little regard to the capacity of his reader, nor will it be much better understood than if it had been wrote in an unknown tongue, there being so many words used by him which common farmers do not understand ; and therefore that book has not been so useful as otherwise it might have been. That excellent writer seems to me to have entered deeper into the true principles of husbandry, than any author I have ever read. Had he taken pains to accomodate himself to the unlearned, his book would have been much more useful than now it is.

I am very sensible, that the low stile, the plainness and simplicity of these essays, has exposed them to the censure of those who do not well consider for whom they are intended and written.

It is much easier to let the pen run forward in a pompous parade of learning, than to bring it into such subjection as to convey and communicate important truths in such words as shall be understood, and to

use such plainness and simplicity as will bring all down to the level of the most inferior capacity.

It was a learned man of the age, instructed in the school at Tarsus, who completed his studies in the famous college at Jerusalem, under the tuition of Gamalie', the illustrious president of that renowned seat of learning; he was the very man who said, 1 Cor. xiv. 19. *I thank God I speak with tongues more than you all; yet in the Church I had rather speak five words with my understanding, that I might teach others also, than ten thousand words in an unknown tongue.*

I purpose to proceed in the same plain simple manner, to set before the reader the way of mending our poor land, and raising crops, either without any dung at all, or if any be applied, it shall be in a small quantity, that the expence will be but little, compared with the common way of husbandry.

In this undertaking I pretend to no other merit than that,

1. To explain the doctrine or principles of Mr. Tull, in such a manner as to be open to any common understanding.

2. To offer such reasons and proofs for the support of these principles, as will naturally occur.

3. To direct to the performance of the work with instruments less intricate, more plain, cheap and commodious, than those used and described by Mr. Tull.

Under these three heads may, I think, be comprehended all that I design at present to say of this method of husbandry, until time and experience shall enable me to write farther upon this important subject; for if I succeed according to my expectation and desire, I apprehend husbandry, in the tillage of land, will stand upon a good footing.

The only way we have to enrich the land, is by dung, or by tillage seperately, or by both of them together. It is performed by dividing the earth into many parts, or as the common way of speaking, it is done by making the ground mellow and soft, so that the roots may freely pass and find their proper nourishment. The more mellow and fine the earth is made, the more roots will be sent out, from corn or whatever is sowed or planted in such mellow land, and the more soft and mellow the ground is made, there will be not only more roots, but they will be longer and extend farther, so that the corn, turnip, carrot, or whatever plant it is, will receive so much the more nourishment, and consequently grow so much the bigger and better. Dung, or any other manure, divides the ground, sets the parts at a distance, and so gives a free passage to the roots of plants. In this action the salts in dung hath much the same operation and effect as leaven, or emptyings hath on dough ; it makes it rise, makes it light, that is sets the parts at a distance. If nothing be done to divide the parts, and make the ground mellow by ploughing, or dung, or both, no crop can be expected. Sow or plant upon untilled land, which is hard and uncultivated, no corn will grow. If the earth can be as well divided, and made as mellow by ploughing, digging or hoeing, why should not tillage do without dung : provided the tillage be equal or in proportion to dung ? To do this in the common way of repeated plain ploughing and harrowing, would be too much charge and labour ; for Mr. Tull said, that three times plain ploughing did only prepare the land for tillage. There is a way by tillage alone, without dung, to make the land fine and mellow, and this way is cheap and effectual ; is done in the following manner.

First plough your ground plain, and plough it deep ; if you have no dung, you must have the more loose mellow earth ; when it is thus ploughed, harrow it well with an iron tooth harrow, let it lie a fortnight exposed to the sun, air and dews, then plough it into ridges ; to every ridge there must be eight furrows of the plain ploughing, two furrows covered, four ploughed, and two left open ; so that in ridge ploughing the team and plough travels but half so far as in plain ploughing ; ridge ploughing will cost but half so much as plain ploughing.

I suppose I need not give any particular directions concerning ploughing the land into ridges, every ploughman understands this, or if he doth not, he may soon learn it of them that do. When it is thus ploughed into ridges, it is prepared to plant with wheat, or cabbages, carrots, or what else you see fit to plant. In what manner, and with what instruments the seeds of wheat, turnips, or cabbages are to be planted, I shall describe under the third head, when I come to speak of the instruments by which it is performed. I shall only add in this place that the wheat is to be planted in two rows on the middle of the ridge, the rows to be at ten inches distance ; the cabbages and turnips in one row on the middle of the ridge, the turnips at six inches distance from each other, cabbages at a foot and a half, or two feet distance ; carrots are to be planted in two rows at ten inches distance, that is, the space between the rows is to be ten inches, the carrots to be planted at six inches distance one from the other, as they stand in the line or row.

The reader will observe, that as yet there is no more tillage applied to the land than what is common and usual in our ordinary way of husbandry. Now, what follows, is that in which the art and mystery doth consist, and when it is described and set before you,

will appear so simple, so little, so mean, that it will be to you as *go wash in Jordan, was to Naaman the Syrian*. Suppose it be turnips, cabbage or carrots planted in the Spring, (for as to what relates to wheat, the golden grain, I purpose to treat of that distinctly by itself) as soon as your cabbages and turnips can be seen, weed them with a small hand hoe. The carrots for the first time must be weeded with the fingers; this is tedious work; when this is done, and the plants a little grown so as to be plainly seen, then take one yoke of oxen, a long yoke so long that one ox may go in one furrow, and the other ox in the other, and the ridge between, in the same manner as we plough Indian corn; and with a common ox plough, turn off a furrow from the ridge, coming as close to the plants as you can, and not plough them up; you may come within two or three inches, if the oxen and plough are good. Thus take off a furrow from each side of every ridge till all is ploughed; let it lye in this state a fortnight or three weeks, then with the plough turn up the two furrows to the ridge; stay about as long as before, and turn the two furrows off from the ridge again; the oftener this is repeated, so much the better: we ordinarily do it but four times; but seven times will do better. When the plants grow larger, you must keep the plough at a greater distance; for if you plough as near the plants as when they are small, you will cut off too many roots.

You must hoe between the rows of carrots with a narrow hand hoe, to kill the weeds; and to till the ground between the rows, you must mind to dig deep.

Turnips, and whatever is planted in a single line or row, must be tended with a hand hoe, while the plants are young, and till all the weeds are destroyed so that you may use the plough. I have been obliged to enter into the practical part of this sort of husbandry, without which I should not be able to explain

the principles, or doctrinal part, as I proposed under the first head.

1. This way of tilling land makes it exceeding fine, soft and mellow, beyond what you would imagine : this, we have shewed already, is one thing requisite and needful.

2. By this tillage we open such clods and parts of earth as never were opened before, and consequently never was touched by any root ; its whole nourishing virtue remains entire : in short it is new land. Every one knows what new land will do before its native and original strength and vigour is consumed and exhausted by the roots of corn and other plants. Thus this sort of tillage doth, in a degree, furnish us with new land. In this way old things become new.

3. In this way of tillage we entirely destroy and extirpate all weeds and grass, yea, even that stubborn grass called blue grass, which is so hurtful to corn ; by which a whole crop is frequently almost destroyed. This grass by many is called Dutch grass ; and probably that grass in England there called couch grass, may be the same, and miscalled here Dutch, from a resemblance or likeness of sound ; their farmers making the same complaint of it as ours do here. The destruction of weeds and grass is of great advantage in tillage. Weeds very much exhaust the land, hinder and damnify the crop : the more these robbers are destroyed, the more nourishment there is for corn.

This method not only destroys the weeds for the present, but for the future also ; for ploughing stirs up the latent seeds of weeds, sets them a growing, and then destroys them when they are come up. The seeds of weeds are numerous and hardy, they will lye many years in the ground, and when by the plough are properly situated for growth, they will come up very plentifully : charlock, commonly called

terrify, which cannot be subdued in the common way of tillage, I suppose in this way, may be effectually conquered.

That the destruction of weeds is one design we have in view when we till land, is what is allowed by all; nay, many think that this is the only end, and at least they act and conduct as if they thought so: if it were not so, why do they neglect to hoe and plough if there be no weeds? And why do they aim at going no deeper than just to cut up the weeds? But there are other great advantages to be had by tillage, besides killing weeds, as has been said already, and will further appear.

4. This way of repeated ploughing keeps the land from going out of tillage. If land be never so much ploughed and harrowed, and made ever so light and mellow, yet in a year's time the tillage is spent in a great degree. The weight of great rains, and the natural weight of the earth, settles it down, so that it is daily growing closer and harder; there is less and less room for the roots to extend and spread, find their food and get nourishment; for the roots in plants are as the mouth is to man and beast; the more roots the more growth. When land, by the law of gravitation, is thus continually sinking down, closing together, and so going out of tillage, we then plough it once in a month, or oftner, if there be need. Thus the tillage is kept up in the same state as at first. I find that a great heavy rain, if it fall soon after the land has been ploughed, it will need ploughing again: in dry weather it will continue in a state of tillage much longer. Our Indian corn has this repeated tillage; but our wheat suffers much for want of after tillage: we sow one year and reap the next, so that from sowing time till harvest, is ten or eleven months.

5. There is in land a twofold and opposite state which renders tillage absolutely necessary: this re-

peated ploughing answers for both. In the common and ordinary state of land, it is too hard and close, the parts are so nigh that there are no holes or passages left for the roots to spread downwards and side ways; or at least these pores, holes or passages, are too small and too few to give room for the roots: often and repeated ploughing sets the particles of earth at such a distance, and so enlargeth these pores or holes in the earth, that the growth of plants is by this means greatly promoted.

Although this be the ordinary state of land which makes tillage necessary; yet there is some land in a state just the reverse: it is too light, its parts are at too great a distance, the pores and passages are too wide, so that the roots are not big enough to fill the pores, or holes. If the roots do not touch the earth, it cannot get nourishment: the root should be enclosed on all sides by the earth. Every one knows that roots above ground in the open air, can do the plant no good. All the difference between roots under ground, which do not touch the earth, and some roots above ground, is, that one is shaded, and the other is exposed to the sun and wind: but as roots in the most hollow and light land, touch the earth in some places, so they get some nourishment and keep alive, yet the plant makes but a poor progress.

I have a piece of summer wheat in a dreined swamp, that almost died of this disease: the land was so new that it would not bear a team, so that it could not be ploughed; the top earth was exceeding light and puffy; the seed was howed in, it came up and grew well, so long as the blade could live upon the milk of the wheat kernel; but when that store was spent, and the time was come that it must live by nourishment obtained by the roots, it turned yellow, and the tops died: one of my sons told me the wheat

would all die ; but an heavy rain fell, which so closed and pressed this light earth together, and so lessened the pores, that the roots were enclosed on all sides, the corn recovered its colour, grew vigorously and well, and put up good large ears. This land as much required ploughing as hard heavy land would have done. Repeated ploughing in land that is too light, and the pores too large, will settle it down and close it together, contract and lessen the pores, as well as raise the heavy land, and enlarge its pores. This seeming contradiction; this blowing hot and cold out the same mouth, may be well enough reconciled, and accounted for in a philosophical manner : but so long as experience shews that all this is true, it will be to no advantage to the farmer to say more about it : nor should I have entered so far into the philosophy of tillage as I have done, were it not necessary for a practical farmer to understand it so far as to make a judgment, and see into the reason of this new kind of tillage and farming : and this is the more needful, as there is a prejudice in men's minds against what is new, or at least what men suppose to be new.

6. This method or way of repeated ploughing, fits and prepares the land to receive and retain all the benefits of the atmosphere : it is now open to receive the floating particles of sulphur, and the nitrous salts of the air, the benefit of the sun's rays, which, when accompanied with a sufficient degree of moisture, enlivens and invigorates all nature. When the winter hath brought a universal gloom upon the face of the vegetable creation, paleness and death appear on all sides : the Psalmist saith of it, *thou hidest thy face they are troubled*. Then speaking of the sun, *thou sendest forth thy spirit they are created, and thou renewest the face of the earth*.

But above all this, we are hereby put in possession of the dews, which is one of the rich treasures of

the atmosphere; when land is made fine a good depth, it is prepared with open mouth, to drink in and retain the dews: when the dew falls upon land that is untilled, or but poorly tilled, the ground being hard, it doth not sink deep, so the next day's sun carries it all off again. It is the same if land be too light and loose; there is not a sufficient connection of parts to convey the dew from one particle of earth to another: I apprehend that the moisture of the dew passeth down in well prepared land as water is conveyed through a rag in filtration, if the rag hath large holes in it the water will stop: but let this be as it will, it is certain, and known to every observing farmer, that the best tilled land in a dry time, always is moister, and bears the drought much better than the same sort of land which is but poorly tilled; that Indian corn, which is the best ploughed and hoed, will always bear the drought best. And what is the reason? because the land is prepared to receive and retain the dew. Mr. Evelin made the following experiment; he dug a hole in the ground a good depth, reduced the earth to fine powder, and filled up the hole with it: a drought came on, this powdered earth was moist to the bottom, when the adjoining land was exceeding hard and dry. Another experiment was made thus, a gallon of rain-water was put into a bowl, and a gallon of dew water in another vessel, and set them to dry away in the sun; the consequence was, the sediment or settlings of the dew water was more in quantity, blacker and richer than that of the rain water. The dews and salts of the air, is all by which the land is enriched; for the other advantages of ploughing are but transient: the advantage this way is so much, that Mr. Tull saith, that land he hath improved this way, by this kind of husbandry, going into another hand, who used it in the common way of husbandry, that part of the field

was so much enriched by the new tillage, that there was a visible difference for the better seven years after. I suppose, that it is this alone which changed the colour of my land in six months; for having ploughed very deep, and turned up much fox-coloured dead earth, it soon became of a good brown colour; so that this kind of tillage seems likely to put us in possession of Joseph's blessing: of which we have an account, Deut. xxxiii. 13, 14. and of Joseph he said, *Blessed of the Lord be his land, for the precious things of heaven, for the dew, and for the deep that coucheth beneath: and for the precious fruits brought forth by the sun, and for the precious things put forth by the moon.* Some understand by *the deep that coucheth beneath*, to be the springs and subterraneous waters: but it seems more likely, to intend the riches of the under earth which coucheth beneath; which, like a couching lion, must be roused and raised up by a proper tillage, in order to exert its full strength.

Thus I have explained the principles of this kind of husbandry, the foundation and reason of it, in as plain and easy a manner as I can.

Before I took any step or pace towards this sort of tillage, I read all I could find upon this subject with care, thought and studied on it with attention; wrote to my good friend, Mr. John Bartram, a farmer in Pennsylvania, a man of worth, to know his opinion of it. He judiciously observed, that England, where it had been practiced with success, was an island, having the sea on all sides, the air must be filled with more vapours and larger dews, than what we enjoy upon the continent: their atmosphere being much more replete with riches for the earth, than what is to be expected in our dry thin air. Notwithstanding all this, it ran strongly in my head to try; for I considered, that, *as God had not left himself*

*without witness, in that he had given us rain and fruitful seasons, so, in some degree, he hath given us the other benefits of the atmosphere, to fill our hearts with food and gladness; therefore thought it our duty to take all the advantage of it that we can: and that we would try the method as far as we could, without the proper instruments; how much there was of truth in the doctrine or principles, if used and applied in this climate: and so proceed, or forbear to get the drill plough, and other instruments, as we should find encouragement; having made some trials one year, this leads me to the second thing.*

2. To offer such reasons and proofs for the support of those principles, as did occur upon the one year's trial which I made. After my land was prepared and ploughed into ridges, it was planted with cabbages, carrots, turnips, onions and beats, and a furrow ploughed off from each side of the ridge, and then ploughed on: and this being repeated four or five times from Spring to Fall, the event was, the weeds were killed, the ground grew fine and mellow, clods and knots broken and reduced to dust; the plants put out numerous roots, spread and grew very finely; all the ground was mellow, not only the furrows which were ploughed, but also the comb or ridge in the middle, as it was narrow and so exposed to the air and dew on three sides, it was struck through, grew mellow, and received as much advantage by the tillage, as that part of the ridge which was ploughed off and on. The land being ploughed deep, there was a great quantity of fine earth prepared to receive the dews and salts of the air, and sufficient room for the roots to spread and branch out on all sides, so that every thing grew apace, and were large, although there was no dung applied; the same land would produce in the ordinary way, carrots no bigger than a common candle; in

this there were many, eight, ten, and some twelve inches in circumference; they were so large, that three ridges of fifteen rods long each, two rows on a ridge, produced more than twenty bushels; so an whole acre's product, yielding in the same proportion, would be two hundred and thirty bushels; had the three ridges yielded no more than twenty bushels, besides the greater increase of the crop, it is done cheap and with more ease, as the horse plough performs the work with more expedition than it can be done by hand, so it is done much better for the present crop, and also mends and enricheth the land, and prepares it for future improvement. It is easier this way, to raise five bushels of carrots than one in the common way. I also tried this method of tillage with turnips planted in a single row; by the middle of June they were surprisingly large; as I did not weigh or measure them, I am not able to give a perfect account of them.

In a former essay, I made mention of a society in Scotland, consisting of three hundred members, many of them noblemen of the first rank; this society was erected to promote husbandry and manufactures; they published a book of their transactions; by the favour of Mr. Collinson, of London, I had an opportunity to read it, and find in their fallow year, instead of the old chargeable way of Summer fallow, they plough into ridges, then plant cabbages and turnips: their cabbages and the early sort are ripe before the time of sowing wheat; with frequent horse ploughing they grow large, and the land in fine order for sowing wheat in the common way. By this means, they sometimes raise a crop of great value, and have their land in better order for wheat than in the old way of fallowing their land. The Lord Rea, observed to the society, that he expected to see that part of his wheat which grew where the rows of cabbages

grew before to be poor, but was surprised to find, that in the very line where the cabbages grew, in that range was the biggest wheat. One would expect that the land would have been exhausted by so many large plants. The true reason of what appeared so strange, was this, the broad leaves of cabbage made a large shade, and within that shade there would be a swift undulation of the air, and consequently a stream of the nitrous and sulphurous particles of the air, would be drawn in and lodged there ; I suppose by this means, that part of the land became more enriched than the open part of the field.

Pease are found to make land mellow, to enrich, and so well to prepare it for wheat, that I have many times known farmers to invite others, who had pease, to sow their land without paying any rent, merely for the advantage it would be to their crop of wheat. Pease make a shade : where the land is shaded the air will be condensed, and consequently, make room for the rushing in of more air, so that in this shade there will be a greater lodgment of the nitrous salts, and consequently the land will be made rich. The same is found by experience to be true of potatoes, and therefore, it is accounted to be an enricher of land. It has been found that potatoes may be successively planted without dung, and have good crops.

It will be asked, if so, why do not weeds, which make shades, enrich the ground ? The reason is plain, because the land is not tilled, and so prepared to receive and retain the dews and salts of the air : so turn it and set it in every light, we shall see and find, that tillage tends to enrich land, and fits it to bring forth fruit. My carrots put forth such numbers of small fibrous roots, for the nourishment of the main root, that when the time came to pull them up, they were comparatively, hairy like a rat. Roots are to plants as the mouth is to animals ; therefore, in feeding

plants we have the greater advantage ; an horse, ox or sheep, has but one mouth ; provide as much hay and provender as you will, he can eat but such a proportion ; if you give Benjamin's mess, five times more than he can eat, it will do no good. But it is otherwise with plants, the more provision you make for them of good rich mould, the more roots will they put forth, take in so much the more food, and consequently, grow so much the larger.

Another proof of the truth of the doctrine, or principles, laid down as the ground work or basis of this new husbandry, I shall borrow from the old husbandry, in the manner of raising Indian corn. The land being previously prepared, the land planted, and corn come up, we plough a furrow off from the corn on each side, then hoe it ; the next time plough up to the corn ; so that this tillage is nearly the same with what is now proposed for wheat, or whatever we would plant ; only by the way, I would observe, that the ploughing between the rows is so shallow, as though they had nothing else in view and design, but only to kill the grass and weeds ; whereas it is found by experience, that if there be no grass or weeds, the ploughing and hoeing will make the corn grow ; it is also found true by experience, that the better the land is ploughed and hoed, the better and longer will it bear the drought, and better crop there will be : nay, what is still more remarkable, if the Indian corn be well tilled, the next crop, whether it be oats or flax, so much the bigger and better will that succeeding crop be, so that the land must have gained strength and riches : if it were not so, why did not the Indian crop exhaust and spend the strength of the land, especially when we consider how large corn is made to grow by the good tillage ? But we find the contrary, the better the crop of Indian, the better will be the crop of oats. There is no sort of husbandry, wherein the

superior force and virtue of tillage doth so evidently appear, as in raising Indian corn; for if you should plough and harrow the best of land, and sow or plant the corn, and never do any thing more to it, there will be less corn than if you should plant poor land, and tend it well; the poor land well ploughed and hoed, shall bring more corn than the rich land; so that by this, we may see the efficacy and advantage of this repeated tillage, which falls in successively, according to the exigency and want of the plant in its several degrees of growth: this keeps the land in a state of tillage. It is hard to find a reason why it should not have the same effect upon wheat, and every other plant that is capable of the like culture; for every one knows, that without this, Indian corn, in good land, will produce very little, and in poor land, nothing at all.

We have seen and experienced the effect of this kind of tillage in Indian corn all our life, and yet never thought of applying the same method to other plants; for we generally go on by tradition, and do not enter into the reason of procedure.

It is natural for mankind to admire and be pleased with new things without reason, and to despise others without sense or judgment. The useless tricks which horses or dogs are taught, are admired and valued, and the instructor is looked upon as little less than a conjurer: whereas we daily see an horse or ox, with little pains taught, when made fast to a plough, to keep the furrow without variation; and at the end of the work, at a word's speaking, come about and return into his work again: as this is ten times more useful, so it is more worthy of admiration. What we see often, we little regard.

The culture of Indian corn, to a man of consideration and reflection, holds forth much useful instruc-

tion, and is a good proof of those principles we have now under consideration.

Having gone through the consideration of the proofs that do occur for the support of the doctrine or principles on which we design to make trials,

Third—I now come to direct the performance of the work with instruments less intricate, more plain, cheap and commodious, than those directed to and described by Mr. Tull.

Having found by experience the advantage of planting seeds in rows, and also finding that to plant by hand is a slow and chargeable way; therefore, I designed to use it no longer than was necessary to find, that it was likely the method would answer the design proposed: being satisfied in that point, the next thing was to get instruments suitable to the work.

The instruments peculiar to this husbandry, are drill ploughs. By a drill I mean an instrument that will make one channel or more, upon a ridge, and drop in the seed at due distances, and in a just proportion: this is what it will do in better order than men can possibly do it with their fingers, and will do more in one day, than one hundred men can do by hand. There is not much reason to call it a plough, for there is no affinity or likeness between them, but only in this, the drill has two coulter by which the channels are cut.

There are in use several sorts of drills; there is the wheat drill, the turnip drill, and divers others; but these named are the chief; to which I have added a dung drill, by which dung, ashes, or any other manure, may be conveyed into the channels where the seed is to be dropped. Mr. Tull's wheat drill is a wonderful invention, but it being the first invented of that kind, no wonder if it be intricate, as indeed it is, and consists of more wheels, and other parts, than there is really any need of. This I was very sensible

of all along, but knew not how to mend it, therefore applied myself to the Reverend Mr. Clap, President of Yale College, and desired him for the regard which he had to the public, and to me, that he would apply his mathematical learning, and mechanical genius, in that affair; which he did to so good purpose, that this new modelled drill can be made with a fourth part of what Mr. Tull's will cost. This I look upon as a great improvement, and take this opportunity to make my acknowledgments for the favour. When this drill came home, I found the wheels were too low for our ridges, therefore it must be mounted upon new wheels. The next thing I wanted in order to compass my design, was a dung drill; this is an invention entirely new, for which there was no precedent or model. For this I applied myself to Benoni Hylliard, a very ingenious man of this town, a wheel-wright by trade. I told him what I wanted, and desired him to make one. At first we could think of no way but to make it as a distinct instrument: but at length his ingenuity led him to set this and the wheat drill upon one frame, so that it became one instrument. Mr. Tull, it is true, might think this drill not to be needful; for he tells us, that he tried applying of dung by hand to the channels, but found that this assistance of dung was not necessary: for he writes, that, to his great surprize, he found that the want of dung might be supplied by repeated horse-ploughings, and that two shillings in horse-ploughing would do more than forty shillings in dung. I should be glad, if in our climate the one half of this would prove true. The land which I design to make use of, is so low and poor, that I shall have need enough of my dung drill, at least, when I first begin with this kind of husbandry. I hope that in time, the land may be so enriched by tillage, that this may prove needless.

The dung drill exhibits or sheds into the channel eighty bushels of dung to the acre, which is about two cart loads; the board on the fore-side of the drill-box, is made fast only by a spring, so that if any clod, lump or stone, cannot pass through the drill, the fore-board opens and lets it out, and the spring shuts it again: thus the danger of stopping or breaking the drill is prevented.

Wheat is planted in two rows, but turnips in one row on the middle of the ridge. The engine is so contrived, that the wheat drill may be taken off, and a turnip drill be put on; and then the dung drill can be so ordered, that the dung shall be conveyed into that one channel, either so much dung as was shed into the two channels, or half so much, more or less, as we please.

The hopper of the wheat drill holds about a peck, and the dung hopper two bushels and an half. Before we plant either wheat or turnips, the tops of the ridges must be harrowed and made smooth; to do this, Mr. Tull used two harrows at once, one upon one ridge, and the other upon the next ridge: a pole from the out side of each harrow held them together, an horse made fast to the middle of the pole, drew both harrows: but instead of this, we have a small harrow on the fore part of the frame, which first harrows the ridge; after the harrow comes two coulters, which makes the two channels at ten inches distance; the dung drill fills these channels with dung; then comes the two coulters belonging to the wheat drill, and opens the two channels, and the wheat drill drops in the wheat seed, half a bushel to an acre; after this follows a small harrow, which covers the seed. There is a tongue or neb to go between the oxen; a long yoke is used for this work, so that one ox travels in one furrow, and the other in the next, with the ridge between: one horse might draw it with ease, could

we find any way to do it, and the horse travel in the furrow; if the horse walk upon the ridge, it would be hurtful. Mr. Tull's wheat drill required two pair of wheels: we have two drills fastened upon a frame two feet eight inches square, and two harrows, each performing its respective part of work at one movement; and to the whole but one pair of wheels: the shaft of the dung drill carries round the shaft of the wheat drill by a cog wheel; the several parts are all plain work, open and easy to the understanding; this I esteem a compendious instrument. It has cost me a great deal more than it will to make another, imitation being so much more easy than invention.

The next instrument that was thought necessary for this kind of husbandry, is the hoe-plough, of which Mr. Tull has given us a draught, which I showed to our best plough-wrights, but they could not understand it, so that I was almost discouraged: but at length I found a way to do well enough, without any such strange built hoe-plough: nor is there any manner of difficulty about it, for the furrows may be ploughed from, and up to the ridges, with a common plough, a yoke of oxen in a long yoke, so that one ox may go in one furrow, and the other ox in the other furrow, and the ridge between. Let the plants be what they will, we can come as near to them as is needful; or it may be done with one horse, with an horse-plough; but the way with oxen I like best, because there is sufficient strength to plough deep, which is of great importance, in order to raise a great deal of mould, for the purposes above mentioned. What will be the success of raising wheat in this method, will be left to experience, and the history of that trial to be communicated in another essay.

Mr. Tull saith, that the wheat planted in this manner is not subject to blast, therefore it is a method that may enable those parts of New-England to raise

wheat, who never could, in ordinary, attain to it; of his we can have no certainty but by trial.

Another instrument necessary in this sort of husbandry, is the turnip drill: this is an instrument which drops a single turnip-seed into a channel cut for that purpose on the middle of the ridge, at six inches distance; but mine is made to drop one at three inches distance, lest the fly should destroy any of them, or any seeds should fail coming up: they should be six inches distance; if they should be too thick, it is easy to cut them out. They raise turnips in abundance, in England, to feed cattle; some do it in the random way of sowing, then where they are too thick hoe them up, till they are thinned to a proper proportion; but then they grow so close together, that it might be difficult and chargeable work to do it: it is found by experience, that this way of drilling, and tending them with the horse-plough, is, by far, the cheapest and most profitable way.

Mr. Tull saith, that his turnips drilled and well ploughed, weighed from six pounds to fourteen, did produce six hundred and forty bushels to the acre: I should be very glad of half that quantity: as to the ease in raising them in this method, by ploughing the furrows off and on, I am satisfied by experience, and that they will grow larger; what I tried were spring turnips.

The usefulness of turnips for cows when they calve, for winter milch-cows, is known to all those who have tried.

To make a turnip drill that will drop a single seed and no more, is a nice piece of work. Any thing farther relating to drilling and ploughing of wheat and turnips, must be referred to another essay, when time and experience shall enable me.

Summer wheat standing so short a time upon the ground, to drill that will not be of advantage. The

raising summer wheat is a new part of husbandry, which obtains greatly of late; and indeed it is wisdom to have two strings to the bow, as was intimated in the third essay.

As Summer wheat requires so much dung, which we cannot well spare, I thought it might do well in the drained swamps; I have tried this year, and it looks promising. There is no part of husbandry affords me a greater satisfaction than this: indeed it looks strange to see wheat growing where not long since there was flags and mire; this I suppose to be the first wheat that ever was raised in such land in New-England. I design to sow a considerable piece the next year. Most of the Summer wheat which was raised last year, was sold for seed at a greater price than Winter wheat.

But to return from this digression. There are two things which may be objected against the theory or principle laid down; it may be objected, that if repeated ploughing will enrich land, whence is it then that land is spent and impoverished by Indian corn?

1. Indian corn seldom is tended as it ought to be; if there be any ploughing between the rows it is shallow, just so as to kill weeds, but not so as to make a great quantity of soft mellow earth.

2. It is succeeded by oats generally, which is a great spunger, and this without rest or relief.

3. The plants are set too thick for benefit of the land, and many times for the corn too.

Look upon that plant in blossom time, when it is in its full pomp and pride, observe its height, its breadth, its verdure, that deep green shows it to be replete with rich sap. A man that spends more than his income, although that be very great, yet he will grow poor; so in land, if the exhaustion be more than the assistance it receives by dung or tillage, the land will not gain but grow poor; that which is cal-

led hoeing scarce deserves the name of tillage, for really it is but scraping. I have had thoughts of trying to plant corn at a great distance every way, and plough deep every time; this, doubtless, would be better for the land, if the crops were less, it may be, we should have a compensation in the advance of the land. One of my sons, upon this sort of reasoning, has planted his corn this year much thinner than ordinary, and ploughed it deeper than what is common, so that will serve to make some discovery.

Another objection is, that sandy land seems to have all the needful properties or qualifications; it is light, mellow, the parts at due distance, and there is room for a passage to the roots; and yet it is found that sands are barren; but this is where it is perfect sand; for it is found by experience, that where loam or clay is mixed with sand in a good proportion, it proves the best of land; whether this mixture be by art, as in the Norfolk husbandry, or if it be by a natural mixture.

No fertility is to be expected from perfect sand, for every grain of sand is a pebble stone, and surely none can reasonably expect corn from stones alone, although these stones lie in never such good order. That a grain of sand is a pebble, appears by being viewed in the microscope or magnifying glass; as also, that sand is one of the ingredients in making the glass.

I have thought of these and other objections, and have helped myself to get over them; whether I have done so for the reader, he can best tell?

I have two things of great importance to communicate, with which I shall conclude this essay. In the fourth essay, I informed the reader, I was in hopes, that I had found certain times for cutting bushes, which would be more effectual for their destruction than any yet discovered; that if I found it so,

I would give notice of it in my next : am glad I am able to perform that promise : the times are in the months of June, July and August, in the old moon that day the sign is in the heart. It will not always happen every month ; it happened so but once this year, and that proves to be on Sunday. Last year, in June or July, I forgot which, I sent a man to make trial ; in going to the place, some of the neighbours understanding by him the business he was going about, and the reason of his going at that point of time, they also went to their land, and cut bushes also on that day ; theirs were tall bushes that had never been cut ; mine were short bushes such as had been often cut, but to no purpose, without it was to increase their number. The consequence was, that in every place it killed so universally, that there is not left alive, scarce one in an hundred. The trial was made in three or four places on that same day. In July or August, on the critical day, another swamp was cut, the brush was the greatest part of it, swamp button wood, the most difficult to subdue of any wood I know ; I have been lately to see it, and find the destruction of these bushes are not so universal as among alders and other sorts of growth ; it is hard to say how many remains alive, it may be one third or a quarter part ; all that I can say, with certainty, is that they are now few, compared with what there was last year : I did not know but that those which are alive, might be such as came up since ; but upon examination, I found the last year's stumps, and could plainly see where they had been cut off ; this was not because the season was better when there was such success, for in this last mentioned piece of swamp, there were sundry spots of alders and other sorts of bushes, they seem to be as universally killed as those before mentioned. The reason why there was not the same success attending the cutting these

button bushes as the other sorts, I suppose to be from the stubborn nature of this kind, which would yield to no cutting : the ordinary way has been to dig or plough it up by the roots, so that considering the nature of this bush, I have had great success : the ground being very boggy, those who mowed them, were obliged to cut them very high, which was another disadvantage.

To show such a regard to the signs, may incur the imputation of ignorance or superstition, for the learned know well enough, that the division of the Zodiac into twelve signs, and the appropriating these to the several parts of the animal body, is not the work of nature, but of art, contrived by astronomers for convenience. It is also as well known, that the moon's attraction hath great influence on all fluids.

It is also well known to farmers, that there are times when bushes, if cut at such a time, will universally die. A regard to the sign, as it serveth to point out and direct to the proper time, so it becomes worthy of observation.

If farmers attend the time with care, and employ hands on those days, they will find their account in it. This rule attended to, may save the country many thousand days work. A farmer of good credit told me, that he had found by experience, that bushes cut with a sharp tool, would die more than when cut with a dull one. This looks agreeable to reason, for the sharp scythe leaves the mouths of the sap vessels all open, by which means they bleed more plentifully ; the dull instrument bruises the part, and in a degree doth close up the wound.

Another important article, is concerning red clover seed. It hath been the prevailing opinion of farmers in this country, that clover seed must be laid very shallow in the ground ; and by the books of husbandry, their opinion and practice is the same in England.

It hath been said, that no harrow must be used after the seed is sown: nay, it has been thought, that if the ground was mellow, that the seed would sink too deep in the earth, and never come up. The constant lesson was, take heed you do not bury your clover seed too deep. But we have gone upon mistaken principles: by experience it is found, that the best way is to plough in the seed, that it will come up at full furrow depth; and this is the practice in those towns where they have raised clover with great success, and sold the seed with such great profit and advantage. A farmer in this town sows and ploughs in his clover seed in this manner; has upon the ground sundry acres ordered in this manner; it was sowed this last Spring, finds no difficulty attending it as to its coming up; shallow sowing has been very detrimental, attended with a great loss when a dry season follows soon upon it; whereas this danger is prevented by sowing deep. I have sustained loss by sowing shallow, which according to the old rule, was thought necessary; there is the loss of seed, and profit of the land, which is more than the loss of a crop of corn.

Besides the advantage we have by deep sowing of clover seed, to secure it in time of early drought, there is another great benefit arising from it: the seed being lodged so deep, it will be well fed and nourished, it hath its provision all round on every side, merely wallows in wealth; so that the grass grows strong and large. I suppose this to be the reason that the clover seed which we have from those parts where they bury their seed so deep, is so much better than ours, which springs from shallow sowed clover: their seed is a larger seed than what we raise, and the grass is larger too: their seed looks plump and well fed.

The Supreme Ruler of the Universe takes care of the whole race of mankind. His goodness, in a special manner, meets us with instruction, and lays

it in our way, that we may find it in our ordinary vocation for our profit and improvement, whether it be merchandize or farming. *The kingdom of Heaven is like unto a merchant-man seeking goodly pearls, who when he had found one pearl of great price, he went and sold all that he had and bought it. Mat. xiii. 45, 46. Judah shall plough, and Jacob shall break his clods. Sow to yourselves righteousness, and reap mercy, break up your fallow ground, for it is time to seek the Lord, till he shall come to rain righteousness upon you: Hosea x, 11, 12.*

# ADVICE

RELATIVE TO THE BUSINESS  
OF  
MAKING AN ORCHARD.

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CONSIDERING how rapidly the people of the United States are pushing their settlements, in various parts of the country, into regions hitherto uncultivated; and how many orchards in the tracts first settled, are so entirely decayed as to require being replaced with new ones, it is not unreasonable to suppose that some thousands of men are, in every year, commencing orchards. As apples, whether designed for cider or for eating, are unquestionably the most valuable fruit produced by trees congenial to the climate of the eastern and middle states; and as an orchard is not a temporary establishment, but one intended to endure through several successive generations, and in which errors in the first formation cannot afterwards be easily corrected; it is of great importance that the best possible plan should be adopted in the beginning. The proverb, that "a thing once *well* done is *twice* done," is in no other case more literally true.

Apples being my favourite fruit, and cider a drink, which I value above all others, I have been led to make some observations and to spend some thoughts on the subject; and as I have long had a wish to shew the Massachusetts Agricultural Society, that, in placing my name on the list of their honorary members, they have not conferred this distinction upon one entirely indifferent to the important objects of their use-

ful institution, I now beg leave to communicate the result of them in a few plain and simple articles of advice, relative to the business of making an ORCHARD. And as they have received the approbation of several respectable gentlemen, to whom I have shewn them, and by whose remarks I have profited in revising them, I hope they will be acceptable to the society.

As every man who undertakes to make a good orchard will naturally make it his first object to have a sufficient variety of the best kinds of fruit for his table and for the market, if he live within reach of one, I shall confine myself to a cider-orchard. This is a branch of husbandry to which the New-England farmers appear to have paid much less attention than their brethren of the middle and some of the southern states, whose climate does not appear to be so well calculated for producing good cider as ours; their cider, though very pleasant, having a less body and acquiring less of a true vinous quality.

The principal objects to be had in view in making a cider-orchard, appear to me to be the following: the obtainment of no one of which is either difficult or expensive, viz.

1. To have trees of a thrifty kind.
2. To have trees that are fruitful; not only blooming well, but retaining their fruit till it is ripe.
3. To have trees bearing every year.
4. To have trees producing fruit of a good size for the convenience of gathering.
5. To have fruit of a quality to make cider of a good body. For this purpose the most acid fruit is generally preferred, as yielding the richest juice. The best cider in the southern states is made from what they call Crabs.
6. To have fruit not apt to decay as soon as it is ripe, and sufficiently mellow to grind well.
7. To have fruit ripening at different times and at

regular intervals, that the farmer may not be hurried in making his cider, but have apples equally ripe to work upon, through the whole season for cider-making. This, on a large farm, is a very important object and entitled to particular attention.

To obtain these objects, when the farmer or nurseryman, of whom he engages his trees, has raised his nursery to a proper size for grafting, let him go into the *best young orchard of natural fruit* within his reach, at the beginning of the season for making cider, and carefully examine the trees and their fruit, with regard to the qualities above pointed out, taking with him their respective owners, for the purpose of obtaining more perfect information than he could gain from inspection alone; and let him repeat his visits, at least, once a week, during the time the apples are ripening, minuting from time to time his observations. Let him then select and mark the trees from which he chooses to take his scions. When he cuts them, at the proper season, let him keep each kind by itself, numbering his bundles according to their order of succession, that when he comes to graft his nursery he may not intermix them. When he removes his young trees to the ground intended for his orchard, which should, by all means, be previously well prepared by tillage, or by ploughing and harrowing into a fine tilth, let him set the earliest kind in the rows on the side where he intends to enter it; the next in succession in the next rows, and so on through the whole plot, that when he commences gathering and carting out his apples, he may not trample over one kind to get at another, but clear all before him as he advances in his work.

As no judicious man would be so imprudent as to transplant into his orchard trees ill-formed or unthrifty, a caution against it might be deemed superfluous, were not the practice too common. Such trees, how-

ever, need not be thrown away. If they are cut off at proper places, they may send out handsome, vigorous shoots and become valuable trees; some of which may be necessary for filling vacancies in the rows, occasioned by failure or accidents.

The advice above, to *take scions from a young orchard of natural fruit*, may require some explanation. It has long been suspected by observing men in England, that grafted trees decay, or, at least, become unfruitful with the parent stock; and some late writers assert, that it is now considered a fact, established beyond controversy. My own observation goes to confirm it. On the farm whereon I was bred, is a number of trees that were grafted about fifty years ago, from trees very old and long since dead. These grafts, though thrifty enough, were never fruitful; not even while the trees from which the scions were taken continued alive. Whether they have borne any fruit of late years I am unable to say; but as I have not for many years, in my rambles about the farm, found any fruit on them, I suspect them to be entirely barren. Some other trees grafted at the same time, with what are, in that quarter, called Jillyflowers, a fine apple, which I do not recollect to have met with in any other part of the country, bore tolerably well for a few years; but for a long time have been mere cumberers of the ground. The trees, however, are still sound and flourishing. As I was unacquainted with the parent stock, I do not know whether it be living or not; but as, at that time, there had been no new kinds of apples introduced into the vicinity, it was, probably, one of those planted by the first settlers of the town, most of which, like them, have now mouldered into dust. From similar ill success in grafting, experienced by others, I presume it happened that the farmers in that quarter have, till lately, had an idea that grafted trees seldom produce much fruit. If this opinion of the English

orchardists be correct, (and though I once disbelieved it, I am now persuaded it is) every one will see the propriety of selecting and propagating some of the most valuable of modern production, in preference to those which are growing superannuated, and of seeking for these in young thrifty orchards of natural fruit. Such valuable kinds, both for eating and for cider, nature is continually producing in every quarter of the country, many of which are among the best apples cultivated in the middle states. It is not many years since the Newtown Pippin, one of the first apples, originated in a village of that name on Long Island. But it is time for me to return from this apparent digression.\*

\* Several gentlemen, who have examined the foregoing piece, having expressed the same doubts relative to this singular opinion of the English writers, which I once entertained myself, it may not be useless to enquire whether the conclusion they have drawn from observation, may not be confirmed by argument.

Among all the animal inhabitants, and vegetable productions of the globe, we find nothing permanent. Some endure much longer than others; but every living thing has its stated period assigned it by its creator. The elephant among animals—the oak and some other trees among vegetables, are said, like the antediluvian race of men, to number their centuries. But these are comparatively few. The period of many others of both is limited to one summer. From the total, (or nearly total) extinction of the orchards planted by the first European settlers of this country, it is reasonable to conclude, that the natural period of the existence of the apple tree may not be far from one hundred and fifty years.

The theory that all future trees and plants, with all their leaves, flowers and other appendages, were contained, in miniature, in the first seeds of their respective species, however incomprehensible, has been generally received; and I know not that any other more rational has ever been suggested. But if we allow that every seed contains all the future parts of the tree proceeding from it, this will be sufficient for my purpose—and this I confess is as far as I can persuade myself to be led by the authority of even the greatest names. Philosophy teaches us (and we have abundant reason to believe) that nature does nothing in vain. Is

When we observe how many trees in common orchards produce little or no fruit; how many bear a blasted, knotty, dry or small fruit hardly worth gathering; how many bear only once in two years; and how many produce apples that begin to decay before they are generally fit for the mill, a great part of which (if the owner wishes to have good cider) must be thrown aside, we cannot but be convinced that an orchard, made according to the foregoing directions, shall, in any given number of years, yield three times the quantity of cider that is obtained from a natural orchard of the same age and number of trees. This alone would far overpay all the extra expense every year. But this is not all. The superior quality of the liquor, arising from its being made at the proper time, from the best kinds of fruit, all perfectly sound, and equally ripe, and without any improper intermix-

it then reasonable to suppose that the seed of a tree, destined to continue but one hundred and fifty years, should be furnished with an indefinite series of embryonic flower buds? For what purpose would this provision be made? Certainly for none that we can conceive of. It is then unphilosophical to suppose it.

Every new tree, proceeding from a scion from an old one, is, (to use a law phrase) *part and parcel of it*, in every other respect than that of situation. The parent stock stands in the ground—the grafted tree stands on another, and sends its roots into the ground by thin layers of wood surrounding the stock, into which it is inserted, but having no other connection with it but that of adhesion. This new tree grows old with that from which it was taken, and the stock of flower-buds, if they be in fact definite and limited to the duration of the tree, must of course be exhausted nearly at the same time in both.

But the question may here arise, why do not trees die at the same time that they cease to bear fruit? To this it may be answered, that, reasoning from the analogy of animals, this is not to be expected. We know that those, particularly the human species and domestic animals, continue healthy and active for a considerable term of time after they have lost the faculty of propagation. It is certainly natural to suppose that the same provision may have been made in the case of vegetables, and that they

ture, will make it command a ready market at an advanced price, while the labour of gathering the apples will be considerably reduced by their superior size. When compared with these important advantages, to which may be added the pleasure of drinking the best of cider, instead of the vile stuff we commonly meet with among our farmers, the only objections which can be raised against the method proposed, a small loss of time and the additional expense of grafting, will vanish into nothing, and even less than nothing, in the mind of every man, who acts on calculation.

It cannot, however, be supposed that young men, who are making farms in the lap of nature, generally

should survive this period a length of time in proportion to their term of existence. How far this may be confirmed by observation I am unable to say. As it is certain that trees must become barren as soon as a limited stock of flower-buds is expended; so the natural death of the tree must take place when no more leaf-buds remain to be developed: and until this period, the trees will continue alive except in cases of a premature death by disease or accidents.

Perhaps it may also be demanded why provision should have been made for continuing the life of vegetables after they have become barren. In the first place, we know this to be the fact with regard to the larger animals, to quadrupeds indeed of almost every size. Why should we not expect the same law to obtain in relation to vegetables? Besides, it is not reasonable to suppose that the production of seeds and fruit, however necessary for the propagation of their species, however useful for the support of animals, may not be the sole objects of their creation. They all may and probably have some other uses in the economy of nature; and these they may continue to subserve long after the period of their fruitfulness has elapsed.

Thus, if I do not mistake, we see that reasoning *à priori* brings us to the same conclusion that has been drawn from observation, and that they mutually confirm each other. If so, the consequence irresistably forces itself upon us, that it is highly imprudent to graft young orchards from trees, which, with all their engrafted progeny, are becoming superannuated, and must in the course of a few years become unfruitful; and as far as respects their proprietor, useless.

with small means, should be the first to adopt improvements in husbandry; that are attended with much immediate extra expense, when the advantages to be derived from them are, as in this case, remote. This can only be expected from those enterprising and intelligent farmers, who have occasion to make new orchards on old farms, and from those gentlemen of fortune and taste who are annually enriching and embellishing the purlieus of our principal sea-ports; and to them it is recommended to take the lead and set the example in this, as they already have done in many other valuable improvements.

When it is considered how long this part of the country has been settled; that the first emigrants either brought with them this fruit, or soon after imported it and raised orchards; and that cider has always been a common and favourite drink among all classes of people, it is a matter of equal surprise and regret that so little has been done for its amelioration.

By some the grafting of cider-orchards may be deemed not only a superfluous, but a strange thing; but these ideas would be equally unfounded. In the cider counties in England, it is believed that most of the orchards are grafted. In the states of New-York, New-Jersey, and as far south as apples are much cultivated, the practice is common, though perhaps not yet general. I presume that several members of the Agricultural Society recollect a large orchard in the vicinity of West-Point, now probably fifty or sixty years old, grafted throughout with the same apple, which is of the Crab kind; and some of them have drank of the cider made from it, which was highly celebrated for its superior quality. This orchard, in full bearing, was a very beautiful object.

It was no part of my design to repeat any thing that, to my knowledge, had before been published on the management of fruit trees; but there are several

things relating to the subject, which cannot be too often repeated, or too warmly urged; and this shall be my apology for adding them.

1. That in selecting a piece of ground for an orchard, convenience of situation should be less consulted than exposure and suitableness of soil. Should the spot decidedly the best on the farm be on the part the most remote from the buildings, this should not be an insurmountable objection, provided it be accessible. The additional trouble of carting the apples is a trifling consideration when compared with the superior thriftiness, size and durability of the trees.

2. That the tap-roots, which, extending into the dead earth, contribute little to their nourishment, should be taken off, that a stronger and more numerous set of horizontal roots may spread through the vegetable mould. Some, in order to prevent the trees forming new tap-roots, have recommended placing a flat stone under each, when transplanted.

3. That in setting the trees, they should be set as low as the depth of the soil will admit: or, at any rate, as deep as they stood in the nursery, and facing the same way, especially if they be of any considerable size; for which purpose the south side should be marked before they are taken up.

4. That the trees should be placed at such a distance one from another, that their branches may spread literally to their utmost usual extent, without interlocking. In most modern orchards, three trees, and sometimes four, are set in the space which ought to be allowed for one; in consequence of this, their branches run together through the whole orchard before they have obtained half their growth. By this means the fruit is too much deprived of the influence of the sun, and the ground rendered entirely useless for cultivation.

5. That the trees should be well supported by strong stakes, so placed that they may not chafe them. The

best method is said to be to place the stakes obliquely, and to tie round the trees pieces of cloth or of case-matting, where the stakes cross them. These should be continued till the trees are so well rooted as not to require a support.

6. That to prevent the trees from suffering by dry seasons, a quantity of small stones or coarse gravel should be placed round them, to keep the ground constantly moist by preventing evaporation.

7. That till the trees have acquired a good size a sward should by no means be suffered to form within reach of their roots.

8. That in ploughing the ground, great care should be taken not to injure the trees, by driving the oxen over them, or suffering the plough to gall the stems or disturb the roots; and that, till the trees shall have grown beyond the reach of cattle, the orchard should be kept entire as a garden. I should, perhaps in some other connection have entered a caution against suffering the trees to stand so thick in the nursery as to occasion their running up tall and slender, with little or no heads; a fault much too common.

To these I shall only add, that whoever wishes to have a handsome orchard, yielding fruit in perfection, whether for the press or the table, should assist his trees in forming well-shaped, spreading heads, and by seasonably removing all decayed and useless branches, keep the bearing part sufficiently exposed to the influence of the sun and the air.

SAMUEL TENNEY.

*Exeter, N. H. April 3, 1811.*











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