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SOUTHAMPTON

AN ESSAY
ON THE
NATURE AND CAUSES OF THE FAILURE
OF THE
POTATO CROP,
WITH THE
MEANS OF PREVENTION AND CURE.

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PREFACE.

No event in agriculture has exhibited more various or more contradictory appearances, than the failure of the potato crop. It has not only baffled all the skill of the practical farmer, but has set at defiance the numerous conflicting theories of the philosophers of Natural History. In some instances, the produce of one furrow, planted the same day, with the same seed, and on the same manure, has been abundant, while the adjoining ridge, under circumstances to all appearance precisely similar, has altogether failed. In some cases, the sets of the numerous kinds and varieties of potatoes have gladdened the heart of the husbandman, by producing luxuriant crops; while in others, apparently the same, his expectations have been blighted by similar seed entirely failing to germinate, and thus presenting one general scene of loss or ruin. Late or early seasons, good or bad soils, have equally

frustrated the hopes of the farmers ; nor have manures, however various or well decomposed, ensured success.

On what grounds, then, it may be asked, has the present writer a claim to expect he shall be able to unravel, in any measure, the clue which conceals the cause or causes of these various and discordant facts from the view of the observer? What reasons entitle him to appear before the public, and discuss so difficult, so contradictory, yet so important and interesting a question?

His ardent and long-continued study,* and love of agriculture—one of the earliest and most invaluable arts—his friendship for farmers—whose industry, frugality, economy, and masonic character without its secrecy, justly entitle them to his most steady love and esteem, will, he trusts, afford a sufficient reason for his attempting this essay.

An extensive personal observation of various districts where potatoes have failed, combined with

* The author commenced his practice and study of agriculture with kind relatives, which he continued to prosecute under the tuition, direction, and assistance of Dr. Coventry, Professor of agriculture in Edinburgh, whose extensive acquaintance with the whole range of human science was only surpassed by his unwearied and warm attention to his pupils and friends. Time—which is gradually but slowly cutting down every thing around us, has only deepened my grateful recollection of the instructive lessons which they conveyed with so much tenderness and simplicity.

the answers given by many enlightened agriculturists who have examined this subject, to the different queries that the author proposed, after a careful examination of all the knowledge which he had himself acquired from his own long experience, will, he hopes, assign another cause for his present effort to stem the progress of so ruinous and increasing a malady.

Nor can he conceal from the public, that gratitude alone, had he no other motive to assign for writing this essay, will, it is to be expected, amply vindicate him for forming such a plan, since he can never cease to remember, while memory holds her seat, with the most heart-felt emotions of thankfulness, the hospitality that he has invariably experienced from the Irish peasantry, who rejoiced to have it in their power to give him, without soliciting it, excellent potatoes, and to add, if their poverty did not prevent, butter-milk and some of their best and largest herrings.

The present state of Ireland is truly deplorable, and such as neither the pen of Shakspeare nor of Scott could depict. Poland, with all the miseries in which it has been involved by one of the most ruthless and cold-hearted tyrants, reminds us of a paradise, when compared with the haggard, woe-worn, and half-naked inhabitants of Erin. Let the failure of this crop become universal in that kingdom, and no imagination will be able to describe, no feeling heart to endure, the consternation, devasta-

tion, horror, and death, which would pervade the length and breadth of the land of potatoes.*

No love of theory, no regard to names has influenced the writer of this Essay to undertake his inquiries. The love of truth alone, an earnest desire to promote the welfare of farmers, who have borne up with great patience under numerous and heavy privations, and a deep sense of the awfully ruinous results that must necessarily follow from an increase of the present disease, are the motives which have induced him to institute his researches, and communicate his conclusions to the public.

May we, in the midst of this and every other divine visitation, look up with pious resignation, yet humble confidence, to the Almighty and most gracious God of creation, providence and grace, that he may not only turn away from us those evils which we most righteously have deserved, but increase the fruits of the earth by his heavenly benediction, and bestow peace, prosperity, and happiness on our native lands.

Little Broughton, July 28, 1834.

* Sir R. Southwell states to the Fellows of the Royal Society, that his grandfather first planted the potato in Ireland, which he received from Sir Walter Raleigh. After the gardener had reared the potatoes to the maturity of apples, he brought one of them to his master, asking if that was the fine fruit. Sir Walter examined it, and feigned to be so dissatisfied that he immediately commanded the gardener to root out the weed, when a bushel of potatoes were found at its root.

ESSAY

ON THE

FAILURE OF THE POTATO CROP.

THERE is no esculent in this kingdom which has been liable to so few failures as the potato. To plant, and to secure a crop, was an invariable result. In some varieties of potatoes, the *curl** caused the crop to be very imperfect; but nothing ever occurred to manifest a general failure. Much has been written on the *curl* by the West of England Agricultural Society, in their various papers on this subject, by Mr. Knight and others, to whom we refer our readers for any information on this subject, since we do not consider it to be connected with the disease now under consideration. All judicious farmers have avoided to raise crops from curled-top potatoes; and severe losses have been sustained by such as did not adhere to this practice. The curl demands particular attention; and no intelligent agriculturist will select his seed without examining the crop when growing. The failure in one single

* The curl first appeared in Lancashire in 1764, and from thence spread over all the potato districts in Britain. What an analogy with respect to its spread between the progress of the curl and the present disease, which is rapidly advancing over the whole empire.

crop this year, from want of attending to this point, did not amount to less than thirty pounds.*

ON THE FAILURE OF THE POTATO CROP.

The disease, which has produced, and continues to occasion, such an extensive failure, is not confined to a few districts. It is moving on, with steady pace, from sea to sea, both in England and Scotland. It is ascending our mountains, and has penetrated our lowest glens. There are very few parts in Ireland where it has not established its power, and, in some parts, been very destructive. Even the Isle of Man has to lament its ravages, where it is advancing with slow but sure progress. It has been wafted to our transatlantic brethren in Canada from our own shores, and nothing but the very greatest care can prevent its prevalence over the whole of North America.

Nor has its existence been confined to two or three years. The first case with which the writer is acquainted, occurred eight years ago, in 1826, and was confined to one solitary farm. It was supposed to be occasioned by the excessive heat of that season, and continued on that farm until the present year.† During the last five years it has been per-

* The present writer knew a farmer twenty years ago, who, by constantly raising his potatoes from the curl-top seed, never had more than half a crop.

† It is not a little singular that the potato tops assumed a minty appearance this same year in an entire district; and the cause was wholly attributed to the heat of the weather.

vading various districts, and continues annually to make new incursions. The ignorance of the farmer concerning its nature, prevention and cure, on its first appearance, and the steady advance with which it pursues its career, unless stopped by some skilful means, are the leading reasons why the disease has received so little check.

ON THE NATURE OF THE DISEASE.

The appearance of this disease is generally very uniform. A small shoot arises from the set of the potato, and advances very near to the top of the furrow, when a very small potato, rarely larger than a nut, forms itself, and from this another shoot ascends, without being able to penetrate the superincumbent soil. On some occasions, two, or even more small potatoes form themselves on the original set, and send forth shoots which have not sufficient vigour to rise above ground.* The sets of the potatoes, in many instances, assume an appearance which is generally denominated dry rot. It advances without interruption, until the whole set moulders away, except the skin, which still appears for some time to retain its original vegetative character. In other instances, a wet rot ensues, and the sets manifest one scene of putrescence and corruption. Worms of various kinds necessarily present themselves under these last circumstances, and are evidently the effect, not the cause, of the disease.

* On rare occasions the shoots in both these cases ascend above ground, when they assume a minty, and very languid appearance.

When the vegetative power of the sets has been entirely destroyed, or lost before planting, no produce can be expected; and it frequently happens that the sets continue in the ground in the same state in which they were deposited. The insidious manner by which this disease propagates itself, and the little attention that is generally first bestowed upon it, contribute in no small degree to increase its power, and extend its ravages.*

THE CAUSES OF THE DISEASE.

PRIMARY CAUSE.

The primary cause of this disease is undoubtedly some imperfection, or defect in the vegetative powers of the seed itself. The same seed has failed in Canada and in England, on soils the most opposite, and climates wholly differing from each other. The most careful observers of this disease, who have continued to raise crops from potatoes affected with it for five years, have found the disease to remain without interruption during the whole of that period, exhibiting the same appearance in every respect that distinguished it from the commencement. It is hence apparent, that no distance of place, or no length of time, have any influence in effecting a change. The same vitiated seed carries

* So great was the incredulity of the neighbouring farmers in one district, where the disease first appeared, that they did not believe the account of the farmer suffering from the disease, until they were themselves eye-witnesses.

destruction along with it to the remotest region of the globe, or the most distant period of time.

PREDISPOSING AND EFFICIENT CAUSES.

1. *Climate* has no small effect upon this plant and its diseases.* It is less subject to be affected with curl, or the present malady, in upland districts, than near the sea. Many of the lower parts of the mountains, and of the retired vales, have not yet suffered from the disease, while the adjoining districts have experienced destruction and havoc for years. The present writer is, however, sorry to be compelled to observe, that the mountains do not afford a barrier against its progress, and unless great care is used by our upland farmers, it will soon spread over the whole length and breadth of our land.

2. That the *atmosphere* requires the closest observation of the farmer who is desirous to avoid the devastation of this disease, is demonstrated by very striking and important facts, which undeniably prove the electrical fluid to have great and powerful influence in hastening the entire destruction of the vegetative power of the potato.† The potato

* The potato is found wild in Chili, where the flowers are *always* white. The hills and cliffs are selected for its abode, and it is not observed at a much greater distance than six or nine miles from the coast. It abounds near Valparaiso, and has been observed along the coast forty-five miles north of that city.

† The present writer has nothing to do with mere opinions. His sole object has been to found all his observations on facts,

crop planted before a thunder shower has nearly failed altogether ; while the very same seed, planted the very same or next day, has succeeded. Marshall, in one of his first works on agriculture, invented an anemometer, or wind-measurer, for farmers, who now make much greater use of the barometer and the thermometer than they did a few years ago, and with considerable advantage. May we not expect that the very appearance of *rainy* clouds, which first induced Mr. Luke Howard, that distinguished meteorologist, to classify this interesting part of Natural History, will aid our farmers in ascertaining with greater accuracy the approach of rain and of thunder showers? A good meteorological farmer in every district would be very useful in directing and assisting the observations of his neighbours.

3. Want of proper attention to the *seasons* for planting has been the cause of many and very extensive failures in the potato crop. This has frequently been occasioned either by not cleaning the land sufficiently early, or by having a disproportionate quantity of labour in other departments of the farm, which prevented the husbandman from planting his potato crop with every advantage. This has been productive of very heavy loss, during a period when the potatoes suffered from no disease. What ruin then may we not expect from such neglect, when the greatest wisdom, the most consummate prudence, skill, and industry are unable to ensure a crop?

wholly unconcerned about the conflicting theories of any natural philosophers.

4. *Great heat*, although the potato requires a dry bed, has been always injurious to this crop. We need not wonder, therefore, if those, who first suffered from this disease attributed the whole reason of the failure to this one cause. In the first case of the malady with which the author is acquainted, and for which heat was assigned as the cause, all the varieties failed except one. This still continues good, while all the others, which then failed, remain bad, and are wholly abandoned.

5. *Cold, long-continued rains, and wet ground* have also afforded to lend assistance to the perfect ruin of the potato, whose vegetative powers had been already in a very weak and languid state. The increase of draining—especially of tyle draining—promises at no distant period, provided the landlord does not neglect his duty, to remove this danger, and to ensure abundant crops of potatoes on any soil. The implement, called Scuffler, made by Mr. Wilkie, has been of great use in assisting to clean wet and heavy soils, and it is to be hoped that it will soon be universally adopted. It is much cheaper and more efficacious for this purpose than the plough, and all agricultural societies ought to do their utmost in encouraging and improving it.

6. Want of proper and complete *Pulverisation*, even in light soils, has contributed to assist in preventing the potato from producing a full crop. The implement already alluded to would be found of great value in effecting this important object.

7. *Manures*, when not fully decomposed, and in a strawy state, have frequently caused the failure of this crop. The value and necessity of manures

being in a properly-matured state, have been felt and acknowledged by all enlightened farmers and at all periods. Some apply the manures in autumn, and others use none for this crop, whose quality they consider to be rendered better by this culture.*

8. The *choice* and *selection* of *seed* is of the utmost importance. Good farmers, even when no failure occurred in the potato crop, were always desirous to exchange their seed from different soils and climates. This was one of the principal means by which they endeavoured to prevent curl, and to ensure a large crop. Need we be surprised, therefore, to find a neglect of this important step attended with ruinous effects in the present state of the potato crop? Vitiating seed has been imported from Ireland to England, from England to Scotland, and the contrary. One district has spread the disease to an adjoining one, which was before this exchange wholly free from its ravages. No caution however great, no attention however watchful, no skill however consummate, can invariably secure a deliverance from this cause. The selection and change of seed should be made when the potatoes are yet growing, and great care should be taken to secure them in houses or pits, and to separate them from such as are used for food.

9. Want of care in cutting the *sets* of potatoes has in some cases been the cause of failure. Examples of this are not numerous, but they are suf-

* The present writer recommends from his own experience the application of lime in autumn for the potato crop, since both the quantity and quality of this esculent are thus improved.

ficient to establish the fact. May not the very great carelessness, with which the cutting of sets has for a long period been performed, afford *one* very satisfactory reason for this disease, since it is an undoubted truth, that many instances of that malady, which manifests itself when one, two, or even more small potatoes form themselves on the parent set, are to be found on such cuts as have been made from the lower part of the potato?

10. The *too deep covering* of the seed has been in some instances the cause, for cuts, when covered slightly, and planted with the sprouts uppermost, have produced a good crop, while the same seed covered deeply, and planted without any care, has almost wholly failed.

11. Some very important and interesting facts clearly prove that the disease has been propagated by *contagion*. On this account it requires great care to keep the infected varieties wholly separate from the others. This will be best accomplished when the potatoes are taken up.

12. The *heating* of potatoes, occasioned by making too large heaps, has evidently caused this disease in some instances. Farmers are adopting, in this case, great caution in all infected districts with manifest advantage, and keep their seed potatoes generally detached from such as are sold for food.

13. Some facts induce the present author to think, that the disease has in certain cases been caused by the very *large sprouts* which made their appearance during the open winters that we have lately had. In all cases where the potatoes were not planted until late in spring, these sprouts were necessarily increasing, and the vegetative principle

weakened and deteriorated. Great care has been taken by some intelligent farmers to prevent their potatoes from growing by repeated turning, and the result has answered their expectation.

Such are the proximate cause, the predisposing and existing causes, which the extensive and various inquiries of the present writer on this subject have brought under his consideration. Having no theory or system either of his own or others to support, he has been guided in all his conclusions by the evidence of facts alone. He trusts the causes assigned will sufficiently account for most of the phenomena that manifest themselves in the investigation of such a complicated and contradictory subject. He cannot dismiss his present remarks on the causes of this disease, without observing, that there is no part of natural history in which it is so difficult to find cases in every respect similar, as in agriculture. The experiments are made in many instances at a great distance both of time and space, and are frequently conducted under very various circumstances. Every allowance has been made for these difficulties, and no pains have been spared to obtain a minute, full, and accurate acquaintance with this interesting and important inquiry.

Should any answers to the queries, which he has proposed to his various purchasers, induce him to add to the number of causes he has assigned, he will, as soon as possible, communicate them to those who are in possession of his work.

MEANS OF PREVENTION.

1st, *Select* with every possible care a sound and healthy potato, which has never during any former year been diseased. This will be best done before the potatoes are taken up, since the appearance of the crop will afford a testimony to its soundness. A most strict and scrupulous inquiry must be made into the state of the crops from which the seed is selected, during the preceding years, for in most instances, if failure had occurred in any preceding year, there is great cause to fear lest the same result should again occur. This will not be so difficult in districts where the malady has first made its appearance, but in all places where the disease has long existed, it requires great caution, and the most minute inquiry to choose a healthy seed.* The great principle of choosing is to select from those who have never failed themselves, nor sold to any that have not succeeded in raising a crop from the seed purchased. This is difficult, but even in very diseased districts not impossible. No skilful farmer will trust to the inquiry even of his ablest servant, but examine every thing for himself. Unless the greatest care and scrupulosity are used in this vital point, all other efforts must undoubt-

* The writer feels particularly anxious that all who answer his queries at the end of this Essay, should give a faithful and true statement relative to this plan of prevention. It is truly distressing to reflect upon the incalculable mischief which has been done by selling vitiated potatoes for seed.

edly fail. Let none in England purchase from Scotland, Ireland, or the Isle of Man, and the contrary, unless they are certain, which is extremely difficult to ascertain, that all the potatoes in the whole cargo are sound and free from disease. It would require an essay of no small length to detail the ruin and devastation which the author knows to have been carried from one part of the island to the other, with all the recklessness and indifference that necessarily belong to merchants, whose sole object is to acquire wealth by their sales. Every farmer must set his face against purchasing such seed, if he wishes to put an end to the disease, and select entirely for himself in whatever part of the kingdom he determines to make his choice. Let no farmer forget, therefore, that an attentive, careful, accurate, judicious and enlightened choice of seed is the first great principle for preventing the spread of this disease. Great care also ought to be taken to pit the seed, thus scrupulously purchased, in a place separate from all his other crop, since in this way he may avoid all overheating, prevent sprouting, and escape the possibility of contagion from his other crop.

2. Great care ought to be taken in cutting the seed potatoes, as has been already observed. It is an ascertained fact that the *skin* of the potato itself, if it has eyes, will produce a crop, and the present writer has taken up with his own hands very excellent and numerous tubers, raised from the *heart*, or substance of the potato, without a single eye, or the least particle of skin. The sets of potatoes ought to be planted in three or four days. Experiments have been made with cuts made from the

top, the middle, and the bottom of the potato, care having been taken to leave a sufficient number of eyes, and a due quantity of the substance of the tubers. The weight of produce was nearly similar in all, and differed only in the earliness and lateness of the crop, and the size of the potatoes. Great attention is paid to the mode of cutting, in districts where early potatoes are chiefly regarded as one of the means for paying a rent. Nor have the farmers been unsuccessful, for they can frequently equal the horticulturist himself, and surpass agriculturists in other districts by having their crops three weeks earlier, and even more. It will be evident from what has been stated, that great care should be taken in cutting potatoes to leave a sufficient quantity of the heart joined to the eye, since a union of both is more likely to secure a crop. In very many cases potatoes are cut in the most slovenly manner, and no attention is paid to the point last mentioned, for the eye is often cut off without having almost a single particle of the heart or substance of the potato joined with it. The writer has met with more cases than one, where potatoes cut by the master have succeeded, and those, which were cut heedlessly by servants, although planted the same day and from the same seed, have almost wholly failed.

The author well remembers the time when the master or mistress, or their sons or daughters, either cut all the potatoes themselves, or carefully watched the servants when cutting. These times must again return if we expect to hasten the arrival of that period, when the failure of the potato crop shall entirely and for ever cease.

3. One of the most effectual plans for preventing

the sprouts to vegetate too much is to place the seed potatoes in *small pits*. Should they begin to sprout much, place them on a floor, and occasionally turn them. This will enable the farmer to secure, as far as he can, all the vegetative power of the potato. The advantage of this plan has been experienced both by farmers and gardeners.

4. Who can doubt the advantages which may be derived by raising the potato from seed, or the *apple*? We do not consider it an infallible means for preventing a failure in the crop, but it will be often found useful. The apples ought to be gathered in October, and kept in dry land all winter; the seed should be carefully picked from the apples in the beginning of April, and sown in a place sufficiently dry and warm. Care must be taken against frost, weeds removed, and water, when necessary, applied.

5. A slight *covering* of the potato will be found of great use in fostering the plant at first. It is a good plan to give a light furrow first, and after the plant has made its appearance to apply a double-mould board plough, by which the earth will be applied more effectually to the stems of the potato, and a more complete drain formed on wet soils or sub-soils.

6. *Climate* ought to be carefully attended to in the choice of seed, and cold upland districts answer the best.* In attending to this, however, it ought never to be forgotten that the first inquiry must be, Is the district free from disease? If this is not the

* Even the curl is prevented when the seed comes from such climates, since the tubers are generally not ripe in consequence of the cold.

case, a selection must be made from some other part.

7. The following question is important, Should the seed be taken up before it has attained *complete maturity*? Farmers answer very differently. Many consider the cause of the disease to arise from taking the potato up in an unripe state, while others view it in a very different light. I think the potato ought not to be fully ripe. Does not the circulation of the fruit sap, when stopped in the unripe potato, start with more rapidity and vigour after it has been planted? Does not the perfectly ripe potato, after performing its functions, become more inert, and appear to die from age, while the less ripe plant possesses a vigorous energy wholly unconsumed?

8. The facts which prove the existence of *contagion* in the vitiated potato, clearly establish the necessity of keeping the plant, labouring under disease, separate and detached from all others, if the farmer is desirous to secure a healthy progeny. This affords another reason why all healthy plants should be preserved in a state which cannot by any means come in contact with the diseased.

9. Very different opinions are formed about the proper *season* for planting, as a means to prevent the disease. Some contend for early and others for late planting, and are generally guided in their opinions by their own individual success or failure. It is an ascertained meteorological fact, established by the ablest writers, that March has less rain than April, April than May, and May than June, and from hence farmers may draw general conclusions with respect to the best time for planting. The beginning or middle of April may be considered the

best time for planting potatoes not destined for an early produce, since the sets will not perish from the coldness of the spring, nor is the ground too dry. The observation of the writer, which has been extended over a great number of seasons, fully confirms the reasoning drawn from meteorological facts, unless the soil has not been properly pulverised, for this circumstance must always be considered in planting potatoes. It deserves to be noticed, that very few failures have occurred in gardens, which, it is well known, are planted early, and where the potatoes are slightly covered.

The electrical state of the atmosphere ought never to be lost sight of, when the season for planting is considered.

10. It is wholly unnecessary to dwell on the importance of using well-decomposed *manure* as a prevention, since every farmer must be fully convinced, that no crop can be long raised where the greatest attention is not paid to this *gold* of the agriculturist.

11. Since *heat* has been considered by many farmers to be the cause of the disease, it is the bounden duty of the author to impress on all farmers the necessity of avoiding to plant under such circumstances. The electrical fluid itself, whose destructive effects on the diseased potato have been certainly established, may exist in no small degree in such an atmosphere, and thus add its own destructive power to the natural heat of the air. This very consideration of heat proves the necessity of farmers paying more attention to the actual state of the atmosphere than has yet been done.

12. Since many instances have occurred where

too much *moisture* had evidently contributed to the destruction of the crop, the writer must not pass over such a circumstance without observation. No land, when properly drained, could possibly be in such a state, and the landlord is bound to see all his fields free from superabundant water. Undrained land ought never to be occupied by any farmer, unless at a rent, and with a lease, which will enable him to remove the water by his own exertions. Since this is unhappily, in these days very rarely, almost never the case, landlords ought to drain all their own property, and to charge their tenants, if not already over-rented, interest for the improvement. When shall we again live to see the day when all landlords, like Coke of Holkham, will adopt as their motto, *Live and let live*?

13. *Soil* has been found to have very little effect in hastening or retarding this disease. The very finest potato soils have altogether failed. Virgin earth has not produced that crop with which on former occasions she invariably gladdened the eye of the farmer. How then is the landlord or his agent generally acting on such occasions? Have they made that reduction which a series of bad crops demands? The present writer is compelled to answer No. Instances have occurred of farmers who have lost during the last five years not less than L.400, without any reduction. It has been proved to a demonstration before the House of Commons, that the state of the agricultural interest is truly deplorable, and will such conduct under such a disease contribute to make it better?

THE CURE.

After all the inquiries which we have been able to make, one mode only presents itself as the most sure method for securing a crop. The plan that we intend to recommend has been found to answer in all the three kingdoms, and has never been introduced until the long continuance of the disease has compelled the farmer to try all the methods which his skill and ingenuity could devise. The most certain means for ensuring a crop is to plant the potato *whole and entire* without *any cuts*.* Some farmers were induced to adopt this practice in consequence of having observed no curl in crops raised from whole potatoes. Experiments for establishing this fact had been conducted with great care, and the result proved that uncut potatoes were not liable to the curl. This fact † induced them to think that the same mode of planting might contribute to prevent the present malady. The trial equalled their expectation, and its adoption followed.

The present writer was delighted, when, after many and repeated examinations, he found no exception to this principle of planting; and, after all his inquiries, he has only met with three well established instances of failure, where whole potatoes were planted. In all the exceptions, the seed from

* I learn from my dearest mother that she adopted this practice more than seventy years ago, and was surprised to find the small potatoes producing as large a crop as the big ones.

† I have generally found this to be the case, and have only observed three or four curls in all my examinations of crops raised from whole potatoes.

which they were planted had been diseased, and afforded another very conclusive proof, that no farmer ought to rely, with perfect confidence, on any system, without taking the greatest possible pains in securing seed which has not been vitiated. He met with many cases, where the crop raised from whole potatoes was good, although the seed itself had been diseased. While this fact proves most undoubtedly that whole potatoes can be relied on with greater confidence than sets, since these last had completely failed, while entire potatoes, raised from the very same seed, succeeded; yet farmers ought to leave no stone unturned, no means untried, for the purpose of securing seed that has not been diseased.

Nor was he only embarrassed by the three exceptions just stated to the principle of planting whole; farmers complained of the smallness of the tubers raised, according to this mode of planting, and he examined many a crop, with great care, for the purpose of ascertaining this fact. After the most attentive and scrupulous inquiry, he found, that one great cause of the small-sized potatoes, when raised from uncut seed, was the planting of the whole potatoes too near each other in the furrow, and not placing the furrows at sufficient distance from each other. Longer experience will soon enable farmers to adopt improved methods in planting whole seed, and they will not then have cause to complain of small potatoes.*

* He found, on examining more than sixty cart-loads in one of our markets, that seventeen were raised from whole potatoes, nor did they appear smaller than such as were raised from cuts.

The additional expense attending the culture of potatoes by planting the tubers whole, is adduced as a strong objection against this system. When, however, we consider that the small and middle-sized potatoes answer as well as the large ones, and that they are planted at one foot, one and a half, or two feet distance, while the sets are frequently only six, seven or eight inches from each other, it must be evident to all, that the expense is very little, if at all, greater. Nothing but the strongest possible conviction of the advantage and necessity of planting whole potatoes, derived from a very extensive, careful and unprejudiced examination of this plan in England, Scotland and Ireland, could have induced me to dwell so long on this subject. This system will, I am perfectly sure, assist more than any plan yet devised to bring back the potatoes to their former state, and, let this be once accomplished, farmers may then pursue their former methods. The great point now wanted, is to arrest entirely the progress of the disease, since, unless this is accomplished, the ruin which it will occasion must annually increase. The raising of new varieties from tubers brought from South America, has not prevented the progress of the malady, and the present writer feels convinced that nothing can or will accomplish it, except planting whole potatoes, and very great care in the selection of the seed. Should even the expense of planting whole potatoes be greater than by sets, nay, should the size of the potatoes thus raised be a little less, it is still the bounden duty of every farmer to adopt this method, because it offers the only certain means for eradicating the disease.

The late Mr. Curwen, M. P., whose exertions as a farmer can never be too highly appreciated, was the first agriculturist that ever directed the attention of the present writer to the planting of whole potatoes. After making various trials, with more or less success, on a soil very badly suited for the culture of this crop, he at last, without using whole potatoes, adopted a plan of planting two sets parallel to each other, which succeeded better upon his heavy soils than any method which has yet been contrived.* While I strongly recommend this system of planting on heavy soils, as the surest method for ensuring a large crop, and removing all rain or water, yet it does not appear calculated to meet the present disease; and, on this account, even if it should be adopted, the planting of whole potatoes would be more certain, since the space allowed would enable them to grow to a large size.

METHOD OF PLANTING WHOLE POTATOES.

The following method appears to be the best for planting whole potatoes. When the varieties bear umbrageous stems, the distance of planting in the furrow ought to be from eighteen inches to two feet, and the interval between the furrows from three to three and a-half feet. The kidney po-

* I refer any of my readers, that may be desirous to have a minute account of Mr. Curwen's method of planting potatoes, to Mr. Allan, agricultural implement-maker, Workington, Cumberland, who will be happy to give them every information.—Any letters addressed to Mr. Allan must be post paid.

tato ought to be planted at less distances, both in and between the furrows, since its stems are not so luxuriant, and is generally less productive.

The writer, in the remarks he has made on the failure of the potato crop, has been guided only by the careful investigation of facts, and an eager desire to stem the progress of a disease, which, he trusts, will soon yield to the steady prosecution of judicious plans for its prevention and cure. He is glad in being able to state, that, in consequence of the very fine season for potatoes, the crop will not be so defective as was once apprehended, nor is there any cause for fearing lest the plant should finally be exterminated. Farmers will become more attentive than ever to the cultivation of this valuable plant, and the very malady which has excited their fears, and caused so great a loss, will only rouse them to new exertions in the adoption of such plans as are calculated to ensure their future and permanent success.

The inquiries of the writer of this Essay, concerning the failure of potatoes, have deeply impressed his mind with the necessity of a closer union in their labours between the farmer and the gardener. The exertions of the former are generally extended to a wider field, which make him frequently overlook the labours of the latter, which are conducted on a more contracted scale and more confined range. When, however, it is considered that many of the most valuable hints on the cure of this disease commenced with horticulturists, all farmers ought to hail them as co-operating in the same great cause, and their best and surest friends.

Nor ought this union to be confined merely to

individuals ; horticultural and agricultural societies should unite in their efforts, and a fellow-feeling established, which would carry on the improvements of both, beyond the highest expectations of either. The farmer would do nothing to retard the ingenuity of the gardener in improving our flowers or our fruit-trees ; and our gardener would find it his interest to do every thing in his power by which the cause of agriculture could be made to prosper. I have frequently been disappointed in securing good seed, when a farmer, which I am sure never would have happened, had I cultivated the friendship of gardeners more extensively and intimately than I did.

Nor has this want of intimacy between the gardener and the farmer been confined to myself. I have observed it in others, and account for it in a great measure from the very different modes of conducting their operations.

When, however, we are attacked by a common enemy, whose ravages can best be destroyed by a steady combination, it is the bounden duty of all, who wish the prosperity of such as raise food for the support of man, to unite their whole powers in annihilating its destructive character.

I cannot conclude my remarks on this important subject without earnestly requesting the assistance of the landlords and their agents to do every thing in their power for the purpose of supporting the interests of their tenants, whose prospects of success in farming have frequently been blighted by the loss, which they have sustained from the disease in potatoes. The want of sympathy on the part of many landlords with their tenants is rapidly hasten-

ing one of the most distressing of all events, an appalling and heart-rending ruin in the farming world. Had farmers been negligent or careless in their duties, their landlords might have been forgiven; but I am bold to assert, without fear of contradiction, that there is no class in society who have surpassed them in economy, industry, skill, and frugality. May all landlords feel the worth of their tenants, and may the prosperity of farmers increase beyond their wishes. Landlords of the very noblest character still exist in these kingdoms, whose *patriarchal* attachment to their farmers has never been diminished. May this truly admirable class of landlords increase, and be *perpetual*.

QUERIES TO BE ANSWERED.

1. Have your potatoes failed?
2. What was the appearance of the disease?
3. Was the disease accompanied with a dry or wet rot?
4. Did you observe any insects? and of what kind?
5. Has the disease continued for many years?

6. Do you consider the primary cause to be in the potato?

7. Did heat seem to act as an exciting cause?

8. Did you observe what effects were produced on the crop by the electrical fluid?

9. What other causes appeared to act in producing the disease.

10. What effects were produced by strawy manure?

11. Have you planted whole potatoes?

12. Was the produce good from whole potatoes?

13. At what distance did you plant the whole potatoes?

14. Did you ever observe a crop to fail from whole potatoes?

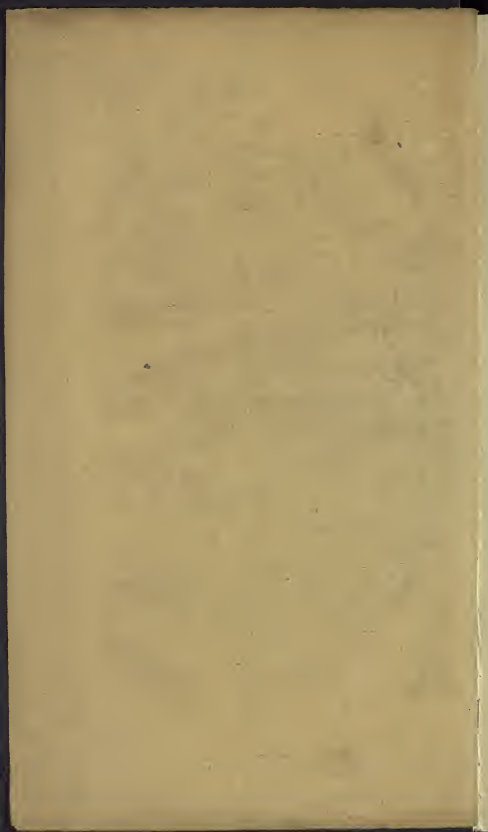
15. What varieties of potatoes have failed the least?

16. What kinds have failed the most?

17. Have you been careful in selecting your seed?

18. Have you changed your seed ?
19. How do you cut your potatoes for seed ?
20. At what season do you generally plant your potatoes ?
21. Which season do you consider the most favourable for a good crop ?
22. Have you ever raised potatoes from the apple ?
23. Did potatoes from the apple never fail ?
24. How many years have elapsed since the disease first showed itself ?
25. How do you distinguish between a healthy and diseased potato ?
26. Do you think it a good plan to cover potatoes deep ?
27. Have not diseased potatoes been imported ?
28. Should not great care be used in planting imported seed ?

I have the pleasure to acknowledge the receipt of
 your letter of the 17th inst. in relation to the
 above mentioned matter. I have the honor to
 inform you that the same has been forwarded
 to the proper authorities for their consideration.
 I am, Sir, very respectfully,
 Your obedient servant,
 J. M. [Name]



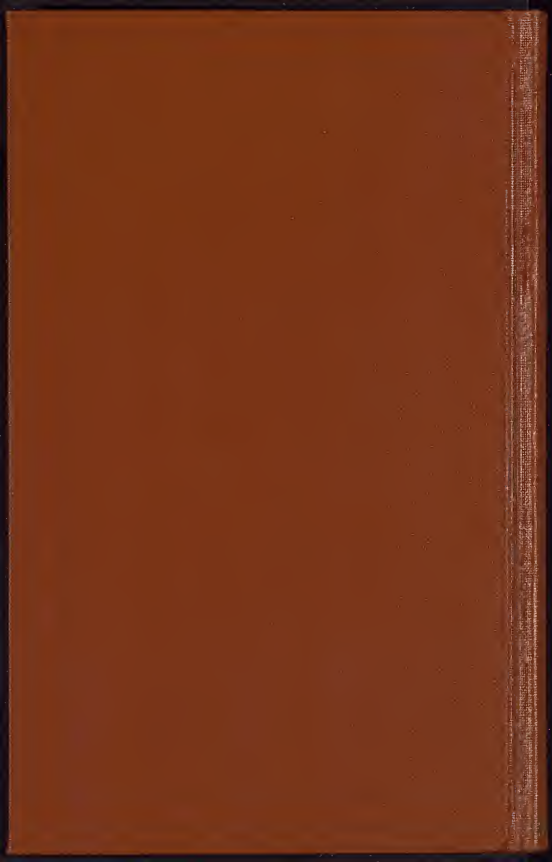


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