

A treatise on the culture of the apple and pear, and on the manufacture of cider and perry. [With a postscript concerning tithes] / [T.A. Knight].

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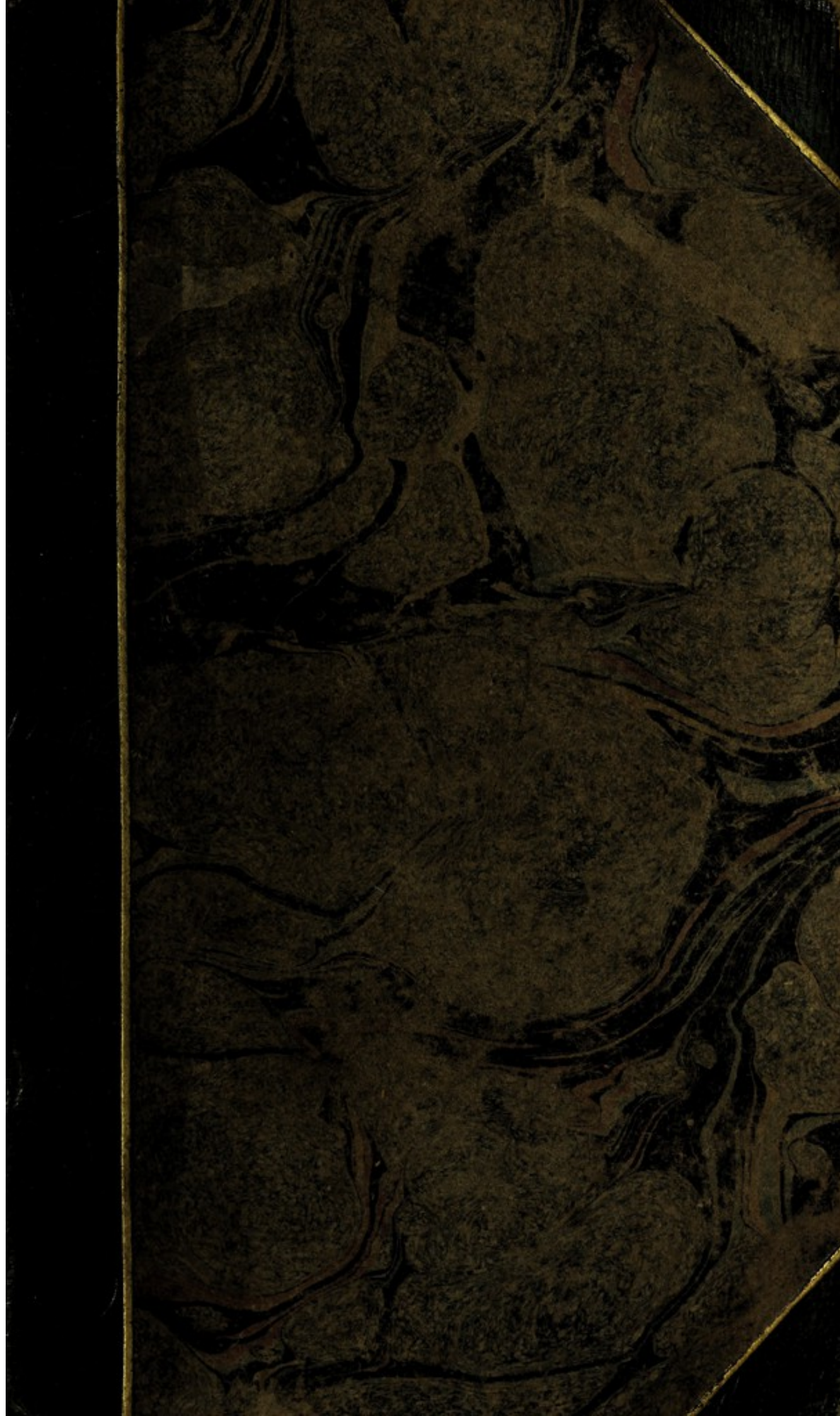
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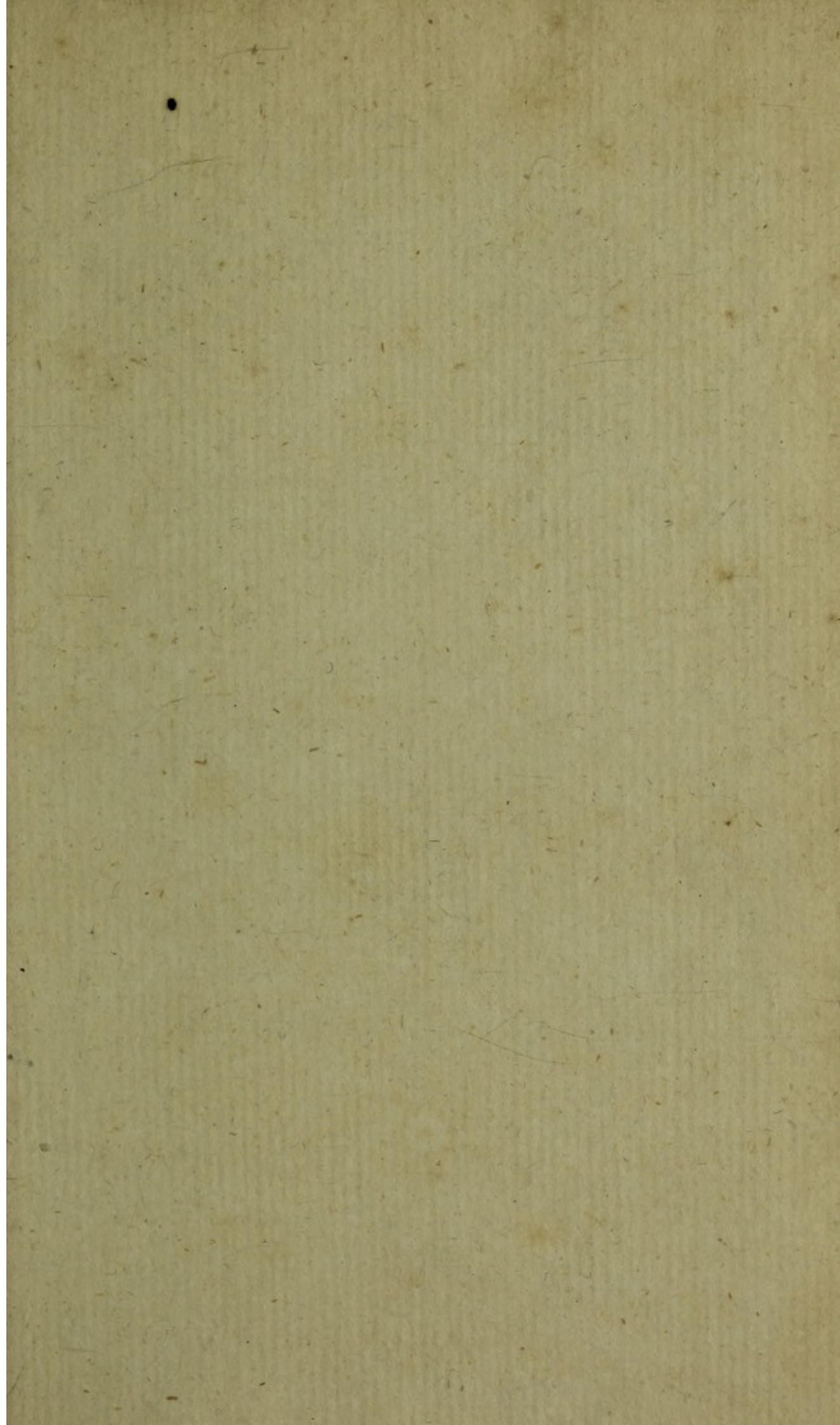


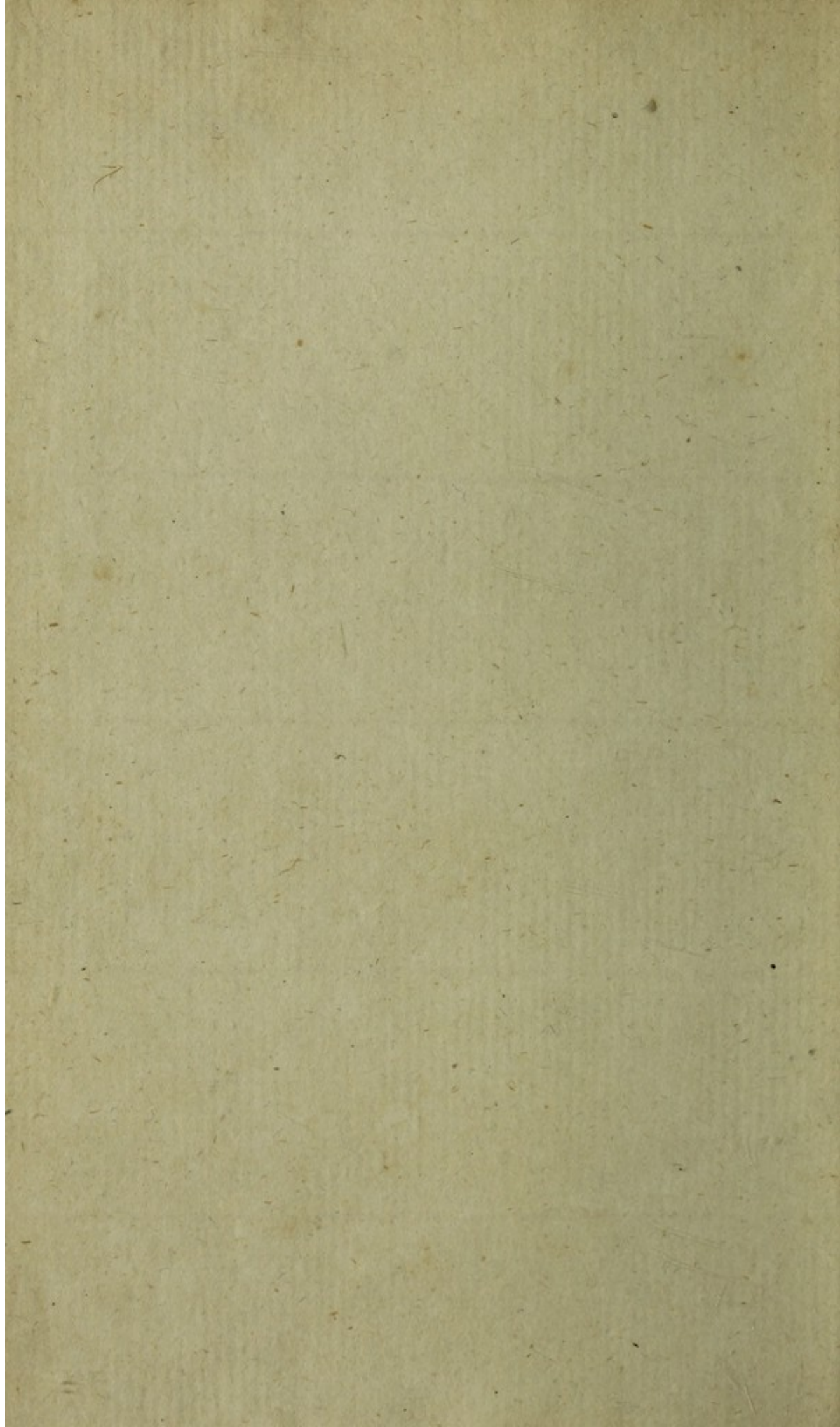
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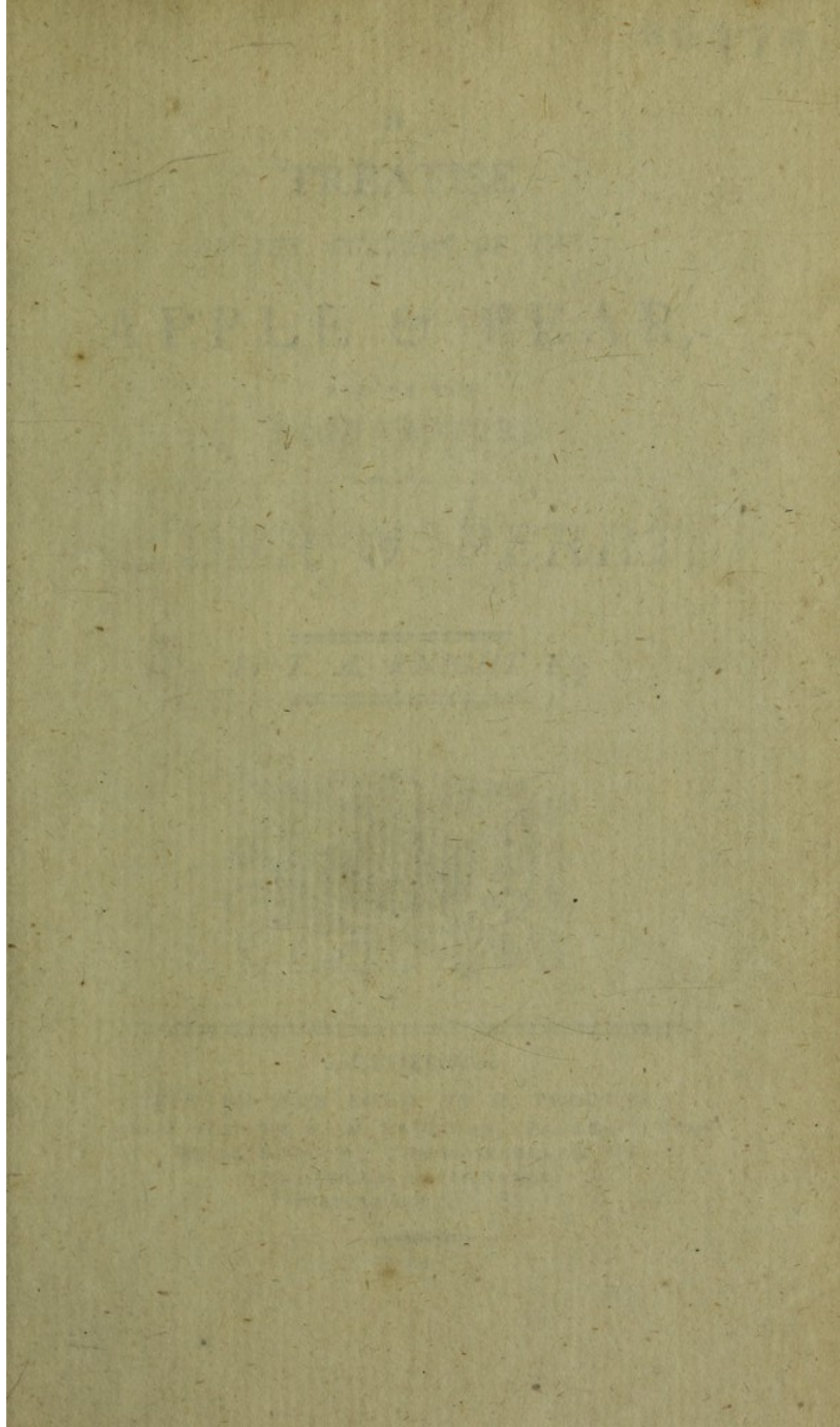
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A
TREATISE
ON THE CULTURE OF THE
APPLE & PEAR,
AND ON THE
MANUFACTURE
OF
CIDER & PERRY.

By T. A. KNIGHT Esq.



=LUDLOW=

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—
1797.



* * *

THE effects of cultivation on the animal and vegetable systems are extremely fimilar. A change in form, in colour, and in fize or stature, takes place in each, and in each thofe changes appear to arife from fimilar caufes : from a more abundant and regular fupply of nourifhment than is afforded in a ftate of nature, with a favourable climate, or protection from the bad effects of an indifferent one. The offspring of every plant and animal, when unchanged by cultivation, bears a very clofe re- femblance to it's parents, but amongft

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the cultivated kinds of each, it is extremely various ; still however generally shewing some similitude to them. By taking advantage of incidental variations, and by propagating from those individuals which approach nearest to our ideas of perfection, improved varieties of fruit, as well as of animals, are obtained. Much attention has in the present day been paid to the improvement of the latter, whilst the former have been almost entirely neglected : probably from an opinion that these, being natives of warmer climates, of necessity degenerate in this. This opinion is however unfounded ; a
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more favourable climate would no doubt be advantageous to every plant and animal; but the stall and meadow counter-balance the defects of our climate in the improvement of the one, and it is probable that the south wall and highly manured border will have the same good effects in the other, and that the changes produced in each will be in proportion to the skill and industry of the cultivator.

The apple (on the culture of which I propose to offer some observations in the following pages) is not the natural produce of any soil, or climate; but owes it's existence to hu-

man art and industry ; and differs from the crab, which is a native of every part of England, only in the changes which cultivation has produced in it. The first varieties which were cultivated in England, were no doubt imported from the continent ; but at what period is not, I believe, known. Many were introduced by a fruiterer of Henry the eighth, and some at subsequent periods ; but I am inclined to think that we are indebted to the industry of the planters of the early part of the last, and the end of the preceding century, for most of those we have at present, and probably
for

for all the old fine cider-fruits. The existence of every variety of this fruit, appears to be confined to a certain period, during the earlier parts of which only, it can be propagated with advantage to the planter. No kind of apple now cultivated appears to have existed more than two hundred years; and this term does not at all exceed the duration of a healthy tree, or of an orchard when grafted on crab-stocks, and planted in a strong tenacious soil. From the description Parkinson, who wrote in 1629, has given of the apples cultivated in his time, it is evident that those now known by the same

names are different, and probably new varieties; and though many of those mentioned by Evelyn, who wrote between thirty and forty years later, still remain, they appear no longer to deserve the attention of the planter. The Moil and it's successful rival the Redstreak, with the Mufts and Golden Pippin, are in the last stage of the decay, and the Stire and Foxwhelp are hastening rapidly after them. The Redstreak, so much celebrated by the writers of the last century, appears almost to have survived it's fame as a cider-fruit; and indeed if it never possessed greater excellence than it does

does at present, it has certainly been much over-rated. But I suspect that each kind of apple is best calculated for cider, when the original tree has attained it's maturity, and before it decays. Not that I think the flavour of the fruit is necessarily debased by the age of the variety; but merely that the crop in the aggregate ripens less perfectly, owing to the weak state of some of the diseased branches.

All efforts, which have hitherto been made to propagate healthy trees of those varieties which have been long in cultivation, have, I believe, been entirely unsuccessful.

The grafts grow well for two or three years, after which they become cankered and mossy, and appear, what I consider them really to be, parts of the bearing branches of old diseased trees. When I first observed the unhealthy state of all the young trees of these kinds, I suspected that it arose from the use of diseased grafts taken from old trees; and that I should be able to propagate all the valuable varieties by buds taken from young newly grafted trees, as these can scarcely be said to take any of the wood of the old stock with them: but to remove still farther every probability of defect
which

which might be communicated from the old trees, I inserted the young shoots and buds taken from newly grafted trees on other young stocks, and I repeated this process six times in as many years, each year taking my grafts, and buds, from those inserted in the year preceding. Stocks of different kinds were also used, some were double grafted, others obtained from apple-trees which grow from cuttings, and others from the seeds of each kind afterwards inserted in them, under the idea that there might be something congenial to the fruits in these. The grafts grew tolerably, and equally well in all, but there was

was always a want of hardness and elasticity in the wood, and at the end of three or four years all began to canker. Several kinds of fruit were subjected to these trials, but principally the Redstreak and Golden Pippin, (particularly the latter) and as these had formerly grown well in the same soil, I began to suspect that their diseases arose from the debility of age, and would consequently be found incurable. The canker however, which constitutes their most fatal disease, often arises from other causes. It is always found in those varieties which have been long in cultivation, and in these it annually becomes more destructive,

structive, and evidently arises from
 the age of the variety; but it often
 appears to be hereditary. A gravelly
 or wet soil, a cold preceding
 summer, or a high exposed situation,
 add much to it's virulence. It is
 most fatal to young free growing
 trees of old varieties, and I have
 often seen the strong shoots of
 these totally destroyed by it, when
 the old trees growing in the same
 orchard, and from which the grafts
 had been taken, were nearly free
 from the disease. The latter had
 ceased to grow larger, but continued
 to bear well, not being of very old
 kinds of fruit: the young stocks,
 by affording the grafts a preter-
 natural

natural abundance of nourishment, seemed in this instance to have brought on the disease ; and I have always found that transplanting, or a heavy crop of fruit, which checked the growth of the tree, diminished it's disposition to canker. In middle-aged trees of very old kinds a succession of young shoots is annually produced by the vigour of the stock, and destroyed again in the succeeding winter : the quantity of fruit these produce is in consequence very small. In this disease something more than a mere extinction of vegetable life appears to take place. The internal bark bears marks of something similar to erosion, and this, I believe, is the original

original seat of the disease, though the wood of the annual shoots is soon tinged to the centre. The canker does not appear to me to be ever a primary, or merely local disease, but to arise from the morbid habit of the plant, and to be incurable by any topical application.

Being, after much unsuccessful experience, satisfied that those varieties of the apple, of which the original trees had long perished from old age, could not be made to grow, I suspected that grafts, taken from very young seedling trees, not yet in a bearing state, could not by any means be made to produce fruit. Having taken cuttings from some
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of these of two years old, I inserted them in stocks of twenty, which had already produced fruit. I afterwards frequently transplanted, and took every means in my power to make them produce blossoms; but though they grew in rich ground, which probably tended to accelerate their maturity, I did not succeed 'till the seedling trees were twelve years old, (the age at which they usually produce fruit) and then other grafts of the same kind, which had been inserted but three years before, readily blossomed. Other cuttings were inserted in very old stocks, which were regrafted; these grew with excessive vigour, but did not produce

produce blossoms so soon as the others.

From the result of these experiments, and from the general failure of every attempt to propagate every old variety of the apple, I think I am justified in the conclusion that all plants of this species, however propagated from the same stock, partake in some degree of the same life, and will attend it in the habits of their youth, their maturity and decay; though they will not be any way affected by any incidental injuries the parent tree may sustain, after they are detached from it. The roots however, and the trunk adjoining them, appear to possess
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in all trees a greater degree of durability, than the bearing branches, having a power of producing new ones, when the old have been destroyed by accident, or even by old age: and I have found that grafts taken from scions, which have sprung out of the trunks of old ungrafted apple and pear trees, grew with much greater luxuriance than those taken at the same time from the extremities of the bearing branches. The former in their growth assumed the appearance of young seedling stocks, and the shoots of the pear were like those covered with thorns. Those propagated from the bearing branches frequently produced fruit the second year,

year, but the others remained long unproductive. It appears to me extremely probable that such trees as the walnut, and mulberry, which do not produce fruit in less than twenty years, might be rendered fruitful in one third of that time, by being grafted with cuttings taken from the productive branches of an old tree.

The life of every tree appears to be greatly prolonged, when its branches are frequently taken off, and it is compelled to make use of the reserved buds with which nature has provided it; and I have not the

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least doubt but that, in the culture of the apple and pear, the life of each original tree might be prolonged to thrice its natural period, by robbing it of its branches as soon as the qualities of its fruit were known, and retaining it as a pollard, or more properly in the state of the stools in a coppice, which is felled at regular periods: for these are known to possess a much greater degree of durability than the same kinds of trees when left in the natural state, and to produce a vigorous succession of branches during many centuries. It is however probable that after a certain period,

each effort of nature will be inferior to the preceding; for timber trees, which have sprung from the stools of an old coppice, are always observed to attain a small stature, with an early maturity and decay. I believe this observation may be extended to every kind of tree, and that the Elm and Poplar, which are now propagated by layers and cuttings, would attain a much larger stature, if raised immediately from seed. The trees thus produced would have the advantages of a greater variety of form, and of tints in the spring and autumn foliage, which are always wanting in those raised

from the same flock, and which constitute no small part of the beauty of forest trees. Should any valuable variety of the apple be retained in the state I have described, I would recommend that its branches be taken off every third or fourth year, and used for grafts, and that it be never suffered to fulfil the intentions of nature by producing either fruit, or blossoms: under this mode of treatment I have little doubt but that the same variety might be propagated through many centuries.

It appears also probable that the latter period of the existence of the apple-tree would be considerably pro-

longed in a southern climate, for all the old kinds grow best in warm situations, and the most diseased flourished with the greatest vigour when I trained them to a south wall. This mode of culture will not suit the cider-maker; but it may probably be adopted with much advantage, when new varieties are to be obtained from seed; and the production of these must be the first thing to engage the attention of the planter of the present day.

A few varieties of the apple are sufficient for the most extensive district, where the soil is of the same kind, and the situation equally warm; but

but a very numerous variety will be wanting to correct the defects of every different soil and aspect. The fruit liquors, for which the county of Hereford has long been celebrated, have always been supposed to derive their excellence from some peculiar quality in the soil which produces them; but a preference has been given to soils of opposite kinds by the planters of different ages. Those of the last century uniformly contended in favour of a light sandy loam, and on this their finest ciders were made: at present a soil of a diametrically opposite quality, a strong red clay, is generally preferred.

Much

Much of the foil however, which is called clay in Herefordshire, is properly argillaceous marl; and some of it contains a large portion of calcareous earth, and effervesces strongly with acids: I have found this foil to form the substratum of some orchards much celebrated for producing ciders of the first quality. It appears to have the effect of mitigating the harshness of rough austere fruits; and as the trees grow with great luxuriance in it, it is perhaps of all foils the best calculated to answer the wishes of the planter. But the strongest, and most highly flavoured liquor, which has hitherto been

been obtained from the apple, is produced by a soil, which differs from any of those above mentioned, the shallow loam on limestone basis of the Forest of Dean. Hence it is evident that those qualities of soil, on which the strength and flavour of the liquor are supposed to depend, either are not discoverable from external appearances, or that liquors of nearly equal excellence may be obtained from soils essentially different.

My own experience induces me to accede to the latter opinion, and to believe, that with proper varieties of fruit, the defects of almost every soil and aspect might be corrected, and
that

that fine ciders might be made in almost every part of England. Every variety of the apple is more or less affected by the nature of the soil it grows in ; and the excellence of the ciders formerly made from the Red-streak and Golden Pippin, and at present from the Stire, in light soils, seems to evince that some fruits receive benefit from those qualities in the soil, by which others are injured. On some soils the fruit attains a large size, and is very productive of juice, on others it is more dry and highly flavoured. Where the juice is abundant, but weak, which sometimes happens in the deep loam of
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the vallies, dry rich fruits, which are eminent for producing strong ciders, should alone be chosen : and when the aspect is unfavourable, or the situation cold and exposed, it seems sufficiently evident, that all fruits, which do not attain an early maturity, should be excluded. On some gravelly soils I have observed the fruit on the same tree to ripen very irregularly, and the cider to be (probably in part from this cause) harsh and rough : these defects would, I have no doubt, be removed by planting such fruits only as become ripe rather early in the season, and which are at the same time capable

pable of being long kept to attain a perfect and regular maturity without decaying.

The most common defect in the orchards of Herefordshire, and the adjoining counties, is the want of a sufficient degree of warmth to bring their fruits to a perfect state of maturity ; for almost all these, having acquired their fame in very warm and favourable situations, have been transferred from those to others, in which, except in very warm summers, they are never properly ripened. The liquor produced from them is consequently harsh and unpalatable, though it frequently possesses from the nature
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of the fruit, a considerable degree of strength. The want of flavour and richness are always attributed to the soil, and I believe almost always unjustly ; for I do not think Herefordshire so much indebted for its fame as a cider country to any peculiarity in its soil, as to the possession of a few very valuable varieties of fruit, for which it appears to be indebted to the industry of the planters of the last century. Those fruits will probably soon cease to exist ; but as good, and perhaps better, may be again produced ; for the skill of our forefathers was by no means equal to their industry. They
were

were ignorant of the sexual system of plants, and appear to have been regardless in what situation, or soil, the seeds they sowed had been produced ; expecting every thing from the richness of the mould in which those, and the plants produced from them, were afterwards placed. They also entertained great expectations from the use of aromatic infusions, in which they steeped the seeds, and with which the young plants were afterwards watered. They had probably observed that the milk and flesh of animals often retained the flavour of the herbs on which they fed, and therefore concluded that the

the juices of plants and fruits would be affected in a similar manner. But the latter, being unprovided with digestive organs, receive their nourishment from vegetable substances, only when these have been reduced nearly to their first principles by putrefaction, and have lost all specific character. Another opinion entertained by them was that any defect, either in the flavour or consistence of the fruits they had raised, might be remedied by the kind of stock on which they were afterwards grafted.

I have reason to believe from considerable experience that their labours

hours here began where they might as well have ended, and that no permanent change can be made in the future produce of the feeds by any mode of cultivation which can be adopted subsequent to their being taken from the parent tree. Each feed contains the root, the leaves, and germen of a future plant, and is converted into it by mere evolution ; a rich or barren soil affording only a greater or less supply of nourishment to it in its unfolded state. The growth of the young plants, and size of their fruit, will no doubt be greatest in rich soils ; but if the trees, or grafts from them, be afterwards

wards planted in a poor one, I believe the fruit in this will be, precisely what it would have been, had the trees originally grown in it. I have several times obtained two trees by grafting from a seedling plant of two years old, and planted the one in the garden, and the other in the cold clay of a very poor nursery. The appearance of the former has always been the most promising, but on taking grafts from each afterwards, I never could observe the least difference in the branches or leaves of the plants, and I therefore conclude that their fruit (though none of them have yet produced any) will be in every respect the same.

The planters of the last century believed that the produce of grafts would be permanently improved by inserting them on stocks of different species, and afterwards propagating from them; but I am confident that no improvement ever was or will be produced by this practice. They also attributed the disposition of their fruits to degenerate when propagated from seed, rather to the action of the wild stock, than to the strong and natural propensity of the plant to return to it's original state. I believe this opinion to be entirely unfounded, but I cannot assert that it is so, and when new

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kinds

kinds are to be obtained from feeds; stocks raised from such cultivated fruits as grow from cuttings would perhaps be more eligible, though the goodness of the fruit is never affected by any stock of the same species.

When I first began to suspect that my endeavours to propagate the old fruits would not be successful, I selected the feeds of some of the best kinds with an intention to propagate new ones. But I soon found that many of the young plants (particularly those from the Golden Pippin) were nearly as much diseased as the trees which produced them.

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I several times raised three or four plants from seeds taken from one apple, and when this had been produced by a diseased tree, I have had not only as many distinct varieties as there were seeds, but some were much diseased and others apparently healthy; though the seeds were sown in the same soil, and the plants afterwards grew within two feet of each other in the nursery. Grafts having been inserted from each, retained the habits of the tree from which they were taken. Few, however, if any of them appeared to possess a sufficient degree of vigour to promise me much success in their cultivation (except

in very favourable situations) should their fruit be such as answered my wishes.

Having before observed that all the old fruits were free from disease when trained to a south wall, I thought it not improbable that seedling plants raised from them would be equally healthy; and that this would not be the sole advantage attending this mode of propagation, as the trees in this situation would enjoy all the benefits of a better climate, whilst their blossoms, being expanded before those of the neighbouring orchards, would escape all chance of being impregnated by the
farina

farina of inferior kinds.* With a view to try the effects of this experiment, I prepared stocks of the best kind of apple I knew, which could be propagated by cuttings, and after planting them against a south wall in extremely rich mould, I grafted them with the Stire,

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Golden

* The science of Botany is so widely extended that it is scarcely necessary to inform any reader that there are males and females in the vegetable as in the animal world. Each blossom of the apple and pear contains about twenty of the former and five of the latter. It appears from the experiments of Spallanzani that several plants are capable of producing perfect seeds independent of the male, but this, I have good reason to believe, is not the case in the apple or pear.

Golden Pippin, and a few other fruits whose time of ripening suited the situation in which I wished to plant. In the course of the ensuing winter the young trees were dug up and (their roots having been retrenched) were again planted in the same places. This mode of treatment had the desired effect of making them produce blossoms at two years old. I suffered only one or two fruits to remain on each tree, which in consequence attained nearly three times their common size with a very high degree of maturity and perfection; and the appearance of the plants I raised from their seeds so much excelled
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any I had formerly obtained from the same fruits taken from the orchard, that I think I can confidently recommend the method I have adopted. I had chosen fruits possessing excellencies and defects of opposite kinds with a wish to see, either through the industry of the Bees or my own, the effects of a process similar to what is called by breeders of animals, crossing the breed. This consists in propagating from males and females not related to each other, and is certainly necessary, in those animals at least in which strength and spirit constitute excellencies, to prevent their degenerating.

degenerating. The experiment was easily made, and the singular effects I had seen produced by similar ones on other plants,* left me no reason to doubt that some effect would be produced in this. From the open structure of the blossoms of vegetables, and from the numerous tribe of insects which feed on their honey or farina, a sexual intercourse must
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* Blossoms of a small white garden Pea, in which the males had previously been destroyed, were impregnated with the farina of a large clay-coloured kind with purple blossom. The produce of the seeds thus obtained were of a dark gray colour, but these having no fixed habits were soon changed by cultivation into a numerous variety
of

of necessity take place between neighbouring plants of the same species; and I am much more disposed to attribute this intercourse to the intention, than to the negligence of nature. My wishes were, of course, to correct the defects and to combine the different excellencies of the best fruits; and I was not without hopes

of very large and extremely luxuriant white ones, which were not only much larger and more productive than the original white one, but the number of seeds in each pod were increased from seven or eight, to eight or nine, and not unfrequently to ten. The newly made gray kinds I found were easily made white again by impregnating their blossoms with the farina of another white kind. In this experiment the seeds which grew towards

hopes that the offspring would possess a greater degree of strength and vigour, as it is known to do in cultivated animals.

A few days before the blossoms expanded of the kinds from which I wished to propagate, I opened the petals and destroyed the males in all the blossoms which I suffered
to

towards the point of the pod, and were by position first exposed to the action of the male, would sometimes produce seeds like it in colour, whilst those at the other end would follow the female. In other instances the whole produce of the pod would take the colour of one or other of the parents; and I had once an instance in which two seeds at one end of a pod produced white seeds like the male, two at the other end
gray

to remain of one kind, taking great care to leave the females uninjured: and when these blossoms were fully expanded, I impregnated half of them with farina taken from another kind of fruit, leaving the other half to the care of the Bees, which were collected in great numbers, owing to the

gray like the female, and the central seed took the intermediate shade, a clay-colour. Something very similar appears to take place in animals which produce many young ones at a birth, when the male and female are of opposite colours. From some very imperfect experiments I have made, I am led to suspect that considerable advantages would be found to arise from the use of new or regenerated varieties of wheat; and these are easily obtained, as this plant readily sports in varieties whenever different kinds are sown together.

the scarcity of flowers at that season, and passed busily from one blossom to another. I had soon the satisfaction to observe that every fruit which I had impregnated grew rapidly, whilst half of those on the other tree, which had remained in their natural state failed, with every one of those left to the care of the Bees. Whence I conclude that these insects are not so good carriers of the farina of plants as is, I believe, generally supposed by naturalists. Had the unmutilated blossoms been more numerous on the adjoining tree, or had the neighbouring orchards been in flower, the event had however probably been different. The

plants I have obtained from the fruits on which this experiment has been made are certainly much the most promising I have yet seen, but whether they will remain free from hereditary disease and debility or not, remains to be proved. Every seed, though taken from the same apple, furnishes a new and distinct variety ; and some of these will grow with more luxuriance than others, and the fruits produced by the different plants will possess different degrees of merit ; but an estimate may be made of their good and bad qualities at the conclusion of the first summer, by the resemblance the leaves bear to the

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the highly cultivated or wild kinds; as has been remarked by the writers, on this subject, of the last century. The plants whose buds in the annual wood are full and prominent are usually more productive than those whose buds are small and shrunk into the bark, but their future produce will depend much on the power the blossoms possess of bearing cold, and this power varies in the different varieties, and can only be known from experience. Those which produce their leaves and blossoms rather early in the spring are generally to be preferred, for though they are more exposed to injury from
from

from frost, they less frequently suffer from the attacks of insects, the more common cause of failure.

The leaves of young seedling plants annually change, become more thick and fleshy, and assume more the character of cultivated kinds. These external changes indicate some internal ones in the constitution of the plant, which may possibly be similar in their nature to those which take place in animals between their infancy, and the time when they become capable of propagating their species.

The properties which constitute
a good

a good apple for cider, and for the desert, are seldom found in the same fruit, though they are not incompatible with each other. The firmness of the pulp, which is essential in the eating apple, is useless in the cider fruit, in the best kinds of which it is often tough, dry, and fibrous; and colour which is justly disregarded in the former is amongst the first good qualities of the latter. Some degree of astringency also which is injurious to the eating fruit is always advantageous to the other. Amongst the endless variety of kinds which are found in Herefordshire very few ever deserved the attention of

of the planter, and the greater part of those are only capable of attaining a proper state of maturity in very warm situations. When the rind and pulp are green the cider will always be thin, weak, and colourless; and when these are deeply tinged with yellow, it will, however manufactured or in whatever soil it may have grown, always possess colour with either strength or richness. The substances which constitute the strength and body in this liquor generally exist in the same proportion with the colour, though there does not appear to be any necessary connection between the tinging matter and the other component parts.

The apple being most easily propagated by grafting, the means of obtaining proper stocks must be amongst the first things to occupy the attention of the planter. A preference has generally, and justly, been given to those raised from the seeds of the native kind, or crab, as being more hardy and durable than those produced from the apple. The habits as well as the diseases of plants are often hereditary, and attention should therefore be paid to the state of the tree from which the seeds are taken: it should be large and of free growth, and rather in a growing state than one of maturity or decay. The crab-trees which

stand in cultivated grounds generally grow more freely and attain a larger stature than those in the woods, and therefore appear to claim a preference. The seeds should be taken from the fruit before it is ground for vinegar, and sown in beds of rich mould an inch deep. From these the plants should be removed in the following autumn to the nursery, and planted in rows at three feet distance from each other and eighteen inches between each plant. Being here properly protected from Cattle and Hares, they may remain 'till they become large enough to be planted out, but the ground

of the nursery, which should always be of good quality, must be regularly worked and kept free from weeds.

The propriety of grafting near the ground, or at the height of six or seven feet, will depend on the kind of fruit to be propagated, whether it be quite new and just beginning to bear, or a middle-aged variety. In new and luxuriant varieties it will be advantageous to graft when the stocks are three years old, as the growth of such will be more rapid smooth and straight than that of the Crab, and there will be no danger of these being injured

injured by beginning to bear too early: but middle-aged kinds will be most successfully propagated by planting stocks of six or seven feet height, and letting them remain ungrafted 'till they become firmly rooted in the places in which the trees are to stand. One graft only should be inserted in each stock, for when more are used they are apt to divide when loaded with fruit, and to cleave the stock, having no natural bond or connection with each other. When the stocks are too large for a single scion, I would recommend that the grafts be inserted in the branches and not in the

principal item. Could the future produce of young seedling trees be ascertained with accuracy at four or five years old, much advantage would arise from inserting buds in the annual shoots of stocks of the same age at the height of six or seven feet; as the planter might then be in possession of a number of trees of any variety just at the age when it arrived at the bearing state. But though the quality of the future produce can not be very accurately known, the experiment still appears eligible, for the trees will attain the same height and size in the same number of years with those

those which have been left in their natural state, and, (should their fruit not be found valuable) will be just as proper as those to be grafted in the manner recommended with middle-aged varieties. An opinion was formerly entertained, and does not at present appear to be quite obsolete, that fruits might be improved by this process of double-grafting; from the changes the sap was supposed to undergo in its passage through a stem belonging to different kinds of fruit. But I am inclined to think that no such changes take place, and that the leaf is the chief laboratory in which nature prepares

the juices of plants, and fits those of the same stock to nourish fruits of different forms, flavours, and colours. The width and thickness of the leaf generally indicate the size of the future apple, and the colour of the black cherry and purple grape may be known by it's autumnal tints, even in plants which have sprung from seed in the preceding spring. The tinging matter in the leaves of these is probably of the same kind as that to which the fruits will in future owe their colours. I have some reason to believe that each variety of fruit requires it's own peculiar leaf; for I have several times

times grafted the branches of young apple and pear-trees close above some buds containing blossoms, and these in four instances produced fruit; which grew well as long as I left any of their own leaves on the tree, but when I took these away, and none remained but those of the grafts, which were of other kinds, they withered and fell off. Whether their falling was occasioned by the want of proper nourishment or by some other cause, is a question on which I am not prepared to decide.

The inexperienced planter will suppose that much time will be lost in propagating new kinds, as these
will

will not produce fruit so soon as those which have been long in cultivation: but he will soon find that the fruit of small young trees by no means repays him for the injury they sustain in growth. Supposing the grafts to be taken from seedling trees of four or five years old, and inserted in stocks of the same age; these will generally produce fruit in seven or eight years from the time of their being grafted, and they cannot in less time gain sufficient height and strength to be removed from the nursery, and afterwards to be firmly rooted in the orchard; though their growth will

will be much more rapid than that of older kinds.

It has been strongly recommended to remove the young trees once* or twice during the time they remain in the nursery, under the idea of increasing the number of their roots, but I think this practice only eligible with trees which do not readily grow when transplanted. I have always found the growth of young apple-trees to be much retarded, and a premature disposition to blossom to

* See Marshall's rural economy of Gloucestershire and introductory sketches towards a topographical history of the county of Hereford, by Rev. J. Lodge.

to be brought on by it, and I could not afterwards observe that those trees, which had been twice removed, grew better than others. It has also been supposed that many small roots proceeding immediately from the trunk are in the future growth of the tree to be preferred to a few large ones, but as the large roots of necessity branch into smaller ones, and probably extend to a greater distance, the advantages of more transplantations than from the feed-bed to the nursery and thence to the orchard may reasonably be questioned.

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The apple-tree succeeds best in situations which are neither high nor remarkably low. In the former it's blossoms are frequently injured by cold winds and in the latter by spring-frosts, particularly when the trees are planted in the lowest part of a confined valley. A south or south-east aspect is generally preferred, on account of the turbulence of the west, and the coldness of north winds, but orchards succeed well in all, and where the violence of the west-wind is broken by an intervening rise of ground, a south-west aspect will be found equal to any. The trees attain their largest stature

stature in a deep strong loam, but will grow well in all rich soils, which are neither excessively sandy nor wet. An orchard generally is most productive of fruit when it is situated near the fold-yard and is in consequence much trod and manured by the Cattle in the winter. The ground in which old apple-trees have grown is esteemed very unfavourable to young ones: when from contiguity to the house an orchard is planted in this kind of ground, the pear and apple should be made to succeed each other, as has been judiciously recommended by Mr. Marshall

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In the choice of fruits for every situation, attention should be paid to select such as are sufficiently early to ripen well in it. A cider-apple may be safely pronounced to be too late for the situation it occupies, when it does not become yellow before the end of October, and I do not know any disadvantages attending an earlier maturity, provided the kinds of fruit be capable of being kept a few weeks. An opinion, I have observed, prevails that the liquors obtained from all early fruits are without strength, or body, but the strongest cider yet known is produced by one of these

these, the Stire. In cold and unfavourable situations those fruits will best repay the planter which in their general character appear nearly related to the native kind or crab, for though the flavour of these be austere and ungrateful to the palate, the ciders produced from some of them, when they have been thoroughly ripened, are often found smooth and generous. But I would recommend the grafts to be taken from an improved crab, and not from a degenerated apple; for the former will possess much of the hardness and vigour, whilst the latter will often inherit the debility and diseases,

diseases, of the parent-tree. Proper fruits of this kind might probably be obtained from a crab of a deep yellow colour, and in taste rather astringent than acid, trained to a south-wall and impregnated with the farina of a rich early apple in the manner already recommended. I am well satisfied that fruits thus obtained would flourish in many situations where kinds which have been more improved by cultivation would not succeed, and when old trees, whose branches have been taken off, are to be regrafted, I have no doubt but that fruits of this kind just arrived at the bearing age might be

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used

used with very great advantage. The leaf and general habit of an improved crab will indicate a worse fruit, and of a degenerated apple a better, than the trees will afterwards produce.

The fruit-trees of Herefordshire are generally planted in quincunx, or in straight lines crossing each other at right angles. The former method is preferred in the hop-yards and pasture, and the latter in tillage, being less inconvenient to the ploughman. But it appears to me that any given number of trees planted near each other in rows, with wide intervals, would be less injurious
either

either to pasture and tillage than in either of the preceding methods. The trees in each row should in this case be of the same variety of fruit, that no one by possessing greater vigour and luxuriance might overgrow and shade another, and that the whole row might appear a continuation of the same tree. The intervals between would afford considerable space for the plough or pasture, and every tree having room to extend it's branches on each side would be more protected than injured by it's neighbours, and would attain nearly, or quite, as large a stature as if intirely insulated. The

cider-maker would also be enabled to collect with convenience each kind by itself, and might afterwards mix them according to his judgment, or caprice. Unless an orchard be very large not more than five, or six, kinds should be planted in it, and if some of these be such as blossom early, and others late, the planter will have as good a chance of an annual supply of fruit, as a larger number of kinds would afford him.

The distance between each row, as well as the space between each tree, must depend on the situation and soil. When the former is high
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and exposed, the trees should be closely planted to afford each other protection; and when the latter is poor and shallow their growth will of course be diminished, and they will consequently require less room. But in low and sheltered situations, and deep rich soils, where the trees are little exposed to winds and attain a large size, wider intervals must be allowed them. In the former instances a distance of twelve yards between each row, and half as much between each tree, will be sufficient; in the latter twenty-four yards between each row and eight between each tree, will not be found

too much, particularly if the ground is intended for tillage after the trees have grown to a considerable size. An opinion rather generally prevails at present in favour of planting single trees at twenty or twenty-five yards distance from each other on arable grounds, and specious reasons may be offered in defence of this practice: the roots, as well as the branches, are at perfect liberty to extend themselves in every direction, but the latter are every way exposed to the storms of autumn and to the cold winds of the spring; and trees of more hardy kinds than the apple, are well known to grow
much

much better when planted near enough to afford each other protection, than when totally insulated. It may be supposed that trees growing in distant rows will not regularly occupy the whole surface of the ground with their roots, but these always extend far beyond the branches, and will meet across very wide intervals. The growth of every insulated tree is more low and spreading, and consequently more injurious to corn, or herbage, growing under it. Where the mode of cultivation will admit, the rows should always extend from north to south, as in this direction each part of every tree

will receive the most equal portions of light and heat.

An orchard is generally raised with most success and at least expence in a hop-yard; the ground under this culture being always well tilled and manured, as well as fenced against all kinds of cattle. Considerable advantages may be obtained by planting twice the number, which are to remain, of trees in each row, using two kinds of fruit, and putting each alternately. The kind which succeeds best may be left, and the other be removed to the tillage. Trees of a large size may be transplanted without the least danger in the autumn,

tumn, particularly if the roots be shortened in the preceding winter. The subsoil of the ground which suits the hop is not unfrequently too moist for the apple, and this defect is rarely removed by draining. Where a hop-yard is wanting trees may be raised in tillage or pasture, but the expence of defending them properly will be considerable, particularly in the latter, in which though ever so well defended they usually make but a slow progress. In tillage the least expensive, and perhaps the best method of raising an orchard will be to exclude every species of cattle, except sheep and pigs,

pigs, and to defend the trees only with small branches bound round their stems, as in the broom or besom of the farm-house. This fence must begin close to the ground and rise to a greater height than the sheep or pigs, or the chains of the horses in ploughing can reach; and to preserve the bottoms of the stems from injury by the plough, a strong oak stake should be driven into the ground on each side of every tree. The small branches which defend the stems will require to be replaced every other year, but this will be done at a very trifling expence.

When a plantation is to be made
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in pasture ground, timber-frames will be found necessary. The kind most in use at present are made with two flat posts placed with their wide surfaces parallel to each other at two feet apart, having boards nailed to their edges on each side with small distances between them. The trees are here perfectly protected from cattle, but when their branches extend themselves, and become agitated by the wind, the stems can scarcely escape being rubbed against the frames. Another and I think a much better kind of frame is made with three posts placed triangularly round the tree, approaching each

each other at the roots and diverging considerably upwards. This appears more expensive than the other, but timber of much inferior value may be used. In this method of planting the formality of the row may be dispensed with, but the trees will succeed much better if three or five be planted near each other with wide intervals, than if each stand entirely alone.

Little care is required, though more than is generally given in Herefordshire, in transplanting the crab-stocks or apple-trees; but in removing from the nursery to the orchard attention should be paid to leave
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the roots as long and as little injured as possible, and not on any account to bury them deeper than they formerly grew. The foil round each tree should be dug eighteen inches deep and four or five feet wide, placing the sod, if the ground be pasture, in the bottom of the holes, as recommended by Mr. Marshal. If the holes in this case be made six months before the time of planting, and if a small quantity of rich mould be mixed with that of the field immediately round the roots, it will much accelerate the future growth of the trees, but it will rarely be advisable to make use of any very delicate

delicate or highly cultivated fruits, when this method of planting is adopted. The branches of the Trees, whether grafted or not, and wherever planted should be much retrenched, and the mould may be raised a few inches round the stems to prevent their being shaken by the wind. A stake to each will also be of much service, but great care must be taken to prevent the bark of the tree receiving injury by being rubbed by it. Wherever a plantation is to be made, the autumn is the most eligible season; but if from any cause the planting be delayed 'till spring, the trees will

will succeed perfectly well, if the soil or succeeding season be not remarkably dry. When the trees have once taken root in the hop-yard or tillage, they will not require any thing more than protection from the planter, but in the pasture the ground should be annually dug three or four feet wide round each during the first four or five years.

The apple-tree being naturally very full of branches frequently requires the operation of pruning, and when properly executed great advantages will be found to arise from it; but as it is generally performed in Herefordshire, the injury
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the tree sustains, is much greater than the benefit it receives. The ignorant pruner gets into the middle of it, and lays about him to right and left, 'till he leaves only small tufts of branches at the extremities of the large boughs. These branches, now receiving the whole nourishment of the tree, of course increase rapidly, and soon become, when loaded with fruit or snow, too heavy for the long naked boughs, which are of necessity full of dead knots from the former labours of the pruner, to support. Many hundred trees annually perish from this cause. I believe the present system of pruning ought

ought to be precisely reversed, and that the pruner should confine himself almost entirely to the extremities of the bearing branches, which are always too full of wood, and leave the internal part of the tree, for reasons I shall mention when speaking of blights, nearly as he finds it. Large branches should rarely, or never, be amputated. In the garden-culture of the apple, where the trees are retained as dwarfs or espaliers, the more vigorously growing kinds are often rendered unproductive by the excessive, though necessary, use of the pruning-knife. I have always succeeded in making

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trees

trees of this kind fruitful by digging them up, and replacing them with some fresh mould in the same situation. The too great luxuriance of growth is checked, and a disposition to bear is in consequence brought on.

Through the negligence of the Herefordshire farmers their orchards are often greatly injured by mistle-toe and moss. The first of these plants is easily removed, and as it makes excellent food for ewes in the spring, it is almost always worth the expence of collecting at that season. Moss appears to constitute a symptomatic, rather than a primary, disease

disease in fruit-trees: it is often brought on by a damp, or uncultivated soil, by the age of the variety of fruit, and by the want of air and light in closely planted unpruned orchards. In these cases it can only be destroyed by removing the cause to which it owes its existence.

Blights are produced by a variety of causes, by insects, by an excess of heat or cold, of drought or moisture; for these necessarily derange and destroy the delicate organization of the blossom: but I believe the common opinion that they arise from some latent noxious

quality in the air, or from lightning, to be totally unfounded. The term "Blight" is very frequently used by the gardener and farmer without any defined idea being annexed to it. If the leaves of their trees be eaten by the caterpillar, or contracted by the aphis; if the blossoms fall from the ravages of insects, or without any apparent cause, the trees are equally blighted: and if an east wind happen to have blown, the insects, (or at least their eggs) whatever be their size, are supposed to have been brought by it. This opinion, which was absurdly entertained by the philosophers of the last

last age, probably has owed it's existence to the hazy appearance of the air, which usually accompanies warm days and frosty nights with a north-east wind in the spring. This weather is injurious to the blossom of every tree, and particularly so to that of the apple; for the warmth of the day hatches the eggs of the insect which breeds in it, whilst the coldness of the night, by checking the progress of the sap, retains the blossom in it's half-expanded state to form a nidus for it. This * insect

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which

* The leaves and blossoms of the apple-tree are sometimes entirely destroyed by a numerous tribe of caterpillars, some kinds of which

which assumes the winged state in July, is a small brown beetle, and it then probably lays those eggs on the trees, which, if the succeeding season be unfavourable, prove destructive of the future crop of fruit. The blossoms of the apple appear also to fail not unfrequently from the want of impregnation, † when
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which become moths in the summer and autumn, and others in the succeeding spring. These however do not in any exclusive degree belong to the apple-tree, being found
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† The fruit being merely the capsule or seed-vessel, probably sometimes attains maturity without being impregnated, but I believe it will in this, as in some other
plants,

the weather is unufually hot and dry, or when cold winds prevail; for I have often obferved the farina to wither and die on the autheræ in fuch feafons. In each of thefe cafes I have always feen thofe trees

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on many other trees; but there is an extremely minute insect of the cochineal tribe, which has lately appeared on the apple-trees near London, and has done incredible damage to them. Small downy spots appear on the stems and branches of the trees, each
of

plants, be without seeds. I have often attentively destroyed the male blossoms of the cucumber and the antheræ of the pea; when the fruit of the one, and the pod of the other, generally attained their usual size, but the seeds remained nearly as they were before the blossoms expanded.

most productive, which, having had the good fortune to escape the desolating hand of the pruner, were moderately full of wood, and capable of affording their blossoms some protection from frost and cold winds,
or

of which covers a multitude of these insects, which are attached to the bark by their suckers and fed by its juices. The trees, on which they abound, appear like tender exotics, the points of whose branches have been killed by the preceding winter. I am informed by Sir Joseph Banks that these insects were first observed in the neighbourhood of Kennington, in 1788, and that they were said to have been imported from France, but he could not obtain any information from his correspondents in that country of their existence there. They have

or excessive heat. I would not be understood to disapprove of judicious pruning, on the contrary I think it ought very frequently to be done; but the tree ought always to retain much of the close branchy growth, which

have since gradually extended themselves round the centre where they first appeared, and no means of destroying them have been yet discovered. Apple-trees should not on any account be brought into the cider-counties from any neighbourhood where these insects are suspected to exist, and every precaution should be taken to prevent their introduction. It is the opinion of the most experienced nurserymen round London, that all the apple-trees in that neighbourhood will be destroyed in a few years, if the insects increase as rapidly as they have lately done.

which it's nature always gives it. The pruning-knife may however be used with some degree of freedom on young trees, for the branches of these soon repair any breaches which may be made in them; but if an old tree, or one which has ceased to grow larger, be so thinned as to admit of a free current of air through it, it is ruined for ever. It has been supposed that the fruit, which stands exposed to the sun and air on the outsides of the branches, is alone capable of making fine cider, but experience by no means justifies this conclusion.

A part of the Herefordshire farmers

mers are extremely well skilled in the management of the fruit, and in the subsequent management of their cider; but the greater number are almost entirely ignorant of both. To the latter class only the following observations, in which I shall do little more than detail a part of the practice of the former, are addressed.

The merit of cider will always depend much on the proper mixture, or rather on proper separation of the fruits. Those whose rinds and pulp are tinged with green, or red without a mixture of yellow (for that colour will disappear in the first stages of fermentation) should
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be carefully kept apart from such as are yellow, or yellow intermixed with red. The latter kinds, which should remain on the trees 'till ripe enough to fall without being much shaken, are alone capable of making fine cider. Each kind should be collected separately, and kept 'till it becomes perfectly mellow. For this purpose, in the common practice of the country, it is placed in heaps of ten inches or a foot thick, and exposed to the sun and air, and rain; not being ever covered except in very severe frosts. The strength and flavour of the future liquor are however increased by keeping the fruit under

under cover some time before it is ground ; but unless a situation can be afforded it, in which it is exposed to a free current of air, and where it can be spread very thin, it is apt to contract an unpleasant smell, which will much affect the cider produced from it. Few farms are provided with proper buildings for this purpose on a large scale, and the improvement of the liquor will not nearly pay the expence of erecting them. It may reasonably be supposed that much water is absorbed by the fruit in a rainy season, but the quantity of juice yielded by any given quantity of fruit will be found to diminish

diminish, as it becomes more mellow, even in very wet weather, provided it be ground when thoroughly dry. The advantages therefore of covering the fruit will probably be much less, than may at first sight be expected.

No criterion appears to be known, by which the most proper point of maturity in the fruit can be ascertained with accuracy; but I have good reason to believe that it improves, as long as it continues to acquire a deeper shade of yellow. Each heap should be examined prior to it's being ground, and any decayed or green fruit carefully taken away. The expence of this will be
 very

very small, and will be amply repaid by the excellence of the liquor, and the ease with which too great a degree of fermentation will be prevented. Each kind of fruit should either be ground separately, or mixed with such only as becomes ripe precisely at the same time; but it is from the former practice that fine ciders, of different flavours and degrees of strength, are best obtained from the same orchard. In grinding, the fruit should be reduced, as nearly as possible, to an uniform mass, in which the rind and kernels are scarcely discoverable. For this purpose the Herefordshire mill, which is made with

with a large stone, similar to those used for grinding corn, supported on it's edge, and drawn round a circular trough in which the apples are placed, appears best calculated. Iron mills have been tried, but this metal is soluble in the acid of apples, to which it communicates a brown colour, and an unpleasant taste. No combination has, I believe, been ascertained to take place between this acid and lead, but as the calx of this metal readily dissolves in, and communicates an extremely poisonous quality to the acetous juice of the apple, it should never be suffered to come into contact with the fruit, or liquor.

After the fruit has been thoroughly ground, the reduced pulp should remain twenty-four hours before it is taken to the press. If the fruit has been thoroughly ripe and mellow, a large quantity of the pulp will pass through the hair-cloth which is used in pressing, and as this will be thrown off in the first stages of fermentation, the casks, in which the liquor is placed to ferment, should want about a gallon each of being full. Some advantages are found in the use of open vessels, but these can only be used under cover, and are therefore proper only where the quantity of liquor to be manufactured is small.

The fermentation of liquors has been divided into three stages, the vinous, the acetous, and the putractive. The first has been observed to take place in such bodies only as contain a considerable portion of sugar, and it is always attended with the decomposition of that substance. The liquor gradually loses it's sweetness, acquires an intoxicating quality, and by distillation affords a greater or less quantity of ardent spirit, according to the quantity of sugar it originally contained, and the skill with which the process has been conducted. When this fermentation proceeds with too much

much rapidity, it is often confounded with the acetous, but the products of that are totally different. A violent degree of fermentation however, tho' purely vinous, is extremely injurious to the strength and permanence of cider, probably owing to a part of the ardent spirit being discharged along with the disengaged air.

The acetous fermentation usually succeeds the vinous; but it will sometimes precede it, when the liquor is in small quantity, and exposes a large surface to the air. In this, vital air is absorbed from the atmosphere, and the ardent spirit, vegeta-

ble acid, and fugar, if any remain, are alike converted into vinegar.

In the putrifaſtive proceſs which follows the acetous, the vinegar loſes it's acidity, becomes foul and viſcid, and emits air of an offensive ſmell: an earthy ſediment ſubſides, and the remaining liquid is little but water.

The juice of the apple in it's unfermented ſtate conſiſts of fugar, vegetable mucilage, acid, water, it's tinging matter, the principle of ſmell, and, I believe, of aſtringency.* Of
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* I uſe the term "principle of aſtringency" but I do not know that the aſtringency of
fruits

these component parts, the first only is known to be capable of producing ardent spirit, and it might thence be inferred that the strongest ciders would be afforded by the sweetest fruits: but the juice of these generally remains defective in what is termed "Body" in liquors, and it is extremely apt to pass from the saccharine to the acetous state. Much of the strength of cider is supposed by the Herefordshire farmers to be derived from the rind

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fruits resides in the same substance which is found in the husks of nuts, and in green tea and other vegetables, and to which Chymists have given this name.

and kernels of the fruit, and hence arises their great attention to grind it thoroughly; the stalks also are necessarily reduced, when the apples are thoroughly ground, and I suspect that the body of the liquor is strengthened, and it's flavour improved, by the astringent juice of these: yet it does not appear probable that either of these contains any saccharine matter.

The strongest ciders (and I believe the strongest wines) are made from fruits which possess some degree of astringency; and this quality is so necessary in the Pear, that I have never known a single instance in which

which perry, made from fruits that were without it, did not become sour before the middle of the succeeding summer. It may be preserved by a mixture of the harsh juice of the crab, and this, I imagine, is effected more by the astringent than by the saccharine matter, the latter contains. If I am right in this conjecture, it will not appear very improbable that the quality Hops possess of preserving malt-liquors in the vinous state, depends on their containing the astringent principle. This is not readily discovered on the palate, but if a plate of polished iron be boiled a few minutes in a

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strong

strong decoction of them, the loss of it's polish, and a black colour communicated to those in contact, seem to evince it's presence: the decoction however does not act very powerfully on a solution of martial vitriol

The time which will elapse before the vinous fermentation takes place in the juice of the apple, is extremely uncertain. If the fruit be immature, and the weather warm, it will commence in less than twenty-four hours; but when that has been thoroughly ripened, and the weather proves cold; it will remain a week,
or

or fortnight, or longer, without the least apparent change; particularly in the juice of those fruits, which produce the strongest ciders. In the commencement of fermentation the dimensions of the liquor are enlarged, an intestine motion is observable in the cask, and bubbles of fixed air begin to rise and break on the surface. If the cask be placed in a vault, or other situation where there is but little change of temperature, the fermentation will generally proceed 'till the whole of the saccharine part is decomposed, and the liquor is become rough, and unpalatable to those unaccustomed to it in this state.

But

But as cider, which contains a considerable degree of sweetness, is most valuable, much attention is employed to prevent an excess of fermentation. This is usually done by placing the casks in the open air, which is much the most effectual method; or in sheds through which there is a free current of it, and by drawing off the liquor from one cask to another, and sometimes by exposing it to the air in flat shallow vessels, whenever the fermentation proceeds with too much rapidity. By the first of these means the liquor is kept cool, and it's decomposition is in consequence retarded; but the effect of
racking

racking off, unless the liquor be bright, does not appear to be so well ascertained. It is generally done with a view to cool it, but heat is rarely, or never, disengaged in the fermentation of cider; and the air through which it passes, when the operation is performed in the day, is usually several lines warmer than the body it is supposed to cool. Some degree of cold will no doubt be produced by evaporation, but never sufficient to produce the total suspension of fermentation, which takes place after the liquor has been drawn off from one cask to another. It no doubt gives out something
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to, and may possibly receive something from, the atmospheric air ; with which it can never have been properly in contact, having been always covered with a stratum of fixed air. This may at any time be proved by holding a lighted candle close to it's surface, where it will be immediately extinguished.

The progress of fermentation, if the weather be cool and settled, will generally become entirely suspended in a few days ; and the liquor will then separate from it's impurities. Whatever is specifically lighter will rise to it's surface, whilst the heavier
lees

lees will descend to the bottom; leaving the intermediate liquid perfectly clear and bright. This must instantly be drawn off, and not suffered on any account again to mingle with it's lees; for these possess much the same properties as yeast, and would inevitably bring on a second fermentation. The best criterion to judge of the proper moment to rack off will be the brightness of the liquor; but this is always attended with external marks, which serve as guides to the cider-maker. The discharge of fixed air, which always attends the progress of fermentation, has entirely ceased; and

and a thick crust, formed of fragments of the reduced pulp raised by the buoyant air it contains, is collected on the surface. The clear liquor being drawn off into another cask, the lees are put into small bags, similar to those used for jellies : through these whatever liquor the lees contain gradually filtrates, becoming perfectly bright ; and it is then returned to that in the cask, in which it has the effect, in some measure of preventing a second fermentation. It appears to have undergone a considerable change in the process of filtration. It's colour is remarkably deep, it's taste harsh, and

and flat, and it has a strong tendency to become acetous; probably by having given out fixed, and absorbed vital, air. Should it become, acetous, which it will frequently do in forty-eight hours, it must not on any account be put into the cask. If the cider, after being racked off, remains bright and quiet, nothing more is to be done to it, 'till the succeeding spring; but if a scum collects on the surface, it must be immediately racked off into another cask; as this would produce bad effects, if suffered to sink. If a disposition to ferment with violence, again appears, it will be necessary to

to rack off from one cask to another, as often as a hissing noise is heard. The strength of cider is much reduced by being frequently racked off, but this arises only from a larger portion of sugar remaining unchanged, which adds to the sweetness, at the expence of the other quality. The juice of those fruits, which, produce very strong ciders, often remains muddy during the whole winter, and much attention must frequently be paid to prevent an excess of fermentation. The smoke of sulphur is sometimes used, and bullock's blood to render it bright: the latter is a disgusting practice, and

and both are unnecessary when the liquor has been made from good fruits, properly ripened.

The casks, into which the liquor is put whenever racked off, must always have been thoroughly scalded, and dried again; and each should want several gallons of being full, to expose a larger surface to the air. Should the weather be uncommonly cold, a covering of straw will be necessary. In the end of march, or the beginning of April, the cider is generally fit to be taken from the hands of the manufacturer, and it is then put into the casks in which it is to remain. These are now to

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be filled entirely, and stopped as soon as all danger of further fermentation is over; which is supposed to be whenever a blue film begins to collect on the surface of the liquor. It will however be proper to put the bungs in somewhat earlier, to exclude the external air; but they should not be driven in firmly, lest fermentation should recommence, and endanger the casks. A small quantity of spirit is sometimes added; and when scarcely any degree of fermentation has taken place, and the liquor in consequence retains nearly the taste of the unfermented juice, it may probably be used with advantage :

tage: but when it has fermented properly, it is always unnecessary; and I have sometimes known a renewed and violent fermentation produced by it, which has proved fatal to the liquor.

Ciders, which have been made from good fruits, and have been properly manufactured, will retain a considerable portion of sweetness, in the cask, to the end of three or four years; but the saccharine part, on which alone their sweetness depends, gradually disappears; probably by a decomposition and discharge of fixed air, similar to that which takes place in the earlier stages of

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their fermentation. Cider is generally in the best state to be put into the bottle at two years old; where it will soon become brisk and sparkling; and if it possesses much richness, it will remain with scarcely any sensible change during twenty, or thirty years; or as long as the cork duly performs it's office.

In making cider for the common use of the farm-house, few of the foregoing rules are, or ought to be attended to. The flavour of the liquor is here a secondary consideration with the farmer; whose first object must be to obtain a large quantity, at a small expence. The
common

common practice of the country is sufficiently well calculated to answer this purpose: the apples are usually ground as soon as they become moderately ripe, and the juice is either racked off once as soon as it becomes bright, or more frequently conveyed from the press directly to the cellar. A violent fermentation soon commences, and continues 'till nearly the whole of the saccharine part is decomposed. The casks are filled up and stopped early in the succeeding spring, and no further attention is either paid, or required. The liquor thus prepared may be kept from two, to five or six, years

in the cask, according to it's strength. It is generally harsh and rough,* but rarely acetous, and in this state, I believe, it is usually supposed to be preferred by the farmers and peasantry. But this opinion is not well founded: they like it best when it possesses much strength with moderate richness, and when it is without any thing harsh, or sour in it's flavour; but they will drink it, and to a most extraordinary excess, when it

* When it has become extremely thin and harsh by excess of fermentation, the addition of a small quantity of bruised wheat, or slices of toasted bread, or any other farinaceous substance, will much diminish it's disposition to become sour.

it is really acetous. They will however acknowledge, when they offer this kind to a stranger, (which they are at all times ready to do with great liberality) that the operation of swallowing it is rather a severe one; but they always assure him that it will do him good, if he can get it down. And indeed if we may judge from the wonderful quantities they drink without apparent injury, we may venture to pronounce it at least as wholesome as any amongst the various kinds of malt-liquors. It must however be admitted that the sweet flatulent liquor, which is generally sold out of the

cider-counties, is far otherwise ; for much of this having become harth, and even acetous, has been afterwards sweetened in the cellar of the merchant.

An inferior kind of liquor is made by macerating the reduced pulp, from which the cider has been pressed, in a small quantity of water, and regrinding it. The residue of three hogsheads of the latter, yields about one of the former, which may be kept 'till the next autumn, and usually supplies the place of cider in the farm-house, for all purposes except for the labourers in the harvest. It is generally fit to drink

drink very soon after it is made, and though no attention is ever paid to it during it's fermentation, it often remains, 'till near the end of the succeeding summer, more palatable than the cider pressed from the same fruit.

I believe the experiments I have mentioned in the former part of these observations, will be sufficient to convince the reader, that under common management, little success is to be expected in the cultivation of the old *fruits; under which name I include

* I would wish to guard the unexperienced planter against trusting to the assertions of nursery-men, particularly some in the neighbourhood

I include every variety, of which a single old and decayed tree can any where be discovered. A graft, taken from a bearing branch of a tree in this state, carries with it the habits and diseases of that branch, and can never form what can with propriety be called a young tree: it will be the continuation of an old one, and each plant will form an unnatural union of youth and

neighbourhood of London; who will promise to send him trees of the Golden Pippin, or of any other kind of apple, that will not canker. But they are much in the habit of promising what they cannot perform, and are extremely ignorant of every thing beyond the mere routine of their profession;

and age, of the living and the dead. Though my own efforts, as well as those of every other planter with whom I am acquainted, have been totally unsuccessful, I am far from wishing to discourage any experiments in the nursery, or garden ; but I recommend it to every man, who plants an orchard, to chuse those kinds of fruit only, of which he knows the first, original, tree to exist

fection ; and (as usually happens) positive in proportion as they are ignorant. As long as the insect I have already noticed (page 89) exists in the nurseries round London, apple-trees should not on any account be taken from them to situations where it is not known.

exist in health and vigour; or those at least of which a single old diseased tree can not be found: for he will certainly see every one he plants affected by the age and state of the original tree, as I have already remarked. The loss, the county of Hereford sustains by the use of old diseased varieties of fruit, is enormously great; its produce, I have not the smallest doubt, being reduced to less than one half, of what it might be. An acre of good ground, fully planted with proper fruits, ought and will afford, an average produce of four, or five, hundred gallons a year; but I am
afraid

afraid that the orchards of Herefordshire in the aggregate scarcely furnish one third of that quantity in their present state.

The directions I have given, will probably be found sufficient for the inexperienced farmer in the manufacture of his cider: but the reader, who desires further information on the subject, will find it treated more at length in Mr. Marshall's rural economy of Gloucestershire, to which I wish to refer him, whilst I proceed to offer a few observations on the culture of the pear.

THE experiments I have made
on the pear have not been nearly
so numerous as those on the apple,
and have been confined to a single
variety, the Taynton Squash; but
they have been fully sufficient to
convince me, that the diseases of
both chiefly arise from the debility
of old age, and will be found equally
incurable. Though the pear is more
probably a naturalized than an in-
digenous fruit in this country, it is
much more hardy than the apple,
and may certainly be cultivated in
almost every part of England with
nearly

nearly as much success as in Herefordshire. Like the apple it grows with greatest luxuriance in strong deep soils, and in these the finest liquors are at present obtained from it; but it will flourish in every variety, where it is not incommoded with water. It's culture differs so little from that of the apple, that the same rules are in general equally applicable to both. It is most successfully propagated on stocks of it's own species, but it will succeed in some degree on those of the Quince, the Medlar, the Whitebeam, the common Service, and the Hawthorn; and probably on many others. When grafted
on

on it's own seedling stocks, which alone I would recommend, the operation should always be performed near the ground, on account of their reclining top-heavy growth. In raising stocks from the seeds of this fruit, much attention must be paid to them during the earlier part of the first summer, or great numbers will perish. They must be kept clear from weeds, and regularly watered in dry weather; and if the mould be frequently stirred between the plants, it will be of great advantage to them: after the middle of August, little care or attention will be required from the planter.

A sufficient number of varieties of this fruit, in a good state of growth, are in cultivation ; but few of them possess any high degree of merit. The greater part are extremely productive of juice, and require to be ground soon after they fall, or are blown from the trees. The produce of some of them, when it has been nicely manufactured from well ripened fruit, often possesses great excellence ; but it is often at the same time sweet, and acetous ; and if, owing to an unfavourable season, the fruit has not been properly ripened, and an excess of fermentation cannot be prevented,

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the liquor becomes sour and unpalatable, and scarcely good enough to answer the meanest purposes of the farm-house. I am much disposed to doubt whether a single perry - pear, possessing nearly the greatest degree of excellence of which this species of fruit is capable, has yet been in cultivation. It appears highly probable that firmer fruits, which might be kept some time, or left under the trees to attain a more perfect and regular maturity, are likely to afford a more permanent, and generous liquor. One pear, which in some degree answers this description, has been much cultivated,

tivated, the Longland ; and though it's produce, being without the fine flavour which is found in some others, is little attended to by the merchant, it has qualities which render it extremely valuable to the farmer : the fruit may be kept some time without sustaining any great degree of injury, when business of more importance occupies his attention : the liquor obtained from it is never very fine, but it is rarely below mediocrity : it possesses more body than is generally found in perry, and retains many of it's good qualities in every different soil and situation. It is a fruit I should

strongly recommend for culture in cold and exposed situations, for which the hardiness of it's blossom renders it peculiarly well calculated; but I am afraid it is advancing nearly to that period when young trees can no longer be raised with advantage to the planter.

The pear is an extremely long-lived tree, and the same variety may in consequence be very long kept in cultivation. At what period the Taynton Squash first sprang from the seed, probably cannot now be at all ascertained; but I suspect from it's present diseased and worn out state, that it existed at least
as

as early as the beginning of the century before the last : for another kind, the Barland, which was much cultivated in the early part of the last century, still retains a large share of health and vigour, and the identical trees which supplied the inhabitants of Herefordshire in the seventeenth century with liquor, are likely to do the same good office to those of the nineteenth. I suspect however that this variety naturally possessed a greater degree of durability, than is common to the species ; and that it's lofty spiral growth, by rendering it difficult to get grafts from the extremities of

the bearing branches, has in cultivation made it still more durable. It is yet capable of being propagated ; but trees nearly of the same stature with those which now abound, must not again be expected. The tree, which is said to have been the original, grew in a field called the Barelands in the parish of Bosbury, and was blown down a few years ago.

Though I do not think very highly of any of the perry-pears which are now cultivated, I do not know that I can point out the means of acquiring better. Those which I have employed to obtain
improved

improved kinds of the apple, appear to me to be wholly improper. Every variety of that fruit, which possesses colour and richness, is capable of making fine cider, but a good perry-pear requires an assemblage of qualities, which will be rarely found in the same fruit. It must contain a large portion of sugar, or its juice can never possess sufficient strength, and unless it be at the same time extremely astringent, the liquor produced from it will be acetous whenever it ceases to be saccharine. In the latter state it will agree with few constitutions, in the former with none. The juice

of the best perry-pears is so harsh and rough, as to occasion a long continued heat and irritation in the throat, when the fruit is attempted to be eaten; yet by being simply pressed from the pulp it becomes rich and sweet without more roughness than is agreeable to almost every palate. This circumstance appears extraordinary, but it does not stand alone in the vegetable world. The root of the arum (wakerobin) is extremely acrid, and if chewed will produce very considerable pain in the mouth for many hours afterwards: but the expressed juice, with the spirituous or watery extracts, scarcely partakes

partakes at all of the acrimony of the root, tho' this, like the pulp of the pear, will be rendered mild and tasteless. The defects of the apple and pear, when raised from seed, are generally of opposite kinds : in the former the fruit is usually harsh and sour, in the latter it is apt to be, when thoroughly ripe, sweet and insipid. The mode of cultivation therefore which would improve the one by bringing it nearer to the highly cultivated state and lessening it's harshness, would not improbably be injurious to the other by producing the same effects.

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An estimate may be formed in the apple of the merit of the fruit by the leaf and growth of the seedling tree, but in the pear these scarcely afford the slightest indication of the future produce. The leaves of those plants which will afterwards afford large rich fruits for the desert are often small and thin, and the stems will be covered with thorns; whilst others, whose leaves and growth shew every mark of a high state of cultivation, will sometimes produce fruits which are small and worthless.

I do not know that better means can be used in obtaining new varieties of this fruit, than sowing a
large

large quantity of seeds from healthy trees of an orchard in which the best kinds only have been planted, and afterwards selecting the plants of the most luxuriant and vigorous growth. But as no estimate can be formed of the value of their future produce, it will be prudent to retain a considerable number 'till their fruits be known : few of which I am afraid must be expected to answer the wishes of the planter.

I have during the last twelve years examined a very large number of seedling-pears, and have a considerable variety growing on a farm I occupy, but I have never discovered

vered more than one kind, which I thought capable of making fine perry. The greater part of these however appeared to me to have sprung from the seeds of rich eatable pears, and some of them bore a very close resemblance to the fruits of old grafted trees in the neighbouring orchards. There is little reason to believe that the resemblance would have been less between the parent and the seedling fruit, had the former been eminent for the production of fine perry ; and it therefore appears probable, that good new kinds may readily be obtained from the seeds of the best now cultivated.

cultivated. But even if few should be found capable of affording fine perry, the produce of all will be valuable to the farmer to mix with crabs, or apples which have been blown prematurely from the tree. The vapid sweetness of the juice of the pear is corrected by the acidity of these, and the liquor produced by the mixture often possesses much more merit, than could have been expected from the ingredients. It will perfectly supply the place of small beer, and may be brought into the market at less than half the price, with sufficient profit to the grower.

The

The time which seedling-trees will require to attain sufficient maturity to produce fruit, appears to vary much in different varieties. I have one plant which produced fruit at sixteen years old, and another which, from the concurrent testimony of many old people, who remember it's first blossoms, appears to have remained unproductive through the first seventy years of it's existence. It has since born tolerably well; but it's fruit is always without seeds, or internal cavity; and it appears to set with difficulty, much the greater part of the blossoms being constantly unproductive. Possibly it's long continued

tinued barrenness, and the defects in it's fructification, may both have arisen from some incidental imperfection in the organization of the plant. The fruit is in other respects perfect, and possesses great merit as an eatable pear.

The directions I have already given for planting the apple, are in every respect applicable to the pear; except that this tree, being of more luxuriant and lofty growth, will require wider intervals. In the most closely planted orchards the rows should not be put at less than eighteen yards distance, nor the trees nearer than eight or nine to each other

other ; and when the ground is to remain in tillage, intervals of twenty-five, or thirty yards, should be allowed between the rows. Attention must also be paid to the forms and stature of the different varieties, and as the fruit of these is rarely mixed with a view to make fine perry, trees of one kind only should occupy each row. In some kinds the fruit grows only on the outside of those branches which are exposed to the sun and air ; in others it occupies every part of the tree. The former will of course require to be planted at greater distances than the latter.

The

The produce of the pear-tree, though of the same variety, and growing on the same stock, ripens extremely irregularly ; and the planter must therefore have a considerable number of trees of each kind he plants, or he will rarely have a sufficient quantity ready to be ground at the same time. Even when the fruit has fallen spontaneously from the trees, a fourth at least of some kinds will be found immature, or decaying, and totally unfit to make fine perry ; and should be (though it rarely or never is) separated from the rest. The pear requires a certain state of maturity to afford perry

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in the greatest state of perfection : it should be ripe without being mellow, or decaying ; when it has not obtained the proper state of ripeness, an excess of fermentation cannot be prevented, and when it has exceeded it, the liquor rarely ferments kindly, and is extremely apt to become sour ; probably by having lost too great a portion of it's astringency : hence few kinds are found to improve by being kept after they have fallen from the trees.

Pruning is not often wanted in the culture of the pear-tree, which is rarely much incumbered with superfluous

superfluous branches ; but in some kinds, whose form of growth resembles the apple-tree, it will sometimes be found beneficial. The observations I have already made on the latter, are, under similar circumstances, equally applicable to this tree.

The blights of the pear, like those of the apple, arise either from insects, or unfavourable weather, or a combination of both. The blossoms are often rendered abortive, by a small brown beetle, precisely similar to that found on the apple-tree, and probably of the same species ; and a considerable quantity

of its fruit is frequently destroyed by the larvæ of a small green four-winged fly. Each fruit which contains the latter insects becomes in a few days rounder than those in the natural state, and grows with much greater rapidity; but it falls off early in the summer, and if it be examined whilst growing, it will be found full of small grubs. The pear-tree suffers more frequently from cold than from insects, and therefore those varieties whose blossoms are produced rather late in the spring, and are preceded by the leaves, are generally most productive of fruit; and some kinds of the
pear,

pear, as of the apple, are much more subject to injury both from insects and unfavourable weather, than others. I have one seedling tree whose bloffoms appear capable of bearing the most unfavourable weather without injury, and which has not once failed to produce a good crop in the memory of the oldest inhabitant of the village in which it stands. The fruit is rather too sweet to make good perry unless in mixture with other kinds, but it nevertheless forms a very valuable variety for cold and exposed situations, as it ripens somewhat early in autumn.

In the manufacture of perry the pears are ground and pressed precisely as apples are for cider; but it is not usual to suffer the reduced pulp to remain any time unpressed. The management of the liquor during it's fermentation is also similar to that of cider; but it does not afford the same criterions by which the proper moment to rack off may be known: the thick scum which collects on the surface of cider rarely appears on the juice of the pear, and during the suspensions of it's fermentation, the excessive brightness of the former liquor is seldom seen in this; but if the
fruit

fruit has been regularly ripe, it's produce will generally become moderately clear and quiet in a few days after it is made, and it must then be drawn off from it's groffer lees. An excess of fermentation is prevented by the means used in the manufacture of cider, and the liquor is rendered bright by isinglass. The power this substance possesses of fining liquors appears to be purely mechanical: it is composed of innumerable fibres, which being dispersed over the liquor, attach themselves to, and carry down, it's impurities. For this purpose it should be reduced to small fragments by

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being pounded in a mortar, and afterwards steeped twelve or fourteen hours in a quantity of liquor sufficient to produce it's greatest degree of expansion. In this state it must be mixed with a few gallons of the liquor, and stirred 'till it is diffused and suspended in it; and it is then to be poured into the cask, and incorporated with the whole by continued agitation for the space of two hours. This process must be repeated 'till the required degree of brightness is obtained, the liquor being each time drawn off, on the second or third day, from it's precipitated lees. Not more
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than an ounce and half, or two ounces of isinglass are, I believe, generally put into a cask of a hundred and ten gallons at once ; but when it's mode of action is considered, I can see no objection to a larger quantity. This substance is most readily diffused in liquors by boiling ; but by this it is dissolved, and converted into glue ; and it's organization, on which alone it's powers of fining depend, is totally destroyed. The application of it is sometimes necessary in the manufacture of cider ; but as it is rarely wanting in that liquor, I deferred inserting the directions for using it, 'till I came to speak of perry, which
is

is seldom made thoroughly bright, or fit for the bottle, without it. The after-management of perry is the same as that of cider; but it does not bear situations where it is exposed to much change of temperature, and it's future merit cannot so well be judged of by it's present state. In the bottle it almost always retains it's good qualities, and in that situation I would always recommend it to be put, if it remains sound and perfect at the conclusion of the first succeeding summer.

The pear though it furnishes but an unpopular liquor, except in it's greatest state of perfection, possesses many

many advantages over the apple for general culture: it will flourish in a greater variety of soil, is much more productive, and being incapable, in those varieties which are proper for perry, of being eaten or applied to any culinary purpose, it is little subject to be stolen in situations where fruits do not abound. As an ornamental tree, it possesses sufficient merit to entitle it to a place, where ornament is the principal object: its form is often picturesque; and its blossoms in the spring, and fruit in autumn, are always beautiful. Every tree, when nearly full-grown in moderately good ground, will afford an annual produce

duce (taking many years together) of more than twenty gallons of liquor, on the lowest computation, and an acre is capable of containing thirty at least of such trees; which, if of new varieties of fruit, will continue productive beyond the conclusion of a second, and perhaps of a third, century. It must be admitted that the produce of different years is extremely unequal, and that a great year of fruit introduces much excess and irregularity in the cider-countries; on which account, I have met with a few individuals disposed to deny that any advantage arose from the culture of the apple and pear: but their arguments were
all

all founded on the abuses of the liquors obtained from them, and therefore can have little weight when employed against the uses, to which they might be applied. It cannot however be denied that the grass in the orchard is injured in quality by the shade of the trees ; but it always comes very early in the spring, when it is particularly valuable to the farmer, and the loss in quantity will in few instances be found equal to one tenth of the value of the fruit. The propriety of tilling an orchard, when the trees are become large, may however be questioned ; unless it be done with a view to render them more productive. Where

a number of trees, sufficient only to afford proper shade and shelter to the cattle, dispersed over every county, great advantages would accrue to individuals at the same time that the face of the country would be greatly improved; the consumption of enormous quantities of barley would be saved; and the farmer would be able to supply his family with a wholesome and palatable beverage on much easier terms, than beer can ever be afforded; and in consequence would cultivate his ground at less expence, and employ a larger portion of it in the production of wheat * and other articles more immediately necessary to society.

* See a note at the conclusion

I cannot dismiss the subject without offering some apology for the imperfections of the foregoing treatise. The experiments, which have given existence to it, have of necessity occupied much the greater part of twenty years, though they have required very little skill, or industry, at any one time. Ten years more must elapse before the result of others I have made can be known, and I have in consequence been often able to give an opinion only, where I wished to have spoken from experience. But I have carefully separated what I knew, from what I thought, and my facts, I am certain, are correct. Those alone will,

will, I believe, afford some information to the common planter, and will, I hope, serve to stimulate the inquiries of others: at a future time it may be in my power to offer a more perfect treatise. The subject is certainly interesting to the gardener and farmer, and there are parts of it, which appear to me, not wholly undeserving the attention of the philosopher.

FINIS.

POSTSCRIPT.

AGRICULTURE is certainly much better understood at present, than it was fifty years ago; but it may reasonably be questioned, whether in a national point of view, it is much better practised. In the former period, Great Britain raised as much corn as supplied it's own consumption, and annually exported between six and seven million bushels, taking the average of seven years: and from the year 1743 to 1748 the sum of eight million seven thousand nine hundred and forty-eight pounds was received by it for corn exported. The exportation in the two following years was still greater; * but during the succeeding years this trade gradually declined, and in the eighteen years preceding 1788, the sum of four million seven hundred and seventy-six thousand pounds, or two hundred and

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* *Chalmer's Estimate.*

and sixty-five thousand three hundred and thirty-three per annum, had been paid for grain of different kinds to foreign nations. * I am not acquainted with the loss this country has since sustained; but it must have been enormously great, and rapidly increasing: yet the farmer of the present day possesses the advantages of a larger capital, and of superior skill and machinery; but these are more than counter-balanced by the extended influence of the Tithe-Laws, or more properly the modern decision of the Court of Exchequer.

The county of Hereford contains at least two hundred thousand acres of arable land, subject to Tithes: to put this in an improved and proper state of cultivation would require an annual expence in labour and manure, in addition to the present, of more than ten shillings an acre; and this sum might easily be employed to pay the farmers ten per cent for

* *Representation of the Lords of the Committee of Council &c. on the Importation and Exportation of Corn.*

for their money, and consequently to bring into the market the value of one hundred and ten thousand pounds of increased produce, and to find constant employment to five thousand labourers. But out of this sum the Tithe-man would take the tenth, or eleven thousand pounds, and the farmers would in consequence lose the whole interest of their money, with one per cent of their capitals. The improvement of stock, and of ground not in a state of tillage, would require at least as large a sum, which cannot be employed by the farmers, as long as the Tithe-Laws remain in their present most oppressive form.

The profits of tillage, when the land is not rich, are extremely small to the farmer : more than half the arable land of Herefordshire is tilled for a less produce than twelve bushels per acre ; even when the ground has lain fallow during the preceding summer. This, with the straw, may be reckoned worth about five guineas, out of which ten shillings

shillings and six-pence belong to the Tithe-man, and the remaining sum is scarcely sufficient to repay the farmer his expences: by a late decision of the Court of Exchequer, or rather by a new law made by it, the stubble is also become titheable.

The wages of the day-labourer taking the average of the kingdom are not less than fifteen pence a day: the farmer must be repaid this expence by an increase in the produce of his ground, equal to the quantity of labour he purchases; and if he forfeits the tenth of that produce, he pays three-halfpence a day to the Tithe-man for every labourer he employs; and he must either deduct that sum out of the wages of the labourer, or set a higher price on the produce of his labour. In either case the loss falls on the unhappy cottager, and ultimately on the parish. But the evil does not end here; high, or indeed proper cultivation, will rarely pay more than ten per cent, and therefore a deduction of a tenth, or
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of eleven per cent, acts as an absolute prohibition. The employment of the labourer is consequently cut off, the ground becomes less productive, and the wages of the labourer are depressed, whilst the price of provisions is raised in the market.

Some pains have been taken to confound * the Tithes with the rent paid to the landlord; and to prove that the one is not more injurious to agriculture, than the other; but the latter is a tax on the land, the former on the labour and capital employed on it. The farmer pays the same sum to the landlord, whether his field be covered with corn, or with brambles; and he is therefore strongly stimulated, and indeed compelled, to employ it in the most advantageous manner to himself, and to the public; but to the Tithe-man he pays the tenth of the produce of his labour and expences, and this in an highly manured field of wheat will
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* In a pamphlet by "a Master of Arts of the University of Cambridge."

very frequently amount to more than two hundred per cent on the annual value of the ground, and will take away the whole profits of the farmer. He must therefore contract his expences, and adopt the ruinous and prevailing system of raising little at proportionably smaller expence. The same acre which under his former system produced eighteen bushels of wheat, at the expence of six pounds, will now produce ten, at the expence of three pounds: the public here sustains a loss of eight bushels of wheat, but the farmer will often be a gainer, and will always have the satisfaction of having injured his enemy, the Tithe-man.

The farmer pays the tenth of the gross produce of his farm, which includes the rent of his land, barns and house, the cost of his implements of husbandry, and of his labouring cattle; the interest of his remaining stock and crop, and the whole of the labour and manure he purchases. Let
such

such a tax be laid on any branch of manufacture, in which this country possesses the greatest exclusive advantages, and it would be immediately ruined. If the clothier were to forfeit the tenth piece of cloth, when manufactured, without having any allowance made for the rent of his buildings, his machinery, the labour he employed, or the raw material he purchased; he would instantly be underfold in every market in Europe; and a great advance in the price of the produce of his manufactory must be paid by the Inhabitants of this country, which would be supplied with cloth, as it is now with corn, on lower terms by foreign nations: many thousands of industrious poor, who receive their maintenance from the woollen trade, must then seek subsistence in other countries, or be supported, as a great part of those which agriculture might employ, now are, by the parish.

As a tax the Tithes fall with accumulated weight on those animals, which in the possession of the farmer are most extensively
useful

useful to society. The tenth only of the produce of animals, as of the earth, belongs to the church; but by the decisions of our most equitable Court of Exchequer, the tenth fleece of the sheep, the tenth lamb, the tenth of the wool of the remaining nine, and the tenth of the herbage they afterwards consume, if sold before they are shorn again, are annually forfeited. This I suppose, forms a fair *ecclesiastical* tenth, but it appears to me rather to exceed an arithmetical one. The tenth calf of the cow, and the tenth meal of milk, are paid when the animal is fed on hay, which has already paid Tithe; and the tenth increase of the hog, which is maintained by the milk, which has virtually been twice tithed already, belongs also to the Tithe-man.

Though the farmers feel more immediately the oppression of the Tithe-Laws than any other members of society, they are least interested in obtaining a Commutation of Tithes: it is true they forfeit the tenth of their corn, and the tenth of the straw,
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which ought to afford manure for the succeeding season; and though they are compelled to cultivate their ground improperly, and at too small an expence, and consequently to bring little into the market, they are sure to sell that little at an exorbitant price. The Tithe is therefore levied on the consumer, and hence have arisen the distresses of the lower order of tradesmen, and of the peasantry, whilst the farmers have grown rich. The excessively high price of every article of provision has given a stimulus to agriculture, which has rendered corn at present, in some degree, abundant; but the same causes, which have produced one scarcity, will produce another; and if the Tithe-Laws remain in their present form, wheat will soon be sold again at double its present price. I believe it is in my power to bring evidence, that more than a thousand bushels of corn have at once ceased to be produced in a single parish, in more than one instance, in this county, and great losses in others have come under my own
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observation,

observation, during the last six years, owing to quarrels between the clergy and their parishioners on the subject of Tithes: these losses have been fully sufficient to produce a local scarcity, and I believe as great, and in many instances greater losses, have been sustained in other parts of the kingdom; for this has much less reason to complain of the clerical, and even of the lay improPRIATORS, than many others. In some counties the crops of corn are annually valued whilst in blossom, and each farmer is fined according to his skill and industry, and the number of labourers, or poor, he has employed; and the clergyman will not always condescend to treat with his parishioners individually, but lets the Tithes in the mass to the best bidder.

It may be supposed that the Tithes by acting as a heavy, and oppressive, tax on tillage, and consequently as a bounty on pasturage, would tend to lessen the price of animal, as well as to raise that of vegetable, food; but I can speak from experience

rience that a highly cultivated acre of tillage, with proper change of crops, will always bring into the market more animal food, independant of the wheat it produces, than the same acre in pasture can be made to do: it is nevertheless almost always the interest of the farmer to discharge his labourers, and to contract his expences by converting his ground to pasture, whenever he cannot enter into a fair composition with the possessor of Tithes.

However oppressive, and injurious, the Tithe-Laws are found in this country, in Ireland they are infinitely more so. Almost the whole of the farmers and peasantry there are either Roman Catholics, or Dissenters; yet all are compelled to pay Tithes to the established clergy, though they support their own by voluntary contributions. Such a tax alone, did they receive no other unnecessary provocations from the blind and bigoted obstinacy of the present administration, is fully sufficient to account for

for the associations of the united Irishmen, and defenders, and for their wish to put themselves under the protection of France.

The natural value of corn, as of every other article, is the price at which it can be brought into the market, paying the expences of rent and labour, and the interest of stock: a tax, amounting to a tenth on each of these, necessarily raises it's value ten per cent: but by rendering a proper state of cultivation impracticable, the Tithes have had the additional effect of producing a scarcity; and I am thoroughly confident that every class of society has paid during the last seven years nearly two shillings a bushel in the price of corn, and twenty per cent on every other article of provision, owing to the Tithe-Laws; and that these now occasion a heavier burthen on the lower classes of society than all the accumulated weight of taxes in the aggregate.

It must however be admitted that other causes have operated, though in a very inferior degree,

degree, to produce the present scarcity, and consequent high price of provisions. An increase of population, and of destructive luxury, has no doubt taken place; but I cannot admit that these causes would have been adequate to counter-balance the advantages which this country receives from the extended culture of potatoes, and which the farmers would have received from the use of their superior skill, capital, and machinery, had they not been prohibited using them.

The scarcity and high price of provisions, have been attributed, but I think very erroneously, to other causes; to the extension of paper-credit, to an increase in the size of farms, and to the advance in the rent to the landlord. The enormous quantity of paper in circulation may possibly tend to increase the price, but by no means to produce a scarcity of provisions; for it enables the farmer to employ a larger capital, and consequently to render his
ground

ground more productive. The circulating capital, which the agriculture of England might, and ought to employ, either in specie, or paper, probably exceeds that now in use at least six millions sterling: and I am thoroughly confident that this sum might easily be employed, and that corn to the value of three, or four millions sterling, might be annually ready for exportation, after the wants of the present number of inhabitants, Great Britain contains, had been abundantly satisfied.

Farms are no doubt in some instances much too large; but small ones, I am afraid, can never be made productive to the community. The farmer who rents but fifty pounds a year in a strong-soiled district, must keep, though he cannot properly employ, four horses, and these will nearly consume the whole produce of his farm. Six horses, with the assistance of oxen, are fully sufficient to cultivate a farm of two, or three, or even of four, hundreds a year, and the ground, I fear, (for I wish much to think

think otherwise) will always be tilled to the greatest national advantage under the latter divisions. Many people are inimical to large farms because they remember that provisions were more cheap, when small ones abounded; but the great manufacturing towns, which now drain the surrounding counties, did not then exist. Small farms would no doubt add to the comforts of the inhabitants of the neighbouring small towns, but those must give way to considerations of greater national importance: very large farms however are every way injurious.

The increase in the rents of the landlords is the effect, but never can be the cause of the high price of provisions. If the farmers had little, or no rents to pay, their corn would produce as high, and probably a higher price than it does at present; for much more would be consumed in what is now the farm house, and the farmer being able to live in ease and affluence, would too often indulge himself in indolence, and excess, and little of course
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would be brought to market; that little would certainly be sold at an exorbitant price, and a famine would be the inevitable consequence. Whoever will examine the state of ground which is let much below it's natural value, will generally find it ill cultivated, and unproductive, affording little employment for the labourer, or provision for the market.

The operation of a Corn-Rent would be diametrically opposite to that of the Tithes, and by it, the revenues of the clergy would be made as beneficial to agriculture, as they are now ruinous, and destructive: it would also tend much to reconcile (and that should be amongst the first objects of every government) the discordant interests of the grower, and of the consumer of corn, which unfortunately are for ever at variance. If every farmer, whose estate ought to produce any given number of bushels of corn, or the value of such quantity, under a fair state of cultivation, were to pay the clergyman the price of a tenth of that quantity in the market-places of the neighbouring towns,

towns, taking the average of the prices of the year, they would take care that those markets should be properly supplied, and the grower and consumer would meet without the intervention of a third person. If the farmers withheld their corn from the market to increase its price, a Corn-Rent would increase in the same proportion, and would act as a powerful check on every species of monopoly: if they did not properly cultivate their ground, and the markets were in consequence ill supplied, it would be a tax on their indolence; and if on the contrary great exertions were made by them, and corn became in consequence cheap, and abundant, it would act as a bounty on their industry.

I have seen only one publication in the defence of the Tithe-Laws, written by a gentleman who signs himself "a Master of Arts of the University of Cambridge:" he has withheld his name, and has acted prudently in doing so, for his pamphlet contains little but declamatory misrepresentation and false statement, apparently intentional.

Some of his objections to a Commutation of Tithes are so curious as to deserve attention. He objects to a Corn-Rent on the ground that, if wheat were made the standard, (as it usually is) the inhabitants of England might cease to use it, and might live on Siberian barley and potatoes, by which the clergy would sustain "essential, and irreparable injury." He dwells much on the great advantages the farmers at present possess by having so many opportunities of receiving "friendly advice, and persuasion" from the clergyman, when he comes to look after his Tithes; and objects to every species of Commutation, because it would tend to lessen the frequency of this blessed intercourse. He also thinks that nothing would so much restore harmony between the pastor and his flock, and silence the murmurs and discontents of the farmers and peasantry, as an act to compel the clergy to collect all their Tithes in kind, and consequently to render themselves as injurious, and oppressive, as possible: and he asserts that wherever this plan has been put in execution for
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any length of time, the “greatest harmony” has subsisted between the incumbent and his parishioners. He has not however condescended to mention an instance in which this “greatest harmony” ever subsisted; and I will venture to assert that he could not point out one where a clergyman had long collected the whole of his Tithes, in which the most rancorous, and inveterate degree of hatred did not exist between him, and the occupiers of land in his parish. This pamphlet is, I believe, generally attributed to the Lord Bishop of R-----; but I cannot conceive it possible, that the author of so weak, and so extremely disingenuous, a production, at present occupies so high and honourable an office in the church.

It is certainly the interest of every class of society to obtain some kind of Commutation of Tithes; but the clergy are particularly interested: land, I am confident, can not be given without great injury to the church, and to the community, though it might with great propriety be given, or at least offered, to the lay impropriators,
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and would, I believe, be very generally accepted by them. A Corn-Rent, or something similar to one, would afford a much better maintenance for the clergy, than they now possess, and would be preferred by a large majority of them. If wheat alone will not afford a proper standard, by which the permanent value of Tithes may be estimated, I cannot see the least difficulty in having a clerk appointed in every market-town to register the weekly price of the other necessaries of life, which are furnished by the farmer. A tax of half a farthing a year, on every acre of ground subject to Tithes, would more than pay the salaries of such officers, and to such a tax the landed interest would readily submit. If any difficulties occur to the reader in the execution of this plan, I would wish him to turn his attention for a moment to the nature of agistment Tithes. The possessor of these is entitled to a tenth of the produce of all ground depastured with unprofitable cattle; but the produce of every acre varies in almost every month in the year; and is greater, or less, as the season is
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more, or less, favourable: every field is also depastured partly with unprofitable stock, which pays Tithes, and with profitable stock, which is exempted; and it is impossible to ascertain with any degree of accuracy what portion is consumed by either of these. The tenth of the improved value of the unprofitable cattle cannot be taken without the greatest injustice to the farmer; for this, in some of the most improved breeds, would not unfrequently be more than equal to the value of the whole produce of the field.

The clergy are in general very moderate in their demands, and to their moderation the poor are indebted for the scanty subsistence they possess; yet the whole odium of the Tithes lies on them. The income they receive almost always bears an inverse proportion to their merits; the few who are rapacious and oppressive, and who are regardless of every thing, but their own interest, being alone well paid. The farmers, and peasantry will always consider the clergyman, who demands nearly the value of his Tithes as their personal enemy:
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they cannot see, and it would be most wonderful if they could, the equity of many of the late decisions of the Court of Exchequer: and they look on the clergyman as the cause of the injustice, and oppression, they suffer: under such circumstances he can be little instrumental in promoting the cause of religion. Let his morality, and precepts, be ever so perfect, his sincerity is suspected, his honesty is called in question, and his every action is seen through a false medium: that respect, and esteem, which alone can render the clergy in the present times of service to society, are totally annihilated, and the pastor is lost in the collector of Tithes.

Necessary as a Commutation of Tithes is to the existence of this country, I am confident that it will meet with the most strenuous opposition from the present minister, and I am afraid he will be warmly supported by the narrow short-sighted policy of a part of the Bishops. Should their opposition be successful, agriculture cannot possibly keep pace with the increasing consumption and demand of provisions: their

their price will in consequence become annually more disproportionate to that of labour, the clergy will become annually more hated, the distresses and discontents of the lower classes of society will rapidly increase, and the Tithes, with the possessors, will soon disappear together, without an act of the legislature. These evils can only be averted by a general petition of the people of England for an immediate Commutation. When one county petitions, others will immediately follow its example, for all are equally interested. I hope the county I live in, and to which I wish most particularly to address this note, as well as the foregoing treatise, will have the honour to present the first petition. In taking an active part to promote it, I cannot justly be accused of acting from any motive of private interest: the property I possess is tithe-free; and I must of course be a loser, when I no longer possess any exclusive advantages.

